

**January 2000**

**This manual supports:**

**ThinkPad 600X (MT 2645)**

**ThinkPad 600X (MT 2646)**

**Note**

Before using this information and the product it supports, be sure to read the general information under "Notices" on page 78.

**First Edition (January 2000)**

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## Read this first

Before you go to the checkout guide, be sure to read this section.

### Important notes

- **Only certified trained personnel should service the computer.**
- **Read the entire FRU removal and replacement page before replacing any FRU.**
- **Use new nylon-coated screws when you replace FRUs.**
- **Be extremely careful during such write operations as copying, saving, or formatting.** Drives in the computer that you are servicing might have been rearranged, or the drive startup sequence might have been altered. If you select an incorrect drive, data or programs might be overwritten.
- **Replace FRUs only for the correct model.** When you replace a FRU, make sure the model of the machine and the FRU part number are correct by referring to the FRU parts list.
- **A FRU should not be replaced because of a single, unreproducible failure.** Single failures can occur for a variety of reasons that have nothing to do with a hardware defect, such as cosmic radiation, electrostatic discharge, or software errors. Consider replacing a FRU only when a problem recurs. If this is suspected, clear the error log and run the test again. Do not replace any FRUs if log errors do not reappear.
- **Be careful not to replace a nondefective FRU.**

**What to do first:** When you do return a FRU, you must include the following information in the parts exchange form or parts return form that you attach to it:

- \_\_\_ 1. Name and phone number of servicer
- \_\_\_ 2. Date of service
- \_\_\_ 3. Date on which the machine failed
- \_\_\_ 4. Date of purchase
- \_\_\_ 5. Failure symptoms, error codes appearing on the display, and beep symptoms
- \_\_\_ 6. Procedure index and page number in which the failing FRU was detected
- \_\_\_ 7. Failing FRU name and part number
- \_\_\_ 8. Machine type, model number, and serial number
- \_\_\_ 9. Customer's name and address

Before checking problems with the computer, determine whether the damage is covered under the warranty by referring to the following:

**Note for warranty:** During the warranty period, the customer may be responsible for repair costs if the computer damage was caused by misuse, accident, modification, unsuitable physical or operating environment, or improper maintenance by the customer. The following list provides some common items that are not covered under warranty and some symptoms that might indicate that the system was subjected to stress beyond normal use.

**The following is not covered under warranty:**

- LCD panel cracked from the application of excessive force or from being dropped.
- Scratched (cosmetic) parts.
- Cracked or broken plastic parts, broken latches, broken pins, or broken connectors caused by excessive force.
- Damage caused by liquid spilled into the system.
- Damage caused by the improper insertion of a PC Card or the installation of an incompatible card.
- Damage caused by foreign material in the diskette drive.
- Diskette drive damage caused by pressure on the diskette drive cover or by the insertion of a diskette with multiple labels.
- Damaged or bent diskette eject button.
- Fuses blown by attachment of a nonsupported device.
- Forgotten computer password (making the computer unusable).

**The following symptoms might indicate damage caused by nonwarranted activities:**

- Missing parts might be a symptom of unauthorized service or modification.
- HDD spindles can become noisy from being subjected to excessive force or from being dropped.
- I9990303 errors can be caused by exposure to strong magnetic fields.

---

## Related service information

This section provides information about the following:

- “Reset switch”
- “Service Web site”
- “Passwords”
- Power management features

### Reset switch

The Reset switch resets the system (regardless of the microcode status) and forces the power off. Use this pushbutton to power off when power is not completely off or the microcode is in a hung state. For its location, see “Rear view” on page 66.

### Service Web site

When the latest maintenance diskette and the system program service diskette are available, a notice will be posted on <http://pccbbs.raleigh.ibm.com/>

### Passwords

As many as three passwords may be needed for any ThinkPad computers: the power-on password (POP), the hard disk password (HDP), and the supervisor password (PAP).

When the power-on password (POP), the hard disk password (HDP), or the supervisor password (PAP) is used, the following situations may occur:

If the PAP is used, the HDP is enabled automatically, but no HDP prompt appears. The HDP is set the same as the PAP.

- **If the POP is the same as the HDP**, the POP prompt appears, but the HDP prompt does not appear.
- **If the POP is not the same as the HDP**, both prompts appear.

If a ThinkPad computer has an extra bay, it can support more than two HDPs. Then the following situations will occur:

- If the **POP** is the same as one of the **HDPs** (HDP-1 or HDP-2), a POP prompt appears. The passwords are different.
- If the **POP** is not the same as either of the **HDPs** (HDP-1 or HDP-2), both prompts appear.
- If the **PAP** is used, the **HDP-1** or the **HDP-2** is automatically enabled, but the HDP prompt does not appear. The HDP-1 or the HDP-2 are then set to the same password as the PAP.

**Supervisor and hard disk passwords:** The supervisor password (PAP) and the hard disk password (HDP) are security features that are used to protect the system and the hard disk data from unauthorized access. No overriding capability is provided. If only a hard disk password is set, you must get the password from its owner in order to run diagnostic tests and perform service. If both the supervisor password and the hard disk password are set, you can enter Easy-Setup by pressing the **Enter** key or by entering the power-on password at the supervisor password prompt. In this case, the **Password**, **Start up**, **Network**, and **Initialize** or **Asset ID** (for some models) icons cannot be selected.

**Note:** The supervisor password and the hard disk password cannot be replaced if they are forgotten. If the customer forgets the supervisor password, the system board must be replaced. If the customer forgets the hard disk password, the hard disk drive must be replaced.

## How to remove the power-on passwords:

If only the power-on password is set, do the following to remove it:

1. Turn off the computer.
2. Remove the DIMM cover from the bottom of the computer.
3. Short-circuit the two password pads or put the jumper on the pins.

For the location of the password pads or the jumper, see "Password pads" on page 68.

4. Turn on the computer and wait until the POST ends. After the POST ends, the password prompt does not appear. The power-on password has been removed.
5. Reinstall the DIMM cover.

If both the power-on password and the supervisor password are set, do the following to remove them:

1. Power on the computer by pressing and holding **F1**.
2. Enter the supervisor password. The Easy-Setup menu appears.
3. Click the **Password** icon.
4. Click the **Power on** icon.
5. Enter the supervisor password, and press the **Space bar**.
6. Press **Enter** twice.
7. Click **Exit**; then click **Restart**.

The power-on password has been removed.



## Power management features

To reduce power consumption, the computer has three power management modes: standby, suspend, and hibernation.

**Standby mode:** In standby mode, the following occurs:

- The LCD backlight turns off.
- The hard disk drive motor stops.
- The speaker is muted.

**Note:** Standby mode in Windows 98 is called *suspend mode* in Windows 95.

To enter standby mode, press **Fn + F3**. To end standby mode and resume normal operation, press any key.

**Suspend mode:** When the computer enters suspend mode, the following events occur in addition to what occurs in standby mode:

- The LCD is powered off.
- The hard disk drive is powered off.
- The CPU stops.

Suspend mode in Windows 95 is called *standby mode* in Windows 98.

You can cause the computer to enter suspend mode by doing any of the following:

- Press **Fn + F4**.
- Close the LCD cover. (To prevent the computer from entering suspend mode when the LCD is closed, click **Will not suspend even if LCD is closed** in the Power Management Properties window. Then only the LCD turns off.)
- Select the **Suspend** button in the Fuel Gauge program.

In certain circumstances, the computer goes into suspend mode automatically:

- If a “suspend time” has been set on the timer, and the user does not do any operation with the keyboard, the TrackPoint, the hard disk, the parallel connector, or the diskette drive within the time set.
- If the ac adapter is plugged in.
- If the battery indicator blinks orange, indicating that the battery power is low. (Alternatively, if **Hibernate when battery becomes low** has been selected in the “Power Management Properties” window, the computer goes into hibernation mode.)

**Note:** Even if you don't set the low-battery alarm, the charge indicator lets you know that the battery is low, and then the ThinkPad automatically enters the power-saving mode. This default low-battery

## Related service information

behavior is independent of the operating system. So, if you have set the low-battery alarm, the computer may not do what you specified. It chooses either your setting or the default setting, whichever is appropriate.

Any one of the following events causes the computer to resume operation from suspend mode:

- The **Fn** key is pressed.
- The LCD cover is opened.
- The ring indicator (RI) is signaled by a serial device or a PC Card device.
- The power switch is turned on.
- The resume timer is set. In Windows 98, the **Scheduled Tasks** setting has priority over the **Resume on timer** selection in the "Power Management Properties" window.

**Note:** The computer does not accept any input immediately after it enters suspend mode. Therefore, wait a few seconds before taking any action to reenter operation mode.

## Hibernation mode

### Note for the Windows NT

A Windows NT user cannot create a hibernation file in a Windows NT system that uses the NTFS format system, the Windows NT default format. If you want to use hibernation mode, you should reinstall Windows NT with a FAT format system.

In hibernation mode, the following occurs:

- The system status, RAM, VRAM, and setup data are stored on the hard disk.
- The system is powered off.

### Notes

1. In the ThinkPad Configuration program, the computer can be set to **suspend/hibernate while docked**.
2. The computer cannot enter hibernation mode when it is powered with ac power and a communication PC Card is used.

Any one of the following events causes the computer to enter hibernation mode:

- The **Fn + F12** keys are pressed.
- The **Hibernation** button is selected in the Fuel-Gauge program.
- The power switch is turned off and the mode is set to **Power switch mode [Hibernation]**.

- The timer conditions are satisfied in suspend mode (for operating systems other than Windows 98).
- A critically low battery condition occurs and mode is set to **Hibernate when battery becomes low**.

When the power is turned on, the computer leaves hibernation mode and resumes operation. The hibernation file in the boot record on the hard disk drive is read, and system status is restored from the hard disk drive.

---

## Checkout guide

Use the following procedures as a guide in identifying and correcting problems with the ThinkPad computer.

**Note:** The diagnostic tests are intended to test only IBM products. The use of non-IBM products, prototype cards, or modified options can lead to false indications of errors and invalid system responses.

1. Identify the failing symptoms in as much detail as possible.
2. Verify the symptoms. Try to re-create the failure by running the diagnostic test or by repeating the operation.

## Testing the computer

The ThinkPad computer has a test program called PC-Doctor DOS (hereafter called *PC-Doctor*). You can detect errors by running the diagnostics test included in PC-Doctor. This section is an overview of the procedure. For details that depend on model-unique functions, refer to "Product overview" on page 13.

For some possible configurations of the computer, PC-Doctor might not run correctly. To avoid this problem, you need to initialize the computer setup by Easy-Setup before you run PC-Doctor. In the Easy-Setup screen, click **Config** and **Initialize**.

**Note:** When you initialize the computer configuration, some devices are disabled, such as the serial port. If you test one of these devices, you need to enable it by using PS2.EXE.

PC-Doctor does not support the test for the device in the SelectaDock docking station.

You can test the device in the docking station with an advanced test in Easy-Setup that is supported by the ThinkPad 600, 600E, or 770x series.

To run such a test,

- Remove a device from the bay of the docking station and install it in the bay of the 600 or 600E computer. Then start Easy-Setup.

## Checkout guide

- Dock the 770 series computer to the docking station. Then start Easy-Setup.

To run the test, do as follows:

**Note:** In the following procedure, you can select an item not only with the arrow keys, but also with the TrackPoint. Instead of pressing **Enter**, click the left button.

1. Insert the PC-Doctor disk into the diskette drive; then power on the computer.

If the computer cannot be powered on, go to “Power system checkout” on page 9, and check the power sources.

If an error code appears, go to “Symptom-to-FRU error messages” on page 17.

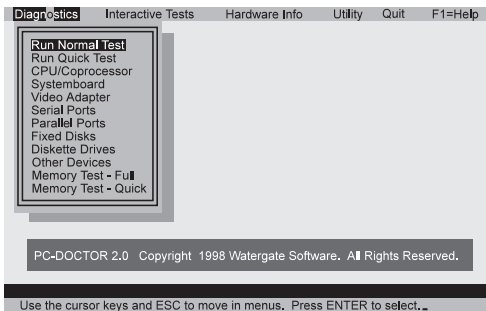
In the first screen, select the model and press **Enter**. Follow the instructions on the screen.

2. The PC-Doctor main panel appears.
3. Select **Diagnostics** with the arrow keys, and press **Enter**.

A pull-down menu appears. (Its exact form depends on the model.)

The options on the test menu are as follows:

Diagnostics	Interactive Tests
<ul style="list-style-type: none"><li>• Run Normal Test</li><li>• Run Quick Test</li><li>• CPU/Coprocessor</li><li>• Systemboard</li><li>• Video Adapter</li><li>• Serial Ports</li><li>• Fixed Disks</li><li>• Diskette Drives</li><li>• Other Devices</li><li>• Memory Test – Full</li><li>• Memory Test – Quick</li></ul>	<ul style="list-style-type: none"><li>• Keyboard</li><li>• Video</li><li>• Internal Speaker</li><li>• Mouse</li><li>• Joystick</li><li>• Diskette</li><li>• System Load</li><li>• CD-ROM/DVD</li><li>• Stereo Speaker</li></ul>
<p><b>Notes:</b></p> <ul style="list-style-type: none"><li>• In the <b>Keyboard</b> test in <b>Interactive Tests</b>, the <b>Fn</b> key is scanned only once. Each key should be held down for at least 2 seconds; otherwise, it cannot be sensed.</li><li>• Sound Card is not recognized in the <b>Hardware Info</b>.</li></ul>	



4. Run the applicable function test.
5. Follow the instructions on the screen. If there is a problem, PC-Doctor shows some messages.
6. To exit the test, select **Quit — Exit Diag.**  
To cancel the test, press **Esc.**

## Detecting system information with PC-Doctor

PC-Doctor can detect the following system information:

### Hardware Info:

- System Configuration
- Memory Contents
- Physical Disk Driver
- Logical Disk Driver
- VGA Information
- IDE Drive Info
- PCI Information
- PNPISA Info
- SMBIOS Info
- FRU Info

### Utility:

- Run External Tests
- Surface Scan Hard Disk
- Benchmark System
- DOS Shell
- Tech Support Form
- Battery Rundown
- View Test Log
- Print Log
- Save Log
- Full Erase Hard Drive
- Quick Erase Hard Drive

## Power system checkout

To verify the symptom of a problem, do the following:

1. Power off the computer.
2. Remove the battery pack.
3. Connect the ac adapter.

## Checkout guide

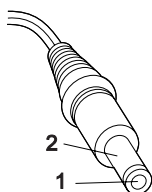
4. Check that power is supplied when you power on the computer.
5. Power off the computer.
6. Disconnect the ac adapter and install the charged battery pack.
7. Check that power is supplied by the battery pack when you power on the computer.

