Dell® Latitude® LM

SERVICE MANUAL

DELL®

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Read This First

A prerequisite for using this manual to service Dell portable computers is a basic knowledge of IBM-compatible PCs and prior training in IBM-compatible PC troubleshooting techniques. In addition to information provided in this manual, Dell provides the *Reference and Troubleshooting Guide* for trouble-shooting procedures and instructions on using the Dell diagnostics to test portable computers, and the online *System User's Guide* for information about system setup and operations.

Warnings, Cautions, and Notes

Throughout this manual, there may be blocks of text printed in bold type or in italic type. These blocks are warnings, cautions, and notes, and they are used as follows:

WARNING: A WARNING indicates the potential for bodily harm and provides instructions for how to avoid the problem.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and provides instructions for how to avoid the problem.

NOTE: A NOTE provides helpful information about using the computer system.

Chapter 1
System Overview

*T*he Dell® Latitude® LM P-100SD and LM P-133ST are high-performance multimedia portable computers that use the Intel® Pentium® microprocessor. This chapter provides an overview of the components and subsystems of these computers.

The individual model names within the Dell Latitude LM portable family indicate the type and operating frequency of the microprocessor and display used in the computer. For example:

- The Dell Latitude LM P-100SD contains a 100-MHz Pentium microprocessor and an SVGA (S) dual-scan (D) STN LCD.

- The Dell Latitude LM P-133ST contains a 133-MHz Pentium microprocessor and an SVGA (S) active-matrix (T) TFT LCD.

System Features

In addition to the standard features found in IBM®-compatible portable computers, the Dell Latitude LM includes the following new and/or advanced features:

- 8 MB of nonremovable main memory on the main board. The memory capacity can be increased up to 40 MB by installing a matched pair of 4-, 8-, or 16-MB memory modules in the memory upgrade sockets on the main board.

- An 11.3-inch dual-scan SVGA color display or a 12.1-inch active-matrix SVGA display.

- 42-WH lithium ion battery (nine cells).

- 256-KB SRAM level-2 external cache and 16-KB internal cache.

- NeoMagic 2070 video controller supporting all video features with a PCI local bus.

- Intel 430MX PCIset for system and PCI controller.

- Built-in microphone and jacks for connecting external speakers, microphones, and headphones.

- Two new diagnostics tests (infrared and audio).

- An options bay that lets users replace the secondary lithium ion battery or diskette drive without turning off or rebooting the computer. This feature is sometimes called *hot swapping.* The CD-ROM can be inserted or removed while the computer is in suspend mode. This feature is sometimes called

warm swapping. However, the CD-ROM must be in the computer before or during boot in order for the drivers to load.

- Built-in serial infrared transmitter/receiver, effective to 1 m (3.3 ft).

- Support for connecting an external diskette drive to the parallel connector on the I/O panel.

*P*hysical Description
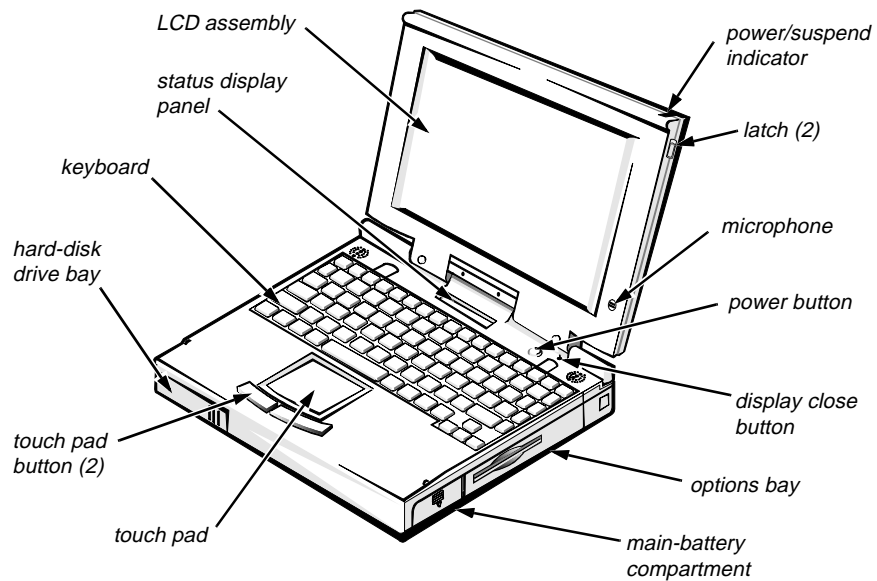
Figure 1-1. Front View of the Portable Computer
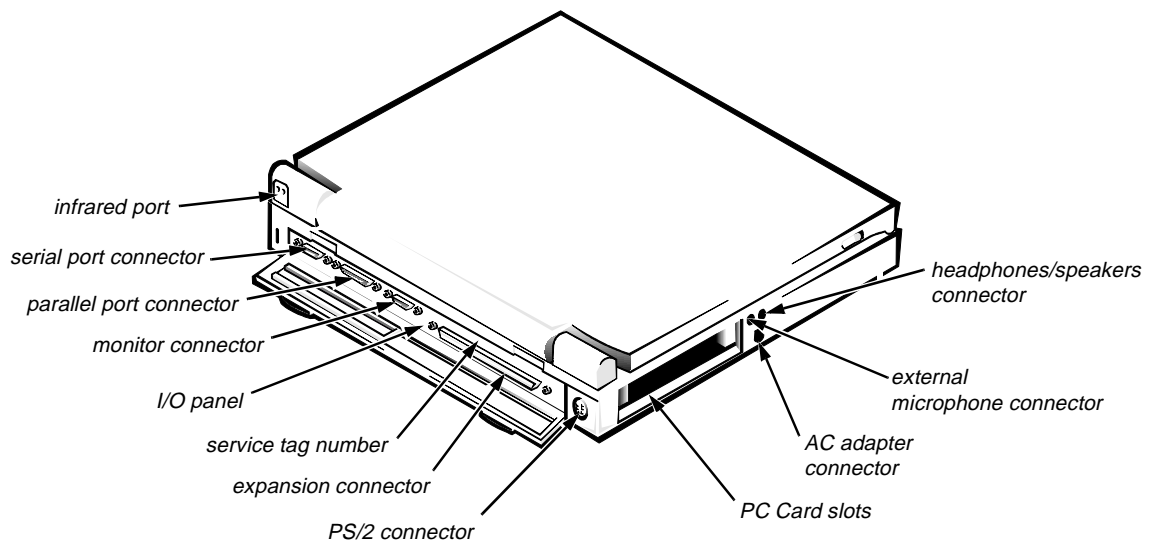
Figure 1-2. Back View of the Portable Computer

Status Display

Figure 1-3. Status Display Panel

The status display panel is located directly above the keyboard. This panel shows icons that indicate keyboard operation or suspend mode; CD-ROM, hard-disk drive, diskette drive, and PC Card activity; and status of the power source (AC power or batteries).

Keyboard Indicators

The following icons indicate the status of the keyboard and whether the computer is in suspend mode.

Caps Lock Indicator
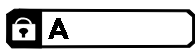
Press <CAPS LOCK> to activate this feature. Press <CAPS LOCK> again to deactivate the feature.

Num Lock Indicator
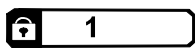
Press <NUM LOCK> to activate this feature. Press <NUM LOCK> again to deactivate this feature.

Pad Lock Indicator

This indicator appears when the embedded keypad is active. To activate the embedded numeric keypad, press <FN><NUM LOCK>. Press <NUM LOCK> to toggle between the cursor keys and number keys.

Scroll Lock Indicator
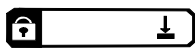
Press <SCROLL LOCK> to activate this feature. Press <SCROLL LOCK> again to deactivate this feature.

Suspend Mode
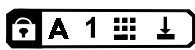
When all indicators are present and appear to be rolling the computer is in suspend mode.

CD-ROM/Hard-Disk Drive Indicator

This indicator blinks when data is being transferred to or from the CD-ROM or hard-disk drive.

Diskette-Drive Access Indicator

This indicator blinks when data is being transferred to or from the internal diskette drive.

PC Card Indicator

This indicator blinks when the computer is accessing data from an installed PC Card or Cards.

AC Power Indicator

This indicator appears when the computer is receiving power through an AC power adapter.

- If the icon is present but not blinking, the computer is on but the battery is not charging.

- If the icon is blinking, the computer is on and the battery is charging.

Battery Activity Indicator

This indicator appears when there are batteries in the computer. If the main battery is present, the upper triangle appears. If the secondary battery is present, the lower triangle appears. If either triangle is blinking, the battery is in use or charging.

Battery Status Indicator

The battery status indicator reflects the state of the main or secondary battery in the computer when the computer is off.

No indicator means there is no battery (main or secondary) in the computer or, if present, the battery has been discharged.

- The AC power indicator with the battery status indicator means the battery is defective.

- An indicator with one bar on the left means a battery is too hot. Allow the battery to cool to room temperature.

- The AC power indicator with the battery status indicator and one bar means that the battery is too hot (40° C [104° F] or more) to start charging. Charging starts automatically when the battery cools to below 40° C.

- An indicator with no bars means that battery power is low (about 80 percent depleted). This is the first low-battery indication and the computer warns the user with three short, audible beeps. There are about 20 minutes of battery life remaining.

- A blinking indicator with no bars means that battery power is critically low (about 95 percent depleted) and needs recharging. There are about 5 minutes of battery life remaining.

- An indicator with bars on the right side of the icon indicates the percentage of battery life remaining. Each bar equals 10 percent of battery life.

Battery Charge Gauge

There is a battery charge gauge on the main and secondary battery. When you press the battery test button (labeled "PUSH"), the appropriate indicator lights up for a few seconds to indicate the amount of charge remaining in the battery.

Password

CAUTION: Dell strongly recommends that the user back up the password onto a diskette. If the user forgets the password and does not have it on diskette, the computer cannot be accessed. In that case, the computer must be returned to Dell at the user's expense. Dell technicians will erase the password by shorting C146, recharge the CMOS battery, and send the computer back at the user's expense. For the procedure to erase the password, see "Deleting the Password" in Chapter 4.

System Power

The power button controls power to the system. The computer receives power from either the AC adapter connected to an AC power source or from up to two batteries. If you use the AC adapter, constant power is available to the computer. If you use one or two batteries, the system has built-in power management features that extend battery life by removing power from parts of the computer that are not being used.

Power Conservation

Attach the AC power adapter to the computer, whenever possible, to conserve battery power. When the AC adapter is attached, the battery is charged while the computer uses AC power.

