Replacing the battery

Before you start, print these instructions.

This system may not support batteries that are not genuine Lenovo-made or authorized. These systems will continue to boot, but may not charge unauthorized batteries.

Attention: Lenovo has no responsibility for the performance or safety of unauthorized batteries, and provides no warranties for failures or damage arising out of their use.

To replace the battery with a new one, read the following prerequisites, and select your model from the list below for the instruction.

Prerequisites for the procedure

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.**

- **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.**

To replace the battery, follow the procedures below.

Replacing the battery installed in the battery space of your computer

1. Turn off the computer, or enter hibernation mode. Then disconnect the ac power adapter and all cables from the computer.
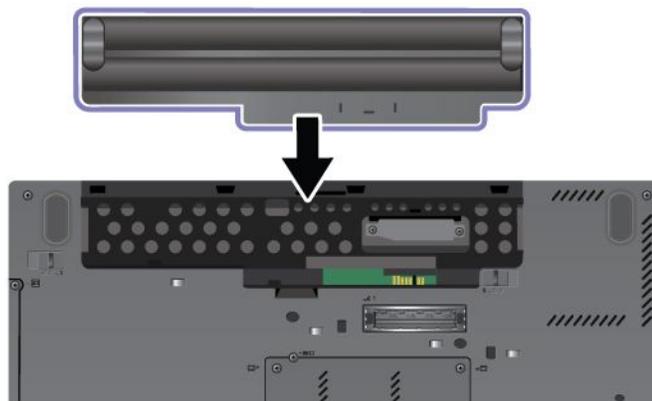2. Close the computer display, and turn the computer over.

3. Unlock the battery latch by sliding it to the unlock position.
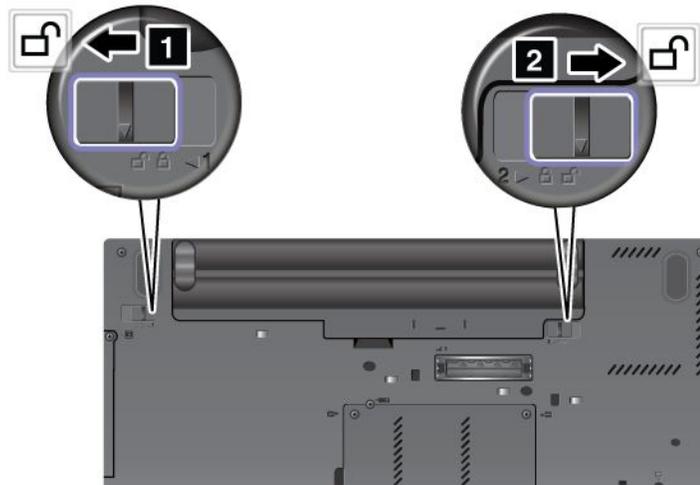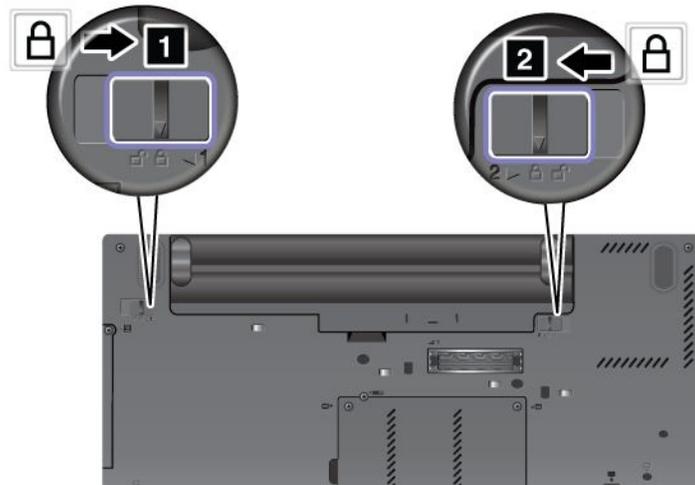
4. Remove the battery.
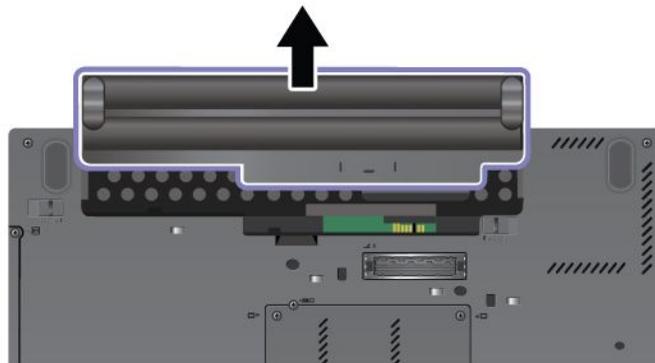
5. Slide the battery into the computer.

6. Slide the battery latch to the locked position.

7. Turn the computer over again. Connect the ac power adapter and the cables to the computer.

Replacing the keyboard

Before you start, print these instructions.

You can use the following procedures to replace the keyboard with a new one, available as an option.

Prerequisites for the procedure

⚠️**DANGER**

| During electrical storms, do not connect the cable to or disconnect it from the telephone outlet on the wall. |
| --- |

⚠️**DANGER**

Electric current from power, telephone, and communication cables is hazardous. To avoid shock hazard, disconnect the cables before opening the cover of this slot.

To replace the keyboard, do as follows.

Removing the keyboard

1. Turn off the computer; then disconnect the ac power adapter and all cables from the computer. Wait for a few minutes, till the inside of the computer cools, before you start the following procedures.
2. Close the computer display, and turn the computer over.
3. Remove the battery. For details, refer to the instructions in "Remove the battery" on page 118.

4. Loosen the two screws on the memory slot cover , then remove the cover.
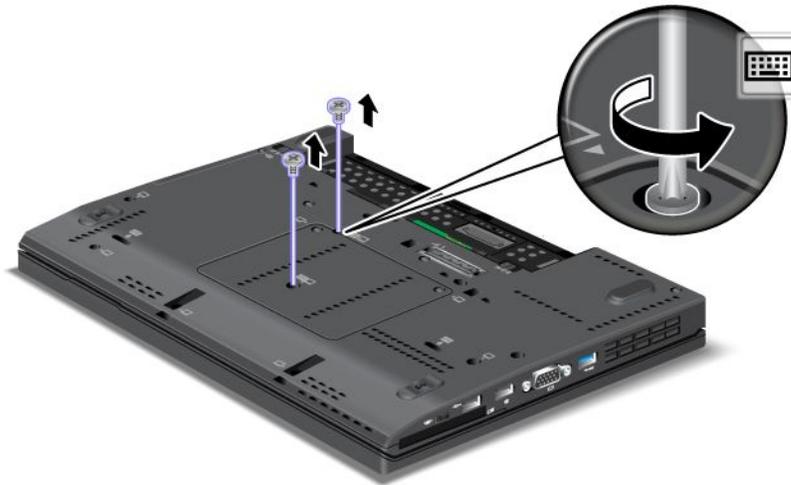
5. Turn the computer over and open the display.
6. Push hard in the direction shown by the arrows **1** in the drawing to unlatch the front side of the keyboard. The keyboard will open up slightly **2**.

7. Carefully lift the keyboard until you can see how it's connected. Hold the keyboard above the computer, and then detach the connector **2**. Now the keyboard has been removed.

**Installing the keyboard**

1. Attach the connector.

2. Insert the keyboard. Make sure that the rear edges of the keyboard are under the frame as shown by the arrows.

3. Press gently on the areas marked in the drawing, and slide the keyboard toward you. Make sure that the edges of the keyboard marked in the drawing, are under the frame.

4. Put the memory slot cover back in place , close the cover , and then tighten the screws.
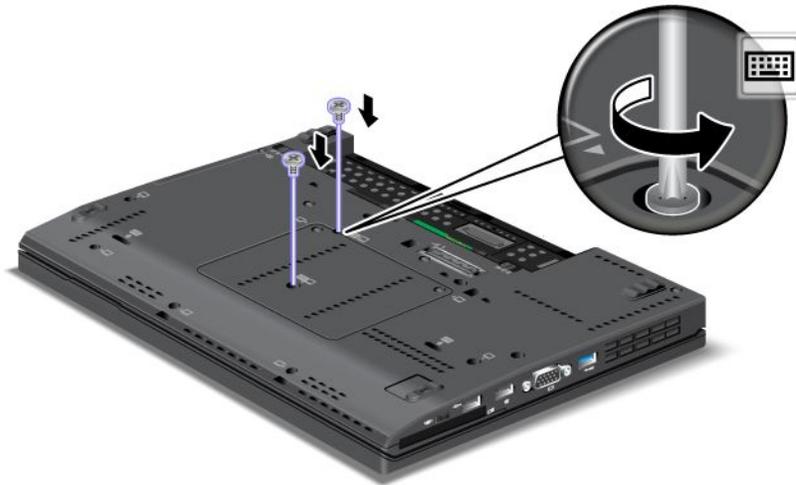
5. Reinstall the battery. For details, refer to the instructions in "Reinstall the battery" on page 118.

6. Turn the computer over again. Connect the ac power adapter and cables to the computer; then turn it on.

Replacing the palm rest

Before you start, print these instructions.

Prerequisites for the procedure

⚠️**DANGER**

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

⚠️**DANGER**

Electric current from power, telephone, and communication cables is hazardous. To avoid shock hazard, disconnect the cables before opening the cover of this slot.

Replacement instructions

1. Turn off the computer; then disconnect the ac power adapter and all cables from the computer. Wait for a few minutes, till the inside of the computer cools, before you start the following procedures.

2. Close the computer display, and turn the computer over.

3. Remove the battery. For more information, refer to Replacing the battery.

4. Remove the keyboard. For more information about how to remove the keyboard, refer to Replacing the keyboard.

5. Remove the screws that secure the palm rest.
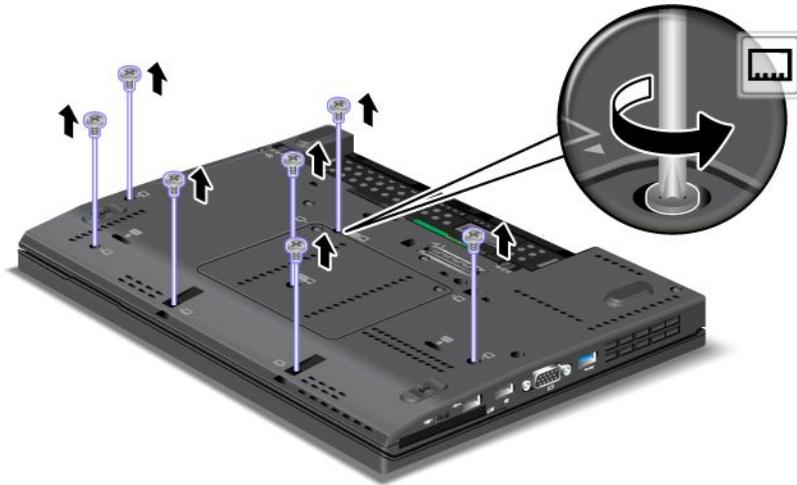
6. Turn the computer over and open the display. Lift up the left and right top edges of the palm rest to remove it.

7. Detach the flip-lock ZIF connector **1**, then remove the palm rest cable **2**.

8. Lift up and remove the palm rest.

9. Release the palm rest from the computer. Now the palm rest has been removed.

Installing the palm rest

1. Attach the palm rest, making sure the latches near the top left and right edges of the palm rest are secure.
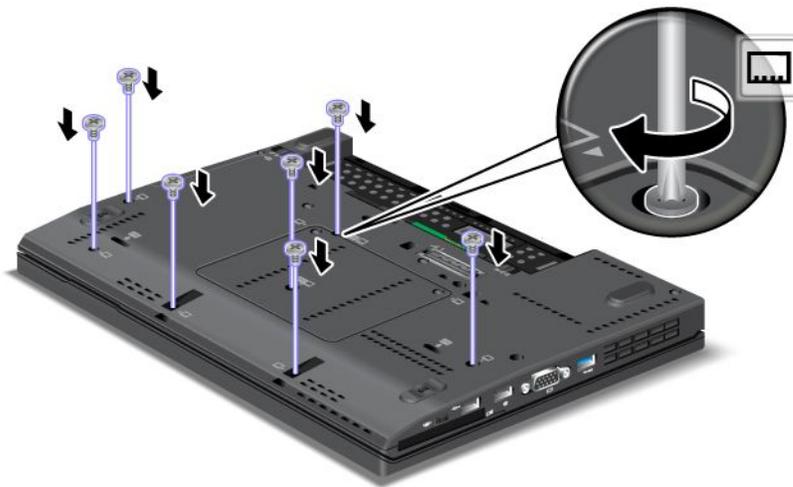
2. Push the front side of the palm rest until it clicks into place.

3. Attach the flip-lock ZIF connector **1**, then push the palm rest cable **2**.

4. Reinstall the screws for the palm rest.

5. Reinstall the keyboard. For more information about how to remove the keyboard, refer to Replacing the keyboard.
6. Reinstall the battery. For more information, refer to Replacing the battery.
7. Turn the computer over again. Connect the ac power adapter and cables to the computer; then turn it on.

Replacing the hard disk drive

Before you start, print these instructions.

You can replace the hard disk drive with a new one which can be purchased from your Lenovo reseller or a marketing representative. To replace the hard disk drive, read the following prerequisites.

Note: Replace the hard disk drive only if you upgrade it or have it repaired. The connectors and slot of the hard disk drive were not designed for frequent changes, or drive swapping.

Prerequisites for the procedure

When replacing the drive, be sure to follow the precautions.

Attention: When you are handling a hard disk drive:

- Do not drop the drive or subject it to physical shocks. Put the drive on a material, such as soft cloth, that absorbs any physical shocks.
- Do not apply pressure to the cover of the drive.
- Do not touch the connector.

The drive is very sensitive. Incorrect handling can cause damage and permanent loss of data.

Before removing the hard disk drive, make a backup copy of all the information on it, and then turn the computer off.

Never remove the drive while the system is operating, in sleep (standby) mode, or in hibernation mode.

To replace the hard disk drive, do as follows:

1. Turn off the computer; then disconnect the ac power adapter and all cables from the computer.
2. Close the computer display, and turn the computer over.
3. Remove the battery. For details, refer to the instructions in "Remove the battery" on page 118.
4. Remove the screw that secures the slot cover **1**. Then flip out the cover **2** and pull up to remove it **3**.
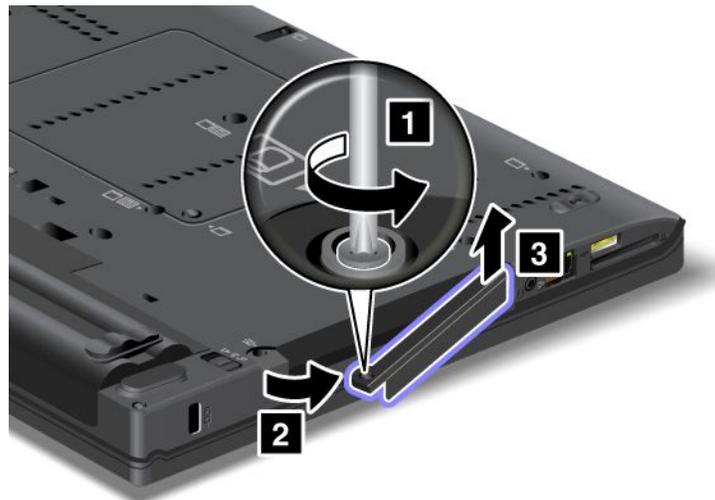
5. Remove the hard disk drive by pulling out the tab.

6. Detach the side rubber rails from the hard disk drive.
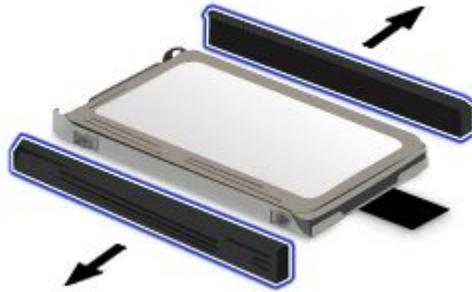
7. Attach the side rubber rails to a new hard disk drive.
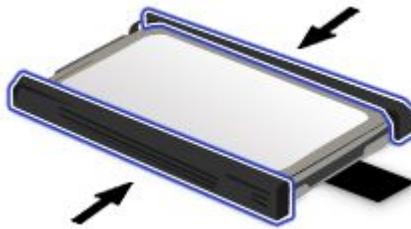
8. Insert the hard disk drive into the hard disk drive bay, then press it firmly into place.
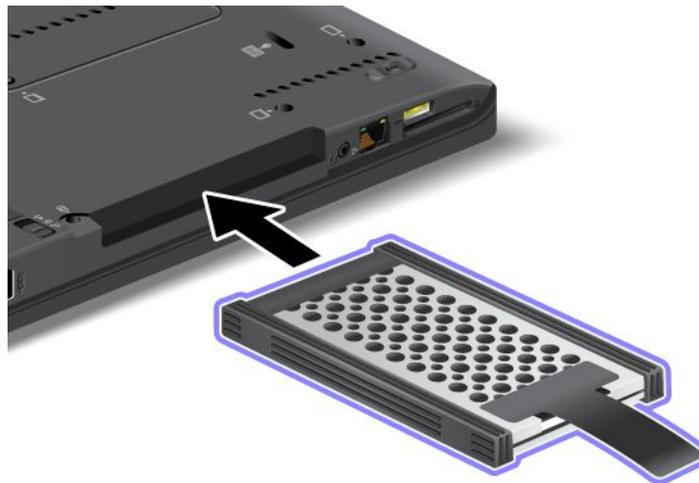
9. Insert the slot cover **1**. Then, slide in the cover **2** and reinstall the screw **3**.

10. Reinstall the battery. For details, refer to the instructions in "Reinstall the battery" on page 118.
11. Turn the computer over again. Connect the ac power adapter and the cables to the computer.

Replacing the solid state drive

You can replace the solid state drive with a new one which can be purchased from your Lenovo reseller or a marketing representative. To replace the solid state drive, read the following prerequisites and select your model from the list below for instructions.

Note: Replace the solid state drive only if you need to have it repaired. The connectors and slot of the solid state drive were not designed for frequent changes, or drive swapping.

Prerequisites for the procedure

When replacing the drive, be sure to follow the precautions.

Attention: When you are handling a solid state drive:

- Do not drop the drive or subject it to physical shocks. Put the drive on a material, such as soft cloth, that absorbs any physical shocks.
- Do not apply pressure to the cover of the drive.
- Do not touch the connector.

The drive is very sensitive. Incorrect handling can cause damage and permanent loss of data.

Before removing the solid state drive, make a backup copy of all the information on it, and then turn the computer off.

Never remove the drive while the system is operating, in sleep (standby) mode, or in hibernation mode.

Replacement instructions

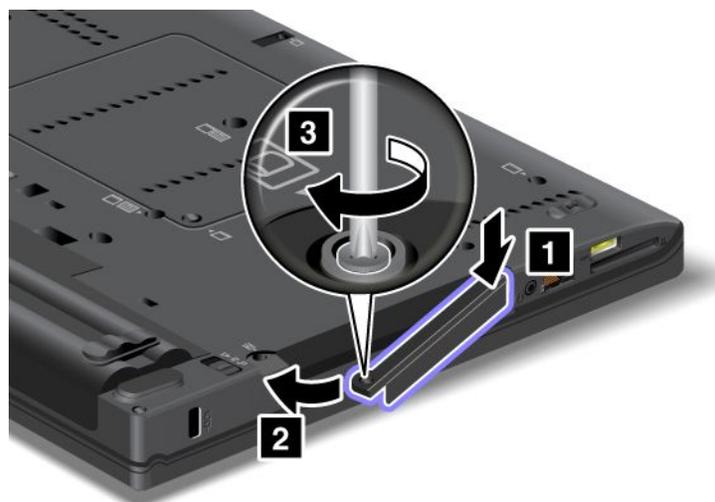To replace the solid state drive, do as follows:

1. Turn off the computer; then disconnect the ac power adapter and all cables from the computer.
2. Close the computer display, and turn the computer over.
3. Remove the battery. For more information, refer to "Replacing the battery" on page 118.

4. Remove the screw that secures the solid state drive **1**. Then flip out the cover **2** and pull up to remove it **3**.
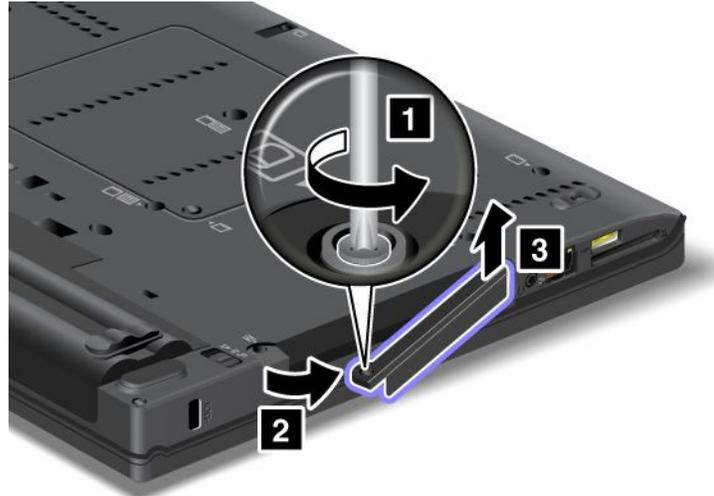
5. Remove the solid state drive by pulling out the tab.
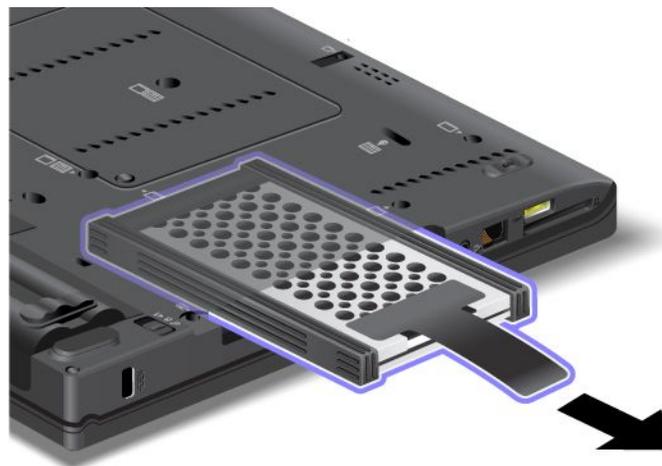
6. Detach the side spacer rails from the hard disk drive.
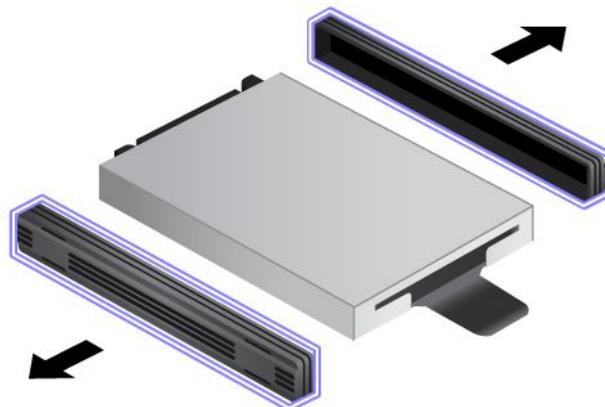
7. Attach the side spacer rails to a new hard disk drive.
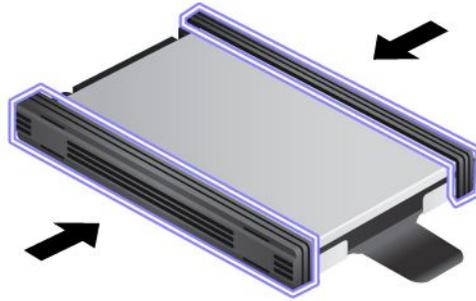
8. Insert the solid state drive into the hard disk drive bay, then press it firmly into place.
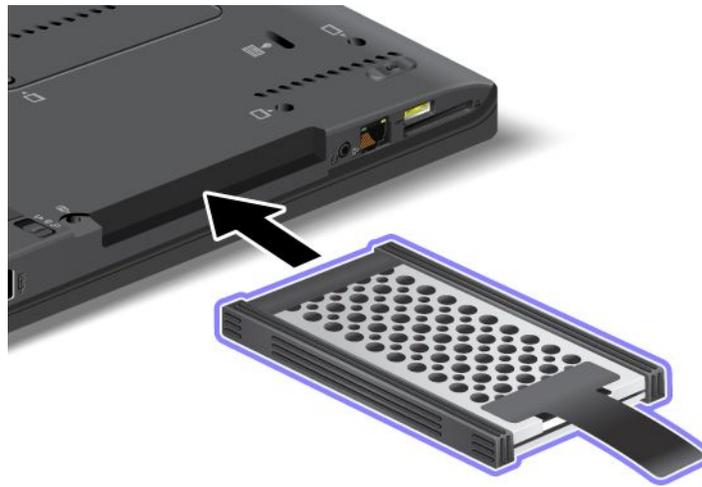
9. Reinstall the cover of the bay **1**, then reinstall the screw **2**.
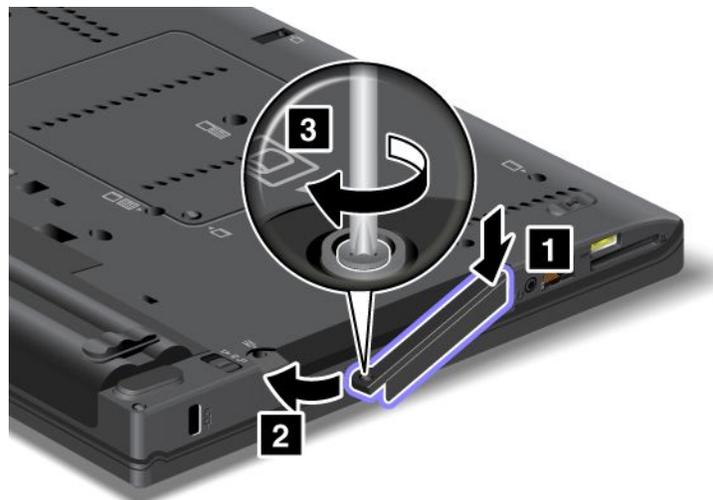
10. Reinstall the battery. For more information about how to reinstall the battery, refer to "Replacing the battery" on page 118.

11. Turn the computer over again. Connect the ac power adapter and the cables to the computer.

Installing and replacing the PCI Express Mini Card for wireless LAN/WiMAX connection

Before you start, print these instructions.

Your computer has a PCI Express Mini Card slot for connection to a wireless LAN/WiMAX. To replace the PCI Express Mini Card with a new one, read the following prerequisites.

Prerequisites for the procedure

⚠️**DANGER**

> **During electrical storms, do not connect the cable to or disconnect it from the telephone outlet on the wall.**

⚠️**DANGER**

> **Electric current from power, telephone, and communication cables is hazardous. To avoid shock hazard, disconnect the cables before opening the cover of this slot.**

Attention: Before you start installing a PCI Express Mini Card, 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.

Your computer has a PCI Express Mini Card slot for connection to a wireless LAN/WiMAX. To replace the PCI Express Mini Card with a new one, follow the procedure below.

Replacing a PCI Express Mini Card with two connectors

1. Turn off the computer; then disconnect the ac power adapter and all cables from the computer. Wait for a few minutes, till the inside of the computer cools, before you start the following procedures.

2. Close the computer display, and turn the computer over.

3. Remove the battery. For details, refer to the instructions in "Remove the battery" on page 118.

4. Remove the palm rest. For details, refer to the instructions in "Remove the palm rest" on page 124.

5. If a tool for removing connectors is included in the package with the new card, use it to disconnect the cables from the card. If no such tool is included, disconnect the cables by picking up the connectors with your fingers and gently unplugging them.

6. Remove the screw. The card pops up.

7. Remove the card.

8. Align the contact edge of the new PCI Express Mini Card with the corresponding socket contact of the computer.

9. Pivot the card until you can snap it into place by pressing the upper side of the connectors **1**, and secure the card with the screw **2**.

10. Connect the cables to the new PCI Express Mini Card. Be sure to attach the gray cable to the connector marked "MAIN" or "M" on the card, and the black cable to the connector marked "AUX" or "A."

Note: If the new PCI Express Mini Card has three connectors, be sure to attach the gray cable to the connector marked "TR1" on the card, and the black cable to the connector marked "TR2". If you attach either cable to the center connector, the connection speed will be lower.

11. Reinstall the palm rest. For details, refer to the instructions in "Reinstall the palm rest" on page 124.

12. Reinstall the battery. For details, refer to the instructions in "Reinstall the battery" on page 118.

13. Turn the computer over again. Connect the ac power adapter and cables to the computer; then turn it on.

Replacing a PCI Express Mini Card with three connectors

1. Turn off the computer; then disconnect the ac power adapter and all cables from the computer. Wait for a few minutes, till the inside of the computer cools, before you start the following procedures.