If you suspect a power problem, see the appropriate one of the following power supply checkouts:

- “Checking the ac adapter”
- “Checking operational charging”
- “Checking the battery pack” on page 11
- “Checking the backup battery” on page 12

**Checking the ac adapter:** You are here because the computer fails only when the ac adapter is used:

- If the power problem occurs only when the port replicator is used, replace the port replicator.
  - If the power-on indicator does not turn on, check the power cord of the ac adapter for correct continuity and installation.
  - If the computer does not charge during operation, go to “Checking operational charging.”
1. Unplug the ac adapter cable from the computer and measure the output voltage at the plug of the ac adapter cable. See the following figure:



(16 - 10 V)

Pin	Voltage (V dc)
1	+15.5 to +17.0
2	Ground

If the voltage is not correct, replace the ac adapter.

If the voltage is acceptable, do the following:

- Replace the system board.
- If the problem persists, go to “Product overview” on page 13.

**Note:** Noise from the ac adapter does not always indicate a defect.

**Checking operational charging:** To check operational charging, use a discharged battery pack or a battery pack that has less than 50% of the total power remaining when installed in the computer.

Perform operational charging. If the battery status indicator or icon does not turn on, remove the battery pack and let it return to room temperature. Reinstall the battery pack. If the charge indicator or icon still does not turn on, replace the battery pack.

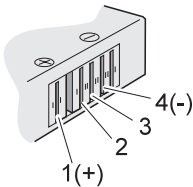
If the charge indicator still does not turn on, replace the system board. Then reinstall the battery pack. If the reinstalled battery pack is not charged, go to the next section.

**Checking the battery pack:** Battery charging does not start until the Fuel Gauge shows that less than 95% of the total power remains; under this condition the battery pack can charge to 100% of its capacity. This protects the battery pack from being overcharged or from having a shortened life.

**Note:** The battery pack might not be able to charge when it is hot. In that case, remove it from the computer and leave it at room temperature for a while. After it cools down, reinstall and recharge it.

Do the following:

1. Power off the computer.
2. Remove the battery pack and measure the voltage between battery terminals 1 (+) and 4 (-). See the following figure:



Terminal	Voltage (V dc)
1	+ 0 to + 12.6
4	Ground (-)

3. If the voltage is less than +11.0 V dc, the battery pack has been discharged. Recharge the battery pack.

**Note:** It takes at least 3 hours to recharge the battery pack.

If the voltage is still less than +11.0 V dc after recharging, replace the battery.

4. If the voltage is more than +11.0 V dc, measure the resistance between battery terminals 3 and 4. The resistance must be 4 to 30 K ohm.

If the resistance is not correct, replace the battery pack. If the resistance is correct, replace the system board.

## Checking the backup battery:

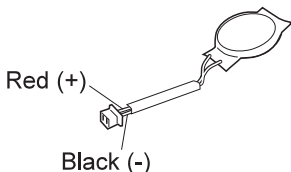
Do the following:

1. Power off the computer, and unplug the ac adapter from it.
2. Turn the computer upside down.
3. Remove the backup battery

**Note:** Removing the backup battery will cause loss of configuration data unless the battery pack is installed and operational.

(see “Checking the battery pack” on page 11).

4. Measure the voltage of the backup battery. See the following figure.



Wire	Voltage (V dc)
Red	+2.5 to +3.2
Black	Ground

- If the voltage is correct, replace the system board.
- If the voltage is not correct, replace the backup battery.
- If the backup battery discharges quickly after replacement, replace the system board.

## Port replicator checkout

Use the following procedure to isolate a port replicator problem. The port replicator attaches to the system expansion connector at the rear of the computer:

1. Power off the computer.
2. Remove the failing devices from the port replicator.
3. Unplug the AC Adapter from the port replicator, if it is attached.
4. Remove the port replicator from the computer.
5. Reconnect the failing device directly to the computer. (If another device is already connected to the computer, remove it first.)
6. Go to “Testing the computer” on page 7 and run the diagnostics.
7. If the advanced diagnostic device test does not find an error, suspect a problem with the port replicator.
8. Power off the computer, and reconnect the port replicator.
9. Power on the computer, and run the following advanced diagnostic tests:
  - Serial port test with the wrap plug installed on the port replicator



- Universal serial bus test with the USB parallel test cable
  - Parallel port test with the wrap plug installed on the port replicator
10. If diagnostic errors appear, replace the port replicator or the diskette drive. If the problem remains after the replacement, replace the system board.
  11. If power problems appear only when the port replicator is used, replace the port replicator.

**Power overload:** If power shutdown occurs intermittently when PC Card devices are used through a port replicator with PC Card slots, suspect a problem with over-current. Some PC Card devices use more power; if the maximum use of each device occurs simultaneously, the total current will exceed the limit, causing a power shutdown. Isolate this problem by removing one of the devices, and using the computer under the same condition. If a power shutdown occurs, you have found the cause of the problem. If not, do this procedure for all the other devices until you determine the cause.

---

## Product overview

This section presents the following product-unique information:

- “Features”
- “Status indicators” on page 15
- “Fn key combinations” on page 16

## Features

The following table is an overview of the system features of the ThinkPad 600X:

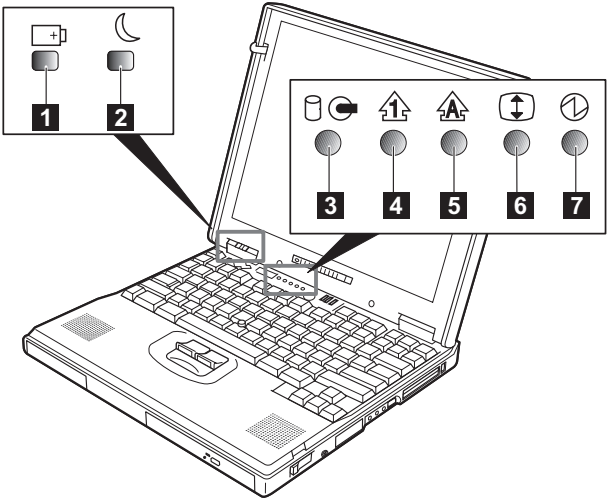
Feature	Description
Processor	<ul style="list-style-type: none"> <li>• Intel® Pentium® III 450 MHz, L2 cache</li> <li>• Intel® Pentium® III 500 MHz, L2 cache</li> <li>• Mobile Pentium® III processor at 650 MHz featuring Intel® SpeedStep technology running at 1.6 V</li> </ul>
Bus architecture	<ul style="list-style-type: none"> <li>• PCI Bus</li> </ul>
Memory (standard)	<ul style="list-style-type: none"> <li>• 64 MB (on the system board) and 32 MB in the DIMM slot</li> </ul>
Memory (option)	<ul style="list-style-type: none"> <li>• 32 MB, 64 MB, or 128 MB DIMM card (maximum of 320 MB)</li> </ul>
CMOS RAM	114 bytes + 4 Kbytes
Video	<ul style="list-style-type: none"> <li>• 13.3-inch, 16M colors XGA (1024×768 resolution) TFT color LCD</li> </ul>

## Product overview

<b>Feature</b>	<b>Description</b>
Diskette drive (External)	1.44 MB (3-mode), 3.5-inch
Hard disk drive	<ul style="list-style-type: none"><li>• 6.0 GB, 2.5-inch, IDE interface</li><li>• 12.0 GB, 2.5-inch, IDE interface</li></ul>
CD-ROM/DVD drive	<ul style="list-style-type: none"><li>• 24 x CD-ROM drive</li><li>• DVD drive (6 x DVD)</li></ul>
I/O port	<ul style="list-style-type: none"><li>• External monitor</li><li>• Headphone</li><li>• Line-in</li><li>• Microphone</li><li>• Mouse</li><li>• Parallel</li><li>• Port replicator</li><li>• Serial</li><li>• USB</li><li>• Video output port</li></ul>
Internal modem	<ul style="list-style-type: none"><li>• 56.6 Kbps</li></ul>
Audio	<ul style="list-style-type: none"><li>• 16-bit audio</li><li>• Internal stereo speaker</li><li>• Internal microphone</li><li>• Software control volume</li></ul>
Infrared transfer	IrDA 1.1
PCMCIA	One Type-III or two Type-II
Ac adapter	56-watt type

## Status indicators

The system status indicators blink green or orange to show the status of the computer.



Symbol	Color	Meaning
<b>1</b> Battery	Green	The battery is fully charged.
	Orange	The battery is charging.
	Blinking orange	The battery needs charging.
<b>2</b> Suspend mode	Green	Suspend mode.
	Blinking green	Entering suspend mode.
<b>3</b> Hard disk in use	Orange	Data is read from or written to the hard disk drive.
<b>4</b> Numeric lock	Green	The numeric keypad on the keyboard is enabled.
<b>5</b> Caps lock	Green	Caps Lock mode is enabled.
<b>6</b> Scroll lock	Green	Arrow keys can be used as screen-scroll function keys.
<b>7</b> Power on	Green	Power on.

## Fn key combinations

The following table shows the function of each combination of **Fn** with a function key.

The **Fn** key works independently from the operating system. The operating system obtains the status through the system management interface to control the system.

<b>Fn +</b>	<b>Description</b>
<b>F1</b>	Reserved.
<b>F2</b>	Turn the Fuel Gauge display on or off.
<b>F3</b>	Turn standby mode on.
<b>F4</b>	Turn suspend mode on.
<b>F5</b>	Reserved.
<b>F6</b>	Reserved.
<b>F7</b>	Switch between the LCD and an external monitor.
<b>F8</b>	Turn screen expansion on or off. (There is no symbol on the key.)
<b>F9</b>	Reserved.
<b>F10</b>	Reserved.
<b>F11</b>	Switch the power management mode: high performance, automatic, or customized. <b>Note:</b> In Windows 98, only the CPU speed is changed.
<b>F12</b>	Turn hibernation mode on.
<b>Pg Up</b>	Increase the volume, or unmute.
<b>Pg Dn</b>	Decrease the volume, or unmute.
<b>Backspace</b>	Mute. <b>Note:</b> To turn on the sound, press <b>Fn + PgUp</b> or <b>Fn + PgDn</b> .

## Symptom-to-FRU error messages

This chapter describes the Symptom-to-FRU error messages.

### How to use error messages

Use the error codes displayed on the screen to diagnose failures.

If two or more error codes are displayed, begin the diagnosis with the first one. Whatever caused the first error code can cause false error codes to be displayed.

If no error code is displayed, see if the error symptom is listed in the “Symptom-to-FRU index.”

### How to diagnose multiple FRUs

When an adapter or a device has more than one FRU, the error code could be caused by any of them. Before replacing multiple FRUs, try removing or exchanging each FRU, one by one in the specified sequence, to see if the symptoms change.

### Symptom-to-FRU index

The symptom-to-FRU index lists the symptoms and errors and their possible causes. The most likely cause is listed first.

**Note:** Do the FRU replacements or other actions in the sequence shown in the “FRU/Action in Sequence” column. If a FRU replacement does not solve the problem, put the original part back in the computer. Do not replace a nondefective FRU.

This index can also help you determine, during regular servicing, what FRUs are likely to need to be replaced next.

A numeric error code is displayed for each error detected in POST or system operation. In the displays, **X** can be any number.

If no numeric codes is presented, use the narrative descriptions of symptoms.

If a symptom is not listed, go to “Undetermined problems” on page 31.

#### **Note**

For an IBM device not supported by diagnostic codes in the ThinkPad notebook computers, see the manual for that device.

