

ThinkPad

User Guide

ThinkPad X220, X220i, X220 Tablet, and X220i Tablet

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

- *Safety and Warranty Guide*
- *Regulatory Notice*
- “Important safety information” on page vi
- Appendix C “Notices” on page 253

The *Safety and Warranty Guide* and the *Regulatory Notice* have been uploaded on the Web site. To refer to them, go to <http://www.lenovo.com/support>, and then click **User Guides & Manuals**.

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Read this first

Be sure to follow the important tips given here to continue 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.



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.

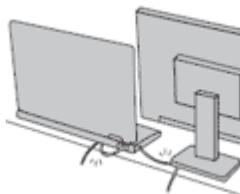
- To avoid spills and the danger of electrical shock, keep liquids away from your computer.
- Never use it to warm your body.

Prevent your computer from getting wet.



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

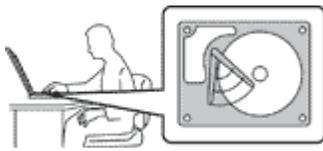
Protect the cables from being damaged.



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.

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 switch is off or is blinking:

- Turn it off.
- Press Fn+F4 to put it in sleep (standby) mode.
- Press Fn+F12 to 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 (standby) mode (Fn+F4), or in hibernation mode (Fn+F12). Do not put a computer in a carrying case while it is turned on.

Important safety information

Note: Read important safety information first.

This information can help you safely use your notebook personal computer. Follow and retain all information included with your computer. The information in this document does not alter the terms of your purchase agreement or the Lenovo® Limited Warranty. For more information, see “Warranty Information” in the *Safety and Warranty 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-sized internal 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.

For more information, see “Important safety information” in the *Safety and Warranty Guide* comes with your computer.

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

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. For more information on CRUs, refer to Chapter 6 “Replacing devices” on page 117 for this product. 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.

 **DANGER**

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 mm², 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 cord 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 or anywhere on the power adapter.

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

Extension cords and related devices

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

Plugs and outlets



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

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

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



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 Universal Serial Bus (USB) and 1394 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.

Batteries



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

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

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

Batteries can degrade when they are left unused for long periods of time. For some rechargeable batteries (particularly Lithium Ion batteries), leaving a battery unused in a discharged state could increase the risk of a battery short circuit, which could shorten the life of the battery and can also pose a safety hazard. Do not let rechargeable Lithium-Ion batteries completely discharge or store these batteries in a discharged state.

Rechargeable battery notice



Do not attempt to disassemble or modify the battery pack. Attempting to do so can cause an explosion, or liquid leakage from the battery pack. A battery pack other than the one specified by Lenovo, or a disassembled or modified battery pack is not covered by the warranty.

If the rechargeable battery pack is incorrectly replaced, there is danger of an explosion. The battery pack 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 pack away from fire.
- Do not expose it to water or rain.
- Do not attempt to disassemble it.
- Do not short-circuit it.
- Keep it away from children.
- Do not drop the battery pack.

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

The battery pack should be stored at room temperature, charged to approximately 30 to 50% of capacity. We recommend that battery pack be charged about once per year to prevent overdischarge.

Lithium coin cell battery notice



DANGER

Danger of explosion if battery is incorrectly replaced.

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

Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

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

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

California Perchlorate Information:

Products containing CR (manganese dioxide) lithium coin cell batteries may contain perchlorate.

**Perchlorate Material - special handling may apply. Go to:
<http://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).

Electrical current safety information



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.
- Disconnect the attached power cords, battery pack, and all the cables before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Do not use you computer until all internal parts enclosures are fastened into place. Never use the computer when internal parts and circuits are exposed.



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. 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. 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.

Liquid crystal display (LCD) notice

CAUTION:

The 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.

Using headphones or earphones

If your computer has both a headphone connector and an audio-out connector, always use the headphone connector for headphones (also called a headset) or earphones.

CAUTION:

Excessive sound pressure from earphones and headphones can cause hearing loss. Adjustment of

the equalizer to maximum increases the earphones and headphones output voltage and therefore the sound pressure 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



DANGER

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

Notice for Tablet PC users

Safety Notice for users in Australia:



DANGER

Do not connect phone line while using tablet mode.

Notice for users in the U.S.A.

Many PC products and accessories contain cords, cables or wires, such as power cords or cords to connect the accessory to a PC. If this product has such a cord, cable or wire, then the following warning applies:

WARNING

Handling the cord on this product or cords associated with accessories sold with this product will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. Wash hands after handling.

Save these instructions.

Chapter 1. Product Overview

This chapter provides information about the locations of connectors, locating important product information, computer features, specifications, operating environment, and preinstalled software programs.

This chapter contains the following topics:

- “Locating computer controls, connectors, features, and indicators” on page 1
- “Locating important product information” on page 24
- “Specifications” on page 31
- “Operating environment” on page 33
- “ThinkVantage Technologies and software” on page 33

Locating computer controls, connectors, and indicators

This section introduces you to the hardware features of your computer, and then gives you the basic information you'll need to start taking advantage of its functions.

- Front
- Right-side
- Left-side
- Rear
- Bottom
- Status indicators

Front view

This section introduces front view of your notebook computer.

ThinkPad X220 and X220i front view

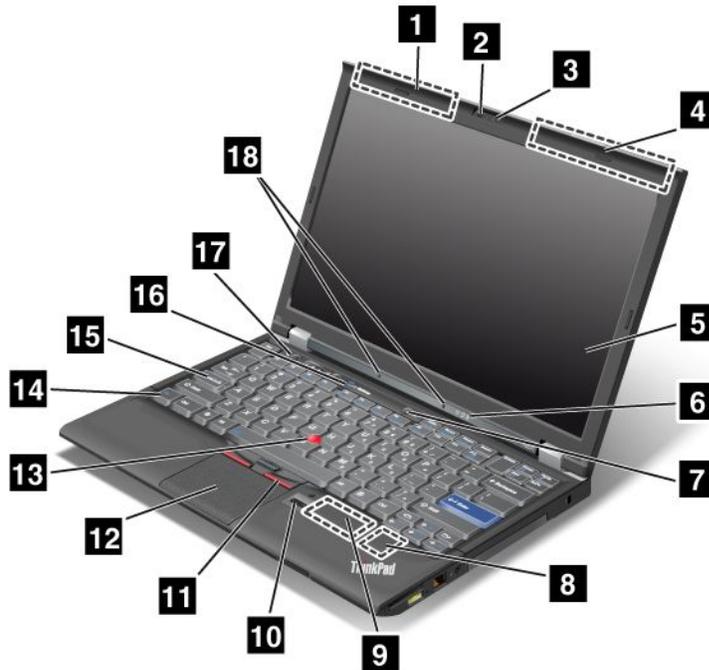


Figure 1. ThinkPad X220 and X220i front view

1 Wireless WAN (auxiliary) and Wireless LAN/WiMAX (auxiliary)

3 Integrated camera

5 Computer display

7 Power switch

9 PCI Express Mini Card slot for wireless WAN or mSATA solid state drive (SSD)

11 TrackPoint buttons

13 TrackPoint pointing stick

15 CapsLock indicator

17 Volume control buttons

2 ThinkLight

4 Wireless LAN (third), Wireless LAN/WiMAX (main), and Wireless WAN (main)

6 System and power-status indicators

8 PCI Express Mini Card slot for wireless LAN/WiMAX

10 Fingerprint reader

12 Touch pad

14 Fn key

16 ThinkVantage button

18 Built-in microphone

1 Wireless WAN (auxiliary) and Wireless LAN/WiMAX (auxiliary)

The built-in antennas for the wireless communication are located at the top left and the top right portions of your computer display.

4 Wireless LAN (third), Wireless LAN/WiMAX (main), and Wireless WAN (main)

The built-in antennas for the wireless communication are located at the top left and the top right portions of your computer display.

For the specific locations of each antenna, refer to “Location of the UltraConnect wireless antennas” on page 246.

2 ThinkLight

You can use your computer under less than perfect lighting conditions.

To illuminate the keyboard, turn on the ThinkLight by pressing Fn+PgUp. To turn it off, press Fn+PgUp again.

3 Integrated camera

Some models have the integrated camera. By using this camera, you can take pictures or hold a video conference.

For more information about how to use the camera, refer to “Using an integrated camera” on page 80.

5 Computer display

The high-resolution, thin-film transistor (TFT) display provides clear and brilliant text and graphics.

For details, refer to the instructions in “Changing display settings” on page 72.

6 System and power-status indicators

Your computer has the system status indicators and the power status indicators. For the detailed information about the location and meaning of each indicator, see “ThinkPad X220i and X220i status indicators” on page 19.

7 Power switch

Use the power switch to turn on the computer. To turn off your computer, use the Start menu shutdown options.

If you cannot turn off the computer by this method, press and hold the power switch for 2 seconds.

If your computer stops responding, and you cannot turn it off, press and hold the power switch for 4 seconds or more. If the system is still not reset, remove the ac power adapter and the battery.

The power switch can also be programmed via Power Manager to shut down the computer or put it into sleep (standby) or hibernation.

8 PCI Express Mini Card slot for wireless LAN/WiMAX

Your computer might include a PCI Express Mini Card in the PCI Express Mini Card slot which enables wireless LAN/WiMAX communications.

9 PCI Express Mini Card slot for wireless WAN or mSATA solid state drive (SSD)

Your computer might include a PCI Express Mini Card in the PCI Express Mini Card slot which enables wireless WAN communications.

With Lenovo technologies advancing to provide you with the best engineered systems, some models are equipped with an mSATA solid state drive for data storage. This cutting-edge technology enables notebook computers to be lighter, smaller and faster.

10 Fingerprint reader

Some models have the fingerprint reader. The fingerprint authentication technology enables you to use your fingerprint to start the computer and enter the ThinkPad Setup.

For details, refer to the instructions in “Using a fingerprint reader” on page 99.

11 TrackPoint buttons

12 Touch pad

13 TrackPoint pointing stick

The keyboard contains the unique TrackPoint® pointing device. Pointing, selecting, and dragging are all part of a single process that you can perform without moving your fingers from typing position.

Move your fingertip across the UltraNav touch pad to move the pointer.

The TrackPoint and TrackPoint buttons provide functions similar to those of a mouse and its buttons.

14 Fn key

Use the Fn key to take advantage of ThinkPad functions, such as turning on the ThinkLight. To use ThinkPad functions, press Fn + the required function key marked in blue.

15 CapsLock indicator

The indicator of CapsLock is located on the CapsLock key.

For more information about CapsLock indicator, see “ThinkPad X220i and X220i status indicators” on page 19.

16 ThinkVantage button

You can also use the ThinkVantage button to interrupt the startup sequence of your computer and start the Rescue and Recovery® workspace, which runs independently of the Windows® operating system and is hidden from it.

Note: If your computer is a Windows 7 model, Lenovo ThinkVantage Toolbox will be displayed.

17 Volume control buttons

The built-in volume buttons enable you to quickly adjust the volume or mute the sound from your computer.

For details, refer to the instructions in “Volume and mute buttons” on page 54.

18 Built-in microphone

The built-in microphone captures sound and voice when it is used with an application program capable of handling audio.

ThinkPad X220 Tablet and X220i Tablet front view



Figure 2. Front view

- | | |
|--|--|
| 1 Wireless WAN (auxiliary) and Wireless LAN/WiMAX (auxiliary) | 2 Integrated camera |
| 3 Built-in microphone | 4 Wireless LAN (third), Wireless WAN (main), and Wireless LAN/WiMAX (main) |
| 5 Computer display | 6 Fingerprint reader |
| 7 Power switch | 8 ThinkVantage button |
| 9 PCI Express Mini Card slot for wireless LAN/WiMAX | 10 PCI Express Mini Card slot for wireless WAN or mSATA solid state drive (SSD) |
| 11 TrackPoint pointing stick | 12 TrackPoint buttons |
| 13 Touch pad | 14 CapsLock indicator |
| 15 Fn key | 16 Volume control buttons |
| 17 System and power-status indicators | 18 Tablet Buttons |
| 19 Built-in stereo speaker | |

1 Wireless WAN (auxiliary) and Wireless LAN/WiMAX (auxiliary)

4 Wireless LAN (third), Wireless WAN (main), and Wireless LAN/WiMAX (main)

The built-in antennas for the wireless communication are located at the top left and the top right portions of your computer display.

For the specific locations of each antenna, refer to “Location of the UltraConnect wireless antennas” on page 246.

2 Integrated camera

Some models have the integrated camera. By using this camera, you can take pictures or hold a video conference.

For more information about how to use the camera, refer to “Using an integrated camera” on page 80.

3 Built-in microphone

The built-in microphone captures sound and voice when it is used with an application program capable of handling audio.

5 Computer display

The high-resolution, thin-film transistor (TFT) display provides clear and brilliant text and graphics.

For details, refer to the instructions in “Changing display settings” on page 72.

6 Fingerprint reader

Some models have the fingerprint reader. The fingerprint authentication technology enables you to use your fingerprint to start the computer and enter the ThinkPad Setup.

For details, refer to the instructions in “Using a fingerprint reader” on page 102.

7 Power switch

Use the power switch to turn on the computer. To turn off your computer, use the Start menu shutdown options.

If you cannot turn off the computer by this method, press and hold the power switch for 2 seconds.

If your computer stops responding, and you cannot turn it off, press and hold the power switch for 4 seconds or more. If the system is still not reset, remove the ac power adapter and the battery.

The power switch can also be programmed via Power Manager to shut down the computer or put it into sleep (standby) or hibernation.

8 ThinkVantage button

You can use the ThinkVantage button to interrupt the startup sequence of your computer and start the Rescue and Recovery workspace, which runs independently of the Windows operating system and is hidden from it.

Note: If your computer is a Windows 7 model, you can press ThinkVantage button to open Lenovo ThinkVantage Toolbox.

9 PCI Express Mini Card slot for wireless LAN/WiMAX

Your computer might include a PCI Express Mini Card in the PCI Express Mini Card slot which enables wireless LAN/WiMAX communications.

10 PCI Express Mini Card slot for wireless WAN or mSATA solid state drive (SSD)

Your computer might include a PCI Express Mini Card in the PCI Express Mini Card slot which enables wireless WAN communications.

With Lenovo technologies advancing to provide you with the best engineered systems, some models are equipped with an mSATA solid state drive for data storage. This cutting-edge technology enables notebook computers to be lighter, smaller and faster.

11 TrackPoint pointing stick

12 TrackPoint buttons

13 Touch pad

14 CapsLock indicator

The indicator of CapsLock is located on the CapsLock key.

For more information about CapsLock indicator, see “ThinkPad X220i and X220i Tablet status indicators” on page 22.

15 Fn key

Use the Fn key to take advantage of ThinkPad functions, such as turning on the ThinkLight. To use ThinkPad functions, press Fn + the required function key marked in blue.

16 Volume control buttons

The built-in volume buttons enable you to quickly adjust the volume or mute the sound from your computer.

For details, refer to the instructions in “Volume and mute buttons” on page 54.

17 System and power-status indicators

Your computer has the system status indicators and the power status indicators. For the detailed information about the location and meaning of each indicator, see “ThinkPad X220i and X220i Tablet status indicators” on page 22.

18 Tablet Buttons

The Tablet Buttons allow you to control your computer in tablet mode, even without the use of the keyboard and UltraNav.

19 Built-in stereo speaker

The stereo speakers are built into your computer.

For details, refer to the instructions in “Volume and mute buttons” on page 54.

Right-side view

This section provides right-side view for your computer.

ThinkPad X220 and X220i right-side view



Figure 3. Right-side view

- | | |
|----------------------------------|---|
| 1 Security keyhole | 2 Hard disk drive or solid state drive |
| 3 Combo audio jack | 4 Ethernet connector |
| 5 Always On USB connector | 6 Media card reader slot |

1 Security keyhole

Your computer comes with a security keyhole. You can purchase a security cable and lock to fit this keyhole.

2 Hard disk drive or solid state drive

Your computer may have a large-capacity, customer-upgradable hard disk drive that can meet a variety of storage demands. To keep the drive safe, Active Protection System™ is installed on your computer. For details, refer to “Access Connections” on page 36

If you wish, you can purchase another hard disk drive and install it in the Serial Ultrabay™ Slim in the ThinkPad X220 UltraBase™.

With Lenovo technologies advancing to provide you with the best engineered systems, some models are equipped with a solid state drive (SSD) for data storage. This cutting-edge technology enables notebook computers to be lighter, smaller and faster.

Note: The hidden service partition is the reason why there is less free space than expected on your hard disk drive or SSD. This reduction is more noticeable on the SSD because of its smaller capacity.

3 Combo audio jack

To listen to the sound from your computer, connect a headphone or a headset, that has a 3.5mm 4-pole plug, to the combo audio jack.

Notes:

- If you are using a headset with a function switch, for example, a headset for an iPhone® mobile digital device, do not press this switch while using the headset. If you press it, the headset microphone will be disabled, and the internal microphone will be enabled instead.
- The combo audio jack does not support a conventional microphone. For more information about the audio devices supported by the combo audio jack of your compute, see “Using audio features” on page 79.

4 Ethernet connector

Connect your computer to a LAN with the Ethernet connector.



To avoid the risk of electrical shock, do not connect the telephone cable to the Ethernet connector. You can only connect an Ethernet cable to this connector.

Two indicators, to the upper right and left of the connector, show the status of the network connection. When your computer connects to a LAN and a session with the network is available, the upper right indicator is solid green. While data is being transmitted, the upper left indicator blinks yellow.

For details, refer to the instructions in “Access Connections” on page 36.

Note: If you attach your computer to the ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, or ThinkPad Mini Dock Plus Series 3 and use an Ethernet connector, use the Ethernet connector on the ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, or ThinkPad Mini Dock Plus Series 3, not the one on the computer.

5 Always On USB connector

The Universal Serial Bus connectors are used for connecting devices compatible with a USB interface, such as a printer or a digital camera.

By default, even if your computer is in sleep (standby) mode, the Always On USB connector still enables you to charge some devices, such as iPod®, iPhone, and BlackBerry® smartphones, by attaching the devices to the connector.

However, with the ac power adapter attached, if you want to charge these devices when your computer is in hibernation mode or powered off, you will need to open the Power Manager program and configure corresponding settings to enable the Always On USB connector function. For details about how to enable the Always On USB connector function, refer to the on-line help of the Power Manager program.

Note: Your computer is compatible with USB 1.1 and 2.0.

6 Media card reader slot

Depending on the model, your computer may have a media card reader slot. The media card reader supports the following cards:

- SD card
- SDHC card
- SDXC card
- MultiMediaCard

Note: Your computer does not support the CPRM feature for SD card.

For details, refer to the instructions in “Using an ExpressCard, a smart card, or a flash media card” on page 81.

ThinkPad X220 Tablet and X220i Tablet right-side view



Figure 4. Right-side view

- | | |
|---|----------------------------------|
| 1 Security keyhole | 2 Tablet Digitizer Pen |
| 3 Hard disk drive or solid state drive | 4 Combo audio jack |
| 5 Ethernet connector | 6 Always On USB connector |
| 7 Media card reader slot | |

1 Security keyhole

Your computer comes with a security keyhole. You can purchase a security cable and lock to fit this keyhole.

2 Tablet Digitizer Pen

The Tablet Digitizer Pen is used to control your computer in “Tablet mode” on page 43 as you would a mouse and a keyboard.

3 Hard disk drive or solid state drive

Your computer may have a large-capacity, customer-upgradable hard disk drive that can meet a variety of storage demands. To keep the drive safe, Active Protection System™ is installed on your computer. For details, refer to “Access Connections” on page 36.

If you wish, you can purchase another hard disk drive and install it in the Serial Ultrabay Slim in the ThinkPad X220 UltraBase.

With Lenovo technologies advancing to provide you with the best engineered systems, some models are equipped with a solid state drive (SSD) for data storage. This cutting-edge technology enables notebook computers to be lighter, smaller and faster.

Note: The hidden service partition is the reason why there is less free space than expected on your hard disk drive or SSD. This reduction is more noticeable on the SSD because of its smaller capacity.

4 Combo audio jack

To listen to the sound from your computer, connect a headphone or a headset, that has a 3.5mm 4-pole plug, to the combo audio jack.

Notes:

- If you are using a headset with a function switch, for example, a headset for an iPhone mobile digital device, do not press this switch while using the headset. If you press it, the headset microphone will be disabled, and the internal microphone will be enabled instead.
- The combo audio jack does not support a conventional microphone. For more information about the audio devices supported by the combo audio jack of your computer, see “Using audio features” on page 79.

5 Ethernet connector

Connect your computer to a LAN with the Ethernet connector.



To avoid the risk of electrical shock, do not connect the telephone cable to the Ethernet connector. You can only connect an Ethernet cable to this connector.

Two indicators, to the upper right and left of the connector, show the status of the network connection. When your computer connects to a LAN and a session with the network is available, the upper right indicator is solid green. While data is being transmitted, the upper left indicator blinks yellow.

For details, refer to the instructions in “Access Connections” on page 36.

Note: If you attach your computer to the ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, or ThinkPad Mini Dock Plus Series 3 and use an Ethernet connector, use the Ethernet connector on the ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, or ThinkPad Mini Dock Plus Series 3, not the one on the computer.

6 Always On USB connector

The Universal Serial Bus connectors are used for connecting devices compatible with a USB interface, such as a printer or a digital camera.

By default, even if your computer is in sleep (standby) mode, the Always On USB connector still enables you to charge some devices, such as iPod, iPhone, and BlackBerry smartphones, by attaching the devices to the connector.

However, with the ac power adapter attached, if you want to charge these devices when your computer is in hibernation mode or powered off, you will need to open the Power Manager program and configure corresponding settings to enable the Always On USB connector function. For details about how to enable the Always On USB connector function, refer to the on-line help of the Power Manager program.

Note: Your computer is compatible with USB 1.1 and 2.0.

7 Media card reader slot

Depending on the model, your computer may have a media card reader slot. The media card reader supports the following cards:

- SD card
- SDHC card
- SDXC card

- MultiMediaCard

Note: Your computer does not support the CPRM feature for SD card.

For details, refer to the instructions in “Using an ExpressCard, a smart card, or a flash media card” on page 81.

Left-side view

This section provides left-side view for your computer.

ThinkPad X220 and X220i left-side view



Figure 5. Left-side view

- | | |
|-------------------------------|--------------------------------|
| 1 ExpressCard slot | 2 Wireless radio switch |
| 3 USB connector (left) | 4 DisplayPort connector |
| 5 Monitor connector | 6 USB connector |
| 7 Fan louvers (left) | |

1 ExpressCard slot

Your computer has an ExpressCard slot for a 54 mm-wide card.

For details, refer to the instructions in “Using an ExpressCard, a smart card, or a flash media Card” on page 81.

2 Wireless radio switch

You can quickly turn the wireless features of your computer on and off using this switch.

3 USB connector (left)

The Universal Serial Bus connector is used for connecting devices compatible with a USB interface, such as a printer or a digital camera.

Note: Your computer is compatible with USB 1.1 and 2.0.

When you attach a USB cable to the connector, make sure that the mark is to the upper side. Otherwise the connector might be damaged.

4 DisplayPort connector

Your computer supports the DisplayPort, a next-generation digital display interface that connects a compatible projector, external monitor, or HDTV to your computer.

5 Monitor connector

You can attach an external monitor or a projector to your computer to display computer information.

