

IBM Mobile Systems

**ThinkPad Computer
Hardware Maintenance Manual
Supplement**

September 1998

This manual supports:

ThinkPad 600 and 600E (MT 2645)

Note

Before using this information and the product it supports, be sure to read the general information under "Notices" on page 99.

First Edition (September 1998)

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General Descriptions

This chapter includes the descriptions for all ThinkPad models. Some descriptions might not apply to the particular computer.

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 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 from 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 recurring problem exists. 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: The servicer must include the following in the parts exchange form or parts return form that is attached to the returned FRU:

- ___ 1. Name and phone number of servicer
- ___ 2. Date of service
- ___ 3. Date that the machine failed
- ___ 4. Date of purchase
- ___ 5. Failure symptoms, error codes appearing on the display, and beep symptoms

Read This First

- ___ 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 may 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 FDD.
- Diskette drive damage caused by the diskette drive cover being pressed 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.

FRU Replacement Notices

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

LCD Replacement Notice

The TFT LCD for the computer contains over 2,359,296 thin-film transistors (TFTs). A small number of missing, discolored, or lighted dots (on all the time) 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 **21 or more**.

Screw Notices

This computer uses special nylon-coated screws with 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:

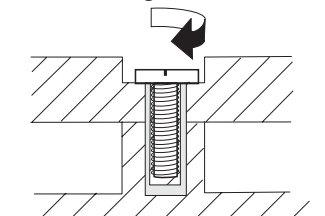
- Keep the screw kit (P/N 05K4841) in your tool bag.
- Always use new screws if you are instructed.
- Use a torque screwdriver if you have one.

Loose screws can cause a reliability problem. The IBM ThinkPad computer addresses this problem with nylon-coated screws. 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

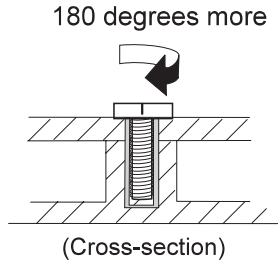


(Cross-section)

Logic card to plastic

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

FRU Replacement Notices



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**

System Board Replacement Notice

Notice for 770E and 600: Restoring the System Unit Serial Number: The EEPROM on the system board contains vital product data (VPD), such as the system unit serial number and the system board serial number. You must restore the system unit serial number to its original number when the system board is replaced.

To restore the system unit serial number, do the following:

1. Press and hold **F1** and power on the computer.
2. Hold down **F1** until the Easy-Setup menu appears.
3. Click on **Config**.
4. Press **Ctrl + N**. The System Unit Serial Number menu appears.
5. Follow the instructions on the menu.

Notes:

1. Do not power-off the computer during the restoration process.
2. The serial number label is attached to the bottom of the computer.

Notice for 770X and 600E

Serial Numbers: 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 EEPROM contains the following serial numbers:

- System board serial number
- System unit serial number
- CPU Card serial number
- DC-DC Card serial number

FRU Replacement Notices

You must restore each of those serial numbers except the system board serial number to its original number when replacing the system board.

To save the original serial numbers, do the following:

1. Boot from DOS, or open an MS-DOS prompt.
2. Insert the ThinkPad Hardware Maintenance Diskette Version 1.05 into the diskette drive.
3. Enter `A:\SERUPDT.EXE` at the DOS prompt.

The usage of this tool is displayed.

Note: SERUPDT.EXE is in the ThinkPad Hardware Maintenance Diskette Version 1.05 or a later version.

4. Enter `SERUPDT R`

Each serial numbers is displayed with its device type. Write down all numbers except the system board serial number. The device type designations for the each serial number are as follows:

- 08: CPU card serial number
- 20: System unit serial number
- 38: DC-DC card serial number
- 40: System board serial number
- 78–7F: Hard disk drive serial number

Note: You can disregard the hard disk drive serial number.

To restore the serial numbers, do the following:

1. Boot from DOS, or open a MS-DOS prompt.
2. Enter `SERUPDT.EXE` at the DOS prompt.
The usage of this tool is displayed.
3. Enter `SERUPDT W nn SSSSSS` for each serial number you saved.

Notes:

- a. `nn` is the device type, and `SSSSSS` is the serial number.
- b. The system unit serial number is written in the label attached on the bottom of the computer.

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. Consequently, 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. Press and hold **F1** and power on the computer.
2. Hold down **F1** until the Easy-Setup menu appears.
3. Click on **Config**.

FRU Replacement Notices

4. Press **Ctrl + G**. The UUID menu appears.
5. Press **F5** to generate a new UUID, and press **Enter** to overwrite it to EEPROM.

CPU Card Replacement Notice (600E and 770X Only)

You must restore the CPU card serial number to its original number, when the CPU card is replaced. To save and restore the CPU card serial number, follow the instruction in “Serial Numbers” on page 4.

DC-DC Card Replacement Notice (600E and 770X Only)

You must restore the DC-DC card serial number to its original number, when the DC-DC card is replaced. To save and restore the DC-DC card serial number, follow the instruction in “Serial Numbers” on page 4.

Related Service Information

This section provides information about the following:

- “How to Use Error Messages”
- “How to Diagnose Multiple FRUs”
- “Reset Switch”
- “Running a Low-Level Format”
- “Service Web Site” on page 8
- “Passwords” on page 8
- “Power Management Features” on page 9
- “Fn Key Combinations” on page 13

How to Use Error Messages

Use the error codes displayed on the screen to diagnose failures. If more than one error code is displayed, begin the diagnosis with the first error code. Whatever caused the first error code can result in false error codes being displayed. If no error code is displayed, see if the error symptom is listed in the “Symptom-to-FRU Index” section.

How to Diagnose Multiple FRUs

When the adapter or 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 designated sequence, to see if the symptoms change.

Reset Switch

The Reset switch resets the system (regardless of the microcode status) and forces the power off. Use this push button to power off when power is not completely off or the microcode is in a hung state. See the “Locations” section of each model for Reset switch location.

Running a Low-Level Format

Do the following to format the hard disk.

Attention: Make sure the drive address to be formatted is correct. This procedure erases all information on the disk.

1. Power off the computer.
2. Hold **F1** until the Easy-Setup menu appears.
3. Click on the **Test** icon. The Basic Diagnostics menu appears.
4. Press **Ctrl+A** to enter advanced diagnostic mode. The ThinkPad FRU Connections window appears.
5. Click on **Exit**. The Keyboard Test menu appears.
6. Click on **Exit** again.
7. Press **Ctrl+L**. The Low-Level Format menu appears.
8. Follow the instructions on the screen

If you are prompted to use the Maintenance Diskette, do the following:

Related Service Information

1. Insert the ThinkPad Hardware Maintenance Diskette Version 1.05 or a later version into the diskette drive and power on the computer.
2. Select **Format the hard disk** from the main menu.
3. Select the drive from the menu.
4. Follow the instructions on the screen.

Service Web Site

When the latest maintenance diskette and the system program service diskette are available, they will be posted on:

Maintenance diskette:

<http://w3.pc.ibm.com/files/searchfile.html>
(search for either MAINTENANCE.EXE or MAINT150.EXE)

System program service diskette:

<http://pccbbs.raleigh.ibm.com/>

Passwords

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

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.

The PAP and the HDP:

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

The ThinkPad computer that has the bay can support more than two HDPs.

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 and HDP-2 are then set to the same password as the PAP.

Supervisor and Hard Disk Passwords: The supervisor password 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, obtaining permission from the password owner to unlock the password is a prerequisite for running diagnostic tests and performing service. If both supervisor password and hard disk password are set, you can enter

Related Service Information

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 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 the power-on password.

1. Power off the computer
2. Remove the DIMM cover on the bottom side of the computer.
3. Short-circuit the two password pads or put the jumper.
For the location of the password pads or jumper, see the "Locations" section for each model.
4. Under the short-circuit condition, power on the computer and wait until the POST ends.
After the POST ends, the password prompt does not appear. The power-on password is removed.
5. Reinstall the DIMM cover.

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

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

Power Management Features

Three power management modes are provided by the computer to reduce power consumption and prolong battery power.

Related Service Information

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.

The computer enters standby mode when the **Fn + F3** keys are pressed.

The computer exits standby and resumes normal operation when any key is pressed.

Suspend Mode: The following events occur in addition to what occurs in standby mode when the computer enters suspend mode:

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

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

The following events cause the computer to enter suspend mode:

The **Fn + F4** keys are pressed.

The LCD cover is closed. If you add a check mark to the **Will not suspend even if LCD is closed** box in the Power Management Properties window, the computer will not enter suspend mode even if the LCD is closed. The LCD only turns off.

The **Suspend** button is selected in the Fuel-Gauge program.

The specified time has elapsed from the last operation with the keyboard, the TrackPoint, the hard disk drive, the parallel connector, or the diskette drive; or the AC Adapter is plugged in.

In Windows 95, the timer is set by the **Suspend Timer** selection in the Power Properties window. In Windows 98, the timer is set by the **System standby timer** selection in the Power Management Properties window.

The battery indicator blinks orange indicating that the battery power is low. If you add a check mark to the **Hibernate when battery becomes low** box in the Power Management Properties window, the computer enters hibernation mode under this condition.

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

Related Service Information

independent of the operating system, so the computer might behave differently from your setting if you set the low-battery alarm. The computer chooses appropriately between your setting and the default setting.

Note: The computer cannot enter suspend mode if it is attached to a docking station.

The following events cause 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 PC Card device.

The power switch is turned on.

The resume timer is set. In Windows 95, you can set the time with the **Resume on timer** selection in the Power Management Properties window. 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 event immediately after it enters suspend mode. Therefore, wait a few seconds before taking any action to reenter operation mode.

Hibernation Mode

For the Windows NT User

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.

It is attached to a Dock I docking station.

Related Service Information

The following events cause 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 hibernation mode is set to **Hibernate by Power Switch???**.

The timer conditions are satisfied in suspend mode (for operating systems other than Windows 98).

A critically low battery condition occurs and hibernation mode is set to **Hibernate when battery becomes low**.

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

Related Service Information

Fn Key Combinations

The following table shows the **Fn** key and function key combinations and their corresponding functions.

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

| Fn + | Description |
|----------------------------------|--|
| F1 | Reserved. |
| F2 | Turn Fuel-Gauge display on or off. |
| F3 | Turn standby mode on. |
| F4 | Turn suspend mode on. |
| F5 | Reserved. |
| F6 | Reserved. |
| F7 | Switch between the LCD and an external monitor. |
| F8 | Turn screen expansion on or off. (no symbol on the key) |
| F9 | Reserved. |
| F10 | Reserved. |
| F11 | Switch the power management mode (High Performance, Automatic, and Customized) Note: In Windows 98, only the CPU speed is changed. |
| F12 | Turn hibernation mode on. |
| Model depending functions | |
| Pg Up | Increase the sound volume. |
| Pg Dn | Decrease the sound volume. |
| Back space | Mute. |

Checkout Guide

Use the following procedure as a guide for computer problems.

Note: The diagnostic tests are intended to test only IBM products. Non-IBM products, prototype cards, or modified options can give false errors and invalid system responses.

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

Note: To run the diagnostics, refer to "Running the Diagnostics" on page 24.

3. Use the following table with the verified symptom to determine which page to go to. Search the "Symptoms (Verified)" column, and find the description that best matches your symptom; then go to the page shown in the "Go To" column.

| Symptoms (Verified) | Go To |
|---|--|
| Power failure. (The power indicator does not go on or stay on.) | "Power Systems Checkout" on page 19. |
| POST does not complete. No beep or error codes are indicated. | "Symptom-to-FRU Index" section, and then use the No Beep Symptoms table. |
| POST beeps, but no error codes are displayed. | "Symptom-to-FRU Index" section, and then use the Beep Symptoms table. |
| POST detected an error and displayed numeric error codes. | "Symptom-to-FRU Index" section, and then use the Numeric Error Codes table. |
| The diagnostic test detected an error and displayed a FRU code. | "FRU Codes" on page 28. |
| The configuration is not the same as the installed devices. | "Checking the Installed Devices List" on page 26. |
| Other symptoms (such as LCD display problems). | "Symptom-to-FRU Index" section, and then use the Other Symptoms table. |

| Symptoms (Verified) | Go To |
|--|--|
| Symptoms cannot be re-created (intermittent problems). | Use the customer-reported symptoms and go to "Symptom-to-FRU Index" section. |

Audio Checkout

ISA Audio Check Out

1. Go to the diagnostic menu by selecting **Test** in the Easy-Setup menu.
2. Select **Audio** and run the diagnostic tests.
3. If the test detects a audio problem, replace the system board.

PCI Audio Check Out

1. Power off the computer.
2. Insert the &sdisk, or later version into the diskette drive.
3. Power on the computer.
4. Select **Test the audio feature** from the main menu.
5. If **FAIL** is displayed on the screen, replace the system board.

Diskette Drive Checkout

Do the following to isolate the problem to a controller, drive, or diskette. A blank, formatted, write-enabled, nondefective 2HD diskette is required.

FDD-1 represents the diskette drive in the bay. *FDD-2* represents an external diskette drive.

Attention: Make sure that the diskette does not have more than one label attached to it. Multiple labels can cause damage to the drive or cause the drive to fail.

Do the following to select the test device.

See "Running the Diagnostics" on page 24 for details.

1. Start Easy-Setup.
2. Click on **Test**.
3. Press **Ctrl+A** to enter the advanced diagnostic mode.
The ThinkPad FRU Connections window appears.
4. Click on **Exit**.
The keyboard layout window appears.
5. Click on **Exit**.
6. Click on **FDD-1** or **FDD-2** to start the test.
7. Insert the blank diskette when instructed and follow the instructions on the screen.
8. If the controller test detects an error, FRU code 10 appears. Replace the system board.

Checkout Guide

9. If the controller test runs without errors, the drive read/write tests start automatically. If a drive test detects an error, FRU code 50 for FDD-1 or 51 for FDD-2 appears. If the diskette itself is known to be good, replace the drive.

Fan Checkout

To check the fan, do the following:

1. Start Easy-Setup.
2. Click on **Test**. The fan will start so you can check the air turbulence at the louver near the power switch.
3. Press **Ctrl+A** to enter the advanced diagnostic mode. The ThinkPad FRU Connections window appears. If the fan connector is not connected, **Fan not connected** message appears.
4. Click on **Exit**. The keyboard layout window appears.
5. Click on **Exit**.
6. Click on **System Board** and press **Enter** to run the test. Follow the description on the window. If the test detects the fan problem, replace it.

Indicator LED Checkout

If an indicator LED problem occurs, do the following:

1. Power off the computer.
2. Power on the computer. All the LEDs should turn on for a moment after the computer is powered on.
3. Verify that all LEDs turned on. If some of the LEDs do not turn on, replace the card that the LEDs are on. If the problem persists, replace the system board.

Indicator Panel Check Out

If an indicator panel problem occurs, do the following:

1. Power off the computer.
2. Power on the computer. All the icons should turn on for a moment after the computer is powered on.
3. Verify that all icons appear correctly. If some of the icons do not appear, replace the card that the indicator panel is connected to. If the problem persists, replace the DC-DC card.

Keyboard or Auxiliary Input Device Checkout

Remove the external keyboard if the internal keyboard is to be tested.

If the internal keyboard does not work or an unexpected character appears, make sure that the flexible cable extending from the keyboard is correctly seated in the connector. If the keyboard cable connection is correct, run the keyboard test. See "Running the Diagnostics" on page 24 for details.

Note: When the **Fn** key is pressed, a black square briefly appears.