## Numeric error codes

Symptom or error	FRU or action, in sequence
<b>10X</b> 101: Interrupt failure. 102: Timer failure. 103: Timer interrupt failure. 104: Protected mode failure. 105: Last 8042 command not accepted. 107: NMI test failure. 108: Timer bus test failure. 109: Low meg-chip select test.	1. <b>System board</b>
<b>110</b> System board parity.	1. <b>Go to “Testing the computer” on page 7.</b> 2. DIMM card. 3. If the expansion unit is attached to the computer, detach it. 4. System board.
<b>111</b> I/O parity.	1. <b>Go to “Testing the computer” on page 7.</b> 2. Expansion unit or port replicator. 3. System board.
<b>11XX</b> 1101: Serial_A test failure.	1. <b>Go to “Testing the computer” on page 7.</b> 2. Serial device. 3. Communication cable. 4. System board.
<b>12XX</b> 1201: Serial_B test failure.	1. <b>Go to “Testing the computer” on page 7.</b> 2. System board (infrared).
<b>158</b> No hard disk password has been set even though the supervisor password is set.	<b>Set the password for the hard disk drive.</b>
<b>159</b> The hard disk password is not set the same as the supervisor password.	<b>Set the correct password for the hard disk drive.</b>

Symptom or error	FRU or action, in sequence
<b>161</b> Dead battery.	<ol style="list-style-type: none"> <li>1. <b>Go to “Checking the backup battery” on page 12.</b></li> <li>2. Backup battery.</li> <li>3. System board.</li> </ol>
<b>163</b> Time and date were not set.	<ol style="list-style-type: none"> <li>1. <b>Set time and date.</b></li> <li>2. System board.</li> </ol>
<b>173</b> Configuration data was lost.	<ol style="list-style-type: none"> <li>1. <b>Select OK in the error screen; then set the time and date.</b></li> <li>2. Backup battery.</li> <li>3. System board.</li> </ol>
<b>174</b>	<ol style="list-style-type: none"> <li>1. <b>Check device configuration.</b></li> <li>2. Hard disk drive assembly.</li> <li>3. System board.</li> </ol>
<b>175, 177, 178</b> 175: EEPROM CRC #1 error. 177: Supervisor password check sum error. 178: EEPROM is not functional.	<ol style="list-style-type: none"> <li>1. <b>System board.</b></li> </ol>
<b>17XX</b> 1701: Hard disk controller failure. 1780, 1790: Hard disk 0 error. 1781, 1791: Hard disk 1 error.	<ol style="list-style-type: none"> <li>1. <b>Go to “Testing the computer” on page 7.</b></li> <li>2. Hard disk drive.</li> <li>3. System board.</li> </ol>
<b>183</b> Incorrect password entered at the supervisor password prompt.	<b>Have the user examine the password.</b>
<b>184</b> Power-on password check sum error.	<b>Reset the power-on password in Easy-Setup.</b>
<b>185</b> The startup sequence is not valid. Suspect that power was off when the startup sequence was being updated.	<b>Reset the startup sequence in Easy-Setup.</b>
<b>188, 189</b> BAD EEPROM CRC #1. An incorrect checksum of the EEPROM is received.	<ol style="list-style-type: none"> <li>1. <b>System board.</b></li> </ol>
<b>190</b> A depleted battery pack was installed while the power was on.	<b>Go to “Checking the battery pack” on page 11.</b>

## Symptom-to-FRU error messages

Symptom or error	FRU or action, in sequence
<b>191XX</b> PM initialization error.	1. <b>System board.</b>
<b>192</b> Fan error.	<ol style="list-style-type: none"> <li>1. <b>Go to “Testing the computer” on page 7.</b></li> <li>2. Measure the voltage of the backup battery. If the voltage is not correct, replace the backup battery.</li> <li>3. Fan.</li> <li>4. System board.</li> </ol>
<b>193</b> RF Antenna has been removed.	<ol style="list-style-type: none"> <li>1. <b>Type the correct supervisor password at the password prompt.</b></li> <li>2. Reseat the RF Antenna to the HDD cover.</li> </ol>
<b>194</b> The computer is carried through the portal gate.	1. <b>Type the correct supervisor password at the password prompt.</b>
<b>195</b> The configuration read from the hibernation area does not match the actual configuration.	<p><b>Check whether the configuration has been changed.</b></p> <p>For example, check whether the DIMM card has been added.</p>
<b>196</b> A read error occurred in the hibernation area of the hard disk drive.	<ol style="list-style-type: none"> <li>1. <b>Run the hard disk drive test.</b></li> <li>2. Hard disk drive.</li> </ol>
<b>199XX</b> Resume error.	1. <b>System board.</b>
<b>1XX</b>	1. <b>System board.</b>
<b>2XX</b> 201: Memory data error. 202: Memory line error 00–15. 203: Memory line error 16–23. 205: Memory test failure on on-board memory. 221: ROM to RAM remap error.	<ol style="list-style-type: none"> <li>1. <b>Go to “Testing the computer” on page 7.</b></li> <li>2. DIMM card.</li> <li>3. System board.</li> </ol>
<b>225</b> Unsupported memory module.	<ol style="list-style-type: none"> <li>1. <b>Check if the supported DIMM is installed.</b></li> <li>2. DIMM card.</li> <li>3. System board.</li> </ol>



Symptom or error	FRU or action, in sequence
<p><b>301, 303, 304, 305, 3XX</b> 301: Keyboard error.</p>	<ol style="list-style-type: none"> <li>1. <b>Go to “Testing the computer” on page 7.</b></li> <li>2. Keyboard.</li> <li>3. External numeric keypad.</li> <li>4. External keyboard.</li> <li>5. Keyboard and mouse cable.</li> <li>6. System board.</li> </ol>
<p><b>601, 6XX</b> 601: Diskette drive or controller error.</p>	<ol style="list-style-type: none"> <li>1. <b>Go to “Testing the computer” on page 7.</b></li> <li>2. Diskette drive assembly.</li> <li>3. Diskette.</li> <li>4. System board.</li> </ol>
<p><b>602</b> Diskette read error.</p>	<ol style="list-style-type: none"> <li>1. <b>Go to “Testing the computer” on page 7.</b></li> <li>2. Diskette.</li> <li>3. Diskette drive assembly.</li> </ol>
<p><b>604</b> Unacceptable ID was read from the diskette drive.</p>	<ol style="list-style-type: none"> <li>1. <b>Go to “Testing the computer” on page 7.</b></li> <li>2. Diskette drive assembly.</li> <li>3. System board.</li> </ol>
<p><b>2402</b></p>	<ol style="list-style-type: none"> <li>1. <b>TV out card.</b></li> </ol>
<p><b>24XX</b> 2401: System board video error.</p>	<ol style="list-style-type: none"> <li>1. <b>Go to “Testing the computer” on page 7.</b></li> <li>2. System board.</li> </ol>
<p><b>808X</b> 8081: PC Card presence test failure. PC Card revision number also checked. 8082: PC Card register test failure.</p>	<ol style="list-style-type: none"> <li>1. <b>Go to “Testing the computer” on page 7.</b></li> <li>2. PC Card slot assembly.</li> <li>3. PCMCIA device.</li> <li>4. System board.</li> </ol>
<p><b>860X</b> Pointing device error when TrackPoint is disabled. 8601: System bus error—8042 mouse interface. 8602: External mouse error. 8603: System bus error or mouse error.</p>	<ol style="list-style-type: none"> <li>1. <b>Go to “Testing the computer” on page 7.</b></li> <li>2. External mouse.</li> <li>3. External keyboard.</li> <li>4. System board.</li> </ol>

## Symptom-to-FRU error messages

Symptom or error	FRU or action, in sequence
<p><b>861X</b>            Pointing device error when TrackPoint is enabled.</p> <p>8611: System bus error—I/F between 8042 and IPDC.            8612: TrackPoint error.            8613: System board or TrackPoint error.</p>	<ol style="list-style-type: none"> <li>1. <b>Go to “Testing the computer” on page 7.</b></li> <li>2. Reseat the keyboard cable on the sub card.</li> <li>3. Keyboard.</li> <li>4. External mouse.</li> <li>5. Sub card.</li> <li>6. System board.</li> </ol>
<p><b>I9990301</b>  <b>I9990302</b>  <b>I9990305</b></p> <p>I9990301: Hard disk error.            I9990302: Invalid hard disk boot record.            I9990305: No bootable device.</p>	<ol style="list-style-type: none"> <li>1. <b>Check that the operating system is installed in the hard disk drive. If not, install the operating system.</b></li> <li>2. Reseat the boot device.</li> <li>3. Check the startup sequence for the correct boot device.</li> <li>4. Check that the operating system has no failure and is installed correctly.</li> </ol>
<p><b>I9990303</b>            (Bank–2 flash ROM check sum error.)</p>	<ol style="list-style-type: none"> <li>1. <b>System board.</b></li> </ol>
<p><b>Other codes not listed above.</b></p>	<p><b>Go to “Undetermined problems” on page 31.</b></p>

## Beep symptoms

Symptom or error	FRU or action, in sequence
Continuous beeps.	1. <b>System board.</b>
One beep and a blank, unreadable, or flashing LCD.	1. <b>Reseat the LCD connector.</b> 2. LCD assembly. 3. System board.
One beep, and the message "Unable to access boot source."	1. <b>Boot device.</b> 2. System board.
One long and two short beeps, and a blank or unreadable LCD.	1. <b>System board.</b> 2. LCD assembly.
One long beep followed by four short beeps each time the power switch is operated. (System cannot power on because of low battery voltage.)	<b>Connect the ac adapter or install a fully charged battery.</b>
One beep every second. (System is shutting down because of low battery voltage.)	<b>Connect the ac adapter or install a fully charged battery. (Allow the system to shut down completely before changing the battery.)</b>
Two short beeps with error codes.	<b>POST error. See "Numeric error codes" on page 18.</b>
Two short beeps with blank screen.	1. <b>System board.</b>

## No Beep Symptoms

Symptom or error	FRU or action, in sequence
No beep, power-on indicator not on, and a blank LCD during POST.	1. <b>Go to "Power system checkout" on page 9.</b> 2. System board. 3. Check the power outlet.
No beep, power-on indicator on, and a blank LCD during POST.	1. <b>System board.</b>
No beep, power-on indicator on, and a blinking cursor only during POST.	1. <b>System board.</b>

## Symptom-to-FRU error messages

Symptom or error	FRU or action, in sequence
No beep during POST, but system runs correctly.	<ol style="list-style-type: none"><li>1. <b>Turn the volume up and check the speaker.</b></li><li>2. Speaker.</li><li>3. Sub card.</li><li>4. System board.</li></ol>

## Audio-related symptoms

Symptom or error	FRU or action, in sequence
In OS/2, DOS, or Windows multimedia programs, no sound comes from the computer. (Only system beeps are heard at power-on.)	<b>Check that the device driver is installed correctly.</b>

## CD-ROM-related symptoms

Symptom or error	FRU or action, in sequence
You hear a noise from the CD-ROM drive when the CD-ROM is spinning.	<ol style="list-style-type: none"><li>1. <b>CD-ROM drive.</b></li><li>2. System board.</li></ol>
The CD-ROM tray does not open even if you press the CD-ROM eject button.	Insert a pin into the CD-ROM emergency eject hole, and eject the CD-ROM tray.

Symptom or error	FRU or action, in sequence
The compact disc cannot be read.	<p>Make sure that:</p> <ul style="list-style-type: none"><li>• The compact disc is not dirty. If it is, clean it with a CD-ROM cleaner kit.</li><li>• The compact disc is not defective. If it is, try another compact disc.</li><li>• The compact disc is placed in the tray with the label side up.</li><li>• The compact disc format has one of the following formats:<ul style="list-style-type: none"><li>– Music CD</li><li>– CD-ROM or CD-ROM XA</li><li>– Multisession photo CD</li><li>– Video CD and CD-i movie (Windows 95 does not support CD-i movies)</li></ul></li></ul> <ol style="list-style-type: none"><li>1. <b>CD-ROM drive.</b></li><li>2. System board.</li></ol>

Symptom or error	FRU or action, in sequence
<p>The CD-ROM does not work.</p>	<p>Make sure that:</p> <ul style="list-style-type: none"> <li>• The computer power is turned on and a compact disc is in the CD-ROM drive.</li> <li>• The CD-ROM drive connector is firmly connected to the computer.</li> <li>• The CD-ROM drive tray is firmly closed.</li> <li>• The device drivers are correctly installed.</li> </ul> <p>If the CD-ROM drive in the docking station still does not work, do the following:</p> <ol style="list-style-type: none"> <li>1. Click on <b>Start</b>.</li> <li>2. Move the cursor to <b>Programs</b> and <b>ThinkPad</b>; then click on <b>ThinkPad Configuration</b>.</li> <li>3. Click on <b>Docking Station</b>.</li> <li>4. Make sure that you checked <b>Enable IDE device in the docking station</b>.</li> </ol> <p><b>Note:</b> Do not use IRQ 11 and 15 for the PCI device setting.</p> <ol style="list-style-type: none"> <li>5. Click on <b>OK</b>.</li> </ol> <p>If the problem remains, replace the following FRUs in order:</p> <ol style="list-style-type: none"> <li>1. <b>CD-ROM drive</b>.</li> <li>2. <b>System board</b>.</li> </ol>

## Function-related symptoms

Symptom or error	FRU or action, in sequence
The system does not suspend or resume when the LCD is closed or opened.	<ol style="list-style-type: none"> <li>1. <b>Go to “Suspend mode” on page 5, and check that the computer can enter suspend mode.</b></li> <li>2. Boot an operating system and press <b>Fn+F4</b>. If the computer enters suspend mode, suspect that the application program is not working properly.</li> <li>3. LCD assembly.</li> <li>4. System board.</li> </ol>
The battery Fuel Gauge does not go higher than 90%.	<b>Go to “Checking the battery pack” on page 11, and see the note.</b>
The memory count (size) appears different from the actual size.	<b>Go to “Testing the computer” on page 7.</b>
The system hangs intermittently.	<b>Go to “Intermittent problems” on page 31.</b>

## Indicator-related symptoms

Symptom or error	FRU or action, in sequence
The indicator incorrectly remains off or on, but the system runs correctly.	<ol style="list-style-type: none"> <li>1. <b>Sub card.</b></li> <li>2. System board.</li> </ol>
The battery power status indicator blinks from green to yellow to orange.	<ol style="list-style-type: none"> <li>1. <b>Check that a correct battery is installed.</b></li> <li>2. Battery pack.</li> <li>3. System board.</li> </ol>
The battery indicator does not turn on when the battery is installed.	<ol style="list-style-type: none"> <li>1. <b>Battery pack.</b></li> <li>2. System board.</li> </ol>

## Infrared-related symptoms

Symptom or error	FRU or action, in sequence
Unable to communicate using the Infrared (IR) Port.	<ol style="list-style-type: none"> <li>1. <b>Make sure the setup for the IR is correct.</b> Use the ThinkPad Configurations utility.</li> <li>2. Make sure there are no fluorescent lights near the computer. The computer may receive optical noise from the fluorescent light.</li> <li>3. Run the advanced diagnostic test. If an error occurs and a FRU code is displayed, replace the parts shown by the FRU code.</li> </ol>

## Keyboard- or TrackPoint-related symptoms

Symptom or error	FRU or action, in sequence
The keyboard (one or more keys) does not work.	<ol style="list-style-type: none"> <li>1. <b>Reseat the keyboard cable on the sub card.</b></li> <li>2. Keyboard.</li> <li>3. System board.</li> </ol>
The TrackPoint does not work.	<ol style="list-style-type: none"> <li>1. <b>Reseat the keyboard cable on the system board.</b></li> <li>2. Go to "Testing the computer" on page 7.</li> <li>3. Keyboard.</li> <li>4. System board.</li> </ol>
The pointer moves automatically or does not work correctly.	<b>See "Testing the computer" on page 7.</b>



## LCD-related symptoms

### Important

The TFT LCD for the notebook computer contains many thin-film transistors (TFTs). A small number of dots that are missing, discolored, or always lighted is characteristic of TFT LCD technology, but excessive pixel problems can cause viewing concerns. The LCD should be replaced if the number of missing, discolored, or lighted dots in any background is:

- **XGA (13.3"):** 8 or more bright dots, 8 or more dark dots, or a total of 9 or more bright and dark dots.