Note: If you attach your computer to the ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, or ThinkPad Mini Dock Plus Series 3 and use a monitor connector, use the monitor connector on the ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, or ThinkPad Mini Dock Plus Series 3,, not the one on the computer.

For details, refer to the instructions in “Attaching an external monitor” on page 73.

6 USB connector

The Universal Serial Bus connectors are used for connecting devices compatible with a USB interface, such as a printer or a digital camera.

Notes:

- Your computer may look slightly different from the illustrations.
- Your computer is compatible with USB 1.1 and 2.0. Some models are also compatible with USB 3.0.
- If your computer is a USB 3.0 model, any function specific to USB 3.0 will not work until your Windows operating system has been started. However, USB 2.0 or 1.0 devices will work.

7 Fan louvers (left)

The internal fan and louvers enable air to circulate in the computer and cool the central processor.

Note: To avoid impeding airflow, do not place any obstacle in front of the fan.

ThinkPad X220 Tablet and X220i Tablet left-side view



Figure 6. Left-side view

- | | |
|--------------------------------|--------------------------------|
| 1 ExpressCard slot | 2 Wireless radio switch |
| 3 USB connectors (left) | 4 DisplayPort connector |
| 5 Monitor connector | 6 USB connector |
| 7 Fan louvers (left) | |

1 ExpressCard slot

Your computer has an ExpressCard slot for a 54 mm-wide card.

For details, refer to the instructions in “Using an ExpressCard, a smart card, or a flash media Card” on page 81.

2 Wireless radio switch

You can quickly turn the wireless features of your computer on and off using this switch.

3 USB connectors (left)

The Universal Serial Bus connectors are used for connecting devices compatible with a USB interface, such as a printer or a digital camera.

Note: Your computer is compatible with USB 1.1 and 2.0.

When you attach a USB cable to the connector, make sure that the mark is to the upper side. Otherwise the connector might be damaged.

4 DisplayPort connector

Your computer supports the DisplayPort, a next-generation digital display interface that connects a compatible projector, external monitor, or HDTV to your computer.

5 Monitor connector

You can attach an external monitor or a projector to your computer to display computer information.

Note: If you attach your computer to the ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, or ThinkPad Mini Dock Plus Series 3 and use a monitor connector, use the monitor connector on the ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, or ThinkPad Mini Dock Plus Series 3, not the one on the computer.

For details, refer to the instructions in “Attaching an external monitor” on page 73.

6 USB connector

The Universal Serial Bus connectors are used for connecting devices compatible with a USB interface, such as a printer or a digital camera.

Notes:

- Your computer may look slightly different from the illustrations.
- Your computer is compatible with USB 1.1 and 2.0. Some models are also compatible with USB 3.0.
- If your computer is a USB 3.0 model, any function specific to USB 3.0 will not work until your Windows operating system has been started. However, USB 2.0 or 1.0 devices will work.

7 Fan louvers (left)

The internal fan and louvers enable air to circulate in the computer and cool the central processor.

Note: To avoid impeding airflow, do not place any obstacle in front of the fan.

Bottom view

This section provides bottom view for your computer.

ThinkPad X220 and X220i bottom view

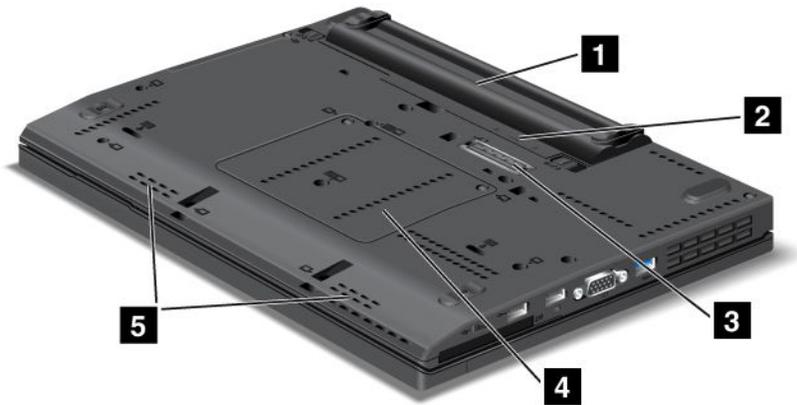


Figure 7. Bottom view

1 Battery

2 SIM card slot

3 Docking connector

4 Memory-upgrade slot

5 Built-in stereo speaker

1 Battery

Use your computer with battery power whenever ac power is unavailable.

By installing a second battery, available as an option, in the serial Ultrabay slim, you can extend the operating time of the computer. You can also use Power Manager to adjust your power setting as needed.

For details, refer to the instructions in “Power Manager” on page 38.

2 SIM card slot

If your computer has a wireless WAN feature, it may require a SIM (Subscriber Identification Module) card to establish a wireless WAN (Wide Area Network) connections. Depending on the country of delivery, the SIM card may be already installed in the SIM card slot.

3 Docking connector

With a ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, ThinkPad Mini Dock Plus Series 3, or ThinkPad X220 Ultrabase, you can extend the computer capabilities when you are in your office or home.

4 Memory-upgrade slot

You can increase the amount of memory in your computer by installing a memory module in the memory bay. Memory modules are available as options.

5 Built-in stereo speaker

The stereo speakers are built into your computer.

For details, refer to the instructions in “Volume and mute buttons” on page 54.

ThinkPad X220 Tablet and X220i Tablet bottom view

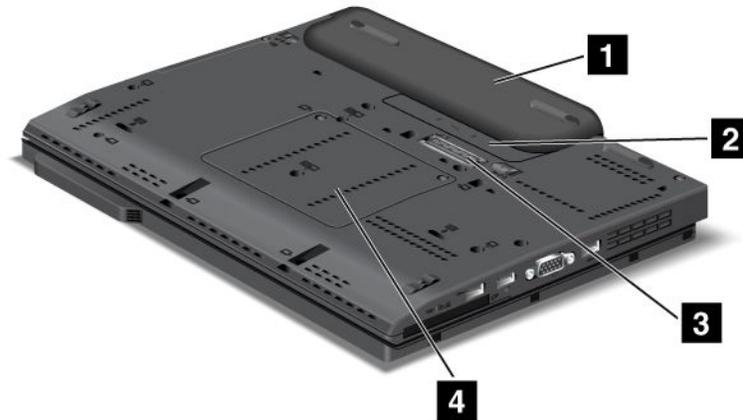


Figure 8. Bottom view

1 Battery

3 Docking connector

2 SIM card slot

4 Memory-upgrade slot

1 Battery

Use your computer with battery power whenever ac power is unavailable.

For details, refer to the instructions in “Power Manager” on page 38.

2 SIM card slot

If your computer has a wireless WAN feature, it may require a SIM (Subscriber Identification Module) card to establish a wireless WAN (Wide Area Network) connections. Depending on the country of delivery, the SIM card may be already installed in the SIM card slot.

3 Docking connector

With a ThinkPad X220 Ultrabase, you can extend the computer capabilities when you are in your office or home.

4 Memory-upgrade slot

You can increase the amount of memory in your computer by installing a memory module in the memory bay. Memory modules are available as options.

Rear view

This section introduces rear view of your computer.

ThinkPad X220 and X220i rear view



Figure 9. Rear view

1 Power jack

2 Fan louvers (rear)

1 Power jack

The ac power adapter cable connects to the computer power jack to provide power to the computer and charge the battery.

2 Fan louvers (rear)

The internal fan and louvers enable air to circulate in the computer and cool the central processor.

Note: To avoid impeding airflow, do not place any obstacle in front of the fan.

ThinkPad X220 Tablet and X220i Tablet rear view



Figure 10. Rear view

1 Power jack

2 Fan louvers (rear)

1 Power jack

The ac power adapter cable connects to the computer power jack to provide power to the computer and charge the battery.

2 Fan louvers (rear)

The internal fan and louvers enable air to circulate in the computer and cool the central processor.

Note: To avoid impeding airflow, do not place any obstacle in front of the fan.

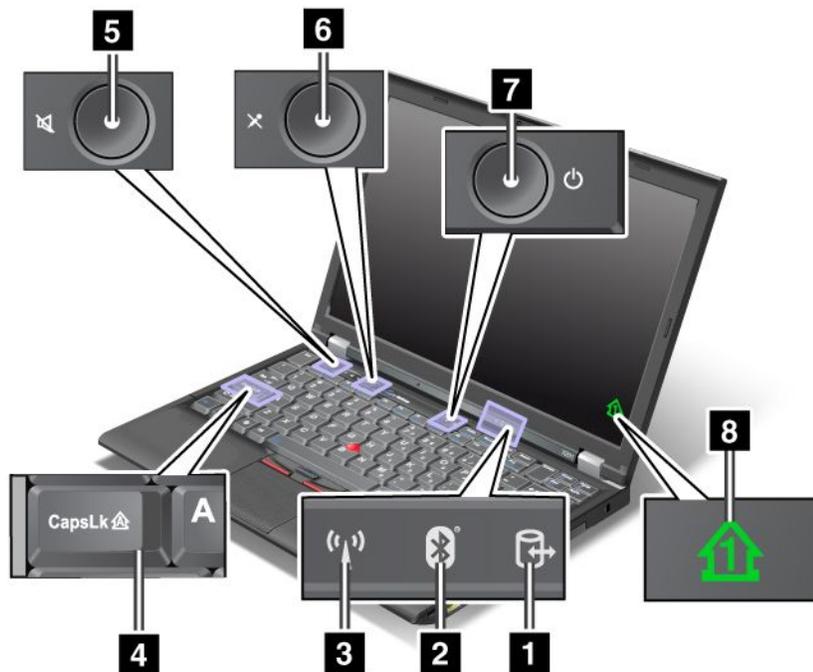
Status indicators

Your computer has system-status indicators and power-status indicators. The status indicators show the current status of your computer.

ThinkPad X220i and X220i status indicators

Your computer has system-status indicators and power-status indicators. The status indicators show the current status of your computer.

Status indicators



1 Device Access

A hard disk drive or an optional drive, such as a drive in the Ultrabay, is being used to read or write data. **When this indicator is blinking, do not put the computer into sleep (standby) mode, remove the device from the bay, or turn off the computer.**

2 Bluetooth status

- **Green:** The feature is on, and the radio link is ready for use, or the data is being transmitted.
- **Off:** The *Bluetooth* feature is disabled.

3 Wireless LAN/Wireless WAN/WiMAX status

- **Green:** The wireless LAN feature (the 802.11b/g Standard, 802.11a/b/g or 802.11n draft 2.0), wireless WAN feature or WiMAX feature is on, and the radio link is ready for use, or the data is being transmitted.
- **Off:** Wireless network devices are disabled or the radio is turned off.

4 Caps Lock

Caps Lock mode is enabled. You can enter all alphabetic characters (A-Z) in upper case without pressing the Shift key.

6 Speaker mute button and 5 Microphone mute button

If you mute the sound and then turn off your computer, the sound will remain muted when you turn on your computer again. To turn on the sound, press the plus (+) or minus (-) button.

7 Power On

The power switch stays lit whenever the computer is on, blinks when the computer is in sleep (standby) mode, and is off when the computer is off.

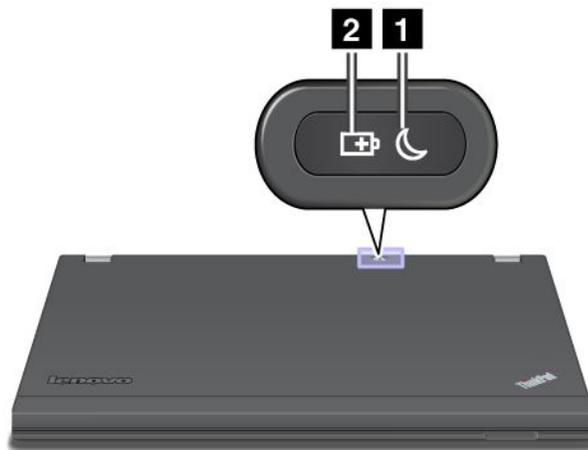
8 Numeric lock

By default, when the numeric lock is on, the numeric lock indicator is displayed on the screen. To change the settings of the numeric lock indicator, see “Changing display settings” on page 72.

Note: Another mode available for your computer, though there is no indicator for it, is Scroll Lock mode. When this mode is enabled, the arrow keys can be used as function keys for screen-scrolling, but not for moving the cursor. To enable or disable this mode, press Scrlk. Not all application programs support this function.

Power-status indicators

The computer has status indicators that show the mode (sleep/standby, hibernation, or normal), ac power status, the status of the battery, and the status of the color sensor (on some models). The following shows the location and the meaning of the indicators:



1 Sleep (standby in Windows XP) status

- **Green:** The computer is in sleep (standby) mode.
- **Blinking green:** The computer is entering sleep (standby) or hibernation mode, or is resuming normal operation.

2 Battery status

- **Green:** The battery charge level is 20% or higher
- **Orange:** The battery charge level is between 5% and 20%.
- **Fast blinking orange:** The battery charge level is lower than 5%.
- **Slow blinking orange:** The battery is being charged. When it reaches 20%, the blinking color changes to green.
- **Slow blinking green:** The battery has between 20% and 80% charge, and charging is continuing. When the battery reaches 80% charge, the battery status indicator stops blinking, but the charging may continue until the battery is 100% charged.

Note: If the computer is operating on battery power, the battery status indicator does not work while the computer is turned off or is in sleep (standby) mode or hibernation mode.

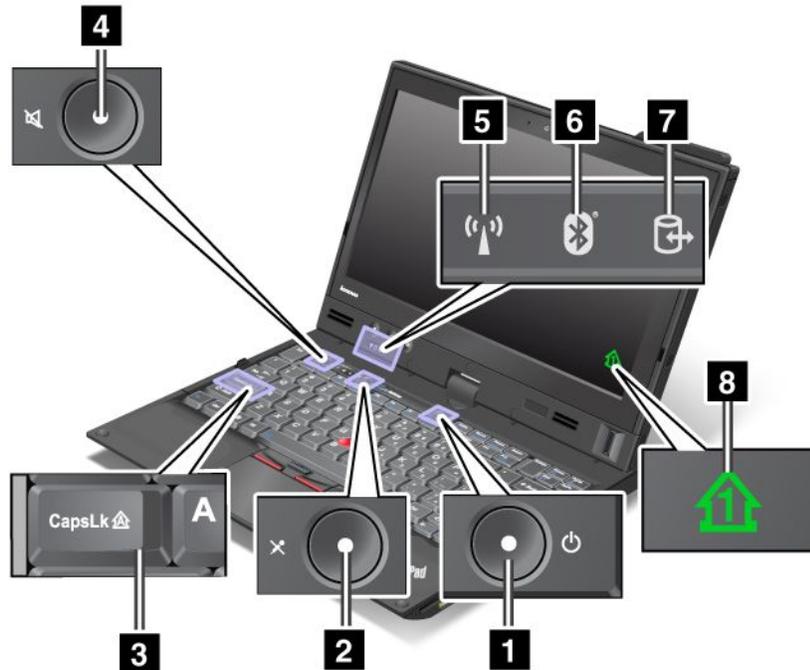
- **Quick blinking orange:** An error occurred in the battery.
- **The battery status indicator blinks three times:** The ac power adapter is attached to the computer.

- **The battery status indicator is off:** The battery is fully charged or the battery is detached.

ThinkPad X220i and X220i Tablet status indicators

Your computer has system-status indicators and power-status indicators. The status indicators show the current status of your computer.

Status indicators



1 Power On

The power switch stays lit whenever the computer is on, blinks when the computer is in sleep (standby) mode, and is off when the computer is off.

2 Speaker mute button and 4 Microphone mute button

If you mute the sound and then turn off your computer, the sound will remain muted when you turn on your computer again. To turn on the sound, press the plus (+) or minus (-) button.

3 Caps Lock

Caps Lock mode is enabled. You can enter all alphabetic characters (A-Z) in upper case without pressing the Shift key.

5 Wireless LAN/Wireless WAN/WiMAX status

- **Green:** The wireless LAN feature (the 802.11b/g Standard, 802.11a/b/g or 802.11n draft 2.0), wireless WAN feature or WiMAX feature is on, and the radio link is ready for use, or the data is being transmitted.
- **Off:** Wireless network devices are disabled or the radio is turned off.

6 Bluetooth status

- **Green:** The feature is on, and the radio link is ready for use, or the data is being transmitted.
- **Off:** The *Bluetooth* feature is disabled.

7 Device Access

A hard disk drive or an optional drive, such as a drive in the Ultrabay, is being used to read or write data. **When this indicator is blinking, do not put the computer into sleep (standby) mode, remove the device from the bay, or turn off the computer.**

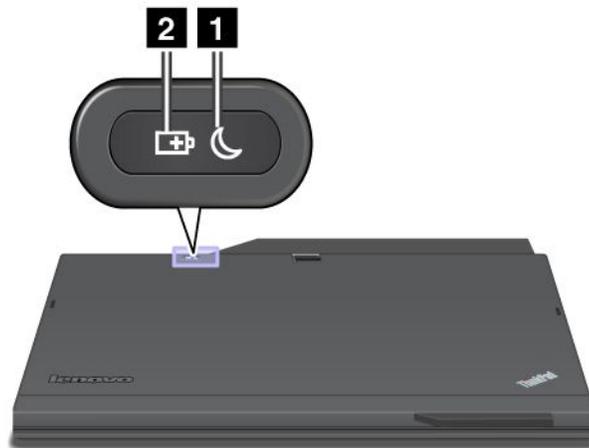
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By default, when the numeric lock is on, the numeric lock indicator is displayed on the screen. To change the settings of the numeric lock indicator, see “Changing display settings” on page 72.

Note: Another mode available for your computer, though there is no indicator for it, is Scroll Lock mode. When this mode is enabled, the arrow keys can be used as function keys for screen-scrolling, but not for moving the cursor. To enable or disable this mode, press ScrLk. Not all application programs support this function.

Power-status indicators

The computer has status indicators that show the mode (sleep/standby, hibernation, or normal), ac power status, the status of the battery, and the status of the color sensor (on some models). The following shows the location and the meaning of the indicators:



1 Sleep (standby in Windows XP) status

- **Green:** The computer is in sleep (standby) mode.
- **Blinking green:** The computer is entering sleep (standby) or hibernation mode, or is resuming normal operation.

2 Battery status

- **Green:** The battery charge level is 20% or higher
- **Orange:** The battery charge level is between 5% and 20%.
- **Fast blinking orange:** The battery charge level is lower than 5%.
- **Slow blinking orange:** The battery is being charged. When it reaches 20%, the blinking color changes to green.
- **Slow blinking green:** The battery has between 20% and 80% charge, and charging is continuing. When the battery reaches 80% charge, the battery status indicator stops blinking, but the charging may continue until the battery is 100% charged.

Note: If the computer is operating on battery power, the battery status indicator does not work while the computer is turned off or is in sleep (standby) mode or hibernation mode.

- **Quick blinking orange:** An error occurred in the battery.
- **The battery status indicator blinks three times:** The ac power adapter is attached to the computer.
- **The battery status indicator is off:** The battery is fully charged or the battery is detached.

Locating important product information

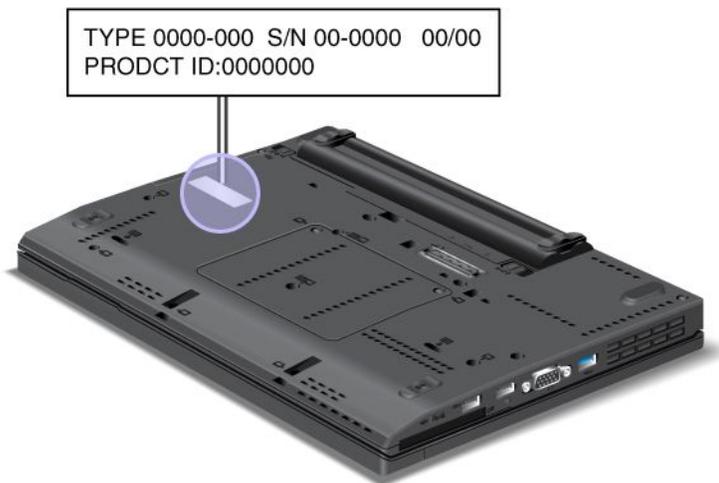
This section provides information to help you locate your machine type and model label, FCC ID and IC Certification label, and Windows Certificate of Authenticity.

Machine type and model label

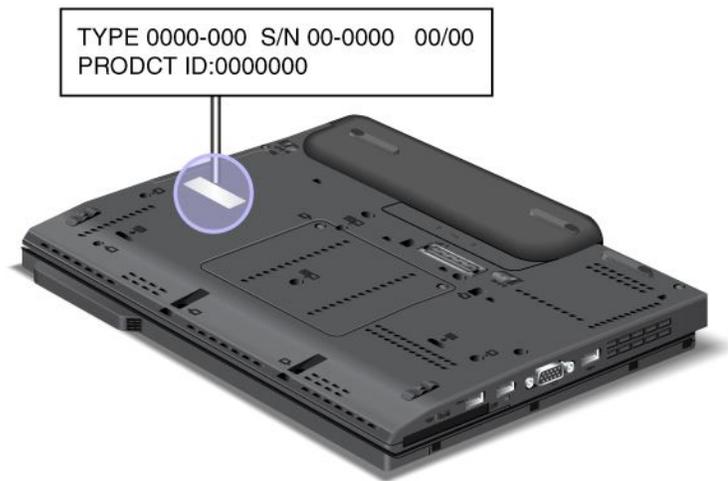
The machine type and model label identifies your computer. If you contact Lenovo for help, the machine type and model number will help support technicians to identify your computer and provide the highest level of service.

You can find the machine type and model of your computer in the label as shown below:

ThinkPad X220 and X220i



ThinkPad X220 Tablet and X220i Tablet



FCC ID and IC Certification number label

This section provides FCC ID and IC Certification number label location for your computer.

ThinkPad X220 and X220i FCC ID and IC Certification number label

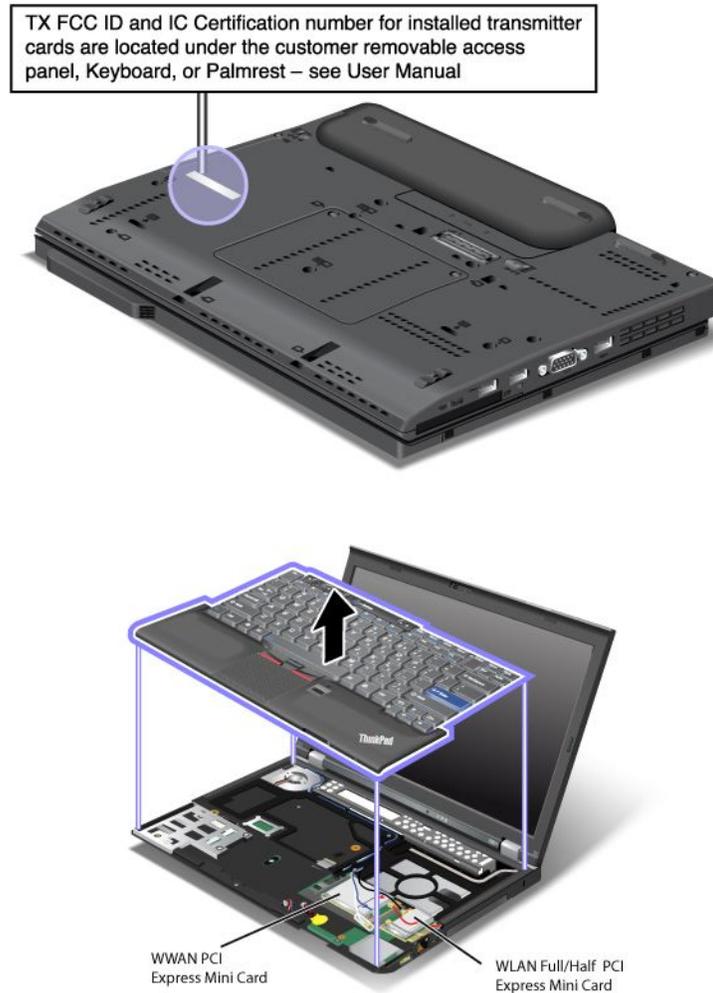
There is no FCC ID or IC Certification number for the PCI Express Mini Card shown on the enclosure of your computer. The FCC ID and IC Certification number label is affixed on the card installed in the PCI Express Mini Card slot of your computer.



