

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

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

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

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

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

For Windows 7:

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

For Windows Vista and Windows XP:

1. Click the **Safely Remove Hardware** icon in the task bar
2. Select corresponding item to eject the card from the Windows operating system.
3. Press the card to eject it from your computer.
4. Remove the card from your computer and store it safely for future use.

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

Chapter 3. You and your computer

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

This chapter contains the following topics:

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

Accessibility and comfort

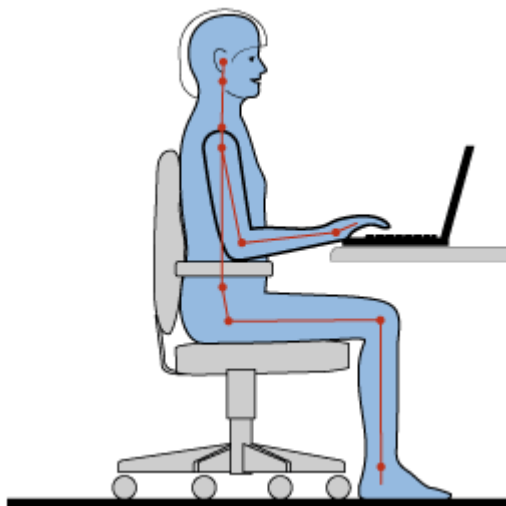
Because your computer enables you to work in so many places, it is important that you remain attentive to good posture, good lighting and proper seating. By keeping these considerations in mind, you can improve performance and achieve greater comfort.

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

Ergonomic information

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

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



General Posture: Below are some general recommendations for assuming a healthy working posture. It is best to periodically make minor modifications in your working posture to deter the onset of discomfort caused by long periods of working in the same position. Frequent, short breaks from your work will also help to prevent any minor discomfort associated with your working posture.

Display: Position the display to maintain a comfortable viewing distance of 510-760 mm (20-30 inch). Avoid glare or reflections on the display from overhead lighting or outside sources of light. Keep the display screen

clean and set the brightness to levels that enable you to see the screen clearly. Press Fn+Home or End to adjust display brightness.

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

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

Arm and Hand Position: If available, utilize chair arm rests or an area on your working surface to provide weight support for your arms. Keep your forearms, wrists, and hands in a relaxed and neutral (horizontal) position. Type with a soft touch without pounding the keys.

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

What if you are traveling?

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

Questions about vision?

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

Adjusting your computer to fit you

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

Active sitting and rest breaks: The longer you sit and work with your computer the more important it is to observe your working posture. Following “general recommendations for maintaining a healthy working posture” on page 85 and practicing “active sitting” are the best ways to avoid discomfort associated with your working postures. Making minor voluntary postural changes and taking short frequent work breaks are the key ingredients for healthy computing. Your computer is a light and mobile system; remember that it can easily be repositioned on your working surface to accommodate many posture modifications you might wish to make.

Work area setup options: Familiarize yourself with all of your office furniture so that you know how to adjust your work surface, seat, and other work tools to accommodate your preferences for comfort. If your work area is not in an office setting, be sure to take special note of employing active sitting and utilizing work breaks. Note that there are many ThinkPad product solutions available to help you modify and expand your computer to best suit your needs. Access the following Web site to view some of these options: <http://www.lenovo.com/accessories/services/index.html>. Explore your options for docking solutions and external products that can provide the adjustability and features that you want.

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

Accessibility information

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

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

Assistive technologies

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

To use the Accessibility Options program, do as follows:

For Windows 7 and Windows Vista:

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

For Windows XP:

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

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

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

FullScreen Magnifier function

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

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

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

Traveling with your computer

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

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

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

Travel tips

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

1. While it is safe to allow your computer to go through the x ray machines at airport security stations, it is important to keep your eyes on the computer at all times to prevent theft.
2. Consider bringing an airplane or automobile adapter for your computer.
3. Because you might need to use your computer in less than perfect lighting conditions, turn on the ThinkLight by pressing Fn+PgUp to illuminate the keyboard.
4. If you carry an ac power adapter, detach the ac cord from it to avoid damaging the cord.

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

Travel tips on airplanes

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

Attention:

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

Follow the tips below.

1. Be careful about the seat in front of you on airplanes. Angle your computer display so that it does not get caught when the person in front of you leans back.
2. Remember to hibernate or turn off your computer when taking off.

Travel accessories

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

Travel Essentials:

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

- A quality carrying case that provides adequate cushion and protection

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

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

Other items you may wish to consider:

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

Chapter 4. Security

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

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

Attaching a mechanical lock

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

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

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

Using passwords

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

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



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



If this icon appears, enter the Hard disk password.



If this icon appears, enter the Supervisor password.

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

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

- “Supervisor password” on page 95

Passwords and sleep (standby) mode

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

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


Typing passwords



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



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

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

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



If this icon appears, enter the Supervisor password.

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

Power-on password

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

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

Setting a power-on password

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

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

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

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

11. Press F10 to exit.

Changing or removing the power-on password

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

To change the password, do the following:

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

To remove the password, do the following:

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

Hard disk passwords

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

- User hard disk password
- Master hard disk password, which requires a user hard disk password

If a user hard disk password has been set, but no master hard disk password has been, the user must enter the user hard disk password in order to gain access to files and applications on the hard disk.

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

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

Setting a hard disk password

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

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

Notes:

- You can set the minimum length of a hard disk password in the ThinkPad Setup menu. For details, refer to “Security menu” on page 185.
 - If you set a hard disk password of over seven characters, the hard disk drive can be used only with a computer that can recognize a hard disk password of over seven characters. If you then install the hard disk drive in a computer that cannot recognize a hard disk password that contains more than seven characters, you cannot get access to the drive.
11. Press Enter once to move to the next line. Retype the password you just entered to verify it. Go to step 18 to complete the procedure.
 12. If you select **User + Master**, a message window opens and prompts you to set up a user hard disk password first. Click **Continue**.
 13. A new hard disk user password window opens. Type your new password in the **Enter New Password** field.
 14. Press Enter once to move to the next line. Retype the password you just entered to verify it.
 15. A message window opens and prompts you to set the master hard disk password. Click **Continue**.
 16. A new master hard-disk password window opens. Type your new password in the **Enter New Password** field.
 17. Press Enter once to move to the next line. Retype the password you just entered to verify it.
 18. Commit your password to memory and press Enter. A Setup Notice window is displayed.

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

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

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

Changing or removing a hard disk password

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

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

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

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

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

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

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

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

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

Supervisor password

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

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

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

Notes:

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

Setting a supervisor password

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

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

Attention: You might want to note your password and keep it in a safe place. If you forget your supervisor password, Lenovo can not reset your password. You must take your computer to a Lenovo reseller or a Lenovo marketing representative to have the system board replaced. Proof of purchase is required, and a fee will be charged for parts and service.

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

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

Changing or removing the supervisor password

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

To change the password, do the following:

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

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

To remove the password, do the following:

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

Hard disk security

Your computer supports an enhanced security solution for solid state drive or hard disk drive. To protect passwords from unauthorized security attacks, several of the latest technologies and algorithms are integrated into UEFI BIOS and hardware design of ThinkPad notebooks.

To maximize security, do the following:

1. Set a power-on password as well as a hard disk password for your internal solid state drive or hard disk drive. Refer to the procedures in “Power-on password” on page 92 and “Hard disk passwords” on page 93. For security, a longer password is recommended.
2. To provide reliable security for UEFI BIOS, use the security chip and a security application with a Trusted Platform Module management feature. Refer to “Setting the security chip” on page 98.

Note: Microsoft Windows 7 and Windows Vista support TPM management feature.

3. If a “Disk Encryption hard disk drive and Encryption solid state drive” on page 98 is installed in your computer, be sure to protect the contents of your computer memory from unauthorized access by use of drive encryption software, such as Microsoft Windows BitLocker® Drive Encryption in Windows 7 and Windows Vista. Refer to “Using Windows BitLocker Drive Encryption” on page 97.
4. Before you dispose of, sell, or hand over your computer, make sure to delete data stored on it. Refer to “Notice on deleting data from your hard disk drive or solid state drive” on page 107.

Notes: The following drive(s) can be protected by UEFI BIOS:

- The hard disk drive built into your computer.

Using Windows BitLocker Drive Encryption

To help protect your computer from being subject to unauthorized access, be sure to use drive encryption software, such as Windows BitLocker Drive Encryption.

Windows BitLocker Drive Encryption is an integral security feature of Windows 7 and Windows Vista. It is supported in Ultimate and Enterprise editions of Windows 7 and Windows Vista. It can help you protect the operating system and data stored in your computer data, even if your computer is lost or stolen. BitLocker works by encrypting all user and system files, including the swap and hibernation files.

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

To check the BitLocker status, click **Start → Control Panel → System and Security (in Windows Vista, Security) → BitLocker Drive Encryption**.

For details about Windows BitLocker Drive Encryption, go to the Help and Support for Windows 7 or Windows Vista, or search for “Microsoft Windows BitLocker Drive Encryption Step-by-Step Guide” on Microsoft web site.

Disk Encryption hard disk drive and Encryption solid state drive

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

Setting the security chip

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

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

Setting the Security Chip

The choices offered in the Security Chip submenu under the **Security** menu of the ThinkPad Setup are as follows:

- **Security Chip:** activates, inactivates, or disables the Security Chip.
- **Security Reporting Options:** enables or disables each Security Reporting Option.
- **Clear Security Chip:** clears the encryption key.

Notes:

1. Be sure that the Supervisor password has been set in the ThinkPad Setup. Otherwise anyone can change the settings for the Security Chip.
2. If you are using Client Security Solution, handle the Security Chip as follows:
 - Do not clear the Security Chip. If you do, the functions assigned to the keys will be erased.
 - Do not disable the Security Chip. If you do, Client Security Solution will not work.
3. If the Security Chip is removed or replaced, or a new one has been added, the computer will not start. You will hear 4 cycles of 4 beeps each, or you see error message 0176 or 0192.
4. If the Security Chip is inactive or disabled, Clear Security Chip will not be displayed.
5. When you clear the Security chip, be sure to turn your computer off and then turn it on again after you set the Security chip to Active. Otherwise, the choice of Clear Security Chip is not displayed.

To set an item in the Security Chip submenu:

1. Print these instructions. To set the Security Chip, you must turn your computer off and then on again.
2. Save all open files, and exit all applications.
3. Turn your computer off and then turn it on again.
4. When the logo screen is displayed, press F1. The ThinkPad Setup opens.
5. Using the cursor keys, move to **Security**. The **Security** menu opens.
6. Using the cursor keys, move to **Security Chip**, and press Enter. The Security Chip submenu opens.
7. Using the cursor keys, move to an item you want to set. When the item you want is highlighted, press Enter.
8. Set the items you want to set.
9. Press F10 to exit.

10. Click **Yes** in the Setup Confirmation window.

To set the Security Chip, you have to open the Client Security Solution, and follow the instructions on the screen.

Note: If your computer is a Windows 7 model, Client Security Solution is not preinstalled on your system. To configure the security chip, you need to download the latest version of Client Security Solution from the Lenovo Web site. To download Client Security Solution, go to: <http://www.lenovo.com/support>. Then follow the instructions on the screen.

Using a fingerprint reader

This section introduces how to use a fingerprint reader in your computer.

Using a fingerprint reader in ThinkPad X220 and X220i

Depending on the options you ordered, your computer may have an integrated fingerprint reader. By enrolling your fingerprint and associating it with a power-on password, a hard disk password, or both passwords beforehand, you can start the computer, log on to the system, and enter the ThinkPad Setup by swiping your finger over the reader, without typing a password. Thus fingerprint authentication can replace passwords and enable simple and secure user access.

For more advanced security, Client Security Solution can be installed. The software is compatible with a variety of user authentication mechanisms, such as those involving fingerprint authentication. This fingerprint reader can work with the software.

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

Enrolling your fingerprint

1. Turn on your computer.
2. To start Lenovo Fingerprint software, refer to “Fingerprint Software” on page 36.
3. Follow the instructions on the screen to enroll your fingerprint. For details, refer to the Help for the program.

LED behavior of the fingerprint reader



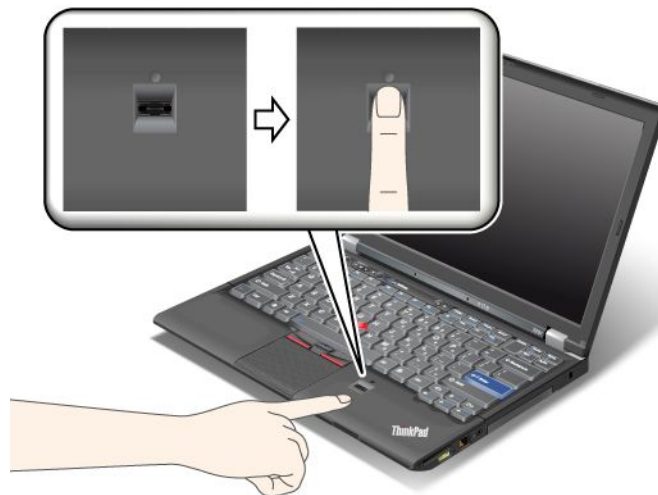
Table 4. LED behavior list_fingerprint reader

Indicator	Description
LED blinks green.	The fingerprint is being authenticated or has been authenticated.
LED is solid green.	The fingerprint reader is ready to swipe.
LED blinks amber.	The fingerprint could not be authenticated.

Swiping your finger over the reader

To swipe your finger over the reader, do as follows:

1. Place the ball of your finger—that is, the central part of the fingerprint—on the small circle above the reader. Make sure that the entire top joint of the finger is on the reader.



2. Apply light pressure and swipe your finger across the reader in one smooth motion.



Logging on to the system

After you enroll your fingerprint, log on to the system as follows:

1. Set a Power-on password or a Hard disk security, or both.
2. Turn your computer off and then on again.
3. When prompted, swipe your finger over the reader.
4. On request, type your power-on password, your hard disk password, or both. The enrolled fingerprint is now associated with your power-on password, your hard disk password, or both.

The next time you start the computer, you can log on to the system by swiping your finger over the reader once.

Attention: If you always use your fingerprint to log on to the system, you may forget your password. Write down your password, and keep it in a safe place. If you forget it and for some reason you cannot swipe your finger across the reader—for example, if you injure that finger—you cannot start the computer or change the password. If you forget your power-on password, you must take your computer to a Lenovo authorized servicer or a marketing representative to have the password canceled. If you forget your hard disk password, Lenovo cannot reset your password or recover data from the hard disk. You must take your computer to a Lenovo authorized servicer or a marketing representative to have the hard disk drive replaced. Proof of purchase is required, and a fee will be charged for parts and service.

Setting the fingerprint reader

If you want to change the settings of the fingerprint reader, follow the procedure below.

The fingerprint submenu under the Security menu of the ThinkPad Setup offers the following choices:

- **Predesktop Authentication:** Enables or disables fingerprint authentication before the operating system is loaded.
- **Reader Priority:** Defines the priority for fingerprint readers if an external fingerprint reader is attached.
- **Security Mode:** Specifies the settings of the security mode.
- **Password Authentication:** Enables or disables password authentication.

Note: This item appears if High security mode is selected.

- **Reset Fingerprint Data:** By choosing this item, you erase all of the fingerprint data stored in either the internal or external fingerprint reader.

To set an item in the fingerprint submenu:

1. Print these instructions. To configure the fingerprint reader, you must turn your computer off and then on again.
2. Save all open files, and exit all applications.
3. Turn your computer off and then on again.
4. When the logo screen is displayed, press F1. The ThinkPad Setup opens.
5. Using the cursor keys, move to **Security**, and press Enter. The Security menu opens.
6. Using the cursor keys, move to **Fingerprint**, and press Enter. The Fingerprint submenu opens.
7. Using the cursor keys, move to an item you want to set. When that item is highlighted, press Enter.
8. Set the items you want to set.
9. Press F10 to exit.
10. In the Setup Confirmation window, select **Yes**.