2. Close the computer display, and turn the computer over.

3. Remove the battery. For details, refer to the instructions in "Remove the palm rest" on page 124.

4. Remove the keyboard. For details, refer to the instructions in "Remove the keyboard" on page 120.

5. If a tool for removing connectors is included in the package with the new card, use it to disconnect the cables from the card. If no such tool is included, disconnect the cables by picking up the connectors with your fingers and gently unplugging them.

6. Remove the screw. The card pops up.
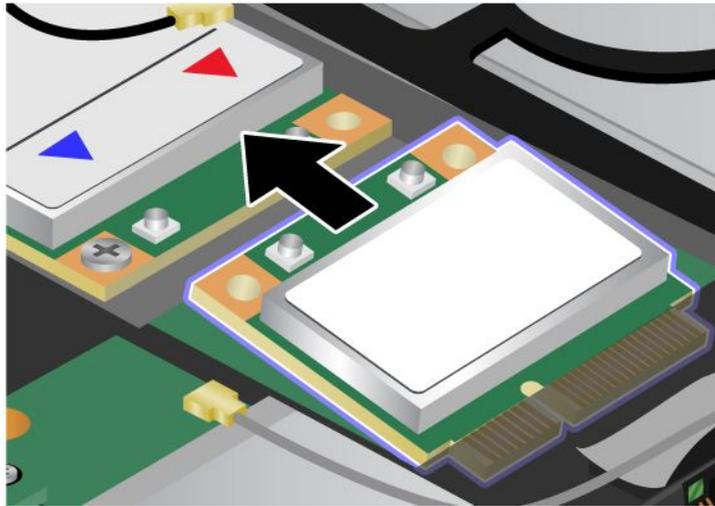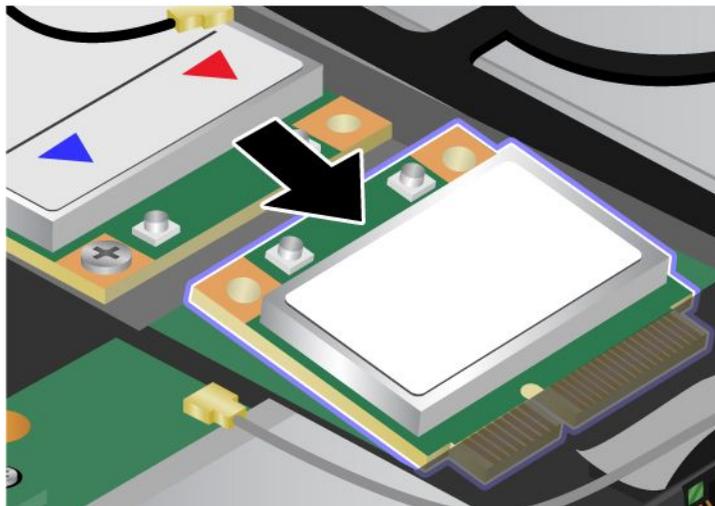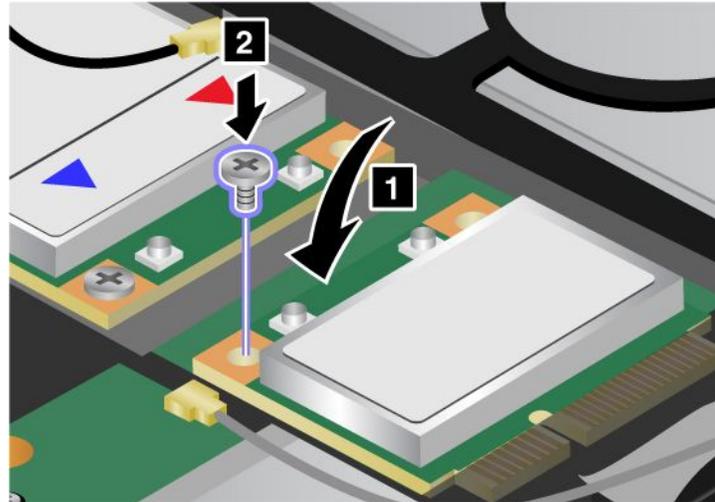
7. Remove the card.

8. Align the contact edge of the new PCI Express Mini Card with the corresponding socket contact of the computer.

9. Pivot the card until you can snap it into place by pressing the upper side of the connectors **1**, and secure the card with the screw **2**.

10. Connect the cables to the new PCI Express Mini Card. Be sure to attach the gray cable to the connector marked "MAIN" or "M" on the card, and the black cable to the connector marked "AUX" or "A."

Note: If the new PCI Express Mini Card has three connectors, be sure to attach the gray cable to the connector marked "TR1" on the card, and the black cable to the connector marked "TR2". If you attach either cable to the center connector, the connection speed will be lower.

11. Reinstall the keyboard. For details, refer to the instructions in "Reinstall the palm rest" on page 124.

12. Reinstall the battery. For details, refer to the instructions in "Reinstall the battery" on page 118.

13. Turn the computer over again. Connect the ac power adapter and cables to the computer; then turn it on.

Installing and replacing the PCI Express Mini Card for wireless WAN connection

Before you start, print these instructions.

Some ThinkPad models have a PCI Express Mini Card slot for connection to a wireless WAN. To replace the PCI Express Mini Card with a new one, read the following prerequisites.

Prerequisites for the procedure

⚠️**DANGER**

> **During electrical storms, do not connect the cable to or disconnect it from the telephone outlet on the wall.**

⚠️**DANGER**

> **Electric current from power, telephone, and communication cables is hazardous. To avoid shock hazard, disconnect the cables before opening the cover of this slot.**

Attention: Before you start installing a PCI Express Mini Card, 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.

If a Wireless WAN is available in your computer, to replace the PCI Express Mini Card, do as follows.

1. Turn off the computer; then disconnect the ac power adapter and all cables from the computer. Wait for a few minutes, till the inside of the computer cools, before you start the following procedures.

2. Close the computer display, and turn the computer over.

3. Remove the battery. For details, refer to the instructions in "Remove the battery" on page 118.

4. Remove the palm rest. For details, refer to the instructions in "Remove the palm rest" on page 124.

5. If a tool for removing connectors is included in the package with the new card, use it to disconnect the cables from the card. If no such tool is included, disconnect the cables by picking up the connectors with your fingers and gently unplugging them.

Note: Depending on the system configuration of your computer, the card may have only one connector.
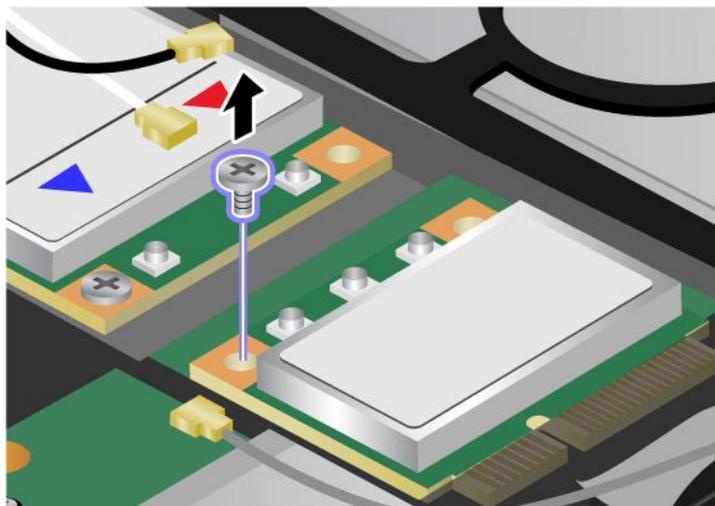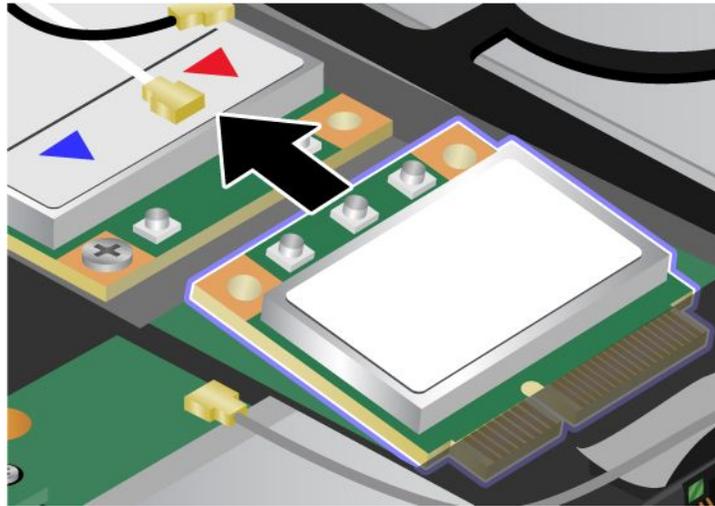
6. Remove the screw. The card pops up.
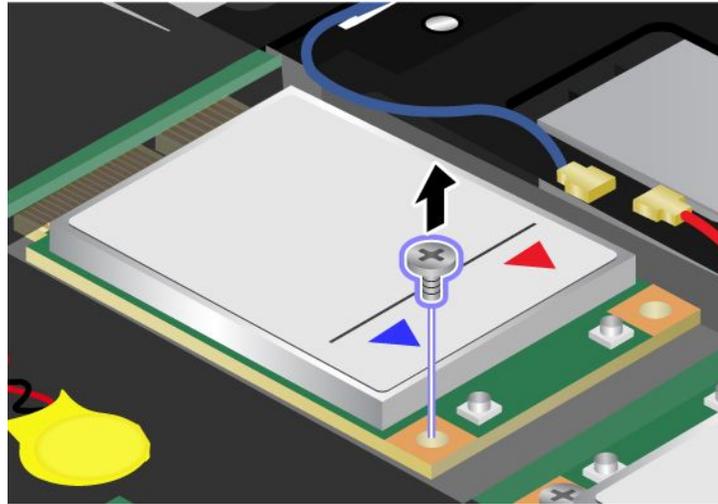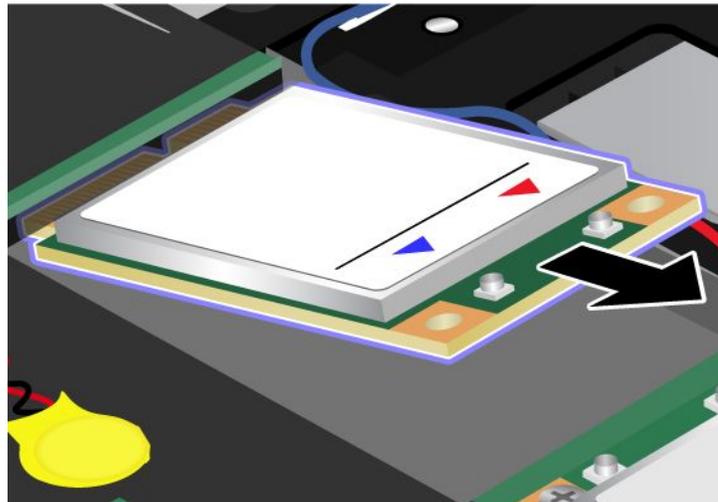
7. Remove the card.

8. Align the contact edge of the new PCI Express Mini Card with the corresponding socket.

   Notes:

   • You can also replace the PCI Express Mini Card for Wireless WAN with an mSATA solid state drive.

   • To install a new mSATA solid state drive, refer to "Installing and replacing the mSATA solid state drive" on page 143.
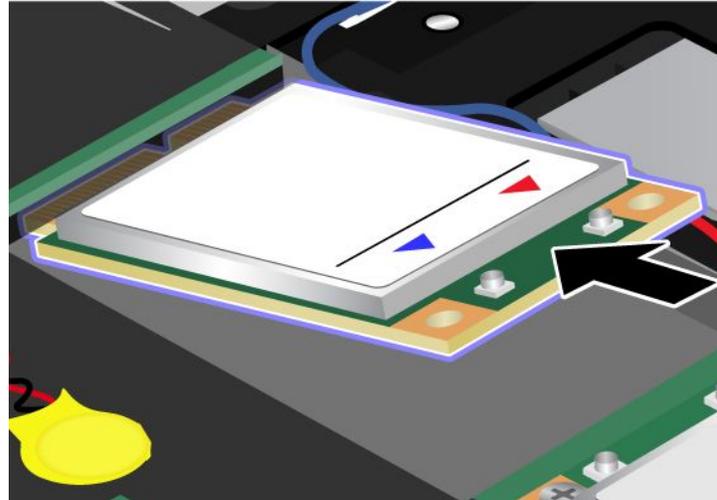
9. Pivot the card until you can snap it into place by pressing the upper side of each connector. Secure the card with the screw.
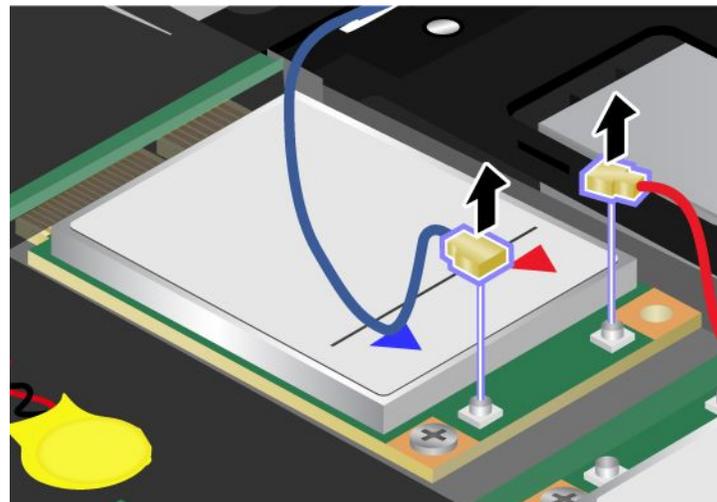
   Note: Depending on the system configuration of your computer, the card may have only one connector.

10. Connect the cables to the new PCI Express Mini Card.
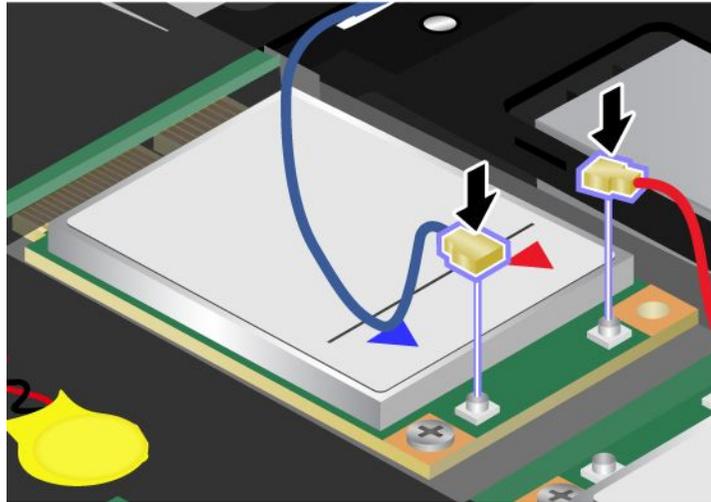
11. Reinstall the keyboard. For details, refer to the instructions in "Reinstall the palm rest" on page 124.
12. Reinstall the battery. For details, refer to the instructions in "Reinstall the battery" on page 118.
13. Turn the computer over again. Connect the ac power adapter and cables to the computer; then turn it on.

Installing and replacing the mSATA solid state drive

Before you start, print these instructions.

Some ThinkPad models have an mSATA solid state drive. You can replace the mSATA solid state drive with a new one which can be purchased from your Lenovo reseller or a marketing representative. To replace the mSATA solid state drive, read the following prerequisites.

Notes:

- You can also replace the mSATA solid state drive with a Wireless PCI Express Mini Card for Wireless WAN.
- Replace the mSATA solid state drive only if you need to have it repaired.

Prerequisites for the procedure

When replacing the mSATA solid state drive, be sure to follow the precautions.

Attention: When you are handling an mSATA solid state drive:

- Do not drop the mSATA solid state drive or subject it to physical shocks. Put the mSATA solid state drive on a material, such as soft cloth that absorbs any physical shocks.
- Do not apply pressure to the cover of the mSATA solid state drive.

The mSATA solid state drive is very sensitive. Incorrect handling can cause damage and permanent loss of data.

Before removing the mSATA solid state drive, make a backup copy of all the information on it, and then turn the computer off.

Never remove the mSATA solid state drive while the system is operating, in sleep (standby) mode, or in hibernation mode.

If an mSATA solid state drive is available in your computer, to replace the mSATA solid state drive, do as follows.

1. Turn off the computer; then disconnect the ac power adapter and all cables from the computer. Wait for a few minutes, till the inside of the computer cools, before you start the following procedures.

2. Close the computer display, and turn the computer over.

3. Remove the battery. For details, refer to the instructions in "Remove the battery" on page 118.

4. Remove the palm rest. For details, refer to the instructions in "Remove the palm rest" on page 124.

5. Remove the screw. The card pops up.
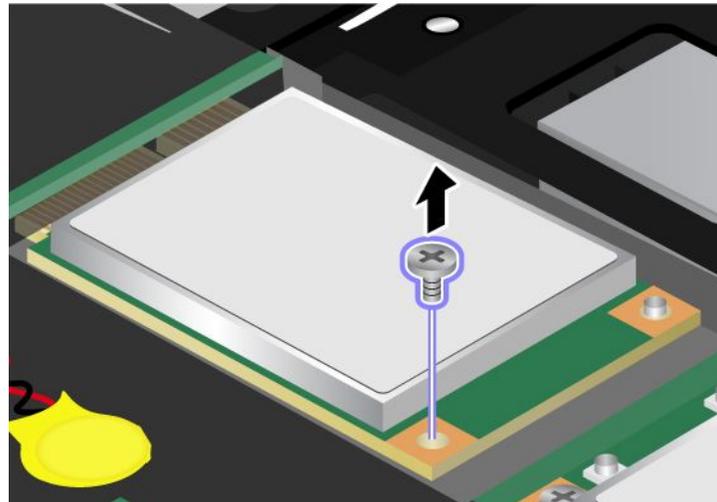
6. Remove the card.
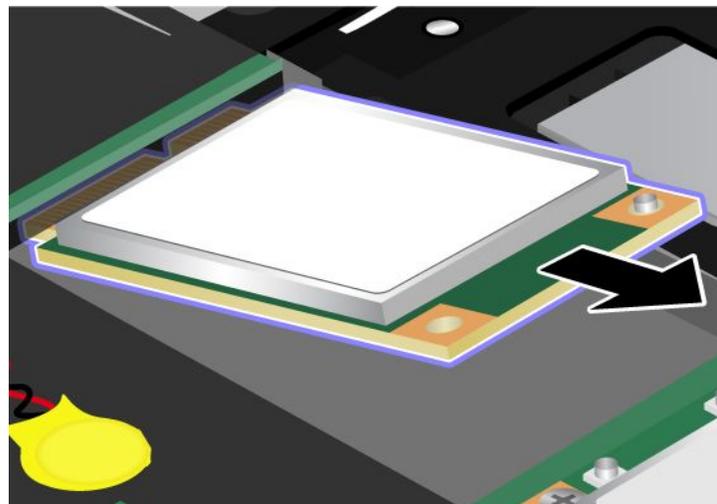
7. Align the contact edge of a new mSATA solid state drive with the corresponding socket.

   Notes:

   - You can also replace the mSATA solid state drive with a Wireless PCI Express Mini Card for Wireless WAN.
   - To install a new PCI Express Mini Card, refer to "Installing and replacing the PCI Express Mini Card for wireless WAN connection" on page 139.
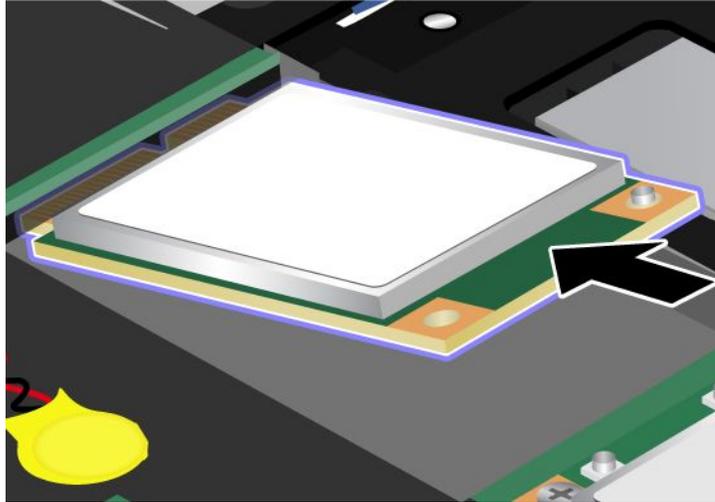
8. Pivot the card downward **1** until you can snap it into place. Secure the card with the screw **2**.
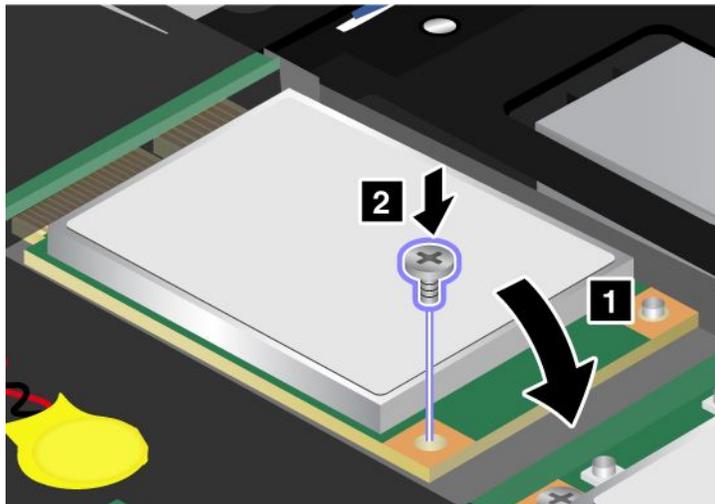
9. Reinstall the keyboard. For details, refer to the instructions in "Reinstall the palm rest" on page 124.
10. Reinstall the battery. For details, refer to the instructions in "Reinstall the battery" on page 118.
11. Turn the computer over again. Connect the ac power adapter and cables to the computer; then turn it on.

Replacing memory

Before you start, print these instructions.

Prerequisites for the procedure

When replacing the memory, be sure to follow the precautions:

Note: The operating speed of the memory module depends on the system configuration of your computer and its combination with the memory module installed on your computer. In some conditions, the memory in your computer may not be able to operate at the maximum speed.

Attention: Before you start installing a module, touch a metal table or a grounded metal object. This action reduces any static electricity from your body. The static electricity could damage the SO-DIMM.

To replace the SO-DIMM, do the following:

1. Turn off the computer; then disconnect the ac power adapter and all cables from the computer.
2. Close the computer display, and turn it over.
3. Remove the battery. Refer to "Replacing the battery" on page 118 for details about how to replacing the battery.
4. Loosen the screws on the memory slot cover **1**, then remove the cover **2**.
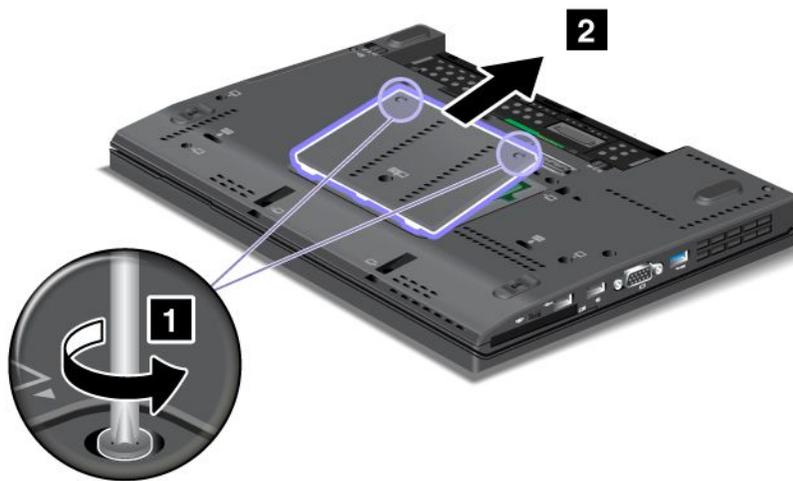
If the two SO-DIMMs are already in the memory slots, remove an SO-DIMM to make room for the new one by pressing out on the latches on both edges of the socket at the same time **1**. Be sure to save it for future use **2**.
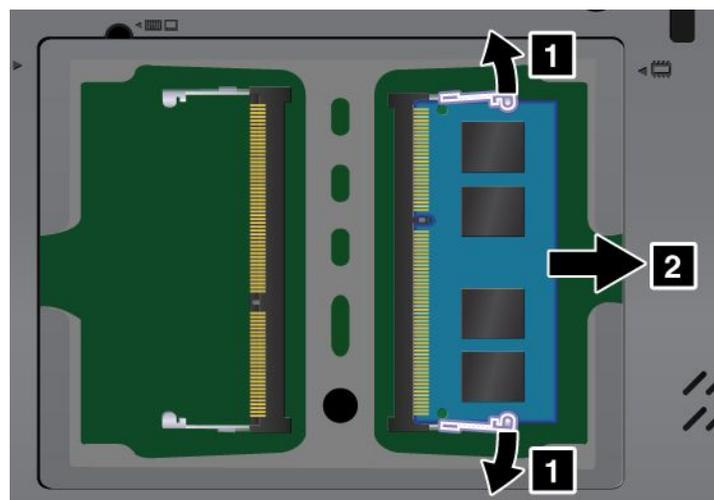
5. Find the notch on the contact edge side of the SO-DIMM you are installing.

    Attention: To avoid damaging the SO-DIMM, do not touch its contact edge.

6. With the notched end of the SO-DIMM toward the contact edge side of the socket, insert the SO-DIMM into the socket at an angle of about 20 degrees **1**; then press it in firmly **2**.
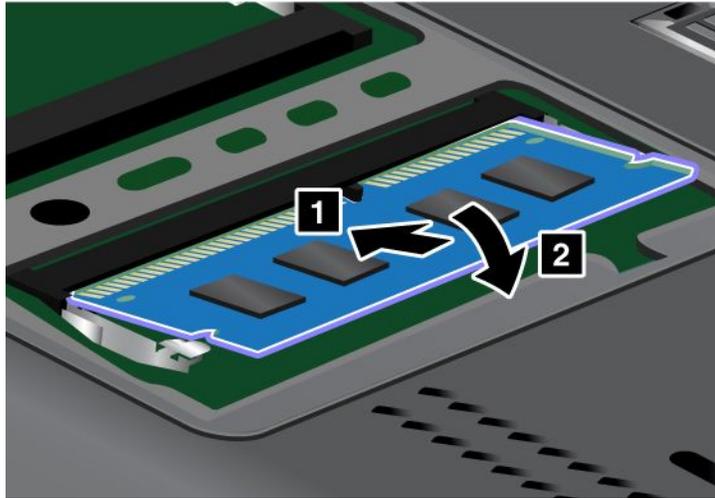
Note: If you install a memory module in only one of the two memory slots, install it in the lower slot.

7. Pivot the SO-DIMM downward until it snaps into place.
8. Make sure that the SO-DIMM is firmly fixed in the slot and cannot be moved easily.
9. Put the memory slot cover back in place **1**, close the cover, and tighten the screws **2**.
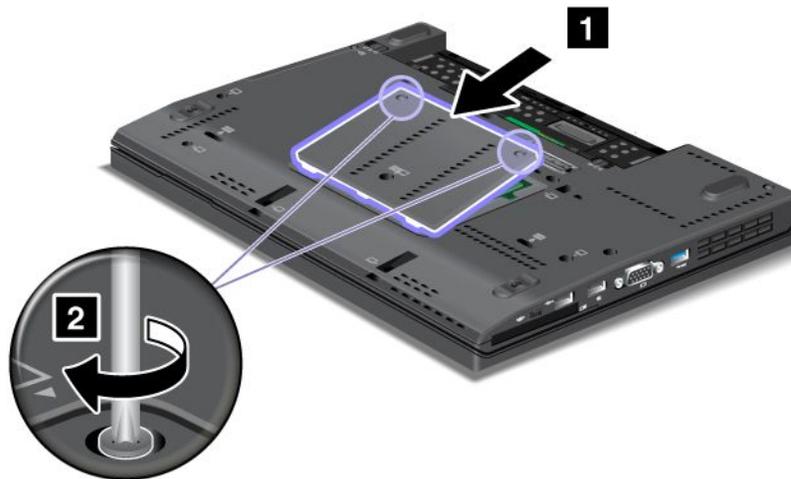
10. Put the battery back in place, turn the computer over again, and reconnect the cables. For information about how to replace the battery, refer to "Replacing the battery" on page 118.

To make sure that the SO-DIMM is installed correctly, do as follows:

1. Turn the computer on.

2. When the logo screen is displayed, press the F1 key. The ThinkPad Setup opens. The "Installed memory" item shows the total amount of memory installed in your computer.

Replacing the SIM card

Before you start, print these instructions.

Your computer 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 your computer or will be part of the shipping contents that came with your computer.

If you find the SIM cards included in the shipping contents, a dummy card is installed in the SIM card slot. Then proceed to the following instructions.

If you find the dummy card in the shipping contents, the SIM card is already installed in the SIM card slot, and no further installation is needed.

Note: The SIM card is identified by the IC chip mounted on one side of the card.

To replace the SIM card, do as follows.