If no integrated wireless PCI Express Mini Card has been preinstalled in your computer, you can install one. To do this, follow the procedure in “Installing and replacing the PCI Express Mini Card for wireless LAN/WiMAX connection” on page 133 or “Installing and replacing the PCI Express Mini Card for wireless WAN connection” on page 139.

ThinkPad X220 Tablet and X220i Tablet FCC ID and IC Certification number label

There is no FCC ID or IC Certification number for the PCI Express Mini Card shown on the enclosure of your computer. The FCC ID and IC Certification number label is affixed on the card installed in the PCI Express Mini Card slot of your computer.



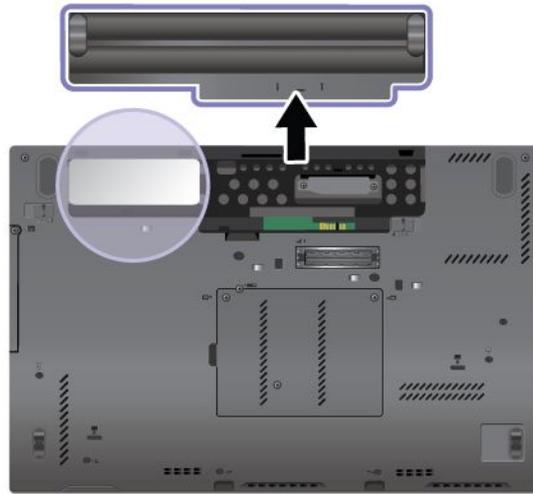
If no integrated wireless PCI Express Mini Card has been preinstalled in your computer, you can install one. To do this, follow the procedure in “Installing and replacing the PCI Express Mini Card for wireless LAN/WiMAX connection” on page 133 or “Installing and replacing the PCI Express Mini Card for wireless WAN connection” on page 139.

Certificate of Authenticity label

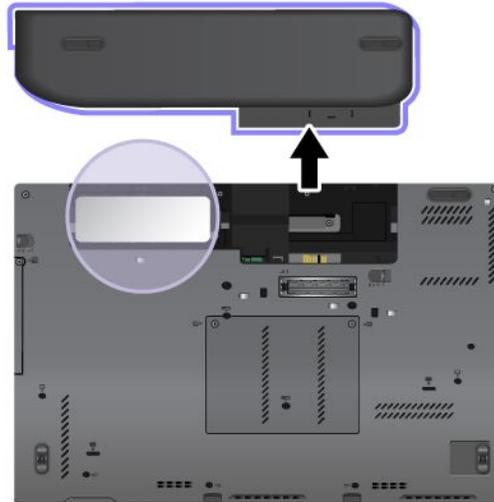
The Microsoft Certificate of Authenticity label for the preinstalled operating system is attached. Printed on this label are the product ID and the product key information for your computer. Record this information and keep it in a safe place. You might need these numbers to start your computer or reinstall the operating system.

The Windows Certificate of Authenticity of your computer is shown as below:

ThinkPad X220 and X220i



ThinkPad X220 Tablet and X220i Tablet



Features

This section provides features for your notebook computer.

ThinkPad X220 and X220i features

Processor

- See the system properties of your computer. You can do this as follows: Click **Start**, right-click **Computer** (in Windows XP, **My Computer**); then from the pull down menu select **Properties**.

Memory

- Double data rate 3 (DDR3) synchronous dynamic random access memory

Storage device

- 2.5-inch (76 mm) solid state drive or 2.5-inch (64 mm) hard disk drive
- mSATA solid state drive (on some models)

Display

The color display uses TFT technology:

- Size: 12.5 inch (317.5 mm)
- Resolution:
 - LCD: 1366-by-768
 - External monitor: Up to 2560-by-1600
- LED backlight
- Brightness control
- ThinkLight

Keyboard

- 89-key, 90-key, or 94-key
- UltraNav (TrackPoint and multi-touch touch pad)
- Fn key function
- ThinkVantage button
- Volume control buttons
- Speaker mute button
- Microphone mute button

Interface

- External monitor connectors
- Combo audio jack (stereo headphone or headset)
- 3 Universal Serial Bus (USB) connectors
- RJ45 Ethernet connector
- ExpressCard slot
- 4-in-1 digital media card reader
- Docking connector

- DisplayPort connector

Optical drive in ThinkPad X220 UltraBase

- DVD drive
- DVD Multi-Burner drive

Wireless features

- Integrated wireless LAN (on some models)
- Integrated *Bluetooth* (on some models)
- Integrated wireless WAN (on some models)
- Integrated WiMAX (on some models)

Security features

- Fingerprint reader (on some models)

ThinkPad X220 Tablet and X220i Tablet features

Processor

- See the system properties of your computer. You can do this as follows: Click **Start**, right-click **Computer** (in Windows XP, **My Computer**); then from the pull down menu select **Properties**.

Memory

- Double data rate 3 (DDR3) synchronous dynamic random access memory

Storage device

- 2.5-inch (76 mm) solid state drive or 2.5-inch (64 mm) hard disk drive
- mSATA solid state drive (on some models)

Display

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- Size: 12.5 inch (317.5 mm)
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Keyboard

- 89-key, 90-key, or 94-key
- UltraNav (TrackPoint and multi-touch touch pad)
- Fn key function
- ThinkVantage button
- Volume control buttons
- Speaker mute button
- Microphone mute button

Interface

- External monitor connectors
- Combo audio jack (stereo headphone or headset)
- 3 Universal Serial Bus (USB) connectors
- RJ45 Ethernet connector
- ExpressCard slot
- 4-in-1 digital media card reader
- Docking connector
- DisplayPort connector

Optical drive in ThinkPad X220 UltraBase

- DVD drive
- DVD Multi-Burner drive

Wireless features

- Integrated wireless LAN (on some models)
- Integrated *Bluetooth* (on some models)
- Integrated wireless WAN (on some models)
- Integrated WiMAX (on some models)

Security features

- Fingerprint reader (on some models)

Tablet features

- Tablet Digitizer Pen
- Touch panel (on select models)

Specifications

This section provides specifications for your computer.

ThinkPad X220 and X220i specifications

Size

- Width: 305.0 mm (12 inch)
- Depth: 206.5 mm (8.13 inch)
- Height: 19 to 26.6 mm (0.75 inch to 1.05 inch)

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)
 - Non-operating: 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 pack, its temperature must be at least 10 ° C (50 ° F).

- Relative humidity:
 - Operating: 8% to 80%
 - Non-operating: 5% to 95%

Heat output

- 65 W (222 Btu/hr) maximum or 90 W (307 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

Battery pack

- Lithium-ion (Li-Ion) battery pack

Battery life

- For percentage of remaining battery power, see the Power Manager Battery Gauge in the task bar.
- The Power Manager also displays a green, yellow and red indication. A battery under warranty with a red indication is eligible for a warranty replacement.

ThinkPad X220 Tabet and X220i Tablet specifications

Size

- Width: 305.0 mm (12 inch)
- Depth: 228.7 mm (9 inch)
- Height: 27 to 31.3 mm (1.06 inch to 1.23 inch)

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)
 - Non-operating: 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 pack, its temperature must be at least 10 ° C (50 ° F).

- Relative humidity:
 - Operating: 8% to 80%
 - Non-operating: 5% to 95%

Heat output

- 65 W (222 Btu/hr) maximum, or 90 W (307 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

Battery pack

- Lithium-ion (Li-Ion) battery pack

Battery life

- For percentage of remaining battery power, see the Power Manager Battery Gauge in the task bar.
- The Power Manager also displays a green, yellow and red indication. A battery under warranty with a red indication is eligible for a warranty replacement.

Operating environment

This section provides information about your computer 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) Non-operating: 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 pack, its temperature must be at least 10°C (50°F).

- Relative humidity:
 - Operating: 8% to 80%
 - Non-operating: 5% to 95%

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

Keep electrical appliances such as an electric fan, radio, high-powered speakers, air conditioner, and microwave oven away from your computer because the strong magnetic fields generated by these appliances can damage the monitor and data on the hard disk drive or solid state drive.

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.

ThinkVantage Technologies and software

Lenovo preinstalls on your PC useful and helpful software applications to help you get started, to stay productive while on the move and to keep you and your computer working. Lenovo offers enhanced security, wireless computing, data-migration and other solutions for your computer.

Following sections provide information about ThinkVantage technologies and other computing solutions, offered by Lenovo.

- “Accessing applications in Windows 7” on page 34
- “Access Connections” on page 36
- “Active Protection System” on page 36
- “Client Security Solution” on page 36
- “Fingerprint Software” on page 36
- “Lenovo ThinkVantage Tools” on page 37
- “Lenovo ThinkVantage Toolbox” on page 37
- “Message Center Plus” on page 37
- “Password Manager” on page 37
- “Power Manager” on page 38
- “Presentation Director” on page 38
- “Product Recovery” on page 38
- “Rescue and Recovery” on page 38
- “System Update” on page 38
- “ThinkVantage GPS” on page 39
- “Lenovo SimpleTap ” on page 39
- “Lenovo ThinkVantage Tablet Shortcut Menu” on page 39

Note: To learn more about ThinkVantage technologies and other computing solutions, offered by Lenovo, go to:

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

Accessing applications in Windows 7

If you are using the Windows 7 operating system, you can access applications by following one of the methods below:

- You can get the applications from the Lenovo ThinkVantage Tools.
Click **Start → All Programs → Lenovo ThinkVantage Tools**. Then depending on the application you want to access, double-click the corresponding icon.

Note: If an application icon in the Lenovo ThinkVantage Tools application navigation window is dimmed, it indicates that you need to install the application manually. To install the application manually, double-click the application icon. Then, follow the instructions on the screen. When the installation process completes, the application icon will be activated.

Table 1. Applications on Lenovo ThinkVantage Tools

Application	Icon name
Access Connections	Internet Connection
Active Protection System	Airbag Protection
Fingerprint Software	Fingerprint Reader
Lenovo ThinkVantage Toolbox	System Health and Diagnostics
Mobile Broadband Activate	3G Mobile Broadband
Password Manager	Password Vault

Table 1. Applications on Lenovo ThinkVantage Tools (continued)

Power Manager	Power Controls
Recovery Media	Factory Recovery Disks
Rescue and Recovery	Enhanced Backup and Restore
System Update	Update and Drivers
ThinkVantage GPS	GPS
Lenovo SimpleTap	Simple Tap
Lenovo ThinkVantage Tablet Shortcut Menu	Tablet Utility

- You can also get the applications from the Control Panel.

Click **Start** → **Control Panel**. Depending on the application you want to access, click the corresponding section and then click the corresponding green text.

Note: If you do not find the application you need in Control Panel, open the Lenovo ThinkVantage Tools application navigation window and double-click the dimmed icon to install the application you need. Then, follow the instructions on the screen. When the installation process completes, the application icon will be activated, and you can find the application in Control Panel.

The sections in Control Panel, the green texts, and the applications are listed in the following table.

Table 2. Applications in Control Panel

Application	Control Panel section	Green text in Control Panel
Access Connections	Network and Internet	Lenovo - Internet Connection
Active Protection System	System and Security Hardware and Sound	Lenovo - Airbag Protection
Communications Utility	Hardware and Sound	Lenovo - Web Conferencing
Fingerprint Software	System and Security Hardware and Sound	Lenovo - Fingerprint Reader or Lenovo - notebook Fingerprint Reader
Lenovo ThinkVantage Toolbox	System and Security	Lenovo - System Health and Diagnostics
Mobile Broadband Activate	Network and Internet	Lenovo - 3G Mobile Broadband
Password Manager	System and Security User Accounts and Family Safety	Lenovo - Password Vault
Power Manager	Hardware and Sound System and Security	Lenovo - Power Controls
Recovery Media	System and Security	Lenovo - Factory Recovery Disks
System Update	System and Security	Lenovo - Update and Drivers
Rescue and Recovery	System and Security	Lenovo - Enhanced Backup and Restore
ThinkVantage GPS	Network and Internet System and Security	Lenovo - GPS

Note: Some applications might not be available in your system.

Access Connections

Access Connections™ 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 reconfigure your settings manually and restart the computer each time.

To open the Access Connections program, do the following:

- For Windows 7: See “Accessing applications in Windows 7” on page 34.
- For Windows Vista® and Windows XP: Click **Start → All Programs → ThinkVantage → Access Connections**.

Active Protection System

The Active Protection System protects your hard disk drive when the shock sensor inside your computer detects a condition that could damage the drive, such as system tilt, excessive vibration, or shock. The hard disk drive is less vulnerable to damage when it is not operating; so the system stops it from spinning, and may also move the read/write heads of the drive to areas that do not contain data. As soon as the shock sensor senses that the environment is stable again (minimal change in system tilt, vibration, or shock), it turns the hard disk drive on.

To open Active Protection System, do the following:

- For Windows 7: See “Accessing applications in Windows 7” on page 34.
- For Windows Vista and Windows XP: Click **Start → All Programs → ThinkVantage → Active Protection System**.

Client Security Solution

The Client Security Solution helps protect your computer and your personal information so that you know that your sensitive data is secure. It can also help manage your passwords, help recover a forgotten password, or help you monitor security settings on your computer and suggest how to enhance your computer security.

These convenient features are made more secure by a built-in security chip, a powerful computer chip dedicated to the security functions of your computer.

To start the Client Security Solution, click **Start → All Programs → ThinkVantage → Client Security Solution**.

For details, refer to the Help for the program.

You can download the latest Client Security Solution at:
<http://www.lenovo.com/support>

Note: If your computer is a Windows 7 model, Client Security Solution is not preinstalled on it.

Fingerprint Software

If your system comes with a fingerprint reader, the Fingerprint Software program enables you to enroll your fingerprint and associate it with your Windows password. As a result, the fingerprint authentication can replace your password and enable simple and secure user access.

To open the fingerprint software, do the following:

- Windows 7: See “Accessing applications in Windows 7” on page 34.
- For Windows Vista and Windows XP: Click **Start → All Programs → ThinkVantage → ThinkVantage Fingerprint Software**.

Lenovo ThinkVantage Tools

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

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

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

Note: Lenovo ThinkVantage Tools is only available on computers preinstalled with Windows 7.

Lenovo ThinkVantage Toolbox

The Lenovo ThinkVantage Toolbox is a diagnostic program that works through the Windows operating system. It enables you to view symptoms of computer problems and solutions for them, and includes automatic notification when action is required, computing assistance, and advanced diagnostics and diagnostic history.

For further information about diagnosing problems, see “Diagnosing problems using Lenovo ThinkVantage Toolbox” on page 209.

To open Lenovo ThinkVantage Toolbox, do the following:

- For Windows 7: See “Accessing applications in Windows 7” on page 34.
- For Windows Vista and Windows XP: Click **Start → All Programs → ThinkVantage → Lenovo ThinkVantage Toolbox**.

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

Message Center Plus

The Message Center Plus displays messages to inform you about helpful software that has been preinstalled on your computer. The software enables you to manage wired and wireless connections, protect your data in the event of a problem and automatically diagnose and resolve potential problems with your computer. The Message Center Plus can also provide messages about new updates available to keep your computer current.

Password Manager

The Password Manager program enables users to manage and remember all their sensitive and easy-to-forget application and Web site login information, such as user IDs, passwords, and other personal information.

To open Password Manager, do the following:

- For Windows 7: See “Accessing applications in Windows 7” on page 34.
- For Windows Vista and Windows XP: Click **Start → All Programs → ThinkVantage → Password Manager**.

Power Manager

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

To open Power Manager, do the following:

- For Windows 7: See “Accessing applications in Windows 7” on page 34.
- For Windows Vista and Windows XP: Click **Start → All Programs → ThinkVantage → Power Manager**.

Product Recovery

This program enables you to create recovery media to restore the contents of the system drive or hard disk drive to the same state as when the computer was originally shipped from the factory.

For information about how to open and use this program, refer to “Creating and using recovery media” on page 109.

Presentation Director

Presentation Director is a display configuration utility that enables you to give presentations conveniently. It also enables you to create and manage the display schemes. However, by default, Presentation Director has some predefined presentation schemes. You can apply them to your presentation with no need to set up a new scheme. To apply a presentation scheme, you can also use the Fn + F7 key combination.

To open Presentation Director, click **Start → All Programs → ThinkVantage → Presentation Director**.

Note: If your computer is a Windows 7 model, Presentation Director is not supported because the Windows 7 operating system handles the external displays instead.

Rescue and Recovery

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

- For Windows 7: See “Accessing applications in Windows 7” on page 34.
- For Windows Vista and Windows XP: Click **Start → All Programs → ThinkVantage → Rescue and Recovery**.

System Update

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

To open the System Update, do the following:

- For Windows 7: See “Accessing applications in Windows 7” on page 34.
- For Windows Vista and Windows XP: Click **Start → All Programs → ThinkVantage → System Update**.

ThinkVantage GPS

If the PCI Express Mini Card installed in your computer supports GPS, your computer can receive signals from GPS satellites and determine its location. If your computer is connected to the Internet, you can find your location on a real-time map provided by Google Maps or Microsoft Bing™ Maps.

To open ThinkVantage GPS, do the following:

- For Windows 7: See “Accessing applications in Windows 7” on page 34.
- For Windows Vista and Windows XP: Click **Start → All Programs → ThinkVantage → ThinkVantage GPS**.

For receiving the signals from GPS satellite, keep the following best usage guidelines in mind:

- Keep your notebook away from your body.
- GPS antenna is located under the LCD screen.
- Ensure that you place your notebook away from concrete or brick walls that may weaken satellite signals.
- Best reception will be available near windows and other locations where cellular phone reception is the strongest.

The GPS satellite signals may not available at following area:

- Inside of tunnel or basement
- Inside of building or beside of building
- Between tall building
- Near the high-voltage electric cables

Note: For ThinkPad X220 Tablet and X220i Tablet, place your notebook on a flat surface and keep the lid open at a 105 degree angle (notebook mode) .

Lenovo SimpleTap

Lenovo SimpleTap provides you a quick and customizable way to access your computer basic settings and some personalized features.

To open the Lenovo SimpleTap, do the following:

- For Windows 7: See “Accessing applications in Windows 7” on page 34.
- For Windows Vista: Click **Start → All Programs → ThinkVantage → Lenovo SimpleTap**.

Lenovo ThinkVantage Tablet Shortcut Menu

If your notebook is a tablet model, Lenovo ThinkVantage Tablet Shortcut Menu is available in your system.

The Tablet Shortcut Menu is a utility for your ThinkPad utility programs such as Access Connections, Presentation Director and EasyEject Utility, for launching custom defined applications, for changing system settings and for changing the focus from one window to another window.

You can use this utility to enable a function that makes your computer detect the state of the display (notebook mode or tablet mode) and change the screen orientation automatically to suit your preference.

To open the Lenovo ThinkVantage Tablet Shortcut Menu, do the following:

- For Windows 7: See “Accessing applications in Windows 7” on page 34.
- For Windows Vista : Click **Start → All Programs → ThinkVantage → ThinkPad Tablet Shortcut Menu**.

Chapter 2. Using your computer

Your computer is powerful and is loaded with features and applications. Use it to accomplish anything, any day, any time.

This chapter contains the following topics:

- “Register your computer” on page 41
- “Frequently asked questions” on page 41
- “Special keys and buttons” on page 48
- “Using the UltraNav pointing device” on page 56
- “Power management” on page 60
- “Connecting to the network” on page 64
- “Using a projector or external display ” on page 72
- “Using audio features” on page 79
- “Using an integrated camera” on page 80
- “Using the ThinkLight feature” on page 81
- “Using the media card reader” on page 81

Register 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 will also receive the following benefits:

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

Note: When you are ready to register by modem, you will need a phone connection to your computer and access to the World Wide Web.

To register your computer with Lenovo, go to this Web site:

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

Then follow the instructions on the screen.

Frequently asked questions

Here are a few tips that will help you optimize the use of ThinkPad notebook.

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.

On the go and need to use battery power more effectively?

- To conserve power, or to suspend operation without exiting applications or saving files, see the explanation about “power-saving modes” on page 61.
- To achieve the best balance between performance and power saving, create and apply power plans (in Windows XP, power schemes) by use of Power Manager.
- If your computer will be turned off for an extended period of time, you can prevent battery power from draining by removing the battery. Look for more information about using the battery in “Power management” on page 60.

Concerned about security or need to securely dispose of data stored on your hard disk or solid state drive?

- Study the Chapter 4 “Security” on page 91 section to find out how you can protect your computer from theft and unauthorized use.
- The Client Security Solution preinstalled on your computer performs many of the security tasks that help protect it. If the setup wizard runs, to keep your secure, be sure to set up the Client Security Solution.

Note: If your computer is a Windows 7 model, Client Security Solution is not preinstalled on it.

- Before you dispose of the data on the hard disk drive or the solid state drive, be sure to read “Notice on deleting data from your hard disk or solid state drive” on page 107.

Getting connected in different locations is a challenge?

- To troubleshoot a wireless networking issue, go to:
<http://www.lenovo.com/support/faq>
- Take advantage of the networking features by use of Access Connections.
- To learn more about using the wireless features of your computer, refer to “Wireless connections” on page 64.
- To travel more confidently, be sure to check the tips in “Traveling with your computer” on page 88.
- Press Fn+F5, or use the wireless radio switch to enable or disable the wireless features.

Need to give presentations or attach an external monitor often?

- Use Presentation Director to set up a presentation.

Note: If your computer is a Windows 7 model, it does not support Presentation Director, however the Fn+F7 key combination may still be used to switch display output location.

- Make sure that you follow the procedure for “Attaching an external monitor” on page 73.
- With the Extend desktop function, you can display output on both the computer display and the external monitor.

Need to attach or replace a device?

- See Chapter 6 “Replacing devices” on page 117 for more information about replacing the devices of your computer.
- See Chapter 7 “Enhancing your computer” on page 151 for more information about enhancing the features of your computer.

You've been using your computer for some time already, and it is getting slower?

- Follow the “General tips for preventing problems” on page 203.
- You can diagnose problems yourself by using the preinstalled software.

- Also Recovery tool is provided on your computer hard disk or solid state drive. For more information, see Chapter 5 “Recovery overview” on page 109.