Checkout Guide

If the tests detect a keyboard problem, do the following one at a time to correct the problem. Do not replace a nondefective FRU:

1. Reseat the keyboard cable.
2. Replace the keyboard.
3. Replace the card that the keyboard is connected to.
4. Replace the system board.

The following auxiliary input devices are supported for this computer:

- Numeric keypad
- Mouse (PS/2 compatible)
- External keyboard (with keyboard/mouse cable)

If any of these devices do not work, reseat the cable connector and repeat the failing operation.

If the problem does not recur, recheck the connector. If the problem is not corrected, replace the device and then the card that the devices are directly connected to.

Memory Checkout

DIMM cards are available for increasing memory capacity.

The memory size is displayed in kilobites. 576 KB is reserved by the system, so you calculate the memory size by the following equation:

$$[\text{total memory size (MB)}] \times 1024 - 576 \text{ (KB)}$$

For example, if the total memory size is 64 MB, it is displayed as 64960 KB.

Memory errors might stop system operations, show error messages on the screen, or hang the system.

Use the following procedure to isolate memory problems:

1. Power off the computer and remove any installed DIMM from its slot.
Note: If the computer has a base memory slot and option memory slots, remove any DIMMs installed in the option memory slots.
2. Press and hold the **F1** key; then power on the computer. Hold the **F1** key down until the Easy-Setup menu appears.
3. Select **Test** and press **Enter**.
4. Select **Memory** and press **Enter** to run the memory test on base memory.

See "Running the Diagnostics" on page 24 for details.

If an error appears:

- If the computer don't have the base memory slot, replace the system board.

- If the computer has the base memory slot, remove the DIMM installed in the base memory slot and go to step 2. Then if an error appears, replace the system board.

Checkout Guide

If an error does not appear, continue the following procedures.

5. Power off the computer and reinstall the DIMM one by one; then power on the computer. Verify the memory size; then test the memory. If an error appears, replace the DIMM.

Note: Make sure that the DIMM is fully installed into the connector. A loose connection can cause an error.

6. If the problem does not corrected, replace the following FRU.
 - a. System board
 - b. CPU card

If memory problems occur intermittently, use the loop option to repeat the test. When the test detects an error, an error log is printed on the printer connected to the parallel port. See "Displaying the Error Log" on page 26 for more information.

System Programs in Flash Memory: System setup programs and diagnostic tests are stored in the Flash memory.

Flash Memory Update: The Flash memory update is required for the following conditions:

- New versions of system programs
- New features or options

To update the Flash memory, do the following:

1. Get the appropriate diskette containing the update.
2. Insert the **System Program Service Diskette** into drive A and power on the computer.
3. Select **Update system programs** from the menu.

Modem (DSP) Checkout

Note: This section is for the built-in modem model.

Do the following:

1. Go to the diagnostic menu by selecting **Test** in the Easy-Setup menu.
2. Select **DSP** and run the diagnostic tests.
3. If the test detects a DSP problem, replace the modem card.

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 attached.
4. Remove the port replicator from the computer.

Checkout Guide

5. Reconnect the failing device directly to the computer. (If another device is already connected to the computer, remove it first.)
6. Go to the "Running the Diagnostics" on page 24 and run the diagnostics.
7. If the advanced diagnostic device test did 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
 - FDD-2 device test on the failing device with a scratch diskette
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.

Port Replicator Power Overload: If power shutdown occurs intermittently when PC Card devices are used through a port replicator with PC Card slots, suspect an over-current problem. Some PC Card devices use more power; if the maximum usage of each device occurs simultaneously, the total current will exceed the limit, thereby causing a power shutdown. Isolate this problem by removing one of the devices, use the computer under the same condition, and see whether a power shutdown occurs. Do this procedure for all devices to determine the cause.

Power Systems Checkout

To verify the symptom of the problem, power on the computer using each of the following power sources:

1. Remove the battery pack.
2. Connect the AC Adapter and check that power is supplied.
3. Disconnect the AC Adapter and install the charged battery pack; then check that power is supplied by the battery pack.

If you suspect a power problem, see the appropriate power supply checkout in the following list:

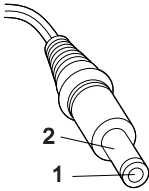
- "Checking the AC Adapter" on page 20
- "Checking Operational Charging" on page 20
- "Checking the Battery Pack" on page 21
- "Checking the Backup Battery" on page 21

Checkout Guide

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 operational charge does not work, 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 within the range, do the following:
 - Replace the system board.
 - If the problem is not corrected, go to “Undetermined Problems” section of each model.

Note: An audible 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.

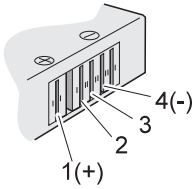
Perform operational charging. If the battery status indicator or icon does not turn on, remove the battery pack and let it return to room temperature. Reinstall the battery pack. If the charge indicator or icon still does not turn on, replace the battery pack.

If the charge indicator still does not turn on, replace either the system board or DC-DC card that the battery is connected to. Then reinstall the battery pack. If the reinstalled battery pack is not charged, go to the next section.

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

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: In this case, the battery pack is over-discharged. It takes at least 3 hours to recharge the battery pack even if the indicator does not turn on.

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.

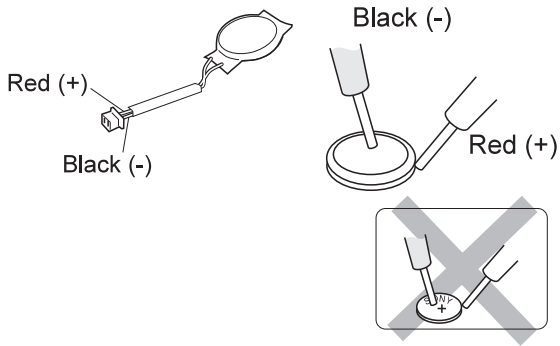
If the resistance is not correct, replace the battery pack. If the resistance is correct, replace the system board.

Checking the Backup Battery: Do the following:

1. Power off the computer and unplug the AC Adapter from the computer.
2. Turn the computer upside down.
3. Remove the backup battery (see "Removal and Replacement" section of each model).
4. Measure the voltage of the backup battery. See the following figure.

Note: Be careful not to measure the wrong side of the backup battery.

Checkout Guide



| 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.

System Board and CPU Card Checkout

The processing functions are performed by both the system board and the CPU card. Processor problems can be caused by either FRU. However, the CPU card generally has a lower probability of failure. If a numeric code indicates the system board or the CPU card as a failing FRU, or the CPU card is indicated by a diagnostic test by showing FRU code 11, use the following procedure to isolate the problem:

1. Run the system board test to verify the symptom. This test verifies both the system board and the CPU card. If no error is detected, return to "Checkout Guide" on page 14.
Note: Don't touch the keyboard and pointing device when the system board test is running. This might cause an unexpected error.
2. If FRU code 10 appears, replace the system board but do not replace the CPU card. Remove the CPU card from the old system board and install it to the new system board.
3. If FRU code 11 appears, reseat the CPU card.
4. Rerun the test to verify the fix.
5. If FRU code 11 remains, replace the CPU card.

If this procedure does not correct the problem, go to the "Undetermined Problems" section for each model.

TrackPoint Checkout

If the TrackPoint does not work, check the configuration in the ThinkPad Configuration program. If the configuration of the TrackPoint is disabled, select **Enable** to enable it.

If this does not correct the TrackPoint problem, continue with the following. After you use the TrackPoint, the pointer drifts on the screen for a short time. This self-acting pointer movement can occur when a slight, steady pressure is applied to the TrackPoint pointer. This symptom is not a hardware problem. No service actions are necessary if the pointer movement stops in a short period of time.

If a click button problem or the pointing stick problem occurs, do the following:

1. Go to the Easy-Setup menu.
2. Select an item with the pointing stick.
3. Press any one of the click buttons.
4. Verify that the item is selected.
5. Move to another item with the pointing stick.
6. Press the pointing stick (press-to-select), and verify that the item is selected.

Note: This step is only for the model that has the press-to-select function.

7. Verify that all buttons work correctly.

If either the pointing stick or the click button do not work, do the following actions one at a time to correct the problem. Do not replace a nondefective FRU.

1. Reseat the keyboard cables.
2. Replace the keyboard.
3. Reseat the card that the TrackPoint cable is directly connected to.
4. Replace the system board.

Running the Diagnostics

The following table lists the special tools needed for the diagnostics:

| Tool Name | Part Number |
|-------------------------|-------------|
| PC test card | 35G4703 |
| Tri-connector wrap plug | 72X8546 |
| USB parallel test cable | 05K2580 |

Use either the TrackPoint or the cursor-moving keys to interact with the tests. The **Enter** key works the same as selecting the **OK** icon to reply OK.

1. Press and hold **F1**; then power on the computer. Hold **F1** down until the Easy-Setup menu appears.
2. Click on **Test**. The basic diagnostic menu appears.
3. Click on a device to run the test. The test progress screen appears; then **OK** appears under the tested device icon when the test ends without any errors.
4. Start the **Advanced Diagnostic test** by pressing **Ctrl+A** on the basic diagnostic menu. The ThinkPad FRU connections window appears.
5. Click on **Exit** or press the **Esc** key. The keyboard test window appears.
6. When you press a key, a mark appears or disappears on the corresponding key position on the screen. Repeat this step for any keys that need to be tested. You can run the keyboard test if you press **Ctrl+K** in the advanced diagnostic test mode.
7. To exit the keyboard test, click on **Exit** or press **Ctrl+Break**. The advanced diagnostics window appears.
8. Click on a device to test it, or click on **Test All** to test all devices.
Click on **Looptest** to run the tests in a repeated loop. The loop option menu appears. Click on a device; the mark appears beside the selected device. Repeat this step to select multiple devices. Click on **OK** to start the diagnostic loop. If no device is selected, all devices tests are looped.
9. To exit the loop, keep pressing **Ctrl+Pause** until the test exits. A beep sounds to notify that the exit interrupt is sensed by the test program. Press **Esc** to exit from the loop test.

PC Card Slots Test

The green LED on the PC test card turns on when the PC Card slot test is running. If the LED does not turn on, check that the card is installed correctly by reseating it. If the LED still does not turn on after the card is reseated, try

Running the Diagnostics

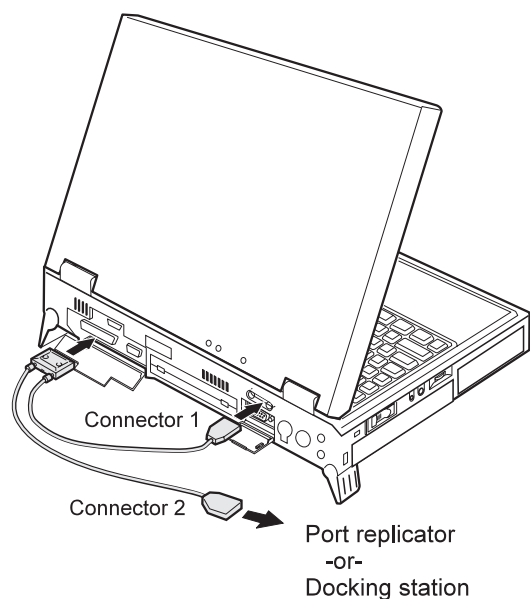
using another slot for the test. If the LED still does not turn on and the test fails, replace the FRU shown by the diagnostic error code.

Universal Serial Bus (USB) Test

At the advanced diagnostic window, do the following:

1. Connect the USB parallel test cable to the parallel connector of the computer.
2. Connect Connector 1 of the cable to the USB connector of the computer.

Note: The illustration shows a ThinkPad 770 computer, but the procedure is the same for the other model.



3. Click on **USB-1** to run the test.

Follow the instructions on the screen. **OK** appears if the test passed, but three lines of error codes appear if the test failed. The defective FRU must be the system board.

If you want to test the USB port on the port replicator, connect the USB parallel test cable to a port replicator and click on **USB-2**.

If you want to test the USB ports on a docking station, connect the USB parallel test cable to the USB ports of the docking station and click on **USB-3** and **USB-4**.

Running the Diagnostics

Displaying the Error Log

Diagnostic errors are printed on a printer attached to the parallel port when the error is detected. The error is also logged in the system memory.

Use the following procedure to display the errors:

1. Enter the advanced diagnostic test.
2. Press **Ctrl+E**.
3. The error log appears.
4. To exit the screen, click on **Exit** or press **Esc**.

The error log is not saved when system power is turned off.

Checking the Installed Devices List

If a device is installed but the icon appears in a gray shade rather than a dark shade on the basic diagnostics menu, the device is defective. If necessary, adjust the contrast control to clearly distinguish the shades of the icon. Reseat the device connectors. If the symptom remains, replace the device or the system board.

If a device that is not installed appears in a dark shade (for example, FDD-2 appears in a dark shade when *no* second FDD is installed), do the following:

1. Replace the **first** device in the configuration, such as an FDD-1.
2. If the problem persists, replace the card that the device is connected to.

The Parallel, and Serial icons are always displayed in a dark shade, because the icons represent subsystems of the system board and not the attachment of devices.

The FDD-1 icon represents a device in the computer. The FDD-2 icon represents another device, such as:

- An external diskette drive attached to the computer
- An external diskette drive attached to a port replicator
- A diskette drive in a docking station

Diagnostic Error Codes

If an error is detected, the following appears:

- Large **X** on the left side of the device icon.
- Device ID (three digits).
- Error code (two digits).
- FRU code (four digits).

X 
SystemBoard
DEV 001
ERR 02
FRU 0010

Running the Diagnostics

The device ID and error code indicate the detailed portion of the FRU that caused the error. If replacing a FRU does not correct the problem, see the device ID or error code from the previous failure. If they have changed, the cause might be that the new FRU is defective or that the FRU was incorrectly installed.