1. Turn off the computer; then disconnect the ac power adapter and all cables from the computer.
2. Close the computer display, and turn it over.
3. Remove the battery. For details, refer to the instructions in "Remove the battery" on page 118.
4. Find the SIM card slot inside the open battery compartment. Remove the card.
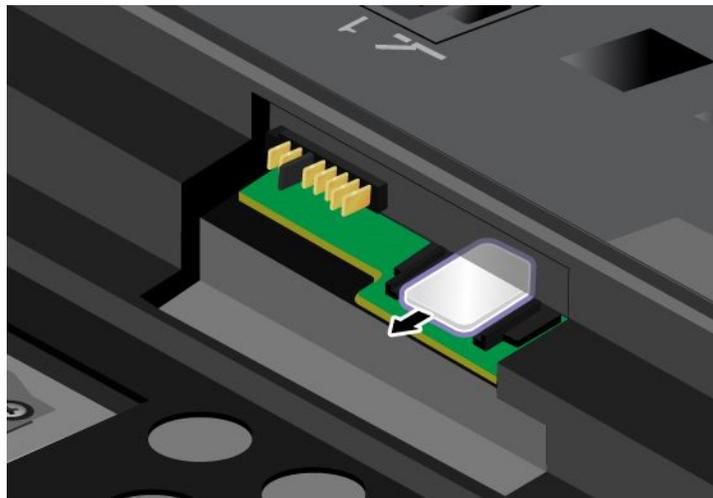
5. Insert the SIM card firmly into the slot.
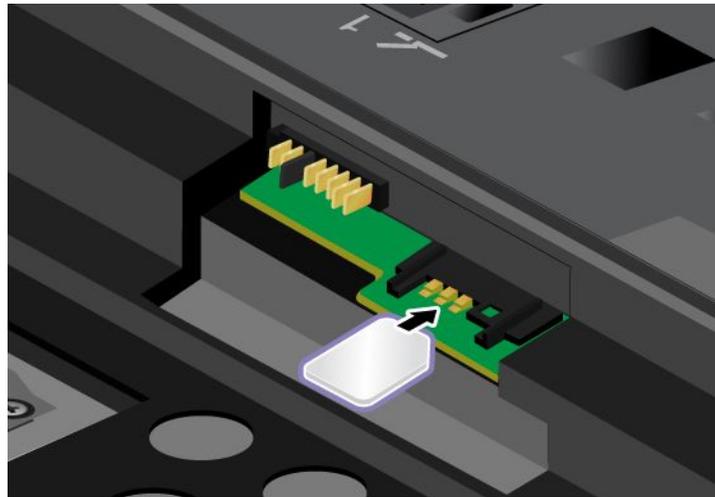
Note: Make sure that you insert the SIM card all the way into the slot.

6. Put the battery back in place. For more details, refer to "Replacing the battery" on page 118.

7. Turn the computer over again, and reconnect the cables.

Chapter 7. Enhancing your computer

This section provides information on installing devices and taking advantage of your computer's high-technology features.

*   "Finding ThinkPad options" on page 151
*   "ThinkPad X220 UltraBase" on page 151
*   "ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, and ThinkPad Mini Dock Plus Series 3" on page 161

Finding ThinkPad options

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

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

To shop at Lenovo, go to:
http://www.lenovo.com/accessories/services/index.html

ThinkPad X220 UltraBase

Your ThinkPad X220, X220i, X220 Tablet, and X220i Tablet support the ThinkPad X220 UltraBase.

After you attach your computer to the ThinkPad X220 UltraBase, you can use its connectors in place of the computer's.

When the computer is attached to the ThinkPad X220 UltraBase, never pick up the assembly by taking hold of the computer alone. Always hold the whole assembly.

For more details about the ThinkPad X220 UltraBase, refer to the following:

*   ThinkPad X220 Ultrabase top view
*   ThinkPad X220 Ultrabase bottom view
*   "Attaching a ThinkPad X220 Ultrabase" on page 153
*   "Detaching a ThinkPad X220 Ultrabase" on page 155
*   Security feature

ThinkPad X220 Ultrabase top view
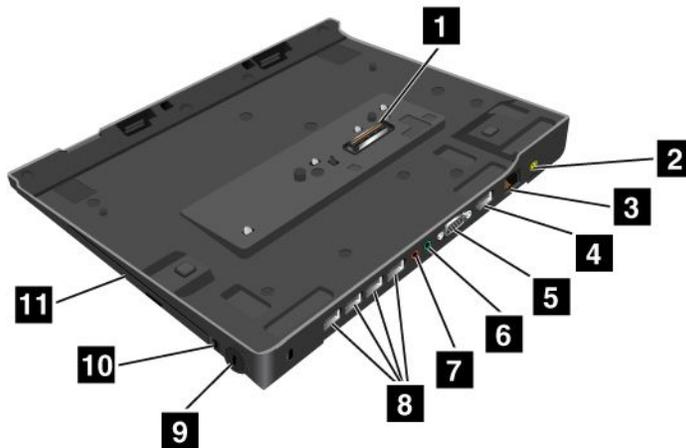
1 The **docking connector** is used for attaching the ThinkPad computer to the ThinkPad X220 UltraBase.

2 The **power jack** is where you connect the AC adapter.

3 The **Ethernet connector** is for connecting the ThinkPad X220 UltraBase to a LAN.

4 The **DisplayPort connector** is for connecting a DisplayPort-compatible display device.

5 The **Monitor connector** is for attaching an external monitor or a projector to your computer.

6 The **headphone jack**, a jack 1/8 inch (3.5 mm) in diameter, is for connecting an external headphone.

7 The **microphone jack**, a jack 1/8 inch (3.5 mm) in diameter, is for connecting an external microphone.

8 The **Universal Serial Bus (USB) connector** is for connecting the devices that conform to the USB interface.

9 The **security keyhole** is for locking the dock.

10 The **system lock key** is for locking the eject button.

11 The **bay** is for optical disk drive or second hard disk drive.

ThinkPad X220 Ultrabase bottom view
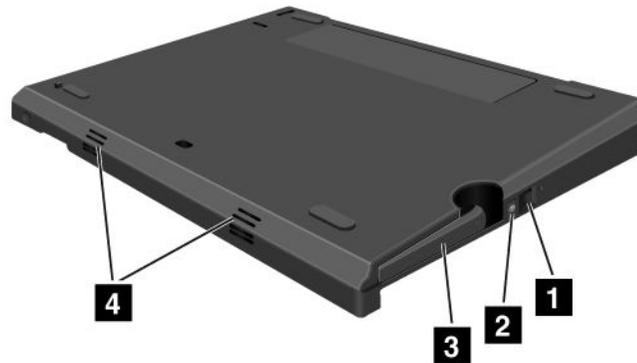
1 By pressing the **eject request button**, you can tell the operating system to get ready for undocking.

2 The **docking indicator** is red when your computer is docked. It blinks when the eject request button is pressed.

3 The **eject lever** detaches your computer from the ThinkPad X220 UltraBase.

4 The **holes** are for the system speakers.

Attaching a ThinkPad X220 Ultrabase

Attention: Disconnect the AC power from your computer before you attach the ThinkPad X220 UltraBase. The AC adapter connector will be damaged if it remains connected to the computer during the attachment

You can hot attach or warm attach the computer to the ThinkPad X220 UltraBase. Hot attach is attaching the computer to the ThinkPad X220 UltraBase while in operating mode; warm attach is attaching the computer to the ThinkPad X220 UltraBase while in sleep (standby) mode.

In doing a hot- or warm- attach, observe the following:

- For hot-attaching: The docking indicator of the ThinkPad X220 UltraBase should turn on after a few seconds.
- For warm-attaching: When the computer returns from sleep (standby) mode, the docking indicator of the ThinkPad X220 UltraBase should turn on.

To attach your computer to a ThinkPad X220 Ultrabase, do the following:

1. Make sure that the system lock key of the ThinkPad X220 UltraBase is in the unlocked (vertical) position.
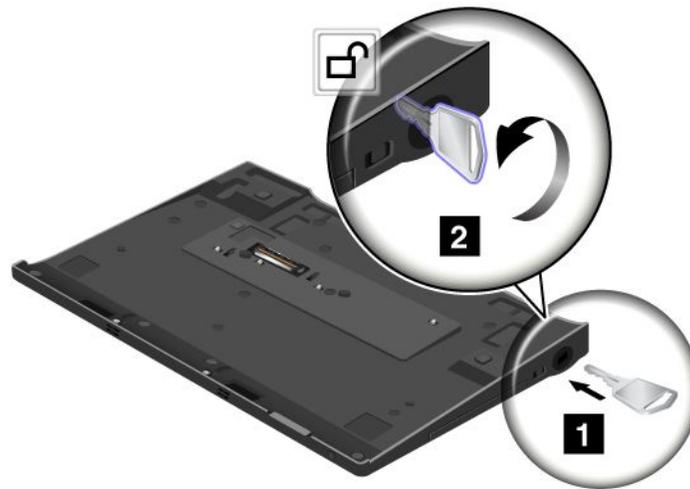
2. Align the front of the computer with the front of the ThinkPad X220 UltraBase.

3. Make sure that the guides of the ThinkPad X220 UltraBase align with the holes of the computer **1**. Then put the computer in place **2**. The docking indicator lights.

4. When the computer is already docked to the ThinkPad X220 UltraBase, you can start the computer.

Note: You can turn the key clockwise to lock it. Then, keep the security key in a safe place. Do not lose this key; otherwise, you will be unable to detach the computer from the ThinkPad X220 UltraBase.

Detaching a ThinkPad X220 Ultrabase

Attention: Do not detach your computer from the ThinkPad X220 UltraBase while the docking indicator of the ThinkPad X220 UltraBase is blinking or on. Wait until the docking indicator turns off. Detaching while the indicator is blinking or on causes the system to beep, and the computer may halt.

You can hot detach or warm detach the computer from the ThinkPad X220 UltraBase. Hot detach is detaching the computer from the ThinkPad X220 UltraBase while in operating mode; warm detach is detaching the computer from the ThinkPad X220 UltraBase while in sleep (standby) mode.

To perform a hot-detach, follow the steps below:

For Windows 7 and Windows Vista:

1. Click **Start**, and then press the right arrow button.
2. Select **Undock**.
3. Make sure that the docking indicator of the ThinkPad X220 UltraBase is off.

For Windows XP:
1. Select the **Undock Computer** in the **Start** menu.
2. Make sure that the docking indicator of the ThinkPad X220 UltraBase is off.

Note: Detaching the UltraBase suddenly while the computer is operating without performing the procedure above may cause the system to malfunction or hang.

To perform a warm-detach, press the **eject request button** of the ThinkPad X220 UltraBase. The system will then resume with an **OK** message. Make sure that the docking indicator of the ThinkPad X220 UltraBase is off. The computer will re-enter sleep (standby) mode.

If you are hot-or warm-detaching the computer, make sure that

• the devices connected to USB, Serial, and Parallel connectors are not in use.
• the connection to a Modem or Ethernet port has ended.
• the battery is fully charged.

To detach your computer from the ThinkPad X220 Ultrabase, do the following:

1. Make sure that the system lock key of the ThinkPad X220 UltraBase is in the unlocked (vertical) position.

2. Close the computer display.
3. If you are hot/warm-detaching the computer, press the eject request button of the ThinkPad X220 UltraBase. Then make sure that the eject inhibit indicator of the ThinkPad X220 UltraBase is off, and the eject ready indicator lights up.
4. Release the eject lever on the left side of the ThinkPad X220 UltraBase **1** until the computer lifts up; then remove the computer **2**.
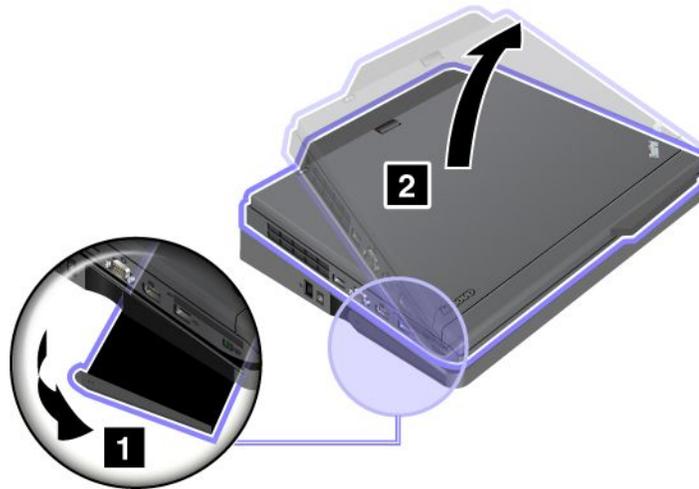
Security feature

The lock of the ThinkPad X220 UltraBase has two positions.
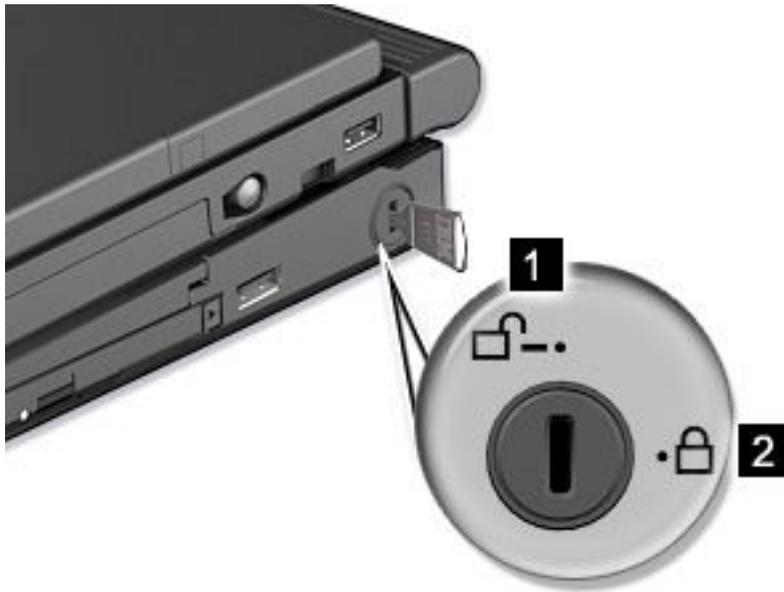
1 Unlock position:

If the UltraBase lock is in this position, your computer is not secured.

1 Base lock position:

If the UltraBase lock is in this position, the ThinkPad X220 UltraBase is locked, and the computer cannot be removed from the ThinkPad X220 UltraBase. The Serial Ultrabay Slim device is also locked and cannot be removed from the UltraBase.

Note: Keep the security key in a safe place. Do not lose this key; otherwise, you will be unable to detach the computer from the ThinkPad X220 UltraBase

If you attach a mechanical lock to the security keyhole of the ThinkPad X220 UltraBase, the ThinkPad X220 UltraBase cannot be taken out of the locked position, and you can secure your computer and the ThinkPad X220 UltraBase.

Note: You need to purchase the mechanical lock commercially. You are responsible for evaluating, selecting, and implementing the locking devices and security features.

ThinkPad Battery 19+

Your ThinkPad X220, X220i, X220 Tablet, and X220i Tablet support the ThinkPad Battery 19+.

With ThinkPad Battery 19+, you can extend the operating time of your notebook computer.

When the computer is attached to the ThinkPad Battery 19+, never pick up the assembly by taking hold of the computer alone. Always hold the whole assembly.

ThinkPad Battery 19+ top view

1 The **docking connector** is used for attaching the ThinkPad computer to the ThinkPad Battery 19+.

ThinkPad Battery 19+ bottom view
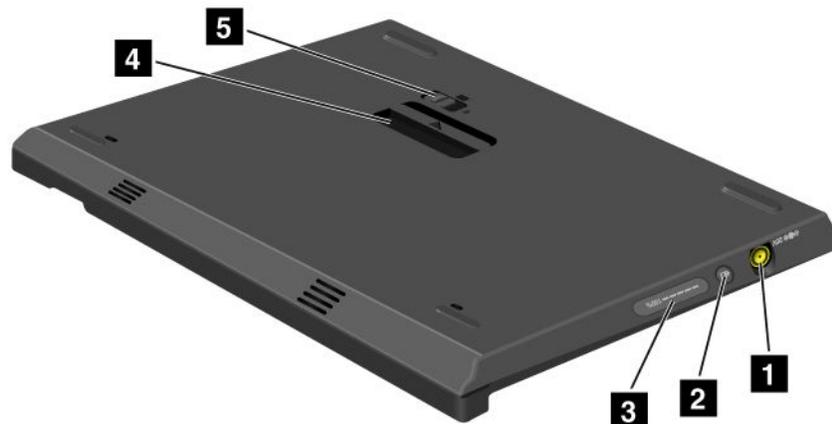
1 The **power jack** is where you connect the AC adapter.

2 By pressing the **indicator button**, the **status indicator** shows the ThinkPad Battery 19+ charge status.

3 The **status indicator** is to show the ThinkPad Battery 19+ charge status.

4 The **eject lever** is to release the ThinkPad Battery 19+ from the docking connector in the computer.

5 The **battery latch** prevents the **eject lever** from being released.

Attaching a ThinkPad Battery 19+

Attention: Disconnect the AC power from your computer before you attach the ThinkPad Battery 19+. The AC adapter connector will be damaged if it remains connected to the computer during the attachment.

To attach a ThinkPad Battery 19+, do the following:

1. Align the front of the computer with the front of the ThinkPad Battery 19+.

2. Make sure that the guides of the ThinkPad Battery 19+ align with the holes of the computer 1. Then put the computer in place 2.

Detaching a ThinkPad Battery 19+

To detach a ThinkPad Battery 19+, do the following:

1. Unlock the battery latch by sliding it to the unlock position.

2. Release the eject lever **2** and pull up the ThinkPad Battery 19+.

Charging a ThinkPad Battery 19+

The ThinkPad Battery 19+ can be charged separately.
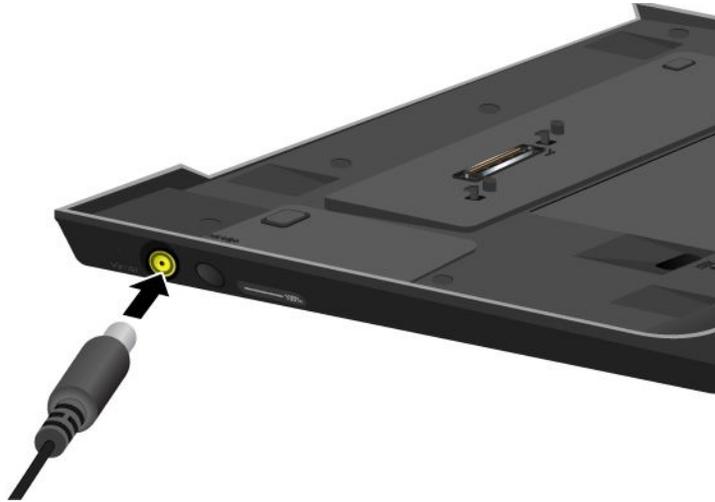
The ThinkPad Battery 19+ can also be charged with a computer.

When the ThinkPad Battery 19+ is charged with a computer, both the main battery and ThinkPad Battery 19+ can be charged simultaneously.

ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, and ThinkPad Mini Dock Plus Series 3

Note: Only ThinkPad X220 and X220i support ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, and ThinkPad Mini Dock Plus Series 3.

After you attach your computer to the ThinkPad Port Replicator Series 3, the ThinkPad Mini Dock Series 3, or the ThinkPad Mini Dock Plus Series 3, you can use its connectors in place of the computer's.

When the computer is attached to the ThinkPad Port Replicator Series 3, the ThinkPad Mini Dock Series 3, or the ThinkPad Mini Dock Plus Series 3, never pick up the assembly by taking hold of the computer alone. Always hold the whole assembly.

For more details about the ThinkPad Port Replicator Series 3, the ThinkPad Mini Dock Series 3, or the ThinkPad Mini Dock Plus Series 3, refer to the following:

Front view

ThinkPad Port Replicator Series 3

1 The **power switch** turns the computer on and off.

2 The **eject button** releases the computer from the ThinkPad Port Replicator Series 3 when pressed.

3 The **sliding adjuster** is a guide used to align the docking connector on your computer as you attach the ThinkPad Port Replicator Series 3.

4 The **docking connector** is where you attach your computer.

ThinkPad Mini Dock Series 3
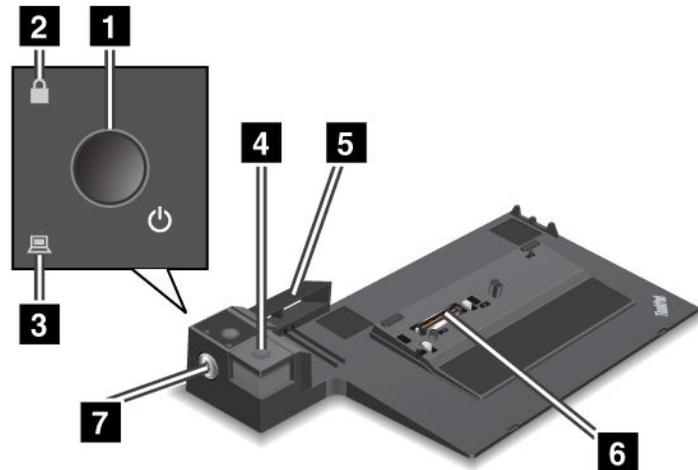
1 The **power switch** turns the computer on and off.

2 The **key lock indicator** lights when the system lock key is in the locked position. When the system lock key is in the locked position, the eject button of the ThinkPad Mini Dock Series 3 is locked; you cannot attach or remove your computer.

3 The **docking indicator** lights when your computer is docked.

4 The **eject button** releases the computer from the ThinkPad Mini Dock Series 3 when pressed.

5 The **sliding adjuster** is a guide used to align the docking connector on your computer as you attach the ThinkPad Mini Dock Series 3.

6 The **docking connector** is where you attach your computer.

7 The **system lock key** is for locking the eject button.

ThinkPad Mini Dock Plus Series 3
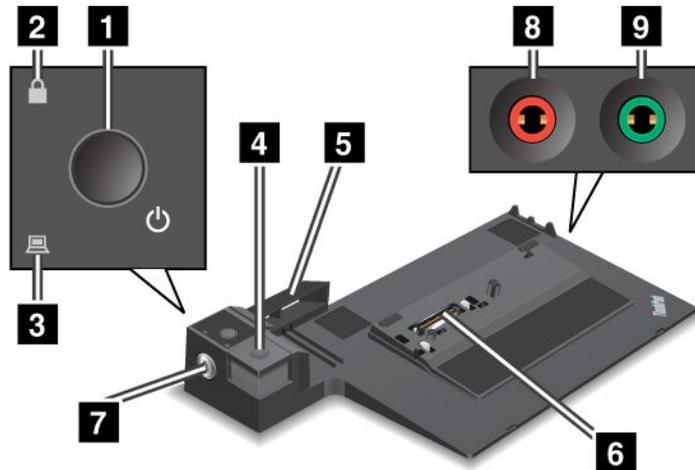
1 The **power switch** turns the computer on and off.

2 The **key lock indicator** lights when the system lock key is in the locked position. When the system lock key is in the locked position, the eject button of the ThinkPad Mini Dock Plus Series 3 is locked; you cannot attach or remove your computer.

3 The **docking indicator** lights when your computer is docked.

4 The **eject button** releases the computer from the ThinkPad Mini Dock Plus Series 3 when pressed.

5 The **sliding adjuster** is a guide used to align the docking connector on your computer as you attach the ThinkPad Mini Dock Plus Series 3.

6 The **docking connector** is where you attach your computer.

7 The **system lock key** is for locking the eject button.

8 The **microphone jack**, a jack 1/8 inch (3.5 mm) in diameter, is for connecting an external microphone.

9 The **headphone jack**, a jack 1/8 inch (3.5 mm) in diameter, is for connecting an external stereo headphone.

Rear view

ThinkPad Port Replicator Series 3
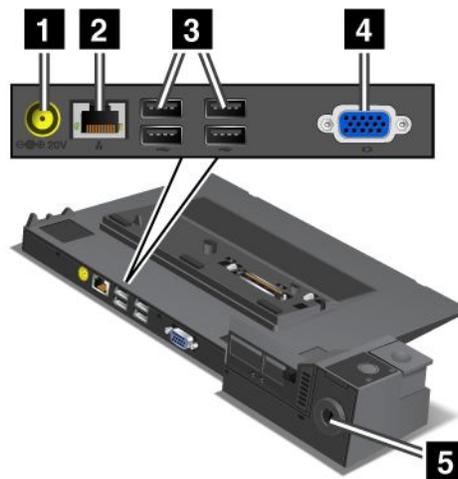
1 The **power jack** is for connecting the ac power adapter.

2 The **Ethernet connector** is for connecting the ThinkPad Port Replicator Series 3 to an Ethernet LAN. The indicator on the connector is the same as that on the computer.

Notes:

- You cannot use the Token Ring cable for this connector.
- You can use this connector for a 10BASE-T/100BASE-TX/1000BASE-T Ethernet.

If you attach your computer to the ThinkPad Port Replicator Series 3 and use an Ethernet connector, use the Ethernet connector on the ThinkPad Port Replicator Series 3, not the one on the computer.

3 The **Universal Serial Bus connectors** are for connecting USB 1.1 and USB 2.0 devices.

4 The **external monitor connector** is for connecting an external monitor.

Note: If you attach your computer to the ThinkPad Port Replicator Series 3 and use an external monitor connector, use the external monitor connector on the ThinkPad Port Replicator Series 3, not the one on the computer.

5 When you attach a mechanical lock to the **security keyhole**, the eject button is locked so that the computer cannot be removed from the ThinkPad Port Replicator Series 3.

ThinkPad Mini Dock Series 3
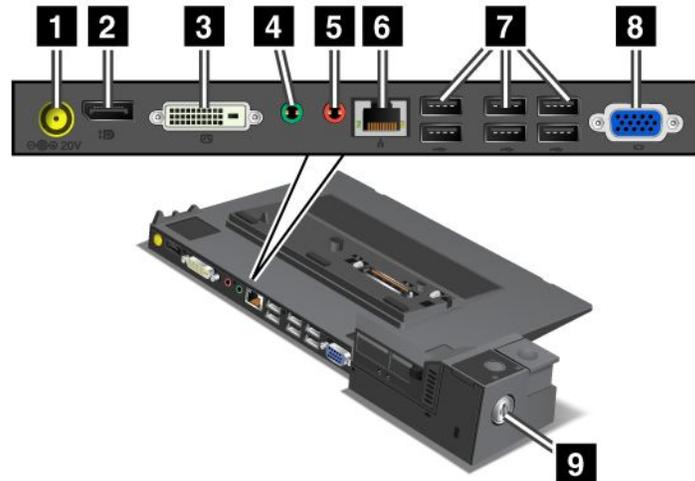
1 The **power jack** is for connecting the ac power adapter.

2 The **DisplayPort** is for connecting a display device.

3 The **digital visual interface connector** is for connecting a monitor that supports Single-Link DVI.

Note: The DVI connector provides a digital interface only. This connector can be used with a computer that supports DVI via docking only.

4 The **headphone jack**, a jack 1/8 inch (3.5 mm) in diameter, is for connecting an external stereo headphone.

5 The **microphone jack**, a jack 1/8 inch (3.5 mm) in diameter, is for connecting an external microphone.

6 The **Ethernet connector** is for connecting the ThinkPad Mini Dock Series 3 to an Ethernet LAN. The indicator on the connector is the same as that on the computer.

Notes:

• You cannot use the Token Ring cable for this connector.

• You can use this connector for a 10BASE-T/100BASE-TX/1000BASE-T Ethernet.

If you attach your computer to the ThinkPad Mini Dock Series 3 and use an Ethernet connector, use the Ethernet connector on the ThinkPad Mini Dock Series 3, not the one on the computer.

7 The **Universal Serial Bus connectors** are for connecting USB 1.1 and USB 2.0 devices.

8 The **external monitor connector** is for connecting an external monitor.

Note: If you attach your computer to the ThinkPad Mini Dock Series 3 and use an external monitor connector, use the external monitor connector on the ThinkPad Mini Dock Series 3, not the one on the computer.

9 When you attach a mechanical lock to the **security keyhole**, the eject button is locked so that the computer cannot be removed from the ThinkPad Mini Dock Series 3.

ThinkPad Mini Dock Plus Series 3
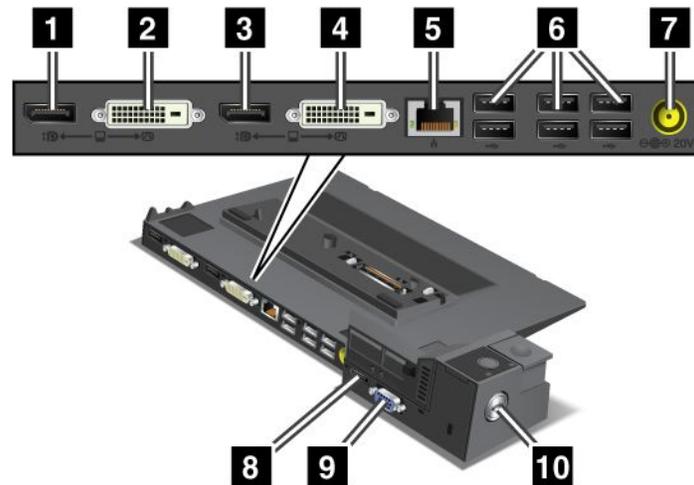
1 The **DisplayPort** is for connecting a display device.