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 175
- “Computer stops responding” on page 210
- “Power problems” on page 232

Tablet mode

ThinkPad X220 Tablet or X220i Tablet notebook can be used in tablet mode, taking advantage of the features and benefits of a tablet PC.

Using the tablet mode

In the tablet mode, you can use your computer in a creative and intuitive way by jotting down notes and illustrations with the Tablet Digitizer Pen and then storing them digitally.

To use your computer in the tablet mode, do as follows:

1. Open the computer display slowly, holding the upper left and right sides of the display with both hands. Your computer is now in the **notebook mode**.



2. Open the display by at least 45 degrees, preferably by 90 degrees. Grasp the center of one side of the computer display with one hand while holding the keyboard bezel with the other hand; then rotate the display slowly clockwise until the back of the display is facing the keyboard. Your computer is now in the **picture frame mode**.

Note: While rotating the display, do not press the upper edge of either side of the display.



3. Close the computer display slowly, holding the upper left and right sides with both hands.

Note: Make sure that the display is rotated at 180 degrees, so that the back of the display faces the keyboard.

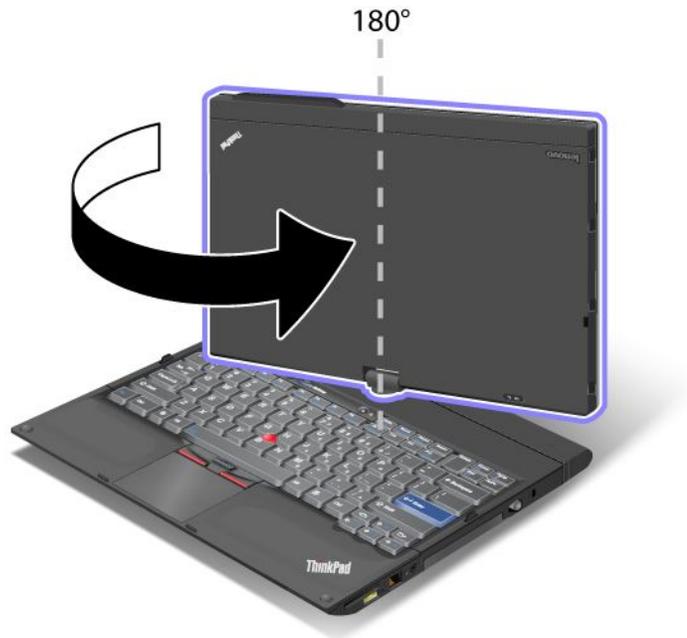


4. Press the center latch down to lock the display.

Note: Do not rotate, twist, or bend the center latch of the display.
Your computer is now in the **tablet mode**.

To return your computer to the notebook mode, do as follows:

1. Open the display by at least 45 degrees, preferably by 90 degrees.
2. Follow the direction shown by the display swivel indicator and rotate the display slowly (figure below shows counter-clockwise rotation as an example) until the front of the display is facing the keyboard.



Your computer is now in the **notebook mode**.

Tips on using your computer in the tablet mode

- To close the computer display, first make sure that the display either faces the keyboard or is positioned at 180 degrees to the keyboard, so that the back of the display faces the keyboard.
- Do not pick up or hold the computer by the display only.
- Do not hit, vibrate, or bump the computer display.
- To allow free ventilation, do not place any obstacle, such as a thick-piled carpet or a soft cushion, in front of the fan.
- When you use the computer in the picture frame mode, hold the display with one hand and use the Tablet Digitizer Pen.
- If you hold the computer with one hand while using it in the tablet mode, do not expose it to excessive vibration, shock, or rotation.
- When using computer outdoors protect against exposure to rain or moisture.
- If you put your computer in a carrying case, put it into notebook mode and close the display.

Using the Tablet Digitizer Pen

The Tablet Digitizer Pen and its accessories are shipped in a separate box within the ThinkPad shipping box. You can use the pen to control your computer just as you would with a mouse or keyboard.

Note: This pen is not waterproof. Take care not to soak it or dip it in water.

You can store the pen in the slot on the right side of the ThinkPad Notebook. Press it gently into the slot until you hear a click.

To remove the pen from its slot, press it gently into the slot **1** to release it; then pull it out **2**.



Note: The pen contains pressure sensors. Do not push the tip of the pen for an extended period of time. Do not subject the pen to shock or vibration.

The Tablet Digitizer Pen consists of a tip **2**, a click button **3**, and an eraser tip **4**. Hold the pen and point the tip at the display to move the cursor **1**.



To make a selection (single click), tap the display once with the pen. To double-click, tap twice without pausing. To do a right-click, tap the display once and then hold the tip of the pen on the display; the right-click icon appears.

Pressing the click button **3** is the same as a right-click. The eraser tip **4** functions like an eraser in applications that support this function.

Using the touch panel

Some models have the touch panel feature. This feature makes interaction with your computer even more natural, because you can use fingers instead of a pen for navigation on the go.

For a single click, tap the display once with your finger. For a double click, tap the display twice without pausing. For a right click, tap the display once and then hold your finger on the display until a circular symbol appears. When you take your finger off the display, the right-click menu will open.

Using the multitouch panel

On a model that has the multitouch panel feature, the touch panel supports multitouch, with which you can zoom in, zoom out, scroll, or rotate on the screen with your two fingers while browsing the Internet or reading or editing a document.

The multitouch panel supports the capacitive touch. Even the slightest contact of your electron-rich finger with the screen's glass is enough to activate the capacitive sensing system. This function does not work with inanimate objects, fingernails, gloved fingers. Advanced palm-rejection technology helps to prevent inadvertent contact with a pen or a finger, which could disrupt finger input.

Tips on using the touch panel

- The touch panel is a glass panel covered with a plastic film. For input you can use either your finger or the Tablet Digitizer Pen shipped with your computer. Do not use any pen other than the specified one, or any metallic object, because to do so might damage the touch panel or cause it to malfunction.
- If you put your computer in a carrying case, put it into notebook mode and close the display. Do not carry your computer in tablet mode.
- If you use both your finger (or two fingers) and the Tablet Digitizer Pen simultaneously for input to the screen, only data entered by use of the Digitizer Pen will be processed.
- With the touch panel, gradually a discrepancy may start to appear between the point you touch with your finger (or two fingers) during the finger point, and its actual position on the screen. To avoid this, regularly correct the accuracy of the finger input by use of the touch panel Settings Utility.
- If your computer is the multitouch model, the touch panel of your computer supports multitouch with which you can:
 - Pinch two fingers together or apart to zoom in or out on a document.
 - Scroll window contents by moving two fingers up and down, left and right.
 - Touch two points on a digital photo and twist to rotate it just like a real photo.

Cleaning the touch panel display

1. To remove fingerprints, etc., from the touch panel display, use a dry, soft, lint-free cloth or a piece of absorbent cotton. Do not apply solvents to the cloth.
2. Gently wipe foreign particles and dust from the touch panel with one side of the cloth.
3. Wipe smudges or fingerprints with the other side of the cloth, or with a clean cloth.
4. After using the cloth, wash it with a neutral detergent.

Using the Tablet buttons

On the display bezel near the screen is a row of buttons with which you can control your computer in the tablet mode, without the use of the keyboard.



- 1** Press the **Screen Rotation button** button to rotate the screen clockwise.
- 2** The **Secure Attention Sequence button** functions the same as the Ctrl+Alt+Del key combination.
- 3** Press the **power button** button to turn the computer on or off.

Using the Tablet Shortcut Menu

Tablet Shortcut Menu is a software tool bar that is optimized for use when your computer is in the tablet mode. From this menu you can adjust certain system settings and start the ThinkPad utility programs, such as Access Connections and Presentation Director. The menu also provides functions that are useful in the tablet mode, such as changing the screen orientation automatically for different positions of the computer, disabling the Beam Forming feature automatically in tablet mode, or resuming the system from standby when the Tablet Digitizer Pen is removed from its slot.

To start the Tablet Shortcut Menu, press the “Using the Tablet buttons” on page 47 on the computer display bezel, using either the Tablet Digitizer Pen or your finger. The main panel appears on the screen.

There is another way to open the main panel.

For Windows 7: Click **Start → All Programs → Lenovo ThinkVantage Tools → Tablet Utility**.

For Windows Vista and Windows XP: Click **Start → All Programs → ThinkVantage → Tablet Shortcut Menu**.

For details, refer to the Help in the Tablet Shortcut Menu.

Special keys and buttons

Your computer has several special keys and buttons.

ThinkVantage button

The blue ThinkVantage button can help you in many situations when your computer is working normally, and even when it is not.



You can also use the ThinkVantage button to interrupt the startup sequence of your computer and start the Rescue and Recovery workspace, which runs independently of the Windows operating system and is hidden from it. If Windows is not running properly, you may need to do the following:

- Get the current system information.
- Rescue a file from your Windows environment or restore back-up files, provided you have made backups by use of the Rescue and Recovery program.
- Configure your computer or start the ThinkPad Setup.

All this can be achieved from the Rescue and Recovery workspace. Turn on the computer; then, while the “To interrupt normal startup, press the blue ThinkVantage button” message is displayed at the lower-left of the screen, press the ThinkVantage button. The Rescue and Recovery screen opens.

Numeric keypad

The keyboard has keys that, when enabled, work as a 10-key numeric keypad.

To enable or disable the numeric keypad, press and hold **Shift** or **Fn** and then press **NmLk (ScrLk)**.

Note: The next drawing shows the locations of the keys that serve as the 10-key numeric keypad. The locations of these keys are the same on every keyboard, though for computers using different languages, different characters are printed on the keytops.



If the numeric keypad is enabled, press and hold **Shift** to use the cursor-control and screen-control keys temporarily.

Note: The functions of the cursor- and screen-control keys are not printed on the keys.



Function key combinations

By setting the function keys, you can change operational features instantly. To use this function, press and hold the Fn key **1**; then press one of the function keys **2**.



Power conservation

- **Fn+F3**

Select a power plan (in Windows XP, power scheme) that has been created by Power Manager, or adjust the power level by using the slider control. When you press this combination of buttons, a panel for selecting a power plan (in Windows XP, power scheme) or adjusting the power level appears.

Note: If you have logged on with an administrator user ID in Windows XP, and you press Fn+F3, the panel for selecting a power scheme appears. If you have logged on with another user ID in Windows XP, and you press Fn+F3, the panel does not appear.

- **Fn+F4**

Put your computer in sleep (standby) mode. To return to normal operation, press the Fn key only, without pressing a function key.

Note: If you want to use the combination to put the computer into hibernation mode or do-nothing mode (in Windows XP, shut the computer down or show the panel for turning off the computer), change the settings in Power Manager.

- **Fn+F12**

Put your computer in hibernation mode. To return to normal operation, press the power button for less than four seconds.

Notes:

- Though the screen fades out immediately after Fn+F12 are pressed, the computer does not enter the hibernation mode immediately. Do not move the system until the Status indicators stops blinking. Moving the computer when it is entering hibernation may cause corruption of the hard drive.

- To use Fn+F3, Fn+F4, and Fn+F12 key combinations, you must have the ThinkPad PM device driver installed on your computer.

For information on the power management function, refer to “Power management” on page 60.

Applying a presentation scheme

- **Fn+F7**

Apply a presentation scheme directly, with no need to start Presentation Director.

To disable this function and use the Fn+F7 key combination for switching a display output location, start Presentation Director, and change the settings.

Click **Start → All Programs → ThinkVantage → Presentation Director**.

For information on applying a presentation scheme, refer to “Presentation Director” on page 38.

Note: If your computer is a Windows 7 model, it does not support presentation schemes, however the Fn+F7 key combination may still be used to switch display output location.

Switching a display output location

- **Fn+F7**

For Windows 7:

Switch between the computer display and an external monitor. Windows will show these display options:

- Computer display only (LCD)
- Computer display and external monitor (same image)
- Computer display and external monitor (extended desktop function)
- External monitor only

Note: To switch between the computer display and an external monitor, the Win+P key combination is also available.

For Windows Vista and Windows XP:

Switch between the computer display and an external monitor. If an external monitor is attached, computer output is displayed in the following three patterns by turns:

- External monitor (CRT display)
- Computer display and external monitor (LCD + CRT display)
- Computer display

Notes:

- This function is not supported if different desktop images are displayed on the computer display and the external monitor (the Extend desktop function).
- This function does not work while a DVD movie or a video clip is playing.

To enable this function, start Presentation Director, and change the settings.

Note: Multiple users can log on to a single operating system by using different user IDs. Each user needs to do the following:

Click **Start → All Programs → ThinkVantage → Presentation Director**, and change the Fn+F7 Settings.

Enabling or disabling the wireless features

- **Fn+F5**

Enable or disable the built-in wireless networking features. If you press Fn+F5, a list of wireless features is displayed. You can quickly change the power state of each feature in the list.

Notes: If you want to use Fn+F5 to enable or disable the wireless features, the following device drivers must be installed on your computer beforehand:

- Power Management driver
- OnScreen Display Utility
- Wireless device drivers

For information on the wireless features, refer to “Wireless connections” on page 64.

Launching the camera and audio settings

- **Fn+F6**

If you press Fn+F6, the camera and audio settings window is opened and the camera preview is turned on. From this window, you can change the camera and audio settings.

Note: The Camera settings area only appears if your computer has an integrated camera. For more information, see “Using an integrated camera” on page 80.

Other functions

- **Fn+PgUp:** Turn the ThinkLight on. To turn it off, press Fn+PgUp again.

Note: This function is supported only on the ThinkPad notebooks that have the ThinkLight. The on or off status of the ThinkLight is shown on the screen for a few seconds when you press Fn+PgUp.

- **Fn+Home:** The computer display becomes brighter.

The purpose of this method is to change the brightness level temporarily. On Windows Vista, the default brightness level is loaded after sleep (standby), hibernation, reboot, or detaching or attaching an ac power adapter. To change the default brightness level, change the settings of the Power Option in the Control Panel or use the Power Manager.

- **Fn+End:** The computer display becomes dimmer.

The purpose of this method is to change the brightness level temporarily. On Windows Vista, the default brightness level is loaded after sleep (standby), hibernation, reboot, or detaching or attaching an ac power adapter. To change the default brightness level, change the settings of the Power Option in the Control Panel or use the Power Manager.

- **Fn+Spacebar:** Enable the FullScreen Magnifier function.

- **Fn+F2:** Lock your computer.

- **Fn+F8:** Change the settings of the UltraNav pointing device.

- **Fn+PrtSc:** Have the same function as the SysRq key.

- **Fn+ScrLk:** Enable or disable the numeric keypad. The indicator of numeric lock is displayed on the screen.

- **Fn+Pause:** Have the same function as the Break key.

- **Fn+cursor keys:** These key combinations are for use with Windows Media Player. They have the following functions:

- Fn + down arrow key: Play or Pause
- Fn + up arrow key: Stop
- Fn + right arrow key: Next Track
- Fn + left arrow key: Previous Track

Volume and mute buttons

You can adjust the sound level of the built-in speakers by using the following three buttons:



If you mute the sound and then turn off your computer, the sound will remain muted when you turn on your computer again. To turn on the sound, press the plus (+) or minus (-) button.

Setting the volume

Each device has volume controls, which you can set.

To open the window for adjusting the output volume or the recording volume, do the following:

For Windows 7 and Windows Vista:

1. Click **Start** → **Control Panel** → **Hardware and Sound** → **Sound**. The Sound window appears.
2. Click the **Playback** tab or **Recording** tab, and then click a device, which you want to customize.
3. Click the **Properties** button.
4. Click the **Levels** tab, and then change the volume by moving the slider.

For Windows XP:

1. Click **Start** → **Control Panel** → **Sounds, Speech, and Audio Devices** → **Sounds and Audio Device**. The Sounds and Audio Device Properties window appears.
2. Click the **Audio** tab, and then click the **Volume** button in Sound Playback or Sound Recording.

Notes:

- You can also get access to the desktop volume control by using the volume icon in the task bar at the lower right of the screen. To open the Volume Control window, click the volume icon. To control the volume, move the volume control slider up or down. To turn off the sound, select **Mute speakers** (in Windows Vista and Windows XP, **Mute**).
- The names of windows or fields are slightly different depending on the operating system you use.

- For details about controlling volume, refer to your Windows online help.

Setting the microphone mute button in Windows 7 and Windows Vista

By default, you can toggle all of your recording devices between the mute state and the un-mute state by pressing the microphone mute button.

If you want to toggle one of the recording devices between the mute state and the un-mute state, do the following:

1. Press Fn+F6. The Communications settings window opens.
2. Click the **Manage Settings** button. The Communications Utility window opens.
3. On the **VoIP Call Settings** tab, click **Microphone mute button settings**. The Setting for Microphone Mute window opens.
4. Select **Only the recording device selected below:**. Then select the recording device from the drop-down list box.
5. Click **OK**.

Windows key and Application key

The following two keys are on your computer keyboard:



1 Windows key

If you press this key, the Start menu of Windows is displayed or hidden.

If you press this key and another key at the same time, the System Properties window or the Computer (in Windows XP, My Computer) window is displayed. For details, refer to the Help in Windows operating system.

2 Application key

To display the shortcut menu for an object, select the object on the desktop or within an application and then press this key.

Using the UltraNav pointing device

Your computer may come with the UltraNav pointing device. The UltraNav consists of the TrackPoint and the touch pad, each of which is itself a pointing device with both basic and extended functions. You can configure both devices by choosing the settings you prefer as follows:

- **Set both the TrackPoint and the touch pad as pointing devices.**

This setting enables the use of all the basic and extended functions of the TrackPoint and the touch pad.
- **Set the TrackPoint as the main pointing device and the touch pad for extended functions only.**

This setting enables the use of all basic and extended functions with the TrackPoint while limiting the use of the touch pad to scrolling, tap zones, and slow-motion pointer functions.
- **Set the touch pad as the main pointing device and the TrackPoint for the extended functions only.**

This setting enables the use of all basic and extended functions with the touch pad while limiting the use of the TrackPoint to scrolling and Magnifying Glass functions.
- **Set the TrackPoint as the main pointing device, and disable the touch pad.**
- **Set the touch pad as the main pointing device, and disable the TrackPoint.**

Changing the UltraNav settings

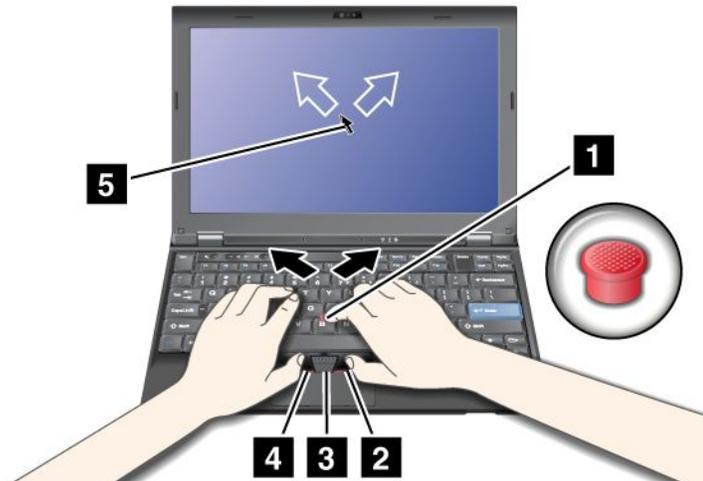
You can change your settings of UltraNav in the **UltraNav** tab of the Mouse Properties window. To open it, use one of the following methods:

- Press Fn+F8, and the UltraNav Device Settings window is displayed. In this window click **Manage Settings**. A mouse properties window is displayed. Click the **UltraNav** tab.
- Use the Start menu of your computer as follows:
 - For Windows 7 and Windows Vista: Click **Start** → **Control Panel** → **Hardware and Sound** → **Mouse** → **UltraNav** tab.
 - For Windows XP: Click **Start** → **Control Panel** → **Printers and Other Hardware** → **Mouse** → **UltraNav** tab.

You can also change the UltraNav settings by clicking the **UltraNav** icon on the system tray. To display the UltraNav icon on the system tray, see “Adding the UltraNav icon to the system tray” on page 59.

Using the TrackPoint pointing device

The TrackPoint pointing device consists of a pointing stick (1) on the keyboard and three click buttons at the bottom of the keyboard. To move the pointer (5) on the screen, you apply pressure to the nonslip cap on the pointing stick in any direction parallel to the keyboard; the pointing stick itself does not move. The speed at which the pointer moves depends on the pressure you apply to the pointing stick. The functions of the left (4) and right (2) click buttons correspond to those of the left and right mouse buttons on a conventional mouse. The TrackPoint center button (3), called the scroll bar, enables you to scroll Web pages or documents in any direction with no need to use the graphic scroll bars on the side of the window.



If you are not familiar with the TrackPoint, these instructions will help you get started:

1. Place your hands in the typing position, and press gently with either index finger on the pointing stick in the direction in which you want the pointer to move.

To move the pointer, press the pointing stick away from you to move it up, toward you to move it down, to one side or the other to move it sideways.

Note: The pointer might drift. This is not a defect. Stop using the TrackPoint for a few seconds; the pointer will stop moving.

2. To select and drag as required by your software, press the left or right click button with either thumb and move the TrackPoint pointing stick.

By enabling Press-to-Select, you can make the TrackPoint pointing stick function the same as the left or right click button.

Customizing the TrackPoint

You can customize the TrackPoint pointing device and its buttons as follows:

- Switch the functions of the left and right buttons.
- Change the sensitivity of the TrackPoint.
- Enable the Press-to-Select function.
- Enable the Magnifying Glass.
- Enable the TrackPoint scrolling function.
- Enable the TrackPoint Scrolling Tips.

To customize the TrackPoint, do as follows:

1. Press Fn+F8. A panel for UltraNav Device Settings pops up.
2. Click **Manage Settings** to open the Mouse properties window.
3. Click the **UltraNav** tab. Under TrackPoint, proceed to changing the settings.

For details, refer to the Help in the Utility.

Changing the cap

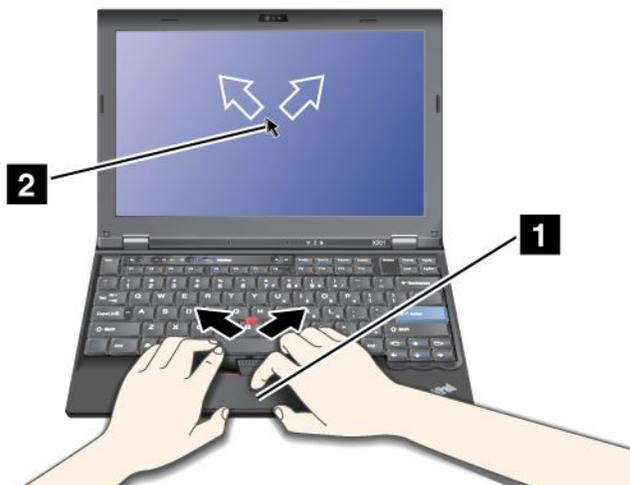
The cap **1** on the end of the TrackPoint pointing stick is removable. You can replace it as shown in the drawing.



Note: If you replace the keyboard, a new keyboard is shipped with the default cap. If you wish, you can keep the cap from your old keyboard and use it on the new one.

Using the touch pad

The touch pad is below the TrackPoint buttons at the bottom of the keyboard. To move the pointer **2** on the screen, slide your fingertip over the pad in the direction in which you want the pointer to move. The left and right bottom of the pad work as click buttons. The functions correspond to those of the left and right mouse buttons on a conventional mouse.



