ThinkPad® R60
Service and Troubleshooting Guide

Includes:

- **Introduction to other sources of information**
- **Important tips for taking care of your computer**
- **Diagnostics and troubleshooting**
- **Recovery options**
- **Help and service**
- **Warranty information for your computer**

ThinkPad® R60
Service and Troubleshooting Guide

> **Note**
>
> Before using this information and the product it supports, be sure to read the following:
>
> - *Safety and Warranty Guide* included in the package with this publication.
> - Wireless related information in online Access Help and Appendix D, "Notices," on page 59.
> - *ThinkPad Regulatory Notice* included in the package with this publication.

Contents

Read first

Avoid leaving the base of your computer, or any other part that becomes hot during operation, in contact with your lap or any part of your body for an extended period when the computer is turned on or when the battery is charging.

When the ac adapter is connected to an electrical outlet and your computer, it generates heat. Do not place the adapter in contact with any part of your body while using it. Never use the ac adapter to warm your body. Extended contact with your body, even through clothing, may cause a skin burn.

Route the cables of an ac adapter, a mouse, a keyboard, a printer, or any other electronic device, or any communication lines, so that they cannot be pinched by your machine or other objects, walked on, tripped over, or in any way be subjected to treatment that could disturb the operation of your computer. Applying strong force to the cables may damage or break them.

To prevent damage to the hard disk and subsequent data loss, before moving your computer, press Fn+F4 to put it in standby mode or turn it off. Make sure that the standby status indicator is on (is green) before moving the computer.

v

Do not drop, bump, scratch, twist, hit, vibrate, push or place heavy objects on your computer, display, or external devices.
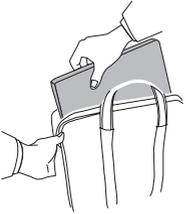
Use a quality carrying case that provides adequate cushion and protection. Do not pack your computer in a tightly packed suitcase or bag.

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

Chapter 1. Finding information

This guide and other publications

Setup Instructions
> helps you to unpack your ThinkPad computer and get started. It
> includes a few tips for first-time users, and introduces software
> preinstalled by Lenovo.

This *Service and Troubleshooting Guide*
> provides information about caring for your ThinkPad computer, basic
> troubleshooting information, some recovery procedures, help and
> service information, and warranty information for your computer. The
> troubleshooting information in this Guide applies only to problems
> that might prevent you from accessing the comprehensive help and
> information portal, called Productivity Center, preloaded on your
> ThinkPad computer.

Access Help
> is a comprehensive online manual that provides answers to most of
> your questions about your computer, helps you to configure
> preloaded features and tools, or solve problems. To open Access Help,
> click **Start**, move the pointer to **All Programs** (in Windows® other
> than Windows XP, **Programs**); then to **ThinkVantage**®. Click **Access
> Help**.

Productivity Center
> provides an easy access to software tools and key Lenovo sites,
> eliminating the need to carry other reference manuals around. To open
> Productivity Center, press the ThinkVantage button on your keyboard.
> For more information about using the ThinkVantage button,
> see"Finding information with the ThinkVantage button" on page 2.

Safety and Warranty Guide
> includes general safety instructions and complete Lenovo Statement of
> Limited Warranty.

Regulatory Notice
> supplements this Guide. Read it before you use the wireless features
> of your ThinkPad computer. The ThinkPad R60 complies with the
> radio frequency and safety standards of any country or region in
> which it has been approved for wireless use. You are requested to
> install and use your ThinkPad computer in strict accordance with the
> local RF regulations.

Finding information with the ThinkVantage button

The blue ThinkVantage button can help you in many situations when your computer is working normally, and even when it is not. Press the ThinkVantage button to open the Productivity Center and get access to informative illustrations and easy-to-follow instructions for getting started and staying productive.

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

Chapter 2. Caring for your ThinkPad computer

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

Important tips:

Be careful about where and how you work

- Do not leave the base of your computer, or any other part that becomes hot during operation, in contact with your lap or any part of your body for an extended period when the computer is functioning or when the battery is charging. Your computer dissipates some heat during normal operation. This heat is a function of the level of system activity and battery charge level. Extended contact with your body, even through clothing, could cause discomfort or, eventually, a skin burn.
- When the ac adapter is connected to an electrical outlet and your computer, it generates heat. Do not place the adapter in contact with any part of your body while using it. Never use the ac adapter to warm your body. Extended contact with your body, even through clothing, may cause a skin burn.
- Route the cables of an ac adapter, a mouse, a keyboard, a printer, or any other electronic device, or any communication lines, so that they cannot be pinched by your machine or other objects, walked on, tripped over, or in any way be subjected to treatment that could disturb the operation of your computer. Applying strong force to the cables may damage or break them.
- Place liquids away from your computer to avoid spills, and keep your computer away from water (to avoid the danger of electrical shock).
- Store packing materials safely out of the reach of children to prevent the risk of suffocation from plastic bags.
- Keep your computer away from magnets, activated cellular phones, electrical appliances, or speakers (within 13 cm/5 in).
- Avoid subjecting your computer to extreme temperatures (below 5°C/41°F or above 35°C/95°F).

Be gentle with your computer

- Avoid placing any objects (including paper) between the display and the keyboard or under the keyboard.

- Do not drop, bump, scratch, twist, hit, vibrate, push, or place heavy objects on your computer, display, or external devices.
- Your computer display is designed to be opened and used at an angle slightly greater than 90 degrees. Do not open the display beyond 180 degrees, as this might damage the computer hinge.

Carry your computer properly

- Before moving your computer, be sure to remove any media, turn off attached devices, and disconnect cords and cables.
- Be sure your computer is in standby or hibernation mode, or turned off, before moving it. This will prevent damage to the hard disk drive and data loss.
- When picking up your open computer, hold it by the bottom. Do not pick up or hold your computer by the display.
- Use a quality carrying case that provides adequate cushion and protection. Do not pack your computer in a tightly packed suitcase or bag.

Handle storage media and drives properly

- Avoid inserting diskettes at an angle and attaching multiple or loose diskette labels, as these can lodge in the drive.
- If your computer comes with an optical drive, do not touch the surface of a disc or the lens on the tray.
- Wait until you hear the CD or DVD click into the center pivot of an optical drive before closing the tray.
- When installing your hard disk, diskette or optical drive, follow the instructions shipped with your hardware, and apply pressure only where needed on the device.

Take care in setting passwords

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

Other important tips

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

- Your computer might have both an Ethernet connector and a modem connector. If so, be sure to connect your communication cable to the correct one, so your connector is not damaged.
- Register your ThinkPad products with Lenovo (refer to the Web page: www.lenovo.com/register). This can help authorities return your computer to you if it is lost or stolen. Registering your computer also enables Lenovo to notify you about possible technical information and upgrades.
- Only an authorized ThinkPad repair technician should disassemble and repair your computer.
- Do not modify or tape the latches to keep the display open or closed.
- Take care not to turn your computer over while the ac adapter is plugged in. This could break the adapter plug.
- Turn off your computer if you are replacing a device in a device bay, or else verify that the device is warm- or hot-swappable.
- If you exchange drives in your computer, reinstall the plastic bezel faces (if supplied).
- Store your external and removable hard disk, diskette or optical drives in the appropriate containers or packaging when they are not being used.
- Before you install any of the following devices, touch a metal table or a grounded metal object. This action reduces any static electricity from your body. The static electricity could damage the device.
  - PC Card
  - ExpressCard
  - Smart Card
  - Memory Card, such as xD-Picture Card, SD Card, Memory Stick, and MultiMediaCard
  - Memory module
  - PCI Express Mini Card
  - Communication Daughter Card
- When transferring data to or from a Flash Media Card, such as an SD card, do not put your computer in standby or hibernation mode before the data transfer is complete. To do so might cause damage to your data.

Cleaning the cover of your computer

Occasionally clean your computer as follows:

1. Prepare a mixture of a gentle kitchen-use detergent (one that does not contain abrasive powder or strong chemicals such as acid or alkaline). Use 5 parts water to 1 part detergent.
2. Absorb the diluted detergent into a sponge.
3. Squeeze excess liquid from the sponge.

4. Wipe the cover with the sponge, using a circular motion and taking care not to let any excess liquid drip.
5. Wipe the surface to remove the detergent.
6. Rinse the sponge with clean running water.
7. Wipe the cover with the clean sponge.
8. Wipe the surface again with a dry, soft lint-free cloth.
9. Wait for the surface to dry completely and remove any cloth fibers from the computer surface.

Cleaning your computer keyboard

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

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

Cleaning your computer display

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

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 nail 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.

Caring for your ThinkPad computer

Chapter 3. Solving computer problems

Note: Refer to Access Help if your system is running and Access Help is accessible. This chapter presents information for use when Access Help is inaccessible.

Frequently asked questions

This section lists frequently asked questions and tells where you can find detailed answers. For details about each publication included in the package with the ThinkPad computer, see "This guide and other publications" on page 1.

What safety precautions should I follow when using my ThinkPad computer?
> See the separate Safety and Warranty Guide for detailed information about safety.

How can I prevent problems with my ThinkPad computer?
> See "Read first" on page v, and also Chapter 2, "Caring for your ThinkPad computer," on page 3 of this Guide. More tips can be found in the following sections of Access Help:
> - Preventing problems
> - Spills on the keyboard

What are the main hardware features of my new ThinkPad computer?
> See the "ThinkPad tour" section of Access Help.

Where can I find the detailed specifications for my machine?
> See www.lenovo.com/think/support

I need to upgrade a device *or* I need to replace one of the following: the hard disk drive, the PCI Express Mini Card, the Modem Daughter Card, memory, the keyboard, or the palm rest.
> See Appendix B, "Customer Replaceable Units (CRUs)," on page 53 of this Guide for the list of Customer Replaceable Units and the location of the instructions for removing or replacing components.

My computer is not operating properly.

Study the "Problem solving " section of Access Help. This Guide describes only problems that might prevent you from accessing the online help system.