2 The **digital visual interface connector** is for connecting a monitor that supports Single-Link DVI.

Note: The DVI connector provides a digital interface only. This connector can be used with a computer that supports DVI via docking only.

3 The **DisplayPort** is for connecting a display device.

4 The **digital visual interface connector** is for connecting a monitor that supports Single-Link DVI.

Note: The DVI connector provides a digital interface only. This connector can be used with a computer that supports DVI via docking only.

5 The **Ethernet connector** is for connecting the ThinkPad Mini Dock Plus Series 3 to an Ethernet LAN. The indicator on the connector is the same as that on the computer.

Notes:

- You cannot use the Token Ring cable for this connector.
- You can use this connector for a 10BASE-T/100BASE-TX/1000BASE-T Ethernet.

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

6 The **Universal Serial Bus connectors** are for connecting USB 1.1 and USB 2.0 devices.

7 The **power jack** is for connecting the ac power adapter.

8 The **eSATA** is for connecting an eSATA device.

9 The **external monitor connector** is for connecting an external monitor.

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

10 When you attach a mechanical lock to the **security keyhole**, the eject button is locked so that the computer cannot be removed from the ThinkPad Mini Dock Plus Series 3.

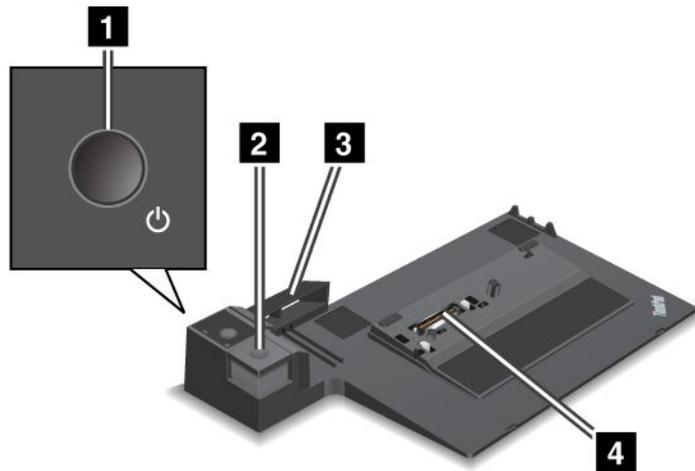## Attaching a ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, or ThinkPad Mini Dock Plus Series 3

To attach your computer to a ThinkPad Port Replicator Series 3, a ThinkPad Mini Dock Series 3, or a ThinkPad Mini Dock Plus Series 3, do the following:

The following drawings are for the ThinkPad Mini Dock Series 3 or the ThinkPad Mini Dock Plus Series 3. The procedure is the same for the ThinkPad Port Replicator Series 3.

Notes:

- Before you attach the computer to a ThinkPad Port Replicator Series 3, a ThinkPad Mini Dock Series 3, or a ThinkPad Mini Dock Plus Series 3, disconnect an ac power adapter from the computer.
- If your computer is operating, make sure that it has finished any operations involving devices that are connected to a USB connector and a USB/eSATA connector. Also make sure that any connection to an Ethernet port has ended.
- Before you attach your computer to a ThinkPad Mini Dock Series 3, or a ThinkPad Mini Dock Plus Series 3), make sure that the system lock key is in place and in the unlocked (horizontal) position.

1. To attach your computer, make sure that the system lock key is in place and in the unlocked (horizontal) position for the ThinkPad Mini Dock Series 3, or the ThinkPad Mini Dock Plus Series 3. Make sure that the mechanical lock is detached for the ThinkPad Port Replicator Series 3.
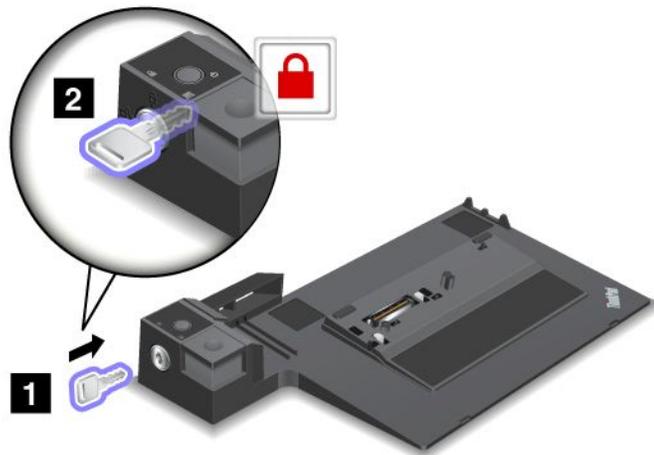
2. Press the button of the ThinkPad Mini Dock Series 3, or the ThinkPad Mini Dock Plus Series 3 **1**. Pull the sliding adjuster in the direction shown by the arrow **2**.
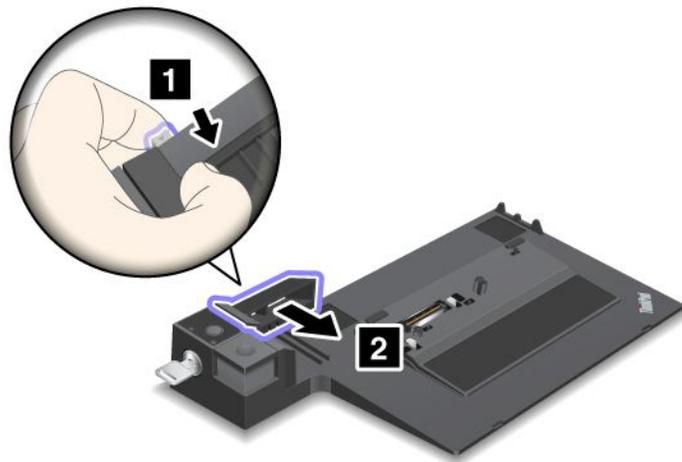
3. Put your computer on the platform of the ThinkPad Mini Dock Series 3, or the ThinkPad Mini Dock Plus Series 3, making sure that the top-left corner of the computer is aligned to the guide plate on the ThinkPad Mini Dock Series 3, or the ThinkPad Mini Dock Plus Series 3.
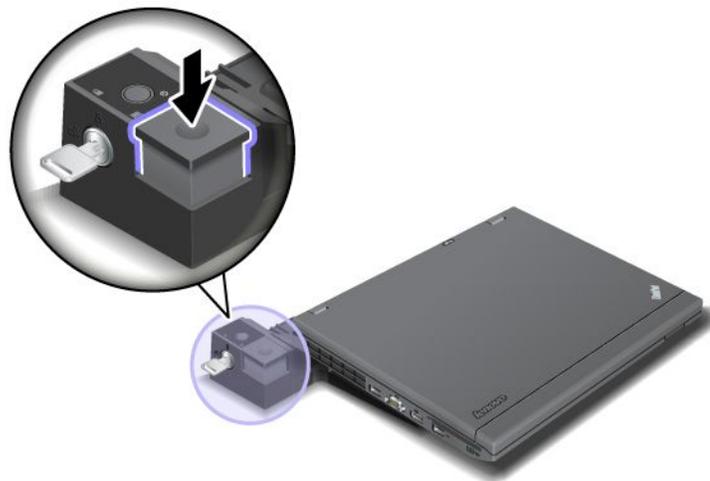
4. Insert your computer into the ThinkPad Mini Dock Series 3, or the ThinkPad Mini Dock Plus Series 3, along the surface, until you hear a click. The computer is now attached to the ThinkPad Mini Dock Series 3, or the ThinkPad Mini Dock Plus Series 3).

   Note: If the docking indicator is not lighted after you attach the ThinkPad Mini Dock Series 3, or the ThinkPad Mini Dock Plus Series 3, your computer is not properly connected to the dock. Check the ac power adapter of the dock, or disconnect and re-attach the ac power adapter. Then attach your computer to the dock.

Notes:

• If you attach the ThinkPad Port Replicator Series 3, the ThinkPad Mini Dock Series 3, or the ThinkPad Mini Dock Plus Series 3 to your computer, but do not connect the ac power adapter of that attachment to the power jack, your computer goes into battery mode.

- If your computer and the ThinkPad Port Replicator Series 3, the ThinkPad Mini Dock Series 3, or the ThinkPad Mini Dock Plus Series 3 are connected to separate ac power adapters, your computer goes into battery mode first, and then shifts into ac mode.
- If in either of the two preceding situations the battery of your computer is detached, or has no battery charge, your computer shuts down.

Connecting an external display to the ThinkPad Mini Dock Plus Series 3

Group 1 (top figure) and Group 2 (lower figure) are independent of each other. Each has a DisplayPort and a digital visual interface. If you connect a display to a DisplayPort and a DVI that are in the same group, the DisplayPort is inactive.

Detaching a ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, and ThinkPad Mini Dock Plus Series 3

To detach your computer from the ThinkPad Mini Dock Series 3, and the ThinkPad Mini Dock Plus Series 3, do the following:

1. Make sure that:
   - The devices connected to USB connectors are not in use.
   - The connection to an Ethernet port has been ended.
   - The devices connected to an eSATA port are not in use (ThinkPad Mini Dock Plus Series 3).

2. Make sure that the system lock key of the ThinkPad Mini Dock Series 3, or the ThinkPad Mini Dock Plus Series 3 is in place and in the unlocked (horizontal) position.
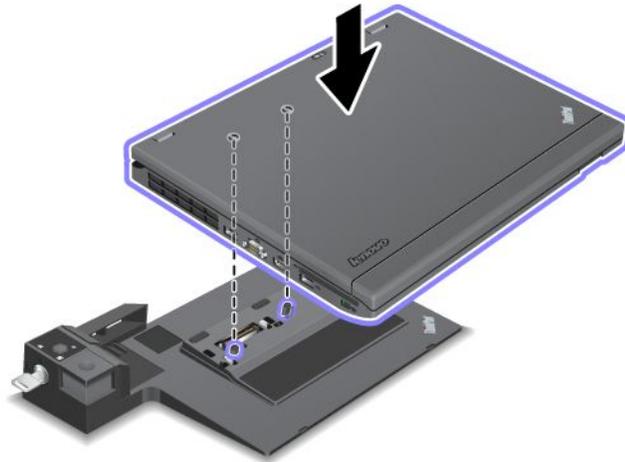
3. Press the eject button **1** until the computer moves up; then, grasp both sides, and remove the computer **2**.
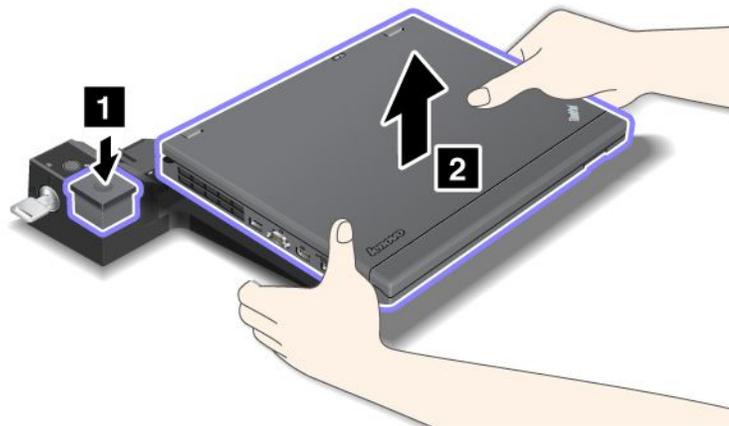
To detach your computer from the ThinkPad Port Replicator Series 3, do the following:

Notes:

- If your computer is operating, make sure that it has finished operations involving devices that are connected to the USB connector. Also make sure that any Ethernet connection is stopped.
- Make sure that the battery pack is fully charged.

1. Make sure that all ejectable devices connected to the ThinkPad Port Replicator Series 3 are stopped.

2. Press the eject button **1** until the computer moves up; then, grasp both sides, and remove the computer **2**.
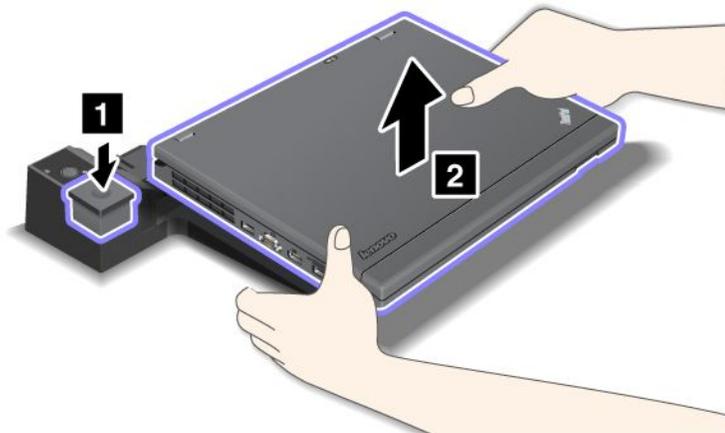
Security feature

The ThinkPad Port Replicator Series 3, the ThinkPad Mini Dock Series 3, or the ThinkPad Mini Dock Plus Series 3 has a security keyhole for a mechanical lock. By attaching a mechanical lock with cable there, you can secure the ThinkPad Port Replicator Series 3, the ThinkPad Mini Dock Series 3, or the ThinkPad Mini Dock Plus Series 3 to a heavy object, such as a desk.

If you use the ThinkPad Port Replicator Series 3, and attach a mechanical lock, the eject button is also locked, so that the computer cannot be detached from the ThinkPad Port Replicator Series 3.

If you use the ThinkPad Mini Dock Series 3 or the ThinkPad Mini Dock Plus Series 3, and attach a mechanical lock, the eject button is not locked. To lock the eject button, use the system lock key.

Lenovo does not offer a mechanical lock. You will need to purchase one elsewhere. You are responsible for evaluating, selecting, and implementing any locking device and security feature. Lenovo makes no comments, judgments, or warranties about the function, quality, or performance of any locking device or security features.

Attach a mechanical lock to the ThinkPad Mini Dock Plus Series 3 as follows:
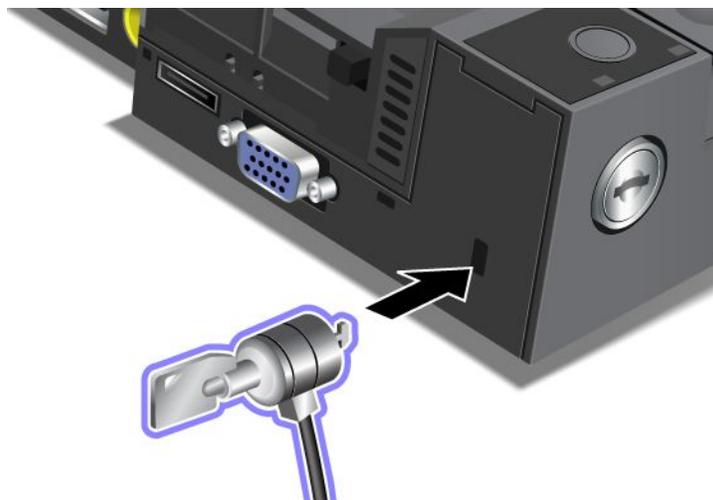
Attach a mechanical lock to the ThinkPad Mini Dock Series 3 as follows:
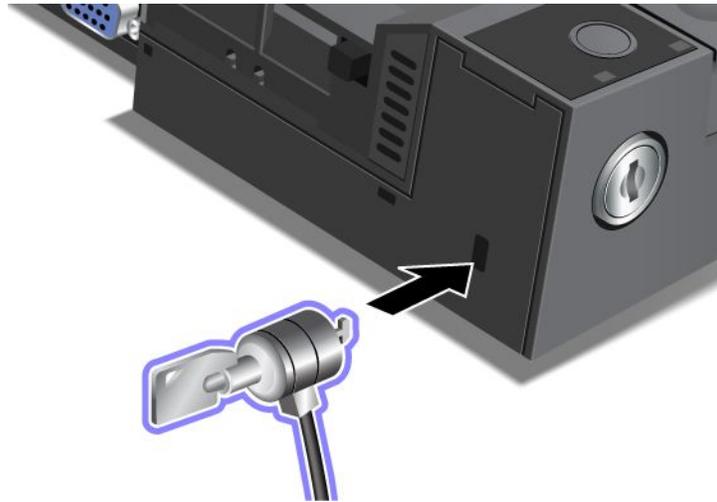
Attach a mechanical lock to the ThinkPad Port Replicator Series 3 as follows:
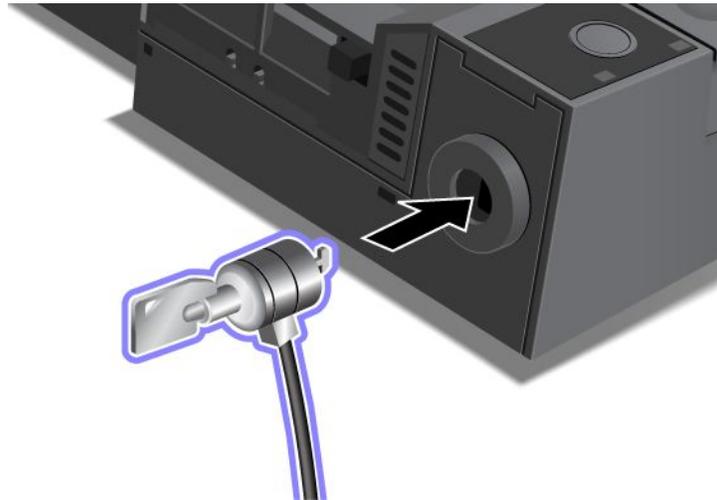
Using the system lock key

The system lock key has two positions, unlocked and locked.
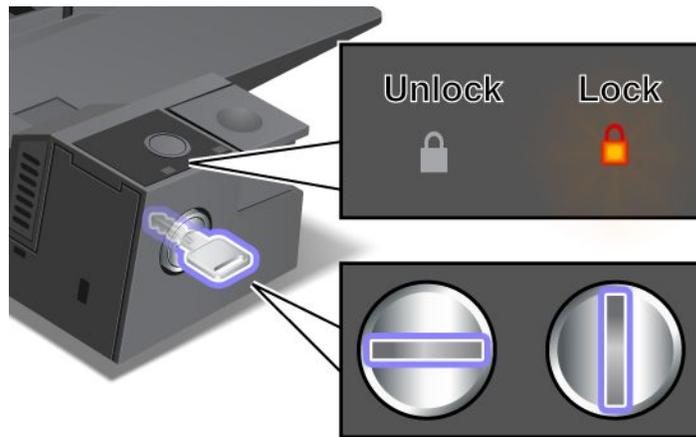
When the key is in the locked position, the eject button of the ThinkPad Mini Dock Series 3 or the ThinkPad Mini Dock Plus Series 3 is locked, and you cannot remove your computer. The key lock indicator lights when the eject button is locked.

Chapter 8. Advanced configuration

While it is important to protect files, data, and settings that are on the hard disk or on the solid state drive, you may also need to install a new operating system, install new device drivers, update your UEFI BIOS, or recover preinstalled software. This information will help you handle your computer with proper care and keep it in top working shape.

- "Installing a new operating system" on page 175
- "Installing device drivers" on page 180
- "ThinkPad Setup" on page 183
- "Using system management" on page 199

Installing a new operating system

If you install a new operating system in your computer, you need to install the Supplement files and ThinkPad device drivers for it at the same time. The necessary files are located in the following directories of your solid state drive or hard disk drive:

- The Supplement files for the operating system supported are in the `C:\SWTOOLS\OSFIXES` directory.
- The device drivers for the operating system supported are in the `C:\SWTOOLS\DRIVERS` directory.
- The preloaded software applications are in the `C:\SWTOOLS\APPS` directory.

Notes:

- The process of installing the new operating system deletes all the data on your hard disk, including backups or images that were stored in a hidden folder by use of the Rescue and Recovery program.
- If you cannot find the Supplement files, the device drivers, and application software you need on your hard disk drive, or if you want to receive updates and the latest information about them, go to: http://www.lenovo.com/support/site.wss/document.do?sitestyle=lenovo&lndocid=tpad-matrix

Before you begin

Before you install the operating system, do the following:

- Copy all the subdirectories and files in the `C:\SWTOOLS` directory to a removable storage device, to avoid losing files during the installation.
- Print the sections you will be using. Go to the section for the operating system you are using:
  - "Windows 7" on page 176
  - "Windows Vista" on page 177
  - "Windows XP" on page 178

  Notes: If your computer is a Windows Vista SP2 or Windows 7 model,
  - 32-bit versions of Windows do not support UEFI BIOS features. Only 64-bit versions of Windows can take advantage of the features enabled by 64-bit UEFI BIOS.
  - If you want to start Windows Recovery Environment (WinRE) using 64-bit version of Microsoft Windows Installation DVD, you should not change the initial **UEFI/Legacy Boot** setting in ThinkPad Setup. The **UEFI/Legacy Boot** setting must be the same as it was when the Windows OS image was installed. Or, you will see an error.

For the country or region code required in the installation, use one of the following:

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

Installing Windows 7

Before you start, print these instructions.

To install Windows 7 and its related software on your computer, do as follows:

1. Start the ThinkPad Setup.

2. Select **Startup** menu.

3. Select **UEFI/Legacy Boot**.

4. Do one of the following:

   - If you want to install the Windows 7 32–bit operating system, select **Legacy Only** or **Both**.
   - If you want to install the Windows 7 64–bit operating system in Legacy mode, select **Legacy Only**.
   - If you want to install the Windows 7 64–bit operating system in UEFI mode, select **UEFI Only**.

5. Press F10.

6. To install Windows 7, insert the DVD for Windows 7 into the DVD drive, and install Windows 7 from the DVD. Then restart the computer, and follow the instructions on the screen.

7. Install the Intel Chipset Support for Windows 2000/XP/Vista/7. To do this, refer to "Installing Intel Chipset Support for Windows 2000/XP/Vista/7" on page 182.

8. Install device drivers. To do this, refer to "Installing drivers and software" on page 183.

Installing Registry Patches for Windows 7

Install the following Registry Patches:

- Registry patch enabling Wake Up on LAN from Standby for Energy Star

- Fix for Issue of HDD with HD Detection

To install these Registry Patches, go to:
http://www.lenovo.com/support

Installing the Windows 7 Update Module Package

The Windows 7 Update Modules are in the following directory:
C:\SWTOOLS\OSFIXES\.

The name of each subfolder is the number of a fix module. For information about each fix module, go to the Microsoft Knowledge Base homepage at http://support.microsoft.com/, type the number of the fix module you need in the search field, and click **Search**.

Note: The Web site address might change without notice. If the homepage is not displayed, search for it from the Microsoft top page.

To install a fix module, run the EXE file in a subfolder and follow the instructions on the screen.

Note: If you remove the hard disk drive from the computer with a single-core processor and install it on a computer with a dual-core processor, you can get access to the hard disk drive. The opposite, however, is not true: If you remove the hard disk drive from a computer with a dual-core processor and install it on a computer with a single-core processor, you cannot get access to the hard disk drive.

Installing Windows Vista

Before you start, print these instructions.

Note: Your computer supports Windows Vista with the Service Pack 2. Before you install Windows Vista Service Pack 2, make sure you install the Windows Vista Service Pack 1 first.

To install Windows Vista and its related software on your computer, do as follows:

1. Start the ThinkPad Setup.
2. Select **Startup** menu.
3. Select **UEFI/Legacy Boot**.
4. Do one of the following:

    - If you want to install the Windows Vista 32–bit operating system, select **Legacy Only** or **Both**.
    - If you want to install the Windows Vista 64–bit operating system in Legacy mode, select **Legacy Only**.
    - If you want to install the Windows Vista 64–bit operating system in UEFI mode, select **UEFI Only**.

5. Press F10.
6. Insert the DVD for Windows Vista integrated with Service Pack 1 into the DVD drive, and restart the computer.
7. Complete the installation of Windows Vista Service Pack 1 by following OS installing instructions.
8. Install the Windows Vista Service Pack 2. You can install the Windows Vista Service Pack 2 using the *Windows Vista Service Pack 2 Installation* CD or download it from either Microsoft Download Center or Microsoft Windows update Web site.
9. Install the Intel Chipset Support for Windows 2000/XP/Vista/7. To do this, refer to "Installing Intel Chipset Support for Windows 2000/XP/Vista/7" on page 182.
10. Install device drivers. To do this, refer to "Installing drivers and software" on page 183.

Installing Registry Patches for Windows Vista

Install the following Registry Patches:

- Registry Patch enabling Device Initiated Power Management on SATA
- Registry Patch enabling USB S3 Power Management
- Registry patch to change IDLE IRP timing by Fingerprint reader
- Registry patch enabling Wake Up on LAN from Standby for Energy Star
- Registry patch to improve USB device detection on resume from sleep
- Fix for Issue of HDD with HD Detection

To install these Registry Patches, go to :
http://www.lenovo.com/support

Installing the Windows Vista Update Module Package

The Windows Vista Update Modules are in the following directory:
`C:\SWTOOLS\OSFIXES\`.

The name of each subfolder is the number of a fix module. For information about each fix module, go to the Microsoft Knowledge Base homepage at http://support.microsoft.com/, type the number of the fix module you need in the search field, and click **Search**.

Note: The Web site address might change without notice. If the homepage is not displayed, search for it from the Microsoft top page.

To install a fix module, run the .exe file in a subfolder and follow the instructions on the screen.

Note: If you remove the hard disk drive from the computer with a single-core processor and install it on a computer with a dual-core processor, you can get access to the hard disk drive. The opposite, however, is not true: If you remove the hard disk drive from a computer with a dual-core processor and install it on a computer with a single-core processor, you cannot get access to the hard disk drive.

Installing Windows XP

Before you start, print these instructions.

Note: Only ThinkPad X220 and ThinkPad X220i support Windows XP.

Note: Your computer supports Windows XP with Service Pack 3. Before you install the Windows XP Service Pack 3, make sure you install the Windows XP Service Pack 2 first.

You must install Intel Rapid Storage Technology Driver before installing the operating system. To install it, you may need to attach a diskette drive to your computer. If you have a diskette drive, follow the procedure below.

Before installing the operating system, install Intel Rapid Storage Technology Driver as follows:

Note: Be sure to install Intel Rapid Storage Technology Driver before installing the operating system. Otherwise your computer will not respond; it will only display a blue screen.

1. Attach a diskette drive to your computer.
2. Copy Intel Rapid Storage Technology Driver from `C:\SWTOOLS\DRIVERS\IMSM` to a diskette.
3. To make sure that SATA AHCI is enabled, start the ThinkPad Setup.
4. Select **Config**.
5. Select **Serial ATA (SATA)**.
6. Select **AHCI** .
7. Change the startup sequence of your computer. Select **Startup** menu.
8. Select **UEFI/Legacy Boot**.
9. Select **Both** or **Legacy Only**.
10. Press F10.
11. Insert the CD for Windows XP integrated with Service Pack 2 into the CD or DVD drive, and restart the computer.
12. To install a third-party SCSI driver first, press F6.
13. When prompted, select **S** for Specify Additional Device.
14. When prompted, insert the diskette that you created in step 2, and press Enter.
15. Scroll the list of drivers. If the **SATA** setting of you computer is set to **AHCI**, select Intel® **Mobile Express Chipset SATA AHCI Controller**.

16. To continue the installation, press Enter again. Leave the diskette in the drive until the next reboot; the software may need to be copied from the diskette again when the files are copied during setup.

17. Complete the installation of Windows XP Service Pack 2 by following OS installing instructions.

18. Install Windows XP Service Pack 3. You can install the Windows XP Service Pack 3 using the *Windows XP Service Pack 3 Installation CD* or download it from either Microsoft Download Center or Microsoft Windows update Web site.

19. Install the Intel Chipset Support for Windows 2000/XP/Vista/7. To do this, refer to "Installing Intel Chipset Support for Windows 2000/XP/Vista/7" on page 182.

20. Apply the PCMCIA Power Policy Registry Patch. To do this, go to `C:\SWTOOLS\OSFIXES\PCMCIAPW\`, double-click install.bat. Then follow the instructions that appear on the screen.

21. Install device drivers. To do this, refer to "Installing drivers and software" on page 183.

If you do not have a diskette drive, you can install Intel Rapid Storage Technology Driver by the following alternative procedure:

Note: If you select **AHCI** for Serial ATA (SATA) in the ThinkPad Setup before installing Intel Rapid Storage Technology Driver, your computer will not respond; it will only display a blue screen.