Using the multi-touch touch pad

The touch pad of your computer supports multi-touch with which you can zoom in, zoom out, scroll or rotate on the screen while browsing the Internet or reading or editing a document.

For details, refer to the Help in the UltraNav.

Customizing the touch pad

To customize the touch pad, do as follows:

1. Press Fn+F8. A panel for UltraNav Device Settings pops up.
2. Click **Manage Settings** to open the Mouse properties window.

3. Click the **UltraNav** tab and proceed to customizing the touch pad.

For details, refer to the Help in the Utility.

Behavior of the UltraNav and an external mouse

By default, the TrackPoint and the touch pad are set to **Enabled**.

Note: If you want to attach an external mouse to a USB connector, select “Disabled.”

Disabling the TrackPoint or the touch pad

If you want to disable the TrackPoint or the touch pad, do either of the following:

- **Use the Fn+F8 key combination:**

1. Press Fn+F8. A panel for UltraNav Device Settings pops up.
2. To disable the TrackPoint, select **Enable touch pad only (disable TrackPoint)**.
To disable the touch pad, select **Enable TrackPoint only (disable touch pad)**.
3. Click **Close**.

- **Configure settings in UltraNav properties window:**

For Windows 7 and Windows Vista

1. Click **Start → Control Panel → Hardware and Sound → Mouse**.
2. Click **UltraNav** tab.
3. To disable the TrackPoint, clear the check box for **Enable TrackPoint**.
To disable the touch pad, clear the check box for **Enable touch pad**.
4. Click **OK**.

For Windows XP

1. Click **Start → Control Panel → Printers and Other Hardware → Mouse**.
2. Click **UltraNav** tab.
3. To disable the TrackPoint, clear the check box for **Enable TrackPoint**.
To disable the touch pad, clear the check box for **Enable touch pad**.
4. Click **OK**.

Note: You can also open the UltraNav properties window by clicking the **UltraNav** icon in the task bar. For details, refer to the instructions in “Adding the UltraNav icon to the system tray” on page 59.

Adding the UltraNav icon to the system tray

For easy access to the UltraNav properties, you can add the **UltraNav** icon on the system tray.

To enable the display of the **UltraNav** icon on the system tray, do as follows:

1. Press Fn+F8. A panel headed UltraNav Device Settings pops up.
2. Click **Manage Settings** to open the Mouse properties window.
3. Click the **UltraNav** tab.
4. Select the check box for **Show UltraNav icon on the system tray**.
5. Click **OK** or **Apply**.
6. If your computer is a Windows 7 model, click **Show hidden icons** in the task bar. The UltraNav icon is displayed. To add it to the task bar permanently, click **Customize** and proceed to customize the settings.

You can now change the properties of UltraNav by clicking the UltraNav icon on the system tray.

Power management

When you need to use your computer away from electrical outlets, you depend on battery power to keep your computer running. Different computer components consume power at different rates. The more you use the power-intensive components, the faster you consume battery power.

Do more, save more and spend more time unplugged with ThinkPad batteries. Mobility has revolutionized business by allowing you to take your work where ever you go. With ThinkPad batteries, you will be able to work longer without being tied to an electrical outlet.

Checking battery status

The Power Manager Battery Gauge in the task tray displays the percentage of battery power remaining.

The rate at which you use battery power will determine how long you can use the battery of your computer between charges. Because each computer user has different 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: how often you access the hard disk drive or the solid state drive, how bright you make the computer display.

Using the ac power adapter

The power to run your computer can come either from the lithium-ion (Li-ion) battery pack provided with it, or from ac power through the ac power adapter. While you use ac power, the battery charges automatically.

The ac power adapter that comes with your computer has two basic components:

1. The transformer pack that converts ac power adapter for use with the computer.
2. The power cord that plugs into the AC outlet and into the transformer pack.

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

To use the ac power adapter, do the following. Be sure to take these steps in the order in which they are given here.

1. Connect the ac power adapter to the power jack of the computer.
2. Connect the power cord to the transformer pack.
3. Plug the power cord into an electrical outlet.

You can check the status of your battery at any time by looking at the battery meter at the bottom of your display.

Notes:

- 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 transformer pack when it is connected to the transformer.
- You can charge the battery when the ac power adapter is connected to the computer and the battery is installed. You need to charge it in any of the following conditions:
 - When you purchase a new battery.
 - If the battery status indicator starts blinking.

- If the battery has not been used for a long time.

Before you charge the battery, make sure that its temperature is at least 10°C (50°F).

Charging the battery

When you check battery status and find that the percentage of power remaining is low or when the power alarm alerts you that remaining power is low, you need to charge your battery or replace it with a charged battery.

If an ac outlet is convenient, plug the ac power adapter into it, and then insert the jack into the computer. The battery will charge in about three to six hours. This is affected by the battery size and the physical environment. The battery status indicator will let you know that the battery is charging, and will also notify you when the battery is fully charged.

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

Maximizing battery life

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

- Use the battery until the charge is completely depleted-until the battery status indicator starts blinking orange.
- Recharge the battery completely before using it. The battery is fully charged if the battery indicator shows green when the ac power adapter is plugged in.
- For a new battery or a battery that you have not used recently, do one of the following:
 1. Recharge the battery completely before using it. The battery is fully charged when the ac power adapter is plugged in and the battery indicator is green.
 2. Use the battery until the charge is completely depleted-until the battery status indicator starts blinking orange.
- Always use power management features such as power modes, screen blank, sleep (standby), and hibernation.

Managing your battery power

With Power Manager, you can adjust your power settings to give you the best balance between performance and power saving.

To start the utility program, do as follows:

- For Windows 7: See “Accessing applications in Windows 7” on page 34.
- For Windows Vista and Windows XP: Click **Start → All Programs → ThinkVantage → Power Manager**.

For more information about the Power Manager program, refer to the on-line help of the program.

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 the battery power.

Introducing the power-saving modes

- **Screen blank.** The computer display requires considerable battery power. To turn off power to the display, do as follows:
 1. Press Fn+F3. A panel for selecting a power plan (in Windows XP, power scheme) appears.

2. Select **Power off display (keep current power plan)** (in Windows XP, **keep current power scheme**).

Notes: You can also turn off the computer display as follows:

1. Press Fn+F3. A panel for selecting a power plan (in Windows XP, power scheme) appears.
 2. Select **Fn+F3 Settings**.
 3. Select **Power off display**.
 4. Click **OK**. The next time you press Fn+F3, you can turn off the computer display.
- **Sleep (standby in Windows XP).** In sleep (standby) mode, your work is saved to memory, and then the solid state drive or the hard disk 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 (standby) mode, press Fn+F4. To return from sleep (standby) mode, press the Fn key.
 - **Hibernation.** By using this mode, you can turn off your computer completely without saving files or exiting from any applications that are running. When you enter hibernation, all open applications, folders, and files are saved to the hard disk, and then the computer turns off. To enter hibernation, press Fn+F12. To resume your session, press the power button for no more than 4 seconds.

When you are not using the wireless features, such as *Bluetooth* or wireless LAN, turn them off. This will help conserve power. To turn off the wireless features, press Fn+F5.

Enabling the wakeup function

If you put your computer into hibernation mode, and the wakeup function is disabled (this is the default setting), the computer does not consume any power. If the wakeup function is enabled, it consumes a small amount of power. To enable the function, do as follows:

For Windows 7 and Windows Vista:

1. Click **Start → Control Panel → System and Security** (in Windows Vista, **System and Maintenance**).
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 wakeup 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**.

For Windows XP:

1. Click **Start → Control Panel → Performance and Maintenance**.
2. Click **Scheduled Tasks**. The scheduled tasks are displayed.
3. Right-click on a scheduled task.
4. Click **Properties**.
5. Click the **Settings** tab.
6. Under Power Management, select the check box for **Wake the computer to run this task**.

Enabling the battery alarm

You can program your computer so that when the battery power falls below a certain level, three events occur: the alarm goes off, a message is displayed, and the LCD is turned off. Do as follows:

1. Start Power Manager.

2. Click the **Global Power Settings** tab.
3. For **Low battery alarm** or **Critically low battery alarm**, set the percentage of the power level and set the action.

Note: If your computer enters sleep (standby) or hibernation mode when the battery is low, but the alarm message has not yet appeared, the message will appear when the computer resumes. To resume normal operation, press **OK**.

Handling the battery



DANGER

Do not attempt to disassemble or modify the battery pack.

Attempting to do so can cause an explosion, or liquid leakage from the battery pack.

A battery pack other than the one specified by Lenovo, or a disassembled or modified battery pack is not covered by the warranty.



DANGER

If the rechargeable battery pack is incorrectly replaced, there is danger of an explosion. The battery pack 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 pack away from fire.**
- **Do not expose it to excessive heat.**
- **Do not expose it to water or rain.**
- **Do not short-circuit it.**
- **Store it in a cool dry place.**
- **Keep it away from children.**

The battery pack is a consumable supply.

If your battery begins to discharge too quickly, replace the battery pack with a new one of the type recommended by Lenovo. For more information on replacing the battery pack, contact your Customer Support Center.



DANGER

Do not drop, crush, puncture, or subject to strong forces. Battery abuse or mishandling can cause the battery to overheat, which can cause gasses or flame to “vent” from the battery pack or coin cell. If your battery is damaged, or if you notice any discharge from your battery or the buildup of foreign materials on the battery leads, stop using the battery and obtain a replacement from the battery manufacturer.



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



Do not put the battery pack in trash that is disposed of in landfills. When disposing of the battery, comply with local ordinances or regulations and your company's safety standards.



There is a danger of an explosion if the backup battery is incorrectly placed. The lithium battery contains lithium and can explode if it is not properly handled, or disposed of. Replace only with a battery of the same type. To avoid possible injury or death, Do not: (1) throw or immerse into water, (2) allow it to heat to more than 100°C (212°F), or (3) attempt to repair or disassemble it. Dispose of it as required by local ordinances or regulations and your company's safety standards.

Connecting to the network

Your computer has one or more network adapters for connecting to the Internet and to your company's wired LAN or wireless LAN network.

Note: Some models come with a built-in wireless WAN card enabling you to establish wireless connections over remote public or private networks.

“Access Connections” on page 36 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.

Your modem enables you to connect to your network or the Internet from almost anywhere. If your network has a phone line or lines dedicated to dial-up clients, you can use a modem to establish a connection to the LAN. If your network does not have dial-up networking capability (and many do not), you might be able to access some information and e-mail over the Internet.

Ethernet connections

You can connect to your network or a broadband connection, such as DSL or CATV, by use of the Ethernet feature built into your computer. This feature enables you to do 1Gbps half or full duplex data transmission.

To connect to a network via Ethernet, you can use Access Connections.

Note: Your computer might have both a modem connector and an Ethernet connector. Be sure to connect your cable to the correct one.

Wireless connections

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

Depending on the frequency used for data transmission, the area covered, or the type of the device used for data transfer, the following categories of wireless networks may be available to you:

Wireless LAN

A wireless local area network 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 network.

Wireless WAN

A wireless wide area network covers a broader geographic area. Cellular networks are used for data transmission, and access is provided by a wireless service carrier.

Bluetooth

One of a number of technologies used to create a wireless personal area network. *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 PC, or remotely controlling and communicating with devices such as mobile phones.

WiMAX (Worldwide Interoperability for Microwave Access)

This long-range wireless data transmission technology based on the 802.16 standard, is expected to provide the user a “last mile” broadband connectivity similar to that provided by cable or ADSL, but without the need to physically connect a cable to the PC.

Making wireless LAN connections

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

Attention:

- If you carry your computer with the wireless LAN feature into an airplane, check the services with the airline before boarding the airplane.
- If there are restrictions on the use of computers on an airplane with the wireless feature, you need to disable it before boarding. To disable it, refer to the instructions in “Enabling or disabling the wireless feature” on page 72.

Note: You can purchase a wireless networking card as an option. For more information, refer to “Finding ThinkPad options” on page 151.

Tips for using the wireless LAN feature

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

Wireless networking setup

To use the built-in wireless networking card (the 802.11 standard) to communicate, start Access Connections.

Note: Before you start setting up wireless networking connections by using Access Connections, obtain a Network Name (SSID) and your encryption information from your network administrator.

Access Connections, a connectivity assistant program, can easily enable one network adapter and disable the other adapters on demand. After setting up your wireless networking connection, you can use the program to quickly switch the network settings.

Wireless upgradeable ThinkPad models

Your computer can be wireless upgradeable. This means that your computer has an antenna that can support wireless LAN access when wireless LAN access points are available. Wireless devices are available from Lenovo. For more information, see “Finding ThinkPad options” on page 151.

Using wireless WAN connections

Wireless Wide Area Network (wireless WAN) enables you to establish wireless connections over remote public or private networks. These connections can be maintained over a large geographical area, such as a city or an entire country, by use of multiple antenna sites or satellite systems maintained by wireless service providers.

Some ThinkPad notebooks come with a built-in wireless WAN card integrating some wireless WAN technologies, such as 1xEV-DO, HSPA, 3G or GPRS. You can connect to the Internet or your company network with the built-in wireless WAN card and the configuration utility to make a wireless WAN connection and monitor its status.

Note: Wireless WAN service is provided by authorized service providers in some countries.

To find the location of the wireless WAN antenna on your computer, refer to “Location of the UltraConnect wireless antennas” on page 246.

To use the wireless WAN feature, start Access Connections.

For maximum performance from your wireless WAN connection, please keep the following best usage guidelines in mind:

- Keep your notebook away from your body.
- Place your notebook on a flat surface and open your computer display to an angle of slightly more than 90 degrees.
- Place your notebook away from concrete or brick walls that may dampen cellular signals.
- Best reception will be available near windows and other locations where cellular phone reception is the strongest.

Using *Bluetooth*

For Windows 7 and Windows Vista

If your computer is equipped with the Integrated *Bluetooth* features, you can enable or disable the features by pressing Fn+F5. If you press Fn+F5, a list of wireless features is displayed. You can enable or disable the *Bluetooth* features with a single click.

To configure a *Bluetooth* device or manage connection settings, you can use **Bluetooth Devices** in Control Panel.

1. Click **Start → Control Panel**.
2. Click **Hardware and Sound**.
3. Click **Devices and Printers** (in Windows Vista, **Bluetooth Devices**).

To send data to a *Bluetooth*-enabled device, do as follows:

1. Right-click data that you want to send.
2. Select **Send To → Bluetooth Devices**.

For details, refer to the Windows online help.

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

For Windows XP

If your computer is equipped with the Integrated *Bluetooth* features, you can enable or disable the features by pressing Fn+F5.

If you press Fn+F5, a list of wireless features is displayed. You can enable or disable the *Bluetooth* features with a single click.

In Windows XP, you can use either ThinkPad *Bluetooth* with Enhanced Data Rate Software, or the Microsoft *Bluetooth* software. By default, ThinkPad *Bluetooth* with Enhanced Data Rate Software is installed on your computer.

Using Bluetooth for the first time on your computer

If this is the first time *Bluetooth* has been used on your computer, follow either of the following procedures:

1. Double-click the **My Bluetooth Places** icon on the desktop, or the **Bluetooth** icon in the task bar. The Start Using *Bluetooth* window opens, and some virtual device drivers are installed automatically.
2. Wait until the installation of the drivers is complete.

OR

1. Right-click the **My Bluetooth Places** icon on the desktop, or the **Bluetooth** icon in the task bar.
2. Select **Start Using Bluetooth**. The Start Using *Bluetooth* window opens, and some virtual device drivers are installed automatically.
3. Wait until the installation of the drivers is complete.

Some other virtual device drivers will be installed on demand when you use certain *Bluetooth* profiles for the first time.

Using the Microsoft Bluetooth software

If you are using Windows XP and want to use the Microsoft standard *Bluetooth* features, install the software by following the instructions in “Installing the Microsoft *Bluetooth* software in Windows XP” on page 69.

For information about how to use the *Bluetooth* function, do as follows:

1. Press Fn+F5 to turn on *Bluetooth*.
2. Click **Start → Control Panel**.
3. Click **Printers and Other Hardware**.
4. Click **Bluetooth Devices**.
5. Click the **Options** tab.
6. Click **Learn more about Bluetooth Settings**.

Using ThinkPad Bluetooth with Enhanced Data Rate Software

If ThinkPad *Bluetooth* with Enhanced Data Rate Software is installed on your computer, two icons are displayed on the screen:

- My *Bluetooth* Places on the desktop
- *Bluetooth* Configuration in the system tray of the task bar

To use the *Bluetooth* features, do the following:

1. Double-click the **My Bluetooth Places** icon on the desktop.
2. For Windows XP, go to *Bluetooth* Tasks and double-click **View devices in range**. A list of the devices on which *Bluetooth* has been enabled appears.
3. Click the device to which you want access. A list of the services available on that device appears, as follows:
 - *Bluetooth* keyboard and mouse (Human interface devices)
 - Printer (HCRP)
 - Audio gateway
 - Headset
 - PIM synchronization
 - Fax
 - File transfer
 - PIM item transfer
 - Dial-up networking
 - Network access
 - *Bluetooth* serial port
 - Bluetooth Imaging
 - Hands Free
 - AV profile
4. Click the service you want.

For more information, press the F1 key to open the online help for *Bluetooth*.

***Bluetooth* Configuration**

To use the configuration features of *Bluetooth*, right-click the icon. A pop-up menu appears. Select ***Bluetooth* Setup Wizard** or **Advanced Configuration**.

The *Bluetooth* Setup Wizard has the following capabilities:

- Finding all *Bluetooth*-enabled devices that can provide services
- Finding a specific *Bluetooth*-enabled device that you want to use, and configuring the services on that device
- Configuring the *Bluetooth*-enabled services on your computer that are provided for remote devices
- Configuring the name and device type of your computer

The Advanced Configuration has the following functions:

- Configuring the name and device type of your computer
- Configuring your computer settings so that remote *Bluetooth*-enabled devices can find your computer
- Configuring your computer settings so that your computer can find remote *Bluetooth*-enabled devices
- Configuring, on your computer, the *Bluetooth*-enabled services provided for remote devices
- Configuring the services on remote *Bluetooth*-enabled devices
- Displaying information about *Bluetooth* hardware

For details, refer to the help for *Bluetooth*. To see the help, double-click **My Bluetooth Places**, and click **Help** and then **Bluetooth help**. Another way to start the help is to right-click **Bluetooth Configuration** in the system tray of the task bar, and click **Advanced Configuration** and then **Help**.

Installing the Microsoft *Bluetooth* software in Windows XP

If you want to use the Microsoft *Bluetooth* software, do as follows:

1. First uninstall the ThinkPad *Bluetooth* with Enhanced Data Rate Software.
 - a. Turn *Bluetooth* power off.
 - b. Click **Start → Control Panel**.
 - c. Click **Add or Remove Programs**.
 - d. Select **ThinkPad Bluetooth with Enhanced Data Rate Software**; then click **Change/Remove** to uninstall the software.
 - e. Follow the instructions on the screen.
2. Next install the Microsoft *Bluetooth* software as follows:
 - a. Turn *Bluetooth* power on. Microsoft *Bluetooth* software is loaded automatically.
 - b. If the Found New Hardware Wizard window pops up, do the following:
 - 1) Select **No, not this time**, and then click **Next**.
 - 2) Select **Install from a list or specific location (Advanced)**; then click **Next**.
 - 3) Select **Search for the best driver in those locations**.
 - 4) Select **Include this location in the search:**, and type C:\SWTOOLS\Drivers\MSBTooth, or specify the location in which you placed the extracted INF file. Then click **Next**.
 - c. Click **Finish**.

Installing ThinkPad Bluetooth with Enhanced Data Rate Software in Windows XP

If you are using the Microsoft *Bluetooth* software and want to use ThinkPad *Bluetooth* with Enhanced Data Rate Software instead, replace the Microsoft *Bluetooth* software with ThinkPad *Bluetooth* with Enhanced Data Rate Software as follows:

1. Press Fn+F5 to turn the *Bluetooth* power on.
2. Click **Start → Run**.
3. Type C:\SWTOOLS\Drivers\TPBTooth\Setup.exe (or specify the full path to the setup.exe file you have downloaded from <http://www.lenovo.com/support>); then click **OK**.
4. Click **Next**.
5. Select **I accept the terms in the license agreement**; then click **Next**.
6. Click **Next** to select the default destination folder.

If you need to change the destination folder, click **Change**, select or enter the name of the destination folder in the Change current destination folder window, and click **OK**.
7. Click **Install** to begin installation.
8. Click **OK** to accept the driver signature.
9. Click **Finish**.
10. Restart the computer if necessary.

If you did not turn the *Bluetooth* power on before installing ThinkPad *Bluetooth* with Enhanced Data Rate Software, that is, if you skipped step 1, replace the *Bluetooth* driver as follows:

1. Click **Start → Control Panel**.

2. Click **Performance and Maintenance**; then click **System**.
3. Click the **Hardware** tab; then click **Device Manager**.
4. Double-click **Bluetooth Radios** to extract the *Bluetooth Radios* device tree.
5. Double-click the **ThinkPad Bluetooth with Enhanced Data Rate** icon to open the Properties window.
6. Click the **Driver** tab; then click **Update Driver**.
7. Click **No, not this time**, and then click **Next**.
8. Select **Install from a list or specific location (Advanced)**, and then click **Next**.
9. Select **Don't search. I will choose the driver to install**; then click **Next**.
10. Select the driver that has no "Digital Signed" icon; then click **Next**.
11. Click **Finish**.

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

Using WiMAX

Some ThinkPad notebooks come with a built-in wireless LAN card integrating WiMAX technology.

WiMAX, a long-range wireless data transmission technology based on the 802.16 standard, provides you with a "last mile" broadband connectivity similar to that offered by cable or ADSL, but without the need to physically connect a cable to the PC.

To use the WiMAX feature, start Access Connections.

For Windows 7: To start the Access Connections wizard, see "Accessing applications in Windows 7" on page 34, and follow the instructions on the screen.

For Windows Vista and Windows XP: To start the Access Connections wizard, click **Start → All Programs → ThinkVantage → Access Connections**. Then follow the instructions on the screen.

Checking wireless connection status

Access Connections Gauge (Windows 7)

If your computer is running Windows 7, the Access Connections Gauge in the task bar displays the signal strength and status of your wireless connection.

Note: To display Access Connections Gauge in the task bar, see the Help in Access Connections.

You can find more detailed information about the signal strength and status of your wireless connection by opening Access Connections or by right-clicking the Access Connections Gauge in the task bar and selecting **View Status of Wireless Connection**.

- Access Connections Gauge states: wireless LAN
 -  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 system 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 Gauge states: wireless WAN

-  No signal
-  Signal level 1
-  Signal level 2
-  Signal level 3

Note: For more information about Access Connections Gauge, see the Help in Access Connections.

Access Connections icon and wireless status icon

The Access Connections icon displays general connection status.

The wireless status icon displays the signal strength and status of your wireless connection.

You can find more detailed information about the signal strength and status of your wireless connection either by opening Access Connections or by double-clicking the Access Connections wireless status icon in the task bar.

Note: If your computer is a Windows 7 model, to display the Access Connections status icon and the wireless status icon in the system tray, refer to the Access Connections on-line help.

- Access Connections icon states

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

- Wireless status icon states: wireless LAN

-  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 system closer to the wireless access point.