The Power Menu of the Setup program has power conservation features. When activated, each power conservation feature turns off or slows down one or more functions while the computer is idle. The power conservation features are as follows:

- Standby mode — To activate this feature, select the **STANDBY TIME-OUT** option in the Power Menu of the Setup program. To deactivate the feature, move the cursor or press any key on the built-in or external keyboard.

- Suspend mode — To activate this feature, press <FN><ESC> or set the **SUSPEND TIME-OUT** option in the Power Menu of the Setup program. When suspend mode is activated, the computer beeps once and the suspend mode indicator in the status display panel blinks every 4 seconds. To deactivate this feature, press any key on the built-in keyboard.

  *NOTE: To conserve power when the computer is not in use, close the display. If the display is closed and an external monitor is **not** connected, the computer beeps one time and goes into suspend mode. If the computer receives a modem call from an external modem while the display is closed, the computer answers the call unless it is in suspend-to-disk mode. To resume work, open the display.*

- Suspend-to-disk mode — To activate this feature, press <FN><A> or set the **SUSPEND TO DISK TIME-OUT** option in the Power Menu of the Setup program. To resume using the computer, press the power button on the built-in keyboard.

- Dimming the display — To activate this feature, set the **DIM MODE TIME-OUT** option in the Power Menu of the Setup program. To increase the brightness of the display, press any key on the built-in keyboard.

- Turning off the hard-disk drive — To activate this feature, set the **HARD-DISK TIME-OUT** option in the Power Menu of the Setup program. The computer automatically turns the hard-disk drive back on the next time the microprocessor accesses the drive.

Interrupt Assignments

Table 1-1. Interrupt Assignments

IRQ Line	Used/Available
IRQ0	Generated by the system timer
IRQ1	Generated by the keyboard controller to signal that the keyboard output buffer is full
IRQ2	Cascade to second interrupt controller
IRQ3	Used by the infrared port (COM2)
IRQ4	Used by the serial port (COM1)
IRQ5	Used by the audio controller
IRQ6	Generated by the diskette drive controller to indicate that the diskette drive requires the attention of the microprocessor
IRQ7	Used by the parallel port
IRQ8	Generated by the system RTC
IRQ9	Software redirect to INTOA
IRQ10	Reserved
IRQ11	Reserved
IRQ12	Generated by the keyboard controller to indicate that the output buffer of the integrated touch pad or external PS/2 mouse is full
IRQ13	Used by the math coprocessor on the microprocessor
IRQ14	Generated by the hard-disk drive to indicate that the drive requires the attention of the microprocessor
IRQ15	Reserved

Technical Specifications

Table 1-2. Technical Specifications

Microprocessor	
Microprocessor type.	Intel Pentium microprocessor
Microprocessor speed.	100 or 133 MHz
Internal cache memory.	16 KB
External cache	256 KB
Math coprocessor	internal to the microprocessor

Chip Set and Bus	
System chip set.	Intel 430MX PCIset
Data bus width	64 bits
DRAM bus width	64 bits
Address bus width	32 bits
Flash EPROM.	2 Mbits

PC Card	
PC Card connectors	two (for two type I or type II cards or one type III card)
Cards supported	3.3- and 5-V
PC Card connector size	68 pins
Data width (maximum)	32 bits

Memory	
Architecture	fast-page mode, two-way interleaved
Memory module capacities . .	4, 8, and 16 MB; must be installed in matched pairs
Standard RAM	8 MB on system board
Maximum RAM	40 MB

Table 1-2. Technical Specifications (Continued)

Memory (Continued)	
Memory access time:	
tRAC	70 ns
tCAC	20 ns
BIOS address	F000:0000

Connectors	
Serial (DTE)	one 9-pin connector; 16,550-compatible, 16-byte buffer
Parallel	one 25-hole connector; unidirectional, bidirectional, EPP 1.9, or ECP
Monitor	one 15-hole connector
PS/2 keyboard/mouse	one 6-pin mini-DIN
Infrared	one IrDA 1.0-compliant window
Audio	microphone; headphones/speaker

Audio	
Audio type.	SoundBlasterPro-compatible voice and music functions
Audio controller	ESS 1688
Conversion	16 bit (stereo analog-to-digital and digital-to-analog)
FM music synthesizer	20-voice, 72-operator
Interfaces:	
Internal	ISA bus
External.	microphone (minijack); headphones/speaker (minijack)
Internal speaker amplifier	0.5 W stereo
Controls.	volume can be controlled through key combinations and software application menus

Table 1-2. Technical Specifications (Continued)

Video	
Video type.	64-bit (128-bit hardware accelerated) PCI
Video controller	NeoMagic 2070
Video memory	896 KB

Active-Matrix Display	
Type	active-matrix color (TFT)
Dimensions:	
Height	184.5 mm (7.3 inches)
Width	246.0 mm (9.7 inches)
Diagonal	307.5 mm (12.1 inches)
Maximum resolution	800 x 600 pixels; 256 colors
Refresh rate (typical)	70 Hz
Response time (typical)	60 ms
Operating angle	0° (closed) to 135°
Dot pitch.	0.31 mm
Power consumption	2.35 W
Controls	brightness can be controlled through key combinations

Dual-Scan Display	
Type	dual-scan color (STN)
Dimensions:	
Height	172.8 mm (6.8 inches)
Width	230.4 mm (9.1 inches)
Diagonal	287.0 mm (11.3 inches)
Maximum resolution	800 x 600 pixels; 256 colors
Refresh rate (typical)	70 Hz
Response time (typical)	300 ms
Operating angle	0° (closed) to 135°

Table 1-2. Technical Specifications (Continued)

Dual-Scan Display (Continued)

Dot pitch	0.29 mm
Power consumption.	3.4 W
Controls.	brightness and contrast can be controlled through key combinations

Keyboard

Number of keys.	87 (U.S. and Canada); 88 (Europe); 89 (Japan)
Key travel	3.0 ± 0.5 mm (0.12 ± 0.02 inch)
Key spacing.	19.1 mm (0.75 inch)
Layout	QWERTY/AZERTY/Kanji

Touch Pad

Interface	PS/2-compatible
X/Y position resolutions	20 points/mm (500 points/inch)
Size:	
Thickness	4.65 mm (0.18 inch) at highest component
Width	62.1-mm (2.4-inch) sensor-active area
Height	49.0-mm (1.9-inch) rectangle with 0.5-mm (0.02-inch) tabs
Weight	15 g (0.52 ounce) $\pm$ 0.5 g (0.001 ounce)
Power:	
Supply voltage	$5\ V \pm 10\%$
Supply current.	4 mA (maximum operating current)

Table 1-2. Technical Specifications (Continued)

Main Battery	
Type	lithium ion
Dimensions:	
Height	22.0 mm (0.86 inch)
Depth	219.0 mm (8.62 inches)
Width	57.8 mm (2.27 inches)
Weight.	0.44 kg (0.97 lb)
Voltage	10.8 VDC
Capacity	42 WH
Charge time (approximate):[1]	
Computer on	4 hours
Computer off	3 hours
Operating time (approximate, with no power management features enabled):[1]	3 to 5 hours with one battery; 6 to 10 hours with two batteries
Life span (approximate)[1]	500 discharge/charge cycles
Temperature range:	
Charge	0° to 40°C (32° to 104°F)
Discharge	0° to 60°C (32° to 140°F)
Storage	-20° to 50°C (-4° to 122°F)

[1]   *Battery performance features such as charge time, operating time, and life span can vary according to the conditions under which the computer and battery are used.*

Table 1-2. Technical Specifications (Continued)

AC Adapter

Input voltage	90 to 264 VAC
Input current (maximum)	1.0 A at 100 VAC, full load
Input frequency	47 to 63 Hz
Output current	2.6 A (continuous)
Output power	34 W
Rated output voltage	16.2 VDC
Physical:	
Height	27.0 mm (1.06 inches)
Width.	60.0 mm (2.36 inches)
Depth.	107.5 mm (4.23 inches)
Weight (with cables)	0.3 kg (0.66 lb)
Temperature range:	
Operating	5° to 35°C (41° to 95°F)
Storage	-20° to 50°C (-4° to 122°F)

Physical (Computer)

Height	49.5 mm (1.95 inches)
Width.	299.9 mm (11.8 inches)
Depth.	228.7 mm (8.93 inches)
Weight (with hard-disk drive, diskette drive, battery, and two PC Card blanks):	
Dell Latitude LM P100SD	3.1 kg (6.9 lb)
Dell Latitude LM P133ST.	3.1 kg (6.9 lb)

*Table 1-2. **Technical Specifications** (Continued)*

Environmental (Computer)

Temperature:

    Operating . . . . 5° to 35°C (41° to 95°F)

    Storage . . . . -20° to 50°C (-4° to 122°F)

Relative humidity . . . . 10% to 90% (noncondensing)

Maximum vibration:

    Operating . . . . 0.51 GRMS using a random-vibration spectrum that simulates air shipment

    Storage . . . . 1.1 GRMS using a random-vibration spectrum that simulates truck shipment

Maximum shock:[2]

    Operating . . . . 1.52 m/sec (4.98 ft/sec)
(less than or equal to a pulse width of 2 ms)

    Storage . . . . 2.03 m/sec (6.66 ft/sec)
(less than or equal to a pulse width of 2 ms)

Altitude:

    Operating . . . . 0 m to 2438 m (0 ft to 8,000 ft)

    Storage . . . . 0 m to 12,192 m (0 ft to 40,000 ft)

[2]   *Measured with the hard-disk drive in head-parked position.*

Chapter 2
Initial Procedures

*T*his chapter describes initial procedures that can help you diagnose a computer problem. These procedures can often reveal the source of a problem or indicate the correct starting point for troubleshooting the computer. Dell recommends that you perform these initial procedures in the order they are presented.

Initial User Contact

When you first contact a user who has a problem, ask the user to describe the problem and the conditions under which it occurs. A verbal description can often indicate the cause of a problem or indicate the appropriate troubleshooting procedure to use. After the user describes the problem, follow these steps:

1. **Ask the user to back up any data on the hard-disk drive if the computer's condition permits.**

   See the "Maintaining Your Computer" section of the online *System's User's Guide*.

2. **Ask the user to try to duplicate the problem by repeating the operations he or she was performing at the time the problem occurred.**

   Can the user duplicate the problem?

   Yes. Proceed to step 3.

   No. Proceed to the next section, "Visual Inspection."

3. **Observe the user to determine whether he or she is making an error, such as typing an incorrect key combination or entering a command incorrectly.**

   Is the problem a result of user error?

   Yes. Instruct the user in the proper procedure or direct him or her to the appropriate user documentation for a description of the correct procedure.

   No. Proceed to the next section, "Visual Inspection."