Where are the recovery CDs?

Your computer did not come with a recovery CD or Windows CD. For an explanation of the alternative recovery methods offered by Lenovo, see "Restoring factory contents" on page 27 of this Guide.

How can I contact the Customer Support Center?

See Chapter 6, "Getting help and service," on page 41 of this Guide. For the phone numbers of the Customer Support Center nearest to you, see "Worldwide telephone list" on page 48.

Where can I find warranty information?

See the separate Safety and Warranty Guide for detailed warranty information. For the warranty applicable to your computer, including the warranty period and type of warranty service, see "Warranty Information" on page 45.

Diagnosing problems

If you have a problem with your computer, you can test it by using PC-Doctor® for Windows. To run PC-Doctor for Windows, do as follows:

1. Click **Start**.
2. Move the pointer to **All Programs** (**Programs** in Windows 2000) and then to **PC-Doctor for Windows**.
3. Click **PC-Doctor**.

For more information about PC-Doctor for Windows, see the Help for the program.

> **Attention**
> Running any tests can take up to several minutes or longer. Make sure you have time to run the entire test; do not interrupt the test while it is running.

When preparing to contact the Customer Support Center, be sure to print the test log so that you can rapidly provide information to the help technician.

Diagnosing HDD from BIOS Setup Utility

You can diagnose the hard disk drive without starting up the operating system. To diagnose the hard disk drive from BIOS Setup Utility, do as follows:

1. Remove any diskette from the diskette drive, and then turn off the computer.
2. Turn on the computer.
3. While the message, "To interrupt normal startup, press the blue ThinkVantage button," is displayed at the lower left of the screen, press F1 to enter BIOS Setup Utility.
4. Using cursor keys, select **HDD diagnostic program**. Press Enter.
5. Using cursor keys, select **Main hard disk drive** or **Ultrabay hard disk drive**.
6. Press Enter to start the diagnostic program.

Diagnosing problems using PC-Doctor from the service partition

By using PC-Doctor from the Rescue and Recovery workspace in the service partition of the hard disk drive, you can diagnose your system without starting up the operating system. Do as follows:

1. Remove any diskette from the diskette drive, and then turn off the computer.
2. Turn on the computer.
3. While the message, "To interrupt normal startup, press the blue ThinkVantage button," is displayed at the lower left of the screen, press the ThinkVantage button to enter the Rescue and Recovery workspace.
4. Select **Diagnose hardware**. The computer restarts and PC-Doctor starts up.

For more information about PC-Doctor, press F1 to go to the Help or online manual.

Troubleshooting

If you do not find your problem here, see Access Help. The following section only describes problems that might prevent you from accessing this help system.

Error messages

Notes:
1. In the charts, x can be any character.
2. The version of PC-Doctor referred to here is PC-Doctor for Windows.

Message:	0176: System Security - The System has been tampered with.
Solution:	This message is displayed if you remove the Security Chip and reinstall it, or install a new one. To clear the error, enter the BIOS Setup Utility, press F9 to set values to default, then press F10 to save changes. If this does not solve the problem, have the computer serviced.
Message:	0182: Bad CRC2. Enter BIOS Setup Utility and load Setup defaults.
Solution:	Checksum of the CRC2 setting in the EEPROM is not correct. Press F1 to go to BIOS Setup Utility. Press F9 and then Enter to load the default setting. Press F10 and then Enter to restart the system.
Message:	0185: Bad startup sequence settings. Enter BIOS Setup Utility and load Setup defaults.
Solution:	Checksum of the startup sequence setting in the EEPROM is not correct. Press F1 to go to BIOS Setup Utility. Press F9 and then Enter to load the default setting. Press F10 and then Enter to restart the system.
Message:	0190: Critical low-battery error
Solution:	The computer turned off because the battery is low. Connect the ac adapter to the computer and charge the battery, or replace the battery with a fully charged one.
Message:	0191: System Security - Invalid remote change requested.
Solution:	The system configuration change has failed. Confirm the operation and try again. To clear the error, enter the BIOS Setup Utility, press F9 to set values to default then press F10 to save changes.
Message:	0199: System Security - Security password retry count exceeded.
Solution:	This message is displayed if you enter a wrong supervisor password more than three times. Confirm the supervisor password and try again. To clear the error, enter the BIOS Setup Utility.
Message:	01C8: More than one modem devices are found. Remove one of them. Press <Esc> to continue.
Solution:	Remove either a Modem Mini-PCI Card or a Modem Daughter Card. Otherwise, press Esc to ignore the warning message. If it does not solve this problem, have the computer serviced.

Message:	01C9: More than one Ethernet devices are found. Remove one of them. Press <Esc> to continue.
Solution:	Your ThinkPad computer has a built-in Ethernet feature, and you cannot add another such feature by installing an Ethernet device. If this error message is displayed, remove the Ethernet device that you installed. Otherwise press Esc to ignore the warning message. If this does not solve the problem, have the computer serviced.
Message:	0200: Hard disk error
Solution:	The hard disk is not working. Make sure that the hard disk drive is attached firmly. Run the BIOS Setup Utility; then make sure the hard disk drive is not disabled in the Startup menu.
Message:	021*x:* Keyboard error
Solution:	Make sure that there are no objects placed on the keyboard, or if you have one, the external keyboard. Turn off the computer, and turn off all attached devices. Turn on the computer first; then turn on the attached devices. If you still see the same error code, do the following: If an external keyboard is connected, do the following: • Turn off the computer and disconnect the external keyboard; then turn on the computer. Make sure that the built-in keyboard operates correctly. If it does, have the external keyboard serviced. • Make sure that the external keyboard is connected to the correct connector. Test the computer by using PC-Doctor. • If the computer stops during the test, have the computer serviced.
Message:	0230: Shadow RAM error, 0231: System RAM error, 0232: Extended RAM error
Solution:	Test your computer's memory with PC-Doctor. If you added a memory module just before turning the computer on, reinstall it. Then test the memory with PC-Doctor.
Message:	0250: System battery error
Solution:	The backup battery, which is used to preserve the configuration information, such as the date and time, while the computer is turned off, is depleted. Replace the battery and run BIOS Setup Utility to verify the configuration. If you still have a problem, have the computer serviced.
Message:	0251: System CMOS checksum bad
Solution:	The system CMOS might have been corrupted by an application program. The computer uses the default settings. Run BIOS Setup Utility to reconfigure the settings. If you still see the same error code, have the computer serviced.
Message:	0271: Date and time error
Solution:	Neither the date nor the time is set in the computer. Set the date and time, using the BIOS Setup Utility.

Message:	0280: Previous boot incomplete
Solution:	Your computer was previously unable to complete the boot process.
	Turn the computer off; then turn it on to start the BIOS Setup Utility. Verify the configuration and then restart the computer either by choosing the **Exit Saving Changes** option under the **Restart** item or by pressing F10. If you still see the same error code, have the computer serviced.
Message:	1802: Unauthorized network card is plugged in - Power off and remove the miniPCI network card.
Solution:	The miniPCI network card is not supported on this computer. Remove it.
Message:	1803: Unauthorized daughter card is plugged in-Power off and remove the daughter card.
Solution:	The daughter card is not supported on this computer. Remove it.
Message:	1810: Hard disk partition layout error
Solution:	A problem in recognizing the layout of the partition on the hard disk has halted computer startup. Either the Predesktop Area has been deleted, or the hard disk contains corrupt data. To try to restart your computer, complete one of the following:
	• If the Predesktop Area has been deleted
	1. Press F1 to open the BIOS Setup Utility.
	2. Select **Security**->**Predesktop Area**-> **Access Predesktop Area**.
	3. Set this item to **Disabled**.
	4. Save and exit.
	• If the above fails
	1. Press Enter.
	2. Double-click **RECOVER TO FACTORY CONTENTS** and follow on-screen instructions.
	Note: This will permanently erase the entire contents of the hard disk, and then restore software preinstalled by Lenovo.
	Press F1 to open BIOS Setup Utility, or Enter to start the Predesktop Area.
	If the computer still does not start, call the Customer Support Center. Telephone numbers are listed in "Worldwide telephone list" on page 48.
Message:	2010: Warning: Your internal hard disk drive (HDD) may not function correctly on this system. Ensure that your HDD is supported on this system and that the latest HDD firmware is installed.
Solution:	If in the primary drive bay you are using a non-IBM or non-Lenovo hard disk drive (HDD) or an old generation IBM HDD that is not supported by this system, with the risk in mind, you can still use it by pressing ESC. If in the primary drive bay you are using a supported IBM / Lenovo HDD with old firmware, you need to update its firmware to the latest version, available at www.lenovo.com/think/support

Message:	2100: Initialization error on HDD0 (Main hard disk drive), 2102: Initialization error on HDD1 (Ultrabay hard disk drive), 2110: Read error on HDD0 (Main hard disk drive), 2112: Read error on HDD1 (Ultrabay hard disk drive)
Solution:	The hard disk is not working. Have the hard disk serviced.
Message:	The power-on password prompt
Solution:	A power-on password or a supervisor password is set. Type the password and press Enter to use the computer. If the power-on password is not accepted, a supervisor password might have been set. Type the supervisor password and press Enter. If you still see the same error message, have the computer serviced.
Message:	The hard disk password prompt
Solution:	A hard disk password is set. Type the password and press Enter to use the computer. If you still see the same error message, have the computer serviced.
Message:	Hibernation error
Solution:	The system configuration changed between the time your computer entered hibernation mode and the time it left this mode, and your computer cannot resume normal operation. • Restore the system configuration to what it was before your computer entered hibernation mode. • If the memory size has been changed, re-create the hibernation file.
Message:	Operating system not found.
Solution:	Verify the following: • The hard disk drive is correctly installed. • A startable diskette is in the diskette drive If you still see the same error message, check the boot sequence, using the BIOS Setup Utility.
Message:	EMM386 Not Installed — Unable to Set Page Frame Base Address.