Symptom or error	FRU or action, in sequence
No beep, power-on indicator on, and a blank LCD during POST.	1. <b>System board.</b>
<ul style="list-style-type: none"> <li>• LCD backlight not working.</li> <li>• LCD too dark.</li> <li>• LCD brightness cannot be adjusted.</li> <li>• LCD contrast cannot be adjusted.</li> </ul>	<ol style="list-style-type: none"> <li>1. <b>Reseat the LCD connectors.</b></li> <li>2. LCD assembly.</li> <li>3. System board.</li> </ol>
<ul style="list-style-type: none"> <li>• LCD screen unreadable.</li> <li>• Characters missing pixels.</li> <li>• Screen abnormal.</li> <li>• Wrong color displayed.</li> </ul>	<ol style="list-style-type: none"> <li>1. <b>See important note for "LCD-related symptoms."</b></li> <li>2. Reseat all LCD connectors.</li> <li>3. LCD assembly.</li> <li>4. System board.</li> </ol>
Extra horizontal or vertical lines are displayed on the LCD.	1. <b>LCD assembly.</b>

## Modem-related symptoms

Symptom or error	FRU or action, in sequence
In OS/2, DOS, or Windows multimedia programs, no sound comes from the computer. (Only system beeps are heard at power-on.)	<b>Check that the device driver is installed correctly.</b>

Symptom or error	FRU or action, in sequence
In OS/2, DOS, or Windows, the modem does not work.	<p><b>Check that the modem is active.</b></p> <p><b>OS/2 and Windows:</b> Click on the <b>Modem</b> icon in the ThinkPad Configuration program.</p> <p><b>DOS:</b> Run the <b>MWMODEM ON</b> command.</p>

## PC Card-related symptoms

Symptom or error	FRU or action, in sequence
PC Card does not work in either the upper slot or the lower slot.	<ol style="list-style-type: none"> <li>1. <b>Reseat the PCMCIA slot assembly.</b></li> <li>2. PCMCIA slot assembly.</li> <li>3. System board.</li> </ol>
PCMCIA slot pin is damaged.	<b>PCMCIA slot assembly</b>
PC Card does not work.	<ol style="list-style-type: none"> <li>1. <b>Reseat the PC Card.</b></li> <li>2. Check that the PC Card is enabled in the ThinkPad Configuration program.</li> <li>3. Reseat the PCMCIA slot assembly.</li> <li>4. PCMCIA slot assembly.</li> <li>5. System board.</li> </ol>

## Peripheral-device-related symptoms

Symptom or error	FRU or action, in sequence
The external monitor does not work correctly.	<b>Connect the external monitor to another PC. If the monitor works properly, replace the system board. If not, replace the external monitor.</b>
Printer problems.	<ol style="list-style-type: none"> <li>1. <b>Run printer self-test.</b></li> <li>2. Run parallel port wrap test.</li> <li>3. System board.</li> <li>4. Printer cable.</li> </ol>
Serial or parallel port device problems.	<ol style="list-style-type: none"> <li>1. <b>Run serial/parallel port wrap test.</b></li> <li>2. Device.</li> <li>3. System board.</li> <li>4. Device cable.</li> </ol>

## Power-related symptoms

Symptom or error	FRU or action, in sequence
Power shuts down during operation.	<ol style="list-style-type: none"> <li>1. <b>Go to “Power system checkout” on page 9.</b></li> <li>2. Battery pack.</li> <li>3. Remove the battery pack and let it cool for 2 hours.</li> <li>4. System board.</li> <li>5. Check the power outlet.</li> </ol>
The system does not power off. (See “Reset switch” on page 3.)	<ol style="list-style-type: none"> <li>1. <b>Press the power shutdown switch.</b></li> <li>2. System board.</li> </ol>

## Other symptoms

Symptom or error	FRU or action, in sequence
Errors occur only when the port replicator is used.	<b>See “Port replicator checkout” on page 12.</b>
PC Card slot pin is damaged.	<ol style="list-style-type: none"> <li>1. <b>PC Card slots assembly</b></li> </ol>

**Note:** If you cannot find a symptom or an error in this list and the problem remains, see “Undetermined problems.”

## Intermittent problems

Intermittent system hang problems can be caused by a variety of reasons that have nothing to do with a hardware defect, such as cosmic radiation, electrostatic discharge, or software errors. FRU replacement should be considered only when a problem recurs.

When analyzing an intermittent problem, do the following:

1. Run the advanced diagnostic test for the system board in loop mode **at least 10 times**.
2. If no error is detected, do **not** replace any FRUs.
3. If any error is detected, replace the FRU shown by the FRU code. Rerun the test to verify that no more errors exist.

## Undetermined problems

You are here because the diagnostic tests did not identify which adapter or device failed, installed devices are incorrect, a short circuit is suspected, or the system is inoperative. Follow these procedures to isolate the failing FRU (do not isolate nondefective FRUs).

## *Symptom-to-FRU error messages*

Verify that all attached devices are supported by the computer.

Verify that the power supply being used at the time of the failure is operating correctly. (See "Power system checkout" on page 9):

1. Power off the computer.
2. Visually check the attached devices damage. If any problems are found, replace the FRU.
3. Remove or disconnect all of the following devices:
  - a. Non-IBM devices
  - b. Devices attached to the port replicator
  - c. Printer, mouse, and other external devices
  - d. Battery pack
  - e. Hard disk drive
  - f. External diskette drive
  - g. DIMM
  - h. CD-ROM and diskette drive in the UltralimBay
  - i. PC Cards
4. Power on the computer.
5. Determine whether the problem has changed.
6. If the problem does not recur, reconnect the removed devices one at a time until you find the failing FRU.
7. If the problem remains, replace the following FRUs, one at a time. Do not replace a nondefective FRU:
  - a. System board
  - b. LCD assembly
  - c. CPU card

## FRU replacement notices

This section contains notices for removal and replacement. Read this section carefully before replacing any FRU.

### Screw notices

Loose screws can cause a reliability problem. The IBM ThinkPad computer address this problem with special nylon-coated screws that have the following characteristics:

- They maintain tight connections.
- They do not easily come loose, even with shock or vibration.
- They need additional force to tighten.
- They should be used only once.

Do the following when you service this machine:

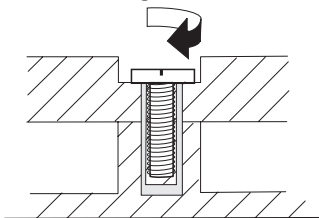
- Keep the screw kit (P/N 05K4841) in your tool bag.
- Always use new screws if you are instructed.
- Use a torque screwdriver if you have one.

Tighten screws as follows:

- **Plastic to plastic**

Turn an additional **90 degrees** after the screw head touches the surface of the plastic part:

90 degrees more

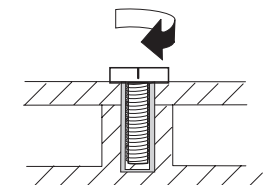


(Cross-section)

- **Logic card to plastic**

Turn an additional **180 degrees** after the screw head touches the surface of the logic card:

180 degrees more



(Cross-section)

- **Torque driver**

If you have a torque driver, refer to the "Torque" column with each step.

- Make sure you use the correct screw, and tighten all screws firmly to the torque shown in the table if you

have a torque screwdriver. **Never use a screw that you removed. Use a new one. Make sure the screws are tightened firmly**

## Retaining serial numbers

This section includes the following descriptions:

- “Restoring serial number of the system unit”
- “Retaining the UUID”

### Restoring serial number of the system

**unit:** When the computer was manufactured, the EEPROM on the system board was loaded with the serial numbers of the system and all major components. The system serial number must remain the same throughout the life of the computer.

When you replace the system board, you must restore the system unit serial number to its original value.

Before replacing the system board, save the original serial number by doing the following:

1. Install the ThinkPad Hardware Maintenance Diskette Version 1.60 and restart the computer.
2. From the main menu, select **1. Set System Identification**.
3. Select **2. Read S/N data from EEPROM**.

The serial number for each device is displayed. Write down the serial number of the system unit, designated as follows:

20: System unit serial number

After you have replaced the system board, restore the serial number by doing the following:

1. Install the ThinkPad Hardware Maintenance Diskette Version 1.60 and restart the computer.
2. From the main menu, select **1. Set System Identification**.
3. Select **1. Add S/N data from EEPROM**.

Follow the instructions on the screen.

**Note:** The serial number of the system unit is written on the label attached on the bottom of the computer.

**Retaining the UUID:** The Universally Unique Identifier (UUID) is a 128-bit number uniquely assigned to your computer at production and stored in the EEPROM of your system board. The algorithm that generates the unique number is designed to provide unique IDs until the year A.D. 3400. No two computers in the world have the same number.

When you replace the system board, you must set the UUID on the new system board as follows:

1. Install the ThinkPad Hardware Maintenance Diskette Version 1.60, and restart the computer.
2. Select **4. Assign UUID** from the main menu.  
A new UUID is created and written. If a valid UUID already exists, it is not overwritten.

---

## FRU removals and replacements

This section presents information and drawings for use in removing and replacing a FRU. Be sure to observe the following general rules:

1. Do not try to service the computer unless you have been trained and certified. An untrained person runs the risk of damaging parts.
2. Before replacing any FRU, review “FRU replacement notices” on page 33.
3. Begin by removing any FRUs that have to be removed before the failing FRU. Any such FRUs are listed at the top of the page. Remove them in the orders in which they are listed.
4. Follow the correct sequence in the steps for removing the FRU, as indicated in the drawings by the numbers in square callouts.
5. When turning a screw to replace a FRU, turn it in the direction indicated by the arrow in the drawing.
6. When removing the FRU, move it in the direction indicated by the arrow in the drawing.
7. To put the new FRU in place, reverse the removal procedure and follow any notes that pertain to replacement. For information about connecting and arranging internal cables, see “Locations” on page 65.
8. When replacing a FRU, use the correct screw as shown in the procedures.

### Caution

Before removing any FRU, power off the computer, unplug all power cords from electrical outlets, remove the battery pack, and then disconnect any interconnecting cables.

### Caution

The battery pack contains small amounts of nickel. Do not disassemble it, throw it into fire or water, or short-circuit it. Dispose of the battery pack as required by local ordinances or regulations.

### Attention

Before the computer is powered on after FRU replacement, make sure all screws, springs, and other small parts are in place and are not loose inside the computer. Verify this by shaking the computer gently and listening for rattling sounds. Metallic parts or metal flakes can cause electrical short circuits.



**Attention**

The system board is sensitive to, and can be damaged by, electrostatic discharge. Establish personal grounding by touching a ground point with one hand before touching these units.

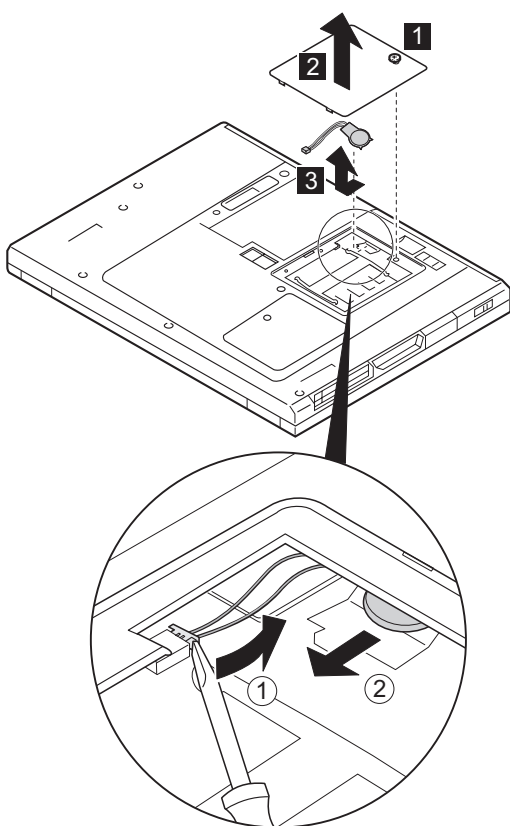
You must use an electrostatic discharge (ESD) strap (P/N 6405959) must be used to establish personal grounding.

## 1010 Backup battery

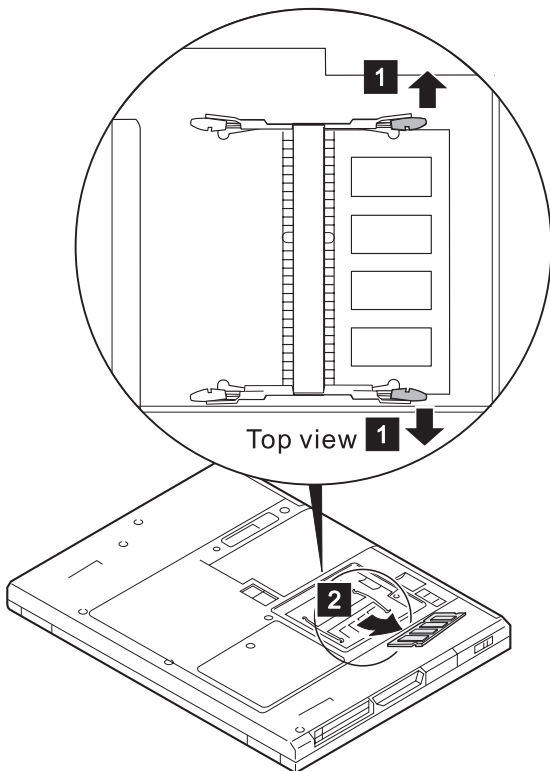
### Caution

The backup battery is a lithium battery and can cause a fire, an explosion, or severe burns. Do not recharge it, remove its polarized connector, disassemble it, heat it above 100°C (212°F), incinerate it, or expose its cell contents to water. Dispose of the battery as required by local ordinances or regulations. The use of an incorrect battery can result in ignition or explosion of the battery.