Visual Inspection

The visual inspection consists of a quick inspection of the exterior of the computer and any attached peripherals, including making any necessary corrections. For information about the proper removal and installation of computer

components, as instructed in the following procedure, see Chapter 4, "Removing and Replacing Parts."

CAUTION: Before you proceed with the visual inspection, ensure that the user has saved all open files and exited all open application programs if possible.

To perform a visual inspection, follow these steps:

1. **Determine the power state of the computer.**

   If the display is on, go to step 2.

   If the display is off, press any key to verify that the computer is not in suspend or standby mode. Then proceed to step 2.

2. **Turn off any attached peripherals, and then turn off the computer. Then proceed to step 3.**

3. **Verify that the exterior of the computer is free of any obvious physical damage.**

4. **If the computer is operating from an AC adapter, verify the following:**

   a. The AC adapter's AC power cable is connected to both the AC adapter and the wall outlet. The AC adapter's LED should be on.

   b. The AC adapter's DC power cable is properly connected to the computer's AC adapter connector.

   c. The AC adapter and cables are free of any obvious physical damage.

5. **If the computer is operating from battery power, remove any installed batteries, verify that they are free of any obvious physical damage, and then reinsert the batteries into their respective compartments. Press the test button located on each battery to see if there is a charge.**

6. **Remove the diskette drive (if installed), verify that it is free of any obvious physical damage, and then reinsert the drive into its compartment.**

7. **Remove any installed PC Cards from the PC card slot, verify that they are free of any obvious physical damage, and then reinsert the card(s) into the PC card slot.**

8. **If there is a memory area problem and the computer has memory modules, remove the memory modules from the main board, verify that they are free of any obvious physical damage, and then reinstall the modules.**

9. **Open the computer, and verify that it is free of any obvious physical damage.**

10. **Verify that the keyboard is free of any obvious physical damage and that its keys operate freely.**

11. **Verify that the touch pad and its associated buttons operate freely.**

12. If an external monitor is connected, verify the following:

a. The monitor's interface cable is properly attached to the external-monitor connector on the computer's I/O panel.

b. The monitor's power cable is attached to a power source and is free of any obvious physical damage.

c. The monitor and its interface cable are free of any obvious physical damage.

d. The monitor's controls are set according to the instructions in the documentation for the monitor.

13. If an external mouse is connected, verify the following:

a. The mouse is properly connected to the keyboard/keypad/mouse connector on the computer's I/O panel.

b. The mouse and its cable are free of any obvious physical damage.

c. The mouse's ball and pushbuttons operate freely.

14. For any attached serial or parallel devices, verify the following:

a. The device's interface cable connector is correctly attached to the appropriate port connector on the computer's I/O panel.

b. The captive screws that secure the connectors at each end of the interface cable are secure enough to ensure a firm connection.

c. The attached device and its interface cable are free of any obvious physical damage.

15. Turn on any attached peripherals and then the computer.

Does the problem recur?

Yes. Proceed to the next section, "Observing the Boot Routine."

No. No further steps are necessary.

Observing the Boot Routine

After you perform a visual inspection as described in the previous section, boot the computer from a diagnostics diskette and, while the boot routine is running, observe the computer for any indications of problems.

NOTE: To prevent possible damage to the original diagnostics diskette, always use a backup copy of the diagnostics diskette when servicing a user's computer. Dell recommends that users make copies of the Dell Diagnostics Diskette. *For instructions, see "Before You Start Testing" in Chapter 4 of the* Dell Latitude LM Reference and Troubleshooting Guide.

To observe the boot routine, follow these steps:

1. Turn off the computer and any attached peripherals.

2. Insert a diagnostics diskette into the diskette drive. Turn on all peripherals and then the computer.

3. **Watch the indicators at the top of the keyboard. Depending on how your computer is configured, after various indicators flash momentarily in the status display panel, some indicators should light up and remain on.**

Do these indicators light up within seconds after the boot routine starts?

Yes. Proceed to step 4.

No. Troubleshoot the power subsystem.

4. **While the boot routine is running, observe the computer for any of the following:**

- Diskette-drive and hard-disk drive access indicator activity

These indicators light in response to data being transferred to or from the drives. If either of these indicators fails to light during the boot routine, troubleshoot the diskette drive or hard-disk drive subsystem, as appropriate.

- System error messages

These messages can indicate problems or provide status information. If a system error message is displayed, refer to Table 3-2.

- Beep codes

A beep code is a series of beeps that indicates an error condition. If the computer emits a beep code, refer to Table 3-1.

NOTE: The computer beeps once shortly after the system boots. This beep is normal and not part of a beep code.

- Any unusual sounds

5. **Observe the display for the Diagnostics Menu of the Dell diagnostics.**

Does the Diagnostics Menu appear on the display?

Yes. See "Running the Dell Diagnostics" in Chapter 3.

No. Proceed to step 6.

6. **Insert another copy of the diagnostics diskette into the diskette drive, and reboot the computer.**

Does the Diagnostics Menu appear on the display?

Yes. See "Running the Dell Diagnostics" in Chapter 3.

No. Proceed to the next section, "Eliminating Resource Conflicts."

Eliminating Resource Conflicts

Devices within or connected to the computer may require dedicated memory spaces, interrupt levels, and/or DMA channels. Because different devices can be configured at different times, it is possible the same resource is assigned to two or more devices.

Disconnect all peripherals and remove all PC Cards to make sure that the computer failure is not caused by faulty devices.

If you suspect that resource conflicts might exist, check the computer and reassign the resources as necessary. For more information about resolving conflicts, see Chapter 3, "Troubleshooting Your Computer," in the *Reference and Troubleshooting Guide*.

Getting Help

If none of the procedures in this chapter reveal the source of the problem or lead to the proper troubleshooting steps for determining the source of the problem, contact Dell for technical assistance. For instructions, see Chapter 5, "Getting Help," in the *Reference and Troubleshooting Guide* or the "Contacting Dell" section of the online *System User's Guide*.

Chapter 3
Beep Codes and Error Messages

*T*his chapter describes beep codes and system error messages that can occur during system start-up or, in the case of some failures, during normal computer operation. The tables in this chapter list faults that can cause a beep code or system error message to occur and the probable causes of the fault in each case.

If a faulty computer does not emit beep codes or display system error messages to indicate a failure, you should load the diagnostics and run the appropriate tests to help isolate the source of the problem. See "Running the Dell Diagnostics" found later in this chapter.

POST Beep Codes

If the display cannot display error messages during POST, the computer may emit a series of beeps that identify the problem or that can help you identify a faulty component or assembly. The following table lists the beep codes that may be generated during POST. Most beep codes indicate a fatal error that requires replacement of the main board or other corrective actions before the computer can operate.

Table 3-1. POST Beep Codes

Beep Code	Error	Probable Causes
1-2	Memory module not being properly identified or used	Faulty memory module or faulty main board
1-2-2-3	ROM BIOS checksum failure	Faulty main board
1-3-1-1	DRAM refresh failure	Faulty main board
1-3-1-3	Keyboard controller test failure	Faulty keyboard or faulty main board
1-3-4-1	RAM failure on address line *nnnn*	Faulty memory module or faulty main board
1-3-4-3	RAM failure on data bits *nnnn* of high byte on memory bus	Faulty memory module or faulty main board
1-4-1-1	RAM failure on data bits *nnnn* of low byte on memory bus	Faulty memory module or faulty main board
2-1-2-3	Check ROM copyright notice failure	Faulty main board
2-2-3-1	Interrupt mask register failure	Faulty main board

System Error Messages

The following table lists (in alphabetical order) system error messages that may appear on the display during the boot routine or during normal computer operation.

Table 3-2. System Error Messages

Message	Definition	Probable Causes
Diskette drive A error	Connector loose or diskette faulty.	Faulty or incorrectly inserted diskette in drive. Faulty diskette drive. Faulty main board.
Extended RAM failed at off-set: *nnnn*	Extended memory not configured properly or failed at memory address *nnnn*.	Faulty or improperly seated memory module. Faulty main board.
Failing bits: *nnnn*	Memory failed at RAM address *nnnn*.	Faulty or improperly seated memory module. Faulty main board.
Fixed disk 0 failure	Hard-disk drive not responding to commands from computer.	Corrupted hard-disk drive boot sector or configuration file. Faulty hard-disk drive. Faulty main board.
Fixed disk controller failure	Hard-disk drive or controller not responding to commands from computer.	Faulty hard-disk drive. Faulty main board.
Incorrect drive A type—run Setup	Diskette drive not identified properly in the Setup program.	Incorrect drive configuration. Faulty connections. Faulty diskette drive. Faulty main board.
Keyboard controller error	Keyboard controller faulty.	Faulty keyboard connection. Faulty keyboard. Faulty main board.

Table 3-2. System Error Messages (Continued)

Message	Definition	Probable Causes
Keyboard error	Keyboard not responding correctly.	Built-in keyboard: Faulty keyboard or key pressed while computer booting. External keyboard: Cable or connector loose. Faulty keyboard or key pressed while computer booting.
Operating system not found	Operating system cannot be found on hard-disk drive or on diskette in diskette drive.	Incorrect drive configuration. Operating system not installed on hard-disk drive or diskette drive not bootable. Faulty connections. Faulty drive. Faulty main board.
Parity check 1 *nnnn*	Parity error in system bus at address *nnnn*.	Faulty main board.
Parity check 2 *nnnn*	Parity error in I/O bus at address *nnnn*.	Faulty main board.
Real time clock error	CMOS battery that supports data stored in NVRAM may be dead.	Faulty battery. Faulty main board.
Shadow RAM failed at off-set: *nnnn*	Shadow RAM failed at address *nnnn*.	Faulty or improperly seated memory module. Faulty main board.
System battery is dead—Replace and run Setup	CMOS battery dead.	Faulty CMOS battery or main board.
System cache error—cache disabled	Primary cache failed.	Faulty microprocessor.

Table 3-2. System Error Messages (Continued)

Message	Definition	Probable Causes
System CMOS checksum bad—run Setup	CMOS has been corrupted or modified, possibly by an application program that changes data stored in CMOS.	BIOS has been updated.
System RAM failed at off-set: *nnnn*	Memory not operating correctly. System RAM failed at address *nnnn* in the 64-KB block at which error was detected.	Faulty or improperly seated memory module. Faulty main board.
System timer error	Timer circuit on main board malfunctioning.	Faulty main board.

Running the Dell Diagnostics

> **CAUTION:** To prevent damage to the original diagnostics diskette, always use a backup copy of the diagnostics diskette when servicing a user's computer. Dell recommends that users make several copies of this diskette to ensure that one is always available.