Solution:	Edit C:\CONFIG.SYS and change a line from
	 `device=C:\WINDOWS\EMM386.EXE RAM`
	 to
	 `device=C:\WINDOWS\EMM386.EXE NOEMS`
	 and save this file.

Message:	CardBus Configuration Error —Device Disabled
Solution:	Go to the BIOS Setup Utility. Press F9 and then Enter to load the default setting. Press F10 and then Enter to restart the system.
Message:	Authentication of system services failed. Press <Esc> to resume.
Solution:	The Predesktop Area in the HDD is broken. If you need to use the Predesktop Area, get a Recovery CD, then recover the Predesktop Area using it.

If one of the following error code messages is displayed on the screen, have the computer serviced:
0175: Bad CRC1, stop POST task
0177: Bad SVP data, stop POST task. Checksum of the supervisor password in the EEPROM is not correct.
0187: EAIA data access error
0188: Invalid RFID serialization information area
0189: Invalid RFID configuration information area
0192: System Security - Embedded Security hardware tamper detected.
0260: System timer error
0270: Real time clock error
02D0: System cache error
02F4: EISA CMOS not writable
02F5: DMA test failed
02F6: Software NMI failed
02F7: Fail-safe timer NMI failed
Fan error
Thermal sensing error

Errors without messages

Problem:	When I turn on the machine, nothing appears on the screen and the machine does not beep while starting up. **Note:** If you are not sure whether you heard any beeps, turn off the computer by pressing and holding the power button for more than 4 seconds; then turn it on and listen again. If you are using an external monitor, refer to "Computer screen problems" on page 21
Solution:	If a power-on password is set, press any key to display the power-on password prompt, and then type the correct password and press Enter. If the power-on password prompt does not appear, the brightness level might be set to minimum brightness. Adjust the brightness level by pressing the Fn+Home. If the screen still remains blank, make sure that: • The battery is installed correctly. • The ac adapter is connected to the computer and the power cord is plugged into a working electrical outlet. • The computer power is on. (Turn on the power switch again for confirmation.)

Problem:	When I turn on the machine, nothing appears on the screen, but I hear two or more beeps.
Solution:	Make sure that the memory card is installed correctly. If it is, but the screen is still blank, and you hear five beeps, have the computer serviced. If you hear 4 cycles of 4 beeps each, the Security Chip has a problem. Have the computer serviced.

Problem:	When I turn on the machine, only a white pointer appears on a blank screen.
Solution:	Reinstall your operating system (see Chapter 4, Recovery options), and turn on the computer. If you still see only the pointer on the screen, have the computer serviced.

Problem:	My screen goes blank while the computer is on.
Solution:	Your screen saver or power management may be enabled. Move the TrackPoint or press a key to exit the screen saver, or press the power switch to resume from standby or hibernation.

A password problem

Problem:	I forgot my password.
Solution:	If you have registered your computer for Password Reset Service, and you forgot your power-on or hard disk password, you can reset it by pressing the ThinkVantage button at the password prompt. • If you cannot reset 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 cannot reset your hard disk password, Lenovo authorized servicer 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. If you forgot your supervisor password, Lenovo authorized servicer cannot reset your password. You must take your computer to a Lenovo authorized servicer or a marketing representative to have the system board replaced. Proof of purchase is required, and a fee will be charged for parts and service.

Keyboard problems

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

Solution:	• If the problem occurred immediately after the computer returned from standby mode, enter the power-on password if one has been set.
	
	• If an external numeric keypad or a mouse is connected:
	  1. Turn off the computer.
	  2. Remove the external numeric keypad or the mouse.
	  3. Turn on the computer and try using the keyboard again.
	
	  If the keyboard problem is resolved, carefully reconnect the external numeric keypad, external keyboard, or mouse, making sure that you have seated the connectors properly.
	
	  If keys on the keyboard still do not work, have the computer serviced.
	
	• If an external PS/2® keyboard is connected, the numeric keypad on your computer does not work. Use the numeric keypad on the external keyboard.

Problem:	A number appears when you type a letter.
Solution:	The numeric lock function is on. To disable it, press and hold Shift or Fn and then press NmLk (ScrLk).

Problem:	All or some of the keys on the external numeric keypad do not work.
Solution:	Make sure that the external numeric keypad is correctly connected to the computer.

Pointing device problems

Problem:	The mouse buttons do not work.
Solution:	If your ThinkPad computer has the TrackPoint only, this problem may occur. Change the mouse driver to **Standard PS/2 Port Mouse**, and then reinstall **PS/2 TrackPoint**. Drivers are provided in the C:\SWTOOLS\DRIVERS directory on your hard disk drive. If your hard disk drive does not contain device drivers, refer to the ThinkPad Web site. For access to this Web site, press the ThinkVantage button and open the Productivity Center.

Problem:	The scrolling or magnifying glass function does not work.
Solution:	Check the mouse driver in the Device Manager window, and make sure that the PS/2 TrackPoint driver is installed.

Standby or hibernation problems

Problem:	The computer enters standby mode immediately after Power-on self-test (POST) (the standby indicator light turns on).
Solution:	Make sure that: • The battery is charged. • The operating temperature is within the acceptable range. Refer to "Specifications" on page 56. If these items are correct, have the computer serviced.

Problem:	The `critical low-battery` error message is displayed, and the computer immediately turns off.
Solution:	The battery power is getting low. Connect the ac adapter to the computer, or replace the battery with a fully charged one.

Problem:	When you take action to return from standby mode, the computer display remains blank.
Solution:	Check whether an external monitor was disconnected or turned off while the computer was in standby mode. If you disconnected or turned off the external monitor, connect it or turn it on before resuming the computer from the standby mode. When resuming the computer from the standby mode without attaching the external monitor or turning it on, and the computer display remains blank, press Fn+F7 to bring up the computer display. **Note:** If you use the Fn+F7 key combination to apply a presentation scheme, press Fn+F7 at least three times in three seconds, and the image is displayed on the computer screen.

Problem:	The computer does not return from standby or hibernation mode.
Solution:	If the system does not return from standby mode, it may have entered standby or hibernation mode automatically because the battery is depleted. Check the standby indicator. • If the standby indicator is on, your computer is in standby mode. Connect the ac adapter to the computer; then press any key. • If the standby indicator is off, your computer is in hibernation mode or power-off state. Connect the ac adapter to the computer; then press power button to resume operation. If the system still does not return from standby mode, your system may stop responding and you cannot turn off the computer. Reset the computer. Unsaved data may be lost. To reset the computer, press and hold the power button for 4 seconds or more. If it is not reset, remove the ac adapter and the battery.

Problem:	The computer enters standby mode unexpectedly.
Solution:	If the processor overheats, the computer automatically enters standby mode to allow the computer to cool and to protect the processor and other internal components. Also, check the settings for standby mode, using Power Manager.

Computer screen problems

Problem:	The screen is blank.
Solution:	- Press Fn+F7 to bring up the image. **Note:** If you use the Fn+F7 key combination to apply a presentation scheme, press Fn+F7 at least three times in three seconds, and the image is displayed on the computer screen. - If you are using the ac adapter, or using the battery, and the battery status indicator is on (is green), press Fn+Home to make the screen brighter. - If the standby status indicator is on (is green), press Fn to resume from the standby mode. - If you still have the problem, do the Solution in the following problem "The screen is unreadable or distorted."

Problem:	The screen is unreadable or distorted
Solution:	Make sure that: - The display device driver is installed correctly. - The screen resolution and color quality are correctly set. - The monitor type is correct. To check these settings, do as follows: 1. Right-click on the desktop, click **Properties**, then click the **Settings** tab. 2. Check whether the screen resolution and color quality are correctly set. 3. Click **Advanced**. 4. Click the **Adapter** tab. 5. Make sure "Mobile Intel(R) 945GM Express Chipset Family", "ATI Mobility Radeon X1300", or "ATI Mobility Radeon X1400" is shown in the adapter information window. 6. Click the **Properties** button. Check the "Device status" box and make sure the device is working properly. If not, click the **Troubleshoot** button. 7. Click the **Monitor** tab. 8. Make sure the information is correct. 9. Click the **Properties** button. Check the "Device status" box and make sure the device is working properly. If not, click the **Troubleshoot** button.

Problem:	Incorrect characters appear on the screen.
Solution:	Did you install the operating system or application program correctly? If they are installed and configured correctly, have the computer serviced.

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

Problem:	A message, "Unable to create overlay window," appears when you try to start DVD playback. *or* You get poor or no playback while running video playback, DVD playback, or game applications.
Solution:	Do either of the following: • If you are using 32-bit color mode, change the color depth to 16-bit mode. • If you are using a desktop size of 1280×1024 or larger, reduce the desktop size and the color depth.

Battery problems

Problem:	The battery cannot be fully charged by the power-off method in the standard charge time for your computer.
Solution:	For details, see the Battery and power category in Troubleshooting under the Problem solving section in Access Help.

Problem:	Your computer shuts down before the battery status indicator shows empty, *-or-* Your computer operates after the battery status indicator shows empty.
Solution:	Discharge and recharge the battery.

Problem:	The operating time for a fully charged battery is short.
Solution:	For details, see the Battery and power category in Troubleshooting under the Problem solving section in Access Help.

Problem:	The computer does not operate with a fully charged battery.
Solution:	The surge protector in the battery might be active. Turn off the computer for one minute to reset the protector; then turn on the computer again.

Problem:	The battery does not charge.
Solution:	For details, see the Battery and power category in Troubleshooting under the Problem solving section in Access Help.

A Hard disk drive problem

Problem:	The hard disk drive does not work.
Solution:	In the startup menu in BIOS Setup Utility, make sure that the hard disk drive is in the "Boot priority order". If it is in the device list of "Excluded from boot order", the hard disk drive is disabled. Move it into the "Boot priority order".

Fingerprint authentication problems

Problem:	You cannot register or authenticate your finger because it is wrinkled, rough, dry, injured, stained, oily, wet, or different one from what you have registered.
Solution:	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.