Device ID: If an error is detected by the diagnostic tests, a three-digit device ID is displayed, indicating the suspected device.

| Icon | Device ID | Suspected Device |
|--------------------|-----------|---|
| SystemBoard | 001 | System board |
| | 003 | Keyboard |
| | 007 | Math coprocessor |
| | 086 | Pointing device |
| Memory | 002 | Memory |
| FDD-1 | 006 | Diskette drive in the computer |
| FDD-2 | 066 | External diskette drive or FDD connector |
| Parallel | 009 | Parallel port |
| Serial | 011 | Serial port |
| HDD-1 | 017 | Hard disk drive |
| HDD-2 | 151 | First (external) hard disk drive |
| HDD-3 | 067 | Second (external) hard disk drive |
| HDD-4 | 152 | Third (external) hard disk drive |
| Display | 050 | Display |
| | 052 | |
| | 053 | |
| | 054 | |
| PCMCIA-1 | 080 | 1. Connection of the PC Card slot 2. PC Card |
| PCMCIA-2 | 088 | External PC Card |
| Infrared | 103 | IR |
| DPS | 113 | DPS |
| Audio (ISA) | 153 | ISA audio |
| USB-1 | 154 | USB |
| USB-2 | 155 | External USB |
| USB-3 | 156 | External USB |
| USB-4 | 157 | External USB |
| Audio (PCI) | 158 | PCI audio |
| CDROM-1 | 215 | CD-ROM |

Running the Diagnostics

| Icon | Device ID | Suspected Device |
|---------|-----------|--------------------|
| CDROM-2 | 216 | External CD-ROM |
| DVD-1 | 217 | DVD drive |
| DVD-2 | 218 | External DVD drive |

FRU Codes: If an error is detected by the diagnostic tests, a four-digit FRU code is displayed. The FRU code indicates two suspected FRUs. Replace the FRU that is indicated by the **two leftmost digits** first; then replace the FRU that indicated by the **two rightmost digits**. No FRU is assigned to code 00. If only one FRU is suspected, the other FRU code is 00. See the reference page before replacing the FRU.

| FRU Code | FRU |
|----------|---|
| 10 | System board |
| 11 | CPU card |
| 12 | DC-DC card |
| 15 | Audio card or system board (audio) |
| 16 | Modem card |
| 20 | Memory |
| 30 | Reserved |
| 32 | External keyboard |
| 33 | External mouse |
| 34 | AC Adapter |
| 35 | Stereo Speaker |
| 36 | Battery pack |
| 37 | Secondary battery pack |
| 38 | Fan |
| 39 | Box speaker |
| 40 | LCD assembly |
| 41 | DVD or DVD and enhanced video adapter |
| 42 | Video card or system board (video) |
| 45 | External monitor |
| 50 | <ol style="list-style-type: none"> 1. Reseat the diskette drive (FDD-1) 2. Diskette drive (FDD-1) |
| 51 | <ol style="list-style-type: none"> 1. Reseat the diskette drive (FDD-2) 2. Diskette drive (FDD-2) |
| 60 | <ol style="list-style-type: none"> 1. Reseat the hard disk drive (HDD-1) 2. Hard disk drive (HDD-1) |
| 61 | <ol style="list-style-type: none"> 1. Reseat the hard disk drive in the docking station (HDD-3) 2. Hard disk drive in the docking station (HDD-3) |

Running the Diagnostics

| FRU Code | FRU |
|----------|--|
| 62 | <ol style="list-style-type: none">1. Reseat the hard disk drive in the docking station (HDD-2)2. Hard disk drive in the docking station (HDD-2) |
| 63 | <ol style="list-style-type: none">1. Reseat the hard disk drive in the docking station (HDD-4)2. Hard disk drive in the docking station (HDD-4) |
| 70 | PC Card (at the port replicator) |
| 72 | PC Card slot assembly |
| 73 | Port replicator |
| 74 | Main board in the docking station |
| 75 | USB card in the docking station |
| 90 | CD-ROM drive |
| 91 | External CD-ROM drive |
| 92 | DVD drive |
| 93 | External DVD drive |

If the problem persists after replacement of the FRUs, go to the "Undetermined Problems" section for each model.

Running the Diagnostics

ThinkPad 600 and 600E

This chapter includes the descriptions for the ThinkPad 600 series computer.

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Model-Unique Functions

Product Overview

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

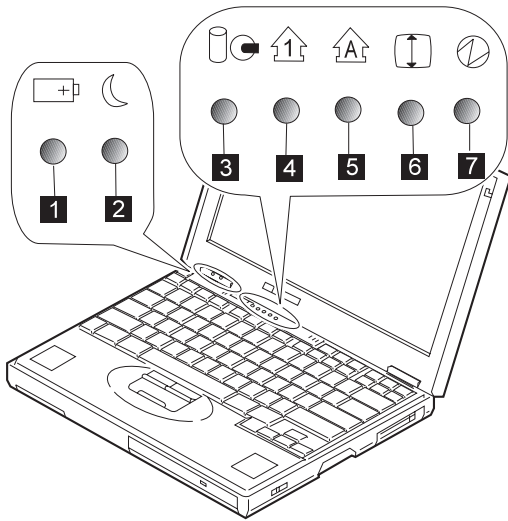
| Feature | Description |
|---------------------------|---|
| Processor | <p>For 600:</p> <ul style="list-style-type: none"> Intel Pentium MMX 233 MHz, L2 cache Intel Pentium II 233 MHz, L2 cache Intel Pentium II 266 MHz, L2 cache Intel Pentium II 300 MHz, L2 cache <p>For 600E:</p> <ul style="list-style-type: none"> Intel Pentium II 300 MHz, L2 cache with AGP |
| Bus Architecture | <p>For 600:</p> <ul style="list-style-type: none"> PCI Bus <p>For 600E:</p> <ul style="list-style-type: none"> PCI Bus, AGP Bus |
| Memory (Standard) | <p>For 600:</p> <ul style="list-style-type: none"> 32 MB (on the system board) 32 MB (on the system board) and 32 MB in the DIMM slot <p>For 600E:</p> <ul style="list-style-type: none"> 32 MB (on the system board) and 32 MB in the DIMM slot |
| Memory (Option) | <p>For 600:</p> <ul style="list-style-type: none"> 16 MB, 32 MB, 64 MB, or 128 MB DIMM card (maximum of 288 MB) <p>For 600E:</p> <ul style="list-style-type: none"> 32 MB, 64 MB, or 128 MB DIMM card (maximum of 288 MB) |
| CMOS RAM | 114 bytes +4 Kbytes |
| Video | <p>For 600:</p> <ul style="list-style-type: none"> 13.0-inch, 64K colors 1024×768 pixel HPA color LCD 12.1-inch, 64K colors, 800×600 pixel TFT color LCD 13.3-inch, 64K colors, 1024×768 pixel TFT color LCD <p>For 600E:</p> <ul style="list-style-type: none"> 13.3-inch, 16K colors 1024×768 pixel TFT color LCD |
| Diskette Drive (External) | 1.44 MB (3-mode), 3.5-inch |

Model-Unique Functions

| Feature | Description |
|-------------------|---|
| Hard Disk Drive | <p>For 600: 3.2 GB, 2.5-inch, IDE interface 4.0 GB, 2.5-inch, IDE interface</p> <p>For 600E: 6.4 GB, 2.5-inch, IDE interface</p> |
| CD-ROM/DVD Drive | <p>For 600: 24 x CD-ROM drive (some models have no CD-ROM)</p> <p>For 600E: 20 x CD-ROM drive DVD drive (2 x DVD)</p> |
| I/O Port | External monitor Headphone Microphone Mouse Parallel Port replicator Serial USB Video output port (for 600E only) |
| Internal Modem | <p>For 600: 56.6 Kbps (some models have no internal modem.)</p> <p>For 600E: 56.6 Kbps</p> |
| Audio | 16-bit audio Internal stereo speaker Internal microphone Software control volume |
| Infrared Transfer | IrDA 1.1 |
| PCMCIA | One Type-III or two Type-II |
| AC Adapter | 56-Watt type |

Status Indicators

The system status indicators show the current computer status in different colors (green and orange):



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

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: Perform the FRU replacement or actions in the sequence shown in the “FRU/Action in Sequence” column. If a FRU replacement did 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 the next possible FRUs to be replaced when servicing a computer.

Numeric error codes show the errors detected in POST or system operation. In the following error codes, **X** can be any number.

If no codes are available, use narrative symptoms.

If the symptom is not listed, go to “Undetermined Problems” on page 48.

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

Numeric Error Codes

| Symptom / Error | FRU / Action in Sequence |
|---|---|
| 10X 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. System board |
| 110 (Planar parity.) | 1. Go to “Memory Checkout” on page 17. 2. DIMM card 3. Detach the expansion unit if it is attached to the computer. 4. System board |

Symptom-to-FRU Index

| Symptom / Error | FRU / Action in Sequence |
|--|--|
| 111 (I/O parity.) | <ol style="list-style-type: none"> 1. Go to "Memory Checkout" on page 17. 2. Expansion unit or port replicator. 3. System board |
| 11XX 1101: Serial_A test failure. | <ol style="list-style-type: none"> 1. Serial device 2. Communication cable 3. System board |
| 12XX 1201: Serial_B test failure. | <ol style="list-style-type: none"> 1. System board (infrared) |
| 158 (The hard disk password was not set even though the supervisor password is set.) | Set the password for the hard disk drive. |
| 159 (The hard disk password is not set the same as the supervisor password.) | Set the correct password for the hard disk drive. |
| 161 (Dead battery.) | <ol style="list-style-type: none"> 1. Go to "Checking the Backup Battery" on page 21. 2. Backup battery 3. System board |
| 163 (Time and date were not set.) | <ol style="list-style-type: none"> 1. Set time and date. 2. System board |
| 173 (Configuration data was lost.) | <ol style="list-style-type: none"> 1. Select OK in the error screen; then set the time and date. 2. Backup battery 3. System board |
| 174 (Configuration error: Perform "Checking the Installed Devices List" on page 26 before changing any FRUs.) | <ol style="list-style-type: none"> 1. Check device configuration. 2. Hard disk drive assembly 3. System board |
| 175, 177, 178 175: EEPROM CRC #1 error. 177: Supervisor password check sum error. 178: EEPROM is not functional. | <ol style="list-style-type: none"> 1. System board |
| 17XX 1701: Hard disk controller failure. 1780, 1790: Hard disk 0 error. 1781, 1791: Hard disk 1 error. | <ol style="list-style-type: none"> 1. Hard disk drive 2. System board |

Symptom-to-FRU Index

| Symptom / Error | FRU / Action in Sequence |
|---|--|
| 183 (Incorrect password entered at the supervisor password prompt.) | Have the user examine the password. |
| 184 (Power-on password check sum error.) | Reset the power-on password in Easy-Setup. |
| 185 (The startup sequence is not valid. Suspect that power was off when the startup sequence was being updated.) | Reset the startup sequence in Easy-Setup. |
| 186 | 1. System board |
| 190 (A depleted battery pack was installed when the power was on.) | Go to "Checking the Battery Pack" on page 21. |
| 191XX (PM initialization error.) | 1. System board |
| 192 (Fan error.) | 1. Measure the voltage of the backup battery. If the voltage is not correct, replace the backup battery. 2. Fan 3. System board |
| 195 (The configuration read from the hibernation area does not match the actual configuration.) | Check if the configuration was changed. For example, check if the DIMM card is added. |
| 196 (A read error occurred in the hibernation area of the hard disk drive.) | 1. Run the hard disk drive test. 2. Hard disk drive |
| 199XX (Resume error.) | 1. System board |
| 1XX | 1. System board |
| 2XX 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. | 1. Go to "Memory Checkout" on page 17. 2. DIMM card 3. System board |

Symptom-to-FRU Index

| Symptom / Error | FRU / Action in Sequence |
|--|--|
| 225 (Unsupported memory module.) | <ol style="list-style-type: none"> 1. Check if the supported DIMM is installed. 2. DIMM card 3. System board |
| 301, 303, 304, 305, 3XX (301: Keyboard error.) | <ol style="list-style-type: none"> 1. Go to “Keyboard or Auxiliary Input Device Checkout” on page 16. 2. Keyboard 3. External numeric keypad 4. External keyboard 5. Keyboard/mouse cable 6. System board |
| 601, 6XX (601: Diskette drive or controller error.) | <ol style="list-style-type: none"> 1. Go to “Diskette Drive Checkout” on page 15. 2. Diskette drive assembly 3. Diskette 4. System board |
| 602 (Diskette read error.) | <ol style="list-style-type: none"> 1. Go to “Diskette Drive Checkout” on page 15. 2. Diskette 3. Diskette drive assembly |
| 604 (Unacceptable ID was read from the diskette drive.) | <ol style="list-style-type: none"> 1. Go to “Diskette Drive Checkout” on page 15. 2. Diskette drive assembly 3. System board |
| 2402 | <ol style="list-style-type: none"> 1. TV Out Card |
| 24XX (2401: System board video error.) | <ol style="list-style-type: none"> 1. System board |
| 808X 8081: PCMCIA presence test failure. (PCMCIA revision number also checked.) 8082: PCMCIA register test failure. | <ol style="list-style-type: none"> 1. PC Card slot assembly 2. PCMCIA device 3. System board |
| 860X (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. | <ol style="list-style-type: none"> 1. External mouse 2. External keyboard 3. System board |

Symptom-to-FRU Index

| Symptom / Error | FRU / Action in Sequence |
|---|---|
| <p>861X (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"> 1. Reseat the keyboard cable on the sub card. 2. Keyboard 3. External mouse 4. Sub card 5. System board |
| <p>I9990301 I9990302 I9990305</p> <p>I9990301: Hard disk error. I9990302: Invalid hard disk boot record. I9990305: No bootable device.</p> | <ol style="list-style-type: none"> 1. Check that the operating system is installed in the hard disk drive. If not, install the operating system. 2. Reseat the boot device. 3. Check the startup sequence for the correct boot device. 4. Check that the operating system has no failure and is installed correctly. |
| <p>I9990303 (Bank-2 flash ROM check sum error.)</p> | <ol style="list-style-type: none"> 1. System board |
| <p>Other codes not listed above.</p> | <p>Go to “Undetermined Problems” on page 48.</p> |

Beep Symptoms

| Symptom / Error | FRU / Action in Sequence |
|--|---|
| Continuous beeps. | 1. System board |
| One beep and a blank, unreadable, or flashing LCD. | 1. Reseat the LCD connector 2. LCD assembly 3. System board |
| One beep, and the message "Unable to access boot source." | 1. Boot device 2. System board |
| One long and two short beeps, and a blank or unreadable LCD. | 1. System board 2. LCD assembly |
| One long beep followed by four short beeps each time the power switch is operated. (System cannot power on due to low battery voltage.) | Connect the AC Adapter or install a fully charged battery. |
| One beep every second. (System is shutting down due to low battery voltage.) | Connect the AC Adapter or install a fully charged battery. (Allow the system to completely shut down before changing the battery.) |
| Two short beeps with error codes. | POST error. See "Numeric Error Codes" on page 36. |
| Two short beeps with blank screen. | 1. System board |

No Beep Symptoms

| Symptom / Error | FRU / Action in Sequence |
|---|--|
| No beep, power-on indicator not on, and a blank LCD during POST. | 1. Go to "Power Systems Checkout" on page 19. 2. System board 3. Check the power outlet |
| No beep, power-on indicator on, and a blank LCD during POST. | 1. System board |
| No beep, power-on indicator on, and a blinking cursor only during POST. | 1. System board |
| No beep during POST but system runs correctly. | 1. Turn the volume up and check the speaker. 2. Speaker 3. Sub card 4. System board |

Symptom-to-FRU Index

Audio-Related Symptoms

| Symptom / Error | FRU / 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.) | Check that the device driver is installed correctly. |

CD-ROM-Related Symptoms

| Symptom / Error | FRU / Action in Sequence |
|--|--|
| You hear a noise from the CD-ROM drive when the CD-ROM is spinning. | <ol style="list-style-type: none">1. CD-ROM drive2. System board |
| 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. |
| The compact disc cannot be read. | Make sure that: <ul style="list-style-type: none">The compact disc is not dirty. If it is, clean it with a CD-ROM cleaner kit.The compact disc is not defective. If it is, try another compact disc.The compact disc is placed in the tray with the label side up.The compact disc format conforms with one of the following:<ul style="list-style-type: none">– Music CD– CD-ROM or CD-ROM XA– Multisession photo CD– Video CD and CD-i movie (Windows 95 does not support CD-i movies) <ol style="list-style-type: none">1. CD-ROM drive2. System board |

Symptom-to-FRU Index

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

Function-Related Symptoms

| Symptom / Error | FRU / Action in Sequence |
|---|--|
| The system does not suspend or resume when the LCD is closed or opened. | <ol style="list-style-type: none"> 1. Go to “Suspend Mode” on page 10, and check that the computer can enter suspend mode. 2. Boot an operating system and press Fn+F4. If the computer enters suspend mode, suspect that the application program is not working properly. 3. LCD assembly 4. System board |
| The battery Fuel-Gauge does not go higher than 90%. | Go to “Checking the Battery Pack” on page 21 and see the note. |
| The memory count (size) appears different from the actual size. | Go to “Memory Checkout” on page 17. |
| The system configuration does not match the installed devices. | Go to “Checking the Installed Devices List” on page 26. |
| The system hangs intermittently. | Go to “Intermittent Problems” on page 48. |