Care for the fingerprint reader

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

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

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

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

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

- Your finger is wrinkled.
- Your finger is rough, dry, or injured.
- Your finger is very dry.
- Your finger is stained with dirt, mud, or oil.
- The surface of your finger is very different from when you enrolled your fingerprint.
- Your finger is wet.
- A finger is used that has not been enrolled.

To improve the situation, try the following:

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

Using a fingerprint reader in ThinkPad X220 Table and X220i Tablet

Depending on the options you ordered, your computer may have an integrated fingerprint reader. By enrolling your fingerprint and associating it with a power-on password, a hard disk password, or both passwords beforehand, you can start the computer, log on to the system, and enter the ThinkPad Setup by

swiping your finger over the reader, without typing a password. Thus fingerprint authentication can replace passwords and enable simple and secure user access.

For more advanced security, Client Security Solution can be installed. The software is compatible with a variety of user authentication mechanisms, such as those involving fingerprint authentication. This fingerprint reader can work with the software.

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

Enrolling your fingerprint

1. Turn on your computer.
2. To start Lenovo Fingerprint software, refer to “Fingerprint Software” on page 36.
3. Follow the instructions on the screen to enroll your fingerprint. For details, refer to the Help for the program.

LED behavior of the fingerprint reader



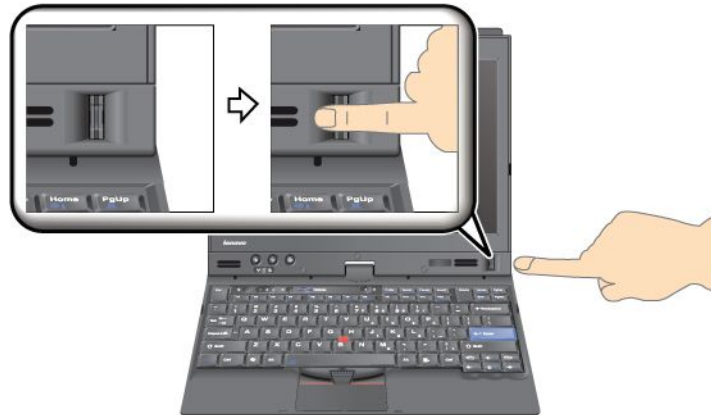
Table 5. LED behavior list_fingerprint reader

Indicator	Description
LED blinks green.	The fingerprint is being authenticated or has been authenticated.
LED is solid green.	The fingerprint reader is ready to swipe.
LED blinks amber.	The fingerprint could not be authenticated.

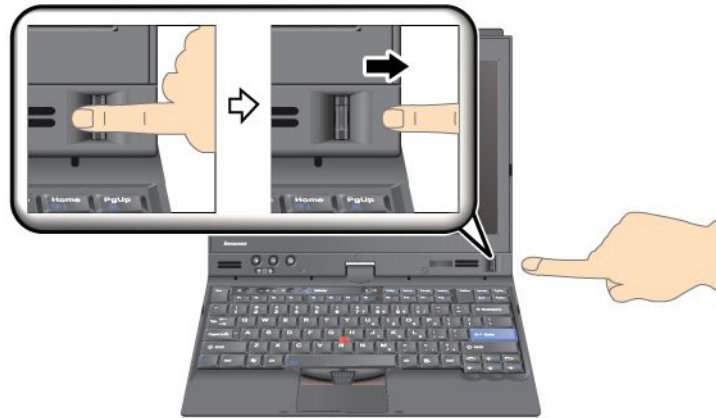
Swiping your finger over the reader

To swipe your finger over the reader in notebook mode, do as follows:

1. Place the ball of your finger—that is, the central part of the fingerprint—on the small circle above the reader. Make sure that the entire top joint of the finger is on the reader.

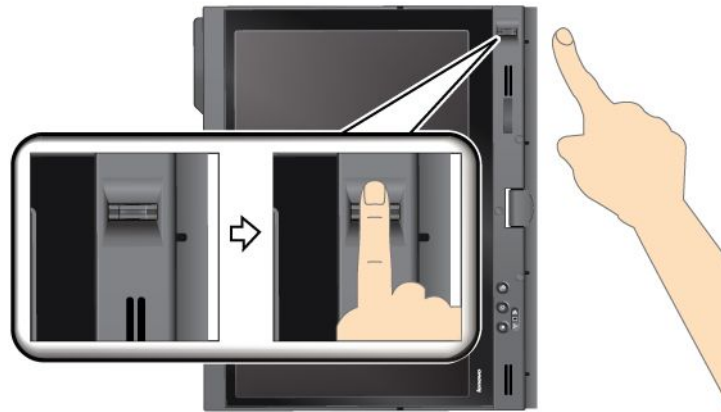


2. Apply light pressure and swipe your finger across the reader in one smooth motion.

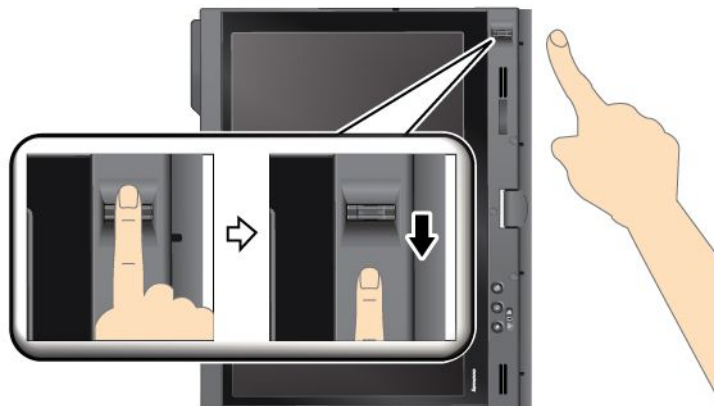


To swipe your finger over the reader in tablet mode, do as follows:

1. Place the ball of your finger—that is, the central part of the fingerprint—on the small circle above the reader. Make sure that the entire top joint of the finger is on the reader.



2. Apply light pressure and swipe your finger across the reader in one smooth motion.



Logging on to the system

After you enroll your fingerprint, log on to the system as follows:

1. Set a Power-on password or a Hard disk security, or both.
2. Turn your computer off and then on again.
3. When prompted, swipe your finger over the reader.
4. On request, type your power-on password, your hard disk password, or both. The enrolled fingerprint is now associated with your power-on password, your hard disk password, or both.

The next time you start the computer, you can log on to the system by swiping your finger over the reader once.

Attention: If you always use your fingerprint to log on to the system, you may forget your password. Write down your password, and keep it in a safe place. If you forget it and for some reason you cannot swipe your finger across the reader—for example, if you injure that finger—you cannot start the computer or change the password. If you forget your power-on password, you must take your computer to a Lenovo authorized servicer or a marketing representative to have the password canceled.

If you forget your hard disk password, Lenovo cannot reset your password or recover data from the hard disk. You must take your computer to a Lenovo authorized servicer or a marketing representative to have the hard disk drive replaced. Proof of purchase is required, and a fee will be charged for parts and service.

Setting the fingerprint reader

If you want to change the settings of the fingerprint reader, follow the procedure below.

The fingerprint submenu under the Security menu of the ThinkPad Setup offers the following choices:

- **Predesktop Authentication:** Enables or disables fingerprint authentication before the operating system is loaded.
- **Reader Priority:** Defines the priority for fingerprint readers if an external fingerprint reader is attached.
- **Security Mode:** Specifies the settings of the security mode.
- **Password Authentication:** Enables or disables password authentication.

Note: This item appears if High security mode is selected.

- **Reset Fingerprint Data:** By choosing this item, you erase all of the fingerprint data stored in either the internal or external fingerprint reader.

To set an item in the fingerprint submenu:

1. Print these instructions. To configure the fingerprint reader, you must turn your computer off and then on again.
2. Save all open files, and exit all applications.
3. Turn your computer off and then on again.
4. When the logo screen is displayed, press F1. The ThinkPad Setup opens.
5. Using the cursor keys, move to **Security**, and press Enter. The Security menu opens.
6. Using the cursor keys, move to **Fingerprint**, and press Enter. The Fingerprint submenu opens.
7. Using the cursor keys, move to an item you want to set. When that item is highlighted, press Enter.
8. Set the items you want to set.
9. Press F10 to exit.
10. In the Setup Confirmation window, select **Yes**.

Care for the fingerprint reader

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

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

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

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

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

- Your finger is wrinkled.
- Your finger is rough, dry, or injured.

- Your finger is very dry.
- Your finger is stained with dirt, mud, or oil.
- The surface of your finger is very different from when you enrolled your fingerprint.
- Your finger is wet.
- A finger is used that has not been enrolled.

To improve the situation, try the following:

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

Notice on deleting data from your hard disk drive or solid state drive

As computers spread into every corner of life, they process more and more information. The data on your computer, some of which is sensitive, is stored on a storage device, either a hard disk drive or solid state drive. Before you dispose of, sell, or hand over your computer, make sure to delete data stored on it.

Handing your computer over to someone else without deleting the loaded software, such as operating systems and application software, may even violate License Agreements. You are advised to check the terms and conditions of those Agreements.

There are methods that seem to delete the data:

- Move the data to the recycle bin, and then choose the Empty recycle bin command.
- Use the Delete command.
- Format your hard disk drive or solid state drive, using the software for initializing it.
- Using the recovery program, provided by Lenovo, bring the hard disk drive or the solid state drive back to factory-ship state.

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

To prevent leakage of data, it becomes very important that you take responsibility for deleting all the data from the hard disk drive or solid state drive when you dispose of, sell, or hand over your computer. You can destroy the data physically by smashing the hard disk drive with a hammer, or magnetically by means of strong magnetic power, thus making the data unreadable. But we recommend that you make use of the software (payware) or service (pay service) specifically developed for the purpose.

For disposing of data on the hard disk drive, Lenovo provides such software as PC Doctor for DOS and the Secure Data Disposal tool. Software provides the interface for full erasure of the contents of a hard disk. To download either application, go to the Lenovo Web site at:
<http://www.lenovo.com/support>

Note: Running the application will take a couple of hours.

If Encryption solid state drive or Disk Encryption hard disk drive is supported and installed in your computer, you can logically dispose of all the data on a device in a very short time by erasing the cryptographic key. The data encrypted with the old key is not physically erased but remains on the disk; however, it cannot be

decrypted without the old key. This feature is enabled by the ThinkPad Setup Menu Extension Utility and is available as a menu item in the ThinkPad Setup.

Using and understanding firewalls

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

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

Protecting data against viruses

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

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

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

Chapter 5. Recovery overview

This chapter provides information about the recovery solutions provided by Lenovo.

This chapter contains the following topics:

- “Creating and using recovery media” on page 109
- “Performing backup and recovery operations” on page 111
- “Using the Rescue and Recovery workspace” on page 112
- “Creating and using a rescue medium” on page 113
- “Reinstalling preinstalled applications and device drivers” on page 114
- “Solving recovery problems” on page 115

Notes:

1. There are a variety of methods to choose from when considering how to recover in the event of a software- or hardware-related problem. Some methods vary depending on the type of your operating system.
2. The product on the recovery media may be used only for the following purposes:
 - Restore the product preinstalled on your computer
 - Reinstall the product
 - Modify the product using the Additional Files

Notes: To prevent potential performance risks or unexpected behavior that might be caused by the new hard disk drive technology, it is recommended that you use one of the following back-up software programs:

- ThinkVantage Rescue and Recovery version 4.23 or later (for Windows XP and Windows Vista), 4.3 or later (for Windows 7)
- Symantec Norton Ghost version 15 or later

Notes: To use this program, do the following:

1. Click **Start** → **Run**. The Run window opens.
 2. Type `cmd` in the field. Then click **OK**.
 3. Type `ghost -align=1mb` and press Enter.
- Acronis True Image 2010 or later
 - Paragon Backup & Recovery 10 Suit or later, Paragon Backup & Recovery 10 Home or later

Creating and using recovery media

You can use recovery media to restore the hard disk drive to the factory default settings. Recovery media are useful if you transfer the computer to another area, sell the computer, recycle the computer, or put the computer in an operational state after all other methods of recovery have failed. As a precautionary measure, it is important to create recovery media as early as possible.

Note: The recovery operations you can perform using recovery media vary depending on the operating system from which the recovery media were created. The recovery media might contain a boot medium and a data medium. Your Microsoft Windows license permits you to create only one data medium, so it is important that you store the recovery media in a safe place after you have made them.

Creating recovery media

This section provides instructions on how to create recovery media on the Windows 7 operating system.

Note: On the Windows 7 operating system, you can create recovery media using discs or external USB storage devices. On the Windows Vista and Windows XP operating systems, you can create recovery media using only discs, so this operation is also called “creating Product Recovery discs.”

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

Using recovery media

This section provides instructions on how to use recovery media on different operating systems.

- On the Windows 7 operating system and the Windows Vista operating system, you can use recovery media to restore the computer to the factory default settings only. You can use recovery media to put the computer in an operational state after all other methods of recovery have failed.

Attention: When you use recovery media to restore the computer to the factory default settings, all the files currently on the hard disk drive will be deleted and replaced by the factory default settings.

To use recovery media on the Windows 7 operating system or the Windows Vista operating system, do the following:

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

Notes:

1. After restoring your computer to the factory default settings, you might have to reinstall device drivers for some devices. See “Reinstalling preinstalled applications and device drivers” on page 114.
 2. Some computers come with Microsoft Office or Microsoft Works preinstalled. If you need to recover or reinstall your Microsoft Office or Microsoft Works applications, you must use the *Microsoft Office CD* or *Microsoft Works CD*. These discs are provided only with computers preinstalled with Microsoft Office or Microsoft Works.
- On the Windows XP operating system, you can use Product Recovery discs to restore your computer to the factory default settings, perform a custom factory recovery, or perform other rescue and recovery operations such as rescuing individual files. You will be given the option to enter the Rescue and Recovery workspace and choose from a variety of recovery operations.

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

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

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

Performing backup and recovery operations

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

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

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

Performing a backup operation

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

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

Performing a recovery operation

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

- To perform a recovery operation using the Rescue and Recovery program on the Windows 7 operating system, do the following:

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

For more information about performing a recovery operation from the Rescue and Recovery workspace, see “Using the Rescue and Recovery workspace” on page 112.

Using the Rescue and Recovery workspace

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

- **Rescue files from your hard disk drive or from a backup** The Rescue and Recovery workspace enables you to locate files on your hard disk drive and transfer them to a network drive or other recordable media, such as a USB device or a disc. This solution is available even if you did not back up your files or if changes were made to the files since your last backup operation. You can also rescue individual files from a Rescue and Recovery backup located on your local hard disk drive, a USB device, or a network drive.
- **Restore your hard disk drive from a Rescue and Recovery backup** If you have backed up your hard disk drive using the Rescue and Recovery program, you can restore the hard disk drive from a Rescue and Recovery backup, even if you cannot start the Windows operating system.
- **Restore your hard disk drive to the factory default settings** The Rescue and Recovery workspace enables you to restore the complete contents of your hard disk drive to the factory default settings. If you have multiple partitions on your hard disk drive, you have the option to restore the factory default settings to the C: partition and leave the other partitions intact. Because the Rescue and Recovery workspace operates independently from the Windows operating system, you can restore the factory default settings even if you cannot start the Windows operating system.

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

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

1. Make sure the computer is turned off.
2. Repeatedly press and release the F11 key when turning on the computer. When you hear beeps or see a logo screen, release the F11 key.
3. If you have set a Rescue and Recovery password, type your password when prompted. The Rescue and Recovery workspace opens after a short delay.

Note: If the Rescue and Recovery workspace fails to open, see “Solving recovery problems” on page 115.