A startup problem

Problem:	The Microsoft® Windows® operating system will not start.
Solution:	Use the Rescue and Recovery workspace to help solve or identify your problem. For details about Rescue and Recovery, see chapter 4.

Other problems

Problem:	Your computer does not respond.
Solution:	• To turn off your computer, press and hold the power switch for 4 seconds or more. If the computer still does not respond, remove the ac adapter and the battery. • Your computer might lock when it enters standby mode during a communication operation. Disable the standby timer when you are working on the network. • IRQs for the PCI might be all set as 11. The computer does not respond because it cannot share the IRQ with other devices. Refer to the ThinkPad Configuration Program.

Problem:	The computer does not start from a device you want.
Solution:	Refer to the Startup menu of the BIOS Setup Utility. Make sure that the startup sequence in the BIOS Setup Utility is set so that the computer starts from the device you want. Also make sure that the device from which the computer starts is enabled. In the startup menu in the BIOS Setup Utility, make sure that the device is included in the "Boot priority order" list. If it is included in the "Excluded from boot order" list, it is disabled. Select the entry for it in the list and press the x key. This moves the entry to the "Boot priority order" list.

Problem:	The computer does not turn off with the power switch.
Solution:	If the standby indicator is on and you are working under battery power, replace the battery with a fully charged one or change your power source to ac power.
	If you still have a problem, press and hold the power switch for 4 seconds or more; this forces the computer to turn off.

Starting BIOS Setup Utility

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

- Config: Set the configuration of your computer.
- Date/Time: Set the date and time.
- Security: Set security features.
- Startup: Set the startup device.
- Restart: Restart the system.

Note: You can set many of these parameters more easily by using the ThinkPad Configuration Program.

To start BIOS Setup Utility, do as follows:

1. To protect yourself against accidental loss of data, back up your data and computer registry. For details see the "Data backup-and-restore tools" section of Access Help.
2. Remove any diskette from the diskette drive, and then turn off the computer.
3. Turn on the computer; then, while the message, "To interrupt normal startup, press the blue ThinkVantage button" is displayed at the lower left of the screen, press the ThinkVantage button. The Rescue and Recovery workspace opens.
4. Click **Access BIOS**. The System Restart Required window is displayed.
5. Click **Yes**. The computer restarts, and the BIOS Setup Utility menu appears.
6. If you have set a supervisor password, the BIOS Setup Utility menu appears after you enter the password. You can start the utility by pressing Enter instead of entering the supervisor password; however, you cannot change the parameters that are protected by the supervisor password. For more information, refer to the on-board help.

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

7. Change the items you wish to change. To change the value of an item, use the F5 or F6 key. If the item has a submenu, you can display it by pressing Enter.

8. Press F3 or Esc to exit from the submenu. If you are in a nested submenu, press Esc repeatedly until you reach the BIOS Setup Utility menu.

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

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

Chapter 4. Recovery options

Using Rescue and Recovery

If Windows is not running properly, use the Rescue and Recovery workspace to help solve or identify your problem. Do the following:

1. Turn off your PC, then turn it on again.
2. Watch the screen carefully while your PC starts. When "To interrupt normal startup, press the blue ThinkVantage button" message is displayed at the lower left of the screen, press the blue ThinkVantage button. The Rescue and Recovery workspace opens.
3. After the Rescue and Recovery workspace opens, you can do the following:
   - Rescue and Restore your files, folders, or backups.
   - Configure your system settings and passwords.
   - Troubleshoot and diagnose problems using diagnostics.

   For more information about using Rescue and Recovery features, see the "Recovery overview" section of the Access Help.

Restoring factory contents

Instead of providing a recovery CD or a Windows CD with your computer, Lenovo provides simpler methods of accomplishing the tasks typically associated with these CDs. The files and programs for these alternative methods are on your hard disk, which eliminates having to locate misplaced CDs and problems associated with using an incorrect CD version.

The complete backup of all the files and programs that Lenovo preinstalled on your computer resides in a hidden protected area, or partition, of the hard disk. Although hidden, the backups in the partition consume hard disk space. Therefore, when checking the capacity of your hard disk according to Windows, you might note that the total capacity of the disk appears to be smaller than anticipated. This discrepancy is explained by the contents of the hidden partition.

The Product Recovery Program contained within this area enables you to restore the complete contents of your hard disk to the same state as it was when originally shipped from the factory.

Notes:

1. If the optical drive is not attached to your ThinkPad computer during recovery, DVD software and CD-recording software will not be installed. To ensure that they will be installed correctly, install the optical drive in the Ultrabay Slim or Ultrabay Enhanced before performing a recovery operation.

2. The recovery process might take up to 2 hours.

To recover the hard disk to its original contents, do the following:

Attention: All of the files on the primary hard disk partition (usually drive C) will be lost in the recovery process. However, before any data is overwritten, you will be given the opportunity to save one or more files to other media.

1. If possible, save all your files and shut down your operating system.

2. Turn off your computer for at least 5 seconds.

3. Turn on your computer. Watch the display carefully. While the message, "To interrupt normal startup, press the blue ThinkVantage button" is displayed, press the ThinkVantage button. The ThinkVantage Rescue and Recovery workspace opens.

4. Click **Restore your system** and follow the instructions on the screen.

Recovering data

If you performed a backup operation using the Rescue and Recovery program, you also have one or more backups stored that reflect the contents of the hard disk as it existed at various points in time. These backups might be stored on your hard disk, or a network drive, or on removable media, depending on the options you selected during the backup operation.

You can use either the Rescue and Recovery program or the Rescue and Recovery workspace to restore the contents of the hard disk to an earlier state using any of the stored backups. The Rescue and Recovery workspace runs independently of the Windows operating system. Therefore, you can start it by pressing the blue ThinkVantage button when prompted during startup.

After the Rescue and Recovery workspace opens you can perform a recovery operation, even if you are unable to start Windows.

Installing a new operating system

For how to install a new operating system, see the Advanced configuration section in online Access Help.

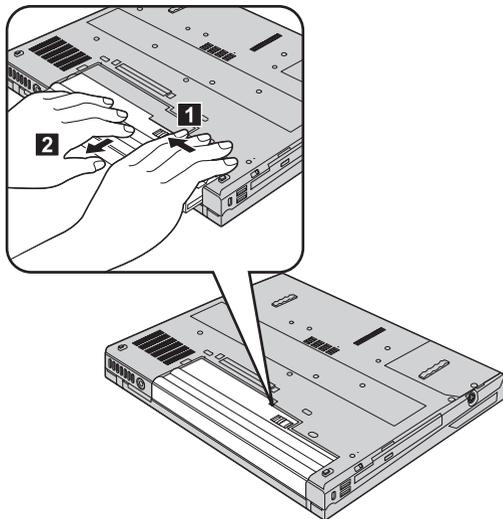# Chapter 5. Upgrading and replacing devices

Replacing the battery

> **Important**
>
> Read *Safety and Warranty Guide* before replacing the battery.

1. **Turn off the computer, or enter hibernation mode.** Then disconnect the ac adapter and all cables from the computer.

    Note: If you are using a PC Card or Secure Digital Card, the computer might not be able to enter hibernation mode. If this happens, turn off the computer.

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

3. Slide and hold the battery latch **1** ; then remove the battery **2** .
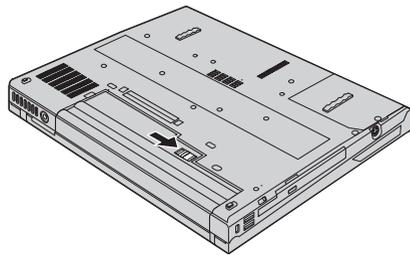
4. Align the front of a fully charged spare battery with the front side of the battery space in the computer; then gently push the battery into the space.
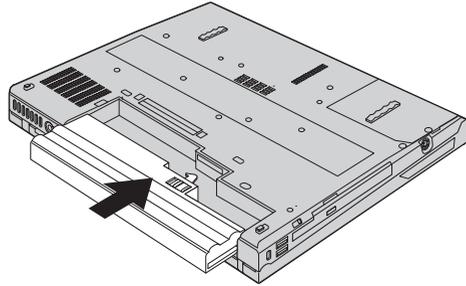
5. Slide the battery latch to the lock position.

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

Upgrading the hard disk drive

Important
Read *Safety and Warranty Guide* before replacing the hard disk drive.

You can increase the storage capacity of your computer by replacing the hard disk drive with one of greater capacity. You can purchase a new hard disk drive from your reseller or Lenovo marketing representative.

Notes:

1. Replace the hard disk drive only if you upgrade it or have it repaired. The connectors and bay of the hard disk drive were not designed for frequent changes, or drive swapping.
2. The ThinkVantage Rescue and Recovery workspace and the Product Recovery program are not included on an optional hard disk drive.

Attention

**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 the physical shock.
- 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 on the hard disk. Before removing the hard disk drive, make a backup copy of all the information on the hard disk, and then turn the computer off. Never remove the drive while the system is operating, in standby mode, or in hibernation mode.
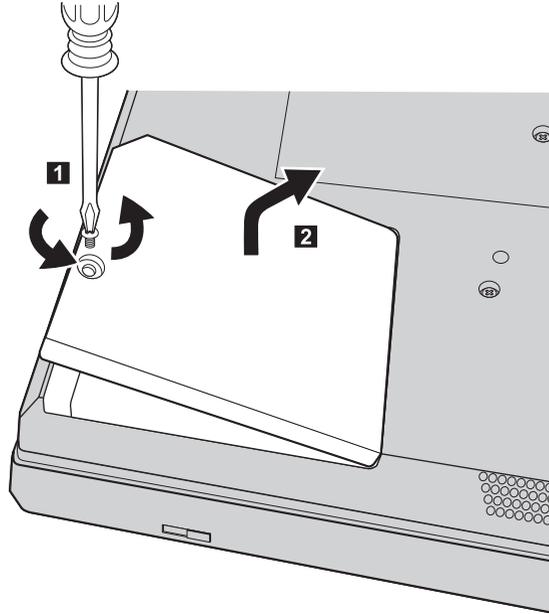

To replace the hard disk drive, do the following:

1. **Turn off the computer**; then disconnect the ac adapter and all cables from the computer.
2. Close the computer display, and turn the computer over.
3. Remove the battery.
4. Remove the screw that secures the hard disk drive **1** and remove the cover **2** .