- Wireless status icon states: wireless WAN

-  Power to the WAN radio is off
-  No association
-  No signal
-  Signal level 1
-  Signal level 2
-  Signal level 3

Note: If you have trouble in making a connection, try moving your computer closer to your wireless access point.

Enabling or disabling the wireless feature

To enable or disable the wireless feature, press Fn+F5. A list of wireless features is displayed. You can turn the feature on and off with a single click.

You can also enable or disable the feature by the following procedures.

To enable the wireless feature, do as follows:

1. Click the Access Connections wireless status icon in the system tray.
2. Click **Power On Wireless Radio**.

To disable the wireless feature, do as follows:

1. Click the Access Connections wireless status icon in the system tray.
2. Click **Power Off Wireless Radio**.

Notes:

- You can use the wireless radio switch to disable the wireless radio of all the wireless devices on your computer.
- If your computer is a Windows 7 model, to display the Access Connections status icon and the wireless status icon in the system tray, refer to the Access Connections on-line help.

Using a projector or external display

Your computer comes with many features to increase the enjoyment of your computer and help you give presentations with confidence.

Changing display settings

You can change the display settings, such as font size or color mode or numeric lock.

Font size

To make a font size larger, do as follows:

For Windows 7:

1. Right-click on the desktop, and click **Personalize**.
2. Click **Display** at the left.
3. Select the **Medium** or **Larger** radio button.
4. Click **Apply**. The change will take effect after you log off.

For Windows Vista:

1. Right-click on the desktop, and click **Personalize**.
2. Click **Adjust font size (DPI)** under **Tasks** at the left. If you are prompted for an administrator password or confirmation, type the password or provide confirmation.
3. Select the **Larger scale (120DPI)- make text more readable** check box.
4. Click **OK**. The change will take effect after the computer restarts. You are prompted to restart the computer after you click **OK** or **Apply**.

For Windows XP:

1. Right-click on the desktop, and click **Properties**. The Display Properties window opens.
2. Click the **Appearance** tab.

3. Under **Font Size**, click **Large Fonts** or **Extra Large Fonts**.
4. Click **Apply** to apply the settings.
5. Click **OK**. If you are prompted to restart the computer after you click **OK** or **Apply**, the change will take effect after the computer restarts.

Numeric lock

To change the numeric lock setting, do as follows:

For Windows 7:

1. Right-click on the desktop, and click **Personalize**.
2. Click **Display** at the left.
3. Click **Change display settings**.
4. Click **Advanced settings**, select the **On Screen Display** tab, and then click **Num Lock Settings**.
5. The setting window opens.
6. Follow the instructions on the screen.

For Windows Vista:

1. Right-click on the desktop, and click **Personalize**.
2. Click **Display Settings**.
3. Click **Advanced Settings**, select the **On Screen Display** tab, and then click **Num Lock Settings**.
4. The setting window opens.
5. Follow the instructions on the screen.

For Windows XP:

1. Right-click on the desktop, and click **Properties**. The Display Properties window opens.
2. Click the **Settings** tab.
3. Click **Advanced**, select the **On Screen Display** tab, and then click **Num Lock Settings**.
4. The setting window opens.
5. Follow the instructions on the screen.

Connecting a projector or external display

Attaching an external monitor

Your computer can support a maximum video resolution of up to 2048x1536 (with an external monitor attached to the CRT connector) or up to 2560x1600 (with an external monitor attached to the DisplayPort connector), provided that the external monitor also supports that resolution. For more details, refer to the manuals provided with your monitor.

You can set any resolution for either the computer display or the external monitor. When you use both at the same time, the resolution of both is the same. If you set a higher resolution for the computer display, you can see only part of the screen at a time. You can see other parts by moving the image with the TrackPoint or another pointing device.

You can move the display output to the computer display, the external monitor, or both in the Display Settings window (in Windows XP, Display Properties window).

Connecting an external monitor

To attach an external monitor, do as follows:

For Windows 7:

1. Connect the external monitor to the monitor connector; then connect the monitor to an electrical outlet
2. Turn on the external monitor.
3. Change the display output location by pressing Fn+F7. This allows you to switch between viewing output on the external display, the computer display, and both displays.

Note: If your computer cannot detect the external monitor, right-click on the desktop, then select **Screen resolution**. Click the **Detect** button.

For Windows Vista:

1. Connect the external monitor to the monitor connector; then connect the monitor to an electrical outlet.
2. Turn on the external monitor.
3. If this is the first time the external monitor has been connected, the New Display Detected dialog box opens. Select one of the following, and then click **OK**.
 - **Duplicate my desktop on all displays (mirrored)**
 - **Show different parts of my desktop on each display (extended)**
 - **Show my desktop on the external monitor only**

Note: If your computer cannot detect the external monitor, the New Display Detected dialog box does not open. For details, refer to the Windows online help.

For Windows XP:

1. Turn off the computer.
2. Connect the external monitor to the monitor connector; then connect the monitor to an electrical outlet.
3. Turn on the external monitor and the computer.
4. Change the display output location by pressing Fn+F7. This allows you to switch between viewing output on the external display, the computer display, and both displays.

Notes:

- Do not change the display output location while a moving picture is being drawn, for example, while playing a movie or a game, or viewing a business presentation. Close the application before changing the display output location, or change the display mode before you open an MPEG file to play.
- If you are attaching an external monitor that supports only VGA mode (640x480 resolution), do not view output on both the computer display and the external monitor. Doing so would cause the external monitor screen to be scrambled and the output not to be displayed; in addition, it could cause damage to the screen. Use the external monitor only.
- If the external TFT monitor you connect has an analog interface, flickers or ripples may appear on some displays, such as the shutdown screen of Windows. This is caused by the external TFT monitor, and cannot be fixed by adjusting the external TFT monitor or the computer side settings.

Setting the monitor types

To set your monitor type, do as follows:

For Windows 7:

1. Connect the external monitor to the monitor connector, and then connect the monitor to an electrical outlet.
2. Turn on the external monitor.

3. Right-click on the desktop, and click **Screen resolution**.

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

4. Set **Resolution**.
5. Click **Advanced Settings**.
6. Click the **Monitor** tab. Check the monitor information window to make sure that the monitor type is correct. If it is, click **OK** to close the window; otherwise do as follows.
7. If more than two monitor types are displayed, select **Generic PnP Monitor** or **Generic Non-PnP Monitor**.
8. Click **Properties**. If you are prompted for an administrator password or confirmation, type the password or provide confirmation.
9. Click the **Driver** tab.
10. Click **Update Driver**.
11. Click **Browse my computer for driver software**, and then click **Let me pick from a list of device drivers on my computer**.
12. Clear the **Show compatible hardware** check box.
13. Select **Manufacturer** and **Model** for your monitor. If you cannot find your monitor in the list, stop the installation of this driver and use the driver shipped with your monitor.
14. After updating the driver, click **Close**.
15. Click **OK**.

Note: To change the color settings, right-click on the desktop, and click **Screen resolution**. Click **Advanced Settings**, select the **Monitor** tab, then set **Colors**.

For Windows Vista:

Note: If you select **Show different parts of my desktop on each display (extended)**, refer to “Using the Extend desktop function” on page 78.

1. Connect the external monitor to the monitor connector, and then connect the monitor to an electrical outlet.
2. Turn on the external monitor.
3. Press Fn+F7 to change the display output location to the external monitor.
4. Right-click on the desktop, and click **Personalize**.
5. Click **Display Settings**. The Display Settings window opens.
6. Click **Advanced Settings**.
7. Click the **Monitor** tab. Check the monitor information window to make sure that the monitor type is correct. If it is, click **OK** to close the window; otherwise do as follows.
8. If more than two monitor types are displayed, select **Generic PnP Monitor** or **Generic Non-PnP Monitor**.
9. Click **Properties**. If you are prompted for an administrator password or confirmation, type the password or provide confirmation.
10. Click the **Driver** tab.
11. Click **Update Driver**.
12. Click **Browse my computer for driver software**, and then click **Let me pick from a list of device drivers on my computer**.
13. Clear the **Show compatible hardware** check box.
14. Select **Manufacturer** and **Model** for your monitor. If you cannot find your monitor in the list, stop the installation of this driver and use the driver shipped with your monitor.
15. After updating the driver, click **Close**.

16. Set **Resolution** and **Colors** in the Display Settings window.
17. Click **OK**.

For Windows XP:

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. Press Fn+F7 to change the display output location to the external monitor.
4. Right-click on the desktop, and click **Properties** to open the Display Properties window.
5. Click the **Settings** tab.
6. Click **Advanced**.
7. Click the **Monitor** tab. Check the monitor information window to make sure that the monitor type is correct. If it is, click **OK** to close the window; otherwise do as follows.
8. If more than two monitor types are displayed, select **Default Monitor**.
9. Click **Properties**.
10. Click the **Driver** tab.
11. Click **Update Driver**. The Hardware Update Wizard appears.
12. Click **No, not this time**, and then click **Next**.
13. Select **Install from a list or specific location (Advanced)**, and then click **Next**.
14. Select **Don't search. I will choose the driver to install**, and then click **Next**.
15. Clear the **Show compatible hardware** check box.
16. Select **Manufacturer** and **Model** for your monitor. If you cannot find your monitor in the list, stop the installation of this driver and use the driver shipped with your monitor.
17. After updating the driver, click **OK** to close the Properties window.
18. Set **Colors** and **Screen area** in the Display Properties window.
19. Click **OK**.

Considerations for attaching an external monitor

- When installing an operating system, you must install the display driver for your monitor that is supplied with the computer, and the Monitor INF file that is supplied with the external monitor.
- If you set a resolution higher than the resolution you are using on the panel, and use a panel that does not support that resolution, take advantage of the virtual screen function, which enables you to display only a part of the high-resolution screen image your computer produces. You can see other parts of the image by moving the screen with the TrackPoint or other pointing device.
- If the external monitor you are using is outdated, the resolution and the refresh rate may be limited.

Using the DVI monitor

If your computer has one of the optional expansion units, a ThinkPad Mini Dock Plus Series 3 or a ThinkPad Mini Dock Series 3, you can use the Digital Visual Interface (DVI) monitor through the DVI connector of that unit.

Notes:

- The screen mode that can be used depends on the specifications of the DVI monitor.
- Before you attach the DVI monitor, make sure that the computer is attached to the expansion unit and the system works properly.

To attach the DVI monitor, do as follows:

1. Turn off the computer.

2. Connect the DVI monitor to the DVI connector of the expansion unit, and then connect the monitor to an electrical outlet.
3. Turn on the DVI monitor and the computer. The system starts.

If the computer output does not appear on the DVI monitor, do as follows:

For a computer that has the Intel display adapter:

1. Press Ctrl+Alt+F12. The **Intel Graphics Media Accelerator Driver for mobile** window appears.
2. Select **Digital Display**, **Intel Dual Display Clone**, or **Extended Desktop**. If you select **Digital Display**, the computer output appears on the DVI monitor only. If you select **Intel Dual Display Clone** or **Extended Desktop**, the output appears both on the computer display and on the DVI monitor.
3. Click **OK**.

Considerations for attaching a DVI monitor

Connect the DVI monitor to the expansion unit, and turn it on before you turn on the computer. Otherwise the system cannot recognize that the monitor is connected. If the option for enabling the DVI monitor in the Display Properties window does not appear, try closing the window and opening it again. If the option still does not appear, make sure that the connector of the monitor is attached firmly, and repeat the procedure for attaching the monitor.

Using the DisplayPort connector

Your computer has a DisplayPort connector, the latest digital display interface for connection to various external devices, such as CRT monitors, projectors, or even HDTV. This compact connector enables a plug-and-play setup and supports adaptors that can plug into DVI, VGA, or HDMI ports.

The DisplayPort connector of your computer supports audio as well as video streaming.

Setting up a presentation

Note: If your computer is a Windows 7 model, it does not support Presentation Director, but the Fn+F7 or Win+P key combination is available for switching display output to a connected projector.

Presentation Director provides an easy way to set up your computer to help you give presentations with confidence, even when you are away from your office.

Use Presentation Director to adjust resolution settings and temporarily disable power management timers to ensure an uninterrupted presentation.

Presentation Director has some predefined presentation schemes. To apply a presentation scheme, you can use the Fn+F7 key combination.

To start Presentation Director, click **Start → All Programs → ThinkVantage → Presentation Director**, and follow the instructions on the screen.

Projecting video

To display information and make presentations, you can attach a data projector to your computer. Attach the data projector to the monitor connector on your computer.

Note: It may take several seconds before the projector displays the image. If you do not see your desktop displayed after 60 seconds, try pressing Fn+F7 to switch between different display output locations.

You can create a presentation scheme by following the instructions of the Presentation Director, with the projector attached to your computer. You can save the scheme for a future presentation with the same equipment.

Playing sound

Your projector might have one or more audio-input connectors. To project sound, you will need to attach the combo audio jack on your computer to these connectors, using an audio cable (commercially available).

Using dual displays

Using the Extend desktop function

Your computer supports a function named the Extend desktop. With the Extend desktop function, you can display output on both the computer display and an external monitor. You can also display different desktop images on each monitor.

You can use the Extend desktop function without changing any settings. If the function does not work, refer to “Enabling the Extend desktop function” on page 78 to enable it.

Considerations for using the Extend desktop function

- If you want to show DOS full-screen while in the Extend desktop mode, only the primary display shows DOS; the other display is blacked out.

If your computer has the Intel display adapter, you can designate the other display as the primary display by doing the following:

1. Press Ctrl+Alt+F12. The Intel CUI window opens.
 2. Select **Extended Desktop**.
 3. Change the setting to designate the primary display.
- When an application using the DirectDraw or the Direct3D is played in full-screen mode, it is shown only on the primary display.
 - You cannot use the display switching function when you are in the Extend desktop mode.

Enabling the Extend desktop function

To enable the Extend desktop function, do as follows:

For Windows 7:

1. Connect the external monitor to the monitor connector; then connect the monitor to an electrical outlet.
2. Turn on the external monitor.
3. Press Fn+F7, then select **Extend**.

To change the resolution for each monitor, do as follows:

1. Right-click on the desktop, and click **Screen resolution**.
2. Click the **Monitor-1** icon (for the primary display, the computer display).
3. Select the **Resolution** of the primary display.
4. Click the **Monitor-2** icon (for the secondary display, the external display).
5. Select the **Resolution** of the secondary display.
6. Place the icons for the monitors so that they touch.

Note: You can set the monitors in any relative position, but the icons must touch each other.

7. Click **OK** to apply the changes.

Note: To change the color settings, right-click on the desktop, and click **Screen resolution**. Click **Advanced Settings**, select the **Monitor** tab, then set **Colors**.

For Windows Vista:

1. Connect the external monitor to the monitor connector; then connect the monitor to an electrical outlet.
2. Turn on the external monitor.
3. If this is the first time the external monitor has been connected, the New Display Detected dialog box opens. Select **Show different parts of my desktop on each display (extended)**, and then click **OK**.

To change the resolution for each monitor, do as follows:

1. Right-click on the desktop, and click **Personalize**.
2. Click **Display Settings**. The Display Settings window opens.
3. Click the **Monitor-1** icon (for the primary display, the computer display).
4. Select the **Resolution** and the **Colors** of the primary display.
5. Click the **Monitor-2** icon (for the secondary display, the external display).
6. Select the **Resolution** and the **Colors** of the secondary display.
7. Place the icons for the monitors so that they touch.

Note: You can set the monitors in any relative position, but the icons must touch each other.

8. Click **OK** to apply the changes.

For Windows XP:

1. Turn off the computer.
2. Connect the external monitor to the monitor connector; then connect the monitor to an electrical outlet.
3. Turn on the external monitor and the computer.
4. Right-click on the desktop, and click **Properties** to open the Display Properties window.
5. Click the **Settings** tab, and click the **Monitor-2** icon.
6. Select the **Extend my Windows desktop onto this monitor** check box and click **Apply**. (If the Monitor Settings window opens, click **Yes**.)

To change the resolution for each monitor, do as follows:

1. Click the **Monitor-1** icon (for the primary display, the computer display).
2. Select the **color quality** and the **screen resolution** of the primary display.
3. Click the **Monitor-2** icon (for the secondary display, the external display).
4. Select the **color quality** and the **screen resolution** of the secondary display.
5. Place the icons for the monitors so that they touch.

Note: You can set the monitors in any relative position, but the icons must touch each other.

6. Click **OK** to apply the changes.

Using audio features

Your computer is equipped with the following:

- Combo audio jack, 1/8 inch (3.5 mm) in diameter
- Built-in stereo speakers
- Built-in dual array digital microphone

Your computer also has an audio chip that enables you to enjoy various multimedia audio features:

- Compliant with Intel High Definition Audio.

- Recording and playback of PCM and WAV files in 16-bit or 24-bit format.
- Playback of a WAV file at a sample rate of 44.1KHz to 192 KHz.
- Playback of MIDI files through a Wave table synthesizer under Microsoft Windows operating systems.
- Playback of MP3 files through the Windows Media Player or a software MP3 player.
- Recording from various sound sources, such as a headset attached either to the combo audio jack of your computer or to the microphone jack of the ThinkPad Mini Dock Series 3 or the ThinkPad Mini Dock Plus Series 3.

Note: The combo audio jack does not support a conventional microphone.

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

Table 3. Audio feature list

Jacks	Headset with a 3.5 mm 4-pole plug	Conventional headphone	Conventional microphone
Combo audio jack	Headphone and microphone functions supported	Headphone function supported	Not supported
Headphone jack of the docking station	Only headphone function supported Microphone function not supported	Headphone function supported	Not supported
Microphone jack of the docking station	Not supported	Not supported	Microphone function supported

Beam Forming feature

A built-in dual array digital microphone is mounted at the top of the display. Whereas a conventional single-element microphone captures sounds from all around, the built-in dual array digital microphone is designed to capture the sound from an exceptionally limited angle, through the combination of a specialized microphone array with a capability of digital signal processing. Therefore the microphone captures sounds from the area in front of the system clearly, but blocks out almost all the sounds from outside the capturing range. Thus the speech of a user sitting in front of the system is input to the system without interference from noise in the surrounding area. To record your speech most clearly, you should speak directly in front of the computer.

Configuring for sound recording

To configure the microphone for optimized sound recording, open the SmartAudio window as follows:

For Windows 7 and Windows Vista: Click **Start** → **Control Panel** → **Hardware and Sound** → **SmartAudio**. The SmartAudio window opens.

For Windows XP: Click **Start** → **Control Panel**. Switch to Classic View and click **SmartAudio**. The SmartAudio window opens.

Using an integrated camera

If your computer has an integrated camera, when you press Fn+F6 to open the Communications settings window, the camera will be launched and the green camera-in-use indicator will turn on automatically. In the Communications settings window, you can preview your video image and take a snapshot of your current image.

You can also 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 videoconferencing 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 documentation that came with the program.

If you do not want the camera to be launched automatically when you press Fn+F6 or when you use a program, press Fn+F6 to open the Communications settings window and click the **Hide my camera image** button to disable the camera.

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:

1. Press Fn+F6. The Communications settings window opens.
2. Click the **Manage Settings** button. The Communications Utility window opens.
3. In the Communications Utility window, configure the camera settings depending on your individual needs.

Using the ThinkLight feature

You can use your computer under less than perfect lighting conditions by enabling the ThinkLight feature. To illuminate the keyboard by turning on your ThinkLight, press Fn+PgUp.



Note: Avoid using your computer in dark conditions for prolonged periods. It is bad for your eyes.

Note: ThinkLight is not available in ThinkPad X220 Tablet and X220i Tablet models.

Using the media card reader

Depending on the model, your computer may have an ExpressCard slot for a 54 mm-wide card, a media card reader slot, or a smart card reader slot.

If your computer has a media card reader slot, it supports the following cards:

- SD card
- SDHC card
- SDXC card
- MultiMediaCard (MMC)

Notes:

- Your computer does not support the CPRM feature for the SD card.
- When transferring data to or from a flash media card, such as an SD card, do not put your computer in sleep (standby) or hibernation mode before the data transfer is complete. To do so might cause damage to your data.

For more information on ExpressCards, smart cards, and flash media cards, refer to any of the following topics:

- “Inserting an ExpressCard, a flash media card, or a smart card” on page 82.
- “Removing an ExpressCard, a flash media card, or a smart card” on page 83.

Inserting an ExpressCard, a flash media card, or a smart card

Attention: Do not insert an ExpressCard while the computer is in sleep (standby) mode or hibernation mode. If you do, the computer may not respond when you try to resume using it.

Attention: Before you start installing any of the following cards, touch a metal table or a grounded metal object. This action reduces any static electricity from your body. The static electricity could damage the card.

- 54 mm-wide ExpressCard
- Flash media card, such as an SD card, an SDHC card, an SDXC card, and a MultiMediaCard
- Smart card

For information about the location of the ExpressCard slot, flash media card reader slot, and smart card slot, see “Locating computer controls, connectors, and indicators” on page 1.

To insert a 54 mm-wide ExpressCard into the ExpressCard slot, do the following:

1. Make sure that the card is correctly oriented.
2. Push the slot cover, and insert the card into the slot with the notched edge facing upward. Then press the card firmly into the connector.

To insert a flash media card into the 4-in-1 media card reader slot, do the following:

1. Make sure that the card is correctly oriented.
2. Insert the card firmly into the 4-in-1 media card reader slot. The card may stop before it is completely installed into the slot.

To insert a smart card into the smart card slot, do the following:

1. Make sure that the card is correctly oriented.
2. Insert the card so that the metallic contact is up and goes in first. Insert the card firmly into the slot.

If the ExpressCard, flash media card, or smart card is not Plug and Play, do the following:

- For Windows 7:
 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. From the **Action** menu, select **Add legacy hardware**. The Add Hardware Wizard starts.
 5. Follow the instructions on the screen.
- For Windows Vista and Windows XP:
 - Open Control Panel and switch to Classic view.
 - Double-click the **Add Hardware** icon. The Add Hardware Wizard starts.
 - Follow the instructions on the screen.

Removing an ExpressCard, a flash media card, or a smart card

Attention: Before removing a storage ExpressCard, such as a flash memory ExpressCard, a solid state ExpressCard, or a memory card reader ExpressCard, from an ExpressCard slot, **you must stop** the ExpressCard. Otherwise, data on the ExpressCard might be corrupted or lost.

Attention: Do not remove an ExpressCard while the computer is in sleep (standby) mode or hibernation mode. If you do, the system will not respond when you try to resume operation.

For information about the location of the ExpressCard slot, flash media card reader slot, and smart card slot, see “Locating computer controls, connectors, and indicators” on page 1.

To remove an ExpressCard, a flash media card, or a smart card, do the following:

For Windows 7:

1. Click the **Show hidden icons** in the task bar.
2. Right-click **Safely Remove Hardware and Eject Media** icon.
3. Select corresponding item to eject the card from the Windows operating system.
4. Press the card to eject it from your computer.
5. Remove the card from your computer and store it safely for future use.

For Windows Vista and Windows XP:

1. Click the **Safely Remove Hardware** icon in the task bar
2. Select corresponding item to eject the card from the Windows operating system.
3. Press the card to eject it from your computer.
4. Remove the card from your computer 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 once, then insert it again.

Chapter 3. You and your computer

This chapter provides you information about accessibility and traveling with your computer.