4. Do one of the following:

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

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

Notes:

1. After restoring your hard disk drive to the factory default settings, you might have to reinstall device drivers for some devices. See “Reinstalling preinstalled applications and device drivers” on page 114.
2. Some computers come with Microsoft Office or Microsoft Works preinstalled. If you need to recover or reinstall your Microsoft Office or Microsoft Works applications, you must use the *Microsoft Office CD* or *Microsoft Works CD*. These discs are provided only with computers preinstalled with Microsoft Office or Microsoft Works.

Creating and using a rescue medium

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

Notes:

1. The recovery operations you can perform using a rescue medium vary depending on the operating system.
2. The rescue disc can be started in all types of optical drives.

Creating a rescue medium

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

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

Using a rescue medium

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

- If you have created a rescue medium using a disc, use the following instructions to use the rescue medium:
 1. Turn off your computer.
 2. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
 3. On the **Startup Device Menu**, select the desired optical drive as the first boot device. Then, insert the rescue disc into the optical drive and press Enter. The rescue medium starts.
- If you have created a rescue medium using a USB hard disk drive, use the following instructions to use the rescue medium:
 1. Attach the USB hard disk drive to one of the USB connectors on your computer.
 2. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
 3. On the **Startup Device Menu**, select the USB hard disk drive as the first boot device and press Enter. The rescue medium starts.
- If you have created a rescue medium using the secondary internal hard disk drive, set the secondary internal hard disk drive as the first boot device in the startup device sequence to start the rescue medium. See “Startup menu” on page 186.

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

Reinstalling preinstalled applications and device drivers

Your computer has provisions that enable you to reinstall selected factory-installed applications and device drivers.

Reinstalling preinstalled applications

To reinstall selected application programs, do the following:

1. Turn on your computer.
2. Use Windows Explorer or Computer (in Windows XP, My Computer) to display the directory structure of your hard disk.
3. Open the C:\SWTOOLS folder.
4. Open the APPS folder. In it are several subfolders named for the various preinstalled applications.
5. Open the subfolder for the application you are reinstalling.
6. Double-click **Setup**, and then follow the on-screen steps to reinstall the program.

Reinstalling preinstalled device drivers

Attention: When you reinstall device drivers, you are changing the current configuration of your computer. Reinstall device drivers only when it is necessary to correct a problem with your computer.

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

1. Turn on your computer.
2. Use Windows Explorer or Computer (in Windows XP, My Computer) to display the directory structure of your hard disk drive.
3. Open the C:\SWTOOLS folder.
4. Open the DRIVERS folder. Within the DRIVERS folder are several subfolders named for the various devices installed in your computer (for example, AUDIO and VIDEO).

5. Open the subfolder for the device.
6. Reinstall the device driver using one of the following methods:
 - In the subfolder for the device, look for a text file (a file with the extension .txt). The text file contains information on how to reinstall that device driver.
-OR-
 - If the subfolder for the device contains a file of setup information (a file with the extension .inf), you can use the Add New Hardware program (in the Windows Control Panel) to reinstall the device driver. Not all device drivers can be reinstalled by use of this program. In the Add New Hardware program, when prompted for the device driver you want to install, click **Have Disk** and **Browse**. Then select the device driver file from the device subfolder.
-OR-
 - In the subfolder for the device, look for the file for the application (a file with the extension .exe). Double-click the file, and follow the instructions on the screen.

Attention: If you need updated device drivers, do not download them from the Windows Update Web site. Obtain them from Lenovo. For more information, see “Making sure device drivers are current” on page 204.

Solving recovery problems

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

- Use a rescue medium to start the Rescue and Recovery workspace. See “Using a rescue medium” on page 113.
- Use recovery media if all other methods of recovery have failed and you need to restore the hard disk drive to the factory default settings. See “Using recovery media” on page 110.

Note: If you are unable to access the Rescue and Recovery workspace or the Windows environment from a rescue medium or recovery media, you might not have the rescue device (an internal hard disk drive, a disc, a USB hard disk drive, or other external devices) set as the first boot device in the startup device sequence. You must first make sure that your rescue device is set as the first boot device in the startup device sequence in the Setup Utility program. See “Startup menu” on page 186 for detailed information about temporarily or permanently changing the startup device sequence. For more information about the Setup Utility program, see “ThinkPad Setup” on page 183.

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

Chapter 6. Replacing devices

You can increase the capacity of the memory or the hard disk drive by replacing the original, built-in device with an optional one. Or, if you need to, you can replace the PCI Express Mini Card by following the procedures in this section.

- “Static electricity prevention” on page 117
- “Replacing the battery” on page 118
- “Replacing the hard disk drive” on page 127
- “Replacing the keyboard” on page 120
- “Replacing memory” on page 145
- “Installing and replacing the mSATA solid state drive” on page 143
- “Installing and replacing the PCI Express Mini Card for wireless LAN/WiMAX connection” on page 133
- “Installing and replacing the PCI Express Mini Card for wireless WAN connection” on page 139
- “Replacing the SIM card” on page 148
- “Replacing the solid state drive” on page 130

Static electricity prevention

Static electricity, although harmless to you, can seriously damage computer components and options. Improper handling of static-sensitive parts can cause damage to the part. When you unpack an option or CRU, do not open the static-protective package containing the part until the instructions direct you to install it.

When you handle options or CRUs, or perform any work inside the computer, take the following precautions to avoid static-electricity damage:

- Limit your movement. Movement can cause static electricity to build up around you.
- Always handle components carefully. Handle adapters, memory modules, and other circuit boards by the edges. Never touch exposed circuitry.
- Prevent others from touching components.
- When you install a static-sensitive option or CRU, touch the static-protective package containing the part to a metal expansion-slot cover or other unpainted metal surface on the computer for at least two seconds. This reduces static electricity in the package and your body.
- When possible, remove the static-sensitive part from the static-protective packaging and install the part without setting it down. When this is not possible, place the static-protective packaging on a smooth, level surface and place the part on it.
- Do not place the part on the computer cover or other metal surface.

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



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:

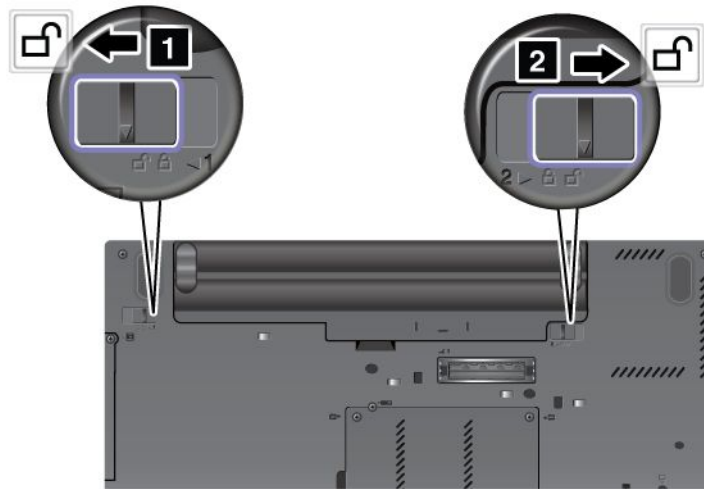
- **Replace only with a battery of the type recommended by Lenovo.**
- **Keep the battery pack away from fire.**
- **Do not expose it to excessive heat.**
- **Do not expose it to water or rain.**
- **Do not short-circuit it.**
- **Do not drop, crush, puncture, or subject to strong forces. Battery abuse 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.

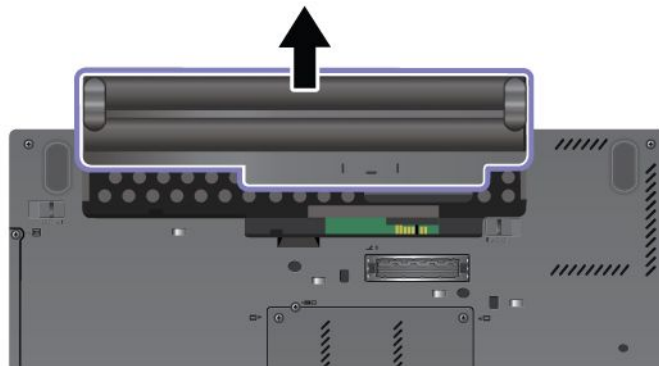
Replacing the battery installed in the battery space of your computer

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.

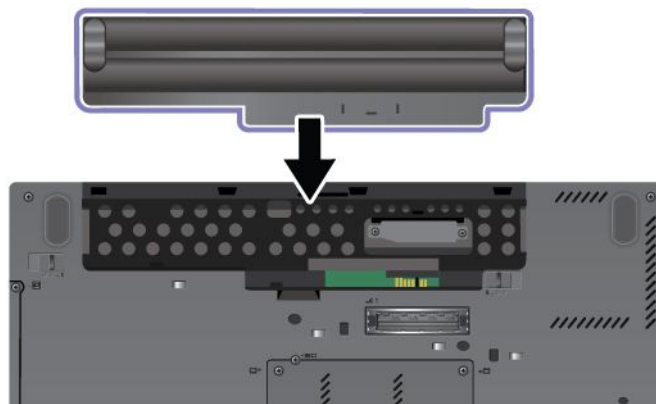
3. Unlock the battery latch by sliding it to the unlock position.



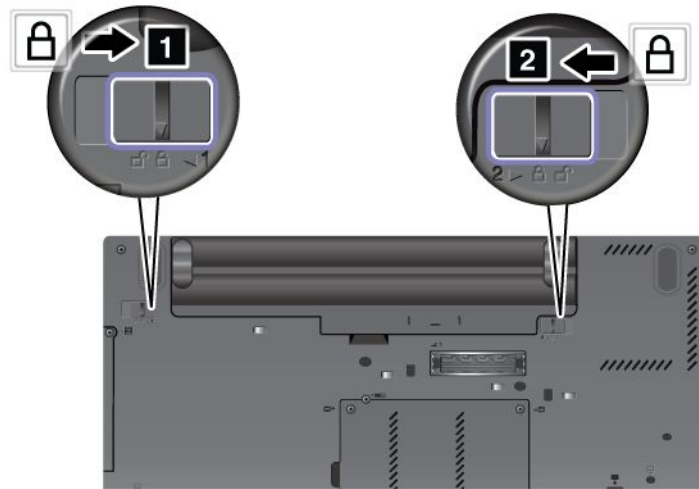
4. Remove the battery.



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**

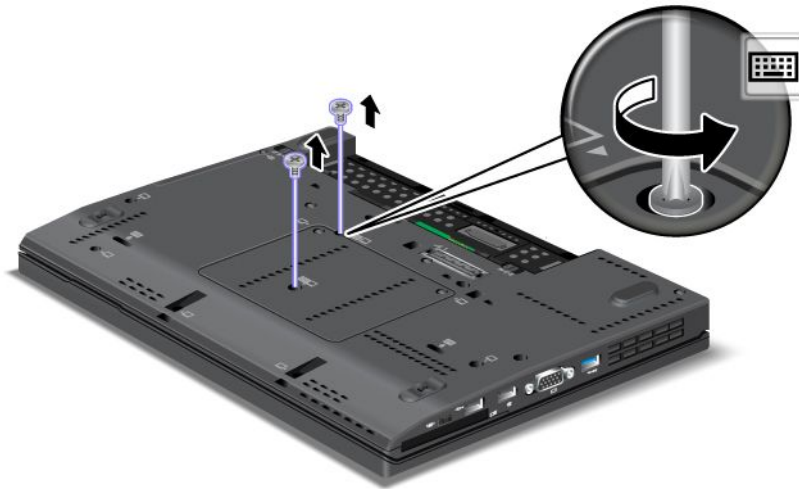
Electric current from power, telephone, and communication cables is hazardous. To avoid shock hazard, disconnect the cables before opening the cover of this slot.

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**.



- 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

- Attach the connector.



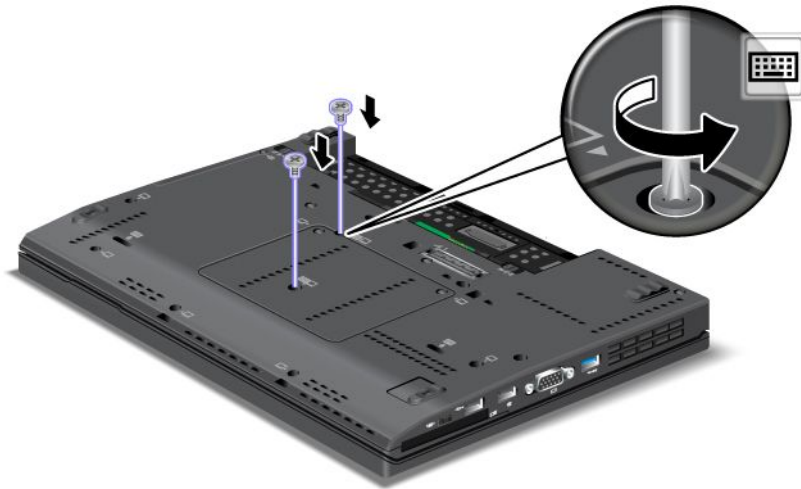
2. Insert the keyboard. Make sure that the rear edges of the keyboard are under the frame as shown by the arrows.



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.



- Put the memory slot cover back in place , close the cover , and then tighten the screws.



- Reinstall the battery. For details, refer to the instructions in “Reinstall the battery” on page 118.
- 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



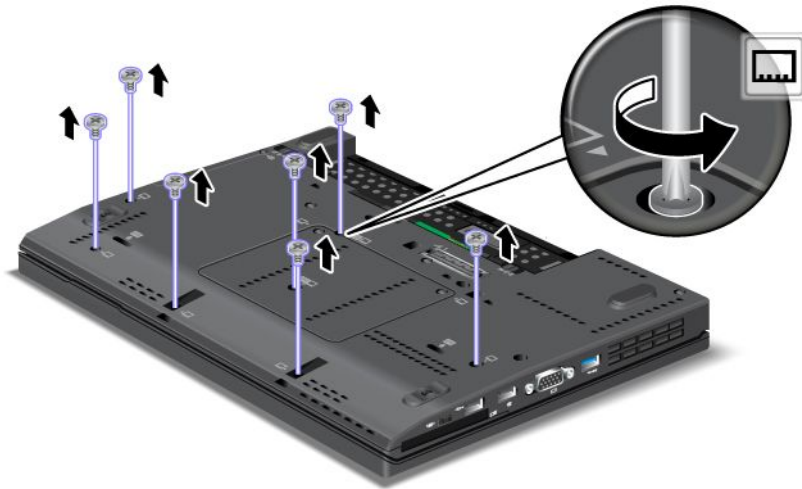
During electrical storms, do not connect the cable to or disconnect it from the telephone outlet on the wall.



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

- 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.
- Close the computer display, and turn the computer over.
- Remove the battery. For more information, refer to Replacing the battery.
- Remove the keyboard. For more information about how to remove the keyboard, refer to Replacing the keyboard.
- 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.



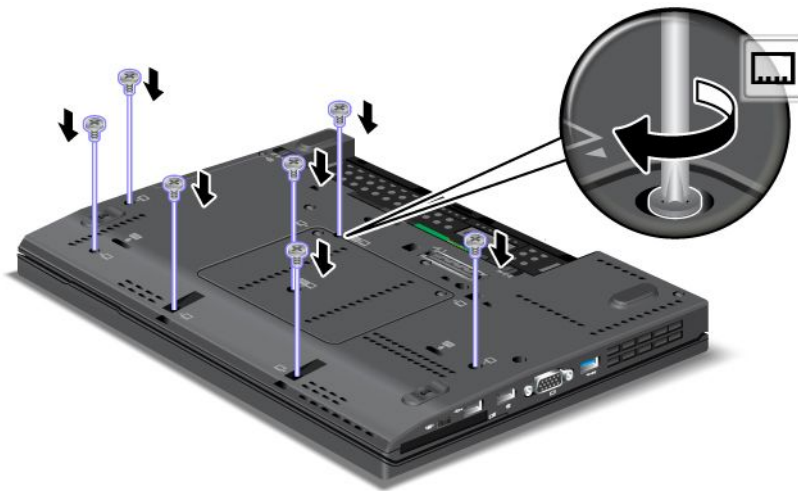
2. Push the front side of the palm rest until it clicks into place.