The Dell diagnostics contains tests that aid in troubleshooting the computer. The diagnostics diskette contains the following test groups:

- RAM — Tests the main memory

- System Set — Tests the primary functions of the main board

- Video — Tests the video subsystem

- Keyboard — Tests the keyboard subsystem

- Mouse — Tests the mouse/touch pad subsystem

- Diskette Drives — Tests the diskette drive subsystem

- Hard-Disk Drives (Non-SCSI) — Tests the IDE hard-disk drive subsystem

- IDE CD ROM Drives — Tests a CD-ROM drive subsystem

- Serial/Infrared Ports — Tests the serial communications port

- Parallel Ports — Tests the parallel communications port

- Audio — Tests the operation of the audio chip set

- SCSI Devices — Tests a SCSI hard-disk drive subsystem

  NOTE: This test does not apply to Dell Latitude LM computers.

- Network Interface — Tests a network controller and its associated interface

  NOTE: This test does not apply to Dell Latitude LM computers.

To start the diagnostics, turn off the computer, insert a diagnostics diskette into the diskette drive, and then turn on the computer.

Starting the diagnostics causes the Dell logo screen to appear, followed by a message indicating that the diagnostics is loading. Before the diagnostics loads, a program tests the portion of main memory (RAM) required for loading the diagnostics. If a main memory error is detected, a message appears on the screen telling you a memory module has failed.

If no errors are found in main memory, the diagnostics loads, and the Diagnostics Menu appears. This menu lets you choose the following options or exit to the MS-DOS® prompt:

- **RUN QUICK TESTS** — Runs preselected tests to quickly locate a computer failure or to indicate where further testing is needed to isolate a failure

- **RUN ALL TESTS** — Runs all tests for a thorough test of the computer

- **RUN SPECIFIC TESTS** — Tests a particular area or subsystem of the computer

Chapter 4
Removing and Replacing Parts

*T*his chapter provides procedures for removing and replacing components, assemblies, and subassemblies.

Unless otherwise noted, each of the procedures in this chapter assumes the following:

- The computer and any attached peripherals are turned off and the peripherals disconnected from the computer's I/O panel.

- A part can be replaced or installed by performing the removal procedure in reverse order.

When performing the procedures in this chapter that require the display assembly to be open, use a book or something similar to support the display assembly. The angle of the display assembly with respect to the bottom case should not exceed 135 degrees. Also, assume that locations or directions relative to the computer are as shown in Figure 4-1 unless otherwise specified in a procedure.

back of computer

left side

DELL

right side

front of computer
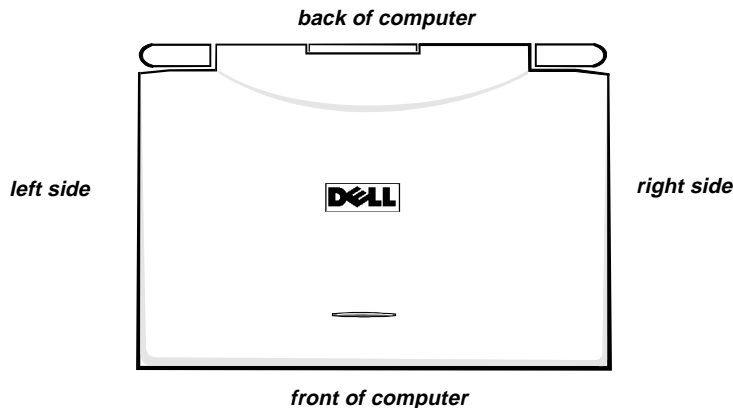
Figure 4-1. Computer Orientation

*R*ecommended Tools

Most of the procedures require the use of one or more of the following tools:

- Small flat-blade screwdriver
- Number 1 magnetized Phillips-head screwdriver
- Antistatic grounding strap
- Needle-nose pliers

- Small scribe (or Delrin [plastic] screwdriver)
- Nut drivers
- Chip removal tool

Screw Identification and Tightening

B7

(screw B7 is 3 mm)

3 mm
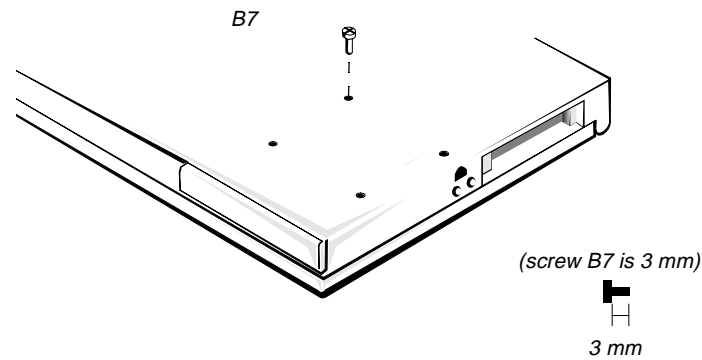
Figure 4-2. Screw Identification

> **CAUTION: It is essential that the correct length screw be used when reinstalling a screw. Otherwise, hardware damage could result. Make sure that the screw is properly aligned with its corresponding hole, and avoid overtightening.**

Where applicable, information about screw lengths is provided in illustrations. Before installing a screw, match the screw to the screw length graphics provided to check for correct length.

Precautionary Measures

Before performing any of the procedures in this chapter, read the following warning.

> **WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF THE EQUIPMENT: Before you start to work on the computer, perform the following steps in the sequence indicated.**
>
> 1. **Turn off the computer and any attached peripherals.**
>
> 2. **Disconnect the computer and any attached peripherals from AC power sources to reduce the potential for personal injury or shock.**
>
> 3. **Ground yourself by attaching an antistatic grounding strap to your wrist and to an unpainted metal surface on the computer's I/O panel. If an antistatic grounding strap is not available, periodically discharge static electricity from your body by touching one of the connectors on the I/O panel.**

1. **Determine the power state of the computer.**

   If the display is on, go to step 2.

   If the display is off, press any key on the keyboard to verify that the computer is not in suspend or standby mode. Then proceed to step 2.

2. **Turn off the computer and any attached peripherals.**

3. **Disconnect the computer and any attached peripherals from AC power sources to reduce the potential for personal injury or shock.**

4. **Remove the main battery from the battery compartment.**

   On the right side of the computer, press down on the battery cover until it unlocks and pull the battery straight out.
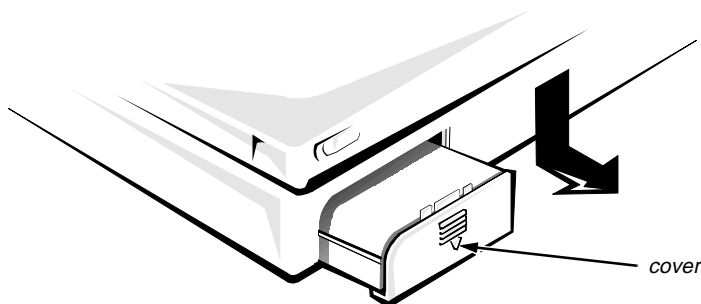
cover

Figure 4-3. Main Battery Removal

5. **Remove the hard-disk drive assembly.**

   Turn the computer over and remove screws HD1 and HD2. Turn the computer right side up. With the computer facing you, slide the hard-disk drive cover to the left and away from the computer. Using the handle on the front of the hard-disk drive, pull the drive straight out of the computer.
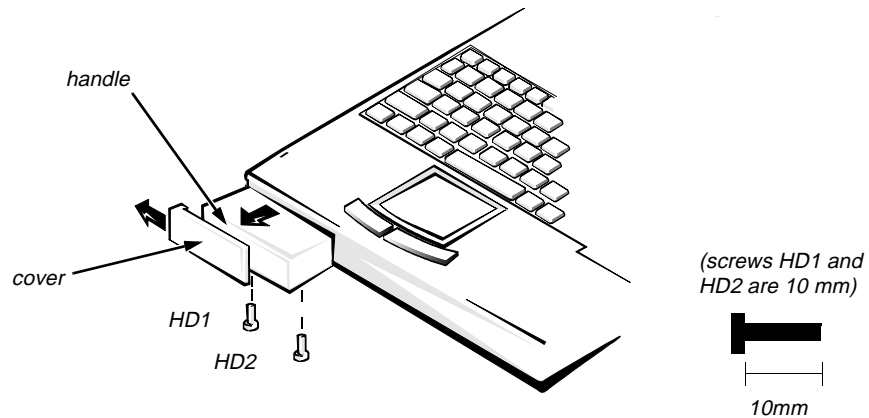

Figure 4-4. Hard-Disk Drive Removal

6. **Remove the diskette drive, secondary battery, or CD-ROM from the options drive bay.**

   NOTE: The options bay allows the user to replace the lithium ion battery or diskette drive without turning off or rebooting the computer. This feature is sometimes called hot swapping. *The CD-ROM can be inserted or removed while the computer is in suspend mode. This feature is sometimes called* warm swapping. *However, the CD-ROM must be in the computer before or during boot in order for the drivers to load.*

   Turn the computer over and push the lock towards the options bay. Slide the latch toward the back of the computer (the latch does not move all the way to the lock groove).
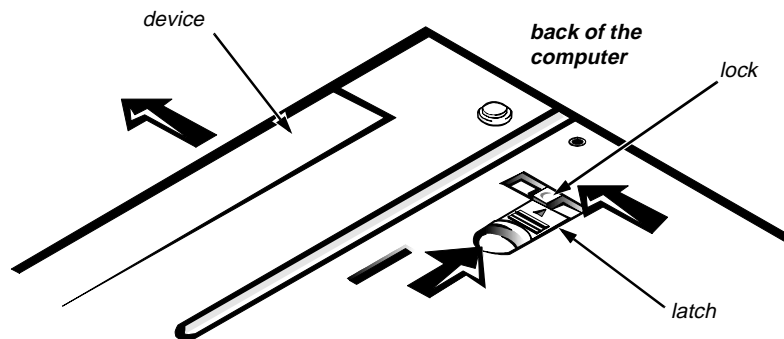
Figure 4-5. Options Bay Lock and Latch

Keep holding the latch with one hand while pulling the device (diskette drive, secondary battery, or CD-ROM) straight out of the options bay with the other.
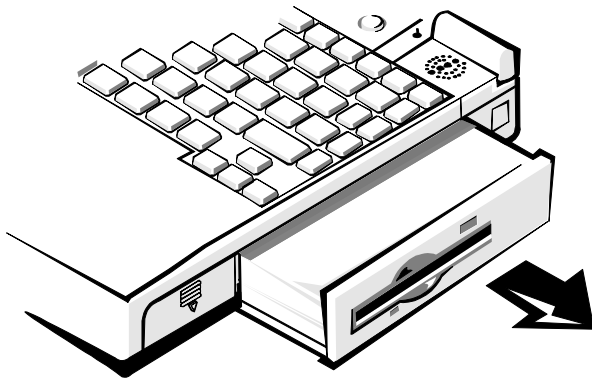
Figure 4-6. Diskette Drive, Secondary Battery, or CD-ROM Removal

7. Remove any PC Cards

To remove a PC Card from the top connector, press the *top* eject button (identified by an arrow pointing up). To remove a PC Card from the bottom connector, press the *bottom* eject button (identified by an arrow pointing down). If you are removing a type III card, press the bottom eject button.
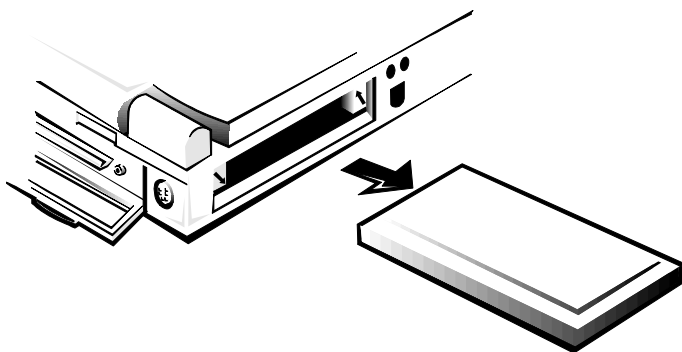
Figure 4-7. PC Card Removal

ZIF Connectors

Some of the computer's interface connectors are zero insertion force (ZIF) connectors. These connectors are not removable; they must be released to disconnect a cable from them.