This chapter contains the following topics:

- “Accessibility and comfort” on page 85
- “Traveling with your computer” on page 88

Accessibility and comfort

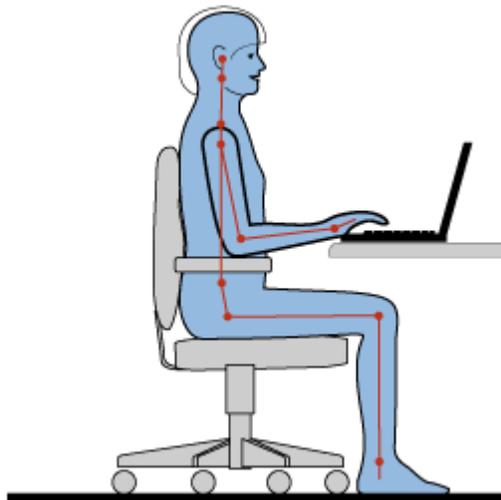
Because your computer enables you to work in so many places, it is important that you remain attentive to good posture, good lighting and proper seating. By keeping these considerations in mind, you can improve performance and achieve greater comfort.

Lenovo is committed to providing the latest information and technology to our customers with disabilities. Refer to our accessibility information which outlines our efforts in this area.

Ergonomic information

Working in the virtual office may mean adapting to frequent changes in your environment. Following some simple rules will make things easier and bring you the maximum benefits of your computer. Keeping in mind such basics as good lighting and proper seating, for example, can help you improve your performance and achieve greater comfort.

Note: This 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: Below are some general recommendations for assuming a healthy working posture. It is best to periodically 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 will also help to prevent any minor discomfort associated with your working posture.

Display: Position the display to maintain a comfortable viewing distance of 510-760 mm (20-30 inch). 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. Press Fn+Home or End to adjust display brightness.

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.

Arm and Hand Position: If available, utilize chair arm rests or an area on your working surface to provide weight support for your arms. 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 may 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 the tips as possible. Sitting properly and using adequate lighting, for example, will help you maintain desirable levels of comfort and performance.

Questions about vision?

ThinkPad notebook's visual display screens 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.

Adjusting your computer to fit you

Because your computer enables you to work in so many places, it is important that you remain attentive to good posture, good lighting and proper seating. Refer to the following tips to improve performance and achieve greater comfort:

Active sitting and rest breaks: The longer you sit and work with your computer the more important it is to observe your working posture. Following "general recommendations for maintaining a healthy working posture" on page 85 and practicing "active sitting" are the best ways 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 a light and mobile system; remember that it can easily be repositioned on your working surface to accommodate many posture modifications you might wish to make.

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 utilizing work breaks. Note that there are many ThinkPad product solutions available to help you modify and expand your computer to best suit your needs. Access the following Web site to view some of these options: <http://www.lenovo.com/accessories/services/index.html>. Explore your options for docking solutions and external products that can provide the adjustability and features that you want.

ThinkPad features that promote comfort: There are easy to use ThinkPad features that can help make your computer more comfortable to use.

Accessibility information

Lenovo is committed to providing people with disabilities greater access to information and technology. As a result, the following information provides ways to help users that have hearing, vision, and mobility limitations get the most out of their computer experience.

Assistive technologies enable users to access information in the most appropriate way. Some of these technologies are already provided in your operating system, others can be purchased through vendors, or accessed through the World Wide Web.

Assistive technologies

Some accessibility technologies are available through the Accessibility Options program. Depending on your operating system, the number of accessibility options available varies. In general, accessibility options enhance the way users with hearing, vision, or mobility limitations navigate and use their computer. For example, some users might not have the fine motor skills required to use a mouse or select key combinations. Other users might require larger fonts or high-contrast display modes. In some cases, magnifiers and built-in speech synthesizers are available. For detailed information about each of these features, consult the Microsoft help system.

To use the Accessibility Options program, do as follows:

For Windows 7 and Windows Vista:

1. Click **Start**, and then click **Control Panel**.
2. Click **Ease of Access**.
3. Click **Ease of Access Center**.

For Windows XP:

1. Click **Start**, and then click **Control Panel**.
2. Click **Accessibility Options**.

This help system supports the accessibility features provided by your Windows operating system, screen readers designed to operate in the Windows environment, and Windows keyboard navigation. For a complete listing of Microsoft Windows Keyboard Guide, go to:
<http://www.microsoft.com/enable/Products/altkeyboard.aspx>

Screen reader technologies are primarily focused on software application interfaces, help systems, and a variety of online documents. However, in the case where a screen reader cannot read documents, the document must first go through a conversion process. One solution converts Adobe PDF files into a format that is read by the screen-reader programs. This solution is a Web-based service provided by Adobe Systems Incorporated. Through <http://access.adobe.com>, Adobe PDF documents can be converted to HTML or plain text in many languages. One conversion option converts PDF documents on the Internet. A second option enables users to submit the URL of an Adobe PDF file through e-mail to convert it to HTML or ASCII text. Adobe PDF files on a local hard disk drive, local CD-ROM, or local area network (LAN) can also be converted by attaching the Adobe PDF file to an e-mail message.

FullScreen Magnifier function

Some models support the FullScreen Magnifier function, which enlarges the active window and makes it easier for you to use the computer display.

To enable the FullScreen Magnifier function, press Fn+Spacebar. The active window is magnified and the FullScreen Magnifier icon is displayed in the system tray at bottom right of your screen. Then you can change the zoom resolution. Click the FullScreen Magnifier icon and make your choice.

To disable the FullScreen Magnifier function, click the FullScreen Magnifier icon and select **Exit** or press Fn+Spacebar.

Traveling with your computer

When you travel abroad, your computer can help you feel more at home and at ease. With your own computer and its files, you can be confident about gathering and offering information to clients and coworkers.

Attending to some important details that can help foreign travel go smoothly:

- “Travel tips” on page 88
- “Travel accessories” on page 88

Travel tips

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

1. While 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.
2. Consider bringing an airplane or automobile adapter for your computer.
3. Because you might need to use your computer in less than perfect lighting conditions, turn on the ThinkLight by pressing Fn+PgUp to illuminate the keyboard.
4. If you carry an ac power adapter, detach the ac cord from it to avoid damaging the cord.

Note: If you use the ThinkLight, the battery life is slightly reduced.

Travel tips on airplanes

If you carry your computer into an airplane, check the travel tips.

Attention:

- For using onboard computer or wireless (such as Internet, *Bluetooth*, etc.) service, check the services with the airline before boarding the airplane.
- If there are restrictions on the use of computers with the wireless feature on an airplane, you need to disable it before boarding. To disable it, refer to the instructions in “Enabling or disabling the wireless feature” on page 72.

Follow the tips below.

1. 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.
2. Remember to hibernate or turn off your computer when taking off.

Travel accessories

Here is a checklist of things to consider packing when you are going to be out of the office:

Travel Essentials:

- ThinkPad ac power adapter
- External mouse, if you are accustomed to using one
- Ethernet cable
- Standard phone cable and modular jack (RJ-11)
- Extra battery, charged

- A quality carrying case that provides adequate cushion and protection

If you are traveling to another country you might want to consider these items:

- An ac power adapter for the country that you are traveling to
- An adapter to connect to a phone line in that country

Other items you may wish to consider:

- ThinkPad ac/dc Combo Adapter
- External storage device
- Phone line splitter, in case you need to dial manually or use your modem without disconnecting the phone line

Chapter 4. Security

This chapter provides information about how to protect your computer from theft and unauthorized use.

- “Attaching a mechanical lock” on page 91
- “Using passwords” on page 91
- “Hard disk security” on page 97
- “Setting the security chip” on page 98
- “Using a fingerprint reader” on page 99
- “Notice on deleting data from your hard disk drive or solid state drive” on page 107
- “Using and understanding firewalls” on page 108
- “Protecting data against viruses” on page 108

Attaching a mechanical lock

You can attach a mechanical lock to your computer, to help prevent it from being removed without your permission.

Attach a mechanical lock to the keyhole of the computer; then secure the chain on the lock to a stationary object. Refer to the instructions shipped with the mechanical lock.

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

Using passwords

By using passwords, you can help prevent your computer from being used by others. Once you set a password, a prompt appears on the screen each time you power on the computer. Enter your password at the prompt. You cannot use the computer unless you type the correct password.

Make sure that only authorized individuals access your computer. Establishing different kinds of passwords requires that other possible users know the proper passwords in order to access your computer or your data.



If this icon appears, enter the Power-on password or Supervisor password.



If this icon appears, enter the Hard disk password.



If this icon appears, enter the Supervisor password.

Click on the items below to find out more about passwords and how to use them to protect your computer.

- “Passwords and sleep (standby) mode” on page 92
- “Power-on password” on page 92
- “Hard disk security” on page 97

- “Supervisor password” on page 95

Passwords and sleep (standby) mode

If you have set passwords and you put your computer into sleep (standby) mode by pressing Fn+F4, the procedure for resuming operation is as follows:

- You are not prompted to type the password when resuming operation.
- If any hard disk or the solid state drive has a hard disk password, it is unlocked automatically when you resume operation.

Typing passwords



If this icon appears, enter the Power-on password or Supervisor password.



If this icon appears, enter the Hard disk password.. If you want to enter a master hard disk password, do the following:

1. Press F1. The icon changes to this: 
2. Now type the master hard disk password.

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



If this icon appears, enter the Supervisor password.

Note: You can press Backspace if you press a wrong key while you are typing your password.

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 appears on the screen whenever you turn on the computer. You must enter the correct password to start using the computer.

Setting a power-on password

1. Print these instructions.
2. Save all open files, and exit all applications.
3. Turn your computer off and then turn it on again.
4. When the logo screen is displayed, press F1. The ThinkPad Setup opens.
5. Select **Security**, using the cursor directional keys to move down the menu.
6. Select **Password**.
7. Select **Power-on Password**.
8. Choose your power-on password, and type it within the brackets on the **Enter New Password** field.

Note: You can set the minimum length of a power-on password in the **ThinkPad Setup** menu. For details, refer to “Security menu” on page 185.

9. Press Enter once to move to the next line. Retype the password you just entered to verify it.
10. Commit your password to memory and press Enter. A Setup Notice window is displayed.

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

11. Press F10 to exit.

Changing or removing the power-on password

To change the power-on password, follow the steps 1 through 9 above in “Setting a power-on password” on page 92, typing your password to get access to the ThinkPad Setup.

To change the password, do the following:

1. In the **Enter Current Password** field, type the current power-on password.
2. In the **Enter New Password** field, type the new power-on password; then retype the password you just entered to verify it in the **Confirm New Password** field.
3. Follow step 10 and step 11 above in “Setting a power-on password” on page 92 to change your power-on password.

To remove the password, do the following:

1. In the **Enter Current Password** field, type the current power-on password.
2. Leave the **Enter New Password** and **Confirm New Password** fields blank.
3. Follow step 10 and step 11 above in “Setting a power-on password” on page 92 to remove your power-on password.

Hard disk passwords

Two types of hard disk passwords help protect the information stored on the hard disk:

- User hard disk password
- Master hard disk password, which requires a 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 in order to gain access to files and applications on the hard disk.

The master password can be set and used only by a system administrator. Like a master key, it enables the administrator to get access to any hard drive in a system. The administrator sets the master hard disk password; and no one else knows it. Then the administrator sets a user hard disk password for each computer in the network, and tells each user the password for his or her computer. The user can change the user hard disk password as desired, but the administrator can still get access by using the master password.

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

Setting a hard disk password

1. Print these instructions.
2. Save all open files, and exit all applications.
3. Turn your computer off and then on again.
4. When the logo screen is displayed, press F1. The ThinkPad Setup opens.
5. Select **Security**, using the cursor directional keys to move down the menu.
6. Select **Password**.
7. Select **Hard Disk x Password**, where **x** is the number of the hard disk drive for which you want to set a password.

8. A Setup Confirmation window opens. You are prompted to select **User** or **User + Master**. Select **User** if you want to set only one hard disk password. If you are an administrator or supervisor, you can select **User + Master** to set two passwords. (The user can change the user password later.)
9. If you select **User + Master**, go to step 12.
10. If you select **User** only, a new-password window opens. Type your new password in the **Enter New Password** field.

Notes:

- You can set the minimum length of a hard disk password in the ThinkPad Setup menu. For details, refer to “Security menu” on page 185.
 - 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 get access to the drive.
11. Press Enter once to move to the next line. Retype the password you just entered to verify it. Go to step 18 to complete the procedure.
 12. If you select **User + Master**, a message window opens and prompts you to set up a user hard disk password first. Click **Continue**.
 13. A new hard disk user password window opens. Type your new password in the **Enter New Password** field.
 14. Press Enter once to move to the next line. Retype the password you just entered to verify it.
 15. A message window opens and prompts you to set the master hard disk password. Click **Continue**.
 16. A new master hard-disk password window opens. Type your new password in the **Enter New Password** field.
 17. Press Enter once to move to the next line. Retype the password you just entered to verify it.
 18. Commit your password to memory and press Enter. A Setup Notice window is displayed.

Attention: You might want to note your passwords and keep them in a safe place. Otherwise, if you forget the user-only password, or both user and master passwords, Lenovo cannot reset your passwords or recover data from the hard disk. You must take your computer to a Lenovo reseller or a marketing representative to have the hard disk drive replaced. Proof of purchase is required, and a fee will be charged for parts and service.

19. Press F10 to exit from the Setup Notice window.

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

Changing or removing a hard disk password

Follow steps 1 through 7 in “Setting a hard disk password” on page 93 above, typing your password to get access to the ThinkPad Setup program.

To change or remove the User only hard disk password, do as follows:

- To change the hard disk password, type the current password in the **Enter Current Password** field. Then type the new password in the **Enter New Password** field, and retype the password you just entered to verify it in the **Confirm New Password** field. Press Enter, and a Setup Notice window is displayed. Press F10 to exit from the Setup Notice window. The user hard disk password will be changed.
- To remove the hard disk password, type the current password in the **Enter Current Password** field. Then leave the **Enter New Password** and **Confirm New Password** fields blank, and press Enter. A

Setup Notice window is displayed. Press F10 to exit from the Setup Notice window. The user hard disk password will be removed.

To change or remove the **User + Master** hard disk password, select **User HDP** or **Master HDP**.

If you choose **User HDP**, do one of the following:

- To change the user hard disk password, type the current user hard disk password or the current master hard disk password in the **Enter Current Password** field. Then type the new user hard disk password in the **Enter New Password** field, and retype the password you just entered to verify it in the **Confirm New Password** field. Press Enter, and a Setup Notice window is displayed. Press F10 to exit from the Setup Notice window. Both the user and master hard disk passwords will be changed.
- To remove the user hard disk password, type the current master hard disk password in the **Enter Current Password** field. Then leave the **Enter New Password** and **Confirm New Password** fields blank, and press Enter. A Setup Notice window is displayed. Press F10 to exit from the Setup Notice window. Both the user and master hard disk passwords will be removed.

If you choose **Master HDP**, do one of the following:

- To change the master hard disk password, type the current master hard disk password in the **Enter Current Password** field. Then type the new master hard disk password in the **Enter New Password** field, and retype the password you just entered to verify it in the **Confirm New Password** field. Press Enter, and a Setup Notice window is displayed. Press F10 to exit from the Setup Notice window. The master hard disk password will be changed.
- To remove the master hard disk password, type the current master hard disk password in the **Enter Current Password** field. Then leave the **Enter New Password** and **Confirm New Password** fields blank, and press Enter. A Setup Notice window is displayed. Press F10 to exit from the Setup Notice window. Both the user and master hard disk passwords will be removed.

Supervisor password

The supervisor password protects the system information stored in the ThinkPad Setup. Without it, no one can change the configuration of the computer. It provides the following security features:

- If a supervisor password is set, a password prompt appears when you try to start the ThinkPad Setup. Unauthorized users cannot get access to configuration data.
- The system administrator can use the supervisor password to get access to 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:
 - Deleting the power-on password
 - Changing or deleting the supervisor password
 - Enabling or disabling the Wake on LAN® and Flash over LAN features
 - Enabling or disabling the Internal Network Option ROM feature
 - Changing date and time
 - Enabling or disabling the Lock UEFI BIOS Setting feature
 - Enabling or disabling the Password at unattended boot
 - Specifying the minimum length for power-on passwords and hard disk passwords
 - Changing the setting for the security chip
 - Enabling or disabling the Boot Device List F12 Option
 - Enabling or disabling the Boot Order Lock

- Enabling or disabling the Flash BIOS Updating by End-Users feature
- Enabling or disabling the Internal Network device
- Enabling or disabling the Internal Wireless device
- Enabling or disabling the Internal *Bluetooth* device
- Enabling or disabling the Internal Wireless WAN device
- Enabling or disabling the Security mode
- Enabling or disabling the Reader priority
- Erasing the fingerprint data

Notes:

- The system administrator can set the same supervisor password on many ThinkPad notebooks to make administration easier.
- By enabling the Lock UEFI BIOS Settings in the Password menu when you set the supervisor password, you make it impossible for anyone but you to make changes.

Setting a supervisor password

Only a system administrator will be able to apply this procedure.

1. Print these instructions.
2. Save all open files, and exit all applications.
3. Turn your computer off and then turn it on again.
4. When the logo screen is displayed, press F1. The ThinkPad Setup opens.
5. Select **Security**, using the cursor directional keys to move down the menu.
6. Select **Password**.
7. Select **Supervisor Password**.
8. A window opens that prompts you to enter a new password.
9. Choose your supervisor password and type it in the **Enter New Password** field; then press Enter.
10. Press Enter to move to the next line. Retype the password you just entered to verify it.
11. Commit your password to memory and press Enter. A Setup Notice window is displayed.

Attention: You might want to note your password and keep it in a safe place. If you forget your supervisor password, Lenovo can not 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.

12. Press F10 to exit from the Setup Notice window.

The next time you open the ThinkPad Setup, you will be prompted to type your password to proceed.

Changing or removing the supervisor password

To change or remove the supervisor password, follow steps 1 through 8 above in “Setting a supervisor password” on page 96, typing your password to get access to the ThinkPad Setup.

To change the password, do the following:

1. In the **Enter Current Password** field, type the current supervisor password.
2. In the **Enter New Password** field, type the new supervisor password; then retype the password you just entered to verify it in the **Confirm New Password** field.

3. Follow step 11 and step 12 above in “Setting a supervisor password” on page 96 to change your supervisor password.

To remove the password, do the following:

1. In the **Enter Current Password** field, type the current supervisor password.
2. Leave the **Enter New Password** and **Confirm New Password** fields in blank.
3. Follow step 11 and step 12 above in “Setting a supervisor password” on page 96 to remove your supervisor password.

Hard disk security

Your computer supports an enhanced security solution for solid state drive or hard disk drive. To protect passwords from unauthorized security attacks, several of the latest technologies and algorithms are integrated into UEFI BIOS and hardware design of ThinkPad notebooks.

To maximize security, do the following:

1. Set a power-on password as well as a hard disk password for your internal solid state drive or hard disk drive. Refer to the procedures in “Power-on password” on page 92 and “Hard disk passwords” on page 93. For security, a longer password is recommended.
2. To provide reliable security for UEFI BIOS, use the security chip and a security application with a Trusted Platform Module management feature. Refer to “Setting the security chip” on page 98.

Note: Microsoft Windows 7 and Windows Vista support TPM management feature.

3. If a “Disk Encryption hard disk drive and Encryption solid state drive” on page 98 is installed in your computer, be sure to protect the contents of your computer memory from unauthorized access by use of drive encryption software, such as Microsoft Windows BitLocker® Drive Encryption in Windows 7 and Windows Vista. Refer to “Using Windows BitLocker Drive Encryption” on page 97.
4. Before you dispose of, sell, or hand over your computer, make sure to delete data stored on it. Refer to “Notice on deleting data from your hard disk drive or solid state drive” on page 107.

Notes: The following drive(s) can be protected by UEFI BIOS:

- The hard disk drive built into your computer.

Using Windows BitLocker Drive Encryption

To help protect your computer from being subject to unauthorized access, be sure to use drive encryption software, such as Windows BitLocker Drive Encryption.

Windows BitLocker Drive Encryption is an integral security feature of Windows 7 and Windows Vista. It is supported in Ultimate and Enterprise editions of Windows 7 and Windows Vista. It can help you protect the operating system and data stored in your computer data, 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, click **Start → Control Panel → System and Security (in Windows Vista, Security) → BitLocker Drive Encryption**.

For details about Windows BitLocker Drive Encryption, go to the Help and Support for Windows 7 or Windows Vista, or search for “Microsoft Windows BitLocker Drive Encryption Step-by-Step Guide” on Microsoft web site.

Disk Encryption hard disk drive and Encryption solid state drive

Some models contain the Disk Encryption hard disk drive or Encryption solid state 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, be sure to set a Hard disk passwords 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 and Client Security Solution, you can do the following:

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

Setting the Security Chip

The choices offered in the Security Chip submenu under the **Security** menu of the ThinkPad Setup are as follows:

- **Security Chip:** activates, inactivates, or disables the Security Chip.
- **Security Reporting Options:** enables or disables each Security Reporting Option.
- **Clear Security Chip:** clears the encryption key.

Notes:

1. Be sure that the Supervisor password has been set in the ThinkPad Setup. Otherwise anyone can change the settings for the Security Chip.
2. If you are using Client Security Solution, handle the Security Chip as follows:
 - Do not clear the Security Chip. If you do, the functions assigned to the keys will be erased.
 - Do not disable the Security Chip. If you do, Client Security Solution will not work.
3. If the Security Chip is removed or replaced, or a new one has been added, the computer will not start. You will hear 4 cycles of 4 beeps each, or you see error message 0176 or 0192.
4. If the Security Chip is inactive or disabled, Clear Security Chip will not be displayed.
5. When you clear the Security chip, be sure to turn your computer off and then turn it on again after you set the Security chip to Active. Otherwise, the choice of Clear Security Chip is not displayed.

To set an item in the Security Chip submenu:

1. Print these instructions. To set the Security Chip, you must turn your computer off and then on again.
2. Save all open files, and exit all applications.
3. Turn your computer off and then turn it on again.
4. When the logo screen is displayed, press F1. The ThinkPad Setup opens.
5. Using the cursor keys, move to **Security**. The **Security** menu opens.
6. Using the cursor keys, move to **Security Chip**, and press Enter. The Security Chip submenu opens.
7. Using the cursor keys, move to an item you want to set. When the item you want is highlighted, press Enter.
8. Set the items you want to set.
9. Press F10 to exit.

10. Click **Yes** in the Setup Confirmation window.

To set the Security Chip, you have to open the Client Security Solution, and follow the instructions on the screen.

Note: If your computer is a Windows 7 model, Client Security Solution is not preinstalled on your system. To configure the security chip, you need to download the latest version of Client Security Solution from the Lenovo Web site. To download Client Security Solution, go to: <http://www.lenovo.com/support>. Then follow the instructions on the screen.

Using a fingerprint reader

This section introduces how to use a fingerprint reader in your computer.

Using a fingerprint reader in ThinkPad X220 and X220i

Depending on the options you ordered, your computer may have an integrated fingerprint reader. By enrolling your fingerprint and associating it with a power-on password, a hard disk password, or both passwords beforehand, you can start the computer, log on to the system, and enter the ThinkPad Setup by swiping your finger over the reader, without typing a password. Thus fingerprint authentication can replace passwords and enable simple and secure user access.