Indicator-Related Symptoms

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

Infrared-Related Symptoms

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

Keyboard- or TrackPoint-Related Symptoms

| Symptom / Error | FRU / Action in Sequence |
|---|--|
| The keyboard (one or more keys) does not work. | <ol style="list-style-type: none"> 1. Reseat the keyboard cable on the sub card. 2. Keyboard 3. System board |
| The TrackPoint does not work. | <ol style="list-style-type: none"> 1. Reseat the keyboard cable on the system board. 2. Go to "TrackPoint Checkout" on page 23. 3. Keyboard 4. System board |
| The pointer moves automatically or does not work correctly. | See "TrackPoint Checkout" on page 23. |

LCD-Related Symptoms

Important

The TFT LCD for the notebook computer contains over 2,359,296 thin-film transistors (TFTs). A small number of missing, discolored, or lighted dots (on all the time) 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 **21 or more**.

| Symptom / Error | FRU / Action in Sequence |
|---|---|
| No beep, power-on indicator on, and a blank LCD during POST. | 1. System board |
| LCD backlight not working. LCD too dark. LCD brightness cannot be adjusted. LCD contrast cannot be adjusted. | 1. Reseat the LCD connectors. 2. LCD assembly 3. System board |
| LCD screen unreadable. Characters missing pels. Screen abnormal. Wrong color displayed. | 1. See important note for "LCD-Related Symptoms." 2. Reseat all LCD connectors. 3. LCD assembly 4. System board |
| LCD has extra horizontal or vertical lines displayed. | 1. LCD assembly |

Modem (DSP)-Related Symptoms

| Symptom / Error | FRU / 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.) | Check that the device driver is installed correctly. |
| In OS/2, DOS, or Windows, the modem does not work. | Check that the DSP Modem is active. OS/2 and Windows: Click on the DSP Modem icon in the ThinkPad Configuration program. DOS: Run the MWMODEM ON command. |

Symptom-to-FRU Index

PC Card-Related Symptoms

| Symptom / Error | FRU / Action in Sequence |
|--|---|
| PC Card does not work in either the upper slot or the lower slot. Diagnostic error code: DEV 080 ERR 33 FRU 7210 | <ol style="list-style-type: none"> 1. Reseat the PCMCIA slot assembly. 2. PCMCIA slot assembly 3. System board |
| PCMCIA slot pin is damaged. | PCMCIA slot assembly |
| PC Card does not work. | <ol style="list-style-type: none"> 1. Reseat the PC Card 2. Check that the PC Card is enabled in the ThinkPad Configuration program 3. Reseat the PCMCIA slot assembly. 4. PCMCIA slot assembly 5. System board |

Peripheral-Device-Related Symptoms

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

Power-Related Symptoms

| Symptom / Error | FRU / Action in Sequence |
|---|---|
| Power shuts down during operation. | <ol style="list-style-type: none"> 1. Go to “Power Systems Checkout” on page 19. 2. Battery pack 3. Remove the battery pack and let it cool for 2 hours. 4. System board 5. Check the power outlet. |
| The system does not power off. (See “Reset Switch” on page 7.) | <ol style="list-style-type: none"> 1. Press the power shutdown switch. 2. System board |

Other Symptoms

| Symptom / Error | FRU / Action in Sequence |
|---|--|
| Errors occur only when the port replicator is used. | See “Port Replicator Checkout” on page 18. |
| PC Card slot pin is damaged. | <ol style="list-style-type: none"> 1. PC Card slots assembly |

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 recurring problem exists.

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).

Verify that all attached devices are supported by the computer.

Symptom-to-FRU Index

Verify that the power supply being used at the time of the failure is operating correctly. (See "Power Systems Checkout" on page 19):

1. Power off the computer.
2. Visually check them for 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 if 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 Removals and Replacements

This section contains information about removals and replacements:

Do not damage any part. Only certified and trained personnel should service the computer.

The arrows in the "Removals and Replacements" section show the direction of movement to remove a FRU, or to turn a screw to release the FRU. The arrows are marked in numeric order, in square callouts, to show the correct sequence of removal. If other FRUs must be removed before the failing FRU is removed, they are listed at the top of the page.

To replace a FRU, reverse the removal procedure and follow any notes that pertain to replacement. See "Locations" for internal cable connections and arrangement information.

When replacing a FRU, use the correct screw as shown in the procedures.

Reviews "FRU Replacement Notices" on page 3 before replacing any FRU.

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, or other small parts are in place and are not left loose inside the computer. Verify this by shaking the computer 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.

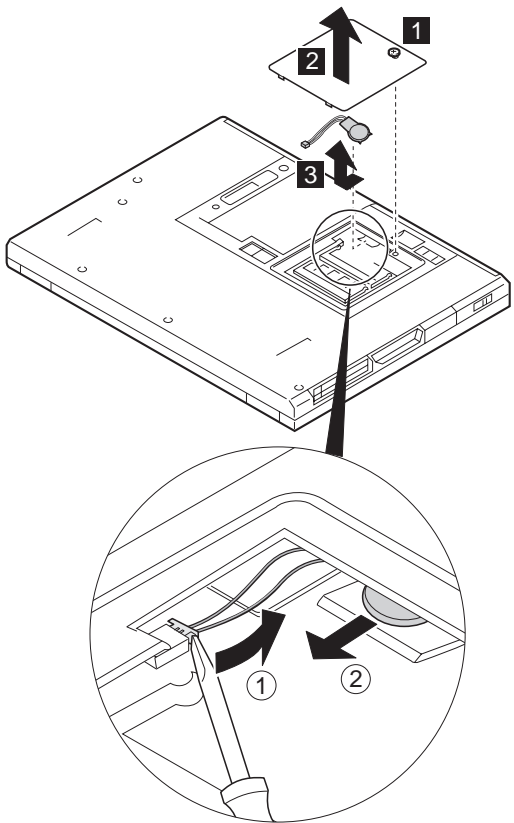
An electrostatic discharge (ESD) strap (P/N 6405959) must be used to establish personal grounding.

1010 Backup Battery

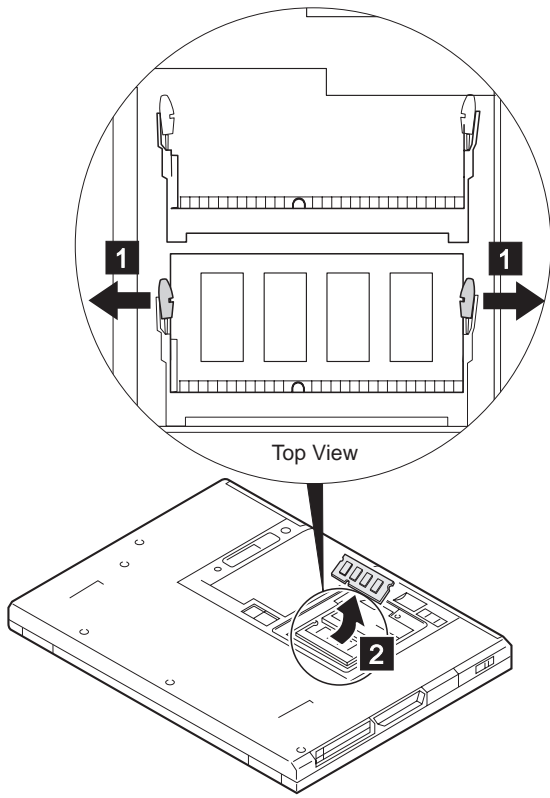
CAUTION:

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. Use of an incorrect battery can result in ignition or explosion of the battery.

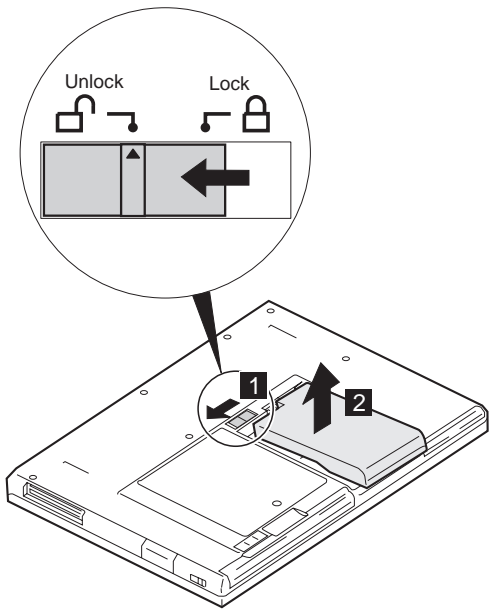
Note: Loosen (but not remove) the screw 1 .



1020 DIMM



1030 Battery Pack



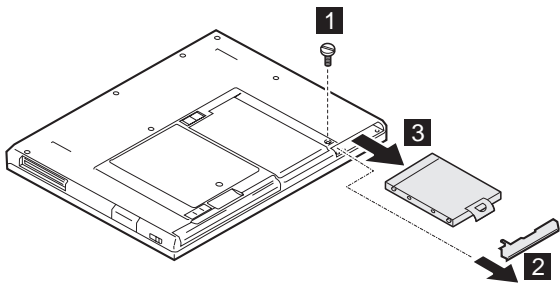
1040 Hard Disk Drive

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 on the drive.

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.

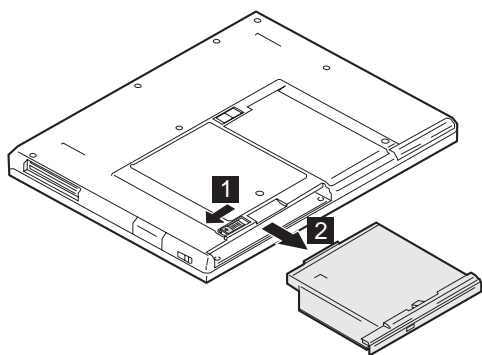


| Step | Screw (Quantity) | Color | Torque |
|--|--------------------------------------|-------|--------|
| 1 | Coin screw —Or— Security screw | Black | — |
| Note: Use a 2.5-mm allen wrench to remove the security screw. | | | |

When replacing: Make sure that the HDD connector is firmly connected.

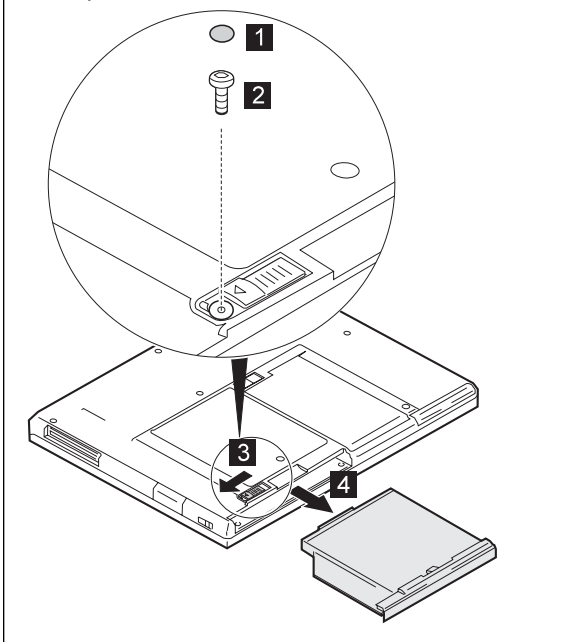
1050 UltralimBay Device

The artwork shows the FDD in the UltralimBay, one of the CD-ROM drive, DVD Drive, battery pack, or HDD with adapter is available in the UltralimBay.



When the security screw is installed

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

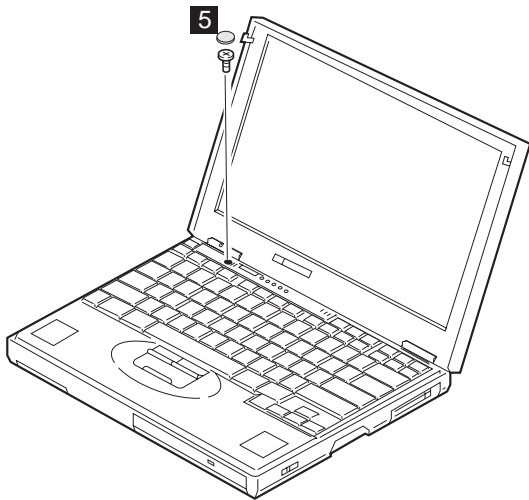
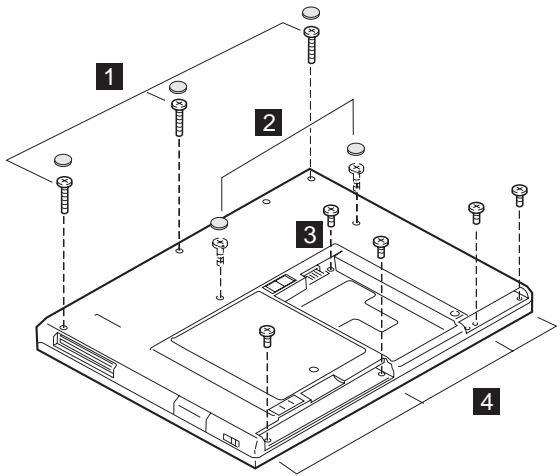


1060 Keyboard Assembly

Battery Pack (1030)

Hard Disk Drive (1040)

CD-ROM Drive or Diskette Drive (1050)

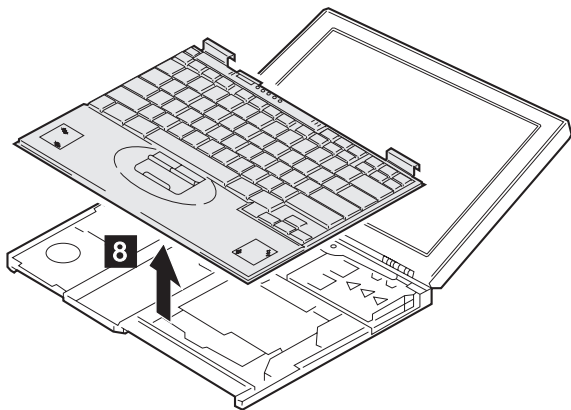
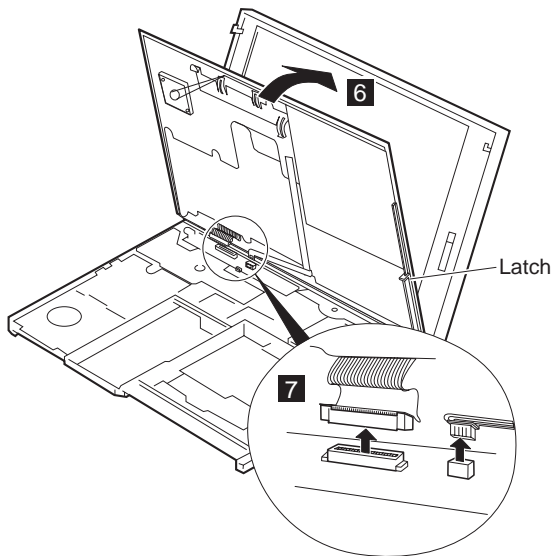


Turn the computer right side up.