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.

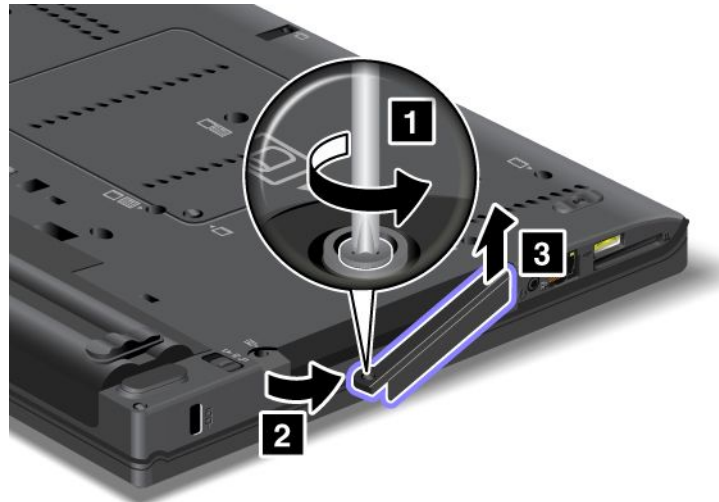
The drive is very sensitive. Incorrect handling can cause damage and permanent loss of data.

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

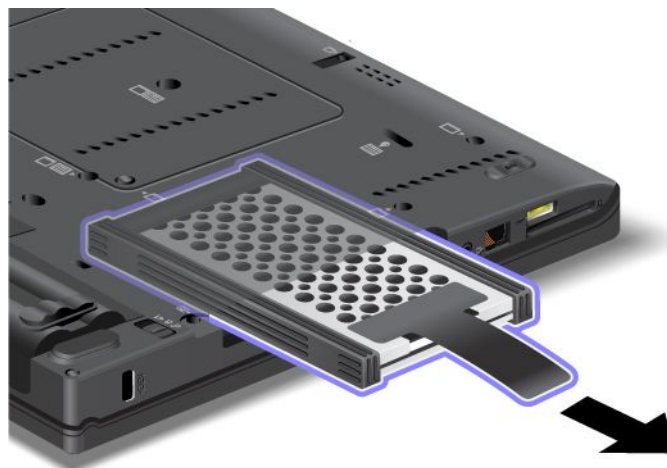
Never remove the drive while the system is operating, in sleep (standby) mode, or in hibernation mode.

To replace the hard disk drive, do as follows:

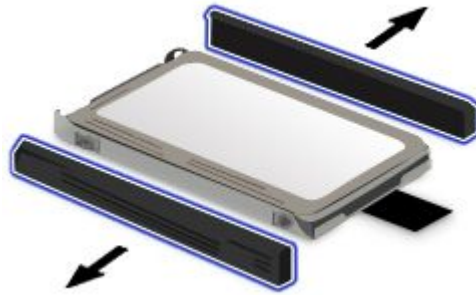
1. Turn off the computer; then disconnect the ac power adapter and all cables from the computer.
2. Close the computer display, and turn the computer over.
3. Remove the battery. For details, refer to the instructions in “Remove the battery” on page 118.
4. Remove the screw that secures the slot cover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



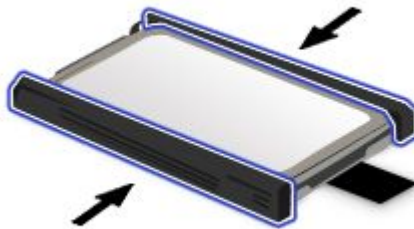
5. Remove the hard disk drive by pulling out the tab.



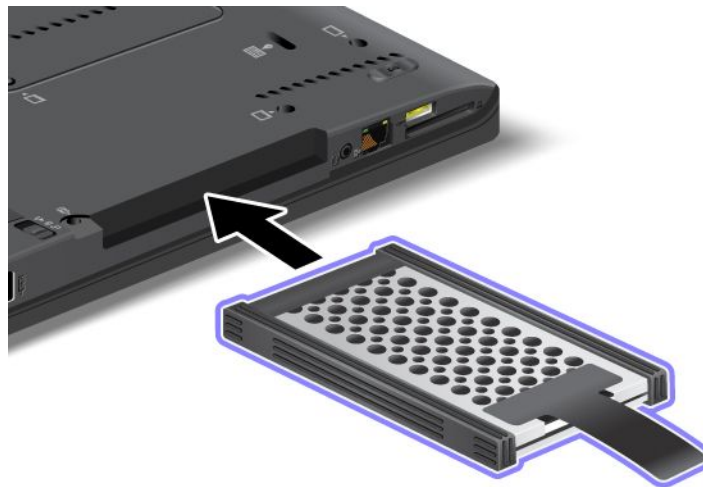
6. Detach the side rubber rails from the hard disk drive.



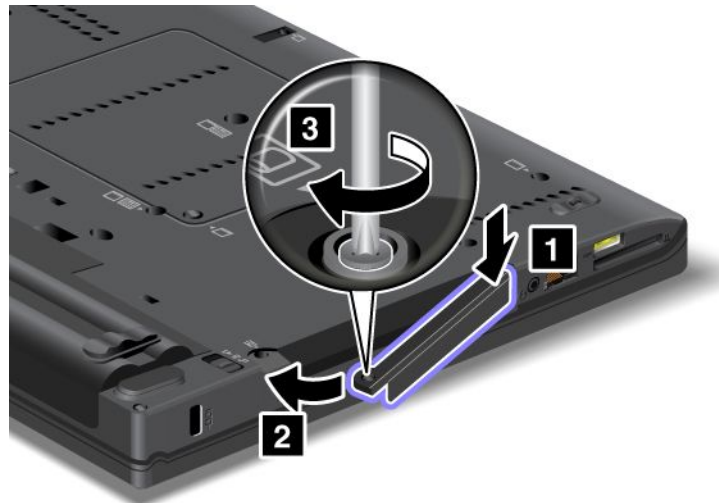
7. Attach the side rubber rails to a new hard disk drive.



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.

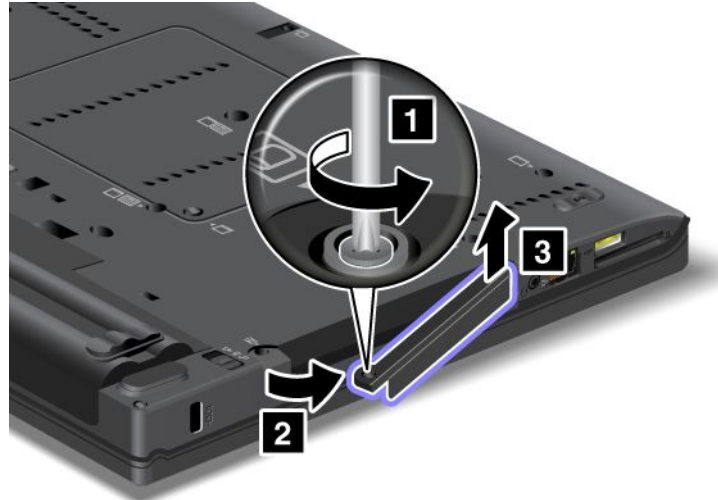
Never remove the drive while the system is operating, in sleep (standby) mode, or in hibernation mode.

Replacement instructions

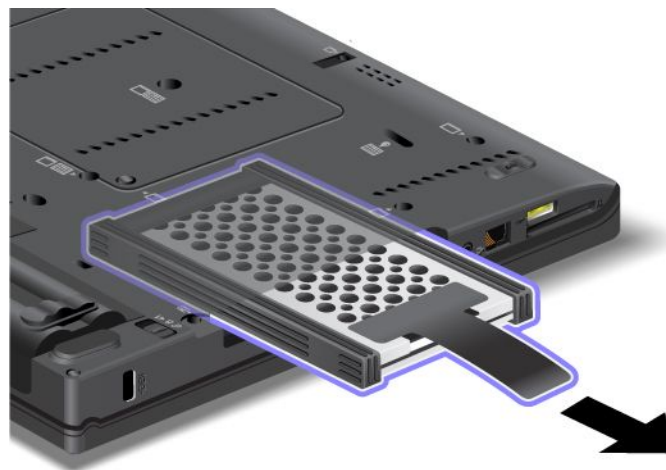
To replace the solid state drive, do as follows:

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.

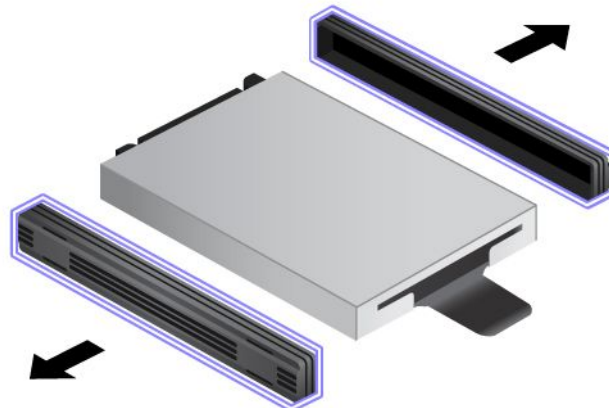
4. Remove the screw that secures the solid state drive **1**. Then flip out the cover **2** and pull up to remove it **3**.



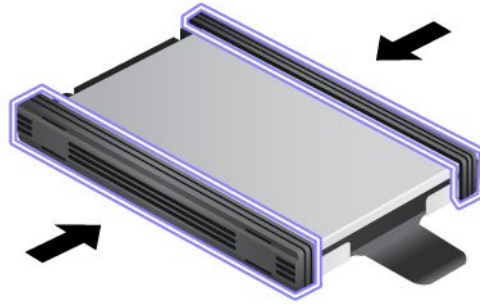
5. Remove the solid state drive by pulling out the tab.



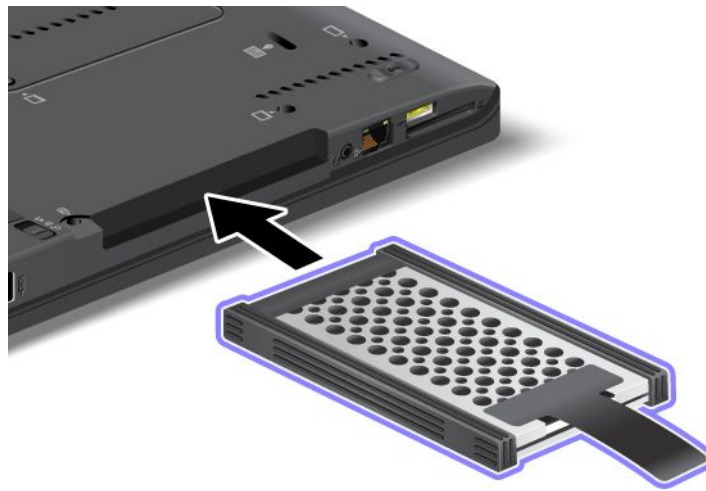
6. Detach the side spacer rails from the hard disk drive.



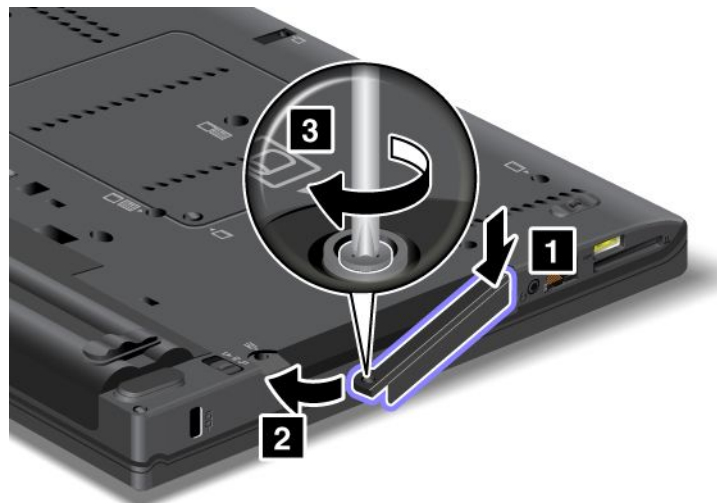
7. Attach the side spacer rails to a new hard disk drive.



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



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



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

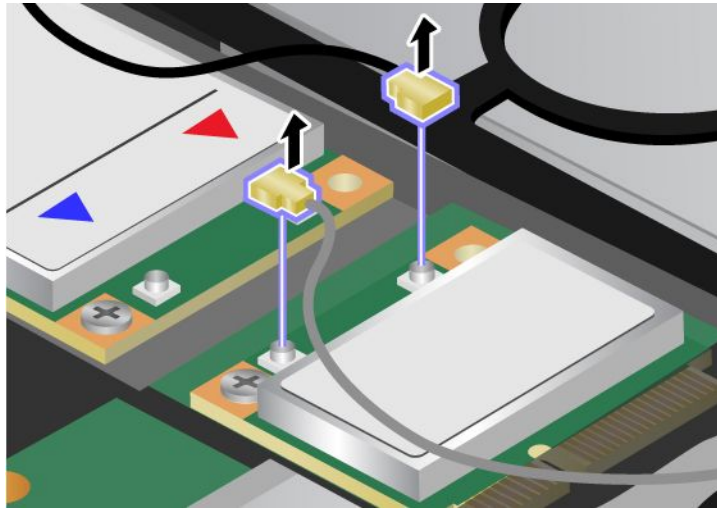
Attention: Before you start installing a PCI Express Mini Card, touch a metal table or a grounded metal object. This action reduces any static electricity from your body. The static electricity could damage the card.

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.

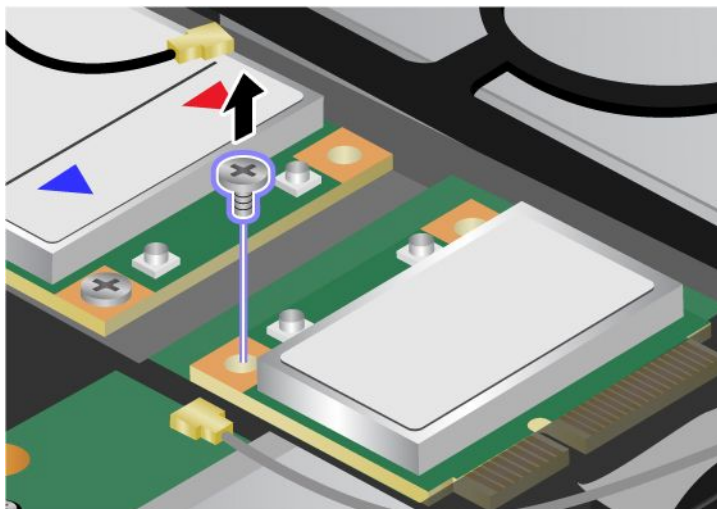
Replacing a PCI Express Mini Card with two connectors

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.

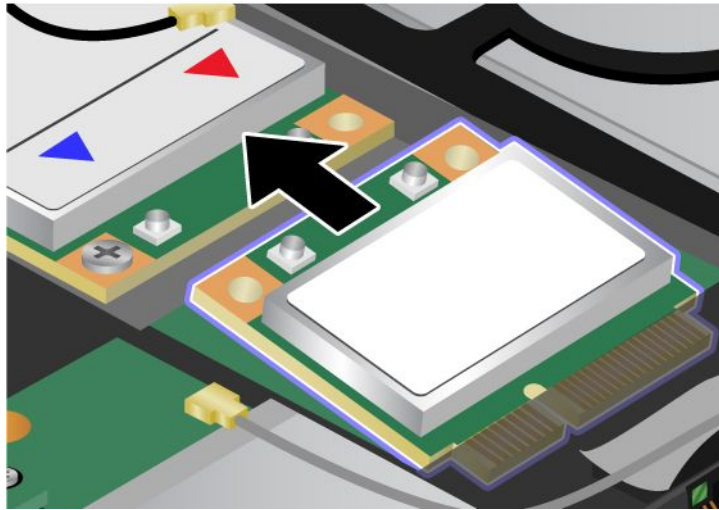
5. If a tool for removing connectors is included in the package with the new card, use it to disconnect the cables from the card. If no such tool is included, disconnect the cables by picking up the connectors with your fingers and gently unplugging them.