For more advanced security, Client Security Solution can be installed. The software is compatible with a variety of user authentication mechanisms, such as those involving fingerprint authentication. This fingerprint reader can work with the software.

Note: If your computer is a Windows 7 model, Client Security Solution is not preinstalled on it.

Enrolling your fingerprint

1. Turn on your computer.
2. To start Lenovo Fingerprint software, refer to “Fingerprint Software” on page 36.
3. Follow the instructions on the screen to enroll your fingerprint. For details, refer to the Help for the program.

LED behavior of the fingerprint reader



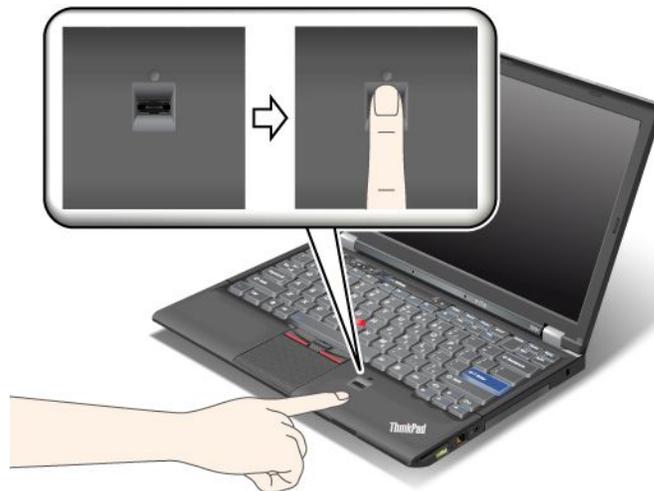
Table 4. LED behavior list_fingerprint reader

Indicator	Description
LED blinks green.	The fingerprint is being authenticated or has been authenticated.
LED is solid green.	The fingerprint reader is ready to swipe.
LED blinks amber.	The fingerprint could not be authenticated.

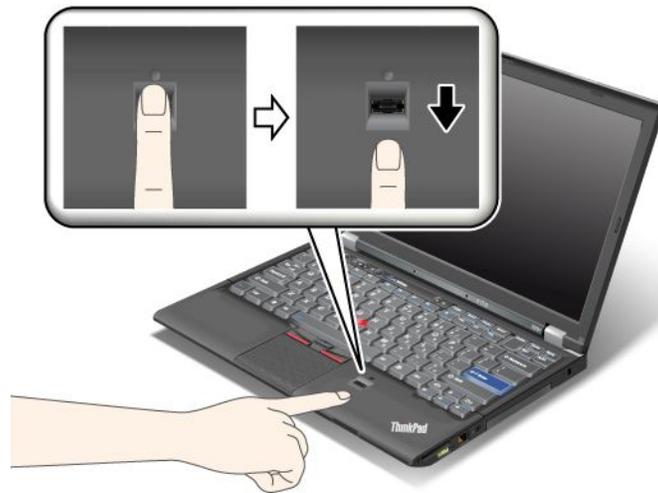
Swiping your finger over the reader

To swipe your finger over the reader, do as follows:

1. Place the ball of your finger—that is, the central part of the fingerprint—on the small circle above the reader. Make sure that the entire top joint of the finger is on the reader.



2. Apply light pressure and swipe your finger across the reader in one smooth motion.



Logging on to the system

After you enroll your fingerprint, log on to the system as follows:

1. Set a Power-on password or a Hard disk security, or both.
2. Turn your computer off and then on again.
3. When prompted, swipe your finger over the reader.
4. On request, type your power-on password, your hard disk password, or both. The enrolled fingerprint is now associated with your power-on password, your hard disk password, or both.

The next time you start the computer, you can log on to the system by swiping your finger over the reader once.

Attention: If you always use your fingerprint to log on to the system, you may forget your password. Write down your password, and keep it in a safe place. If you forget it and for some reason you cannot swipe your finger across the reader—for example, if you injure that finger—you cannot start the computer or change the password. If you forget your power-on password, you must take your computer to a Lenovo authorized servicer or a marketing representative to have the password canceled. If you forget your hard disk password, Lenovo cannot reset your password or recover data from the hard disk. You must take your computer to a Lenovo authorized servicer or a marketing representative to have the hard disk drive replaced. Proof of purchase is required, and a fee will be charged for parts and service.

Setting the fingerprint reader

If you want to change the settings of the fingerprint reader, follow the procedure below.

The fingerprint submenu under the Security menu of the ThinkPad Setup offers the following choices:

- **Predesktop Authentication:** Enables or disables fingerprint authentication before the operating system is loaded.
- **Reader Priority:** Defines the priority for fingerprint readers if an external fingerprint reader is attached.
- **Security Mode:** Specifies the settings of the security mode.
- **Password Authentication:** Enables or disables password authentication.

Note: This item appears if High security mode is selected.

- **Reset Fingerprint Data:** By choosing this item, you erase all of the fingerprint data stored in either the internal or external fingerprint reader.

To set an item in the fingerprint submenu:

1. Print these instructions. To configure the fingerprint reader, you must turn your computer off and then on again.
2. Save all open files, and exit all applications.
3. Turn your computer off and then on again.
4. When the logo screen is displayed, press F1. The ThinkPad Setup opens.
5. Using the cursor keys, move to **Security**, and press Enter. The Security menu opens.
6. Using the cursor keys, move to **Fingerprint**, and press Enter. The Fingerprint submenu opens.
7. Using the cursor keys, move to an item you want to set. When that item is highlighted, press Enter.
8. Set the items you want to set.
9. Press F10 to exit.
10. In the Setup Confirmation window, select **Yes**.

Care for 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 may not be able to register or authenticate it:

- Your finger is wrinkled.
- Your finger is rough, dry, or injured.
- Your finger is very dry.
- Your finger is stained with dirt, mud, or oil.
- The surface of your finger is very different from when you enrolled your fingerprint.
- Your finger is wet.
- A finger is used that has not been enrolled.

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 too dry, apply lotion to them.

Using a fingerprint reader in ThinkPad X220 Table and X220i Tablet

Depending on the options you ordered, your computer may have an integrated fingerprint reader. By enrolling your fingerprint and associating it with a power-on password, a hard disk password, or both passwords beforehand, you can start the computer, log on to the system, and enter the ThinkPad Setup by

swiping your finger over the reader, without typing a password. Thus fingerprint authentication can replace passwords and enable simple and secure user access.

For more advanced security, Client Security Solution can be installed. The software is compatible with a variety of user authentication mechanisms, such as those involving fingerprint authentication. This fingerprint reader can work with the software.

Note: If your computer is a Windows 7 model, Client Security Solution is not preinstalled on it.

Enrolling your fingerprint

1. Turn on your computer.
2. To start Lenovo Fingerprint software, refer to “Fingerprint Software” on page 36.
3. Follow the instructions on the screen to enroll your fingerprint. For details, refer to the Help for the program.

LED behavior of the fingerprint reader



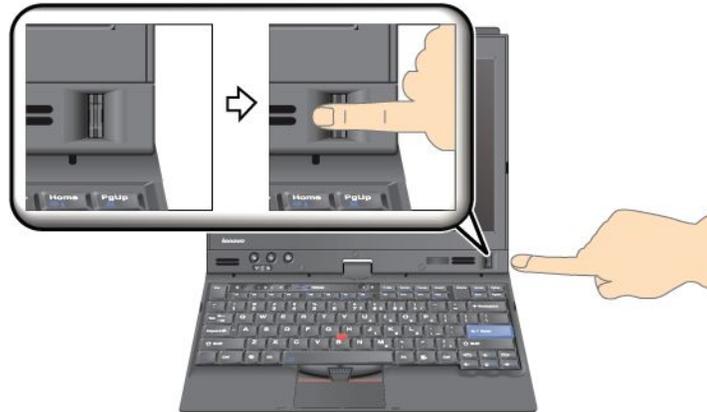
Table 5. LED behavior list_fingerprint reader

Indicator	Description
LED blinks green.	The fingerprint is being authenticated or has been authenticated.
LED is solid green.	The fingerprint reader is ready to swipe.
LED blinks amber.	The fingerprint could not be authenticated.

Swiping your finger over the reader

To swipe your finger over the reader in notebook mode, do as follows:

1. Place the ball of your finger—that is, the central part of the fingerprint—on the small circle above the reader. Make sure that the entire top joint of the finger is on the reader.

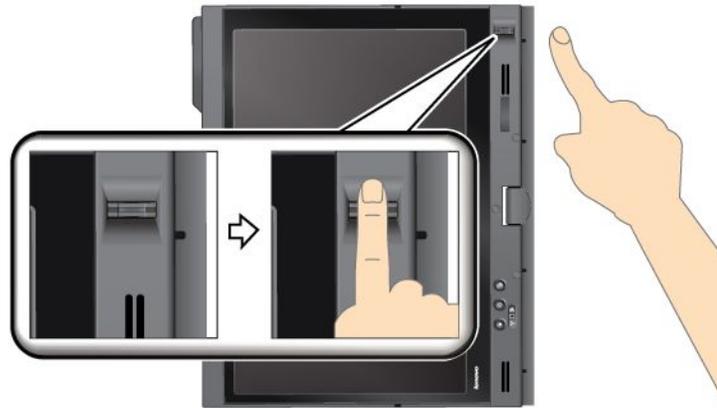


2. Apply light pressure and swipe your finger across the reader in one smooth motion.

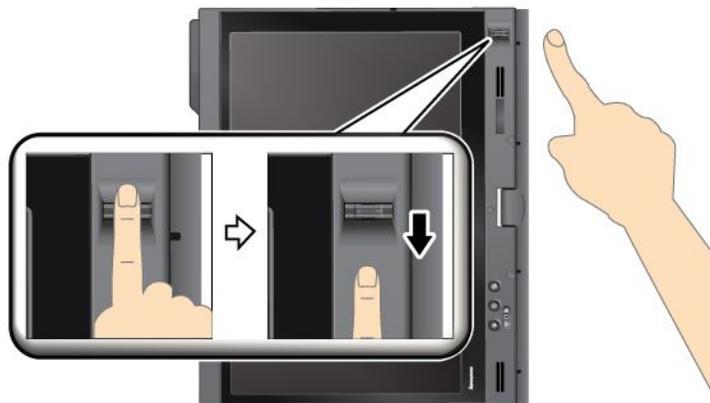


To swipe your finger over the reader in tablet mode, do as follows:

1. Place the ball of your finger—that is, the central part of the fingerprint—on the small circle above the reader. Make sure that the entire top joint of the finger is on the reader.



2. Apply light pressure and swipe your finger across the reader in one smooth motion.



Logging on to the system

After you enroll your fingerprint, log on to the system as follows:

1. Set a Power-on password or a Hard disk security, or both.
2. Turn your computer off and then on again.
3. When prompted, swipe your finger over the reader.
4. On request, type your power-on password, your hard disk password, or both. The enrolled fingerprint is now associated with your power-on password, your hard disk password, or both.

The next time you start the computer, you can log on to the system by swiping your finger over the reader once.

Attention: If you always use your fingerprint to log on to the system, you may forget your password. Write down your password, and keep it in a safe place. If you forget it and for some reason you cannot swipe your finger across the reader—for example, if you injure that finger—you cannot start the computer or change the password. If you forget your power-on password, you must take your computer to a Lenovo authorized servicer or a marketing representative to have the password canceled.

If you forget your hard disk password, Lenovo cannot reset your password or recover data from the hard disk. You must take your computer to a Lenovo authorized servicer or a marketing representative to have the hard disk drive replaced. Proof of purchase is required, and a fee will be charged for parts and service.

Setting the fingerprint reader

If you want to change the settings of the fingerprint reader, follow the procedure below.

The fingerprint submenu under the Security menu of the ThinkPad Setup offers the following choices:

- **Predesktop Authentication:** Enables or disables fingerprint authentication before the operating system is loaded.
- **Reader Priority:** Defines the priority for fingerprint readers if an external fingerprint reader is attached.
- **Security Mode:** Specifies the settings of the security mode.
- **Password Authentication:** Enables or disables password authentication.

Note: This item appears if High security mode is selected.

- **Reset Fingerprint Data:** By choosing this item, you erase all of the fingerprint data stored in either the internal or external fingerprint reader.

To set an item in the fingerprint submenu:

1. Print these instructions. To configure the fingerprint reader, you must turn your computer off and then on again.
2. Save all open files, and exit all applications.
3. Turn your computer off and then on again.
4. When the logo screen is displayed, press F1. The ThinkPad Setup opens.
5. Using the cursor keys, move to **Security**, and press Enter. The Security menu opens.
6. Using the cursor keys, move to **Fingerprint**, and press Enter. The Fingerprint submenu opens.
7. Using the cursor keys, move to an item you want to set. When that item is highlighted, press Enter.
8. Set the items you want to set.
9. Press F10 to exit.
10. In the Setup Confirmation window, select **Yes**.

Care for 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 may not be able to register or authenticate it:

- Your finger is wrinkled.
- Your finger is rough, dry, or injured.

- Your finger is very dry.
- Your finger is stained with dirt, mud, or oil.
- The surface of your finger is very different from when you enrolled your fingerprint.
- Your finger is wet.
- A finger is used that has not been enrolled.

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 too dry, apply lotion to them.

Notice on deleting data from your hard disk drive or solid state drive

As computers spread into every corner of life, they process more and more information. The data on your computer, some of which is sensitive, is stored on a storage device, either a hard disk drive or solid state drive. Before you dispose of, sell, or hand over your computer, make sure to delete data stored on it.

Handing your computer over to someone else without deleting the loaded software, such as operating systems and application software, may even violate License Agreements. You are advised to check the terms and conditions of those Agreements.

There are methods that seem to delete the data:

- Move the data to the recycle bin, and then choose the Empty recycle bin command.
- Use the Delete command.
- Format your hard disk drive or solid state drive, using the software for initializing it.
- Using the recovery program, provided by Lenovo, bring the hard disk drive or the solid state drive back to factory-ship state.

These operations, however, only change the file allocation 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 may read and misuse the critical data on hard disk drives or solid state drives for unexpected purposes.

To prevent leakage of data, it becomes very important that you take responsibility for deleting all the data from the hard disk drive or solid state drive when you dispose of, sell, or hand over your computer. You can destroy the data physically by smashing the hard disk drive with a hammer, or magnetically by means of strong magnetic power, thus making the data unreadable. But we recommend that you make use of the software (payware) or service (pay service) specifically developed for the purpose.

For disposing of data on the hard disk drive, Lenovo provides such software as PC Doctor for DOS and the Secure Data Disposal tool. Software provides the interface for full erasure of the contents of a hard disk. To download either application, go to the Lenovo Web site at:
<http://www.lenovo.com/support>

Note: Running the application will take a couple of hours.

If Encryption solid state drive or Disk Encryption hard disk drive is supported and installed in your computer, you can logically dispose of all the data on a device in a very short time by erasing the cryptographic key. The data encrypted with the old key is not physically erased but remains on the disk; however, it cannot be

decrypted without the old key. This feature is enabled by the ThinkPad Setup Menu Extension Utility and is available as a menu item in the ThinkPad Setup.

Using and understanding firewalls

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

For more information about how to use the firewall program, refer to the on-line help 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 system of your antivirus software.

Chapter 5. Recovery overview

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

This chapter contains the following topics:

- “Creating and using recovery media” on page 109
- “Performing backup and recovery operations” on page 111
- “Using the Rescue and Recovery workspace” on page 112
- “Creating and using a rescue medium” on page 113
- “Reinstalling preinstalled applications and device drivers” on page 114
- “Solving recovery problems” on page 115

Notes:

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

Notes: 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:

- ThinkVantage Rescue and Recovery version 4.23 or later (for Windows XP and Windows Vista), 4.3 or later (for Windows 7)
- Symantec Norton Ghost version 15 or later

Notes: To use this program, do the following:

1. Click **Start** → **Run**. The Run window opens.
 2. Type `cmd` in the field. Then click **OK**.
 3. Type `ghost -align=1mb` and press Enter.
- Acronis True Image 2010 or later
 - Paragon Backup & Recovery 10 Suit or later, Paragon Backup & Recovery 10 Home or later

Creating and using recovery media

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

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

Creating recovery media

This section provides instructions on how to create recovery media on the Windows 7 operating system.

Note: On the Windows 7 operating system, you can create recovery media using discs or external USB storage devices. On the Windows Vista and Windows XP operating systems, you can create recovery media using only discs, so this operation is also called “creating Product Recovery discs.”

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

Using recovery media

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

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

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

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

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

Notes:

1. After restoring your computer to the factory default settings, you might have to reinstall device drivers for some devices. See “Reinstalling preinstalled applications and device drivers” on page 114.
 2. Some computers come with Microsoft Office or Microsoft Works preinstalled. If you need to recover or reinstall your Microsoft Office or Microsoft Works applications, you must use the *Microsoft Office CD* or *Microsoft Works CD*. These discs are provided only with computers preinstalled with Microsoft Office or Microsoft Works.
- On the Windows XP operating system, you can use Product Recovery discs to restore your computer to the factory default settings, perform a custom factory recovery, or perform other rescue and recovery operations such as rescuing individual files. You will be given the option to enter the Rescue and Recovery workspace and choose from a variety of recovery operations.

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

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

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

Performing backup and recovery operations

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

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

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

Performing a backup operation

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

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

Performing a recovery operation

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

- To perform a recovery operation using the Rescue and Recovery program on the Windows 7 operating system, do the following:

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

For more information about performing a recovery operation from the Rescue and Recovery workspace, see “Using the Rescue and Recovery workspace” on page 112.

Using the Rescue and Recovery workspace

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

- **Rescue files from your hard disk drive or from a backup** The Rescue and Recovery workspace enables you to locate files on your hard disk drive and transfer them to a network drive or other recordable media, such as a USB device or a disc. This solution is available even if you did not back up your files or if changes were made to the files since your last backup operation. You can also rescue individual files from a Rescue and Recovery backup located on your local hard disk drive, a USB device, or a network drive.
- **Restore your hard disk drive from a Rescue and Recovery backup** If you have backed up your hard disk drive using the Rescue and Recovery program, you can restore the hard disk drive from a Rescue and Recovery backup, even if you cannot start the Windows operating system.
- **Restore your hard disk drive to the factory default settings** The Rescue and Recovery workspace enables you to restore the complete contents of your hard disk drive to the factory default settings. If you have multiple partitions on your hard disk drive, you have the option to restore the factory default settings to the C: partition and leave the other partitions intact. Because the Rescue and Recovery workspace operates independently from the Windows operating system, you can restore the factory default settings even if you cannot start the Windows operating system.

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

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

1. Make sure the computer is turned off.
2. Repeatedly press and release the F11 key when turning on the computer. When you hear beeps or see a logo screen, release the F11 key.
3. If you have set a Rescue and Recovery password, type your password when prompted. The Rescue and Recovery workspace opens after a short delay.

Note: If the Rescue and Recovery workspace fails to open, see “Solving recovery problems” on page 115.

4. Do one of the following:

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

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

Notes:

1. After restoring your hard disk drive to the factory default settings, you might have to reinstall device drivers for some devices. See “Reinstalling preinstalled applications and device drivers” on page 114.
2. Some computers come with Microsoft Office or Microsoft Works preinstalled. If you need to recover or reinstall your Microsoft Office or Microsoft Works applications, you must use the *Microsoft Office CD* or *Microsoft Works CD*. These discs are provided only with computers preinstalled with Microsoft Office or Microsoft Works.

Creating and using a rescue medium

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

Notes:

1. The recovery operations you can perform using a rescue medium vary depending on the operating system.
2. The rescue disc can be started in all types of optical drives.

Creating a rescue medium

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

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

Using a rescue medium

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

- If you have created a rescue medium using a disc, use the following instructions to use the rescue medium:
 1. Turn off your computer.
 2. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
 3. On the **Startup Device Menu**, select the desired optical drive as the first boot device. Then, insert the rescue disc into the optical drive and press Enter. The rescue medium starts.
- If you have created a rescue medium using a USB hard disk drive, 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 the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
 3. On the **Startup Device Menu**, select the USB hard disk drive as the first boot device and press Enter. The rescue medium starts.
- If you have created a rescue medium using the secondary internal hard disk drive, set the secondary internal hard disk drive as the first boot device in the startup device sequence to start the rescue medium. See “Startup menu” on page 186.

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 applications and device drivers

Your computer has provisions that enable you to reinstall selected factory-installed applications and device drivers.

Reinstalling preinstalled applications

To reinstall selected application programs, do the following:

1. Turn on your computer.
2. Use Windows Explorer or Computer (in Windows XP, My Computer) to display the directory structure of your hard disk.
3. Open the C:\SWTOOLS folder.
4. Open the APPS folder. In it are several subfolders named for the various preinstalled applications.
5. Open the subfolder for the application you are reinstalling.
6. 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. Use Windows Explorer or Computer (in Windows XP, My Computer) to display the directory structure of your hard disk drive.
3. Open the C:\SWTOOLS folder.
4. Open the DRIVERS folder. Within the DRIVERS folder are several subfolders named for the various devices installed in your computer (for example, AUDIO and VIDEO).

5. Open the subfolder for the device.
6. Reinstall the device driver using 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.
-OR-
 - 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.
-OR-
 - In the subfolder for the device, look for the file for the application (a file with the extension .exe). Double-click the file, and follow the instructions on the screen.

Attention: If you need updated device drivers, do not download them from the Windows Update Web site. Obtain them from Lenovo. For more information, see “Making sure device drivers are current” on page 204.

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 “Using a rescue medium” on page 113.
- Use recovery media if all other methods of recovery have failed and you need to restore the hard disk drive to the factory default settings. See “Using recovery media” on page 110.

Note: If you are unable to access the Rescue and Recovery workspace or the Windows environment from a rescue medium or recovery media, you might not have the rescue device (an internal hard disk drive, a disc, a USB hard disk drive, or other external devices) set as the first boot device in the startup device sequence. You must first make sure that your rescue device is set as the first boot device in the startup device sequence in the Setup Utility program. See “Startup menu” on page 186 for detailed information about temporarily or permanently changing the startup device sequence. For more information about the Setup Utility program, see “ThinkPad Setup” on page 183.

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

Chapter 6. Replacing devices

You can increase the capacity of the memory or the hard disk drive by replacing the original, built-in device with an optional one. Or, if you need to, you can replace the PCI Express Mini Card by following the procedures in this section.

- “Static electricity prevention” on page 117
- “Replacing the battery” on page 118
- “Replacing the hard disk drive” on page 127
- “Replacing the keyboard” on page 120
- “Replacing memory” on page 145
- “Installing and replacing the mSATA solid state drive” on page 143
- “Installing and replacing the PCI Express Mini Card for wireless LAN/WiMAX connection” on page 133
- “Installing and replacing the PCI Express Mini Card for wireless WAN connection” on page 139
- “Replacing the SIM card” on page 148
- “Replacing the solid state drive” on page 130

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 CRU, do not open the static-protective package containing the part until the instructions direct you to install it.

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 containing the part to a metal expansion-slot cover or other unpainted metal surface on the computer for at least two seconds. This reduces static electricity in the package and your body.
- When possible, remove the static-sensitive part from the static-protective packaging and install the part without setting it down. When this is not possible, place the static-protective packaging on a smooth, level surface and place the part on it.
- Do not place the part on the computer cover or other metal surface.