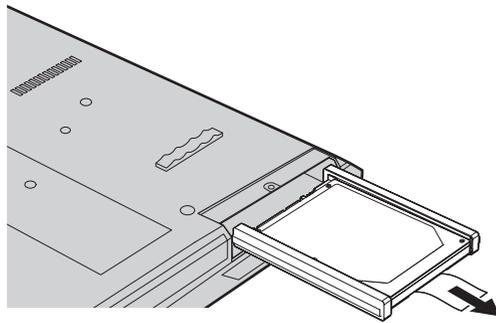   **For models with 14.1-inch LCD:**
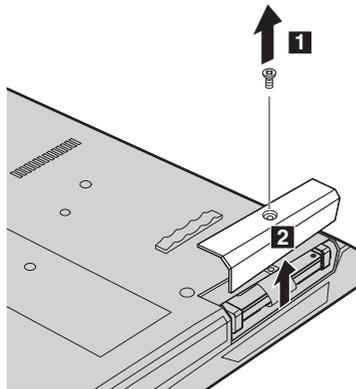
For models with 15.0-inch LCD:

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

   For models with 14.1-inch LCD:

For models with 15.0-inch LCD:
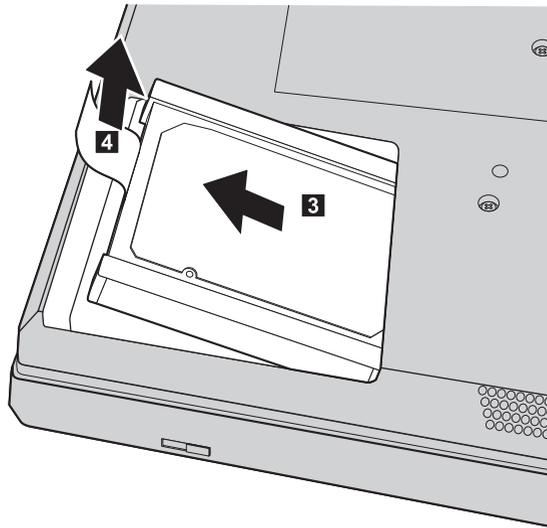
6. Detach the side rubber rails from the hard disk drive.
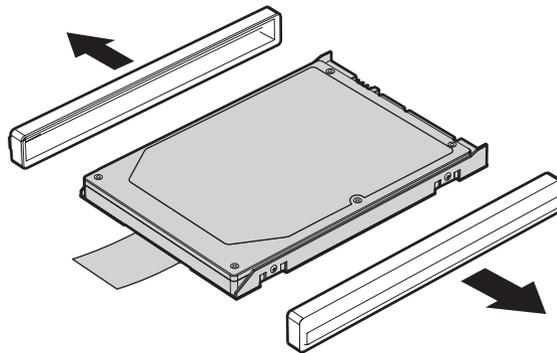
7. Attach the side rubber rails to a new hard disk drive.
8. Insert the hard disk drive into the hard disk drive bay; then firmly slide it into place.
9. Reinstall the cover of the bay, and reinstall the screw.
10. Reinstall the battery.
11. Turn the computer over again. Connect the ac adapter and the cables to the computer.

Replacing memory

> **Important**
>
> Read *Safety and Warranty Guide* before replacing memory.

Increasing memory capacity is an effective way to make programs run faster. You can increase the amount of memory in your computer by installing a double data rate (DDR) 2 synchronous dynamic random access memory (DRAM) unbuffered small outline dual inline memory module (SO-DIMM), available as an option, in the memory slot of your computer. SO-DIMMs with different capacities are available.

Note: Use only the memory types supported by your computer. If you incorrectly install the optional memory or install an unsupported memory type, a warning beep will sound when you try to start the computer.

To install an SO-DIMM, do the following:

1. Touch a metal table or a grounded metal object. This action reduces any static electricity in your body, that could damage the SO-DIMM. Do not touch the contact edge of the SO-DIMM.
2. **Turn off the computer**; then disconnect the ac adapter and all cables from the computer.
3. Close the computer display, and turn the computer over.
4. Remove the battery.

5. Remove the screws that secure the palm rest.
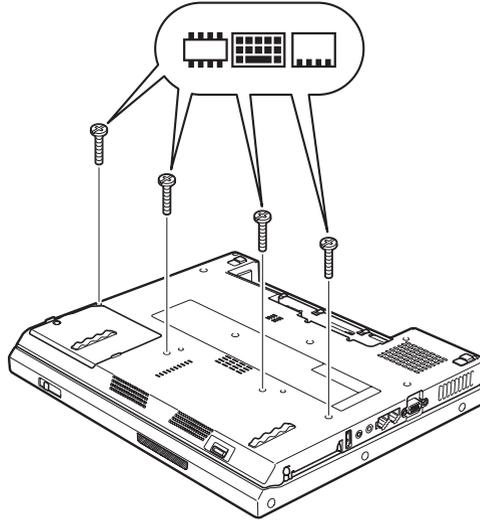
6. Turn the computer over.

7. Lift the left edge of the palm rest a little in the direction shown by arrow **1**, and then lift the palm rest from the computer in the direction shown by arrow **2**.
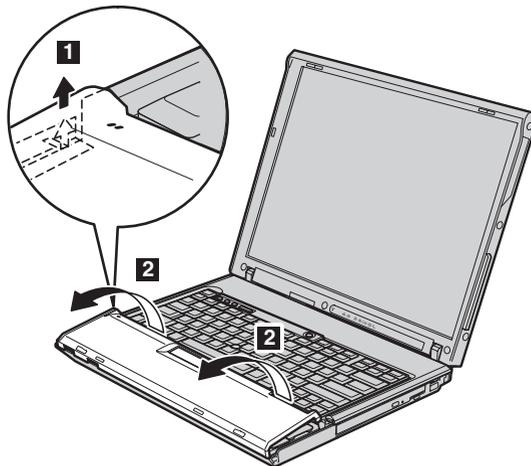
Note: When you lift the left and front edges of the palm rest, it is normal to hear a click.

8. Move the palm rest carefully away from the computer until you can see where it's connected **3** , and then detach the connector **4** . Now the palm rest has been removed.
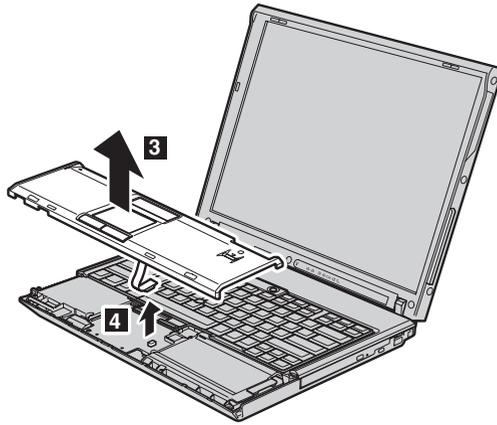
9. Remove the memory cover.
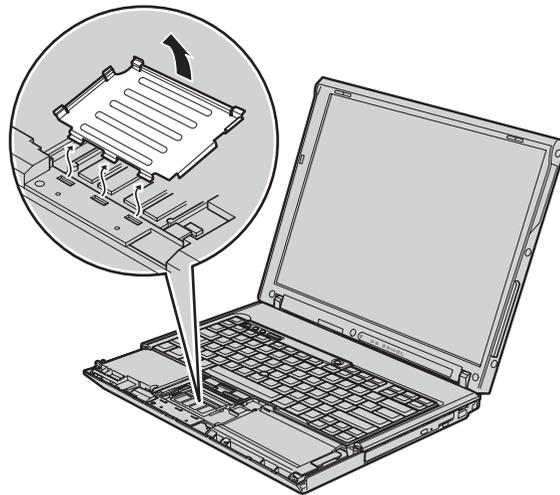
10. If two SO-DIMMs are already installed in the memory slot, remove one of them to make room for the new one by pressing out on the latches on both edges of the socket at the same time **1** . Be sure to save it for future use **2** .
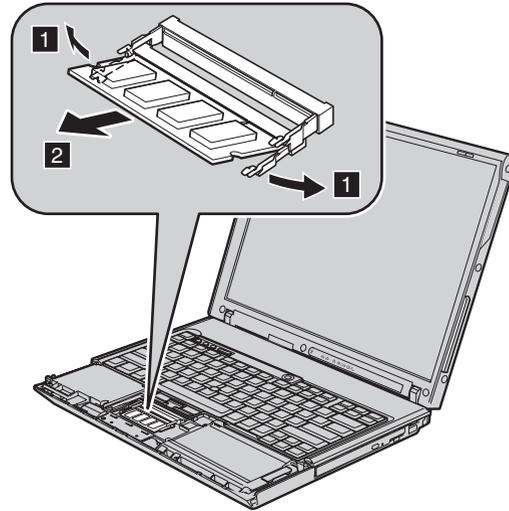
11. With the notched end of the SO-DIMM toward the contact edge side of the socket, firmly insert the SO-DIMM into the socket at an angle of about 20 degrees **1** ; then pivot it downward until it snaps into place **2** .
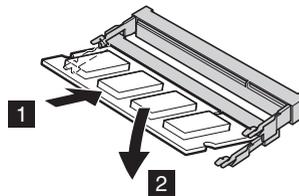
12. Reinstall the memory cover.