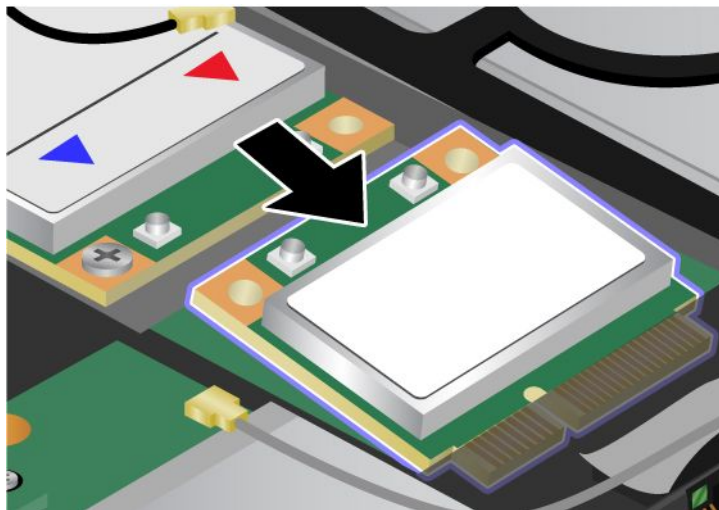
6. Remove the screw. The card pops up.



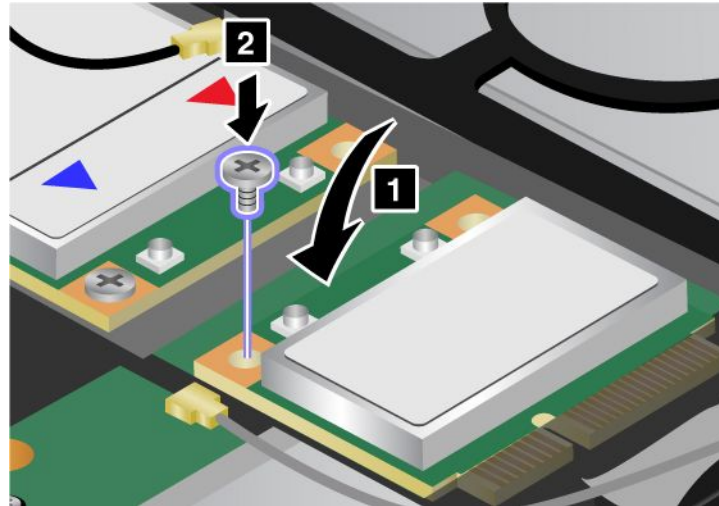
7. Remove the card.



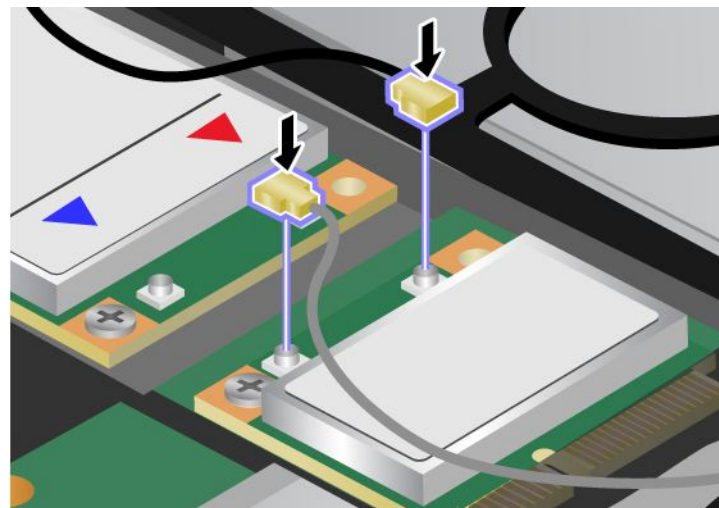
8. Align the contact edge of the new PCI Express Mini Card with the corresponding socket contact of the computer.



- 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**.



- 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.”



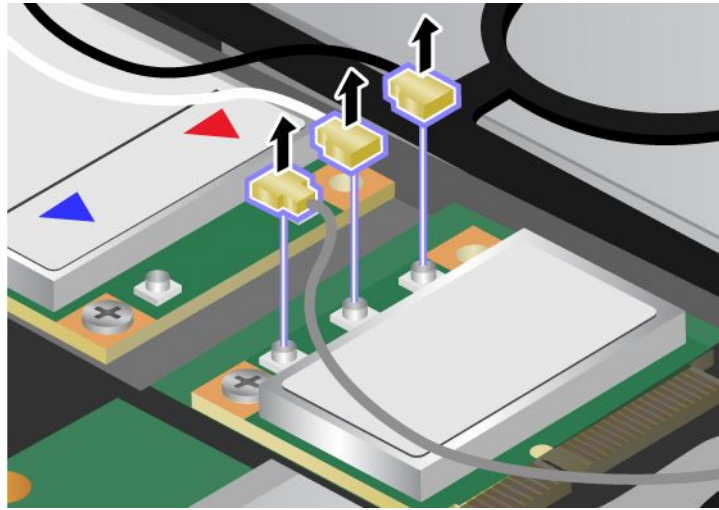
Note: If the new PCI Express Mini Card has three connectors, be sure to attach the gray cable to the connector marked “TR1” on the card, and the black cable to the connector marked “TR2”. If you attach either cable to the center connector, the connection speed will be lower.

- Reinstall the palm rest. For details, refer to the instructions in “Reinstall the palm rest” on page 124.
- Reinstall the battery. For details, refer to the instructions in “Reinstall the battery” on page 118.
- Turn the computer over again. Connect the ac power adapter and cables to the computer; then turn it on.

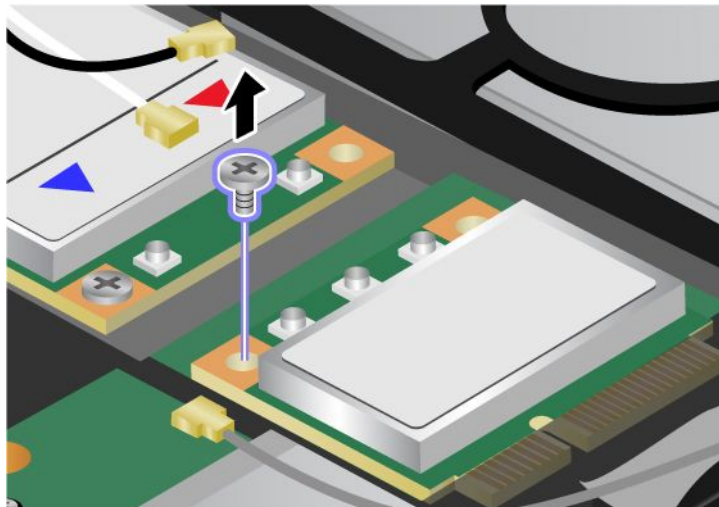
Replacing a PCI Express Mini Card with three connectors

- 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.
- Close the computer display, and turn the computer over.
- Remove the battery. For details, refer to the instructions in “Remove the palm rest” on page 124.
- Remove the keyboard. For details, refer to the instructions in “Remove the keyboard” on page 120.

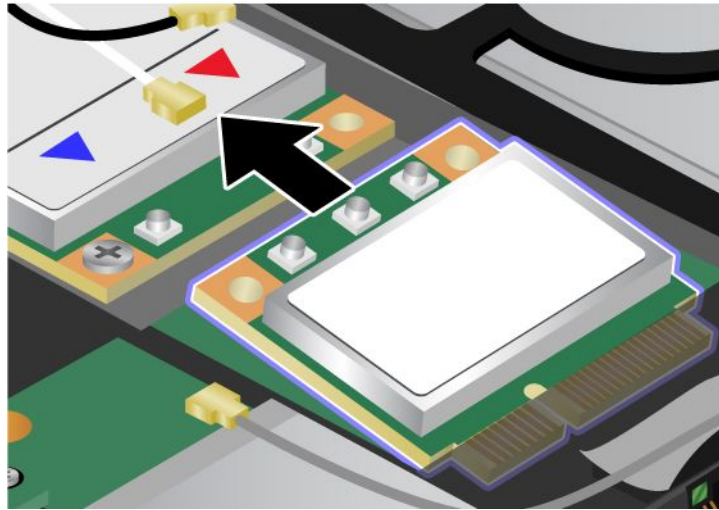
5. If a tool for removing connectors is included in the package with the new card, use it to disconnect the cables from the card. If no such tool is included, disconnect the cables by picking up the connectors with your fingers and gently unplugging them.



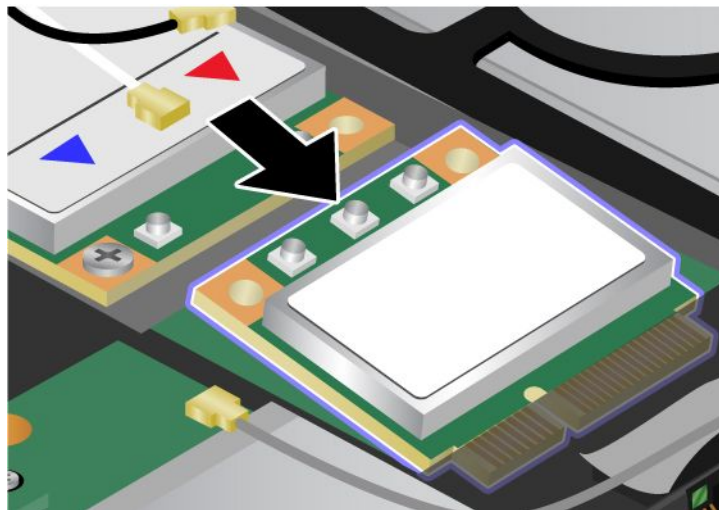
6. Remove the screw. The card pops up.



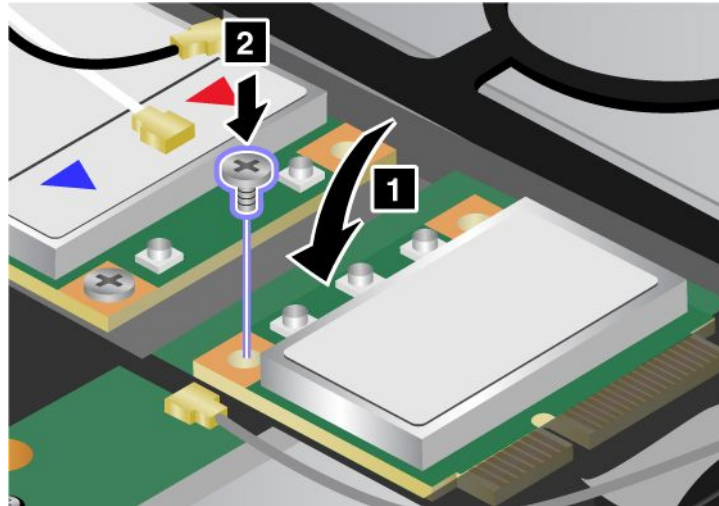
7. Remove the card.



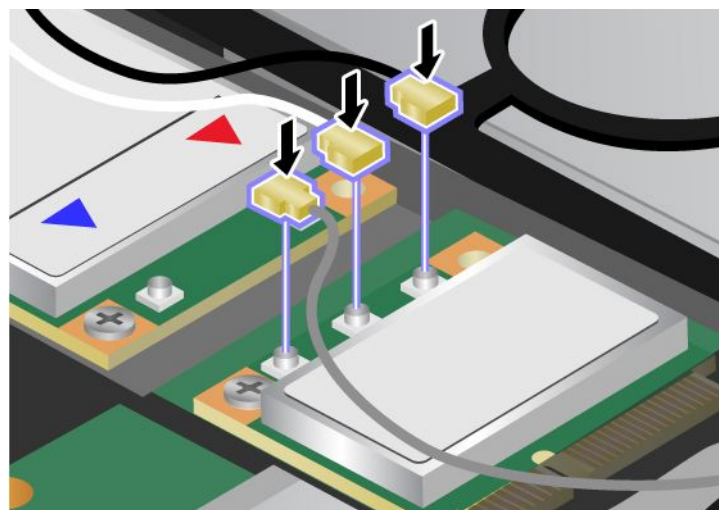
8. Align the contact edge of the new PCI Express Mini Card with the corresponding socket contact of the computer.



- 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**.



- 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.

- Reinstall the keyboard. For details, refer to the instructions in “Reinstall the palm rest” on page 124.
- Reinstall the battery. For details, refer to the instructions in “Reinstall the battery” on page 118.
- 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



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

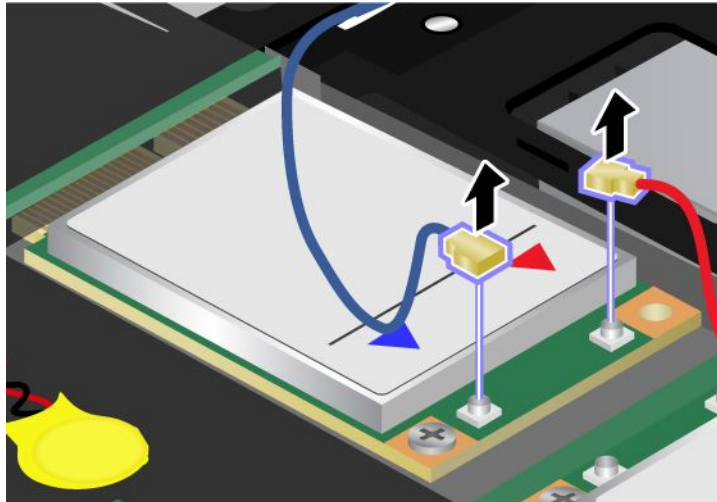


Electric current from power, telephone, and communication cables is hazardous. To avoid shock hazard, disconnect the cables before opening the cover of this slot.

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.

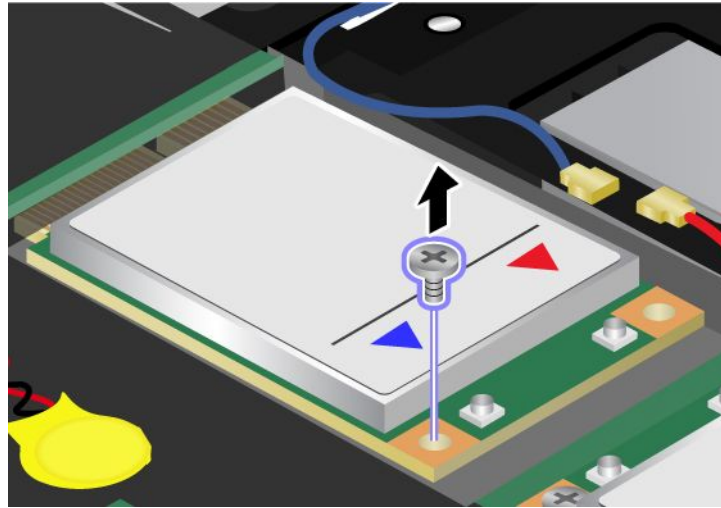
If a Wireless WAN is available in your computer, to replace the PCI Express Mini Card, do as follows.

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.