> **CAUTION: ZIF connectors are fragile. To avoid breaking the connectors, touch them carefully. Do not apply too much pressure to the movable part of the connector when opening or closing it.**

To disconnect an interface cable from a ZIF connector, follow these steps:

1. **Insert a small flat-blade screwdriver under the movable part of the connector.**

   For most ZIFs, carefully pry up first one end of the movable part of the connector and then the other end. Some ZIFs (keyboard connector on the main board) may need to be lifted in the center.
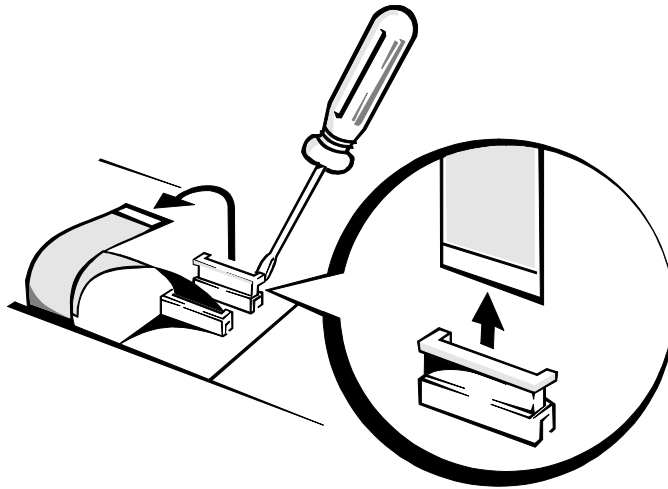
Figure 4-8. Releasing a ZIF Connector

2. **Pull up gently on the movable part of the connector until it releases the interface cable.**

3. **Grasp the interface cable and pull it out of the connector.**

To reconnect an interface cable to a ZIF connector, follow these steps:

1. **Use the flat-blade screwdriver to open the movable part of the ZIF connector.**

2. **Orient the end of the interface cable with the ZIF connector, and insert the end of the cable into the connector.**

3. **While holding the cable in place, close the ZIF connector.**

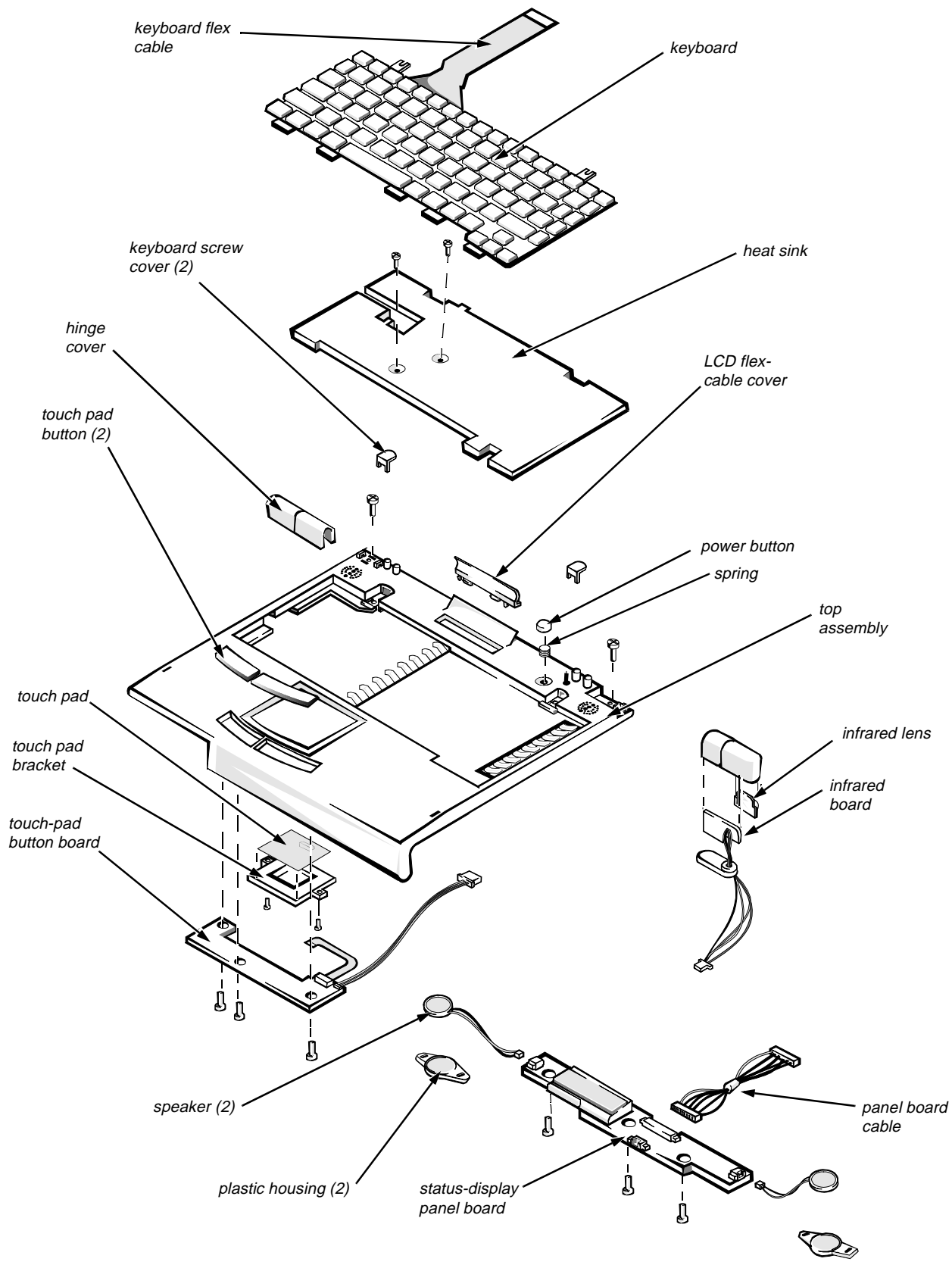   To ensure a firm connection, make sure the ZIF connector is completely closed.

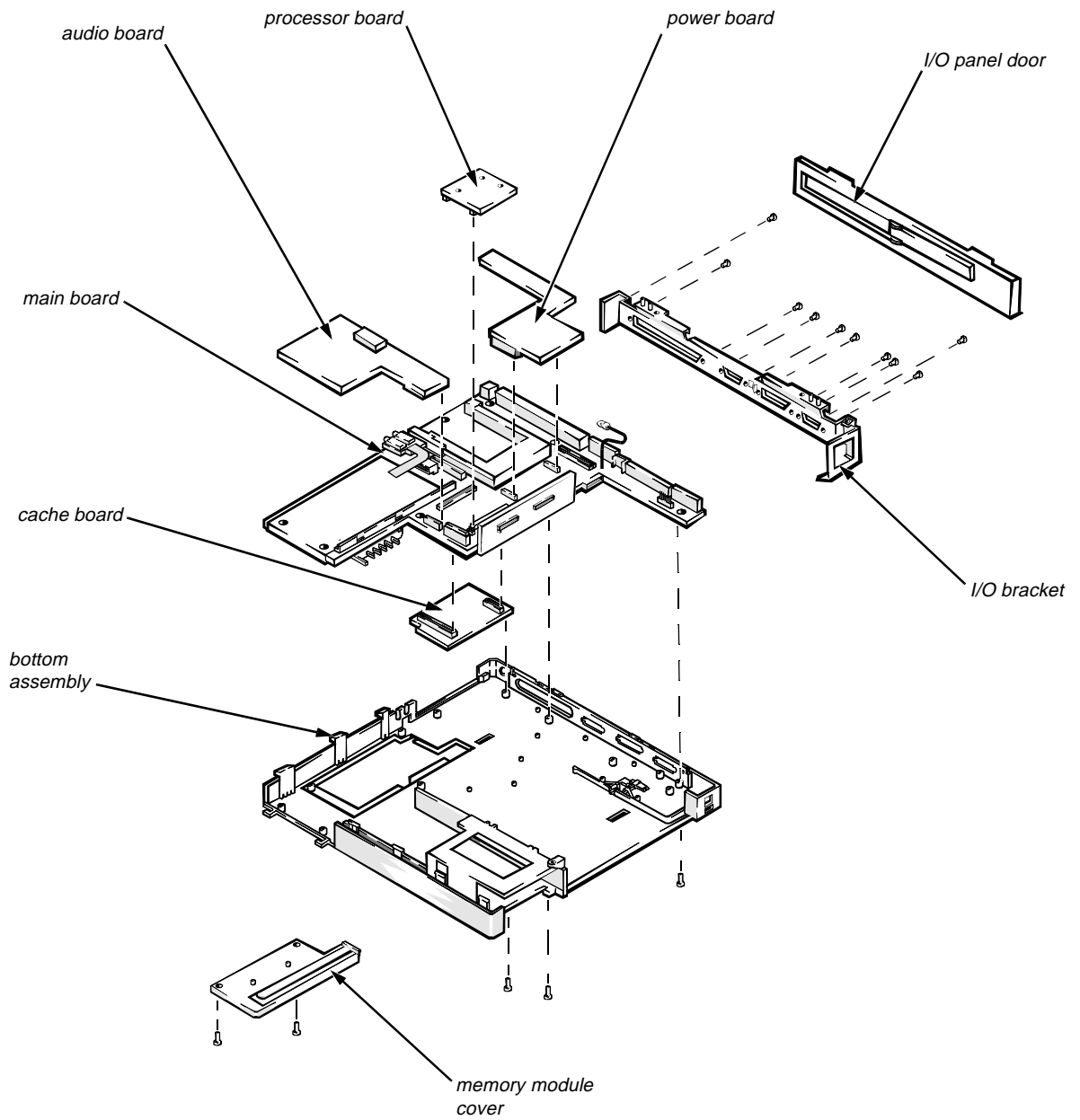# Exploded Views of Components and Assemblies