13. Reinstall the palm rest by attaching it to the connector.
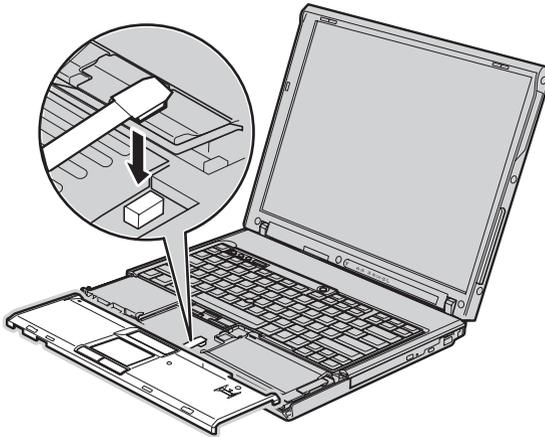
14. Align the right and left top edges of the palm rest.
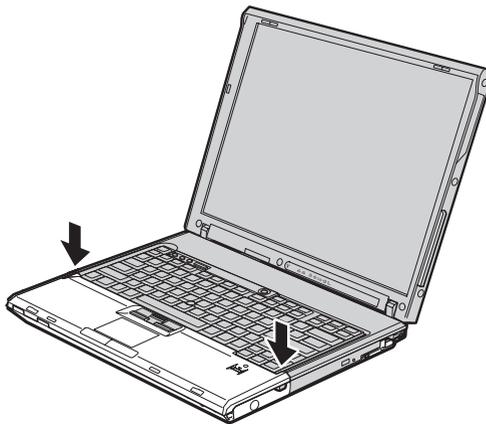
15. Push gently on the area marked in this figure, in the direction shown by the arrow, until you hear a click.
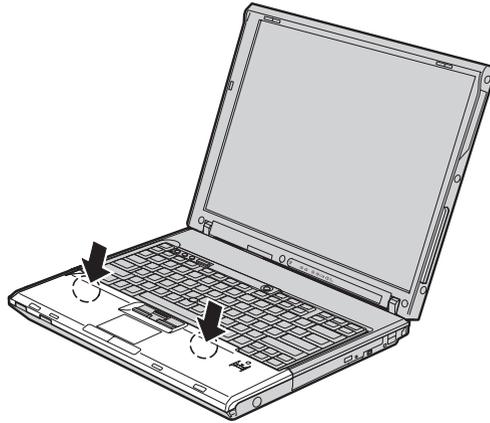
16. Push the front side of the palm rest until it clicks into place.
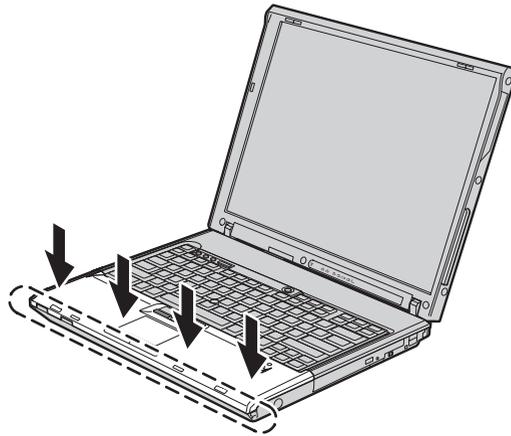
17. Close the computer display, and turn the computer over; then replace the screws that secure the palm rest.
18. Reinstall the battery.
19. Turn the computer over again, and re-connect the ac adapter and the cables to the computer.

To make sure that the SO-DIMM is installed correctly, do as follows:
1. Turn the computer on.
2. While the "To interrupt normal startup, press the blue ThinkVantage button" message is displayed at the lower-left of the screen, press the ThinkVantage button. ThinkVantage Rescue and Recovery screen opens.
3. Click **Access BIOS**. The System Restart Required window is displayed.

4. Click **Yes**. The computer restarts, and the BIOS Setup Utility screen opens. The "Installed memory" item shows the total amount of memory installed in your computer. For example, if your computer has 256 MB of memory and you install a 256-MB SO-DIMM in it, the quantity shown in "Installed memory" should be 512 MB.

Chapter 6. Getting help and service

Getting help and service

If you need help, service, technical assistance, or just want more information about ThinkPad computers, you will find a wide variety of sources available from Lenovo to assist you. This section contains information about where to go for additional information about ThinkPad computers, what to do if you experience a problem with your computer, and whom to call for service should it be necessary.

Microsoft Service Packs are the latest software source for Windows product updates. They are available via Web download (connection charges may apply) or via CD-ROM. For more specific information and links, go to www.microsoft.com. For technical assistance with installation of, or questions related to, Service Packs for your preloaded Microsoft Windows product, refer to the Microsoft Product Support Services Web site at http://support.microsoft.com/directory/, or you can contact Customer Support Center at the phone number(s) listed in "Worldwide telephone list" on page 48. Some fees might apply.

Getting help on the Web

The Lenovo Web site on the World Wide Web has up-to-date information about ThinkPad computers and support. The address for the Personal Computing home page is www.lenovo.com/think

You can find support information for your ThinkPad computer at www.lenovo.com/think/support. Research this Web site to learn how to solve problems, find new ways to use your computer, and learn about options that can make working with your ThinkPad computer even easier.

Calling the Customer Support Center

If you have tried to correct the problem yourself and still need help, during the warranty period, you can get help and information by telephone through the Customer Support Center. The following services are available during the warranty period:

- Problem determination - Trained personnel are available to assist you with determining if you have a hardware problem and deciding what action is necessary to fix the problem.

- Lenovo hardware repair - If the problem is determined to be caused by Lenovo hardware under warranty, trained service personnel are available to provide the applicable level of service.
- Engineering change management - Occasionally, there might be changes that are required after a product has been sold. Lenovo or your reseller, if authorized by Lenovo, will make selected Engineering Changes (ECs) available that apply to your hardware.

The following items are not covered:
- Replacement or use of parts not manufactured for or by Lenovo or nonwarranted parts

  Note: All warranted parts contain a 7-character identification in the format FRU XXXXXXX
- Identification of software problem sources
- Configuration of BIOS as part of an installation or upgrade
- Changes, modifications, or upgrades to device drivers
- Installation and maintenance of network operating systems (NOS)
- Installation and maintenance of application programs

To determine if your machine is in warranty and when the warranty expires, go to www.lenovo.com/think/support, and click **Warranty**, then follow the instructions on the screen.

Refer to your Lenovo hardware warranty for a full explanation of Lenovo warranty terms. Be sure to retain your proof of purchase to obtain warranty service.

If possible, be near your computer when you make your call in case the technical assistance representative needs to help you resolve a computer problem. Please ensure that you have downloaded the most current drivers and system updates, run diagnostics, and recorded information before you call. When calling for technical assistance, please have the following information available:
- Machine Type and Model
- Serial numbers of your computer, monitor, and other components, or your proof of purchase
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information for your system

The telephone numbers for your Customer Support Center location are located in the Worldwide telephone list section of this guide.

Note: Telephone numbers are subject to change without notice. For the latest list of Customer Support Center telephone numbers and hours of

operation, visit the Support Web site at www.lenovo.com/support/ phone. If the number for your country or region is not listed, contact your Lenovo reseller or Lenovo marketing representative.

Getting help around the world

If you travel with your computer or relocate it to a country where your ThinkPad machine type is sold, your computer might be eligible for International Warranty Service, which automatically entitles you to obtain warranty service throughout the warranty period. Service will be performed by service providers authorized to perform warranty service.

Service methods and procedures vary by country, and some services might not be available in all countries. International Warranty Service is delivered through the method of service (such as depot, carry-in, or on-site service) that is provided in the servicing country. Service centers in certain countries might not be able to service all models of a particular machine type. In some countries, fees and restrictions might apply at the time of service.

To determine whether your computer is eligible for International Warranty Service and to view a list of the countries where service is available, go to www.lenovo.com/think/support, click **Warranty**, and follow the instructions on the screen.

Appendix A. Warranty information

Warranty Information

This Appendix provides information regarding the warranty period and type of warranty service applicable to your Machine in your country or region. For the terms and conditions of the Statement of Limited Warranty that applies to your Machine, refer to Chapter 2, Warranty Information in the Safety and Warranty Guide included with your Machine.

Warranty Period

The warranty period may vary by country or region and is specified in the table below. NOTE: "Region" means either Hong Kong or Macau Special Administrative Region of China.

A warranty period of 3 years on parts and 1 year on labor means that Lenovo provides warranty service without charge for:

a. parts and labor during the first year of the warranty period; and

b. parts only, on an exchange basis, in the second and third years of the warranty period. Your Service Provider will charge you for any labor provided in performance of the repair or replacement(s) in the second and third year of warranty period.

Machine Type	Country or Region of Purchase	Warranty period	Types of Warranty Service
9444, 9446	US, Canada, Mexico, Brazil, Australia, and Japan	Parts and Labor - 4 years	6
		Battery pack - 1 year	1
	Others	Parts and Labor - 4 years	7
		Battery pack - 1 year	1
9445, 9447	All	Parts and Labor - 4 years	5
		Battery pack - 1 year	1

Machine Type	Country or Region of Purchase	Warranty period	Types of Warranty Service
0656	US, Canada, Mexico, Brazil, Australia, and Japan	Parts and Labor - 90 days Battery pack - 90 days	6 1
	Others	Parts and Labor - 90 days Battery pack - 90 days	7 1
9459, 9464	All	Parts and Labor - 3 years Battery pack - 1 year	5 1
9455, 9456, 9460, 9461, 0658	US, Canada, Mexico, Brazil, Australia, and Japan	Parts and Labor - 1 year Battery pack - 1 year	6 1
	Others	Parts and Labor - 1 year Battery pack - 1 year	7 1
9457, 9458, 9462, 9463, 0659	US, Canada, Mexico, Brazil, Australia, and Japan	Parts and Labor - 3 years Battery pack - 1 year	6 1
	Others	Parts and Labor - 3 years Battery pack - 1 year	7 1

Types of Warranty Service

If required, your Service Provider will provide repair or exchange service depending on the type of warranty service specified for your Machine in the above table and as described below. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations, additional charges may apply outside your Service Provider's normal service area, contact your local Service Provider representative or your reseller for country and location specific information.