1. Start the ThinkPad Setup.
2. Select **Config**.
3. Select **Serial ATA (SATA)**.
4. Select **Compatibility**.
5. Change the startup sequence of your computer. Select **Startup** menu.
6. Select **UEFI/Legacy Boot**.
7. Select **Legacy Only** or **Both**.
8. Press F10.
9. Insert the installation CD for Windows XP integrated with Service Pack 2 into the CD or DVD drive, and restart the computer.
10. Complete the installation of Windows XP Service Pack 2 by following OS installing instructions.
11. Install Windows XP Service Pack 3. You can install the Windows XP Service Pack 3 using the *Windows XP Service Pack 3 Installation* CD or download it from either Microsoft Download Center or Microsoft Windows update Web site.
12. Run Intel Rapid Storage Technology Driver. To do this, go to `C:\DRIVERS\WIN\IRST\PREPARE`, and double-click install.cmd.
13. Turn the computer off and then on again.
14. Start the ThinkPad Setup.
15. Select **Config**.
16. Select **Serial ATA (SATA)**.
17. Select **AHCI**.
18. Start Windows XP. The Welcome to the Found New Hardware Wizard appears.
19. Select **No, not this time**, and then click **Next**.
20. Select **Install from a list or specific location (Advanced)**, and then click **Next**.
21. Select **Search for the best driver in these locations.** Then select **Include this location in the search:**, specify the path, `C:\DRIVERS\WIN\IRST`, and click **Next**. The Completing the Found New Hardware Wizard appears.
22. Click **Finish**.

23. When the System Settings Change window appears, click **Yes**. The computer restarts.

24. Install the Intel Chipset Support for Windows 2000/XP/Vista/7. To do this, refer to "Installing Intel Chipset Support for Windows 2000/XP/Vista/7" on page 182.

25. Apply the PCMCIA Power Policy Registry Patch. To do this, go to `C:\SWTOOLS\OSFIXES\PCMCIAPW\`, double-click install.bat, and then follow the instructions that appear on the screen.

26. Install device drivers. To do this, refer to "Installing drivers and software" on page 183.

Installing device drivers

To install device drivers, refer to the web site:
http://www.lenovo.com/support

Installing the driver for the 4-in-1 Media Card Reader

To use the 4-in-1 Media Card Reader, you need to download and install the Ricoh Multi Card Reader Driver for Windows XP/Vista x86/x64. To download it, go to Lenovo Web site at:
http://www.lenovo.com/support/site.wss/document.do?sitestyle=lenovo&lndocid=tpad-matrix

Note: If you are installing Windows XP anew, be sure to install RICOH SD/MMC Bus Host Adapter driver for Windows 2000/XP 77sp05ww first. To download it, visit Lenovo Web site athttp://www.lenovo.com/support/site.wss/document.do?sitestyle=lenovo&lndocid=tpad-matrix, and then install the driver.

To install the driver, do as follows:

1. Click **Start → All Programs → Accessories → Command Prompt**. The DOS prompt window appears.

2. Type `StandardInstall.bat` at the DOS prompt. The Welcome to the Device Driver Installation Wizard for the RICOH Media Driver opens.

3. Click **Next**. If the device driver is already installed, click **No**. Otherwise, follow the instructions on the screen.

Installing the driver for USB 3.0

If your computer supports USB 3.0, and you have reinstalled the operating system, you need to download and install the USB 3.0 driver to use the USB 3.0. Do the following:

For Windows 7 and Windows Vista

1. Access Lenovo Web site at
http://www.lenovo.com/support/site.wss/document.do?sitestyle=lenovo&lndocid=HOME-LENOVO
When you get to the site, find your model and display the driver links.

2. Select the USB 3.0 driver for 32-bit or 64-bit and extract it to your local hard disk.

3. Double-click Setup.exe in `C:\DRIVERS\WIN\USB3.0\`.

4. Click **Next**. If the device driver is already installed, click **Cancel**. Follow the instructions on the screen until the installation is finished.

For Windows XP

1. Access Lenovo Web site at
http://www.lenovo.com/support/site.wss/document.do?sitestyle=lenovo&lndocid=HOME-LENOVO.
When you get to the site, find your model and display the driver links.

2. Select the USB 3.0 driver for 32-bit and extract it to your local hard disk.

3. Double-click Setup.exe in `C:\DRIVERS\WIN\USB3.0\`.

4. Click **Next**. If the device driver is already installed, click **Cancel**. Follow the instructions on the screen until the installation is finished.

Installing ThinkPad Monitor File for Windows 2000/XP/Vista/7

ThinkPad Monitor File for Windows 2000/XP/Vista/7 is in the following directory:
`C:\SWTOOLS\DRIVERS\MONITOR`.

Note: If you cannot find this directory on your hard disk drive or solid state drive, download the ThinkPad Monitor File for Windows 2000/XP/Vista/7 from the ThinkPad Web site at:
http://www.lenovo.com/support/site.wss/document.do?sitestyle=lenovo&lndocid=tpad-matrix

Note: Before you install this file, make sure that the correct video driver has been installed.

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**.
5. Click the **Monitor** tab.
6. Click **Properties**.
7. Click the **Driver** tab.
8. Click **Update Driver**.
9. Select **Browse my computer for driver software**, and then click **Let me pick from a list of device drivers on my computer**.
10. Click **Have Disk**.
11. Specify path "`C:\SWTOOLS\DRIVERS\MONITOR`" to this monitor INF then click **Open**.
12. Click **OK**.
13. Confirm the correct display type, then click **Next**.
14. Windows has finished installing. Click **Close**.
15. Click **Close** for Display Properties.
16. Click **OK** in the **Monitor** tab.
17. Click **OK** and close the Display Settings window.

For Windows Vista

1. Right-click on the desktop, and click **Personalize**.
2. Click **Display Settings**. The Display Settings window opens.
3. Click **Advanced Settings**.
4. Click the **Monitor** tab.
5. Click **Properties**. (For Windows Vista, also click **Continue**.)
6. Click the **Driver** tab.
7. Click **Update Driver**.
8. Select **Browse my computer for driver software**, and then click **Let me pick from a list of device drivers on my computer**.
9. Click **Have Disk**.
10. Specify path "`C:\SWTOOLS\DRIVERS\MONITOR`" to this monitor INF then click **Open**.

11. Click **OK**.

12. Confirm the correct display type, then click **Next**.

13. Windows has finished installing. Click **Close**.

14. Click **Close** for Display Properties.

15. Click **OK** in the **Monitor** tab.

16. Click **OK** and close the Display Settings window.

For Windows XP

1. Right-click on the desktop and select **Properties** from the pop-up menu.

2. Select the **Settings** tab.

3. Click the **Advanced** tab.

4. Select the **Monitor** tab.

5. Select **Plug and Play Monitor from the monitor type list**.

6. Click **Properties**.

7. Select the **Driver** tab and click **Update Driver**. The Hardware Update Wizard starts.

8. Select **No, not this time** for Windows Update connection, and then click **Next**.

9. Select **Install from a list or specific location (Advanced)**.

10. Click **Next**.

11. Select **Don't search, I will choose the driver to install**.

12. Click **Next**.

13. Click **Have Disk**.

14. Click **Browse**.

15. Specify "C:\SWTOOLS\DRIVERS\MONITOR" as location directory and select TPLCD.INF.

16. Click **OK**.

17. System will show ThinkPad Display. Click **Next**. System will copy ThinkPad Monitor INF file and color profile.

18. Click **Finish** and then **Close**.

19. Click the **Color Management** tab.

20. Click **Add**.

21. Select TPFLX.ICM or TPLCD.ICM and click **Add**.

22. Click **OK** and close the Display Properties window.

Installing Intel Chipset Support for Windows 2000/XP/Vista/7

Before you begin

Before you install the operating system, Copy all the subdirectories and files in the C:\SWTOOLS directory to a removable storage device, to avoid losing files during the installation.

To install Intel Chipset Support for Windows 2000/XP/Vista/7, do the following:

1. Restore C:\SWTOOLS from the backup copy you made before starting the installation.

2. Run infinst_autol.exe in C:\SWTOOLS\DRIVERS\INTELINF.

Installing drivers and software

The device drivers are provided in the `C:\SWTOOLS\DRIVERS` directory on your hard disk drive. You will also need to install application software, which is provided in the `C:\SWTOOLS\APPS` directory on your hard disk drive. To do this, refer to the instructions in "Reinstalling preinstalled applications and device drivers" on page 114.

Note: If you cannot find the Supplement files, device drivers, and application software you need on your hard disk drive, or if you want to receive updates and the latest information about them, refer to the ThinkPad Web site at:
http://www.lenovo.com/support/site.wss/document.do?sitestyle=lenovo&lndocid=tpad-matrix

ThinkPad Setup

Your computer provides a program, called ThinkPad Setup, that enables you to select various setup parameters.

To start ThinkPad Setup, do as follows:

1. To protect yourself against accidental loss of data, back up your computer registry. See "Performing backup and recovery operations" on page 111.
2. If the diskette drive is connected to the computer, remove any diskette from the diskette drive, and then turn off the computer.
3. Turn on the computer. When the logo screen is displayed, press the F1 key. The ThinkPad Setup opens.

   If you have set a supervisor password, the ThinkPad Setup menu appears after you enter the password. You can start the ThinkPad Setup by pressing Enter instead of entering the supervisor password; however, you cannot change the parameters that are protected by the supervisor password. For more information, refer to "Using Passwords" on page 91.

   An example of the ThinkPad Setup menu is shown as below:

```
                            ThinkPad Setup

     Main     Config    Date/Time    Security    Startup    Restart


        UEFI BIOS Version                83ET18WW (0.18 )
        UEFI BIOS Date ( Year-Month-Day)  2010-10-15
        Embedded Controller Version      83HT08WW (0.08 )
        Machine Type Model               814C01G
        System-unit serial number        814C01GR9404EZP
        System board serial number       1DEG96410E
        Asset Tag                        No Asset Information
        CPU Type                         Genuine Intel ( R ) CPU      T9800
        CPU Speed                        2.00GHz
        Installed memory                 1024MB
        UUID                             2cdc7dc0-dfbc-11d4-86fe-987939c1ac1e
        MAC Address (Internal LAN)       00  1F  16  04  1A  74



     F1   Help      ↑↓ Select Item   -/+    Change Values        F9 Setup Defaults
     ESC  Exit      ←→ Select Menu   Enter  Select > Sub-Menu     F10 Save and Exit
```

4. Using the cursor keys, move to an item you want to change. When the item you want is highlighted, press Enter. A submenu is displayed.

5. Change the items you wish to change. To change the value of an item, press +/-. If the item has a submenu, you can display it by pressing Enter.

6. Press Esc to exit from the submenu.

7. If you are in a nested submenu, press Esc repeatedly until you reach the ThinkPad Setup menu.

   Note: If you need to restore the settings to their original state as of the time of purchase, press F9 to load the default settings. You can also select an option in the Restart submenu to load the default settings or discard the changes.

8. Select **Restart**. Move the cursor to the option you want for restarting your computer; then press **Enter**. Your computer restarts.

Config menu

If you need to change the configuration of your computer, select **Config** from the ThinkPad Setup menu.

Notes:

- The default settings are already optimized for you. If you consider changing the computer configuration, proceed with extreme caution. Setting the configuration incorrectly might cause unexpected results.

- In each submenu, press the Enter key to show selectable options and select a desired option by using cursor key, or type desired values from the keyboard directly.

The following submenu is displayed:

- **Network**: Set the LAN related functions.

- **USB**: Enable or disable USB related functions.

- **Keyboard/Mouse**: Set the keyboard and the mouse related functions.

- **Display**: Specify the settings for display output.

- **Power**: Set power management related functions.

- **Beep and Alarm**: Enable or disable the audio related functions.

- **Serial ATA (SATA)**: Specify the settings for the hard disk drive.

- **CPU**: Specify the settings for the CPU.

- **Intel AMT**: Set the Intel® AMT related functions.

Date and time menu

If you need to set the current date and time of your computer, select **Date/Time** from the ThinkPad Setup menu. The following submenu is displayed:

- System Date

- System Time

To change the date and time, do the following:

1. Using the up and down arrow keys, select the item to change-date or time.

2. Press Tab, Shift Tab, or Enter to select a field.

3. Type the date or time.

   Note: Another way to adjust date and time is press the - or + key.

Security menu

If you need to set the security features of your computer, select **Security** from the ThinkPad Setup menu.

Notes:

- The default settings are already optimized for you. If you consider changing the computer configuration, proceed with extreme caution. Setting the configuration incorrectly might cause unexpected results.

- In each submenu, you can enable a function by selecting **Enabled**, or disable it by selecting **Disabled**.

The following submenu is displayed:

- **Password**: Set a password related functions.
- **Fingerprint**: Set the fingerprint reader related functions.
- **Security Chip**: Set the security chip related functions.
- **UEFI BIOS Update Option**: Specify the settings for Flash UEFI BIOS update.
- **Memory Protection**: Specify the settings for the Data Execution Prevention feature.
- **Virtualization**: Enable or disable the settings for Intel Virtualization Technology and Intel VT-d Feature.
- **I/O Port Access**: Enable or disable the access to individual I/O ports.
- **Anti-Theft**: Enable or disable UEFI BIOS interface to activate Anti-Theft services, such as Intel AT and Computrace.

To set a password related functions, go to the Security menu and select **Password**. The following submenu is displayed:

- **Hardware Password Manager**
- **Supervisor Password**
- **Lock UEFI BIOS Settings**
- **Set Minimum Length**
- **Password at unattended boot**
- **Password at restart**
- **Power-On Password**
- **Hard Disk x Password**

Notes:

- **Hard Disk 1** means the hard disk drive built into your computer.
- **Hard Disk 2** appears on the Password submenu only if a hard disk drive is installed in the serial Ultrabay enhanced.

If you select and enable **Hardware Password Manager**, you can manage your power-on password, supervisor password, and your hard disk passwords by the management server. By default, this is set to **Enabled**.

Lock UEFI BIOS Settings enable or disable the function that protects items in the ThinkPad Setup from being changed by a user who does not have the supervisor password. By default, this is set to **Disabled**. If you set the supervisor password and enable this function, no one but you can change any items in the ThinkPad Setup.

If you select **Set Minimum Length**, you can specify a minimum length for power-on passwords and hard disk passwords. By default, this is set to **Disabled**. If you set the supervisor password and specify a minimum length for passwords, no one but you can change the length.

If you select and enable **Password at unattended boot**, a password prompt is displayed when the computer is turned on, from either a power-off state or hibernation, by an unattended event such as Wake on LAN®. If you select **Disabled**, no password prompt is displayed; the computer goes ahead and loads the operating system. To prevent unauthorized access, set the user authentication on the operating system.

If you select and enable **Password at restart**, a password prompt is displayed when you restart the computer. If you select **Disabled**, no password prompt is displayed; the computer goes ahead and loads the operating system. To prevent unauthorized access, set the user authentication on the operating system.

Startup menu

You may need to change the startup sequence of your computer. For example, if you have different operating systems on different devices, you can have the system start up from either of them.

Attention: After you change your startup sequence, you must be extremely careful not to specify a wrong device during a copy, a save, or a format operation. If you specify a wrong device, your data and programs might be erased or overwritten.

Attention: If you are using the BitLocker drive encryption, you should not change the startup sequence. BitLocker drive encryption detects the change of startup sequence and locks the computer from booting.

Changing the startup sequence

Selecting the **Startup** to display the **Boot** submenu.

To change the startup sequence, do the following:

1. Select **Boot**; then press Enter.

    - You can use the **Boot** submenu to specify the startup sequence that runs when you turn on the power. Refer to "Boot submenu" on page 186.

    - You can use the **Network Boot** to specify the top priority boot device that runs when **Wake on LAN** is commonly used by LAN administrators in corporate networks to get remote access to your computer. Refer to "Network Boot" on page 187.

2. Select the device you want to start first.

    Use these keys to set the order that the UEFI BIOS will use when starting an operating system:

    - + or - key moves the device up or down.

3. Press F10 to save the changes and restart the system.

To change the startup sequence temporarily so that the system starts up from a different drive, do the following:

1. Turn off the computer.

2. 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 F12.

3. Select the device you want to start first from the **Boot** menu.

    Note: The **Boot** menu is also shown when the system cannot boot from any devices or operating system was not found.

Boot submenu

The following list, showing the order in which devices will be started up, is always displayed. Even devices that are not attached to or installed on your computer are listed. For each device that is attached to or installed on the computer, information about it is presented after the colon.

1. USB CD:

2. USB FDD:

3. ATAPI CD0:

4. ATA HDD0:

5. ATA HDD1:

6. ATA HDD2:

7. USB HDD:

8. PCI LAN:

9. ATAPI CD1:

10. ATAPI CD2:

11. ATA HDD3:

12. ATA HDD4:

13. Other CD:

14. Other HDD:

Network Boot

Use the **Network Boot** to select the boot device when the system wakes from LAN. If **Wake-on-LAN** is enabled, the network administrator can turn on all of the computers in a LAN remotely by use of network management software.

Other items in the Startup menu

The following items are also displayed in the **Startup** menu of the ThinkPad Setup:

• **UEFI/Legacy Boot**: Select system boot capability.

• **UEFI/Legacy Boot Priority**: Select priority of boot option between UEFI and Legacy.

• **Boot Mode**: Enable or disable the diagnostics boot mode.

• **Option Key Display**: Choose whether to show the option key message when the system is booted.

• **Boot device List F12 Option**: Choose whether to show the pop-up list of the boot devices.

• **Boot Order Lock**: Enable or disable the Boot Priority Order lock.

Restart menu

If you need to close the ThinkPad Setup and restart the system, select **Restart** from the ThinkPad Setup menu. The following submenu is displayed:

• **Exit Saving Changes**: Restart the system after saving the changes.

• **Exit Discarding Changes**: Restart the system without saving the changes.

• **Load Setup Defaults**: Load the default setting that was in effect at the time of purchase.

• **Discard Changes**: Discard the changes.

• **Save Changes**: Save the changes.

ThinkPad Setup items

The following tables show the contents of the "Config menu items" on page 188, the "Security menu items" on page 194, and the "Startup menu" on page 198 of the ThinkPad Setup.

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

Notes:

- **Enabled** means that the function is configured.
- **Disabled** means that the function is not configured.
- Default values are in **boldface**.

Config menu items

Table 6. Config menu items

Menu item	Submenu item	Selection	Comments
Network	Wake On LAN	• Disabled • **AC only** • AC and Battery	Enable the system to Power on when the Ethernet controller receives a magic packet. If you select "AC Only", Wake On LAN is enabled only when ac power adapter is attached. If you select "AC and Battery", Wake On LAN is enabled with any power sources. **Note:** AC is required with magic packet type Wake On LAN. **Note:** Wake On LAN function does not work when a hard disk password is set.
	Ethernet LAN Option ROM	• Disabled • **Enabled**	Load the Ethernet LAN Option ROM to enable startup from an integrated network device.
USB	USB UEFI BIOS Support	• Disabled • **Enabled**	Enable or disable boot support for USB diskette, USB memory key, and USB optical drive.
	Always On USB	• Disabled • **Enabled**	If you select "Enabled", the external USB devices can be charged via USB ports even when the system is in low power mode (standby, hibernate, or power-off).

Table 6. Config menu items (continued)

Menu item	Submenu item	Selection	Comments
	Always On USB Charge in off mode	• **Disabled** • Enabled	If you select "Enabled", the Always On USB connector enables you to charge some devices, such as iPod and iPhone and BlackBerry smartphones. **Note:** 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 online help of the Power Manager program.
Keyboard/Mouse	TrackPoint	• Disabled • **Enabled**	Enable or disable the built-in TrackPoint. **Note:** If you want to use an external mouse, select "Disabled."
	Touch Pad	• Disabled • **Enabled**	Enable or disable the built-in touch pad. **Note:** If you want to use an external mouse, select "Disabled."
	Fn and Ctrl Key swap	• **Disabled** • Enabled	If you select "Enabled", the Fn key works as the Ctrl key, and the Ctrl key works as the Fn key. **Note:** Even when "Enabled" is selected, you need to press the Fn key to return the computer from sleep mode to normal operation.

Table 6. Config menu items (continued)

Menu item	Submenu item	Selection	Comments
	Fn Key Lock	• **Disabled** • Enabled	If you select "Enabled", you can press the Fn key to keep it in a pressed condition, and then press the desired function key. The action is equivalent to pressing the required key and the Fn key simultaneously. If you press the Fn key twice, the state is locked until you press the Fn key again.
	ThinkPad NumLock	• **Independent** • Synchronized	If you select "Independent", NumLock on your computer can be disabled independently regardless of the NumLock state of the external keyboard. If NumLock on the computer is enabled, NumLock on the external keyboard will also be enabled. If you select "Synchronized", NumLock on your computer and NumLock on the external keyboard are synchronized.
	Power-On NumLock	• **Automatic** • On • Off	If you select "Automatic", NumLock is enabled when full size keyboard is attached. If you select "On", NumLock is always enabled. If you select "Off", NumLock is always disabled. **Note:** Power-On NumLock will be displayed if you select "Synchronized" at the **ThinkPad NumLock**.

Table 6. Config menu items (continued)

Menu item	Submenu item	Selection	Comments
Display	Boot Display Device	• **ThinkPad LCD** • Analog (VGA) • Digital on ThinkPad • Digital 1 on dock • Digital 2 on dock	Select the display device that is to be active at boot time. This selection is effective for boot time, password prompt, and ThinkPad Setup. "Digital on Thinkpad" is DisplayPort on your computer. "Digial 1 on dock" and "Digital 2 on dock" are DisplayPort or DVI on docking station.
	Graphics Device	• Integrated Graphics • Discrete Graphics • **NVIDIA Optimus**	Integrated Graphics will achieve longer battery life, and Discrete Graphics enhances performance. NVIDIA Optimus runs as Integrated Graphics mode and Discrete Graphics is enabled on demand. **Note:** NVIDIA Optimus mode should only be selected if you are using a Windows 7 model.
	OS Detection for NVIDIA Optimus	• Disabled • **Enabled**	System BIOS automatically switches Graphics device setting to NVIDIA Optimus mode if the OS supports the feature, and to Discrete Graphics if the OS does not support it.
Power	Intel SpeedStep® technology (Intel SpeedStep mounted models only)	• Disabled • **Enabled** Mode for AC • **Maximum Performance** • Battery Optimized Mode for Battery • Maximum Performance • **Battery Optimized**	Select the mode of Intel SpeedStep technology at runtime. **Maximum Performance**: Always highest speed **Battery Optimized**: Always lowest speed **Disabled**: No runtime support, lowest speed

Table 6. Config menu items (continued)

Menu item	Submenu item	Selection	Comments
	Adaptive Thermal Management	Scheme for AC • **Maximize Performance** • Balanced Scheme for Battery • Maximize Performance • **Balanced**	This selects a thermal management scheme to use. **Maximize Performance**: Reduces CPU throttling **Balanced**: Balances sound, temperature and performance **Note:** Each scheme affects fan sound, temperature, and performance.
	Optical Drive Speed	• High Performance • **Normal** • Silent	Set the speed of optical drive to the desired performance.
	CPU Power Management	• Disabled • **Enabled**	Enable or disable the power saving feature that stop the microprocessor clock automatically when there are no system activities. Normally, it is not necessary to change the setting.
	PCI Express Power Management	• Disabled • **Enabled**	Enable or disable a feature that automatically adjusts power management when there is no PCI Express activity. Normally, it is not necessary to change the setting.
	Power On with AC Attach	• **Disabled** • Enabled	Enable or disable a feature that powers on the system when AC is attached. If you select "Enabled", the system is powered on when AC is attached. When the system is in hibernate state, the system resumes. If you select "Disabled", the system is not powered on nor resumed when AC is attached.

Table 6. Config menu items (continued)

Menu item	Submenu item	Selection	Comments
Beep and Alarm	Power Control Beep	• Disabled • **Enabled**	If this function is enabled, a beep sounds when the computer enters a power management mode, when it resumes operational mode, and when the ac power adapter is connected or disconnected.
	Low Battery Alarm	• Disabled • **Enabled**	Enable or disable the low battery alarm.
	Password Beep	• **Disabled** • Enabled	Enable this option to have a beep sound when the system is waiting for a power-on, hard disk, or supervisor password. Different beeps will be sounded when the entered password matches or does not match the configured password.
	Keyboard Beep	• **Enabled** • Disabled	Enable or disable keyboard beep when unmanageable key combinations are pressed.
Serial ATA (SATA)	SATA Controller Mode Option	• Compatibility • **AHCI** • RAID	Select SATA controller operation mode. If your system supports RAID, select "RAID." If you select "Compatibility mode", serial SATA controller operates in compatibility mode.
CPU	Core Multi-Processing	• Disabled • **Enabled**	Enable or disable additional execution core units within a CPU. **Note:** If you are using a computer with a single-core processor, this item does not appear. **Note:** For Core Multi-Processing, refer to the instructions in "Installing Windows XP" on page 178.
	Intel Hyper-Threading Technology	• Disabled • **Enabled**	Enable or disable additional logical processors within a processor core.

Table 6. Config menu items (continued)

Menu item	Submenu item	Selection	Comments
Intel AMT	Intel AMT Control	• Disabled • **Enabled**	If you select "Enabled", Intel AMT (Active Management Technology) is configured and additional setup items are provided in MEBx (Management Engine BIOS Extension) Setup. **Note:** You can enter MEBx Setup menu by pressing Ctrl-P key combination in Startup Interrupt Menu. To display the Startup Interrupt Menu, press ThinkVantage button or Enter key during POST.
	CIRA Timeout	**0**-255	Set timeout option for CIRA connection to be established. 1 though 254 seconds are selectable. If you select "0", use 60 seconds as default timeout value. If you select "255", waiting time for establishing a connection is unlimited.
	Console Type	• PC-ANSI • **VT100+** • VT-UTF8	Select the console type for AMT. **Note:** This console type should match the Intel AMT remote console.

Security menu items

Table 7. Security menu items

Menu item	Submenu item	Selection	Comments
Password			Refer to "Security menu" on page 185 and "Using passwords" on page 91.
Fingerprint	Predesktop Authentication	• Disabled • **Enabled**	Enable or disable fingerprint authentication before the operating system is loaded.
	Reader Priority	• **External ➜ Internal** • Internal Only	If **External ➜ Internal** is selected, an external fingerprint reader is used if attached. Otherwise, an internal fingerprint reader is used. If Internal Only is selected, an internal fingerprint reader is used.

Table 7. Security menu items (continued)

Menu item	Submenu item	Selection	Comments
	Security Mode	• **Normal** • High	If fingerprint authentication fails, you can still start the computer by entering a password. If you have selected "Normal", enter a power-on password or a supervisor password; if you have selected "High", enter a supervisor password.
	Password Authentication	• Disabled • **Enabled**	Enable or disable password authentication. If high security mode is selected, this item appears.
	Reset Fingerprint Data	• **Enter**	This option is used to erase all fingerprint data stored in the fingerprint reader and reset settings to the factory state (ex. Power-on security, LEDs, etc.) As a result, any power-on security features previously enabled will not be able to work until they are re-enabled in the fingerprint software.
Security Chip	Security Chip	• Active • **Inactive** • Disabled	If you select "Active", Security Chip is functional. If you select "Inactive", Security Chip is visible, but is not functional. If you select "Disabled", Security Chip is hidden and is not functional.
	Security Reporting Options		Enable or disable the following Security Reporting Options. • BIOS ROM String Reporting: BIOS text string • ESCD Reporting: Extended system configuration data • CMOS Reporting: CMOS data • NVRAM Reporting: Security data stored in the Asset ID • SMBIOS Reporting: SMBIOS data

Table 7. Security menu items (continued)

Menu item	Submenu item	Selection	Comments
	Clear Security Chip	• **Enter**	Clear the encryption key. **Note:** Only if you select "Active" for Security Chip, this item appears.
	Intel TXT Feature	• **Disabled** • Enabled	Enable or disable Intel Trusted Execution Technology.
UEFI BIOS Update Option	Flash BIOS Updating by End-Users	• Disabled • **Enabled**	If you select "Enabled", all users can update the UEFI BIOS. If you select "Disabled", only the person who knows supervisor password can update the UEFI BIOS.
	Flash Over LAN	• Disabled • **Enabled**	Enable your computer's UEFI BIOS to be updated (flashed) over an active network connection.
Memory Protection	Execution Prevention	• Disabled • **Enabled**	Some computer viruses and worms cause memory buffers to overflow by running code where only data is allowed. If the Data Execution Prevention feature can be used with your operating system, then by selecting "Enabled" you can protect your computer against attacks by such viruses and worms. If after choosing "Enabled" you find that an application program does not run correctly, select "Disabled" and reset the setting.
Virtualization	Intel Virtualization Technology	• **Disabled** • Enabled	If you select "Enabled," a VMM (Virtual Machine Monitor) can utilize the additional hardware capabilities provided by Intel Virtualization Technology.
	Intel VT-d Feature	• **Disabled** • Enabled	Intel VT-d is Intel Virtualization Technology for Directed I/O. When enabled, a VMM can utilize the platform infrastructure for I/O virtualization.