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

FRU Removals and Replacements

| Step | Screw (Quantity) | Color | Torque |
|------|---------------------------------|--------|--------|
| 4 | M2.5 × 3 mm, nylon-coated (4) | Yellow | 4 kgcm |
| 5 | M2.5 × 4.8 mm, nylon-coated (1) | Black | 4 kgcm |



1070 Keyboard

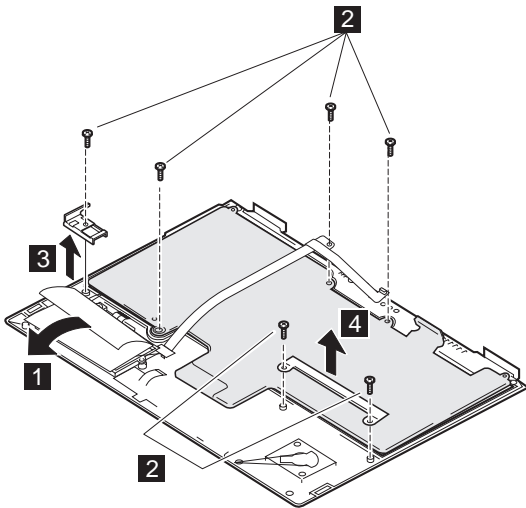
Battery Pack (1030)

Hard Disk Drive (1040)

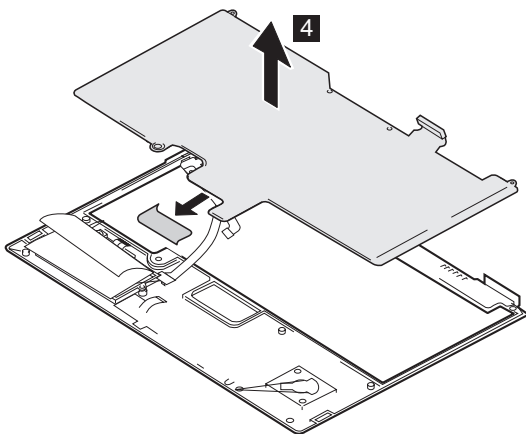
CD-ROM Drive or Diskette Drive (1050)

Keyboard Assembly (1060)

Note: When you tear off the insulator in step 1, do it gently for it is reused.



Bottom view



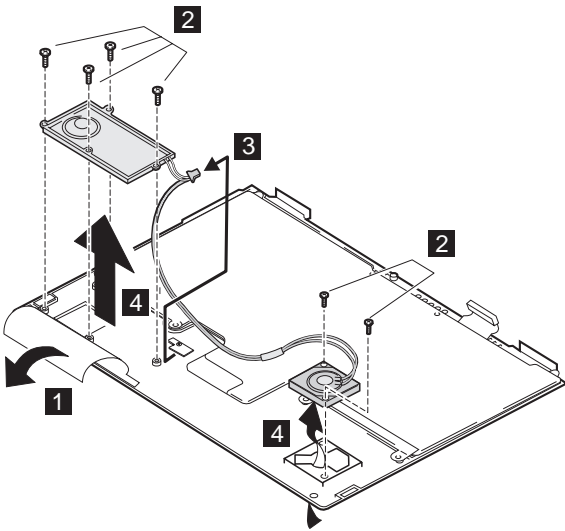
| Step | Screw (Quantity) | Color | Torque |
|------|-------------------------------|--------|--------|
| 2 | M2.5 × 3 mm, nylon-coated (6) | Yellow | 4 kgcm |

1080 Speakers

- Battery Pack (1030)
- Hard Disk Drive (1040)
- CD-ROM Drive or Diskette Drive (1050)
- Keyboard Assembly (1060)

Note:

In step 1, remove the insulator on the left speaker.



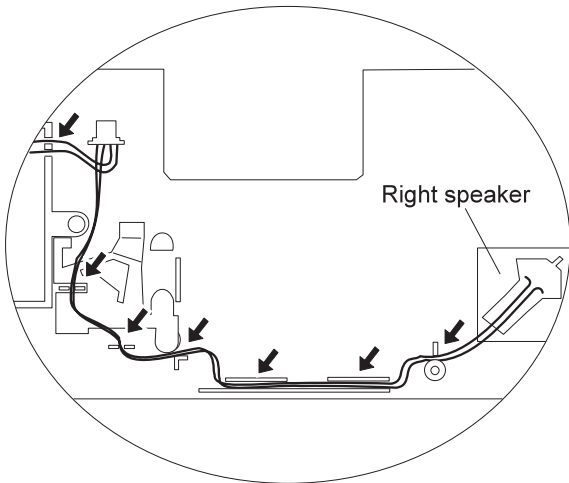
Bottom view

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

FRU Removals and Replacements

Cable routine:

When replacing the right speaker, see the following artwork for its cable routine.



1085 Speaker Cable

Battery Pack (1030)

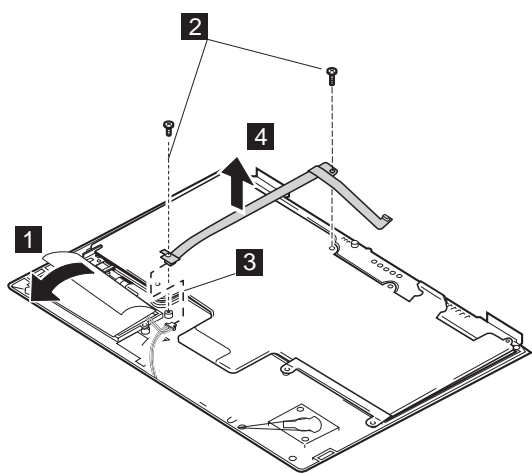
Hard Disk Drive (1040)

CD-ROM Drive or Diskette Drive (1050)

Keyboard Assembly (1060)

Note:

In step 1, remove the insulator on the left speaker.



Bottom view

| Step | Screw (Quantity) | Color | Torque |
|------|-------------------------------|--------|--------|
| 2 | M2.5 × 3 mm, nylon-coated (1) | Yellow | 4 kgcm |

1090 LCD Assembly

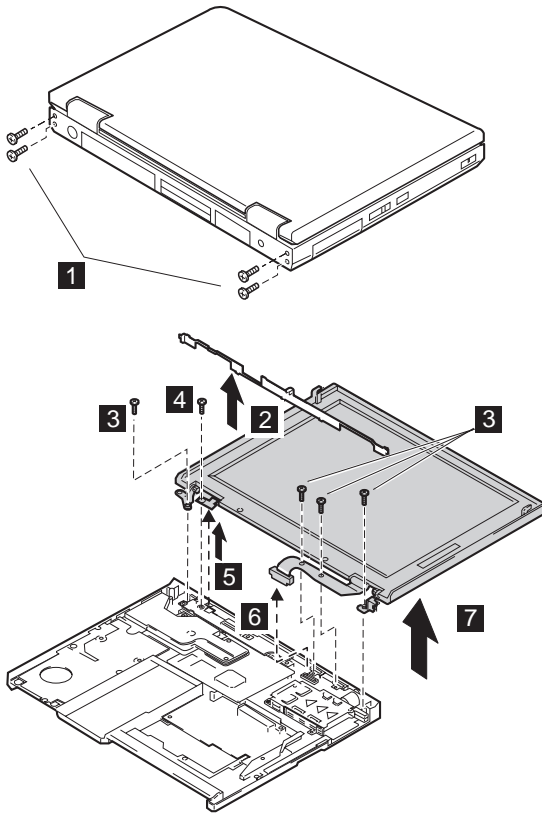
Battery Pack (1030)

Hard Disk Drive (1040)

CD-ROM Drive or Diskette Drive (1050)

Keyboard Assembly (1060)

Note: For the LCD FRU removals and replacement, go to "2010 LCD Front Cover" on page 71.



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

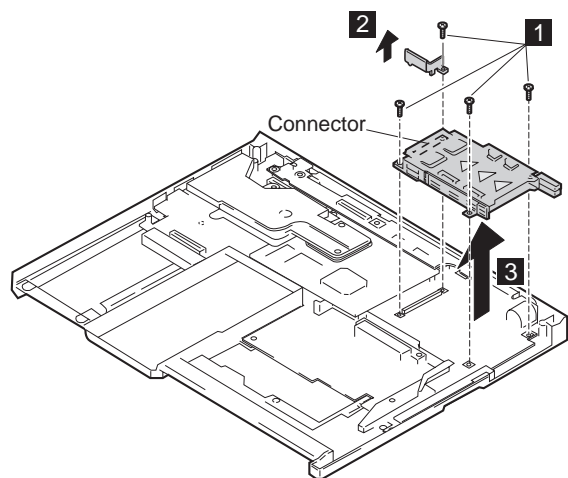
1100 PC Card (PCMCIA) Slot Assembly

Battery Pack (1030)

Hard Disk Drive (1040)

CD-ROM Drive or Diskette Drive (1050)

Keyboard Assembly (1060)



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

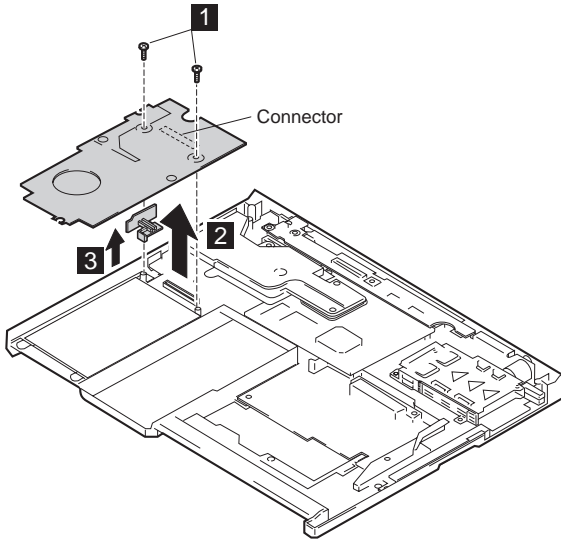
1110 Modem Card

Battery Pack (1030)

Hard Disk Drive (1040)

CD-ROM Drive or Diskette Drive (1050)

Keyboard Assembly (1060)

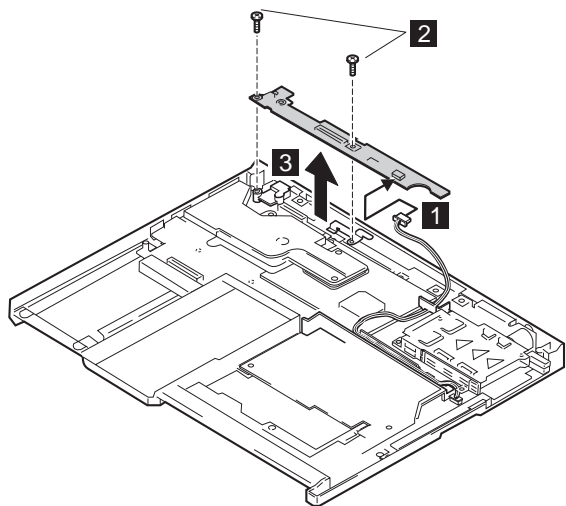


| Step | Screw (Quantity) | Color | Torque |
|------|---------------------------------|-------|--------|
| 1 | M2.5 × 4.8 mm, nylon-coated (2) | Black | 4 kgcm |

FRU Removals and Replacements

1120 Sub Card

- Battery Pack (1030)
- Hard Disk Drive (1040)
- CD-ROM Drive or Diskette Drive (1050)
- Keyboard Assembly (1060)
- LCD Assembly (1090)



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

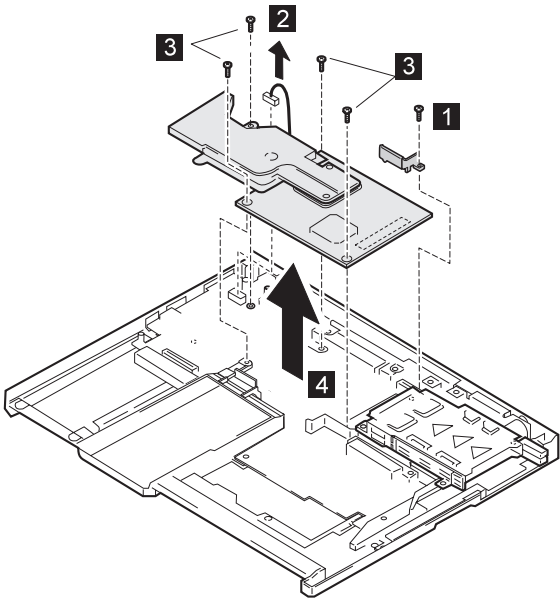
1130 CPU Card and Fan

Battery Pack (1030)

Hard Disk Drive (1040)

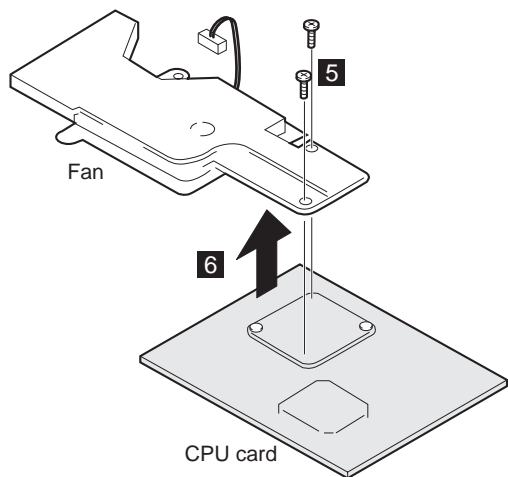
CD-ROM Drive or Diskette Drive (1050)

Keyboard Assembly (1060)



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

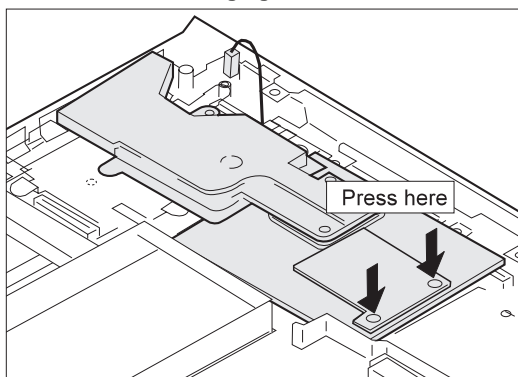
FRU Removals and Replacements



| 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 the place indicated in the figure. **Press the both sides at the same time. Do not press only one side or any other part of the card for not damaging it.**



1140 Guide Rail, Mic. Cable, or TV Out Card

Battery Pack (1030)

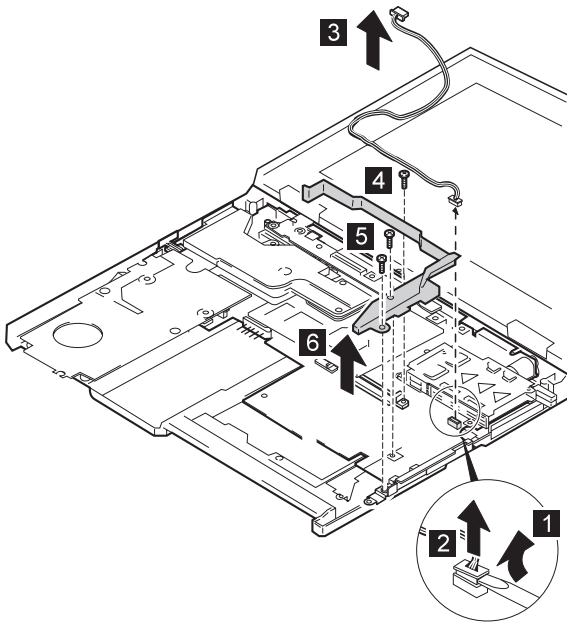
Hard Disk Drive (1040)

CD-ROM Drive or Diskette Drive (1050)

Keyboard Assembly (1060)

Note: TV out card is available for 600E model only.