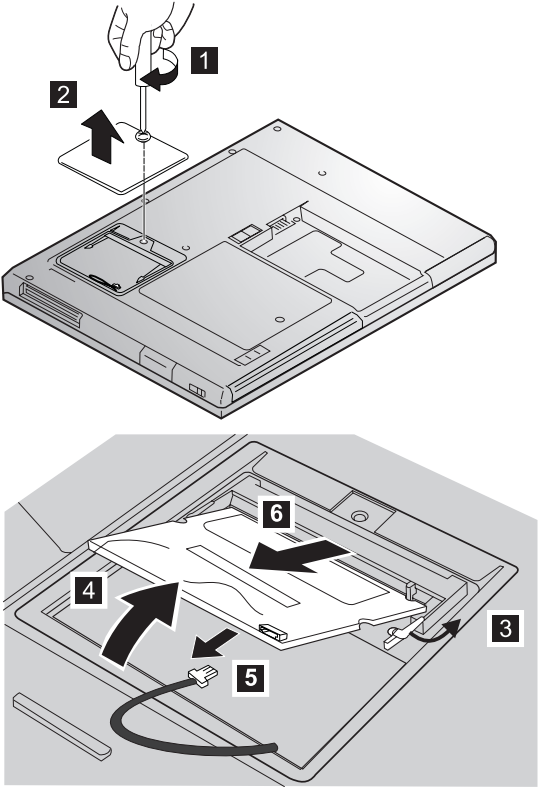
**Note:** Loosen the screw **1**, but do not remove it.



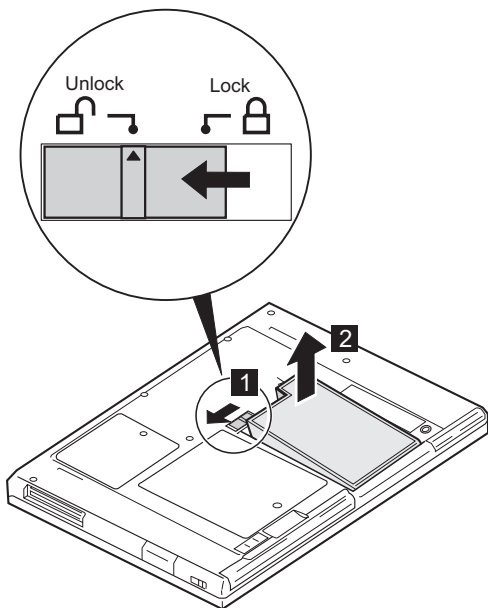
# 1020 DIMM



# 1025 Modem card



## 1030 Battery pack



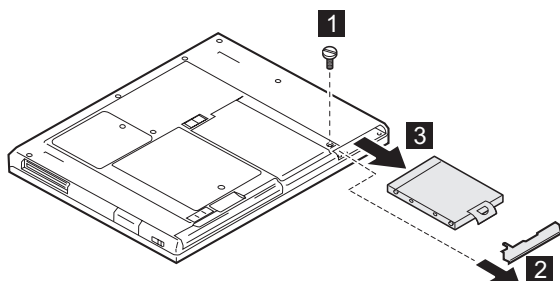
## 1040 Hard disk drive

### Attention

**Do not drop or apply any shock to the hard disk drive.** The hard disk drive is sensitive to physical shock. Incorrect handling can cause damage and permanent loss of data.

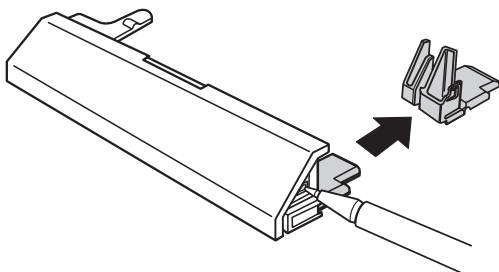
Before removing the drive, have the user make a backup copy of all the information on the drive if possible.

Never remove the drive while the system is operating or is in suspend mode.



Step	Screw (Quantity)	Color	Torque
<b>1</b>	Coin screw —Or— Security screw	Black	—
<b>Note:</b> Use a 2.5-mm allen wrench to remove the security screw.			

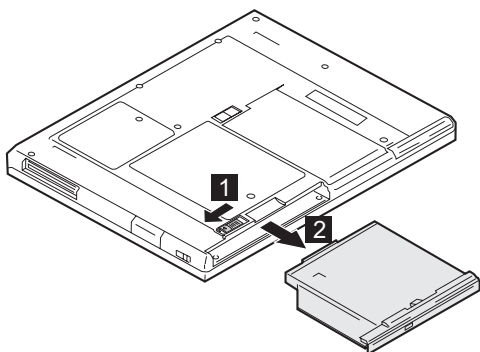
If you install an hard disk drive with a depth of 12mm, you need to remove a spacer. To remove a spacer, do as follows:



### When replacing:

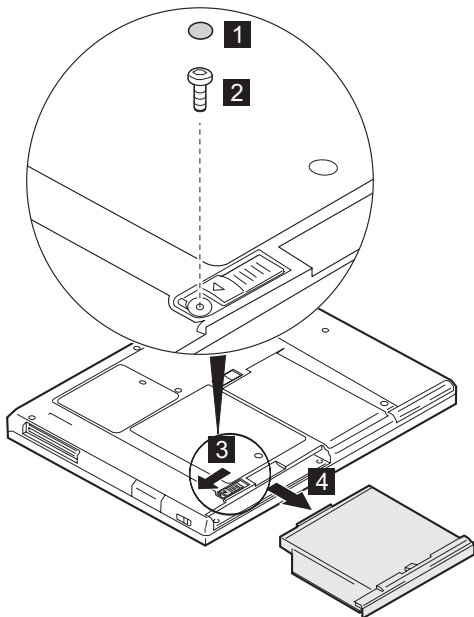
Make sure that the hard disk drive connector is firmly connected.

## 1050 UltralimBay device



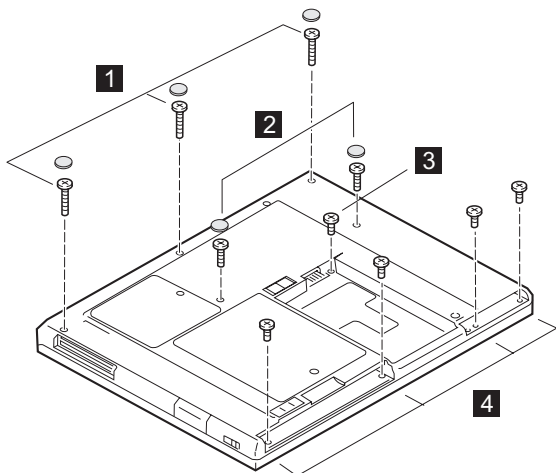
### When the security screw is installed

In step **1**, use a 2.5-mm allen wrench to remove the security screw.



## 1060 Keyboard assembly

- Battery pack (1030)
- Hard disk drive (1040)
- UltralimBay device (1050)

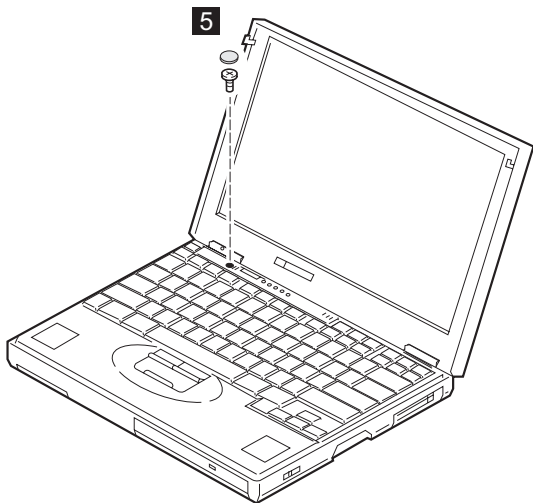


Step	Screw (Quantity)	Color	Torque
<b>1</b>	M2.5 × 19.5 mm, nylon-coated (3)	Black	4 kgcm
<b>2</b>	M2.5 × 16 mm, nylon-coated (2)	Black	4 kgcm
<b>3</b>	M2.5 × 4.8 mm, nylon-coated (1)	Black	4 kgcm
<b>4</b>	M2.5 × 3 mm, nylon-coated (4)	Yellow	4 kgcm

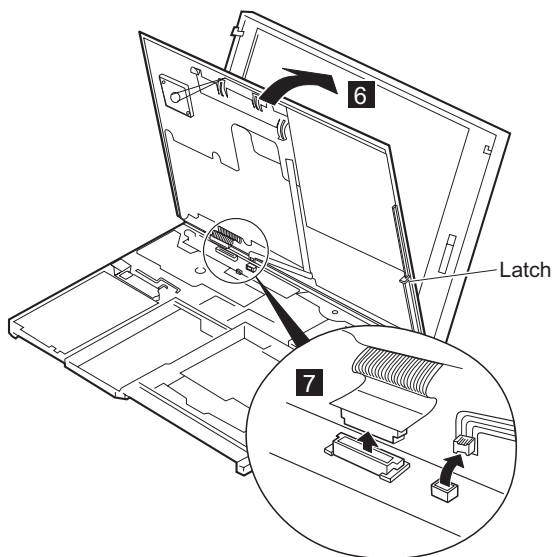
Now turn the computer right side up.

(Continued)

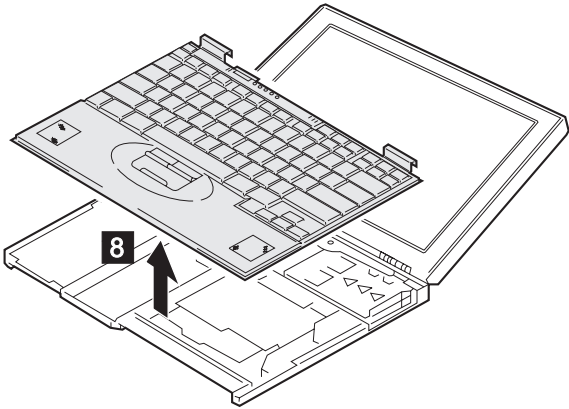




Step	Screw (Quantity)	Color	Torque
5	M2.5 × 4.8 mm, nylon-coated (1)	Black	4 kgcm



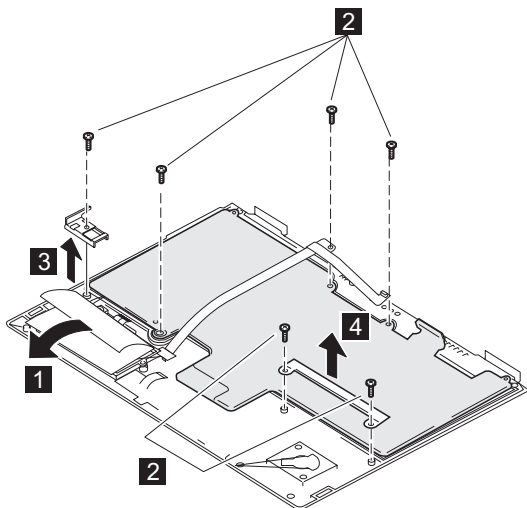
(Continued)



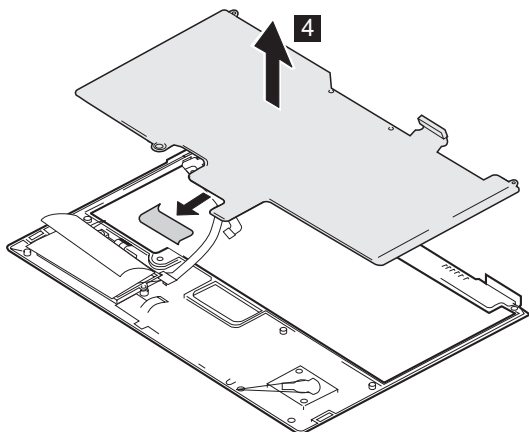
## 1070 Keyboard

- Battery pack (1030)
- Hard disk drive (1040)
- UltralimBay device (1050)
- Keyboard assembly (1060)

**Note:** In step **1**, remove the insulator gently for it is reused.



Bottom view

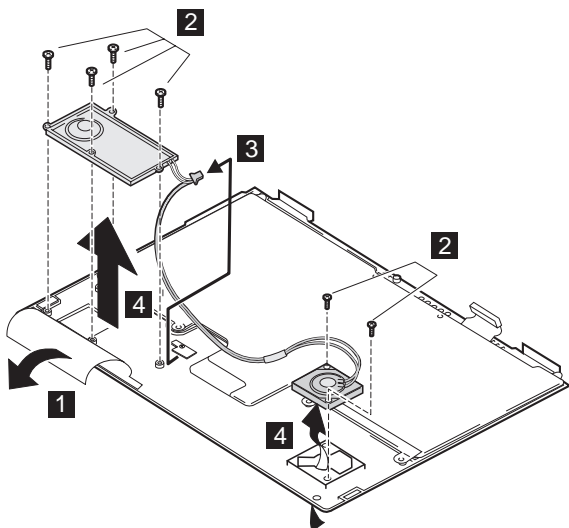


Step	Screw (Quantity)	Color	Torque
<b>2</b>	M2.5 × 3 mm, nylon-coated (6)	Yellow	4 kgcm

## 1080 Speakers

- Battery pack (1030)
- Hard disk drive (1040)
- UltralimBay device (1050)
- Keyboard assembly (1060)

**Note:** In step **1**, remove the insulator on the left speaker.



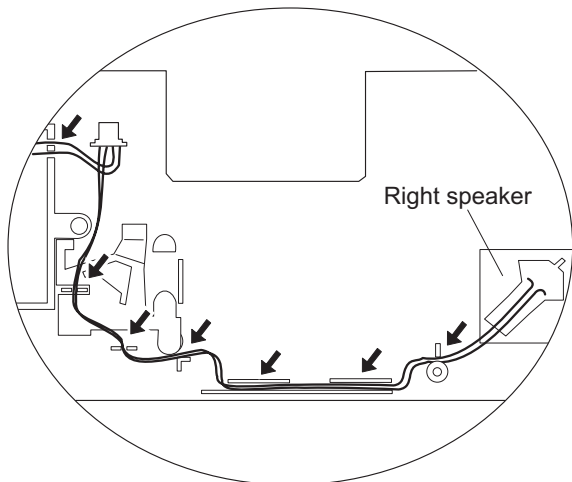
**Bottom view**

Step	Screw (Quantity)	Color	Torque
<b>2</b>	M2.5 × 3 mm, nylon-coated (6)	Yellow	4 kgcm

(Continued)

**Cable route:**

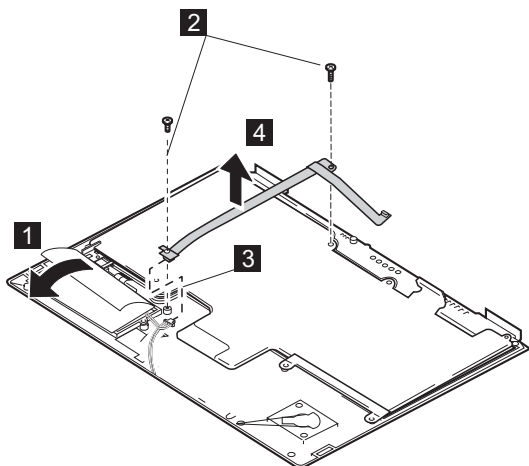
When replacing the right speaker, see the following figure for its cable route.