Table 7. Security menu items (continued)

Menu item	Submenu item	Selection	Comments
I/O Port Access	Ethernet LAN	• Disabled • **Enabled**	If you select "Enabled", you can use the Ethernet LAN device.
	Wireless LAN	• Disabled • **Enabled**	If you select "Enabled", you can use the Wireless LAN device.
	WiMAX	• Disabled • **Enabled**	If you select "Enabled", you can use the WiMAX device.
	Wireless WAN	• Disabled • **Enabled**	If you select "Enabled", you can use the Wireless WAN device.
	Bluetooth	• Disabled • **Enabled**	If you select "Enabled", you can use the *Bluetooth* device.
	Modem	• Disabled • **Enabled**	If you select "Enabled", you can use the Modem device.
	USB Port	• Disabled • **Enabled**	If you select "Enabled", you can use the USB port.
	IEEE 1394	• Disabled • **Enabled**	If you select "Enabled", you can use the IEEE 1394 (Firewire) device.
	ExpressCard Slot	• Disabled • **Enabled**	If you select "Enabled", you can use the ExpressCard Slot.
	Ultrabay (HDD/Optical)	• Disabled • **Enabled**	If you select "Enabled", you can use the Ultrabay (HDD/Optical) device.
	eSATA Port	• Disabled • **Enabled**	If you select "Enabled", you can use the eSATA Port.
	Memory Card Slot	• Disabled • **Enabled**	If you select "Enabled", you can use the Memory Card slot (SD Card/MultiMediaCard).
	Integrated Camera	• Disabled • **Enabled**	If you select "Enabled", you can use the Integrated Camera.
	Microphone	• Disabled • **Enabled**	If you select "Enabled", you can use the Microphone (Internal, External, or Line-In).
	Fingerprint Reader	• Disabled • **Enabled**	If you select "Enabled", you can use the fingerprint reader.

Table 7. Security menu items (continued)

Menu item	Submenu item	Selection	Comments
Anti-Theft	Intel AT Module Activation	• Disabled • **Enabled** • Permanently Disabled	Enable or disable the UEFI BIOS interface to activate Intel AT module that is an optional Anti-Theft service from Intel. **Note:** If you set the Intel AT module activation to "Permanently Disabled", you will be unable to enable this setting again.
	Computrace Module Activation	• Disabled • **Enabled** • Permanently Disabled	Enable or disable the UEFI BIOS interface to activate Computrace module. Computrace is an optional monitoring service from Absolute Software. **Note:** If you set the Computrace module activation to "Permanently Disabled", you will be unable to enable this setting again.

Startup menu items

Table 8. Startup menu items

Menu item	Selection	Comments
Boot		Refer to "Startup menu" on page 186.
Network Boot		Refer to "Startup menu" on page 186.
UEFI/Legacy Boot	• **Both** • UEFI Only • Legacy Only	Select system boot capability. • **Both**: System will boot by following **UEFI/Legacy Boot Priority** setting. • **UEFI Only**: System will boot from UEFI enabled OS. • **Legacy Only**: System will boot from any OS other than UEFI enabled OS. **Note:** If you select "UEFI Only", system cannot boot from the bootable devices which do not have UEFI enabled OS.
UEFI/Legacy Boot Priority	• UEFI First • **Legacy First**	Select priority of boot option between UEFI and Legacy.

Table 8. Startup menu items (continued)

Menu item	Selection	Comments
Boot Mode	• **Quick** • Diagnostics **Note:** You can also enter the "Diagnostic" mode by pressing Esc during POST.	Screen during POST: • **Quick**: ThinkPad Logo screen is displayed. • **Diagnostics**: Text messages are displayed.
Option Keys display (ThinkVantage button message)	• Disabled • **Enabled**	If you select "Disabled", the "To interrupt normal startup, press the blue ThinkVantage button." message is not displayed during POST.
Boot Device List F12 Option	• Disabled • **Enabled**	If you select "Enabled", the F12 key is recognized and the Boot Menu is displayed.
Boot Order Lock	• **Disabled** • Enabled	If you select "Enabled", the Boot Priority Order is locked for your future use.

Updating your system UEFI BIOS

The Unified Extensible Firmware Interface (UEFI) BIOS is a part of the system programs that make up the basic layer of software built into your computer. UEFI BIOS translates the instructions from other software layers.

Your computer system board has a module called electrically erasable programmable read-only memory (EEPROM, also referred to as flash memory). You can update UEFI BIOS and the Configuration/ThinkPad Setup Program by starting your computer with a flash update optical disc or .flash update tool application running on the Windwos environment.

In some instances when you add software, hardware, or a device driver, you may be informed that you need to update your UEFI BIOS in order for the new addition to work properly.

To update your UEFI BIOS, visit this Web site at
http://www.lenovo.com/support/site.wss/document.do?sitestyle=lenovo&lndocid=tpad-matrix
Then follow the instructions on the screen.

Using system management

This section is intended primarily for network administrators.

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

This manageability, or "Total Cost of Ownership" (TCO), enables you to remotely power on your computer, format the hard disk drive, install the software of your choice (for example, Windows XP with user and system-management applications), and have the computer start up and function in the same way as an ordinary desktop PC.

Once the computer is configured and operational, you can manage it by use of software and manageability features already integrated into the client system and the network.

System management

Check the following topics to learn more about features of System Management:

- Desktop Management Interface
- Preboot eXecution Environment
- Wake on LAN
- Resume on incoming call
- Asset ID EEPROM

Desktop Management Interface

The system BIOS (UEFI BIOS) of your computer supports an interface called System Management BIOS Reference Specification (SMBIOS) V2.6.1. SMBIOS provides information about the hardware components of your system. It is the responsibility of the BIOS to supply this database with information about itself and the devices on the system board. This specification documents the standards for getting access to this BIOS information.

Preboot eXecution Environment

Preboot eXecution Environment (PXE) technology makes your computer more manageable (it is PXE 2.1-compliant) by enabling it to boot (load an operating system or another executable image) from a server. Your computer supports the PC functions that PXE requires. For example, with the appropriate LAN card, your computer can be booted from the PXE server.

Note: Remote Program Load (RPL) cannot be used with your computer.

Wake on LAN

A network administrator can use Wake on LAN to turn on a computer from a management console.

When Wake on LAN is used with network management software, many functions, such as data transfer, software updates, and Flash BIOS updates, can be performed remotely without remote attendance. This updating can be done after normal working hours and on weekends, to save time and increase productivity. Users are not interrupted during normal working hours, and LAN traffic is kept to a minimum.

If a computer is turned on by the Wake on LAN function, the Network boot sequence is used.

Resume on incoming call

If your computer is connected to a telephone line and you have specified **Resume on incoming call**, it will return from sleep (standby) mode to normal operation when a telephone call comes in.

To enable your computer to wake up from sleep (standby) mode, do the following:

For Windows 7 and Windows Vista:

1. Click **Start**, and then click **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. The Device Manager window opens.
4. Double-click **Modems** (in Windows Vista, click the **+** mark for **Modems**), and then click your modem.
5. Click the **Power Management** tab.
6. Select the **Allow this device to wake the computer** check box.

For Windows XP:

1. Click **Start**, and then click **Control Panel**.

2. Click **Performance and Maintenance**.

3. Click **System**.

4. Click the **Hardware** tab.

5. Click the **Device Manager** button. The Device Manager window opens.

6. Click the **+** mark for **Modems**, and then click your modem.

7. Click **Action**, and then click **Properties**.

8. Click the **Power Management** tab.

9. Select the **Allow this device to bring the computer out of Standby** check box.

Asset ID EEPROM

The Asset ID EEPROM contains information about the system, including its configuration and the serial numbers of key components. It also includes a number of blank fields in which you can record information about the end users in your network.

Setting management features

To enable the network administrator to control your computer remotely, you must configure the network interface by setting the system-management features in the ThinkPad Setup. That ThinkPad Setup contains the following functions:

- Wake on LAN

- Network boot sequence

- Flash update

If an administrator's password (supervisor password) has been set, you will need to specify it when you start the ThinkPad Setup, so that you can use these functions.

Wake on LAN

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

Setting up in the ThinkPad Setup

To enable or disable Wake on LAN, go to the ThinkPad Setup menu. When your computer is not under the network administrator's system management, you can disable Wake on LAN.

To set this function, do the following:

1. Start the ThinkPad Setup menu.

2. Select **Config**.

3. The Config submenu appears.

4. Select **Network**.

5. The Network item submenu appears.

6. For Wake On LAN, select one of the following: **AC Only**, **AC and Battery**, or **Disabled**.

7. Press F10.

Network Boot sequence

When your computer is turned on remotely, system will try to boot from the device that is selected by **Network Boot** setting, and then follow the boot order list in the **Boot** menu.

To define a sequence:

1. On the ThinkPad Setup menu, select **Startup**. The Startup submenu appears.
2. Select Network Boot and press Enter key to show pop-up boot device list.
3. Select a boot device from the list to make it as top boot priority.
4. Press F10.

Note: If you want to initialize the setting to return to the default startup sequence, press F9. The default settings are automatically reloaded.

Flash update

When a Flash UEFI BIOS update from the network is enabled, a network administrator can remotely update the system programs in your computer from a management console. The following requirements must be met:

- Update Flash from network must also be enabled; the procedure is given below.
- Your computer must be started over the LAN.
- Your computer must be engaged in a Preboot eXecution Environment.
- Network-management software must be installed in the remote administrator's computer.

To enable or disable the Flash update from the network setting, do the following:

1. On the ThinkPad Setup menu, select **Security**. The Security submenu appears.
2. Select **UEFI BIOS Update Option**. The UEFI BIOS Update Option submenu appears.
3. For Flash Over LAN, select either **Enabled** or **Disabled**.
4. Press F10.

Chapter 9. Preventing problems

An important part of owning a ThinkPad notebook is maintenance. With proper care, you can avoid common problems. The following sections provide information that can help you to keep your computer running smoothly.

General tips for preventing problems

1. Check the capacity of your hard disk drive from time to time. If the hard disk drive gets too full, Windows will slow down and might produce errors.

   Note: In Windows 7 and Windows Vista, click **Start** ➙ **Computer**. In Windows XP, click **Start** ➙ **My Computer**.

2. Empty your recycle bin on a regular basis.

3. Use disk defragment tool regularly on your hard disk drive to improve data seek and read times.

4. To free up disk space, uninstall unused application programs.

   Note: You might also want to look for application program duplication or overlapping versions.

5. Clean out your Inbox, Sent, and Trash folders from your e-mail client program.

6. At least once a week, make a point to back up your data. If critical data is present, it is a good idea to perform a daily backup. Lenovo has many backup options available for your computer. Rewritable optical drives are available for most machines and are easily installed.

7. Use or schedule System Restore to take a system snapshot periodically. For more information about System Restore see Chapter 5 "Recovery overview" on page 109.

8. Update device drivers and UEFI BIOS when needed.

9. Profile your machine at http://www.lenovo.com/think/support to keep up to date with current drivers and revisions.

10. Keep up to date for device drivers on other non-Lenovo hardware. You might want to read the device driver information release notes prior to updating for compatibility or known issues.

11. Keep a log book. Entries might include major hardware or software changes, driver updates, minor issues you have experienced and how you resolved them.

12. If you ever need to run a recovery on your computer to return the preload onto the machine, the following tips might help along the way:

    - Remove all external devices such as the printer, keyboard, etc.

    - Make sure that your battery is charged and that you have the ac power connected.

    - Boot into the ThinkPad Setup and load the default settings.

    - Restart the machine and start the recovery.

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

13. For suspected hard disk drive issues, refer to "Diagnosing problems" on page 209 and run Lenovo ThinkVantage Toolbox for a diagnostic test of the drive prior to calling the Customer Support Center. If your computer does not start up, download the files to create a bootable self-test media from the following Web site: http://www.lenovo.com/hddtest. Run the test and record any messages or error codes. If the test returns any failing error codes or messages, call the Customer Support Center with the codes or messages and the computer in front of you. A technician will assist you further.

14. If required, you can find your country's Customer Support Center at the following Web address: http://www.lenovo.com/support/site.wss/document.do?sitestyle=lenovo&lndocid=migr-4hwse3. When calling the Customer Support Center, please make sure you have your machine model type, serial number and the computer in front of you. Also, if the machine is producing error codes, it is helpful to have the error screen on or the message written down.

Making sure device drivers are current

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

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

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

Getting the latest drivers from the Web site

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

1. Connect to the Internet.
2. Go to:
   http://www.lenovo.com/support/site.wss/document.do?sitestyle=lenovo&lndocid=tpad-matrix

   Enter the product number of the computer or click Detect my system on the screen.
3. Click **Downloads and drivers**.
4. Follow the directions on the screen and install the necessary software.

Getting the latest drivers using System Update

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

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

For more information about how to use the System Update, refer to "System Update" on page 38.

Taking care of your computer

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

Be careful about where and how you work

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

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

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

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

Be gentle with your computer

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

Carry your computer properly

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

Handle storage media and drives properly

- If your computer comes with an optical drive, do not touch the surface of a disc or the lens on the tray.
- Wait until you hear the CD or DVD click into the center pivot of the drive before closing the tray.
- On your computer, use only optical drives designed for use with the serial Ultrabay enhanced.

   Note: You can install a 9.5-mm-thick serial Ultrabay slim or a 12.7-mm-thick serial Ultrabay enhanced device in the serial Ultrabay enhanced.

- When installing the hard disk drive, solid state drive, or optical drive, follow the instructions shipped with your hardware, and apply pressure only where needed on the device.
- Turn off your computer if you are replacing the hard disk drive or solid state drive.
- When replacing the primary hard disk drive or solid state drive, reattach the cover of the drive slot.
- Store your external and removable hard disk or optical drives in the appropriate containers or packaging when they are not being used.
- Before you install any of the following devices, touch a metal table or a grounded metal object. This action reduces any static electricity from your body. The static electricity could damage the device.
  - Memory module
  - Mini-PCI Card
  - ExpressCard
  - CompactFlash
  - Smart card
  - Memory Card, such as SD Card, SDHC Card, SDXC Card, and MultiMediaCard.

  Note: Not all listed devices are included in your computer.

  This action reduces any static electricity from your body. The static electricity could damage the device.
- 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.

Take care in setting passwords

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

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.

Register your computer

- Register your ThinkPad products with Lenovo (refer to the Web page: http://www.lenovo.com/register). This can help authorities return your computer to you if it is lost or stolen. Registering your computer also enables Lenovo to notify you about possible technical information and upgrades.

Be sure not to modify your computer

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

Tips on using the built-in modem

- Your computer modem may use only an analog telephone network, or public-switched telephone network (PSTN). Do not connect the modem to a PBX (private branch exchange) or any other digital telephone extension line because this could damage your modem. Analog phone lines are often used in homes, while digital phone lines are often used in hotels or office buildings. If you are not sure which kind of phone line you are using, contact your telephone company.

- Your computer might have both an Ethernet connector and a modem connector. If so, be sure to connect your communication cable to the correct one.

⚠️**DANGER**

> **To avoid the risk of electrical shock, do not connect the telephone cable to the Ethernet connector.**

Cleaning the cover of your computer

Occasionally clean your computer as follows:

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

Cleaning your computer keyboard

1. Apply some isopropyl rubbing alcohol to a soft, dust-free cloth.
2. Wipe each keytop surface with the cloth. Wipe the keys one by one; if you wipe several keys at a time, the cloth may hook onto an adjacent key and possibly damage it. Make sure that no liquid drips onto or between the keys.
3. Allow to dry.
4. To remove any crumbs or dust from beneath the keys, you can use a camera blower with a brush or cool air from a hair dryer.

Note: Avoid spraying cleaner directly onto the display or the keyboard.

Cleaning your computer display

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

5. Wipe the display again; do not let any liquid drip into the computer.
6. Be sure to dry the display before closing it.

Chapter 10. Troubleshooting computer problems

This chapter provides information on helping your solve computer problems.

- "Diagnosing problems" on page 209
- "Troubleshooting" on page 210

Diagnosing problems

If you experience problems with your computer, use the following procedure as a starting point for solving them.

- If you can start up the operating system, see "Using Lenovo ThinkVantage Toolbox" on page 209.
- If you cannot start up the operating system, see "Using the In-ROM Diagnostics program" on page .

Using Lenovo ThinkVantage Toolbox

Note: If your system is running and *User Guide* is accessible, see *User Guide*.

If your computer is not operating properly, you may be able to diagnose the problem by having Lenovo ThinkVantage Toolbox test components of your computer.

To start this program, do as follows:

For Windows 7:

1. Click **Start**.
2. Move the pointer to **Control Panel**, to **System and Security**, and then to **Lenovo's System Health and Diagnostics**.

For Windows XP:

1. Click **Start**.
2. Move the pointer to **All Programs**, to **ThinkVantage**, and then to **Lenovo ThinkVantage Toolbox**.

If the Lenovo ThinkVantage Toolbox is not installed on your computer, go to http://web.lenovothinkvantagetoolbox.com/, click **Download Lenovo ThinkVantage Toolbox**, and follow the instructions on the screen.

For more information about this program, see the Help for the program.

Running any tests may take up to several minutes or longer. Make sure you have time to run the entire test; do not interrupt the test while it is running. When preparing to contact the Customer Support Center, be sure to print the test log so that you can rapidly provide information to the help technician.

Using the In-ROM Diagnostics program

The In-ROM Diagnostics program is used to detect hardware problems when you cannot start the Windows operating system and all storage devices are unavailable.

To run the In-ROM Diagnostics program, do the following:

1. Turn off your computer.
2. Turn on the computer and press F10 repeatedly at startup.

3. After you enter the In-ROM Diagnostics program, select the diagnostic test you want to run. Then, follow the instructions on the screen.

When the program completes the diagnostic test, the computer will restart automatically.

Note: If the program returns any error code, call the Lenovo Customer Support Center, and provide your machine type and model number, serial number, and the error code. For information about how to get your machine type and model number, and serial number, see "Machine type and model label" on page 24. For information about calling the Lenovo Customer Support Center for service, see "Calling Lenovo" on page 238.

Troubleshooting

If your computer has an error, it typically displays a message or an error code, or a beep sounds when you turn it on. To correct an error, first find the description of the error in the left-hand column of the chart that applies. Then click that description to get a troubleshooting procedure.

To make sure that your computer has the features or options that are introduced in the following sections, consult the online help or the list shipped with your computer.

Computer stops responding

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

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

1. Push and hold the power switch until the machine turns off. After the computer is turned off, restart by pressing the power switch. If the machine does not turn on, continue to step 2.

   Note: Do not remove the battery and ac power to reset the computer.

2. While the machine is turned off, remove all power sources from the computer (battery and ac power). Hold down the power button for 10 seconds. Plug in the ac power while keeping the battery out of the computer. If the computer does not turn back on, continue to step 3.

   Note: Once the computer starts up and enters Windows, use the proper shutdown procedure to turn the computer off. Once the machine is off, reattach the battery and restart the computer. If the computer does not start with the battery reattached, remove the battery and again start with step 2. If the computer starts with ac power but does not start when the battery is attached, call the Customer Support Center for support.

3. While the machine is off, remove all sources of power from the machine (battery and ac power). Remove all external devices that are attached to your computer (keyboard, mouse, printer, scanner, etc.). Repeat step 2. If step 2 is unsuccessful, continue to step 4.

   Note: The following steps involve removing static sensitive components from your computer. Please make sure that you are properly grounded and remove all sources of power attached to the computer. If you are uncomfortable or unsure about removing components please call the Customer Support Center for assistance.

4. While the computer is off, remove all sources of power and external hardware. Refer to the procedure in "Replacing memory" on page 145 on how to remove and reseat the memory modules. Remove any non-original memory module added to your computer. After removing the extra memory module and reseating the original memory module, repeat step 2. If the computer still does not turn on, consult the user's reference guide for other customer-replaceable components that are attached to your computer.

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

Spills on the keyboard

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

If you spill something on your computer:

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

1. Carefully unplug the ac power adapter immediately.
2. Turn off the computer immediately. If the computer does not turn off, remove the battery. The more quickly you stop the current from passing through the computer the more likely you will reduce damage from short circuits.
3. Wait until you are certain that all the liquid is dry before turning on your computer.

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

Error messages

- **Message**: 0176: System Security - The System has been tampered with.

  Solution: This message is displayed if you remove the Security Chip and reinstall it, or install a new one. To clear the error, enter the ThinkPad Setup. If this does not solve the problem, have the computer serviced.

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

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

- **Message**: 0182: Bad CRC of Security Settings in EEPROM. Enter ThinkPad Setup.

  Solution: Checksum of the Security settings in the EEPROM is not correct. Enter ThinkPad Setup to check Security settings, Press F10 and then press Enter to restart the system.

  If you still have a problem, have the computer serviced.

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

  Solution: Checksum of the Security settings in the EFI Variable is not correct. Enter ThinkPad Setup to check Security settings, Press F10 and then press Enter to restart the system.

  If you still have a problem, have the computer serviced.

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

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

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

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

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

  Solution: The EEPROM checksum is not correct (block # 4 and 5). The system board should be replace, and the UUID needs to be reinstalled. Have the computer serviced.

- **Message**: 0190: Critical low-battery error

Solution: The computer turned off, because the battery is low. Connect the ac power adapter to the computer and charge the battery, or replace the battery with a fully charged one.

- **Message**: 0191: System Security - Invalid remote change requested

  Solution: The system configuration change has failed. Confirm the operation and try again. To clear the error, enter the ThinkPad Setup.

- **Message**: 0192: System Security - Embedded Security hardware tamper detected

  Solution: The Security Chip has been replaced with a different one. Have the computer serviced.

- **Message**: 0199: System Security - Security password retry count exceeded.

  Solution: This message is displayed if you enter a wrong supervisor password more than three times. Confirm the supervisor password and try again. To clear the error, enter the ThinkPad Setup.

- **Message**: 0251: System CMOS checksum bad - Default configuration used

  Solution: The system CMOS might have been corrupted by an application program. The computer uses the default settings. Run the ThinkPad Setup to reconfigure the settings. If you still see the same error code, have the computer serviced.

- **Message**: 0253: EFI Variable Block Data was destroyed.

  Solution: The system EFI Variable Block Data might have been corrupted.

  1. Press F1 to go to the ThinkPad Setup.
  2. Press F9 and then press Enter to load the default setting.
  3. Press F10 and then press Enter to restart the system.

  If you still have a problem, have the computer serviced.

- **Message**: 0271: Check date and time settings

  Solution: Neither the date nor the time is set in the computer. Set the date and time, using the ThinkPad Setup.

- **Message**: 1802: Unauthorized network card is plugged in - Power off and remove the network card.

  Solution: The mini PCI Express network card is not supported on this computer. Remove it.

- **Message**: 1820: More than one external fingerprint readers are attached.

  Solution: Power off and remove all but the reader that you set up within your main operating system.

- **Message**: 2000: ThinkVantage Active Protection sensor diagnostics failed.

  Solution: ThinkVantage Active Protection sensor is not working correctly. Have the computer serviced.

- **Message**: 2100: Detection error on HDD0 (Main HDD)

  Solution: The hard disk is not working. Have the hard disk serviced.

- **Message**: 2101: Detection error on HDD1 (Ultrabay HDD)

  Solution: The hard disk is not working. Have the hard disk serviced.

- **Message**: 2102: Detection error on HDD2 (Mini SATA)

  Solution: The Mini SATA device is not working. Have the Mini SATA device serviced.

- **Message**: 2110: Read error on HDD0 (Main HDD)

Solution: The hard disk is not working. Have the hard disk serviced.

- **Message**: 2111: Read error on HDD1 (Ultrabay HDD)

  Solution: The hard disk is not working. Have the hard disk serviced.

- **Message**: 2112: Read error on HDD2 (Mini SATA)

  Solution: The Mini SATA device is not working. Have the Mini SATA device serviced.

- **Message**: 2200: Machine Type and Serial Number are invalid.

  Solution: Machine Type and Serial Number are invalid. Have the computer serviced.

- **Message**: 2201: Machine UUID is invalid.

  Solution: Machine UUID is invalid. Have the computer serviced.

- **Message**: The power-on password prompt

  Solution: A power-on password or a supervisor password is set. Type the password and press Enter to use the computer (refer to "Using passwords" on page 91). If the power-on password is not accepted, a supervisor password might have been set. Type the supervisor password and press Enter. If you still see the same error message, have the computer serviced.

- **Message**: The hard disk password prompt

  Solution: A hard disk password is set. Type the password and press Enter to use the computer (refer to "Hard disk passwords" on page 93).

- **Message**: Hibernation error

  Solution: The system configuration changed between the time your computer entered hibernation mode and the time it left this mode, and your computer cannot resume normal operation.

  - Restore the system configuration to what it was before your computer entered hibernation mode.
  - If the memory size has been changed, re-create the hibernation file.

- **Message**: Fan error

  Solution: Cooling fan has failed. Have the computer serviced.

Errors without messages

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

  Solution: You can disable any system timers, such as the LCD turn-off timer or the blank timer

  1. Start Power Manager.
  2. Click the **Power plan** tab (in Windows XP, **Power scheme**), and then select **Maximum Performance** from the predefined power plans (in Windows XP, **Power scheme**).

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

  Note: If you are not sure whether you heard any beeps, turn off the computer by pressing and holding the power switch for 4 seconds or more. Turn it on and listen again.

  Solution: Make sure that:

  - The battery is installed correctly.

– The ac power adapter is connected to the computer and the power cord is plugged into a working electrical outlet.

– The computer is turned on. (Turn the power switch on again for confirmation.)

If a power-on password is set:

– Press any key to display the prompt for the power-on password. If the brightness level of the screen is low, increase it by pressing the Fn+Home.

– Type the correct password and press Enter (refer to Power-on password).

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

- **Problem**: When I turn on the machine, only a white cursor appears on a blank screen.

  Solution: If you have modified a partition on your hard disk drive or solid state drive by using a partition software, information about that partition, or the master boot record may have been destroyed.

  1. Turn off the computer, and then turn it on again.

  2. If you still see only the cursor on the screen, do the following:

     – If you have used the partition software, examine the partition on the hard disk drive or solid state drive by using the software, and recover the partition if required.

     – Use either the Rescue and Recovery workspace or the recovery discs to restore the system to the factory state. For details about restoring the system to the factory state, see "Creating and using recovery media" on page 109.

     If the problem persists, have the computer serviced.

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

  Solution: Your screen saver or power management may be enabled. Do either of the following:

  – Touch the TrackPoint or the touch pad, or press a key to exit the screen saver.

  – Press the power switch to resume from sleep (standby) or hibernation.

Beep errors

Table 9. Beep errors

Problem	Solution
One short beep, pause, three short beeps, pause, three more short beeps, and one short beep	Make sure that memory modules are installed correctly. If they are, and you still hear the beeps, have the computer serviced.
One long and two short beeps	The video function has a problem. Have the computer serviced.
Four cycles of four short beeps	The Security Chip has a problem. Have the computer serviced.
Five beeps	The system board has a problem. Have the computer serviced.

Memory problems

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

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

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

It may be necessary to remove all added memories to test the computer with only the factory-installed memories, and then reinstall the memory one at a time to ensure a proper connection. For the procedures to remove and reinstall a memory, refer to "Replacing memory" on page 145.

2. Check for error messages during startup.

   Follow the appropriate corrective actions for Power-on self-test (POST) "Error messages" on page 211.

3. Verify that the latest system BIOS (UEFI BIOS) for your model has been installed.

4. Verify the proper memory configuration and compatibility including the maximum memory size and the memory speed.

   For details, refer to the instructions in "Replacing memory" on page 145.

5. Run "Lenovo ThinkVantage Toolbox" on page 209.

Modem and networking

The following are the most common modem and networking problems:

Ethernet problems

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

  Solution: Make sure that:

  – The cable is installed properly.

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

  – You are using the correct device driver.

  For Windows 7 and Windows Vista:

  1. Click **Start**, and then click **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. If the **!** mark is to the left of the adapter name under Network adapters, you might not use the correct driver or the driver is not enabled. To update the driver, right-click the highlighted adapter.

  5. Click **Update Driver Software**, and then follow the instructions on the screen.

  For Windows XP:

  1. Click **Start**, and then click **Control Panel**.

  2. Click **Performance and Maintenance**, and then click **System**.

  3. Click the **Hardware** tab, and click the **Device Manager** button.

  4. If the **x** mark is to the left of the adapter name under Network adapter, you might not use the correct driver or the driver is not enabled. To update the driver, right-click the highlighted adapter.

  5. Click **Properties**. The Properties window appears.

  6. Click the **Driver** tab.

  7. Click the **Update Driver** button. The Update Device Driver wizard appears. Follow the instructions on the screen.

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

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

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

Check with your LAN administrator for the necessary networking software.

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

  Solution: The network driver files may be corrupt or missing. Update the driver by referring to the "Solution" description for the procedure to make sure that the correct device driver is installed in the preceding problem.

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

  Solution:

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

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

- **Problem**: The Wake on LAN (WOL) feature is not working.

  Solution:

  – Make sure that WOL is enabled in the ThinkPad Setup.

  – If it is, check with your LAN administrator for the necessary settings.

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

  Solution:

  – Try another cable.

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

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

A wireless LAN problem

- **Problem**: You cannot connect using the built-in wireless networking card.

  Solution: Make sure that your wireless LAN driver is the latest version installed. Check the Web site and confirm the driver version supported by Access Connections is the latest documented in the README file.

  Make sure that your computer is within range of a wireless access point.

  Make sure that the wireless radio is enabled by double-clicking the Access Connections 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.