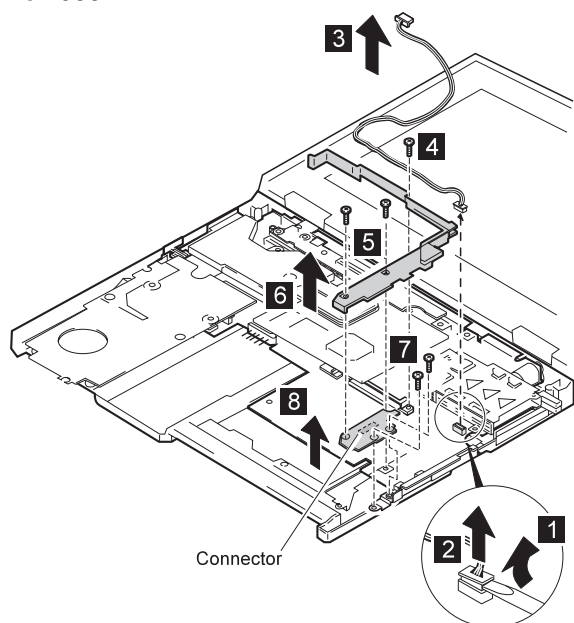
For 600



| 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 (3) | Black | 4 kgcm |

FRU Removals and Replacements

For 600E

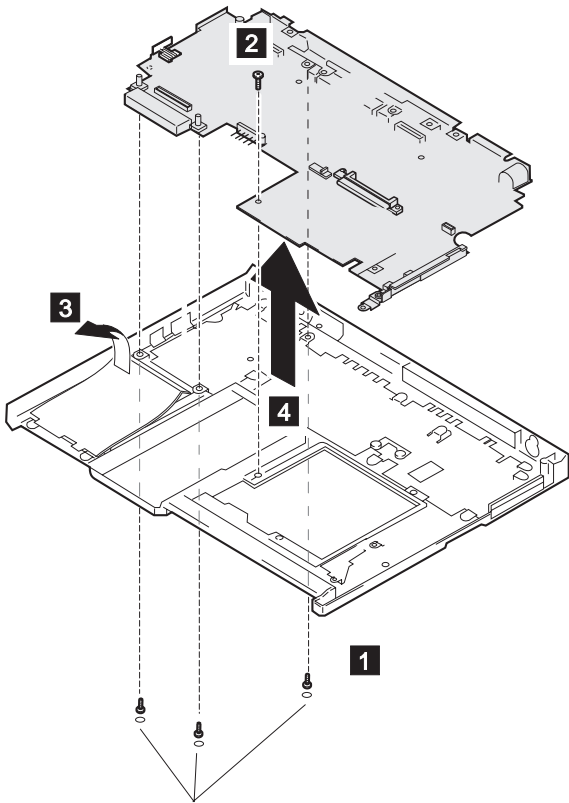


| Step | Screw (Quantity) | Color | Torque |
|------|---------------------------------|--------|----------|
| 4 | M2.0 × 9.5 mm, nylon-coated (1) | Black | 2.5 kgcm |
| 5 | M2.5 × 4.8 mm, nylon-coated (2) | Black | 4 kgcm |
| 7 | M2.5 × 7 mm, nylon-coated (2) | Yellow | 4 kgcm |

When replacing: Make sure the connector on the TV out card is firmly connected.

1150 System Board

- Backup Battery (1010)
- DIMM (1020)
- Battery Pack (1030)
- Hard Disk Drive (1040)
- CD-ROM Drive or Diskette Drive (1050)
- Keyboard Assembly (1060)
- LCD Assembly (1090)
- PC Card (PCMCIA) Slot Assembly (1100)
- Modem Card (1110)
- Sub Card (1120)
- CPU Card and Fan (1130)
- TV Out Card (1140)



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

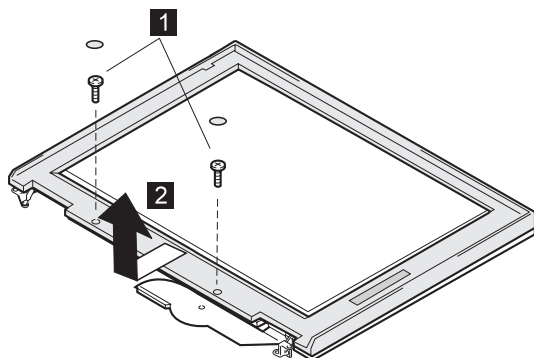
2010 LCD Front Cover

Battery Pack (1030)
 Hard Disk Drive (1040)
 CD-ROM Drive or Diskette Drive (1050)
 Keyboard Assembly (1060)
 LCD Assembly (1090)

Important

The TFT LCD for the notebook computer contains over 2,359,296 thin-film transistors. A small number of missing, discolored, or constantly lighted dots 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 **21 or more**.

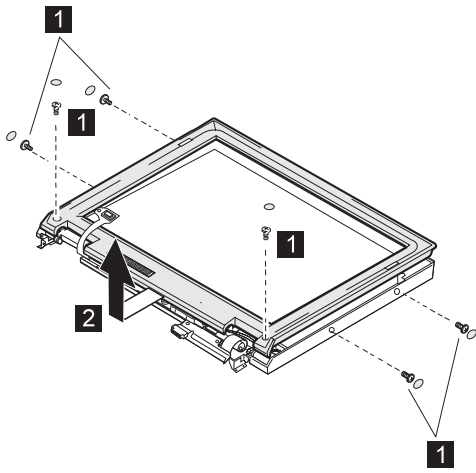
12.1-Inch TFT Panel (600 Only)



| Step | Screw (Quantity) | Color | Torque |
|------|---------------------------------|-------|--------|
| 1 | M2.5 × 4.8 mm, nylon-coated (2) | Black | 4 kgcm |

FRU Removals and Replacements

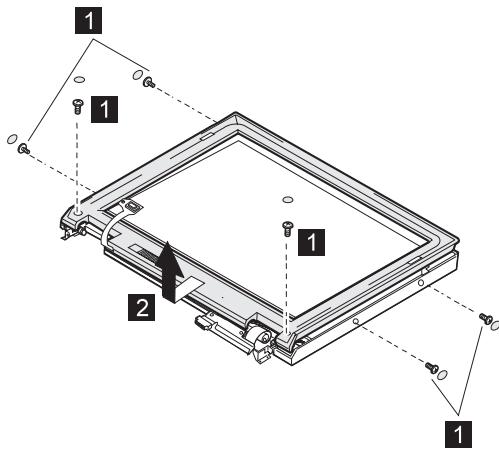
13.3-Inch TFT Panel



| Step | Screw (Quantity) | Color | Torque |
|------|---------------------------------|-------|--------|
| 1 | M2.5 × 4.8 mm, nylon-coated (2) | Black | 4 kgcm |
| 1 | M2.5 × 4.8 mm, nylon-coated (4) | Black | 4 kgcm |

FRU Removals and Replacements

13.0-Inch HPA Panel (600 Only)

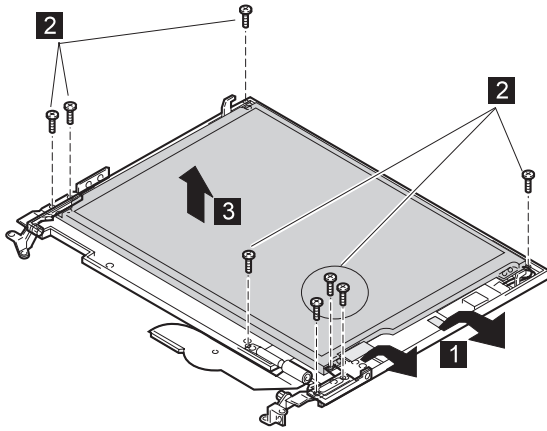


| Step | Screw (Quantity) | Color | Torque |
|------|-------------------------------------|-------|-----------|
| 1 | M2.5 × 4.8 mm, nylon-coating (2) | Black | 4 kgcm |
| 1 | M2.5 × 4.8 mm, nylon-coating (4) | Black | 4 kgcm |

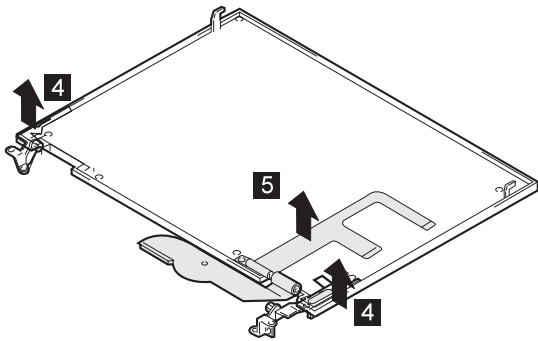
2020 LCD Hinges and Cables

- Battery Pack (1030)
- Hard Disk Drive (1040)
- CD-ROM Drive or Diskette Drive (1050)
- Keyboard Assembly (1060)
- LCD Assembly (1090)
- LCD Front Cover (2010)

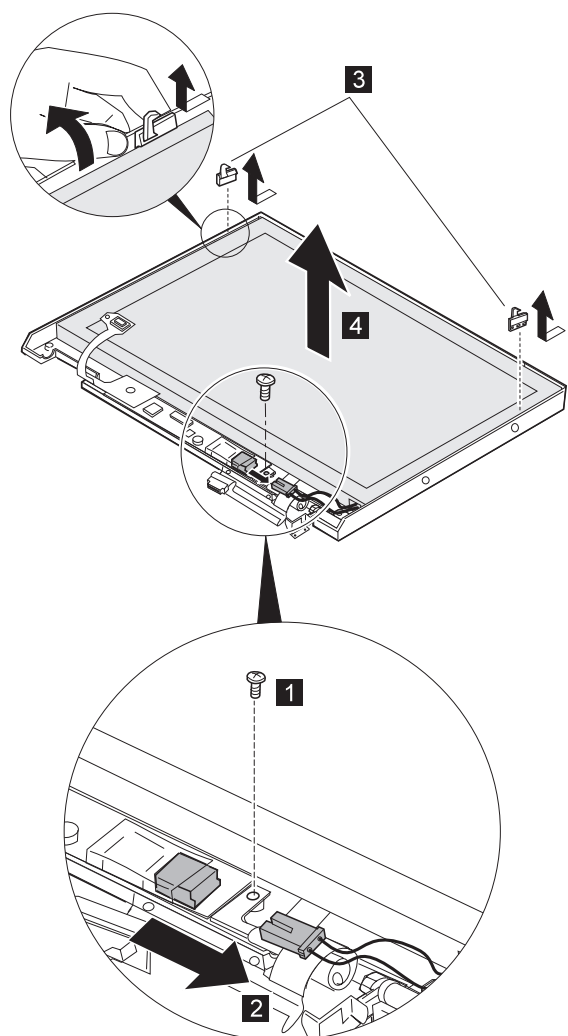
12.1-Inch TFT Panel (600 Only)



| Step | Screw (Quantity) | Color | Torque |
|------|------------------|-------|--------|
| 2 | M2 × 4.8 mm, (8) | Black | 4 kgcm |

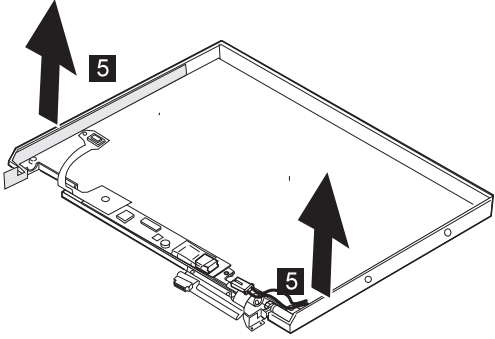


13.3-Inch TFT Panel

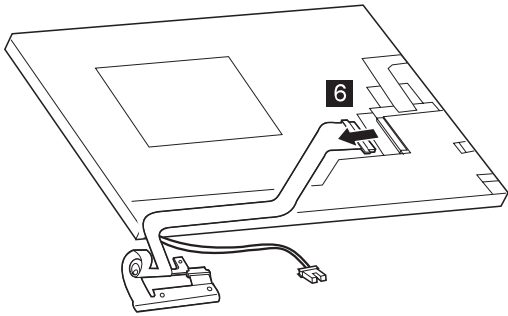


When you replace the cables, make sure the cables are not caught by the LCD panel.

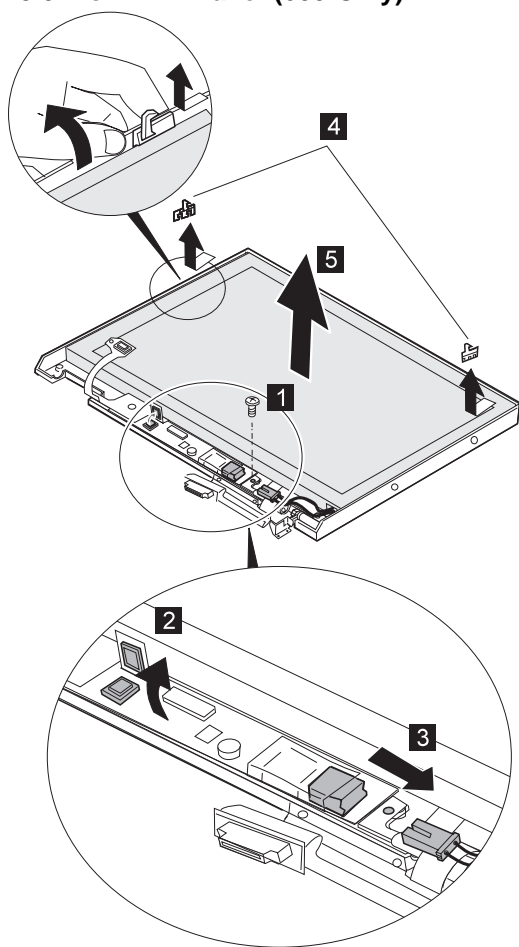
FRU Removals and Replacements



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



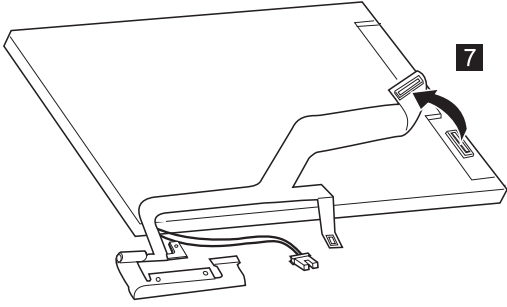
13.0-Inch HPA Panel (600 Only)



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

| Step | Screw (Quantity) | Color | Torque |
|------|---------------------------------|-------|--------|
| 2 | M2.5 × 4.8 mm, nylon-coated (6) | Black | 4 kgcm |

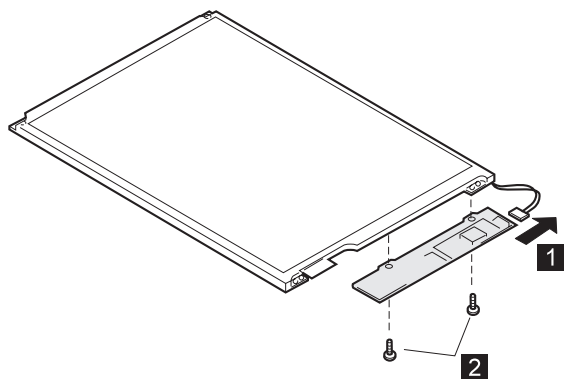
FRU Removals and Replacements



2030 Inverter Card

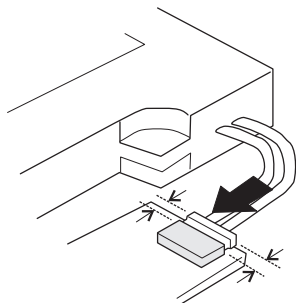
- Battery Pack (1030)
- Hard Disk Drive (1040)
- CD-ROM Drive or Diskette Drive (1050)
- Keyboard Assembly (1060)
- LCD Assembly (1090)
- LCD Front Cover (2010)
- LCD Hinges and Cables (2020)

12.1-Inch TFT Panel (600 Only)



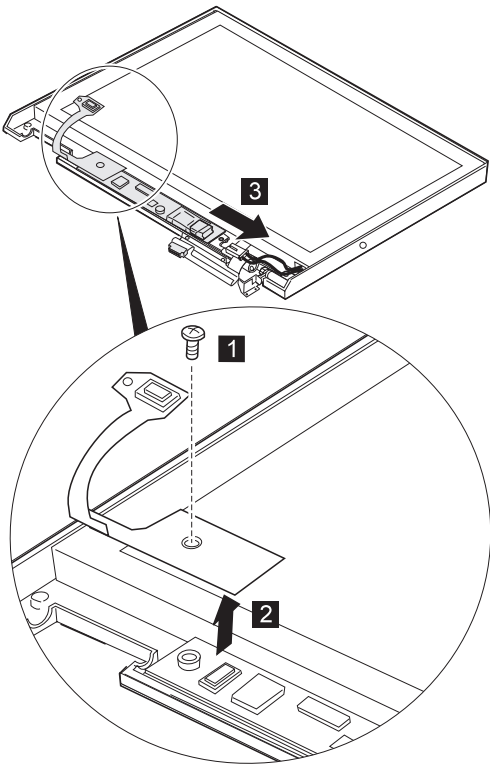
| Step | Screw (Quantity) | Color | Torque |
|------|-------------------------------|--------|----------|
| 2 | M2.0 × 3 mm, nylon-coated (2) | Silver | 2.5 kgcm |

Note: Connect the LCD connector to the inverter card by lining them up straight.