LCD panel
assembly

latch (2)

power/
suspend
indicator

keyboard

heat sink

bottom
assembly

diskette drive,
secondary battery,
or CD-ROM

hard-disk drive

main battery
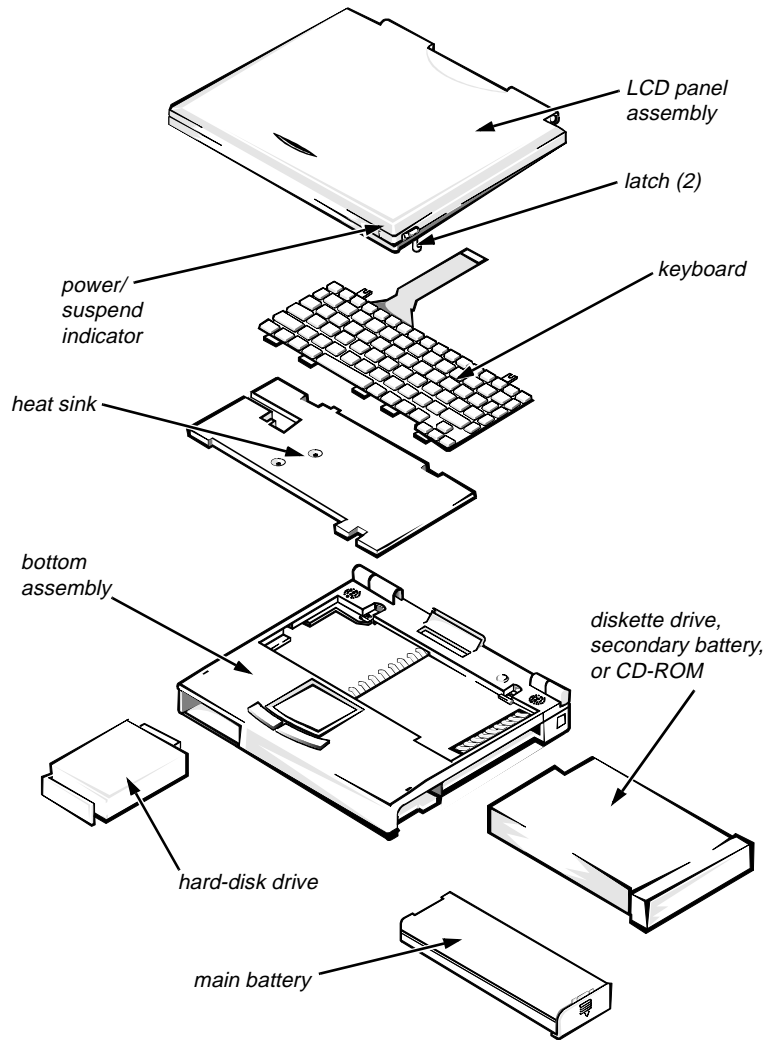
Figure 4-9. Exploded View—Computer

front bezel

LCD panel

LCD panel flex cable

latch

power/suspend indicator

hinge (2)

back bezel

stiffener

microphone

inverter board

inverter board connector
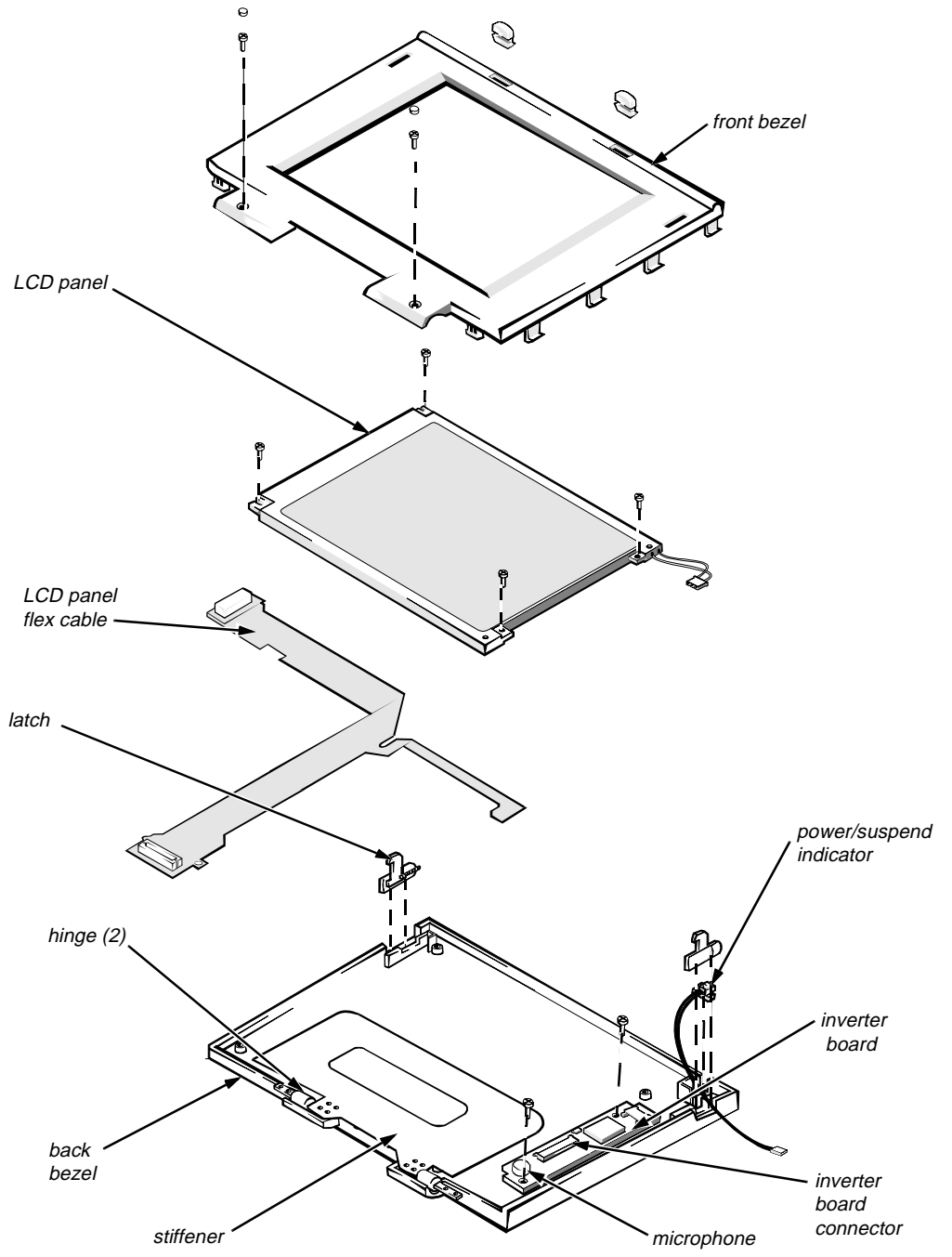
Figure 4-10. Exploded View—LCD Assembly

Figure 4-11. Exploded View—Top Assembly

audio board

processor board

power board

I/O panel door

main board

cache board

bottom
assembly

I/O bracket

memory module
cover

Figure 4-12. Exploded View—Bottom Assembly

Factory Repair Parts and Assemblies

This section contains a parts list and procedures for removing and replacing factory components and subassemblies. This information is provided for reference only. Dell does not recommend removal and replacement of these parts in the field.

Table 4-1 lists the factory repair parts and assemblies available for the computer. Some parts may only be available as part of a kit or assembly. The subsections that follow provide instructions for removing and replacing these parts and assemblies. An asterisk (*) identifies those parts or assemblies that are replaceable by a customer.

Table 4-1. Factory Repair Parts and Assemblies

Part or Assembly Name	Order Name
AC Adapter/Power Cables	
AC Adapter, service kit*	CUS,ADPT,AC,EXT,16.2V,34W, LMP
AC Adapter*	ADPT,AC,EXT,16.2V,34W,LMP
Cable, power, U.S.	CORD,PWR,110V,6F,AC ADPT,US
Cable, power, Australia	CORD,PWR,220V,6F,AC ADPT,AUS
Batteries	
Battery, main, 42-WH*	BTRY,MAIN,42WHR,LIION,LMP
Battery, secondary*	BTRY,2ND,LIION,LMP
Board Assemblies	
Board assembly, 100-MHz, service kit	SVC,SYS,PLN,LMP100SD
Main board	SYS,PLN,3.3V STN LCD,LMP
Processor board, 100-MHz	CRD,PRCR,LMP100
Card, cache	CRD,L2,CACHE,LMP
Heat sink, microprocessor, subassembly	SUBASSY,HTSNK,CPU,LMP
Board, power supply	CRD,CONV,DC-DC,LMP
Insulator, main board	INSUL,MYLAR,PWA,LMP

Customer-replaceable unit (CRU)

Table 4-1. Factory Repair Parts and Assemblies (Continued)

Part or Assembly Name	Order Name
Board Assemblies (Continued)	
Board assembly, 133-MHz, service kit	SVC,SYS,PLN,LMP133ST
Main board	SYS,PLN,3.3V TFT LCD,LMP
Processor board, 133-MHz	CRD,PRCR,LMP133
Card, cache	CRD,L2,CACHE,LMP
Heat sink, microprocessor, subassembly	SUBASSY,HTSNK,CPU,LMP
Board, power supply	CRD,CONV,DC-DC,LMP
Insulator, main board	INSUL,MYLAR,PWA,LMP
Boards and Cards	
Board, status display panel	CRD,CNTRL,SPKR,LMP
Board, infrared	CRD,IR,LMP
Board, audio	CRD,AUDIO,LMP
Cable, audio board	CBL,FLEX,JK,AUD,LMP
CD-ROM	
CD-ROM, service kit∗	CUS,CD ROM,4X,LMP,SANYO
CD-ROM drive	CD ROM,4X,LMP,SANYO
Diskette Drive Assembly	
Diskette drive assembly∗	CUST,FD,INT/EXT,LMP
Diskette drive, internal/external	FD,INT/EXT,LMP
Case, upper	PLSTC,UPR,FD,LMP
Case, lower	PLSTC,LWR,FD,LMP
Cable, service kit∗	CUST,CBL,FD,INT/EXT,LMP
Connector, cable	CBL,FD,INT/EXT,LMP