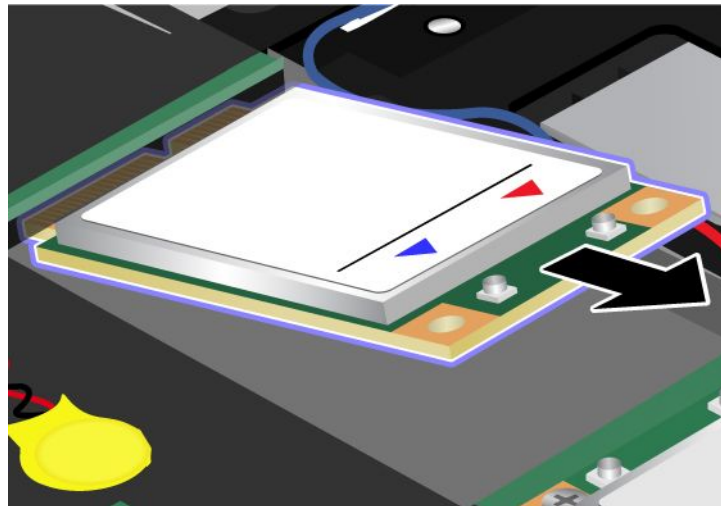


Note: Depending on the system configuration of your computer, the card may have only one connector.

6. Remove the screw. The card pops up.



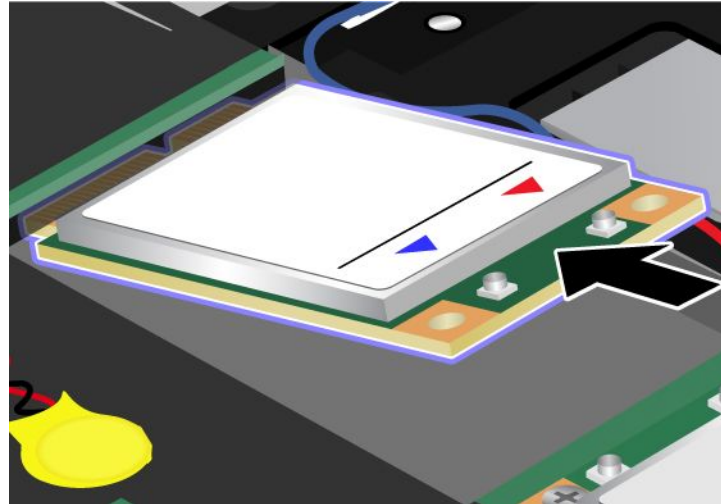
7. Remove the card.



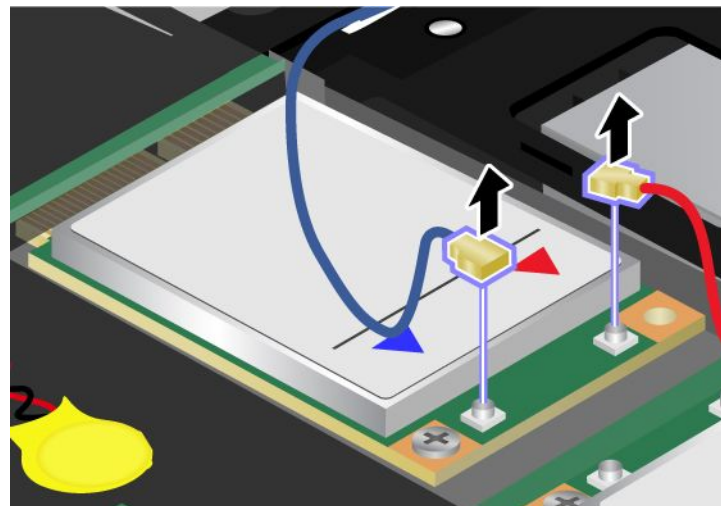
8. Align the contact edge of the new PCI Express Mini Card with the corresponding socket.

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.

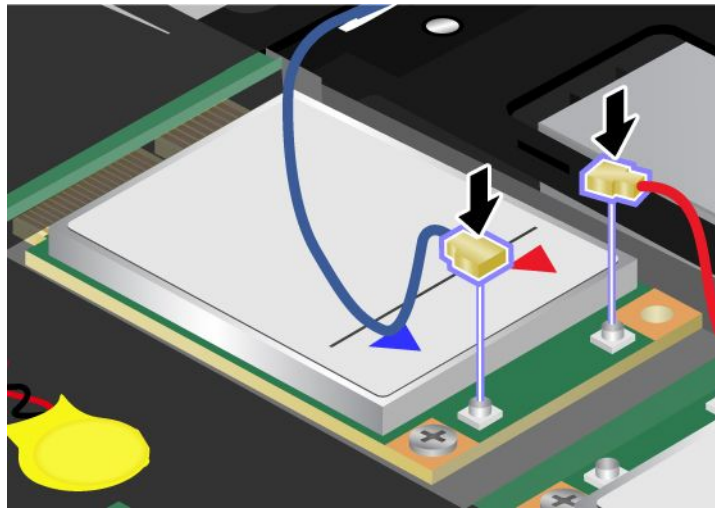


9. Pivot the card until you can snap it into place by pressing the upper side of each connector. Secure the card with the screw.



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.

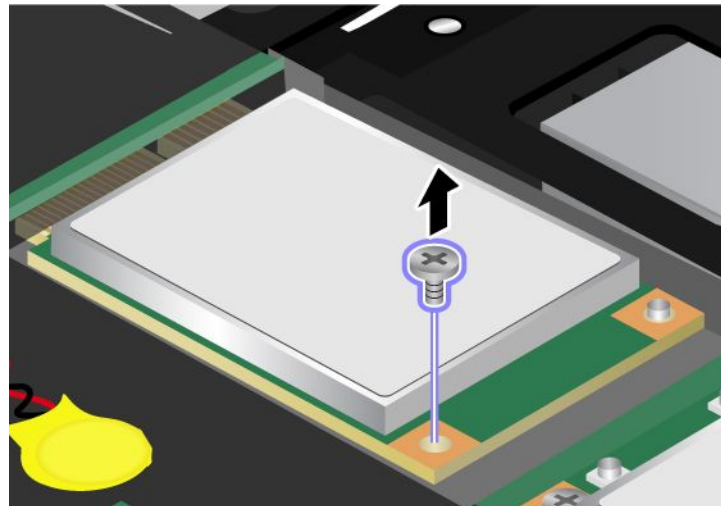
The mSATA solid state drive is very sensitive. Incorrect handling can cause damage and permanent loss of data.

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

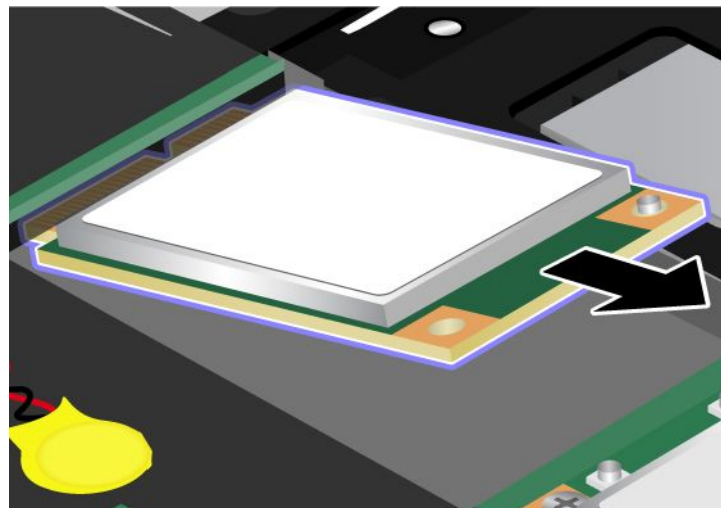
Never remove the mSATA solid state drive while the system is operating, in sleep (standby) mode, or in hibernation mode.

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.



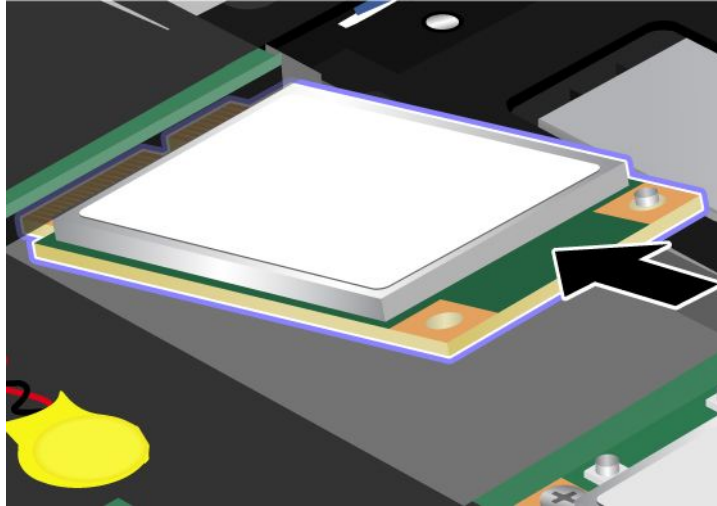
6. Remove the card.



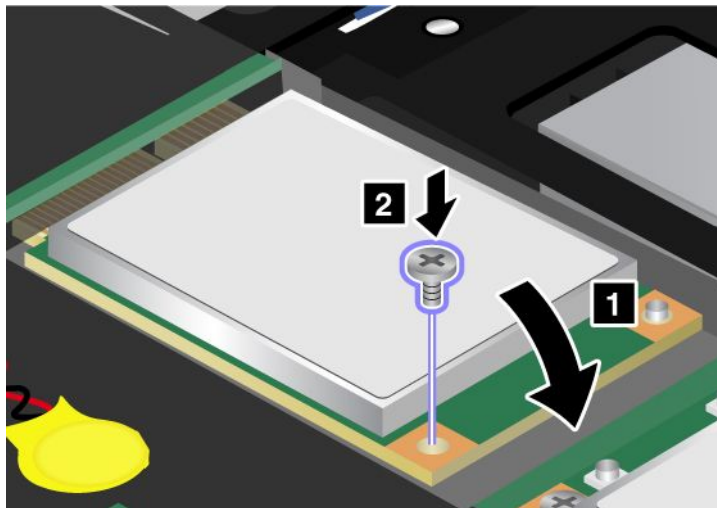
7. Align the contact edge of a new mSATA solid state drive with the corresponding socket.

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

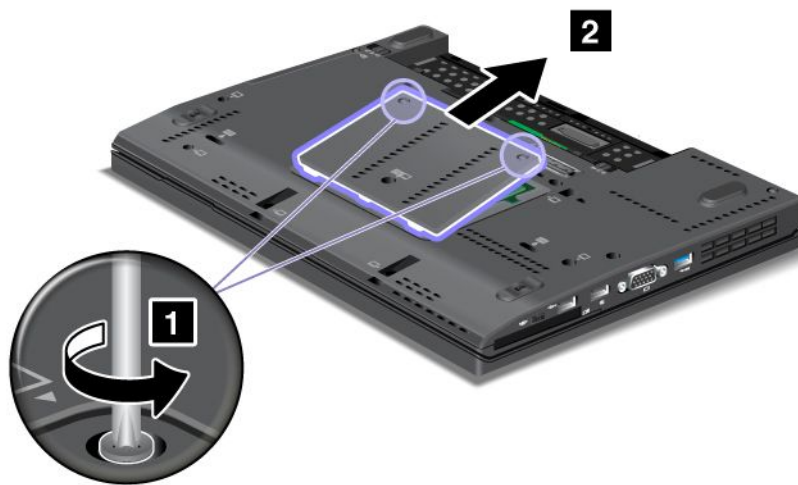
When replacing the memory, be sure to follow the precautions:

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.

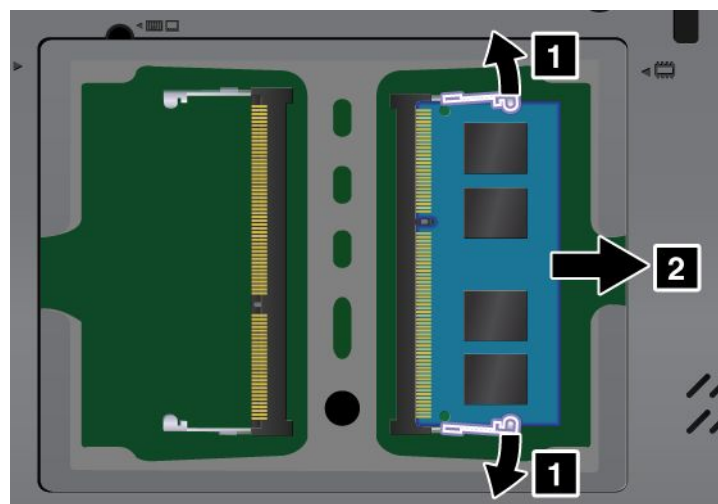
Attention: Before you start installing a module, touch a metal table or a grounded metal object. This action reduces any static electricity from your body. The static electricity could damage the SO-DIMM.

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**.



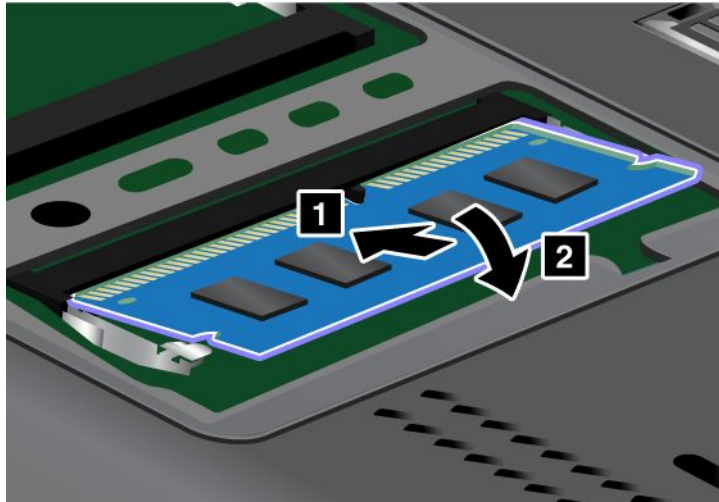
If the two SO-DIMMs are already in the memory slots, remove an SO-DIMM to make room for the new one by pressing out on the latches on both edges of the socket at the same time **1**. Be sure to save it for future use **2**.



5. Find the notch on the contact edge side of the SO-DIMM you are installing.

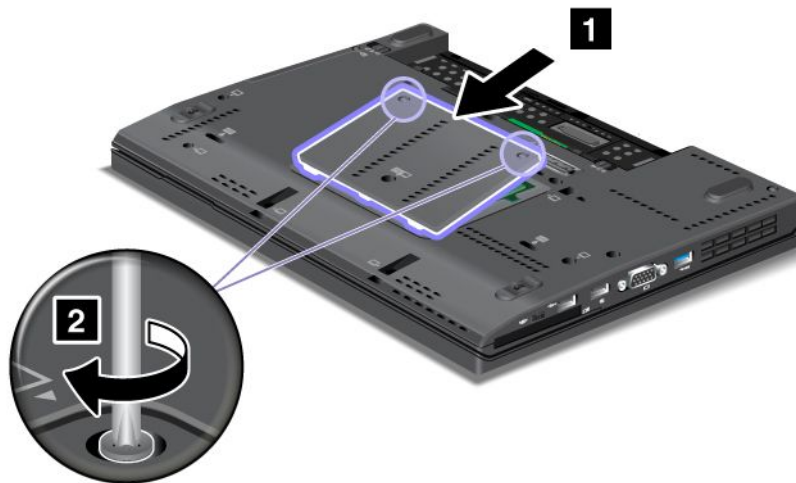
Attention: To avoid damaging the SO-DIMM, do not touch its contact edge.

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.