  Check Network Name (SSID), and your encryption information. Use Access Connections to verify this case-sensitive information.

A wireless WAN problem

- **Message**: Unauthorized WAN card is plugged in - Power off and remove the WAN card.

  Solution: The WAN card is not supported on this computer. Remove it.

  Note: Depending on your computer, some models do not have a wireless WAN.

Bluetooth problems

For Windows 7 and Windows Vista

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

  Solution: Do the following:

  1. Exit the application that uses the sound device (for example, Windows Media Player).
  2. Open the Control Panel by clicking **Start → Control Panel**.
  3. Click **Hardware and Sound → Sound**.
  4. Select the **Playback** tab.
  5. If you are using Headset profile, select **Bluetooth Hands-free Audio** and click the **Set Default** button. If you are using AV profile, select **Stereo Audio** and click the **Set Default** button.
  6. Click **OK** to close the Sound window.

- **Problem**: PIM (Personal Information Manager) items sent from Windows 7 and Windows Vista cannot be received correctly into the address book of any other *Bluetooth*-enabled device.

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

For Windows XP

Notes: If you are using the Microsoft standard *Bluetooth* features and you want to access information about how to use the *Bluetooth* function, do the following:

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**

Note: If you are using the ThinkPad *Bluetooth* with Enhanced Data Rate Software, refer to the following instructions.

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

- **Problem**: You search for a *Bluetooth*-enabled device by clicking View devices in range in My *Bluetooth* Places, but you cannot find anything.

  Solution: Make sure that the device to which you want to connect is enabled for the *Bluetooth* connection.

  After making sure of the above, turn the *Bluetooth* power off and then on again, or restart your computer. Then search for the device again.

  Note: If you are using the ThinkPad *Bluetooth* with Enhanced Data Rate Software, refer to the following instructions.

- **Problem**: You cannot connect to any *Bluetooth*-enabled device.

  Solution: Make sure that both your computer and the device are turned on and their *Bluetooth* antennas are enabled.

After making sure of the above, turn the *Bluetooth* power off and then on again, or restart your computer. Then re-establish your connection to the device.

If the problem persists, re-install the *Bluetooth* software and reestablish your connection to the device.

- **Problem**: Your computer is connected to a *Bluetooth*-enabled device, but you cannot use any of the services of that device.

  Solution: Make sure that the device is enabled for the *Bluetooth* connection.

    1. Double-click the **My *Bluetooth* Places** icon.
    2. Go to *Bluetooth* Tasks and click **View devices in range**.

  If you cannot find the device, it may have stopped responding. Make sure that it is enabled for the *Bluetooth* connection. If you find it, connect to the services you want.

  If you are sure that the device is responding, turn the *Bluetooth* power off and then on again, or restart your computer. Then try to connect again.

- **Problem**: You cannot pull a business card from the connected computer.

  Solution: Make sure that the connected computer has its own default business card application and that the card is ready for communication.

  Make sure that the security settings on the connected computer allow you to download the business card.

- **Problem**: You cannot send a business card to the connected computer.

  Solution: Make sure that your computer has its own default business card application and that the card is ready for communication.

  Make sure that the security settings on the connected computer allow you to upload your business card.

- **Problem**: Your computer is connected to a *Bluetooth*-enabled computer that works as an FTP server, but you cannot see any files in the FTP server.

  Solution: Check the newly shared files as follows:

    1. In the menu of My *Bluetooth* Places, click **View**.
    2. Click **Update**. The status is updated in the window, so that you can check the newly shared files.

  Make sure that the shared folder in the connected computer contains the files you are looking for.

  Make sure that the security settings on the connected computer allow you to connect and view the files in the computer.

- **Problem**: Your computer is connected to a *Bluetooth*-enabled computer, but you cannot gain access to the network.

  Solution: Make sure that the *Bluetooth*-enabled computer is connected to a network.

  Make sure that the connected computer has been set up to share its network connectivity and that the security settings allow you to connect and establish the remote network access.

- **Problem**: Your computer cannot connect a *Bluetooth*-enabled computer that uses serial port applications.

  Solution: Reestablish a connection with the *Bluetooth*-enabled computer, and try the serial connection again.

- **Problem**: *Bluetooth* serial port was disconnected automatically.

  Solution: When any serial-based connection is established, an inactivity timer starts. If no application opens the port, the connection is ended automatically. This is a normal characteristic of the serial-based connection and is not a defect. If you need the *Bluetooth* serial port, just reconnect it.

- **Problem**: PIM Synchronization failed with an error message "The Synchronization with xxx (*Bluetooth* device name) failed. PIM (Personal Information Manager) Interface failed."

  Solution: Start a mail application, and set up your e-mail account. **OR**, modify the *Bluetooth* configuration so as not to synchronize e-mail items, as follows:

1. Double-click **My *Bluetooth* Places**.

2. Click ***Bluetooth***, and select ***Bluetooth* Setup Wizard**.

3. Select **I want to configure the *Bluetooth* services that this computer will provide to remote devices.**, and click **Next**.

4. Select **PIM Synchronization**, and click **Configure**.

5. Select **Do Not Synchronize** in the e-mail synchronization selection, and click **OK**.

6. Click **Finish** to close the *Bluetooth* Service Selection window.

- **Problem**: ThinkPad *Bluetooth* with Enhanced Data Rate Software does not function.

   Solution: Do the following:

   1. Turn on *Bluetooth* by pressing Fn+F5.

   2. Click **Start → Control Panel**.

   3. Click the **Performance and Maintenance** icon.

   4. Click the **System** icon.

   5. Click the **Hardware** tab.

   6. Click the **Device Manager** button. The Device Manager window opens.

   7. Check whether the words "*Bluetooth* Device" appear in the device listing in the window.

   If the words "*Bluetooth* Radio" appear in the device listing, the Microsoft *Bluetooth* software is installed on your computer. If you want to use ThinkPad *Bluetooth* with Enhanced Data Rate Software, you have to install it and then replace the *Bluetooth* driver. For more information, see "Using *Bluetooth*" on page 66.

- **Problem**: While looking at the Classic View of the Control Panel, you see two *Bluetooth* icons in the Control Panel.

   Solution: If you have installed the Microsoft *Bluetooth* software before, and you are using ThinkPad *Bluetooth* with Enhanced Data Rate Software, you may find two *Bluetooth* icons in the Control Panel. One is the *Bluetooth* Configuration icon for ThinkPad *Bluetooth* with Enhanced Data Rate Software, and the other is the *Bluetooth* Devices icon for the Microsoft *Bluetooth* software.

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

   Solution: Do the following:

   1. Exit the application that uses the sound device (for example, Windows Media Player).

   2. Open the Control Panel by clicking **Start → Control Panel**.

   3. Double-click **Sounds and Audio Devices** to open the Sounds and Audio Devices Properties window.

   4. Select the **Audio** tab.

   5. If you are using Headset profile, select ***Bluetooth* Audio** for both Sound playback and Sound recording. If you are using AV profile, select ***Bluetooth* High Quality Audio** for both Sound playback and Sound recording.

   6. Click **OK** to close the Sounds and Audio Devices Properties window.

Keyboard and other pointing devices

The following are the most common keyboard and other pointing devices problems:

UltraNav problems

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

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

– When the computer is turned on.

– When the computer resumes normal operation.

– When the TrackPoint is pressed for a long time.

– When the temperature changes

- **Problem**: The TrackPoint or touch pad does not work.

  Solution: Make sure that the TrackPoint or touch pad is set to Enabled in the UltraNav Device Setting.

  Note: To open the UltraNav Device Setting, press Fn+F8.

Keyboard problems

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

  Solution: If an external numeric keypad is connected:

  1. Turn off the computer.

  2. Remove the external numeric keypad.

  3. Turn on the computer and try using the keyboard again.

  If the keyboard problem is resolved, carefully reconnect the external numeric keypad, external keyboard, making sure that you have seated the connectors properly.

  If the problem remains, make sure that the correct device driver is installed.

  For Windows 7:

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

  2. Click **Keyboard**.

  3. Select the **Hardware** tab. In the Device Properties, make sure that the Device Status is **This device is working properly**.

  For Windows Vista:

  1. Click **Start → Control Panel**.

  2. Click **Hardware and Sound**, and then click Keyboard.

  3. Select the **Hardware** tab. In the Device Properties, make sure that the Device Status is **This device is working properly**.

  For Windows XP:

  1. Click **Start → Control Panel**.

  2. Click **Printers and Other Hardware**, and then click **Keyboard**.

  3. Select the **Hardware** tab. In the In the Device Properties, make sure that the Device Status is **This device is working properly**.

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

- **Problem**: A number appears when you type a letter.

  Solution: The numeric lock function is on. To disable it, press Shift+ScrLk or Fn+NmLk.

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

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

Display and multimedia devices

This section includes the most common display and multimedia devices problems which are computer screen, external monitor, audio, and optical drive. Check these topics to learn more information.

Computer screen problems

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

  Solution: Do the following:

  – Press Fn+F7 to bring up the image.

     Note: If you use the Fn+F7 key combination to apply a presentation scheme, press Fn+F7 at least three times in three seconds, and the image is displayed on the computer screen.

  – If you are using the ac power adapter, or using the battery and the battery status indicator is on (is green), press Fn+Home to make the screen brighter.

  – If the sleep (standby) status indicator is on (is green), press Fn to resume from the sleep (standby) mode.

  – If the problem persists, do the Solution in the problem below.

  Note: If your computer is a Windows 7 model, it does not support the presentation scheme.

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

  Solution: Make sure that:

  – The display device driver is installed correctly.

  – The screen resolution and color quality are correctly set.

  – The monitor type is correct.

  To check these settings, do as follows:

  For Windows 7:

  1. Right-click on the desktop, and click **Personalize**.

  2. Click **Display** at the left.

  3. Select **Change display settings**. Check whether the screen resolution is correctly set.

  4. Click **Advanced Settings**.

  5. Click the **Adapter** tab.

  6. Make sure that the correct device driver name is shown in the adapter information window.

     Note: The device driver name depends on the video chip that has been installed on your computer.

  7. Click the **Properties** button. If you are prompted for an administrator password or confirmation, type the password or provide confirmation. Check the "Device status" box and make sure the device is working properly. If not, click the **Troubleshoot** button. Close the **Properties** window.

  8. Click the **Monitor** tab. Check whether the color quality is correctly set, make sure other information is also correct.

  9. Click the **Properties** button. If you are prompted for an administrator password or confirmation, type the password or provide confirmation. Check the "Device status" box and make sure the device is working properly. If not, click the **Troubleshoot** button.

  For Windows Vista:

  1. Right-click on the desktop, and click **Personalize**.

  2. Click **Display Settings** and check whether the screen resolution and color quality are correctly set.

  3. Click **Advanced Settings**.

4. Click the **Adapter** tab.

5. Make sure that the correct device driver name is shown in the adapter information window.

    Note: The device driver name depends on the video chip that has been installed on your computer.

6. Click the **Properties** button. If you are prompted for an administrator password or confirmation, type the password or provide confirmation. Check the "Device status" box and make sure the device is working properly. If not, click the **Troubleshoot** button.

7. Click the **Monitor** tab.

8. Make sure the information is correct.

9. Click the **Properties** button. If you are prompted for an administrator password or confirmation, type the password or provide confirmation. Check the "Device status" box and make sure the device is working properly. If not, click the **Troubleshoot** button.

For Windows XP:

1. Right-click on the desktop, and click **Properties** to open the Display Properties window.

2. Click the **Settings** tab.

3. Check whether the screen resolution and color quality are correctly set.

4. Click **Advanced**.

5. Click the **Adapter** tab.

6. Make sure that the correct device driver name is shown in the adapter information window.

    Note: The device driver name depends on the video chip that has been installed on your computer.

7. Click the **Properties** button. Check the "Device status" box and make sure the device is working properly. If not, click the **Troubleshoot** button.

8. Click the **Monitor** tab.

9. Make sure the information is correct.

10. Click the **Properties** button. Check the "Device status" box and make sure the device is working properly. If not, click the **Troubleshoot** button.

- **Problem**: Incorrect characters appear on the screen.

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

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

  Solution: Press and hold the power switch for 4 seconds or over to turn off your computer; then turn it on again.

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

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

External monitor problems

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

  Solution: To bring up the image, press Fn+F7 and select the desired monitor. If the problem persists, do the following:

  1. Connect the external monitor to another computer to make sure it works.

  2. Reconnect the external monitor to your computer.

3. Refer to the manual shipped with the external monitor to check the resolutions and refresh rates that are supported.

   – If the external monitor supports the same resolution as the computer display or a higher resolution, view output on the external monitor or on both the external monitor and the computer display.

   – If the external monitor supports a lower resolution than the computer display, view output on the external monitor only. (If you view output on the both the computer display and the external monitor, the external monitor screen will be blank or distorted.)

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

  Solution:

  – Make sure that monitor information is correct. Do the following:

    For Windows 7:

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

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

    2. Click the icon for the desired monitor (the **Monitor-2** icon is for the external monitor).

    3. Click **Advanced Settings**.

    4. Click the **Adapter** tab.

    5. Make sure that the correct device driver name is shown in the adapter information window.

       Note: The device driver name depends on the video chip that has been installed on your computer.

    6. Click **OK**.

    If the information is incorrect, reinstall the device driver. See below for more information.

    For Windows Vista:

    1. Right-click on the desktop and click **Personalize**.

    2. Click **Display Settings**.

    3. Click the **Advanced Settings** button.

    4. Click the **Adapter** tab.

    5. Make sure that the correct device driver name is shown in the adapter information window.

       Note: The device driver name depends on the video chip that has been installed on your computer.

    6. Click **OK**.

    If the information is incorrect, reinstall the device driver. See below for more information.

    For Windows XP:

    1. Right-click on the desktop, and click **Properties** to open the Display Properties window.

    2. Click the **Settings** tab.

    3. Click **Advanced**.

    4. Click the **Adapter** tab.

    5. Make sure that the correct device driver name is shown in the adapter information window.

       Note: The device driver name depends on the video chip that has been installed on your computer.

    6. Click **OK**.

    If the information is incorrect, reinstall the device driver. See below for more information.

  – Check the monitor type and, if necessary, update the driver by doing the following:

    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 and the computer.

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

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

4. Click the icon for the desired monitor (the **Monitor-2** icon is for the external monitor).

5. 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 one monitor type is 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.

14. After updating the driver, click **Close**.

15. Set **Resolution**.

    Note: To change the color settings, select the **Monitor** tab, then set **Colors**.

16. Click **OK**.

For Windows Vista:

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.

   Note: After pressing Fn+F7, you will need to wait for a moment before the image appears.

4. Right-click on the desktop, and click **Personalize**.

5. Click **Display Settings**.

6. Click the **Advanced Settings** button.

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 one monitor type is 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.

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.

   Note: After pressing Fn+F7, you will need to wait for a moment before the image appears.

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 one monitor type is 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 **Manufacturers** and **Models** for 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**.

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

   Solution: Make sure that the monitor information is correct. (Refer to the "Solution" for setting a higher resolution on the external monitor.)

   Make sure that the appropriate monitor type is selected. (Refer to the "Solution" for setting a higher resolution on the external monitor.)

   Make sure that an appropriate refresh rate is selected by doing the following:

   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 and the computer.

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

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

   4. Click the icon for the desired monitor (the **Monitor-2** icon is for the external monitor).

5. Click **Advanced Settings**.

6. Click the **Monitor** tab.

7. Select the correct screen refresh rate.

For Windows Vista:

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.

   Note: After pressing Fn+F7, you will need to wait for a moment before the image appears.

4. Right-click on the desktop, and click **Personalize**.

5. Click **Display Settings**.

6. Click the **Advanced Settings** button.

7. Click the **Monitor** tab.

8. Select the correct screen refresh rate.

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.

   Note: After pressing Fn+F7, you will need to wait for a moment before the image appears.

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.

8. Select the correct refresh rate.

- **Problem**: Wrong characters appear on the screen.

  Solution: Did you follow the correct procedure in installing the operating system or application program? If you did, have the external monitor serviced.

- **Problem**: The Extend desktop function does not work.

  Solution: Enable the Extend desktop function by doing the following:

  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 and the computer.

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

  4. Click the **Monitor-2** icon.

  5. Select **Extend these displays** for Multiple displays.

  6. Click the **Monitor-1** icon (for the primary display, the computer display).

  7. Select the **Resolution** of the primary display.

  8. Click the **Monitor-2** icon (for the external monitor).

9. Select the **Resolution** of the secondary display.

10. Set the relative position of the each monitor by dragging its icon. You can set the monitors in any relative position, but the icons must touch each other.

11. 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. Attach the computer to an external monitor.

2. Right-click on the desktop, and click **Personalize**.

3. Click **Display Settings**.

4. Click the **Monitor-2** icon.

5. Select the **Extend the desktop onto this monitor** check box.

6. Click the **Monitor-1** icon (for the primary display, the computer display).

7. Select the **Resolution** and **Colors** of the primary display.

8. Click the **Monitor-2** icon (for the external monitor).

9. Select the **Resolution** and **Colors** of the secondary display.

10. Set the relative position of the each monitor by dragging its icon. You can set the monitors in any relative position, but the icons must touch each other.

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

For Windows XP:

1. Attach the computer to an external monitor.

2. Right-click on the desktop, and click **Properties** to open the Display Properties window.

3. Click the **Settings** tab.

4. Click the **Monitor-2** icon.

5. Select the **Extend my Windows desktop onto this monitor** check box.

6. Click the **Monitor-1** icon (for the primary display, the computer display).

7. Select the screen resolution and color quality of the primary display.

8. Click the **Monitor-2** icon (for the external monitor).

9. Select the screen resolution and color quality of the secondary display.

10. Set the relative position of the each monitor by dragging its icon. You can set the monitors in any relative position, but the icons must touch each other.

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

- **Problem**: Display switching does not work.

  Solution: If you use the Extend desktop function, disable it, and change the display output location. If a DVD movie or a video clip is playing, stop the playback, close the application, and then change the display output location.

- **Problem**: If you use the Extend desktop function, you cannot set a higher resolution or higher refresh rate on the secondary display.

  Solution: Change the resolution and the color depth to lower settings for the primary display by doing the following:

  For Windows 7: Change the resolution depth to lower settings for the primary display. Refer to the "Solution" for "The Extend desktop function does not work" above.

For Windows Vista: Using the Display Settings window, change the resolution and the color depth to lower settings for the primary display. To launch the Display Settings window, refer to the "Solution" for "The Extend desktop function does not work" above.

For Windows XP: Using the Display Properties window, change the resolution and the color depth to lower settings for the primary display. To launch the Display Properties window, refer to the "Solution" for "The Extend desktop function does not work" above.

- **Problem**: The screen position on the external monitor is incorrect when that monitor is set for a high resolution.

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

Audio problems

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

  Solution: Make sure the built-in audio device is configured correctly.

  For Windows 7 and Windows Vista:

  1. Click **Start → Control Panel**.
  2. Click **Hardware and Sound**.
  3. Click **Device Manager**. If you are prompted for an administrator password or confirmation, type the password or provide confirmation.
  4. Double-click **Sound, video and game controllers**, (in Windows Vista, click the **+** mark for **Sound, video and game controllers**).
  5. Make sure the following device is enabled and configured correctly:
     - Conexant CX20672 SmartAudio HD

  For Windows XP:

  1. Click **Start → Control Panel**.
  2. Click **Performance and Maintenance**
  3. Click **System**.
  4. Click the **Hardware** tab, and then click the **Device Manager** button.
  5. Click the **+** mark for **Sound, video and game controllers**.
  6. Make sure the following device is enabled and configured correctly:
     - Conexant CX20672 SmartAudio HD

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

  Solution: Make sure that Microphone Boost is turned on and set as follows:

  For Windows 7 and Windows Vista:

  1. Click **Start → Control Panel**.
  2. Click **Hardware and Sound**.
  3. Click **Sound**.
  4. Click the **Recording** tab in the Sound window.
  5. Select **Microphone**, and click the **Properties** button.

6. Click the **Levels** tab, and move the **Microphone Boost** slider upwards.

7. Click **OK**.

For Windows XP:

1. Double-click the volume icon in the task bar. The Volume Control window opens.

2. Click **Options**.

3. Click **Properties**.

4. Select **Conexant HD Audio input** in the Mixer device list.

5. Click **OK**.

6. Click **Options**, and then click **Advanced Controls**.

7. Find the **Microphone volume** control, and then click **Advanced**.

8. Select the **Microphone boost** check box.

9. Click **Close**.

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

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

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

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

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

- **Problem**: The volume sliders do not all fit in the Volume Control window in Windows XP.

  Solution: Press Ctrl+S keys while the volume control is in focus, and toggle to a smaller size.

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

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

- **Problem**: There is no volume control for MIDI sound on the Volume Mixer window (in Windows XP, Volume Control window).

  Solution: Use the hardware volume control. In Windows XP, use the hardware volume control or the Wave volume control on the Volume Control window. This is because the Built-In Synthesizer Software does not support the control.

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

  Solution: You can still hear some sound even though you have set the Master volume control at minimum. To turn off the sound completely, go to the Master volume control and select Mute speakers (in Windows Vista and Windows XP, Mute).

- **Problem**: Sound does not come from a headphone or a speaker, or your computer cannot record sounds when the SmartAudio is set to MULTI-STREAM mode (Windows Vista).

  Solution: To switch from one device to another (for example, from a speaker to a headphone, or from an external microphone to a built-in microphone), do as follows:

1. Click **Start → Control Panel → Hardware and Sound**.

2. Click the **SmartAudio** icon. The SmartAudio window opens.

3. Make sure that you are in MULTI-STREAM mode in the Audio Director window.

4. In the Volume Mixer window, select the device you want-for example, speakers. If your computer is attached to a ThinkPad Mini Dock Plus or a ThinkPad Mini Dock, you can also select a device from them.

5. Play any sound via a music program (for example, Windows Media Player). Make sure that sound comes from speakers now.

6. Then, if you would like to switch to a headphone, close the music program.

7. Go to the Volume Mixer window. Then select another device, which is now the headphone.

8. Play any sound via the music program. Make sure that sound comes from a headphone attached directly to the system.

For details, refer to the Help for SmartAudio.

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

- **Problem**: When you connect a headphone to your computer while playing sound, a speaker does not produce sound in the MULTI-STREAM mode at SmartAudio (Windows 7).

  Solution: Once the headphone is attached, the streaming is automatically redirected to it. If you want to listen to sound from the speakers again, be sure to set those speakers as the default device. The procedure is as follows:

  1. Click **Start → Control Panel → All Control Panel Items**.

  2. Click the **SmartAudio** icon. The SmartAudio window opens.

  3. Look at the playback devices. If you have attached a headphone, the headphone will be automatically set as the default device, and the icon for that headphone will be checked.

  4. To set a different device as the default, just double-click the icon for those speakers. That icon will now have a check mark.

  5. Play any sound by use of a music program such as Windows Media Player. Make sure that sound comes from the speakers.

  For details, refer to the Help for SmartAudio.

Fingerprint reader problems

- **Problem**: The surface of the reader is dirty, stained, or wet.

  Solution: Gently clean the surface of the reader with a dry, soft, lint-free cloth.

- **Problem**: The reader often fails to enroll or authenticate your fingerprint.

  Solution: If the surface of the reader is dirty, stained, or wet, gently clean the surface of the reader with a dry, soft, lint-free cloth.

  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 the one you used when you enrolled your fingerprint.

– Your finger is wet.

– A finger that has not been enrolled is used.

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.

Battery and power

This section tells what to do if you have a battery and power problem.

This section includes five topics: Battery, ac power adapter, Power, Power button, Startup and Sleep (standby) and hibernation. Check these topics to find the related information.

Battery problems

- **Problem**: The battery pack cannot be fully charged by the power-off method in the standard charge time for your computer.

  Solution: The battery pack might be over-discharged. Do the following:

  1. Turn off the computer.

  2. Make sure that the over-discharged battery pack is in the computer.

  3. Connect the ac power adapter to the computer and let it charge.

  If the optional Quick Charger is available, use it to charge the over-discharged battery pack.

  If the battery pack cannot be fully charged in 24 hours, use a new battery pack.

- **Problem**: Your computer shuts down before the battery status indicator shows empty, *-or-* Your computer operates after the battery status indicator shows empty.

  Solution: Discharge and recharge the battery pack.

- **Problem**: The operating time for a fully charged battery pack is short.

  Solution: Discharge and recharge the battery pack. If your battery's operating time is still short, use a new battery pack.

- **Problem**: The computer does not operate with a fully charged battery pack.

  Solution: The surge protector in the battery pack might be active. Turn off the computer for one minute to reset the protector; then turn on the computer again.

- **Problem**: The battery pack cannot be charged.

  Solution: You cannot charge the battery when it is too hot. If the battery feels hot, remove it from the computer and allow it to cool to room temperature. After it cools, reinstall it and recharge the battery. If it still cannot be charged, have it serviced.

AC power adapter problems

- **Problem**: The ac power adapter is connected to the computer and the working electrical outlet, but the power adapter (power plug) icon is not displayed in the task bar. Also the ac power indicator does not light up.

  Solution: Do as follows:

  1. Make sure that the connection of the ac power adapter is correct. For connecting the ac power adapter, see the Setup Instructions manual included in the shipping contents of your computer.

2. If the above step is correct, turn off the computer, then disconnect the ac power adapter and uninstall the main battery.

3. Reinstall the battery and reconnect the ac power adapter, then turn on the computer.

4. If the power adapter icon still does not appear on the task bar and the ac power indicator does not light up, have the ac power adapter and your computer serviced.

Note: If your computer is a Windows 7 model, to display the power adapter (power plug) icon, click **Show hidden icons** in the task bar.

Power problems

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

If your computer is getting no power at all, check the following items:

1. Verify the power switch. Refer to "Status indicators" on page 19. The power switch is illuminated whenever the computer is on.

2. Check all power connections. Remove any power strips and surge protectors to connect the ac power adapter directly to the ac power outlet.

3. Inspect the ac power adapter. Check for any physical damage, and make sure that the power cable is firmly attached to the adapter brick and the computer.

4. Verify the ac power source is working by attaching another device to the outlet.

5. Remove the computer from a "Detaching a ThinkPad X220 Ultrabase" on page 155.

6. Remove all devices and then test for system power with minimal devices attached.

   a. Disconnect the ac power adapter and all cables from the computer.

   b. Close the computer display, and turn the computer over.

   c. Remove the battery. Refer to "Replacing the battery" on page 118.

   d. Remove the memory (SO-DIMM). Refer to "Replacing memory" on page 145.

   e. Remove the PCI Express Mini Card. Refer to "Installing and replacing the PCI Express Mini Card for wireless LAN/WiMAX connection" on page 133.

   f. Remove the hard disk drive and solid state drive. Refer to "Replacing the hard disk drive" on page 127 and "Replacing the solid state drive" on page 130.

   g. Wait for 30 seconds, and then reinstall the SO-DIMM and the known good battery or the ac power adapter to test the computer with minimal devices attached first.

   h. Reinstall each device one at a time that you have removed in the earlier steps.

If your computer does not run on battery power, check the following items:

1. Remove and reset the battery to make sure that it is properly connected. Refer to "Replacing the battery" on page 118.

2. Swap batteries with another similar model, if available.

   If another similar ThinkPad model is available, then verify that the battery pack works in the other computer and that the battery pack for the other model works in this computer.

3. Verify the battery-status indicator. Refer to "Status indicators" on page 19.

   The battery-status indicator is normally illuminated whenever the battery is installed and the computer is on, or the ac power adapter is connected and the battery is charging. This indicator may be blinking or solid in either orange or green color depending on the status of the battery.

A power button problem

• **Problem**: The system does not respond, and you cannot turn off the computer.

Solution: Turn off the computer by pressing and holding the power button for 4 seconds or more. If the system is still not reset, remove the ac power adapter and the battery.

Startup problems

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

If you receive an error message before the operating system loads, check the following item:

• Follow the appropriate corrective actions for Power-on self-test error messages.

If you receive an error message while the operating system is loading the desktop configuration after the POST is completed, check the following items:

1. Visit the Lenovo Support Web site at http://www.lenovo.com/support and search for the error message.
2. Visit the Microsoft Knowledge Base homepage at http://support.microsoft.com/ and search for the error message.

Sleep (standby) and hibernation problems

• **Problem**: The computer enters sleep (standby) mode unexpectedly.

   Solution: If the processor overheats, the computer automatically enter sleep (standby) mode to allow the computer to cool and to protect the processor and other internal components. Check the settings for sleep (standby) mode, using Power Manager.

• **Problem**: The computer enters sleep (standby) mode (the sleep/standby indicator turns on) immediately after Power-on self-test.

   Solution: Make sure that:

   – The battery is charged.

   – The operating temperature is within the acceptable range. Refer to "Features" on page , "Specifications" on page 31, and "Operating environment" on page 33.

   If the battery is charged and the temperature is within range, have the computer serviced.

• **Problem**: The "critical low-battery error" message appears, and the computer immediately turns off.

   Solution: The battery power is getting low. Connect the ac power adapter to the computer and plug it into an electrical outlet, or replace the battery with a charged one.

• **Problem**: The computer display remains blank after you press Fn to return from sleep (standby) mode.