## 1085 Speaker cable

- Battery pack (1030)
- Hard disk drive (1040)
- UltralimBay device (1050)
- Keyboard assembly (1060)

**Note:** In step **1**, remove the insulator on the left speaker.

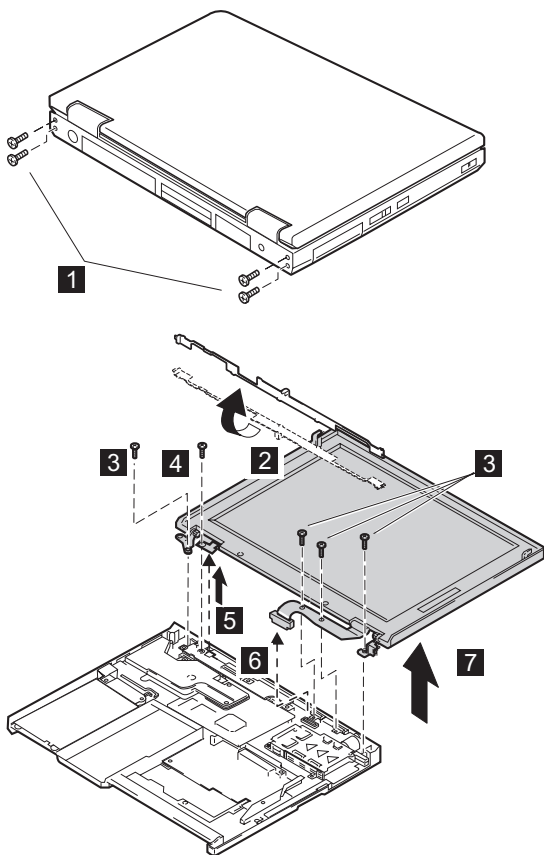


**Bottom view**

Step	Screw (Quantity)	Color	Torque
<b>2</b>	M2.5 × 3 mm, nylon-coated (2)	Yellow	4 kgcm

## 1090 LCD assembly

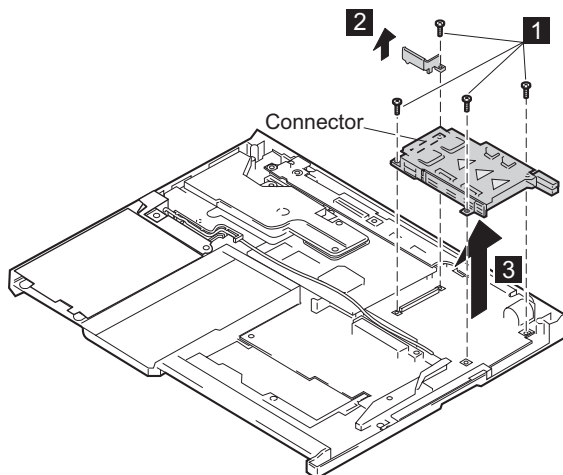
- Battery pack (1030)
- Hard disk drive (1040)
- UltralimBay device (1050)
- Keyboard assembly (1060)



Step	Screw (Quantity)	Color	Torque
<b>1</b>	M2.5 × 4.8 mm, nylon-coated (4)	Black	4 kgcm
<b>3</b>	M2.5 × 4.8 mm, nylon-coated (4)	Black	4 kgcm
<b>4</b>	M2.5 × 4.8 mm, nylon-coated (1)	Black	4 kgcm

## 1100 PC Card slot assembly

- Battery pack (1030)
- Hard disk drive (1040)
- UltralimBay device (1050)
- Keyboard assembly (1060)

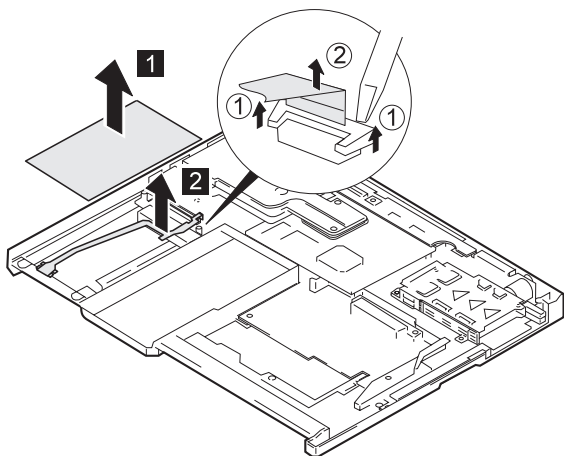


Step	Screw (Quantity)	Color	Torque
<b>1</b>	M2.0 × 9.5 mm, nylon-coated (4)	Black	2.5 kgcm



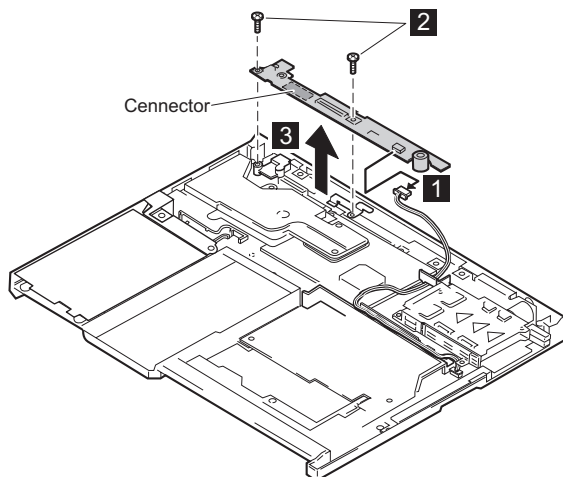
## 1110 Asset ID RF adapter kit

- Battery pack (1030)
- Hard disk drive (1040)
- UltralimBay device (1050)
- Keyboard assembly (1060)



## 1120 Sub card

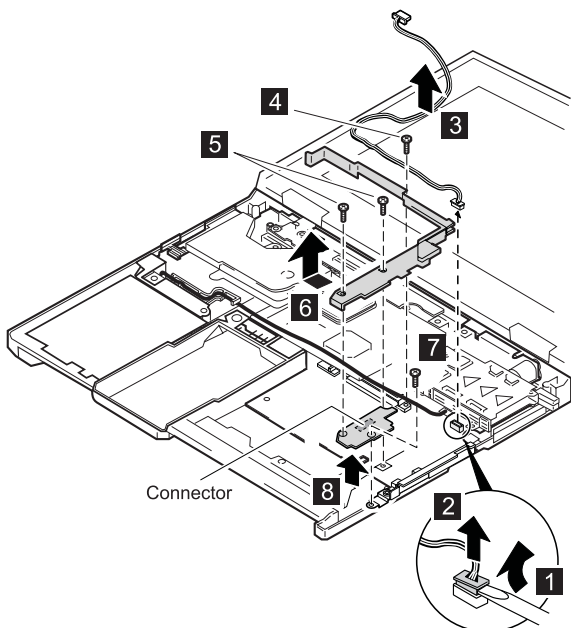
- Battery pack (1030)
- Hard disk drive (1040)
- UltralimBay device (1050)
- Keyboard assembly (1060)
- LCD assembly (1090)



Step	Screw (Quantity)	Color	Torque
2	M2.5 × 4.8 mm, nylon-coated (2)	Black	4 kgcm

## 1130 Guide rail, microphone cable, or TV Out card

- Battery pack (1030)
- Hard disk drive (1040)
- UltralimBay device (1050)
- Keyboard assembly (1060)
- Sub card (1120)



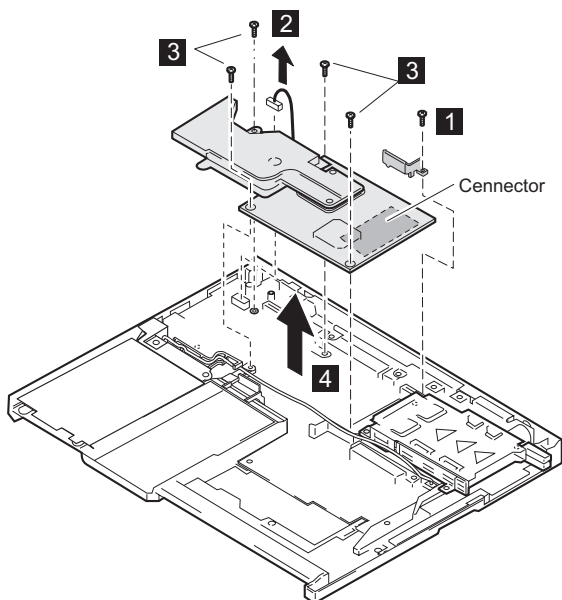
Step	Screw (Quantity)	Color	Torque
4	M2.0 × 9.5 mm, nylon-coated (1)	Black	2.5 kgcm
5	M2.5 × 4.8 mm, nylon-coated (2)	Black	4 kgcm
7	M2.5 × 7 mm, nylon-coated (1)	Yellow	4 kgcm

### When replacing:

Make sure the connector on the TV Out card is firmly connected.

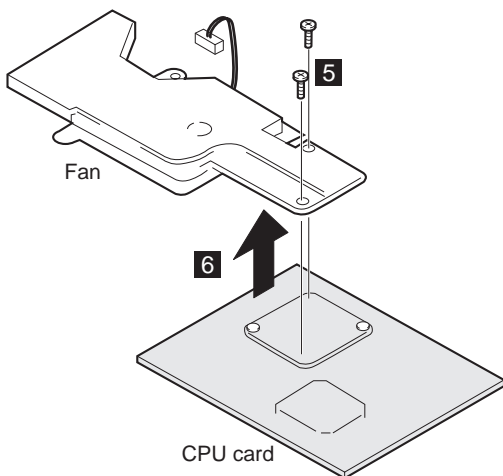
## 1140 CPU card and fan

- Battery pack (1030)
- Hard disk drive (1040)
- UltralimBay device (1050)
- Keyboard assembly (1060)



Step	Screw (Quantity)	Color	Torque
<b>1</b>	M2.0 × 9.5 mm, nylon-coated (1)	Black	2.5 kgcm
<b>3</b>	M2.0 × 9.5 mm, nylon-coated (4)	Black	2.5 kgcm

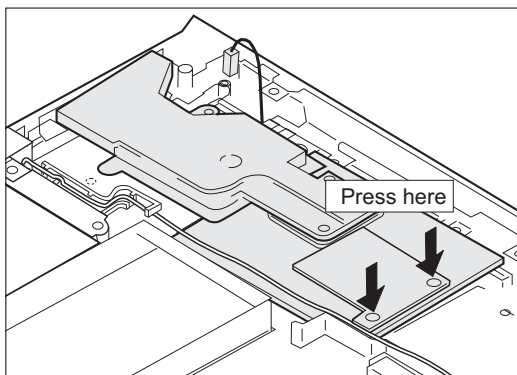
(Continued)



Step	Screw (Quantity)	Color	Torque
5	M2.0 × 4.0 mm, nylon-coated (2)	Black	2.5 kgcm

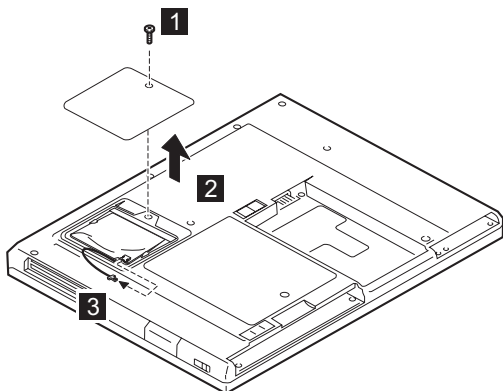
#### When replacing:

When you replace the CPU card, press it only at the places indicated in the figure. **Press both sides at the same time. Do not press only one side or any other part of the card; to do so might damage it.**



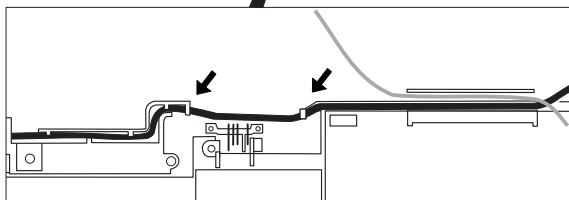
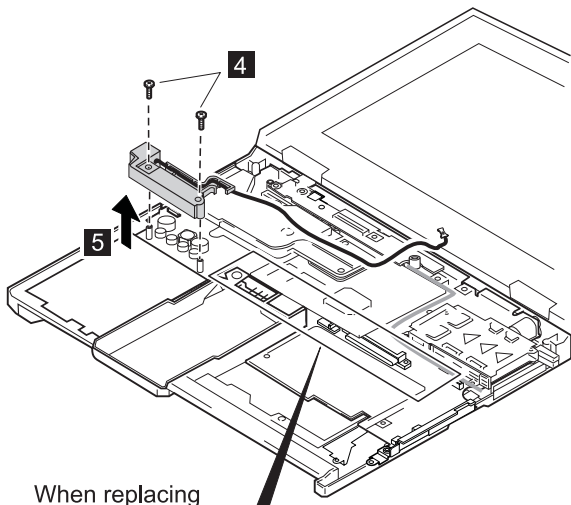
## 1150 Modem cable assembly