FRU Removals and Replacements

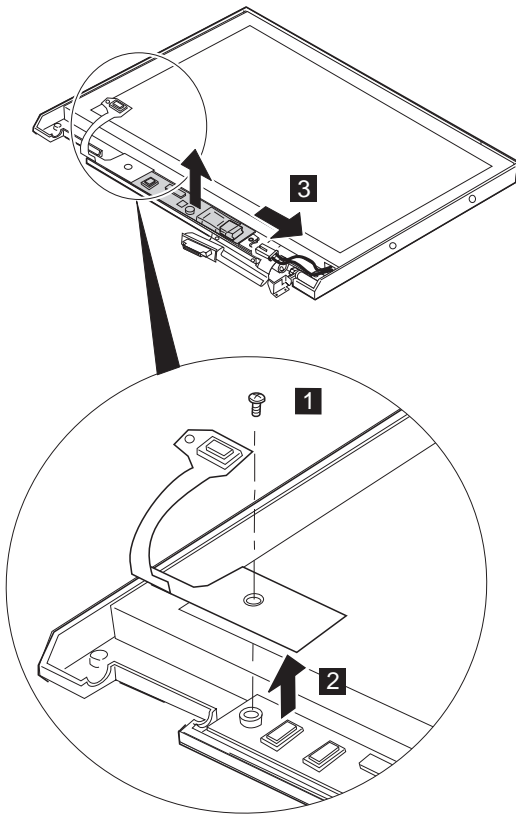
13.3-Inch TFT Panel



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

FRU Removals and Replacements

13.0-Inch HPA Panel (600 Only)

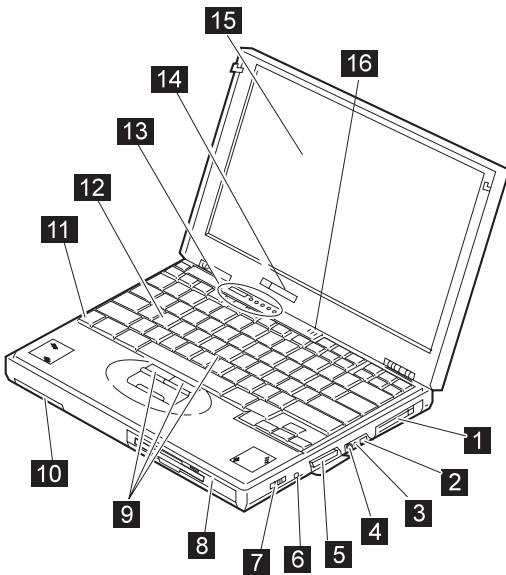


| Step | Screw (Quantity) | Color | Torque |
|------|----------------------------------|-------|--------|
| 1 | M2.5 × 4.8 mm, nylon-coating (1) | Black | 4 kgcm |

Locations

Front View

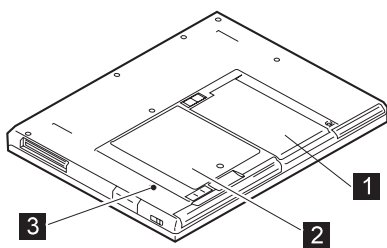
- 1 PC Card Slots
- 2 Infrared Port
- 3 Headphone Jack
- 4 Microphone Jack
- 5 External Diskette Drive Connector
- 6 Video Out Connector
- 7 LCD Latch
- 8 Diskette/CD-ROM Drive
- 9 TrackPoint
- 10 Hard Disk Drive
- 11 Fn Key
- 12 Keyboard
- 13 Indicator Panel
- 14 Brightness Control
- 15 LCD Panel
- 16 Built-in Microphone



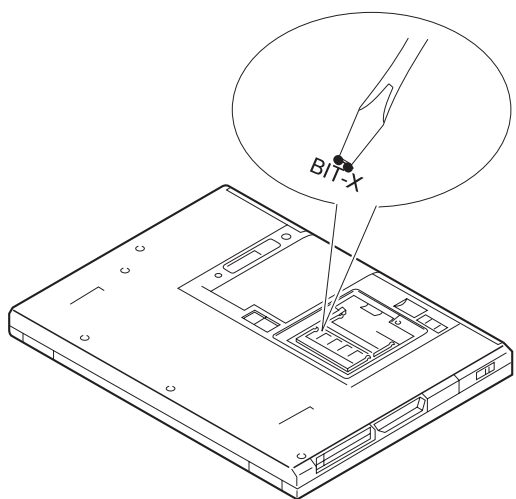
Locations

Bottom View

- 1 Battery Pack
- 2 DIMM Cover
- 3 UltralimBay Indicator



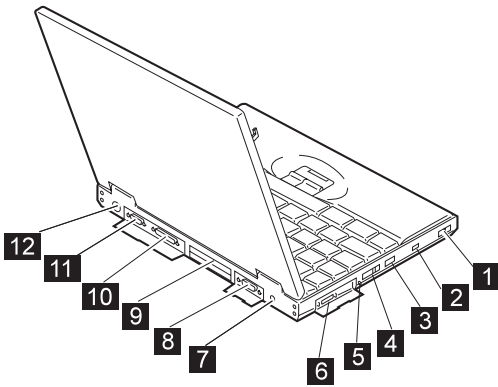
Password Pads



Locations

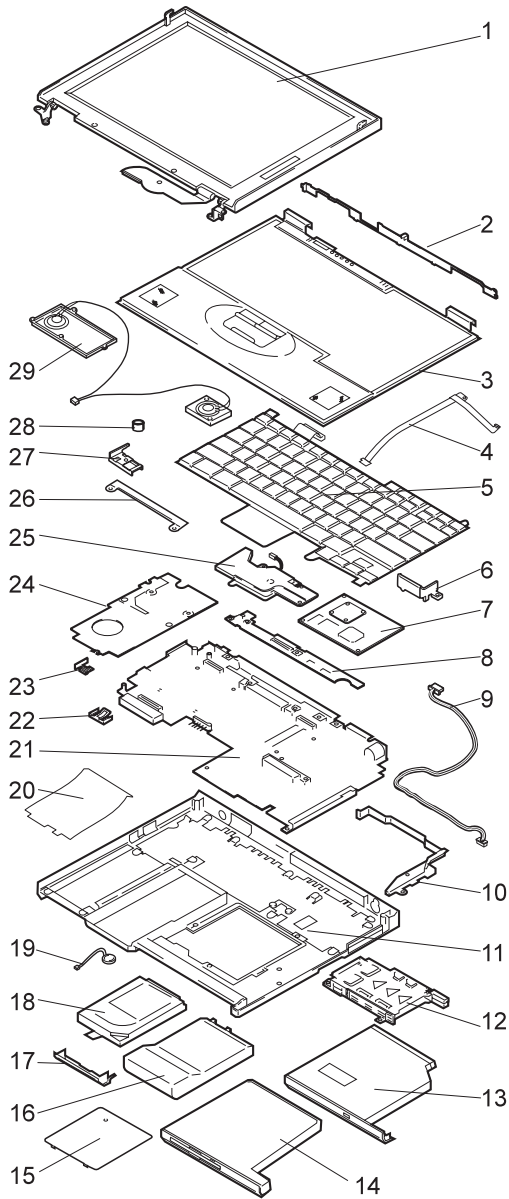
Rear View

- 1 LCD Latch
- 2 Security Keyhole
- 3 Modem Port
- 4 Power Switch
- 5 Reset Switch
- 6 Universal Serial Connector
- 7 AC Adapter Jack
- 8 Serial Connector
- 9 System Expansion Connector
- 1 Parallel Connector
- 11 External Monitor Connector
- 12 External-Input-Device Connector



Parts List

Model 600



Parts List

| Index | System Unit | |
|--------------|--|---------|
| 1 | LCD Assembly (see "LCD FRU (TFT)" on page 88.) | |
| 2 | Center Cover (see misc. parts) | |
| 3 | Keyboard Bezel | 05K7046 |
| 3 | Keyboard Bezel - Korea | 05K7048 |
| 4 | Speaker and Microphone Cable (see Speaker) | |
| 5 | Keyboard (see "Keyboard" on page 95) | |
| 6 | Holder for CPU Card (see misc. parts) | |
| 7 | CPU Card (MMX 233 MHz) | 12J0408 |
| | CPU Card (Pentium II 233 MHz) | 10L0888 |
| | CPU Card (Pentium II 266 MHz) | 10L0887 |
| | CPU Card (Pentium II 300 MHz) | 10L1020 |
| 8 | Sub Card | 05K3468 |
| 9 | Mic. Cable (see misc. parts) | |
| 10 | Guide Rail (see misc. parts) | |
| 11 | Base Cover (with modem) | 05K4826 |
| | Base Cover (without modem) | 05K5376 |
| | Base Cover for Korea | 05K5274 |
| | Base Cover for China | 05K5651 |
| | Base Cover for Taiwan | 05K5667 |
| 12 | PC Card Slot | 05K4790 |
| 13 | CD-ROM Drive | 05K8873 |
| 14 | Diskette Drive | 05K8874 |
| 15 | DIMM Cover | 05K7064 |
| 16 | Battery Pack | 02K7018 |
| 17 | Hard Disk Drive Cover, Coin Screw | 05K5995 |
| 18 | Hard Disk Drive (3.2 GB) | 83H7090 |
| | Hard Disk Drive (4.0 GB) | 83H7085 |
| | Hard Disk Drive (5.1 GB) | 83H7102 |
| | Hard Disk Drive (6.4 GB) | 83H7103 |
| | Hard Disk Shield | 05K4752 |
| 19 | Backup Battery | 02K6502 |
| 20 | Insulator for Modem (see misc. parts) | |
| 21 | System Board (12.1 LCD model) | 10L1740 |
| | System Board (13.0 LCD model) | 10L1740 |
| | System Board (13.3 LCD model) | 10L1711 |
| | System Board (13.3 LCD model) | 10L1711 |
| 22 | Backup Battery Holder | 05K4827 |
| 23 | Power Switch Knob (see misc. parts) | |
| 24 | Modem Card | 05K3469 |
| 25 | Fan | 05K4830 |
| 26 | Keyboard Bracket (see misc. parts) | |
| 27 | Bracket for Keyboard Corner (see misc. parts) | |
| 28 | TrackPoint Cap | 84G6536 |
| 29 | Speaker(includes speaker and microphone cable) | 02K4861 |

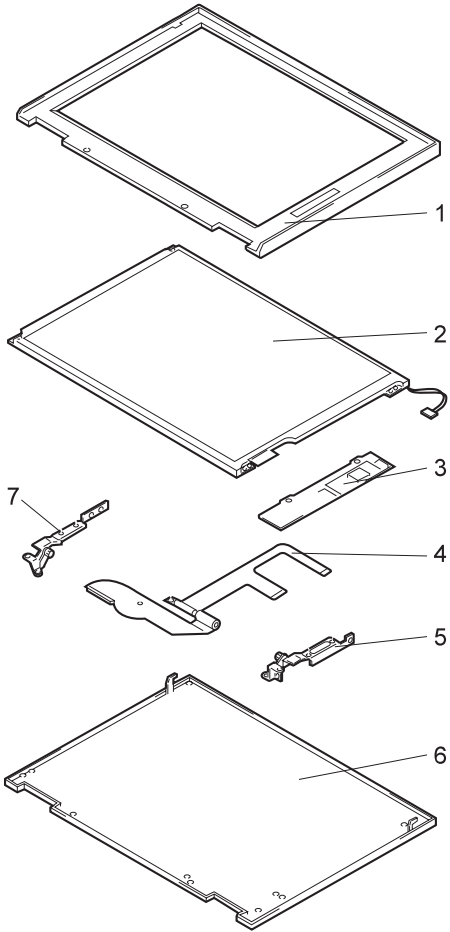
Parts List

| Index | System Unit | |
|--------------|------------------------------------|---------|
| | Telephone Cable | 05K2707 |
| | External FDD Cover | 05K2643 |
| | HDD Bracket | 05K4752 |
| | Blank Bay | 05K4842 |
| | CD-ROM Carrying Case | 05K4843 |
| | AC Adapter (56 W) | |
| | 2-pin | 11J8974 |
| | 2-pin | 02K6497 |
| | 3-pin | 02K7007 |
| | 3-pin | 02K7011 |
| | Doors | 05K4828 |
| | FDD | |
| | I/O Right | |
| | I/O Left | |
| | USB | |
| | Miscellaneous Parts for Base Cover | 05K4827 |
| | System Miscellaneous Parts | 05K4831 |
| | Center Cover | |
| | Guide Rail | |
| | Insulator for Modem | |
| | Insulator for Bay | |
| | Holder for CPU Card | |
| | Power Switch Knob | |
| | Blank Door for Modem | |
| | Latch for Keyboard Bezel | |
| | Bracket for Keyboard | |
| | Bracket for Blind Corner | |
| | Bracket for Keyboard Corner | |
| | Planar Miscellaneous Parts | 05K4829 |
| | I/O Plate | |
| | Hex Stud for Bus | |
| | Hex Stud for D-Sub | |
| | FDD/Audio Cover | |
| | USB Plate | |
| | Holder Sub Card | |
| | Insulator Planar Battery | |
| | Insulator Planar Bay | |
| | Insulator Planar Fuse | |

Parts List

LCD FRU (TFT)