   Solution: Check whether an external monitor was disconnected or turned off while the computer was in sleep (standby) mode. If you disconnected or turned off the external monitor, connect it or turn it on before resuming the computer from the sleep (standby) mode. When resuming the computer from the sleep (standby) mode without attaching the external monitor or turning it on, and the computer display remains blank, press Fn+F7 to bring up the computer display.

   Note: If you are using Fn+F7 to apply a presentation scheme, you will need to press Fn+F7 at least three times in three seconds to bring up the computer display.

   Note: If your computer is a Windows 7 model, it does not support the presentation scheme.

• **Problem**: The computer does not return from sleep (standby) mode, or the sleep (standby) indicator stays on and the computer does not work.

   Solution: If the system does not return from sleep (standby) mode, it may have entered sleep (standby) or hibernation mode automatically because the battery is depleted. Check the sleep (standby) indicator.

– If the sleep (standby) indicator is on, your computer is in sleep (standby) mode. Connect the ac power adapter to the computer; then press Fn.

– If the sleep (standby) indicator is off, your computer is in hibernation mode or power-off state. Connect the ac power adapter to the computer; then press the power button to resume operation.

If the system still does not return from sleep (standby) mode, your system may stop responding and you may not be able to turn off the computer. In this case, you need to reset the computer. If you have not saved your data, it may be lost. To reset the computer, press and hold the power button for 4 seconds or more. If the system is still not reset, remove the ac power adapter and the battery.

• **Problem**: Your computer does not enter sleep (standby) or hibernation mode.

Solution: Check whether any option has been selected to disable your computer from entering sleep (standby) or hibernation mode.

If your computer tries to enter sleep (standby) mode but the request is rejected, the device in the USB connector might be disabled. If this occurs, do a hot-unplug-and-plug operation for the USB device.

• **Problem**: The Fn+F12 key combination does not make the computer enter hibernation mode.

Solution: The computer cannot enter hibernation mode:

– If the hibernation mode is not enabled in Windows XP. To enable it, do as follows:

For Windows XP:

1. Click **Start ➔ Control panel**.
2. Click **Performance and Maintenance**.
3. Click **Power Options**.
4. Click the **Hibernate** tab.
5. Click the **Enable hibernation** check box.
6. Click **OK**.

If you want to be able to enter hibernation mode by pressing Fn+F12, you need to install ThinkPad PM driver.

• **Problem**: The battery discharges slightly while the computer is in hibernation mode.

Solution: If the wakeup function is enabled, the computer consumes small amount of power. This is not a defect. For details, refer to "Power-saving modes" on page 61.

Drives and other storage devices

This section includes three drive problems which are hard disk drive, solid state drive, and optical drive.

Hard disk drive problems

• **Problem**: The hard disk drive makes a rattling noise intermittently.

Solution: The rattling noise might be heard:

– When the hard disk drive begins or finishes getting access to data.

– When you carry the hard disk drive.

– When you carry your computer.

This is a normal characteristic of a hard disk drive and is not a defect.

• **Problem**: The hard disk drive does not work.

Solution: In the startup menu of the ThinkPad Setup, make sure that the hard disk drive is included in the "Boot priority order" list. If it is included in the "Excluded from boot order" list, it is disabled. Select the entry for it in the list and press the Shift+1 key. This moves the entry to the "Boot priority order" list.

- **Problem**: After setting a hard disk password on the hard disk drive of the computer, you moved the drive to another computer. Now you cannot unlock the hard disk password.

  Solution: Your computer supports an enhanced password algorithm. Computers older than yours may not support such a security function.

Solid state drive problems

- **Problem**: When you compress files or folders by use of the data compression function in Windows, and then decompress them, the process of writing to or reading from the files or folders is slow.

  Solution: Apply the disk defragmentation tool in Windows for faster access to the data.

Software problems

- **Problem**: An application does not run correctly.

  Solution: Make sure that the problem is not being caused by the application.

  Check that your computer has the minimum required memory to run the application. Refer to the manuals supplied with the application.

  Check the following:

  - The application is designed to operate with your operating system.
  - Other applications run correctly on your computer.
  - The necessary device drivers are installed.
  - The application works when it is run on some other computer.

  If an error message appears while you are using the application program, refer to the manuals supplied with the application.

  If the application still does not run correctly, contact your place of purchase or a service representative for help.

Ports and connectors

This section includes the most common ports and connectors problems: Universal Serial Bus, and docking station or port replication.

Universal Serial Bus problems

- **Problem**: A device connected to the USB connector does not work.

  Solution: Open the Device Manager window. Make sure that the USB device setup is correct, and that the assignment of computer resource and the installation of the device driver are correct.

  For Windows 7 and Windows Vista:

  1. Click **Start** ➔ **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.

  For Windows XP:

  1. Click **Start** ➔ **Control Panel**.
  2. Click **Performance and Maintenance**, and click **System**.

3. Click the **Hardware** tab, and click the **Device Manager** button.

Refer to "Diagnosing problems" on page 209 and run Lenovo ThinkVantage Toolbox for a diagnostic test of the USB connector.

A docking station or port replicator problem

- **Problem**: The computer does not start when you try to turn it on, and does not respond when you try to resume operation.

  Solution: Make sure that:

  – The ac power adapter is connected to the docking station or the port replicator.

  – The docking indicator of the ThinkPad Mini Dock Plus Series 3 or the ThinkPad Mini Dock Series 3 is on.

  – The computer is securely attached to the docking station or the port replicator.

Chapter 11. Getting support

There is more to owning a ThinkPad notebook than having a powerful, portable computer. This chapter offers information about when to communicate with Lenovo and how best to do it.

- "Before you contact Lenovo" on page 237
- "Getting help and service" on page 238
- "Purchasing additional services" on page 243

Before you contact Lenovo

Often, you can solve your computer problems by referring to the information in the explanations of error codes, running Lenovo ThinkVantage Toolbox or by consulting the ThinkPad Web site.

Register your computer

Register your ThinkPad products with Lenovo. Go to: http://www.lenovo.com/register. This can help authorities return your computer to you if it is lost or stolen. Registering your computer also enables Lenovo to notify you about possible technical information and upgrades.

For more information about registering your computer, refer to "Register your computer" on page 41.

Download system updates

Downloading updated software might resolve problems you experience with your computer.

To download updated software, go to http://www.lenovo.com/support/site.wss/document.do?sitestyle=lenovo&lndocid=tpad-matrix. Then follow the instructions on the screen.

Record information

Before you talk to a Lenovo representative, record the following important information about your computer.

Record problem symptoms and details

Collect the answers to the questions below before you call for help. Then, you will be able to get help as quickly as possible.

- What is the problem? Is it continuous or intermittent?
- Is there an error message that appears? What is the error code, if any?
- What operating system are you using? Which version?
- Which software applications were running at the time of the problem?
- Can the problem be reproduced? If so, how?

Record system information

The serial number label is on the bottom of your computer. Record the machine type and the serial number.

- What is the name of your Lenovo product?
- What is the machine type?
- What is the serial number?

Getting help and service

If you need help, service, technical assistance, or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you. This section contains information about where to go for additional information about Lenovo and our products, what to do if you experience a problem with your computer, and whom to call for service should it be necessary.

Information about your computer and preinstalled software, if any, is available in the documentation that comes with your computer. That documentation includes printed books, online books, README files, and help files. In addition, information about Lenovo products is available on the World Wide Web.

Microsoft Service Packs are the latest software source for Windows product updates. They are available via Web download (connection charges may apply) or via disc. For more specific information and links, please go to http://www.microsoft.com. Lenovo offers Up and Running technical assistance with installation of, or questions related to, Service Packs for your Lenovo-preloaded Microsoft Windows product. For information, please contact the Customer Support Center.

Using diagnostic programs

Many computer problems can be solved without outside assistance. If you experience a problem with your computer, the first place to start is the troubleshooting information of your computer documentation. If you suspect a software problem, see the documentation, including README files and online help, that comes with the operating system or application program.

ThinkPad notebooks come with a set of diagnostic programs that you can use to help you identify hardware problems. See "Diagnosing problems" on page 209 for instructions on using the diagnostic programs.

The Troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. Lenovo maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates.

Lenovo support Web site

Technical support information is available at:
http://www.lenovo.com/support

This portal is updated with the latest information about the following subjects:

- **Downloads & Drivers**: Download drivers, flash BIOS, and update your software
- **Warranty**: Check your warranty status and upgrade your warranty.
- **Technical Support**: Click **Need Help?** for self-help tips to help diagnose a problem.
- **ThinkVantage**: Learn more about ThinkVantage software to improve productivity and reduce cost.
- **Lenovo Forums**: Search the community knowledge base for your computer to share and discover information with other users.
- **User Guides & Manuals**: Read or print any publications related to your product.

Calling Lenovo

If you have tried to correct the problem yourself and still need help, during the warranty period, you can get help and information by telephone through the Customer Support Center. The following services are available during the warranty period:

- Problem determination - Trained personnel are available to assist you with determining if you have a hardware problem and deciding what action is necessary to fix the problem.

- Lenovo hardware repair - If the problem is determined to be caused by Lenovo hardware under warranty, trained service personnel are available to provide the applicable level of service.
- Engineering change management - Occasionally, there might be changes that are required after a product has been sold. Lenovo or your reseller, if authorized by Lenovo, will make selected Engineering Changes (ECs) available that apply to your hardware.

The following items are not covered:
- Replacement or use of parts not manufactured for or by Lenovo or nonwarranted parts

    Note: All warranted parts contain a 7-character identification in the format FRU XXXXXXX.
- Identification of software problem sources
- Configuration of system BIOS (UEFI BIOS) as part of an installation or upgrade
- Changes, modifications, or upgrades to device drivers
- Installation and maintenance of network operating systems (NOS)
- Installation and maintenance of application programs

For the terms and conditions of the Lenovo Limited Warranty that applies to your Lenovo hardware product, see "Warranty Information" in the *Safety and Warranty Guide* that comes with your computer.

If possible, be near your computer when you make your call in case the technical assistance representative needs to help you resolve a computer problem. Please ensure that you have downloaded the most current drivers and system updates, run diagnostics, and recorded information before you call. When calling for technical assistance, please have the following information available:
- Machine Type and Model
- Serial numbers of your computer, monitor, and other components, or your proof of purchase
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information for your system

Telephone numbers

Note: Telephone numbers are subject to change without notice. For the latest list of Customer Support Center telephone numbers and hours of operation, go to the Support Web site at:
http://www.lenovo.com/support/phone

Table 10. World-wide telephone list

Country or Region	Telephone Number
Africa	Africa: +44 (0)1475-555-055 South Africa: +27-11-3028888, 0800110756 and +27-11- 3027252 Central Africa: Contact the nearest Lenovo Business Partner
Argentina	0800-666-0011 (Spanish)
Australia	131-426 (English)
Austria	0043-0810-100654 (Warranty service and support) (German)
Belgium	02-225-3611 (Warranty service and support) (Dutch and French)
Bolivia	0800-10-0189 (Spanish)
Brazil	Sao Paulo region: (11) 3889-8986 Outside Sao Paulo region: 0800-701-4815 (Brazilian Portuguese)

Table 10. World-wide telephone list (continued)

Country or Region	Telephone Number
Brunei	801-1041 (English and Bahasa Melayu)
Canada	1-800-565-3344 (English and French)
Caribbean (Bermuda, Jamaica, and Tortola)	1-877-426-7378 (English)
Chile	800-361-213 188-800-442-488 (Toll free) (Spanish)
China	Technical Support Line 800-990-8888 86-10-58851110 (Mandarin)
China (Hong Kong S.A.R.)	ThinkPad (Technical enquiry hotline): 2516-3939 (Hong Kong) ThinkPad Service Center: 3140-2788 (Hong Kong) (Cantonese, English, and Mandarin)
China (Macau S.A.R.)	ThinkPad (Technical enquiry hotline): 0800-839 (Macau) ThinkPad Service Center: 2871-5399 (Macau) (Cantonese, English, and Mandarin)
Colombia	1-800-912-3021 (Spanish)
Costa Rica	0-800-011-1029 (Spanish)
Croatia	0800-0426
Cyprus	+357-22-841100
Czech Republic	+420-2-7213-1316
Denmark	7010-5150 (Warranty service and support) (Danish)
Dominican Republic	1-866-434-2080 (Spanish)
Ecuador	1-800-426911 (Spanish)
Egypt	+202-35362525
El Salvador	800-6264 (Spanish)
Estonia	+372 66 00 800 +372 6776793
Finland	+358-800-1-4260 (Warranty service and support) (Finnish)
France	Hardware 0810-631-213 (Warranty service and support) Software 0810-631-020 (Warranty service and support) (French)
Germany	0180 5 - 00 46 18 (German)
Greece	+30-210-680-1700
Guatemala	1800-624-0051 (Spanish)

Table 10. World-wide telephone list (continued)

Country or Region	Telephone Number
Honduras	Tegucigalpa: 232-4222 San Pedro Sula: 552-2234 (Spanish)
Hungary	+ 36 1 3825716 + 36 1 3825720 (English and Hungarian)
India	1800-425-2666 or +91-80-2535-9182 (English)
Indonesia	021 5238 823 001-803-606-282 (Local number only) +603 8315 6859 (DID) (English and Bahasa Indonesian)
Ireland	01-881-1444 (Warranty service and support) (English)
Israel	Givat Shmuel Service Center: +972-3-531-3900 (Hebrew and English)
Italy	+39-800-820094 (Warranty service and support) (Italian)
Japan	ThinkPad Products Toll Free: 0120-20-5550 International: +81-46-266-4716 (Japanese and English) The above numbers will be answered with a Japanese language voice prompt. For telephone support in English, please wait for the Japanese voice prompt to end, and an operator will answer. Please say "English support please," and your call will be transferred to an English speaking operator.
Korea	1588-6782 (Korean)
Latvia	+371 7070360
Lithuania	+370 5 278 66 00
Luxembourg	+352-360-385-343 (French)
Malaysia	1800-88-1889 (Local number only) +603 8315 6855 (DID) (English and Bahasa Melayu)
Malta	+35621445566
Mexico	001-866-434-2080 (Spanish)
Middle East	+44 (0)1475-555-055
Netherlands	+31-20-514-5770 (Dutch)
New Zealand	0800-733-222 (English)
Nicaragua	001-800-220-1830 (Spanish)
Norway	8152-1550 (Warranty service and support) (Norwegian)

Table 10. World-wide telephone list (continued)

Country or Region	Telephone Number
Panama	206-6047 001-866-434-2080 (Lenovo Customer Support Center- toll free) (Spanish)
Peru	0-800-50-866 (Spanish)
Philippines	1800-1601-0033 (Local number only) +603 8315 6858 (DID) (English and Filipino)
Poland	+48 22 760-73-00 (Polski)
Portugal	+351 21 892 7046 (Portuguese)
Romania	+4-021-224-4015
RUCIS (Russia and CIS)	For Russia: 8 800 100 7888 (Toll free number) For CIS Countries: 0040 31 620 5099 (Payable) (Russian and English)
Singapore	800 6011 343 (Local number only) +603 8315 6856 (DID) (English)
Slovakia	+421-2-4954-5555
Slovenia	+386-1-200-50-60 (Slovenian)
Spain	91-714-7983 0901-100-000 (Spanish)
Sri Lanka	+9411 2493547 +9411 2493548 (English)
Sweden	077-117-1040 (Warranty service and support) (Swedish)
Switzerland	0800-55-54-54 (Warranty service and support) (German, French, and Italian)
Taiwan	886-2-82273299 or 0800-000-702 (Mandarin)
Thailand	1-800-060-066 (Local number only) 66 2273 4088 +603 8315 6857 (DID) (Thai and English)
Turkey	00800-4463-2041 (Turkish)
United Kingdom	08705-500-900 (Standard warranty support) (English)
United States	1-800-426-7378 (English)
Uruguay	000-411-005-6649 (Spanish)

Table 10. World-wide telephone list (continued)

Country or Region	Telephone Number
Venezuela	0-800-100-2011 (Spanish)
Vietnam	For Northern Area and Hanoi City: 844 3 946 2000 or 844 3 942 6457 For Southern Area and Ho Chi Minh City: 848 3 829 5160 or 844 3 942 6457 (Vietnamese and English)

In all other countries and regions, contact your Lenovo reseller or marketing representative, or go to the Lenovo support Web site at:
http://www.lenovo.com/support

Purchasing additional services

During and after the warranty period, you can purchase additional services, such as support for Lenovo and non-Lenovo hardware, operating systems, and application programs; network setup and configuration; upgraded or extended hardware repair services; and custom installations. Service availability and service name might vary by country.

For more information about these services, go to:
http://www.lenovo.com/accessories/services/index.html

Appendix A. Regulatory information

Wireless related information

Wireless interoperability

Wireless LAN PCI Express Mini Card is designed to be interoperable with any wireless LAN product that is based on Direct Sequence Spread Spectrum (DSSS), Complementary Code Keying (CCK), and/or Orthogonal Frequency Division Multiplexing (OFDM) radio technology, and is compliant to:

- The 802.11b/g Standard, 802.11a/b/g or 802.11n draft 2.0 on Wireless LANs, as defined and approved by the Institute of Electrical and Electronics Engineers.
- The Wireless Fidelity (WiFi) certification as defined by the Wi-Fi Alliance.

Bluetooth device is designed to be interoperable with any *Bluetooth* product that is compliant to *Bluetooth* Specification 2.1+EDR as defined by the *Bluetooth* SIG. Following profiles are supported by *Bluetooth* device:

- Generic Access
- Service Discovery
- Serial Port
- Dial-up Networking
- FAX
- LAN Access using PPP
- Personal Area Network
- Generic Object Exchange
- Generic Object Push
- File Transfer
- Synchronization
- Audio Gateway
- Headset
- Printer
- Human Interface Devices (Keyboard/Mouse)
- Basic Image
- Handsfree
- AV
- Phone Book Access Profile (PBAP) (Windows 7 and Windows Vista only)
- VDP-Sync Profile (Windows 7 and Windows Vista only)

Usage environment and your health

Integrated wireless cards emit radio frequency electromagnetic energy like other radio devices. However, the level of energy emitted is far much less than the electromagnetic energy emitted by wireless devices like for example mobile phones.

Due to the fact that integrated wireless cards operate within the guidelines found in radio frequency safety standards and recommendations, Lenovo believes they are safe for use by consumers. These standards and recommendations reflect the consensus of the scientific community and result from deliberations of panels and committees of scientists who continually review and interpret the extensive research literature.

In some situation or environment, the use of integrated wireless cards may be restricted by the proprietor of the building or responsible representatives of the organization. These situations and areas may for example include:

- Using the integrated wireless cards on board of airplanes, in hospitals or near petrol stations, blasting areas (with electro-explosive devices), medical implants or body-worn electronic medical devices, e.g. pace makers.
- In any other environment where the risk of interference to other devices or services is perceived or identified as harmful.

If you are uncertain of the policy that applies on the use of wireless devices in a specific organization (e.g., airport or hospital), you are encouraged to ask for authorization to use integrated wireless cards prior to turning on the computer.

Location of the UltraConnect wireless antennas

ThinkPad models feature an integrated diversity antenna system built into the display for optimal reception, enabling wireless communication wherever you are.

ThinkPad X220 and X220i
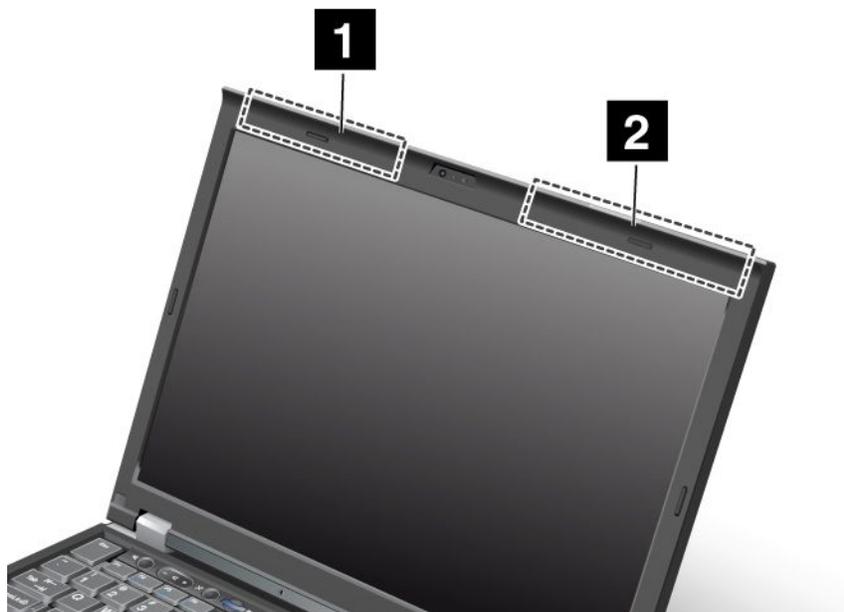
1. **Wireless LAN and WiMAX combo antenna (Auxiliary)**

   The auxiliary antenna connected to the wireless LAN or WiMAX feature is located on the upper left side of the computer display, near the center.

2. **Wireless LAN (third), Wireless LAN/WiMAX (main), and Wireless WAN (main)**

   The main antenna connected to the wireless LAN or WiMAX feature is located on the upper right side of the computer display, near the center. If your computer has the Multiple Input Multiple Output (MIMO) wireless LAN feature, the third wireless antenna is also located here.

ThinkPad 220 Tablet and X220i Tablet

1. **Wireless WAN (Auxiliary)**

   If your computer comes with a wireless WAN feature, its auxiliary antenna is located at the top left side of the computer display.

2. **Wireless LAN and WiMAX combo antenna (Auxiliary)**

   The auxiliary antenna connected to the wireless LAN or WiMAX feature is located at the top left portion of the computer display, near the center.

3. **Wireless LAN antenna (Third)**

   If your computer has the Multiple Input Multiple Output (MIMO) wireless LAN feature, the third wireless antenna is located at the top center portion of the computer display.

4. **Wireless LAN and WiMAX combo antenna (Main)**

   The main antenna connected to the wireless LAN or WiMAX feature is located at the top right side of the computer display, near the center.

5. **Wireless WAN antenna (Main)**

   If your computer comes with a wireless WAN feature, its main antenna is located at the top right side of the computer display.

Locating wireless regulatory notices

For more information about the wireless regulatory notices, refer to the *Regulatory Notice* shipped with your computer.

If your computer is shipped without the *Regulatory Notice*, you can find it on the Web site at: http://www.lenovo.com/support

To view the *Regulatory Notice* on the Web site, do the following:

1. Go to:
   http://www.lenovo.com/support

2. Click the **Support & downloads** section, a new page is displayed.

3. In the right pane, type your computer number in the **Enter a product number** filed, and click **Go**.

4. You can then find the *Regulatory Notice* in the displayed search results.

Export classification notice

This product is subject to the United States Export Administration Regulations (EAR) and has an Export Classification Control Number (ECCN) of 4A994.b. It can be re-exported except to any of the embargoed countries in the EAR E1 country list.

Electronic emission notices

The following information refers to ThinkPad 4294, 4296, 4297, 4298, 4299, 4300, 4301, 4286, 4287, 4289, 4290, 4291, 4292, and 4293.

Federal Communications Commission Declaration of Conformity

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult an authorized dealer or service representative for help.

Lenovo is not responsible for any radio or television interference caused by using other than specified or recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Responsible Party:
Lenovo (United States) Incorporated
1009 Think Place - Building One
Morrisville, NC 27560
Phone Number: 919-294-5900

Industry Canada Class B emission compliance statement

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

European Union - Compliance to the Electromagnetic Compatibility Directive

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Lenovo cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the installation of option cards from other manufacturers.

This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication devices.

$$C\hspace{-0.2em}\epsilon$$

German Class B compliance statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse B EU-Richtlinie zur Elektromagnetischen Verträglichkeit
Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse B ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der Lenovo empfohlene Kabel angeschlossen werden. Lenovo übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der Lenovo verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der Lenovo gesteckt/eingebaut werden.

Deutschland:

Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Betriebsmitteln
Dieses Produkt entspricht dem „Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln" EMVG (früher „Gesetz über die elektromagnetische Verträglichkeit von Geräten"). Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln, EMVG vom 20. Juli 2007 (früher Gesetz über die elektromagnetische Verträglichkeit von Geräten), bzw. der EMV EG Richtlinie 2004/108/EC (früher 89/336/EWG), für Geräte der Klasse B.

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraf 5 des EMVG ist die Lenovo (Deutschland) GmbH, Gropiusplatz 10, D-70563 Stuttgart.

Informationen in Hinsicht EMVG Paragraf 4 Abs. (1) 4:
Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse B.

Korea Class B compliance statement

사용자 안내문(B급 기기)
- 가정용 방송통신기기 -

이 기기는 가정용(B급)으로 전자파적합등록을 한 기기로서 주로 가정에서
사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

Japan VCCI Class B compliance statement

この装置は，クラスB情報技術装置です。 この装置は，家庭環境で使用するこ
とを目的としていますが，この装置がラジオやテレビジョン受信機に近接して使
用されると，受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。　　　　　　　VCCI-B

Japan compliance statement for products which connect to the power mains with rated current less than or equal to 20 A per phase

日本の定格電流が 20A/相 以下の機器に対する高調波電流規制
高調波電流規格 JIS C 61000-3-2 適合品

Lenovo product service information for Taiwan

台灣 Lenovo 產品服務資訊如下 :
荷蘭商聯想股份有限公司台灣分公司
台北市信義區信義路五段七號十九樓之一
服務電話 : 0800-000-702

Pointer to the printed pub for additional regulatory information

For additional regulatory information, refer to the *Regulatory Notice* shipped with your computer.

If your computer is shipped without the *Regulatory Notice*, you can find it at the Web site http://www.lenovo.com/support. For details, refer to the instructions on "Locating wireless regulatory notices" on page 247.

Appendix B. WEEE and recycling statements

Lenovo encourages owners of information technology equipment to responsibly recycle their equipment when it is no longer needed. Lenovo offers a variety of programs and services to assist equipment owners in recycling their IT products. Information on product recycling offerings can be found on Lenovo's Internet site at: http://www.pc.ibm.com/ww/lenovo/about/environment/.

EU WEEE statements

EU Only

The Waste Electrical and Electronic Equipment (WEEE) mark applies only to countries within the European Union (EU) and Norway. Appliances are labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

Users of electrical and electronic equipment (EEE) with the WEEE marking per Annex IV of the WEEE Directive must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to them for the return, recycle, recovery of WEEE and minimize any potential effects of EEE on the environment and human health due to the presence of hazardous substances. For additional WEEE information go to: http://www.lenovo.com/lenovo/environment.

Japan recycling statements

Collecting and recycling a disused Lenovo computer or monitor

If you are a company employee and need to dispose of a Lenovo computer or monitor that is the property of the company, you must do so in accordance with the Law for Promotion of Effective Utilization of Resources. Computers and monitors are categorized as industrial waste and should be properly disposed of by an industrial waste disposal contractor certified by a local government. In accordance with the Law for Promotion of Effective Utilization of Resources, Lenovo Japan provides, through its PC Collecting and Recycling Services, for the collecting, reuse, and recycling of disused computers and monitors. For details, visit the Lenovo Web site at: www.ibm.com/jp/pc/service/recycle/pcrecycle/.

Pursuant to the Law for Promotion of Effective Utilization of Resources, the collecting and recycling of home-used computers and monitors by the manufacturer was begun on October 1, 2003. This service is provided free of charge for home-used computers sold after October 1, 2003. For details, visit the Lenovo Web site at: www.ibm.com/jp/pc/service/recycle/personal/.

Disposing of a Lenovo computer components

Some Lenovo computer products sold in Japan may have components that contain heavy metals or other environmental sensitive substances. To properly dispose of disused components, such as a printed circuit board or drive, use the methods described above for collecting and recycling a disused computer or monitor.

Disposing of disused lithium batteries from Lenovo computers

A button-shaped lithium battery is installed on the system board of your Lenovo computer to provide power to the computer clock while the computer is off or disconnected from the main power source. If you want to replace it with a new one, contact your place of purchase or ask for a repair service provided by Lenovo. If you have replaced it by yourself and want to dispose of the disused lithium battery, insulate it with vinyl tape, contact your place of purchase, and follow their instructions. If you use a Lenovo computer at home and need to dispose of a lithium battery, you must comply with local ordinances and regulations.

Disposing a disused battery pack from Lenovo notebook computers

Your Lenovo notebook computer has a lithium ion battery pack or a nickel metal hydride battery pack. If you are a company employee who uses a Lenovo notebook computer and need to dispose of a battery pack, contact the proper person in Lenovo sales, service, or marketing, and follow that person's instructions. You also can refer to the instructions at: www.ibm.com/jp/pc/environment/recycle/battery/. If you use a Lenovo notebook computer at home and need to dispose of a battery pack, you must comply with local ordinances and regulations. You also can refer to the instructions at: www.ibm.com/jp/pc/environment/recycle/battery/.

Appendix C. Notices

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Attention: Lenovo Director of Licensing

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ThinkPad.

Part Number:

Printed in China

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