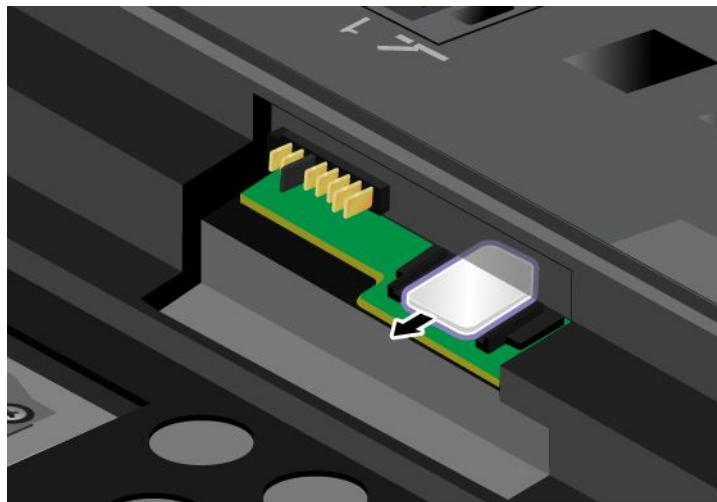
If you find the SIM cards included in the shipping contents, a dummy card is installed in the SIM card slot. Then proceed to the following instructions.

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.

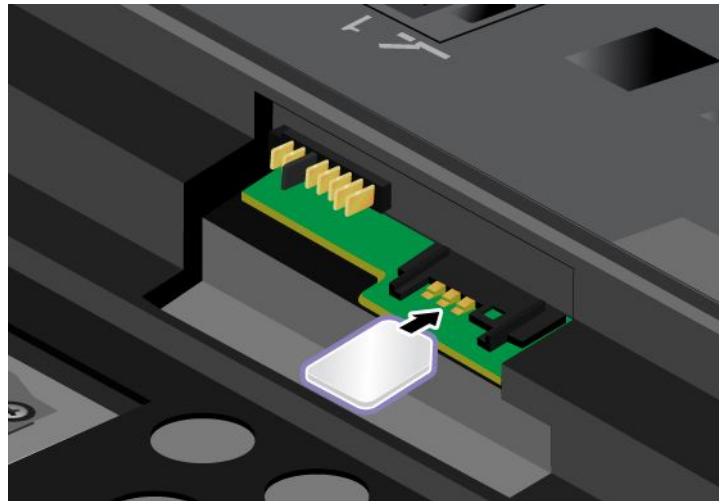
Note: The SIM card is identified by the IC chip mounted on one side of the card.

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.

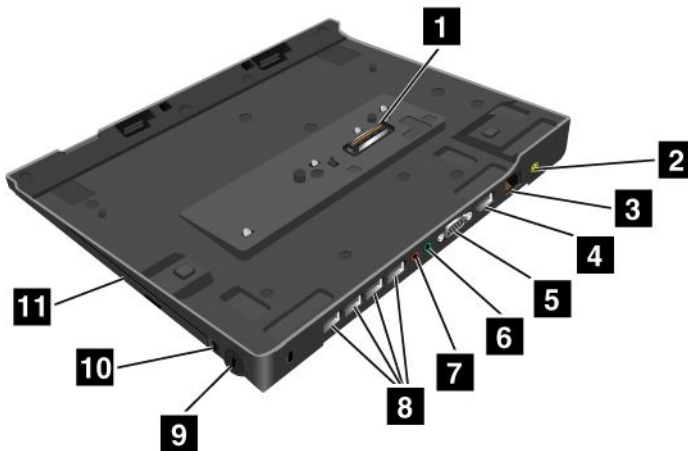
After you attach your computer to the ThinkPad X220 UltraBase, you can use its connectors in place of the computer's.

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.

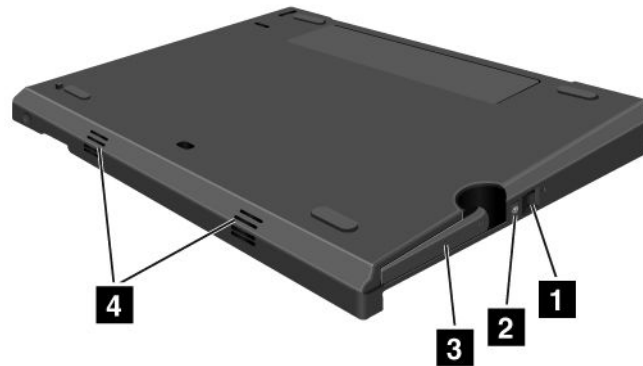
8 The **Universal Serial Bus (USB) connector** is for connecting the devices that conform to the USB interface.

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.

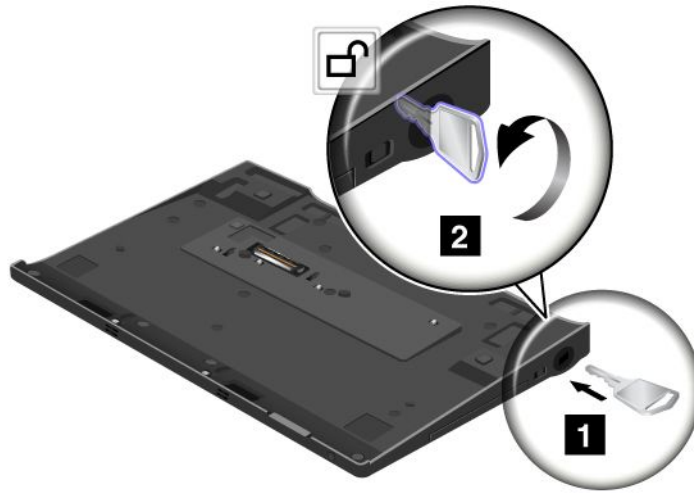
You can hot attach or warm attach the computer to the ThinkPad X220 UltraBase. Hot attach is attaching the computer to the ThinkPad X220 UltraBase while in operating mode; warm attach is attaching the computer to the ThinkPad X220 UltraBase while in sleep (standby) mode.

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

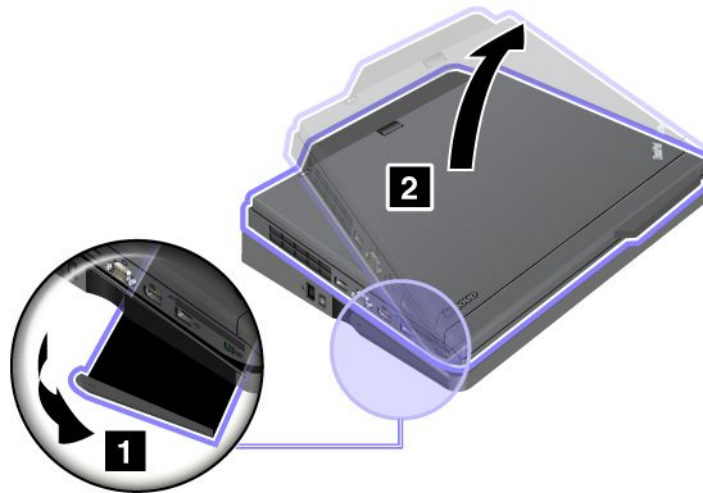
- the devices connected to USB, Serial, and Parallel connectors are not in use.
- the connection to a Modem or Ethernet port has ended.
- the battery is fully charged.

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.

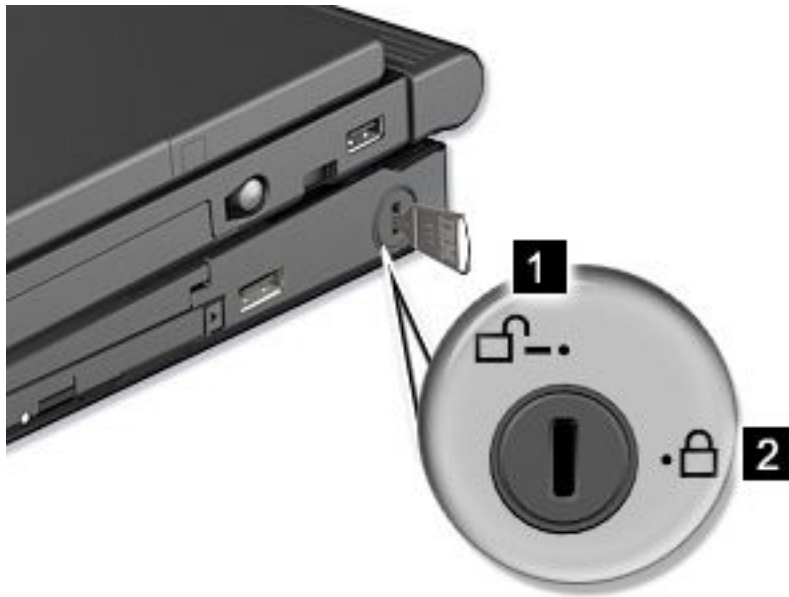


2. Close the computer display.
3. If you are hot/warm-detaching the computer, press the eject request button of the ThinkPad X220 UltraBase. Then make sure that the eject inhibit indicator of the ThinkPad X220 UltraBase is off, and the eject ready indicator lights up.
4. Release the eject lever on the 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.

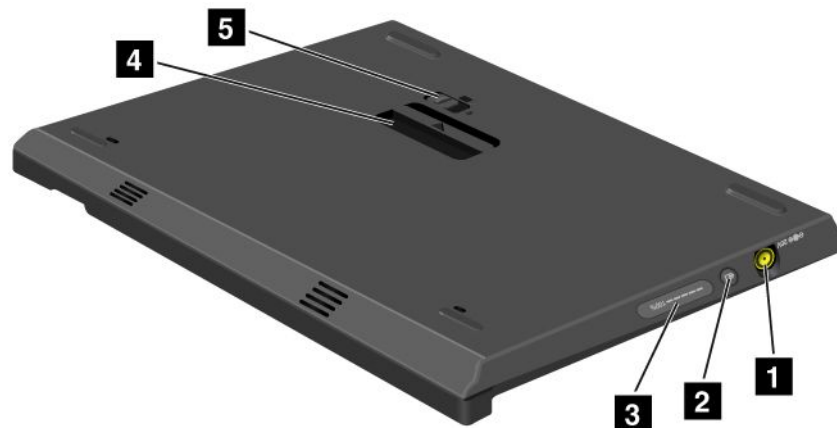
When the computer is attached to the ThinkPad Battery 19+, never pick up the assembly by taking hold of the computer alone. Always hold the whole assembly.

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.

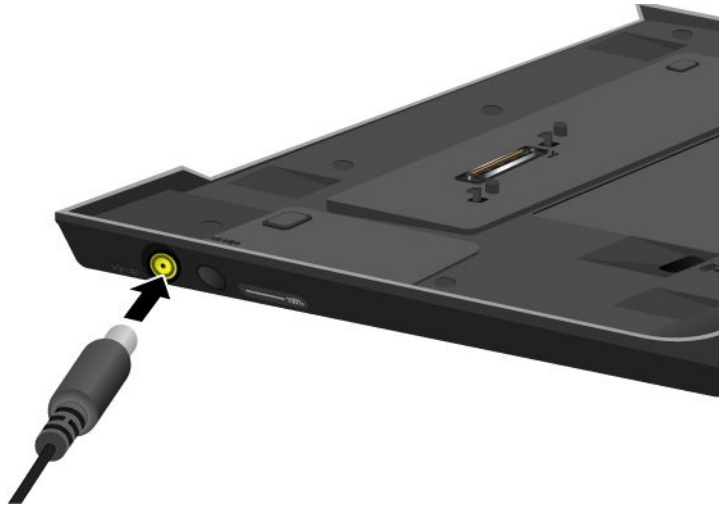


2. Release the eject lever **2** and pull up the ThinkPad Battery 19+.



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.

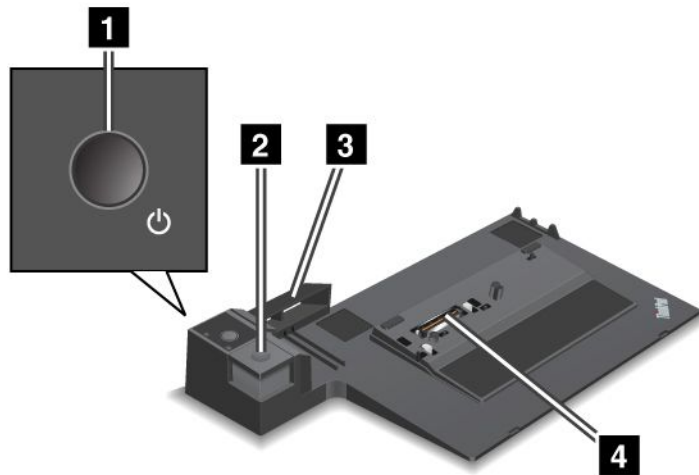
When the computer is attached to the ThinkPad Port Replicator Series 3, the ThinkPad Mini Dock Series 3, or the ThinkPad Mini Dock Plus Series 3, never pick up the assembly by taking hold of the computer alone. Always hold the whole assembly.

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” on page 162
- “Rear view” on page 165
- “Attaching a ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, or ThinkPad Mini Dock Plus Series 3” on page 168
- “Detaching a ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, and ThinkPad Mini Dock Plus Series 3” on page 170
- “Security feature” on page 172
- “Using the system lock key” on page 174

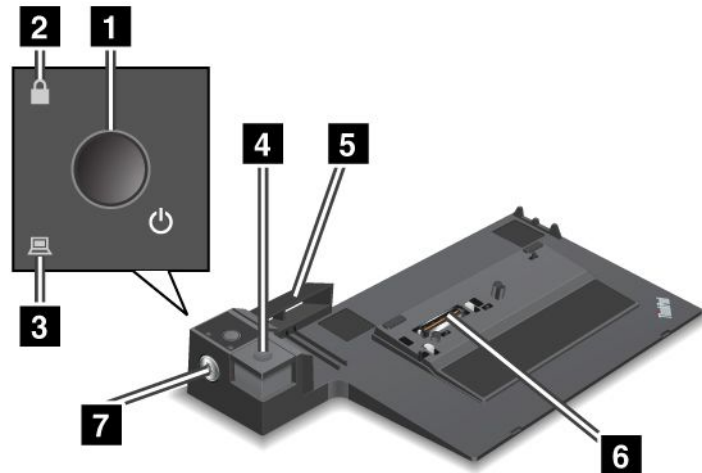
Front view

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.

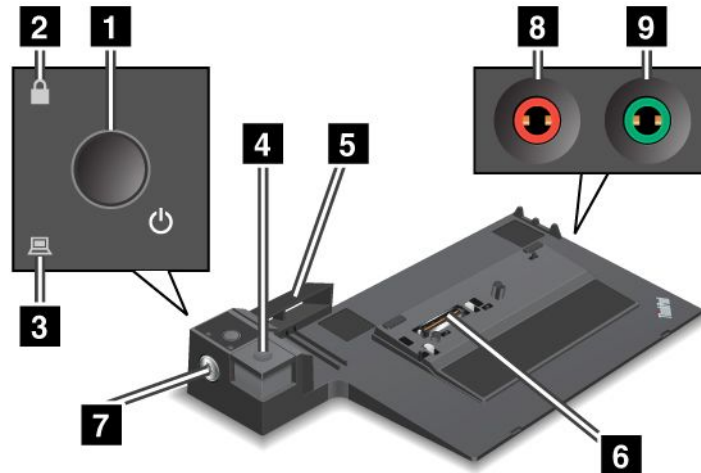
4 The **eject button** releases the computer from the ThinkPad Mini Dock Series 3 when pressed.

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.

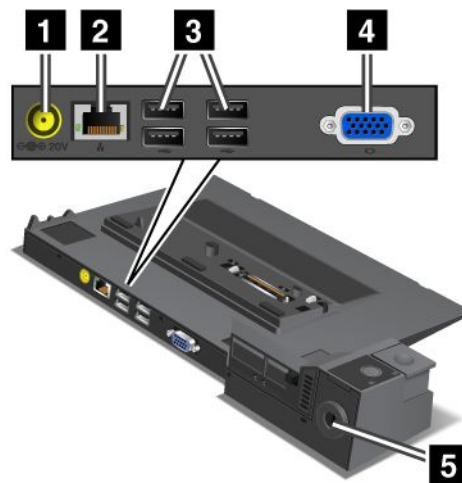
ThinkPad Mini Dock Plus Series 3



- 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.