- Battery pack (1030)
- Hard disk drive (1040)
- UltralimBay device (1050)
- Keyboard assembly (1060)



Step	Screw (Quantity)	Color	Torque
1	M2.5 × 4.8 mm, nylon-coated (1)	Black	4 kgcm

(Continued)



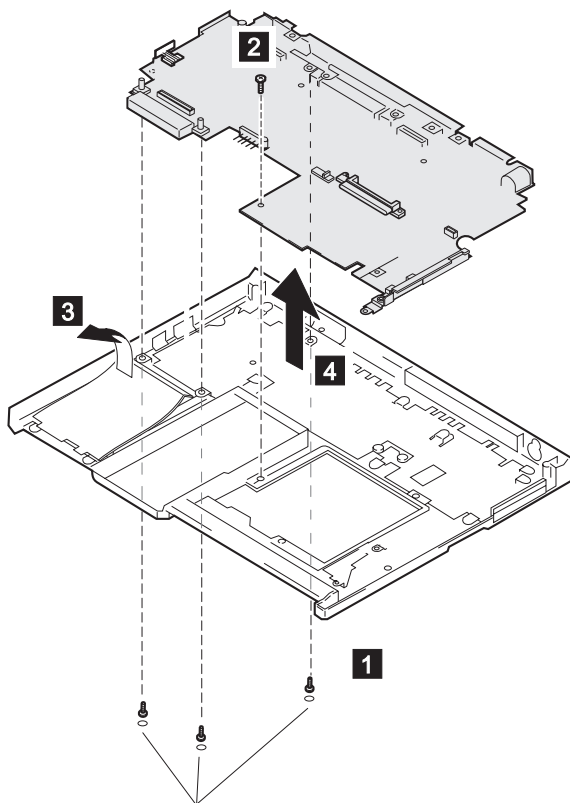
#### Cable route:

When replacing the modem cable, see the preceding figure for its cable route.

Step	Screw (Quantity)	Color	Torque
4	M2.5 × 4.8 mm, nylon-coated (2)	Black	4 kgcm

## 1160 System board

- Backup battery (1010)
- DIMM (1020)
- Modem card (1025)
- Battery pack (1030)
- Hard disk drive (1040)
- UltralimBay device (1050)
- Keyboard assembly (1060)
- LCD assembly (1090)
- PC Card slot assembly (1100)
- Sub card (1120)
- TV Out card (1130)
- CPU card and fan (1140)
- Modem cable assembly (1150)



Step	Screw (Quantity)	Color	Torque
<b>1</b>	M2.5 × 4.8 mm, nylon-coated (3)	Black	4 kgcm
<b>2</b>	M2.5 × 4.8 mm, nylon-coated (1)	Black	4 kgcm



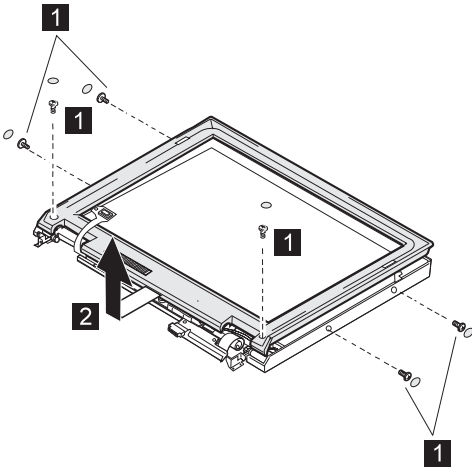
## 2010 LCD front cover

- Battery pack (1030)
- Hard disk drive (1040)
- UltralimBay device (1050)
- Keyboard assembly (1060)
- LCD assembly (1090)

### Important

The TFT LCD for the notebook computer contains many thin-film transistors (TFTs). A small number of dots that are missing, discolored, or always lighted is characteristic of TFT LCD technology, but excessive pixel problems can cause viewing concerns. The LCD should be replaced if the number of missing, discolored, or lighted dots in any background is:

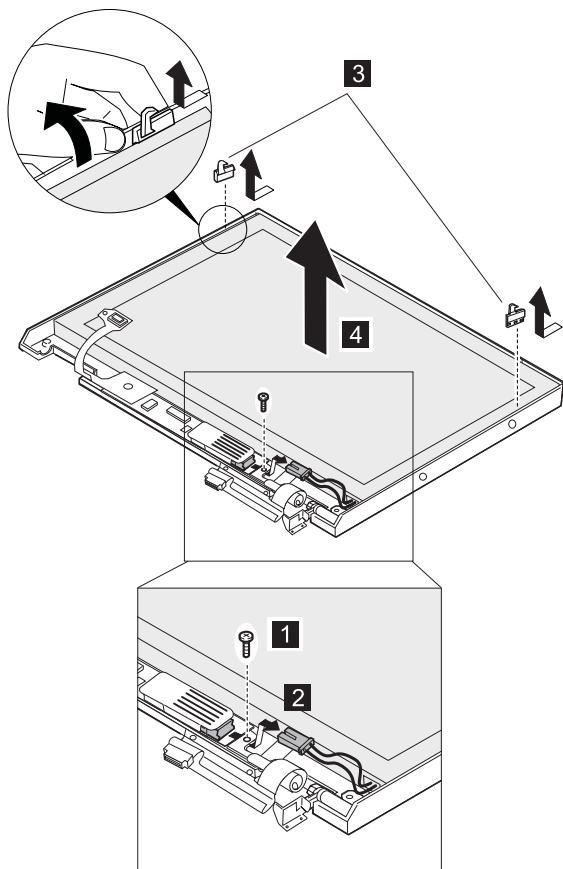
- **XGA (13.3")**: 8 or more bright dots, 8 or more dark dots, or a total of 9 or more bright and dark dots.



Step	Screw (Quantity)	Color	Torque
<b>1</b>	M2.5 × 4.8 mm, nylon-coated (6)	Black	4 kgcm

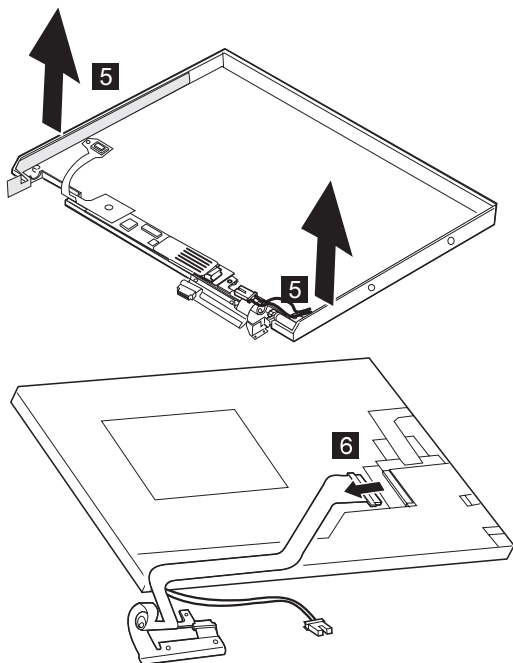
## 2020 LCD Hinges and cables

- Battery pack (1030)
- Hard disk drive (1040)
- UltralimBay device (1050)
- Keyboard assembly (1060)
- LCD Assembly (1090)
- LCD front cover (2010)



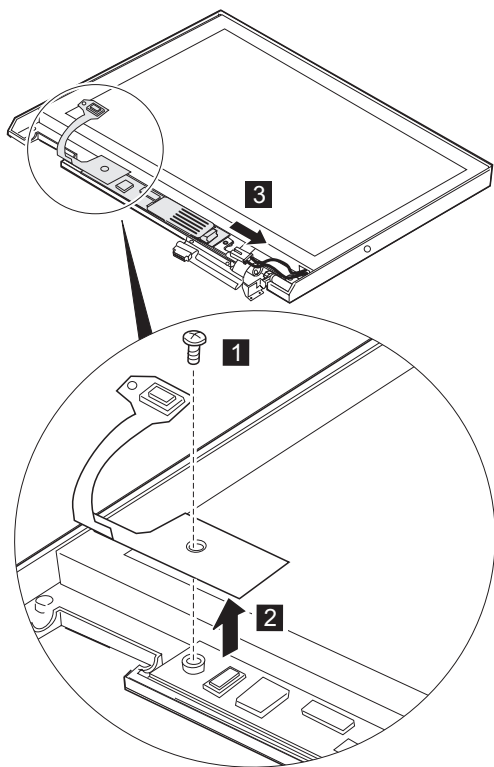
(Continued)

When you replace the cables, make sure they are not caught by the LCD panel.



## 2030 Inverter card

- Battery pack (1030)
- Hard disk drive (1040)
- UltralimBay device (1050)
- Keyboard assembly (1060)
- LCD assembly (1090)
- LCD front cover (2010)



Step	Screw (Quantity)	Color	Torque
<b>1</b>	M2.5 × 4.8 mm, nylon-coating (1)	Black	4 kgcm

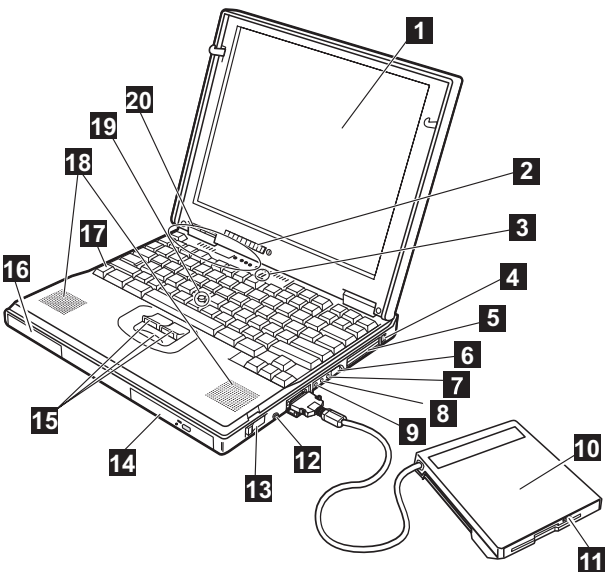
## Locations

### Front view

- 1** LCD panel
- 2** Brightness control
- 3** Built-in microphone
- 4** PC Card slots
- 5** PC Card eject button
- 6** Infrared port
- 7** Headphone jack
- 8** Line-in jack
- 9** Microphone jack
- 10** External diskette drive
- 11** Diskette-eject button
- 12** Video-out connector
- 13** LCD latch
- 14** UltralimBay

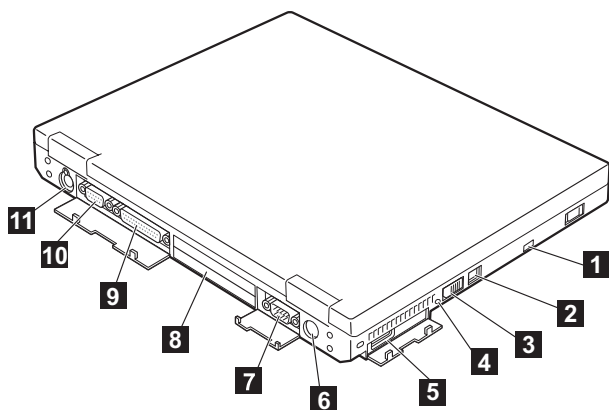
**Note:** The UltralimBay accepts storage devices, such as a DVD drive or a CD-ROM.

- 15** Click buttons
- 16** Hard disk drive
- 17** Fn key
- 18** Internal speaker
- 19** TrackPoint stick
- 20** System-status indicators



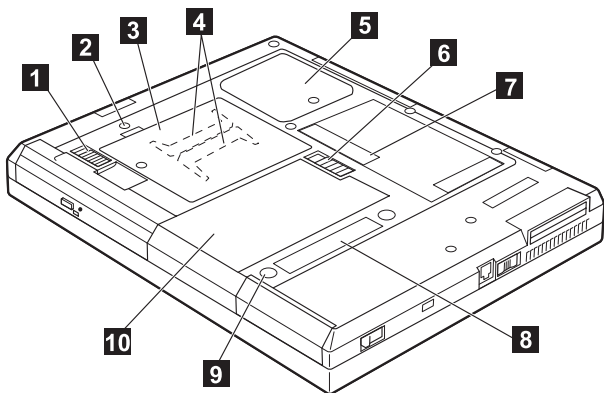
## Rear view

- 1** Security keyhole
- 2** Modem connector
- 3** Power switch
- 4** Reset switch
- 5** Universal serial bus (USB) connector
- 6** Power jack
- 7** Serial connector
- 8** System-expansion connector
- 9** Parallel connector
- 10** External-monitor connector
- 11** External-input-device connector