∗ Customer-replaceable unit (CRU)

Table 4-1. Factory Repair Parts and Assemblies (Continued)

Part or Assembly Name	Order Name
Hard-Disk Drive Assemblies	
Hard-disk drive, 540-MB, service kit*	CUS,HD,540MB,I,F2,12.5MM,NBK
Hard-disk drive, subassembly, 540-MB	SUBASSY,HD,540MB,LF2, 12.5MM,NBK
Hard-disk drive, 540-MB	HD,540MB,I,F2,12.5MM,NBK
Bracket, hard-disk drive	BRKT,HD,12.5MM,LMP
Screws, bracket	SCR,3X.5X3,FLH,PNH,MS,ZPS,HD
Hard-disk drive, 810-MB, service kit*	CUS,HD,810MB,12.5MM,NN,#1, NBK
Hard-disk drive, 810-MB	SUBASSY,HD,810MB,12.5MM,NN, NBK
Hard-disk drive, 810-MB	HD,810MB,I,F2,12.5MM,NN,#1, NBK
Bracket, hard-disk drive	BRKT,HD,12.5MM,LMP
Screws, bracket	SCR,3X.5X3,FLH,PNH,MS,ZPS,HD
Hard-disk drive, 1.4-GB, service kit*	CUS,HD,1.4GB,12.5MM,NN,#1, NBK
Hard-disk drive, 1.4-GB	SUBASSY,HD,1.4GB,12.5MM,NN, NBK
Hard-disk drive, 1.4-GB	HD,1.4GB,I,F2,12.5MM,NN,#1, NBK
Bracket, hard-disk drive	BRKT,HD,12.5MM,NBK
Screws, bracket	SCR,3X.5X3,FLH,PNH,MS,ZPS,HD
Keyboards	
Keyboard, U.S.	KYBD,87,LMP,US,SMK
Keyboard, Latin/Spanish	KYBD,88,LMP,LTN/SPN,SMK
Keyboard, Japan	KYBD,89,LMP,JPN,SMK

Customer-replaceable unit (CRU)

Table 4-1. Factory Repair Parts and Assemblies (Continued)

Part or Assembly Name	Order Name
LCD Assembly	
LCD panel, active-matrix color display (TFT), 12.1"	LCD,TFT,SVGA,12.1",LMP,IBM
Board, TFT inverter	CRD,INVRTR,TFT,LMP
Cable, TFT flex	CBL,LCD,FLEX,TFT,IBM,LMP
Bezel, TFT front	BZL,LCD,LMP,IBM
Bezel, TFT back	CVR,LCD,LMP,IBM
LCD panel, dual-scan color display (STN), 11.3"	LCD,STN,SVGA,11.3",LMP, SANYO
Board, STN inverter	CRD,INVRTR,STN,LMP
Cable, STN flex	CBL,LCD,FLEX,STN,SANYO,LMP
Bezel, STN front	BZL,LCD,LMP,SANYO
Bezel, STN back	CVR,LCD,LMP,SANYO
Latch, LCD, right	LTCH,PLSTC,RT,LCD,LMP
Latch, LCD, left	LTCH,PLSTC,LF,LCD,LMP
Memory	
Memory module, 8-MB, service kit∗	CUS,MEM,8M,LMP
Memory module, two 4-MB	SIMM,4MB,LXP
Memory module, 16-MB, service kit∗	CUS,MEM,16M,LMP
Memory module, two 8-MB	DIMM,8MB,2X32,TL,LXP
Memory module, 32-MB, service kit∗	CUS,MEM,32M,LMP
Memory module, two 16-MB	DIMM,16MB,LXP
Miscellaneous Parts	
Cover, front, hard-disk drive	BZL,HDD,LMP
Cover, hinge/infrared lens, right	CVR,PLSTC,IR,LMP
Cover, hinge, left	CVR,HNG,LF,LMP
Cover, keyboard screws	CVR,SCR,KYBD,LMP

∗ Customer-replaceable unit (CRU)

Table 4-1. Factory Repair Parts and Assemblies (Continued)

Part or Assembly Name	Order Name
Miscellaneous Parts *(Continued)*	
Cover, flex-cable	CVR,HNG,CTR,LMP
Insulator, expansion connector	INSUL,CON,DCKG,LMP
Insulator, main board	INSUL,MYLAR,I/O,LMP
Bracket, I/O	BRKT,I/O,LMP
Door, I/O	DOOR,I/O,LMP
Door, memory module	DOOR,RAM,LMP
Guide, hard-disk drive, left	GDE,RL,LF,HD,LMP
Assembly, base	CVR,BTM,PLSTC,SYS,BAS,LMP
Door, expansion connector (docking port)	DOOR,DCKG,LMP
Screws	
Screw, hard-disk module, lock	SCR,2X.4X8,PHH,MS,BLO
Screw, hard-disk bracket	SCR,3X.5X3,FLH,PNH,MS,ZPS,HD
Screw, heat sink	SCR,2X.4X6,PHH,MS,ZPS
Screw, keyboard	SCR,3X.5X3,FLH,PNH,MS,ZPS, KYBD
Screw, memory module door	SCR,2X.4X5,FLH,MS,BLO
Screw, I/O panel standoff	SCR,440X.23,JK,MS,ZPS
Screw, expansion connector (docking port) standoff	SCR,CON,JK,DCKG,LMP
Service Documentation	
Service Manual	MNL,SERVICE,LMP
Technical sheet, hard-disk drive	TSH,HD,LMP,ENG
Technical sheet, options bay	TSH,OPT,BAY,LMP,ENG
Technical sheet, AC adapter	TSH,AC ADAPT,LMP,ENG
Technical sheet, main battery	TSH,BTRY,LMP,ENG

Table 4-1. Factory Repair Parts and Assemblies (Continued)

Part or Assembly Name	Order Name
Service Documentation (Continued)	
Technical sheet, whole unit replacement	TSH,WUE,SVC,LMP
Technical sheet, memory module	TSH,MEM,LMP,ENG
Software	
Diagnostics diskette, service kit, U.S.	KIT,DSK,DIAG,V3.58,F3,US
Diagnostics diskette, service kit, Spanish	KIT,DSK,DIAG,V3.58,F3,SPN
Software support diskette, service kit	KIT,DSK,SSD,F3,LMP
BIOS upgrade, service kit	KIT,FLASH,UPG,F3,LMP/LXi
Speaker	
Speaker	SPKR,AUDIO,LMP
Insulator, speaker	INSUL,MYLAR,SPKR,LMP
Cover, speaker	CVR,SCR,SPKR,LMP
Top Case Assembly	
Top case	CVR,TOP,PLSTC,SYS,BASE,LMP
Button, touch pad, right	BTN,TPAD,RT,LMP
Button, touch pad, left	BTN,TPAD,LF,LMP
Spring, touch pad or power button	SPR,PWR,KNOB,LMP
Button, power	BTN,PWR,LMP
Touch Pad	
Touch pad assembly	ASSY,TPAD,LMP
Cable, touch pad	CBL,FLEX,TPAD,LMP
Card, touch-pad switch	SWT,CRD,TPAD,LMP
Card, touch pad	CRD,TPAD,LMP
Insulator, touch pad	INSUL,MYLAR,TPAD,LMP

Table 4-2. Naming Conventions

Name in This Manual	Name in Other Documents
Main board	Mother board assembly
Processor board	CPU daughter board
Heat sink	Daughter card heat-sink assembly
Inverter board	Invertor PWA
Front bezel	LCD bezel
Flex-cable cover	Top cover
Back bezel	LCD back plastics
Bottom or base assembly	Bottom plastics
Top assembly	Palm rest plastics
Infrared board	I/R PWA
Diskette drive	Floppy-disk drive

Deleting the Password

If a user forgets the password and does not have it backed up on diskette, the user must return the computer to the factory where a service provider will delete the password using the following procedure. The computer will then be returned to the user.
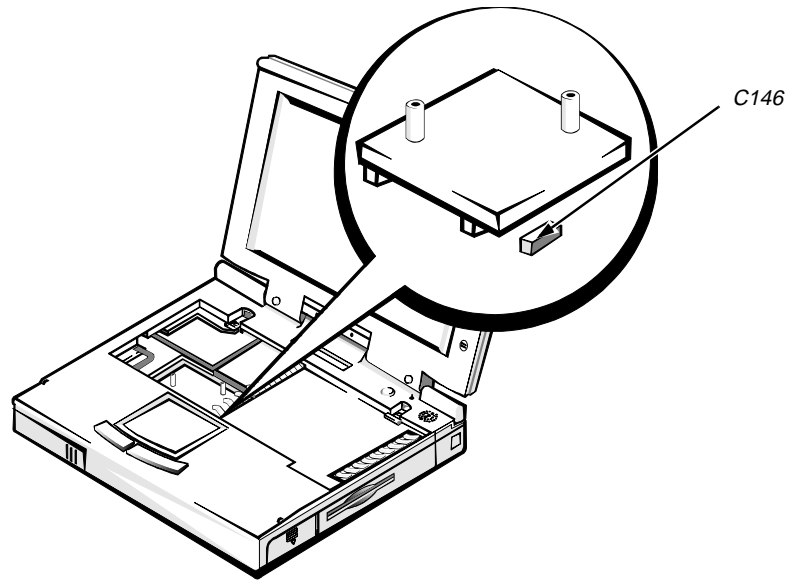
Figure 4-13. Capacitor C146 (Location)

To delete the password, use the following procedure:

1. **Open the computer and remove the keyboard.**

    See "Keyboard" found later in this chapter.