1. **Customer Replaceable Unit (″CRU″) Service**

   Lenovo will ship CRUs to you for you to install, Tier 1 CRUs are easy to install whereas Tier 2 CRUs require some technical skill and tools. CRU information and replacement instructions are shipped with your Machine and are available from Lenovo at any time on your request. You may request that a Service Provider install CRUs, at no additional charge, under the type of warranty service designated for your Machine. Lenovo specifies in the materials shipped with a replacement CRU whether a

defective CRU must be returned. When return is required, 1) return instructions and a container are shipped with the replacement CRU, and 2) you may be charged for the replacement CRU if Lenovo does not receive the defective CRU within 30 days of your receipt of the replacement.

2. **On-site Service**

   Your Service Provider will either repair or exchange the failing Machine at your location and verify its operation. You must provide suitable working area to allow disassembly and reassembly of the Lenovo Machine. The area must be clean, well lit and suitable for the purpose. For some Machines, certain repairs may require sending the Machine to a designated service center.

3. **Courier or Depot Service ***

   You will disconnect the failing Machine for collection arranged by your Service Provider. A shipping container will be provided to you for you to return your Machine to a designated service center. A courier will pick up your Machine and deliver it to the designated service center. Following its repair or exchange, the service center will arrange the return delivery of the Machine to your location. You are responsible for its installation and verification.

4. **Customer Carry-In or Mail-In Service**

   You will deliver or mail as your Service Provider specifies (prepaid unless specified otherwise) the failing Machine suitably packaged to a designated location. After the Machine has been repaired or exchanged, it will be made available for your collection or, for Mail-in Service, the Machine will be returned to you at Lenovo's expense, unless your Service Provider specifies otherwise. You are responsible for the subsequent installation and verification of the Machine.

5. **CRU and On-site Service**

   This type of Warranty Service is a combination of Type 1 and Type 2 (see above).

6. **CRU and Courier or Depot Service**

   This type of Warranty Service is a combination of Type 1 and Type 3 (see above).

7. **CRU and Customer Carry-In or Mail-In Service**

   This type of Warranty Service is a combination of Type 1 and Type 4 (see above).

When a 5, 6 or 7 type of warranty service is listed, your Service Provider will determine which type of warranty service is appropriate for the repair.

* This type of service is called ThinkPad EasyServ or EasyServ in some countries.

To obtain warranty service contact a Service Provider. In Canada or the
United States, call 1-800-IBM-SERV (426-7378). In other countries, see the
telephone numbers below.

Worldwide telephone list

Phone numbers are subject to change without notice. For the most current
phone numbers, go to http://www.lenovo.com/support/phone.

Country or Region	Telephone Number
Africa	Africa: +44 (0)1475-555-055 South Africa: +27-11-3028888 and 0800110756 Central Africa: Contact the nearest Lenovo Business Partner
Argentina	0800-288-5366 (Spanish)
Australia	131-426 (English)
Austria	Up and running support: 01-24592-5901 Warranty service and support: 01-211-454-610 (German)
Belgium	Up and running support: 02-210-9820 (Dutch) Up and running support: 02-210-9800 (French) Warranty service and support: 02-225-3611 (Dutch, French)
Bolivia	0800-0189 (Spanish)
Brazil	Sao Paulo region: (11) 3889-8986 Outside Sao Paulo region: 0800-701-4815 (Brazilian Portuguese)
Canada	1-800-565-3344 (English, French) In Toronto only call 416-383-3344
Chile	Toll Free: 1230-020-1130 (Spanish)
China	800-810-1818 ext 5070 8610 84981188 ext 5070 (Mandarin)
China (Hong Kong S.A.R.)	ThinkPad (Technical enquiry hotline): 852-2516-3939 ThinkPad Service Center: 852-2825-6580 ThinkCentre Commerical PC: 8205-0333 Multimedia Home PC: 800-938-228 (Cantonese, English, Mandarin)
China (Macau S.A.R.)	ThinkPad (Technical enquiry hotline): 0800-839 ThinkCentre (Technical enquiry hotline): 0800-336 (Cantonese, English, Mandarin)
Colombia	01-800-952-0466 (Spanish)
Costa Rica	800-011-1029 (Spanish)
Croatia	0800-0426

Country or Region	Telephone Number
Cyprus	+357-22-841100
Czech Republic	+420-2-7213-1316
Denmark	Up and running support: 4520-8200 Warranty service and support: 7010-5150 (Danish)
Dominican Republic	Toll Free: 1-866-434-2080 (Spanish)
Ecuador	1-800-426911 (Spanish)
El Salvador	800-6264 (Spanish)
Estonia	+386-61-1796-699
Finland	Up and running support: 09-459-6960 Warranty service and support: +358-800-1-4260 (Finnish)
France	Up and running support: 0238-557-450 Warranty service and support (hardware): 0810-631-213 Warranty service and support (software): 0810-631-020 (French)
Germany	Up and running support: 07032-15-49201 Warranty service and support: 01805-25-35-58 (German)
Greece	+30-210-680-1700
Guatemala	1800-624-0051 (Spanish)
Honduras	Tegucigalpa: 232-4222 San Pedro Sula: 552-2234 (Spanish)
Hungary	+36-1-382-5720
India	1800-425-6666 +91-80-2678-8970 (English)
Indonesia	800-140-3555 (English) 62-21-251-2955 (Bahasa, Indonesian)
Ireland	Up and running support: 01-815-9202 Warranty service and support: 01-881-1444 (English)
Israel	Givat Shmuel Service Center: +972-3-531-3900 Haifa Service Center: +972-4-849-4608 (Hebrew, English)
Italy	Up and running support: 02-7031-6101 Warranty service and support: +39-800-820094 (Italian)

Country or Region	Telephone Number
Japan	ThinkPad Products Toll Free: 0120-20-5550 International: +81-46-266-4716 Both of the above numbers will be answered with a Japanese language voice prompt. For telephone support in English, please wait for the Japanese voice prompt to end, and an operator will answer. Please say "English support please," and your call will be transferred to an English speaking operator.
Korea	1588-5801 (Korean)
Latvia	+386-61-1796-699
Lithuania	+386-61-1796-699
Luxembourg	+352-298-977-5063 (French)
Malaysia	1800-88-8558 (English, Bahasa, Melayu)
Malta	+356-23-4175
Mexico	01-800-123-1632 (Spanish)
Middle East	+44 (0)1475-555-055
Netherlands	+31-20-514-5770 (Dutch)
New Zealand	0800-733-222 (English)
Nicaragua	001-800-220-1830 (Spanish)
Norway	Up and running support: 6681-1100 Warranty service and support: 8152-1550 (Norwegian)
Panama	001-866-434-2080 (Toll Free) (Spanish)
Peru	0-800-00-966 (Spanish)
Philippines	1800-1888-1426 (English) 63-2-995-8420 (Filipino)
Poland	+48-22-878-6999
Portugal	+351-21-892-7147 (Portuguese)
Romania	+4-021-224-4015
Russian Federation	+7-495-940-2000 (Russian)
Singapore	1800-3172-888 (English, Bahasa, Melayu)
Slovakia	+421-2-4954-1217
Slovenia	+386-1-4796-699
Spain	91-714-7983 0901-100-000 (Spanish)
Sri Lanka	+94-11-2448-442 (English)

Country or Region	Telephone Number
Sweden	Up and running support: 08-477-4420 Warranty service and support: 077-117-1040 (Swedish)
Switzerland	Up and running support: 058-333-0900 Warranty service and support: 0800-55-54-54 (German, French, Italian)
Taiwan	886-2-8723-9799 0800-000-700 (Mandarin)
Thailand	1-800-299-229 (Thai)
Turkey	00800-4463-2041 (Turkish)
United Kingdom	Up and running support: 01475-555-055 Warranty support: 08705-500-900 (English)
United States	1-800-426-7378 (English)
Uruguay	000-411-005-6649 (Spanish)
Venezuela	0-800-100-5722 (Spanish)
Vietnam	For northern area and Hanoi: 84-4-843-6675 For southern area and Ho Chi Minh City: 84-8-829-5160 (English, Vietnamese)

Appendix B. Customer Replaceable Units (CRUs)

For your ThinkPad computer, the following parts are designated Customer Replaceable Unit (CRU) parts.

Listed below are the CRUs and the documentation where removal/replacement instructions are located.

	Service and Troubleshooting Guide	Setup Instructions	Access Help	Online Hardware Maintenance Manual	Online Video
Tier 1 CRUs					
Battery	X		X	X	X
Hard disk drive	X		X	X	X
Optical drive			X	X	X
Ultrabay device			X	X	X
AC adapter and power cord		X			
TrackPoint cap			X		
Tier 2 CRUs					
Memory	X		X	X	X
Keyboard			X	X	X
Palm rest - integrated with touch pad and fingerprint reader	X		X	X	X
PCI Express Mini Card			X	X	X
Communication Daughter Card			X	X	X

You can find instructions for replacing CRUs in Access Help. To open Access Help, click **Start**, move the pointer to **All Programs** (in Windows other than Windows XP, **Programs**); then to **ThinkVantage**. Click **Access Help**

If you are unable to access these instructions or if you have difficulty replacing a CRU, you can use either of the following additional resources:

- The Online Hardware Maintenance Manual and Online Videos available from the Support Web site http://www.lenovo.com/think/support/site.wss/document.do?lndocid =part-video
- The Customer Support Center. For the telephone number of the Support Center for your country or region, see "Worldwide telephone list" on page 48.

Appendix C. Features and Specifications

For details about each part and its function of your computer, see the About your computer section in online Access Help.

Features

Processor
- See the system properties of your computer. You can do this as follows: right-click My computer on your desktop, from the pull down menu select Properties.