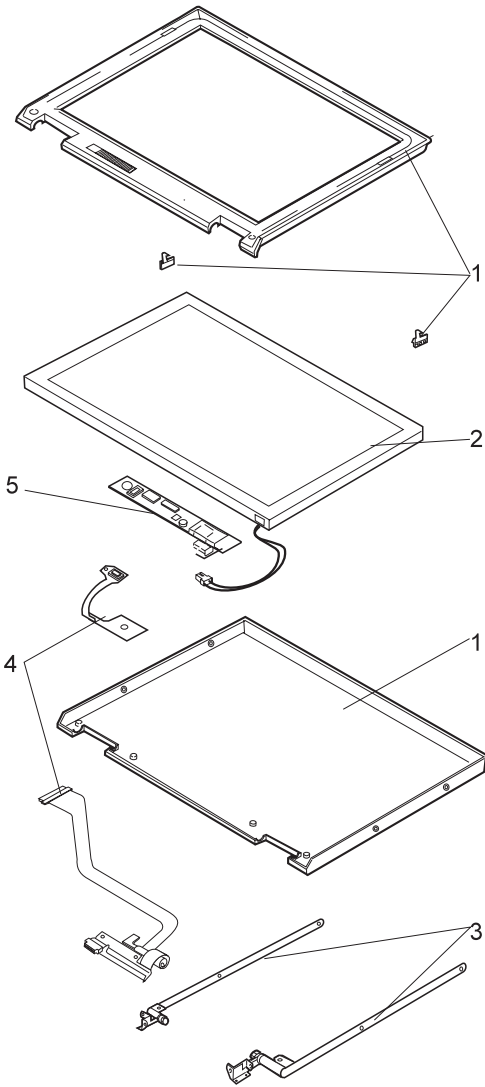
12.1-Inch TFT



| Index | System Unit | |
|--------------|--------------------|---------|
| 1 | Cover Set | 05K5255 |
| 2 | LCD Panel | 05K9335 |
| 3 | Inverter Card | 10L0931 |
| 4 | LCD Cables | 05K2655 |
| 5 | Hinges | 05K5257 |

Parts List

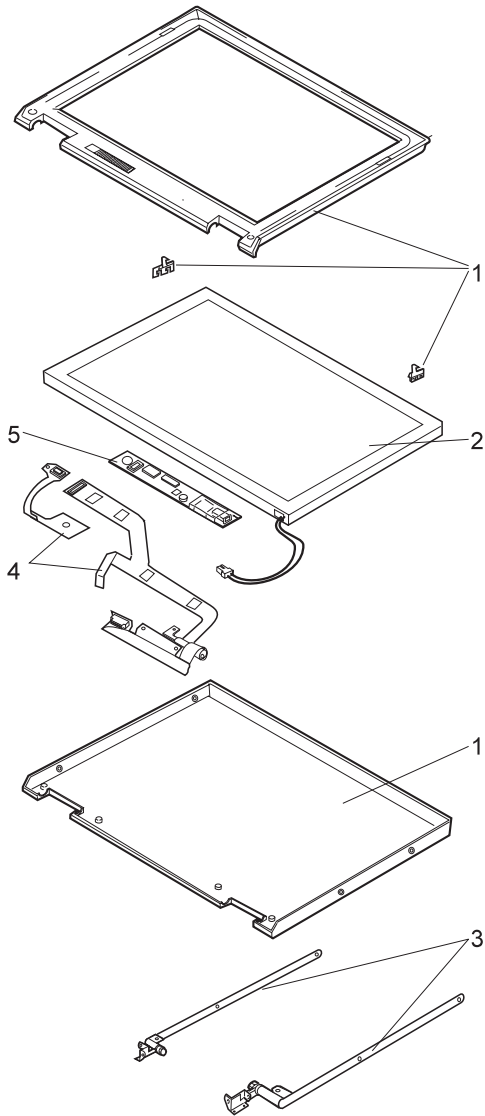
13.3-Inch TFT



| Index | System Unit | |
|--------------|---------------------|---------|
| 1 | Cover Set | 05K4833 |
| 1 | Cover Set (Korea) | 05K5256 |
| 2 | LCD Panel (DBU) | 05K9428 |
| | LCD Panel (HITACHI) | 05K9346 |
| | LCD Panel (LG) | 05K9367 |
| 3 | Hinges | 05K4835 |
| 4 | LCD Cables | 05K2646 |
| 5 | Inverter Card | 05K3471 |

Parts List

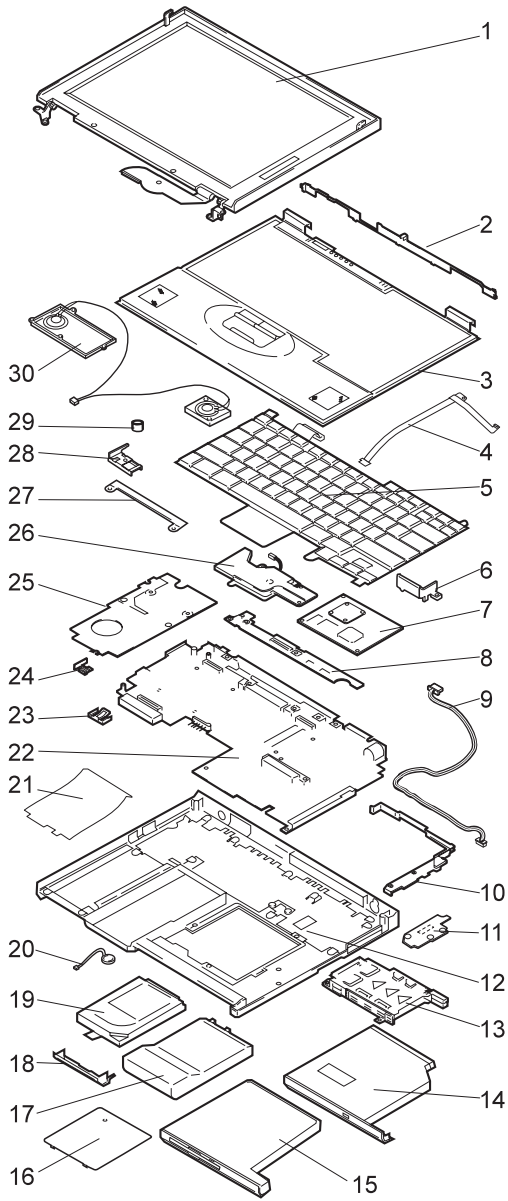
13.0-Inch HPA



| Index | System Unit | |
|--------------|--------------------|---------|
| 1 | Cover Set | 05K4832 |
| 2 | LCD Panel | 05K9337 |
| 3 | Hinges | 05K4834 |
| 4 | LCD Cables | 05K2645 |
| 5 | Inverter Card | 05K3470 |

Parts List

Model 600E



Parts List

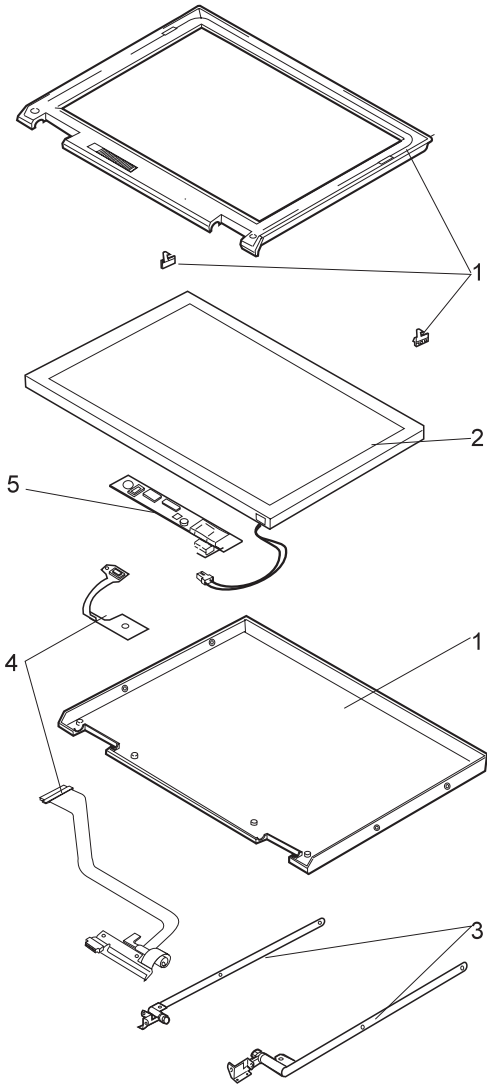
| Index | System Unit | |
|--------------|--|---------|
| 1 | LCD Assembly (see "LCD FRU (TFT)" on page 94) | |
| 2 | Center Cover (see misc. parts) | |
| 3 | Keyboard Bezel | 05K5856 |
| 4 | Speaker and Microphone Cable 2 (see misc. parts) | |
| 5 | Keyboard (see "Keyboard" on page 95) | |
| 6 | Holder for CPU Card (see misc. parts) | |
| 7 | CPU Card (MMX 233 MHz) | 12J0408 |
| | CPU Card (Pentium II 300 MHz, AGP) | 10L0907 |
| 8 | Sub Card 2 | 10L1193 |
| 9 | Mic. Cable (see misc. parts) | |
| 10 | Guide Rail 2 (see misc. parts) | |
| 11 | TV Out Card | 10L1192 |
| 12 | Base Cover | 05K5849 |
| | for China | 05K5851 |
| | for Taiwan | 05K5852 |
| 13 | PC Card Slot | 05K4790 |
| 14 | DVD Drive | 05K8971 |
| 15 | Diskette Drive | 05K8874 |
| 16 | DIMM Cover | 05K7064 |
| 17 | Battery Pack | 02K7018 |
| 18 | Hard Disk Drive Cover, Coin Screw | 05K5995 |
| 19 | Hard Disk Drive (6.4 GB) | 83H7103 |
| | Hard Disk Shield | 05K4752 |
| 20 | Backup Battery | 02K6502 |
| 21 | Insulator for Modem (see misc. parts) | |
| 22 | System Board (13.3 AGP model) | 10L1191 |
| 13 | Backup Battery Holder | 05K4827 |
| 24 | Power Switch Knob (see misc. parts) | |
| 25 | Modem Card | 05K3469 |
| 26 | Fan 2 | 05K5570 |
| 27 | Keyboard Bracket (see misc. parts) | |
| 28 | Bracket for Keyboard Corner (see misc. parts) | |
| 29 | TrackPoint Cap | 84G6536 |
| 30 | Speaker | 02K4861 |

Parts List

| Index | System Unit | |
|--------------|------------------------------------|---------|
| | Telephone Cable | 05K2707 |
| | Video Cable | 05K2821 |
| | External FDD Cover | 05K2643 |
| | HDD Bracket | 05K4752 |
| | Blank Bay | 05K4842 |
| | CD-ROM Carrying Case | 05K4843 |
| | AC Adapter (56 W) | |
| | 2-pin | 11J8974 |
| | 2-pin | 02K6497 |
| | 3-pin | 02K7007 |
| | 3-pin | 02K7011 |
| | Doors | 05K4828 |
| | FDD | |
| | I/O Right | |
| | I/O Left | |
| | USB | |
| | Miscellaneous Parts for Base Cover | 05K4827 |
| | System Miscellaneous Parts | 05K5854 |
| | Center Cover | |
| | Guide Rail | |
| | Insulator for Modem | |
| | Insulator for Bay | |
| | Speaker and Microphone Cable 2 | |
| | Holder for CPU Card | |
| | Power Switch | |
| | Latch for Keyboard Bezel | |
| | Bracket for Keyboard | |
| | Bracket for Blind Corner | |
| | Bracket for Keyboard Corner | |
| | Planar Miscellaneous Parts | 05K5853 |
| | I/O Plate | |
| | Hex Stud for Bus | |
| | Hex Stud for D-Sub | |
| | FDD/Audio Cover | |
| | USB Plate | |
| | Holder Sub Card | |
| | Insulator Planar Battery | |
| | Insulator Planar Bay 2 | |
| | Insulator Planar Fuse | |

Parts List

LCD FRU (TFT)
13.3-Inch TFT



| Index | System Unit | |
|--------------|---------------------|---------|
| 1 | Cover Set | 05K4833 |
| 2 | LCD Panel (DBU) | 05K9398 |
| 2 | LCD Panel (HITACHI) | 05K9346 |
| 2 | LCD Panel (LG) | 05K9367 |
| 3 | Hinges | 05K4835 |
| 4 | LCD Cables | 05K2646 |
| 5 | Inverter Card | 05K3471 |

Parts List

Keyboard

| | |
|------------------------|---------|
| Arabic | 02K4837 |
| Belgian | 02K4801 |
| Canadian French | 02K4788 |
| Czech | 02K4839 |
| Danish | 02K4794 |
| Dutch | 02K4791 |
| French | 02K4790 |
| German | 02K4789 |
| Greek | 02K4843 |
| Hungary | 02K9841 |
| 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 |

Miscellaneous Parts

| | |
|--|---------|
| Screw Kit (for 600 series) | 05K4841 |
| Including nylon-coated screws: | |
| Pan head screw M2 x 4 mm (black) | |
| Pan head screw M2 x 9.5 mm (black) | |
| Pan head screw M2.5 x 3 mm (yellow) | |
| Flat head screw M2.5 x 4.8 mm (black) | |
| Flat head screw M2.5 x 16 mm (black) | |
| Flat head screw M2.5 x 19.5 mm (black) | |
| Flat head screw M3 x 3 mm (black) | |
| Screw Cap (painted) | |
| Screw Cap (no painted) | |

Parts List

Option Parts List

| | |
|--|---------|
| PC Card Enable with Advanced EtherJet Feature | 05K4820 |
| UltraslimBay Battery | 02K6504 |
| UltraslimBay HDD Adapter | 05K5336 |
| SuperDisk UltraslimBay Drive | 20L1929 |
| SelectaBase PC Card Enabler | 83H6741 |
| 56 AC Adapter (2-pin) | 83H6739 |
| SelectaBase 600 | 12J2467 |
| SelectaDock III | 3547003 |
| External Battery Charger | 02K6499 |
| 24X-10X IDE CD-ROM Drive | 12J2471 |
| 20X-8X CD-ROM Drive | 1969010 |
| 20X-8X Stereo CD-ROM Drive | 1969011 |
| 6.4 GB Hard Disk Drive | 02K0518 |
| DVD UltraslimBay Drive | |
| -For North America (Region 1) | 05K8890 |
| -For Japan and EMEA (Region 2) | 05K8891 |
| -For AP North and AP South (Region 3) | 05K8832 |
| -For Latin America and AP South (Region 4) | 05K8893 |
| -For Russia (Region 5) | 05K8959 |
| -For China (Region 6) | 05K8960 |
| 32 MB SDRAM SO DIMM | 76H0294 |
| 64 MB SDRAM SO DIMM | 20L0241 |
| 128 MB SDRAM SO DIMM | 01K1150 |
| Miniature Mouse (Black) | 07G0033 |
| TrackPoint III Cap | 39H1354 |

Parts List

Common Parts List

Tools

| | |
|--|---------|
| Tri-Connector 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 1.50 | |

Parts List

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

For 2-pin power cords:

| P/N | Used in These Countries |
|---------|-------------------------|
| 13H5273 | Japan |

For 3-pin power cords:

| P/N | Used in These Countries |
|---------|---|
| 02K0539 | 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, Curacao, 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 |
| 76H3518 | 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 |
| 76H3520 | Denmark |
| 76H3522 | Bangladesh, Myanmar, Pakistan, South Africa, Sri Lanka |
| 76H3524 | Abu Dhabi, Albania, Antigua, Bahrain, Brunei, Dubai, Fiji, Hong Kong, India, Ireland, Kenya, Kuwait, Malaysia, Nigeria, Oman, Qatar, Singapore, United Kingdom |
| 76H3528 | Switzerland, Liechtenstein |
| 76H3530 | Chile, Ethiopia, Italy, Libya |
| 76H3532 | Israel |
| 76H3535 | Korea |

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Part Number: 10L9620

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