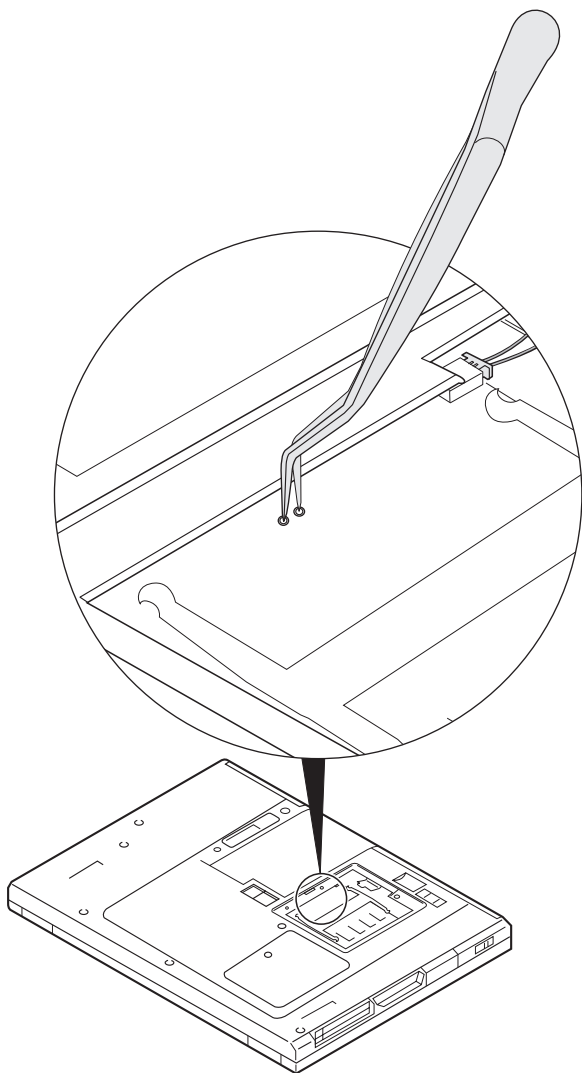


**Bottom view**

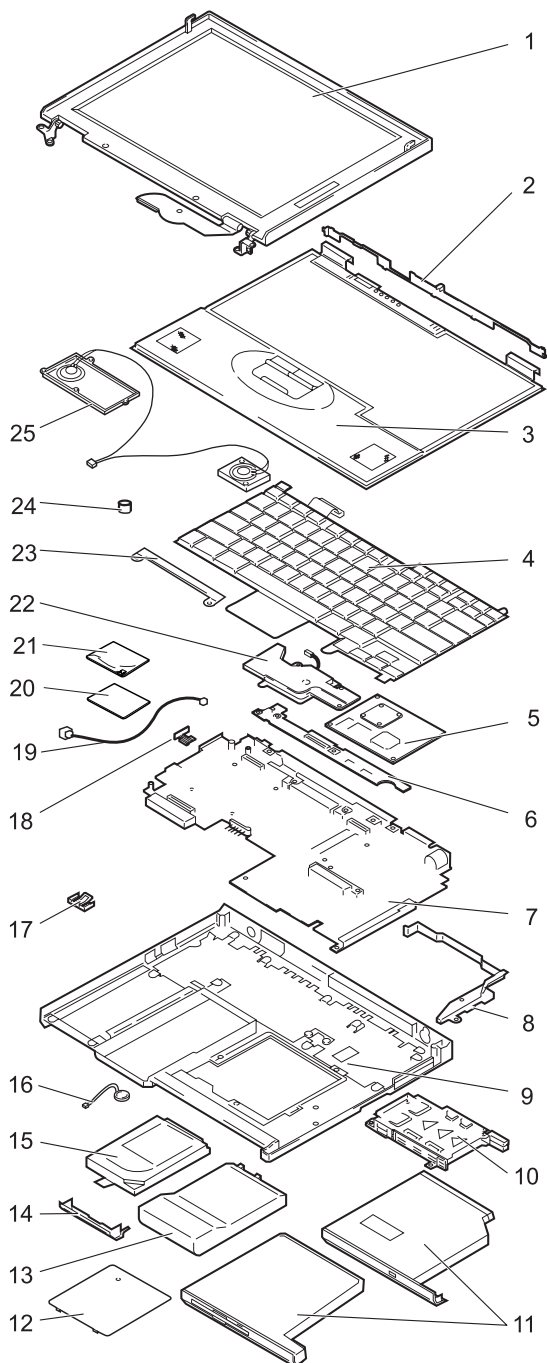
- 1** UltralimBay device lock
- 2** Bay LED
- 3** Memory-slot cover
- 4** Memory slots
- 5** Mini-PCI modem slots
- 6** Battery-pack latch
- 7** Serial number label
- 8** Space for the name plate
- 9** Hard-disk-drive screw
- 10** Battery pack



## Password pads





**Parts list**

Parts list

No.	FRU	P/N
1	LCD unit (see "LCD FRU" on page 73.)	
2	Center cover (see System miscellaneous parts)	
3	Keyboard bezel	05K7046
	Keyboard bezel for Korea	05K7048
4	Keyboard (see "Keyboard" on page 72)	
5	CPU card (450 MHz)	10L1354
	CPU card (500 MHz)	10L1355
	CPU card, for 2465-5Fx and -9Fx	10L1356
6	Sub card	10L1335
7	System board	10L1353
	System board, for 2465-5Fx and -9Fx	08K3110
8	Guide rail (see System miscellaneous parts)	
9	Base cover (2645)	27L6587
	for China	27L6588
	for Korea	27L6589
	Base cover (2646)	08K5769
	for China	08K5770
	for Korea	08K5771
	Base cover, for AAP	08K5768
10	PC Card slots	05K4790
11	DVD drive (6X)	05K9196
	CD-ROM drive (LG)	05K9267
	CD-ROM drive (TOSHIBA)	27L3711
	Diskette drive (TEAC)	05K8874
12	DIMM cover	05K7064
13	Battery pack	10L2158
14	Cover, hard disk drive	05K5995
15	Hard disk drive (6.0 GB)	22L0055 09N0791
	Hard disk drive (12.0 GB)	22L0053 09N0795
	Hard disk drive (18.0 GB)	22L0051
	Bracket, Hard disk drive	05K4752
16	Backup battery	02K6502
17	Backup battery holder	05K4827
18	Power switch knob (see System miscellaneous parts)	
19	Cable, modem	27L0501

(Continued)

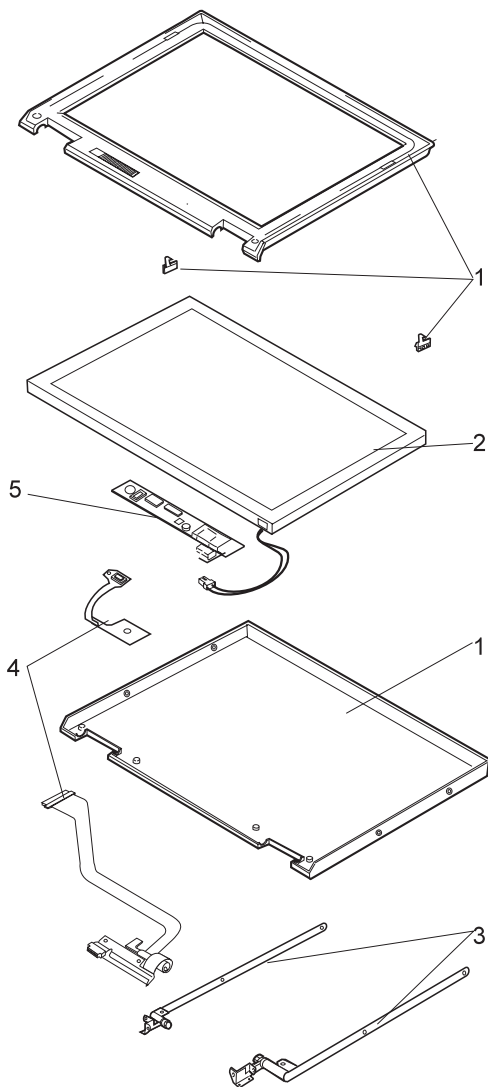
No.	FRU	P/N
20	Cover, modem	08K6031
21	Modem card	08K3429
22	Fan assembly	08K5909
	Fan assembly, for 2465-5Fx and -9Fx	08K6290
23	Keyboard bracket (see System miscellaneous parts)	
24	TrackPoint III cap	84G6536
25	Speaker	02K4897
	Cable, diskette drive	05K2844
	Doors <ul style="list-style-type: none"> <li>• Diskette drive</li> <li>• I/O right</li> <li>• I/O left</li> <li>• USB</li> </ul>	05K4828
	TV out card	10L1352
	Screw kit All nylon-coated screws: <ul style="list-style-type: none"> <li>• M2 x 4 mm, pan head (5)</li> <li>• M2 x 9 mm, flat head (10)</li> <li>• M2.5 x 3 mm, flat head (20)</li> <li>• M2.5 x 4.8 mm, flat head (30)</li> <li>• M2.5 x 9 mm, flat head (10)</li> <li>• M2.5 x 3 mm, flat head small (5)</li> <li>• M3 x 3 mm, flat head (5)</li> <li>• Hex stud D-sub (10)</li> <li>• Screw caps (10)</li> <li>• Screw caps, front (5)</li> <li>• Screw caps, side (5)</li> <li>• Screw caps, rear (5)</li> </ul>	05K4841
	System miscellaneous parts <ul style="list-style-type: none"> <li>• Blank cover, modem</li> <li>• Spacer, HDD cover</li> <li>• Label, S/N blank</li> <li>• Screw cap</li> </ul>	05K6298
	System board miscellaneous kit <ul style="list-style-type: none"> <li>• I/O plate</li> <li>• Hex stud bus</li> <li>• Hex stud D-Sub</li> <li>• Cover, diskette drive or audio</li> <li>• USB plate</li> <li>• Holder, sub card</li> <li>• Pan head screw M 2x 4</li> <li>• Pan head screw M 2.4 x 4.8</li> <li>• Screw cap</li> </ul>	27L6590
	Base miscellaneous part	05K6297
	HDD Screw Kit	05K6073

## Keyboard

	<b>Language</b>	<b>P/N</b>
	Arabic	02K4837
	Belgian	02K4801
	Czech	02K4839
	Canadian French	02K4788
	Danish	02K4794
	Dutch	02K4791
	French	02K4790
	German	02K4789
	Greek	02K4843
	Hungary	02K4841
	Hebrew	02K4835
	Italian	02K4795
	Japanese	02K4786
	Korean	02K4800
	Latin American Spanish	02K4799
	Norwegian	02K4793
	Portuguese	02K4798
	Russian	02K4833
	Spanish	02K4796
	Swedish or Finnish	02K4792
	Swiss	02K4797
	Taiwan	02K4803
	Turkish	02K4802
	U.K. English	02K4787
	U.S. English	02K4785

## LCD FRU

### 13.3-inch XGA TFT



No.	FRU	P/N
	LCD unit (Samsung)	05K9546
	LCD unit (LG)	05K9547

(Continued)

## Parts list

No.	FRU	P/N
1	LCD cover kit <ul style="list-style-type: none"><li>• Rear cover</li><li>• Front bezel</li><li>• Brightness knob</li><li>• Latches (right and left)</li><li>• Cover, cable</li><li>• Screw cap</li></ul>	08K5978
	for Korea	08K5979
2	LCD panel (see LCD unit)	
3	Hinges	05K4835
4	LCD cables	22L1891
5	Inverter card	10L1350

## Option list

AC adapter (56W, Sanken)	02K6555
AC adapter for Japan	02K6554
AC adapter (56W, ASTEC)	02K6557
AC adapter for Japan (56W, ASTEC)	02K6556
Battery attachment	02K6501
Battery charger	11J9003
Blank bezel for bay	05K4842
Carrying case, for CD-ROM	05K4843
Enhanced video cable	05K2821
External diskette drive case	05K6187
Modem kit	
for Austria	22L1863
for Australia	22L1939
for Belgium	22L1861
for Brazil	22L1871
for Cyprus	22L1887
for Denmark	22L1879
for France	22L1862
for Germany	22L1877
for Indonesia	22L1872
for Israel	22L1935
for Italy	22L1865
for Malaysia	22L0425
for Mexico	22L1870
for Netherlands	22L1878
for New Zealand	22L1937
for Norway or Finland	22L1880
for Pakistan	22L1873
for Philippines	22L1874
for Portugal	22L1883
for Singapore	22L1941
for Spain	22L1866
for Sweden	22L1881

## Parts list

for Switzerland	22L1882
for Turkey	22L1884
for U.K.	22L1876
for Vietnam	22L1875
Secondary battery	02K6505
Slim Bay adapter	05K5858
SelectaBase 600	12J2480
SuperDisk (LS-120) UltralimBay drive	20L1922
Telephone cable	05K2707
UltralimBay HDD adapter	05K5338
24X-10X IDE CD-ROM drive	12J2471
6.4-GB hard disk drive	02K0518
DVD UltralimBay drive	
for North America (Region 1)	05K8890
for Japan and EMEA (Region 2)	05K8891
for AP North and AP South (Region 3)	05K8832
For LA and AP South (Region 4)	05K8893
for Russia (Region 5)	05K8959
for China (Region 6)	05K8960
32-MB SDRAM SO DIMM	20L0243
64-MB SDRAM SO DIMM	20L0264
128-MB SDRAM SO DIMM	20L0265
256-MB SDRAM SO DIMM	33L3070
Miniature mouse (black)	07G0033

## Common Parts List

### Tools

Triconnector wrap plug	72X8546
PC test card	35G4703
Audio wrap cable	66G5180
USB parallel test cable	05K2580
Screwdriver kit	95F3598
Torque screwdriver	05K4695
5mm socket wrench	05K4694
Screwdriver	27L8126
ThinkPad hardware maintenance diskette version 1.60	—
<b>Note:</b> Download the file from the Web site.	



**Power cords:** IBM power cords for a specific country are usually available only in that country:

**For 2-pin power cords:**

Used in these countries	P/N
Japan	13H5273
Argentina	36L8870

**For 3-pin power cords:**

Used in these countries	P/N
Argentina	36L8867
People's Republic of China (other than Hong Kong)	76H3514
Argentina, Australia, New Zealand, Papua New Guinea, Paraguay, Uruguay	76H3516
Aruba, Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Curaçao, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Thailand, Trinidad (West Indies), United States of America, Venezuela	02K0539
Austria, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Egypt, Finland, France, Germany, Greece, Hungary, Iceland, Indonesia, Macao, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Turkey, Yugoslavia	76H3518
Denmark	76H3520
Bangladesh, Myanmar, Pakistan, South Africa, Sri Lanka	76H3522
Abu Dhabi, Albania, Antigua, Bahrain, Brunei, Dubai, Fiji, Hong Kong, India, Ireland, Kenya, Kuwait, Malaysia, Nigeria, Oman, Qatar, Singapore, United Kingdom	76H3524
Liechtenstein, Switzerland	76H3528
Chile, Ethiopia, Italy, Libya	76H3530
Israel	76H3532
Korea	76H3535

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