Memory
- Double data rate (DDR) 2 synchronous dynamic random access memory (DRAM)

Storage device
- 2.5-inch hard disk drive

Display
The color display uses TFT technology:
- Size: 14.1 inch

  Resolution:
  - LCD: Up to 1400-by-1050, depending on the model
  - External monitor: Up to 2048-by-1536
- Size: 15.0 inch

  Resolution:
  - LCD: Up to 1400-by-1050, depending on the model
  - External monitor: Up to 2048-by-1536
- ThinkLight™
- Brightness control

Keyboard
- Fingerprint reader (on some models)
- 89-key, 90-key, or 94-key
- UltraNav® (TrackPoint® and touch pad)
- Fn key function
- ThinkVantage button
- Volume control buttons

Interface
- Stereo headphone jack

- Microphone jack
- Video-out connector (S-Video) (on some models)
- 3 Universal Serial Bus (USB) connectors
- IEEE 1394 connector (on some models)
- RJ11 telephone connector
- RJ45 Ethernet connector
- Ultrabay™ Enhanced (on some models)
- Docking connector (on some models)
- External-monitor connector
-

PC Card slot
- Type II PC Card (lower slot)
- ExpressCard slot (upper slot) (on some models)

Optical drive
- CD-ROM, DVD-ROM, Combo or Multi-Burner drive depending on the model

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

Specifications

Size
14-inch model
- Width: 314 mm (12.4 in.)
- Depth: 260 mm (10.2 in.)
- Height: 34.3 to 37.2 mm (1.35 to 1.46 in.)
15-inch model
- Width: 332 mm (13.1 in.)
- Depth: 269 mm (10.6 in.)
- Height: 37.3 to 40.2 mm (1.47 to 1.58 in.)

Environment
- Maximum altitude without pressurization: 3048 m (10,000 ft)
- Temperature
  - At altitudes up to 2438 m (8000 ft)
    - Operating: 5° to 35°C (41° to 95°F)
    - Non-operating: 5° to 43°C (41° to 109°F)
  - At altitudes above 2438 m (8000 ft)
    - Maximum operating temperature, 31.3°C (88° F)

> **Note:** When you charge the battery pack, its temperature must be at least 10°C (50°F).

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

Heat output
- 65 W (222 Btu/hr) maximum or 90 W (307 Btu/hr) maximum (depending on the model)

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

Battery pack
- ThinkPad R60 6 Cell Lithium-ion (Li-Ion) battery pack
  - Nominal voltage: 10.8 V dc
  - Capacity: 5.2AH
- ThinkPad R60 9 Cell Lithium-ion (Li-Ion) battery pack
  - Nominal voltage: 10.8 V dc
  - Capacity: 7.8AH

Battery life
- For detailed information on battery life, see the Power Manager Gauge in the task tray.

Specifications

Appendix D. Notices

Notices

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

Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

> *Lenovo (United States), Inc.*
> *500 Park Offices Drive, Hwy. 54*
> *Research Triangle Park, NC 27709*
> *U.S.A.*
> *Attention: Lenovo Director of Licensing*

LENOVO GROUP LTD. PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or

indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary.

Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk.

Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Television output notice

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

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

Electronic emissions notices

The following information refers to ThinkPad R60, machine type 9444, 9445, 9446, 9447, 9455, 9456, 9457, 9458, 9459, 9460, 9461, 9462, 9463, 9464, 0656, 0658, and 0659

Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, used, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee the interference will not occur in a particular

installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from Lenovo authorized dealers. Lenovo is not responsible for any radio or television interference caused by using other than recommended cables or connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Responsible party:
    Lenovo (United States) Inc.
    One Manhattanville Road
    Purchase, New York 10577
    Telephone: (919) 254-0532

Industry Canada Class B emission compliance statement

This Class B digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Lenovo cannot accept responsibility

for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-Lenovo option cards.

This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication devices.

Properly shielded and grounded cables and connectors must be used in order to reduce the potential for causing interference to radio and TV communications and to other electrical or electronic equipment. Such cables and connectors are available from Lenovo authorized dealers. Lenovo cannot accept responsibility for any interference caused by using other than recommended cables and connectors.

Important information for the European Directive 2002/96/EC

EU ONLY

Notice : This mark applies only to countries within the European Union (EU) and Norway. This appliance is labelled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

Remarque : Cette étiquette concerne uniquement les pays de l'Union européenne et la Norvège. Cet appareil porte une étiquette liée aux dispositions de la Directive 2002/96/CE du Conseil Européen relative aux déchets d'équipements électriques et électroniques (DEEE). Cette directive détermine les dispositions générales, applicables dans l'Union européenne, pour la récupération et le recyclage des équipements utilisés. Cette étiquette est apposée à différents produits pour signaler qu'ils ne doivent pas être jetés mais récupérés, selon les dispositions énoncées dans la directive.

注意: このマークは、EU 諸国およびノルウェーにおいてのみ適用されます。この機器には、EU 諸国に対する廃電気電子機器指令 2002/96/EC (WEEE) のラベルが貼られています。この指令は、EU 諸国に適用する使用済み機器の回収とリサイクルの骨子を定めています。このラベルは、使用済みになった時に指令に従って適正な処理をする必要があることを知らせるために、種々の製品に貼られています。

IBM Lotus Software Offer

About the offer: As a qualifying ThinkPad computer customer, you are receiving a single, limited license for the Lotus Notes® "standalone" client and a single license for the Lotus SmartSuite® software. These licenses entitle you to install and use this software on your new ThinkPad computer using one of the following options:

- **Media for this software is not included in this offer. If you do not already have the appropriate Lotus Notes Client or Lotus SmartSuite software media**, you can order a CD and install the software onto your computer. For more information, see "To order a CD" on page 64.
- **If you already have a licensed copy of the software**, you are entitled to make and use one additional copy of the software you have.

About IBM Lotus Notes: With your standalone, limited use Notes client, you can integrate your most valuable messaging, collaborative and personal information management (PIM) resources —like e-mail, calendar, to-do list — allowing you to access them while connected to or disconnected from your network. The standalone license does not include the right to access any IBM Lotus Domino servers; however this stand-alone license may be upgraded to a full Notes license at a reduced price. For more information visit http://www.lotus.com/notes.

About IBM Lotus SmartSuite: Lotus SmartSuite contains powerful applications with timesaving features that give you a head start on your work and guide you through individual tasks.

- Lotus Word Pro® – Word Processor
- Lotus 1-2-3® – Spreadsheet
- Lotus Freelance Graphics® – Presentation Graphics
- Lotus Approach® – Database
- Lotus Organizer® – Time, Contact, and Information Manager
- Lotus FastSite® – Web Publisher
- Lotus SmartCenter – Internet Information Manager

Customer Support: For support information and phone numbers to help with initial installation of software, visit http://www.lenovo.com/think/support. To purchase technical support beyond this initial installation support, visit http://www.lotus.com/passport.

International Program License Agreement: The software licensed to you under this offer does not include software upgrades or technical support, and is subject to the terms and conditions of the IBM International Program License Agreement (IPLA) that accompanies the software. Your use of the Lotus SmartSuite and Lotus Notes programs described in this offer constitutes acceptance of the terms of this Offer and the IPLA. For further information regarding the IBM IPLA, visit http://www.ibm.com/software/sla/sladb.nsf. These programs are not for resale.

Proof of Entitlement: The proof of purchase for your qualifying ThinkPad computer, as well as this Offer document, should be retained as your proof of entitlement.

Purchasing Upgrades, Additional Licenses and Technical Support
Software upgrades and technical support are available for a fee through IBM's Passport Advantage® Program. For information about purchasing additional licenses for Notes, SmartSuite, or other Lotus® products, visit http://www.ibm.com or http://www.lotus.com/passport.

To order a CD:

Important: Pursuant to this Offer, you may order one CD media per license. You will need to provide the 7 digit serial number of the new ThinkPad computer that you purchased. The CD is provided at no charge; however, applicable shipping, duties and taxes may be imposed by local jurisdictions. Please allow 10 to 20 business days from receipt of your request for delivery.
  –In U. S. Or Canada:
    Call 800-690-3899
  –In Latin American Countries:
    Via the Internet: http://smartsuite.modusmedia.com
    Mail address:
      IBM - Lotus Notes and SmartSuite Program
      Modus Media International
      501 Innovation Avenue
      Morrisville, NC, USA 27560
    Fax: 919-405-4495
    To inquire about an order, contact:
      smartsuite_ibm@modusmedia.com
  –In European Countries:
    Via the Internet: http://ibm.modusmedia.co.uk
    Mail address:
      IBM - Lotus Notes and SmartSuite Program
      P.O. Box 3118
      Cumbernauld, Scotland, G68 9JX
    To inquire about an order, contact:
      ibm_smartsuite@modusmedia.com

Via the Internet: http://smartsuite.modusmedia.com
Mail address:
   IBM - Lotus Notes and SmartSuite Program
   Modus Media International
   eFulfillment Solution Center
   750 Chai Chee Road
   #03-10/14, Technopark at Chai Chee,
   Singapore 469000
Fax: +65 6448 5830
To inquire about an order, contact:
   Smartsuiteapac@modusmedia.com

Trademarks

The following terms are trademarks of Lenovo in the United States, other countries, or both:
   Lenovo
   ThinkPad
   PS/2
   Rapid Restore
   Rescue and Recovery
   ThinkLight
   ThinkPad
   TrackPoint
   ThinkVantage
   Ultrabay
   UltraNav

The following terms are trademarks of International Business Machines Corporation in the United States, other countries, or both:
   IBM
   Lotus
   Lotus 1-2-3
   Lotus Approach
   Lotus FastSite
   Lotus Freelance Graphics
   Lotus Notes
   Lotus Organizer
   Lotus SmartCenter
   Lotus SmartSuite
   Lotus Word Pro

Microsoft and Windows are trademarks of Microsoft Corporation in the United States, other countries, or both.

Intel, Pentium, and Intel SpeedStep are trademarks of Intel Corporation in the United States and/or other countries. (For a complete list of Intel trademarks, see www.intel.com/sites/corporate/tradmarx.htm)

Other company, product, or service names may be trademarks or service marks of others.

Index

Part Number: 42T8002

Printed in China