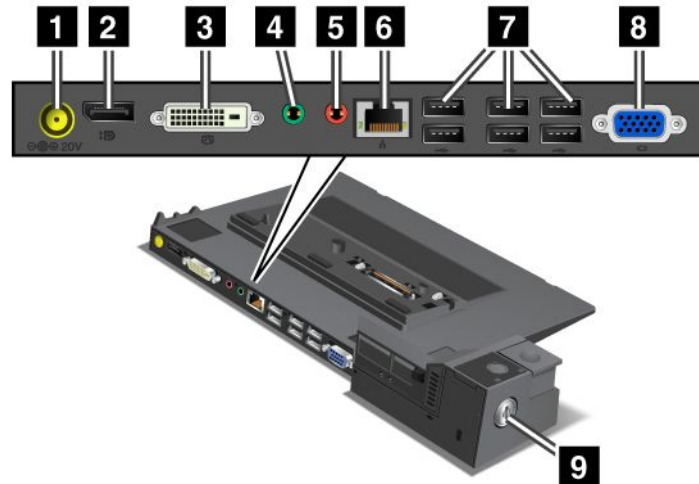
3 The **Universal Serial Bus connectors** are for connecting USB 1.1 and USB 2.0 devices.

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.

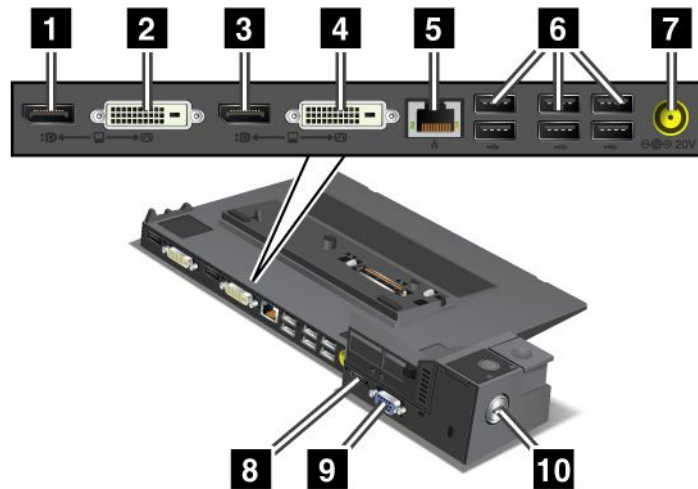
7 The **Universal Serial Bus connectors** are for connecting USB 1.1 and USB 2.0 devices.

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.

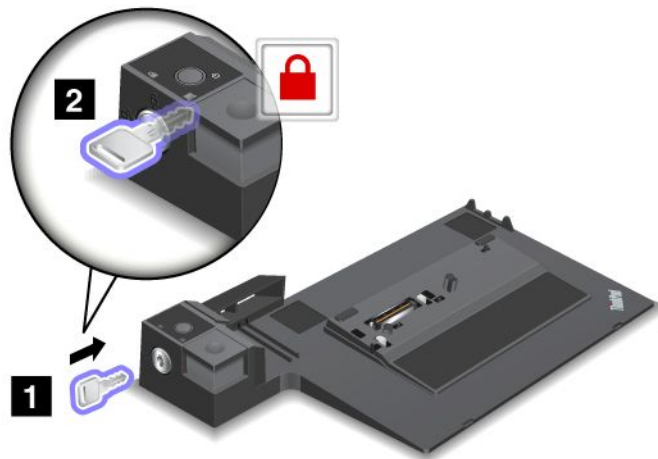
Attaching a ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, or ThinkPad Mini Dock Plus Series 3

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:

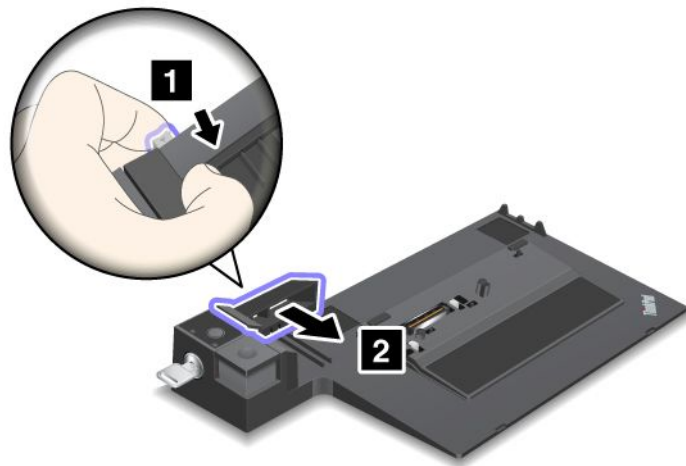
The following drawings are for the ThinkPad Mini Dock Series 3 or the ThinkPad Mini Dock Plus Series 3. The procedure is the same for the ThinkPad Port Replicator Series 3.

Notes:

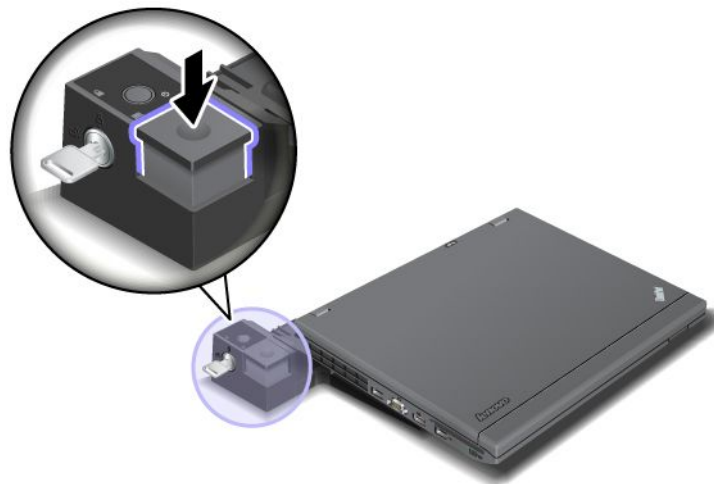
- Before you attach the computer to a ThinkPad Port Replicator Series 3, a ThinkPad Mini Dock Series 3, or a ThinkPad Mini Dock Plus Series 3, disconnect an ac power adapter from the computer.
 - If your computer is operating, make sure that it has finished any operations involving devices that are connected 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.

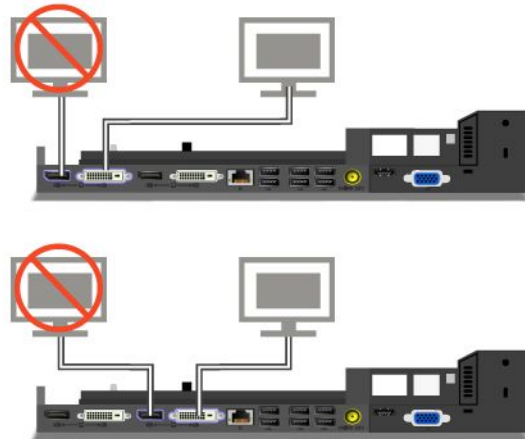
Notes:

- 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.

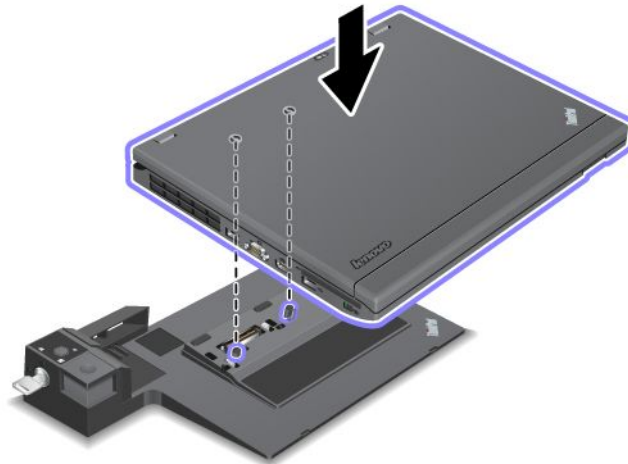


Detaching a ThinkPad Port Replicator Series 3, ThinkPad Mini Dock Series 3, and ThinkPad Mini Dock Plus Series 3

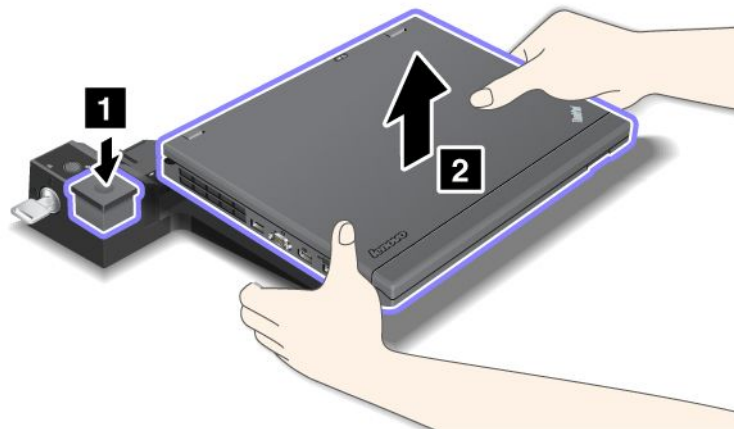
To detach your computer from the ThinkPad Mini Dock Series 3, and the ThinkPad Mini Dock Plus Series 3, do the following:

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**.



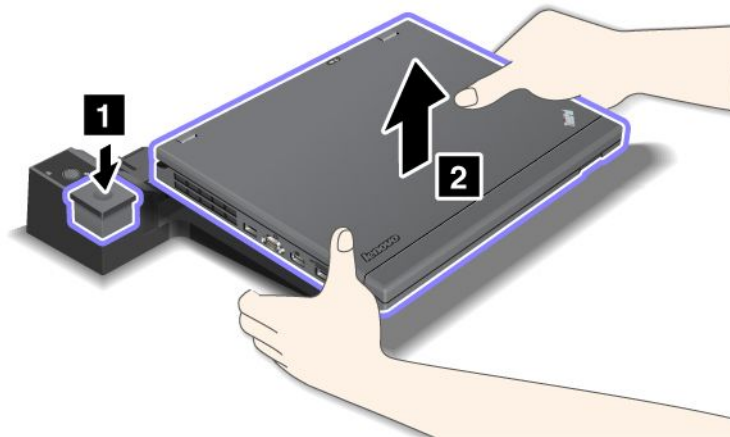
To detach your computer from the ThinkPad Port Replicator Series 3, do the following:

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

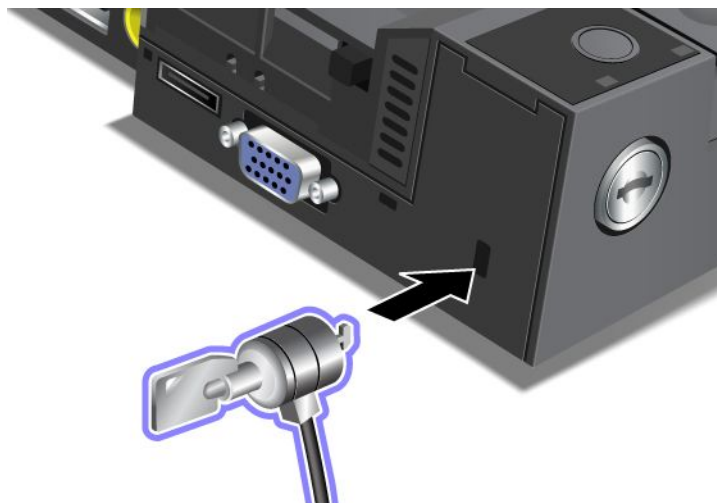
The ThinkPad Port Replicator Series 3, the ThinkPad Mini Dock Series 3, or the ThinkPad Mini Dock Plus Series 3 has a security keyhole for a mechanical lock. By attaching a mechanical lock with cable there, you can secure the ThinkPad Port Replicator Series 3, the ThinkPad Mini Dock Series 3, or the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

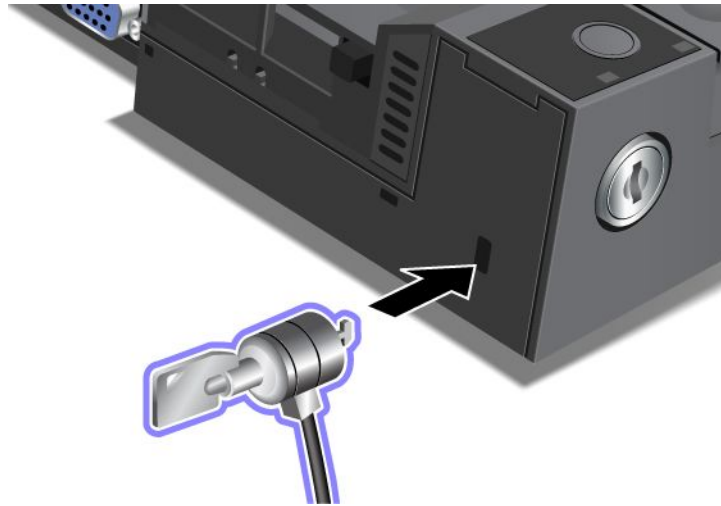
If you use the ThinkPad Mini Dock Series 3 or the ThinkPad Mini Dock Plus Series 3, and attach a mechanical lock, the eject button is not locked. To lock the eject button, use the system lock key.

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.

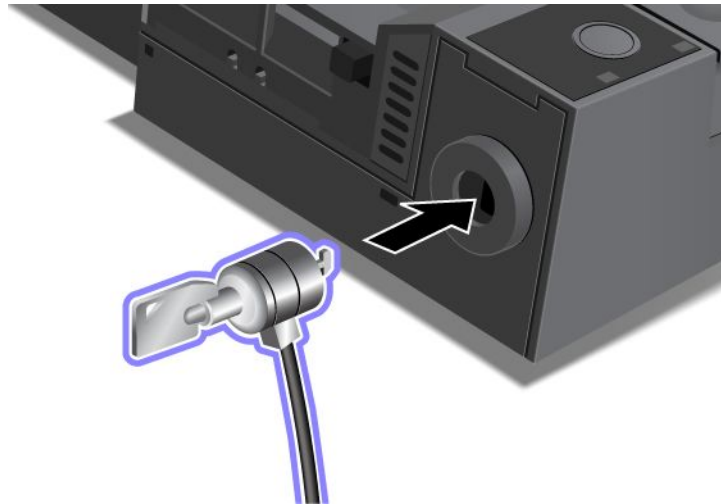
Attach a mechanical lock to the ThinkPad Mini Dock Plus Series 3 as follows:



Attach a mechanical lock to the ThinkPad Mini Dock Series 3 as follows:

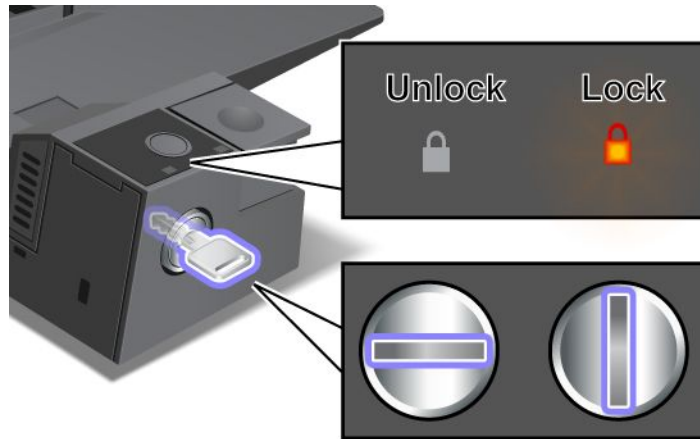


Attach a mechanical lock to the ThinkPad Port Replicator Series 3 as follows:



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&Indocid=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\0SFIXES\.

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 your 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:\SWT00LS\0SFIXES\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&Indocid=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 at <http://www.lenovo.com/support/site.wss/document.do?sitestyle=lenovo&Indocid=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&Indocid=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&Indocid=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&Indocid=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.