2. **Place a short across the terminals of capacitor C146.**

3. **Allow time for the CMOS battery to recharge.**

Hard-Disk Drive
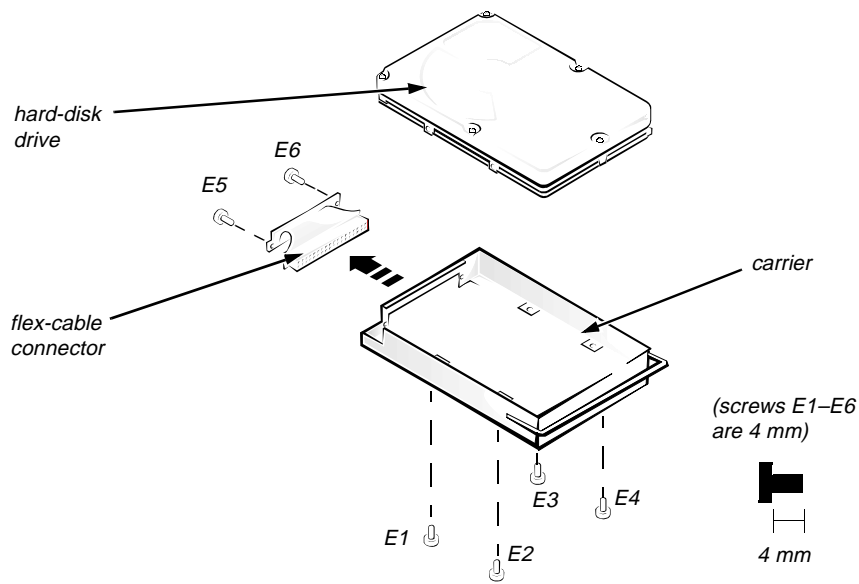
Figure 4-14. Hard-Disk Drive Disassembly

The hard-disk drive resides in a carrier that mounts in the computer's hard-disk drive compartment on the front of the computer. Four screws secure the drive inside the carrier. A mylar insulator provides electrical insulation between the hard-disk drive and the rest of the computer. To disassemble the hard-disk drive from the carrier, follow these steps:

1. **Remove the hard-disk drive assembly from the computer.**

   See step 5 of "Precautionary Measures" found earlier in this chapter.

2. **Place the hard-disk drive assembly bottom side up on a work surface, and remove screws E1, E2, E3, and E4.**

3. **Remove the hard-disk drive from the carrier.**

   Gently pry the drive from the carrier with a small scribe.

4. **Lift the hard-disk drive out of the bottom case.**

   Carefully pry the flex-cable connector away from the hard-disk drive inter-face connector on the back of the drive.

CAUTION: Use a small flat-blade screwdriver to disconnect the flex-cable connector. Do *not* handle the flex cable too roughly or you could accidently disconnect the cable from the connector card rather than the drive.

Diskette Drive

diskette drive
and carrier
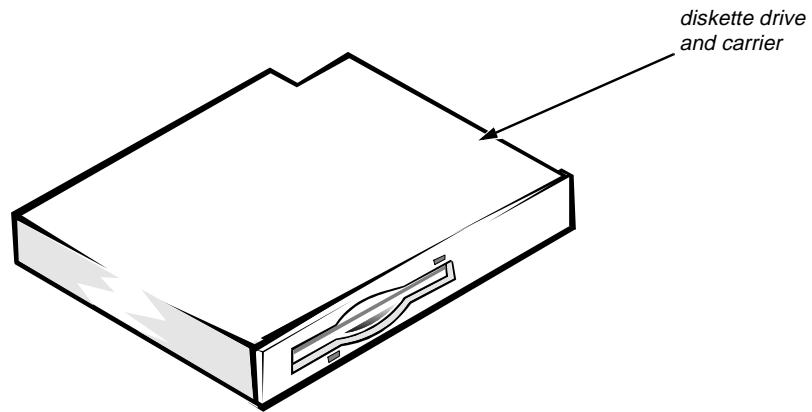
Figure 4-15. Diskette Drive Assembly

The diskette drive resides in a carrier that slides into the options drive bay on the right side of the computer. The diskette drive and carrier are replaced as a unit and are not disassembled.

CD-ROM
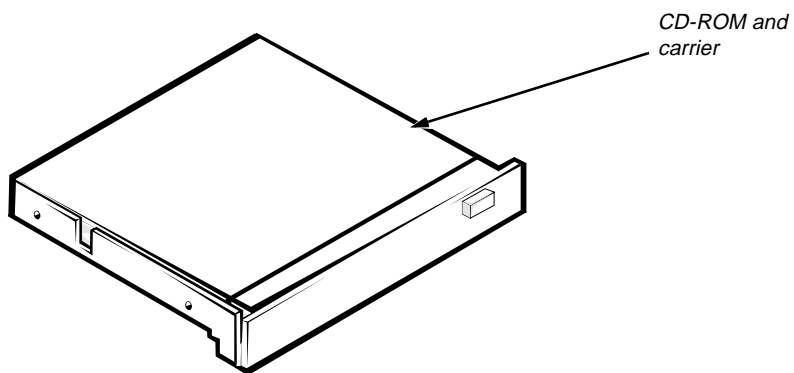
CD-ROM and
carrier

Figure 4-16. CD-ROM Assembly

The CD-ROM resides in a carrier that slides into the options drive bay on the
right side of the computer. The CD-ROM and carrier are replaced as a unit and
are not disassembled.

Memory Module

MM2

MM1

(screws MM1 and MM2 are 3.5 mm)

3.5 mm

cover

memory module (2)
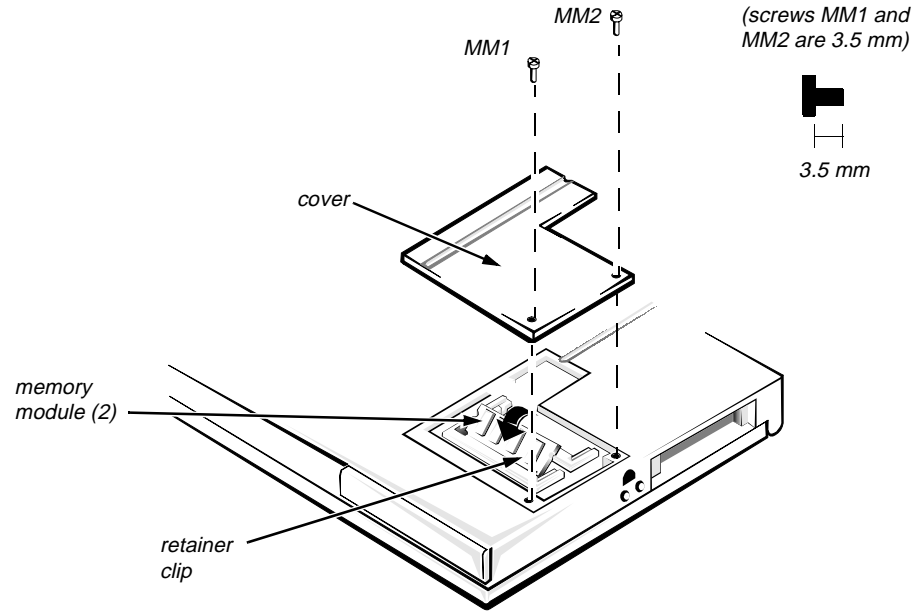
retainer clip

Figure 4-17. Memory Module Removal

To remove a memory module, follow these steps:

1. **Turn the computer over, and remove the two memory-module cover screws.**

2. **Remove the memory module cover.**

   Grasp the two memory-module retainer clips and release the memory module. Gently rotate the memory module toward you, and then pull straight up on the module, disconnecting the module from the connector on the main board assembly.

To *reinstall* a memory module, both memory modules *must* be a matched pair, both slots must be filled, and both slots must have the same memory capacity. The following combinations are possible:

- 16 MB — Install two 4-MB memory modules.

- 24 MB — Install two 8-MB memory modules.

- 40 MB — Install two 16-MB memory modules.

LCD Assembly

The LCD assembly consists of the display assembly and its related components. The subsections that follow provide removal and replacement procedures for the components of the LCD assembly.
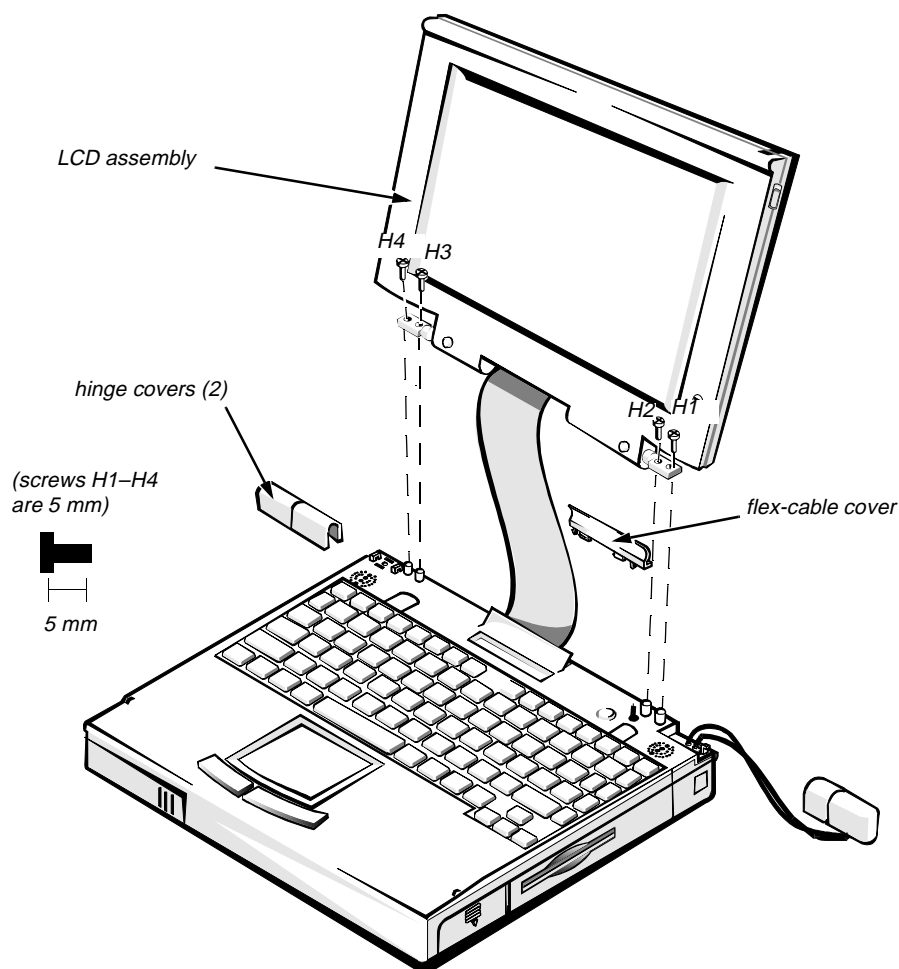
Figure 4-18. LCD Assembly Removal

To remove the LCD assembly, follow these steps:

1. **With the computer closed and the back facing you, remove the two hinge covers.**

   Pop off both of the covers with the heel of your palm; or insert your finger-tips or a scribe between each cover and the LCD assembly, and then lift the covers sideways until they are released from the catches holding them to the computer.

2. **Remove hinge screws H1, H2, H3, and H4.**

3. **Remove the flex-cable cover.**

Front Bezel
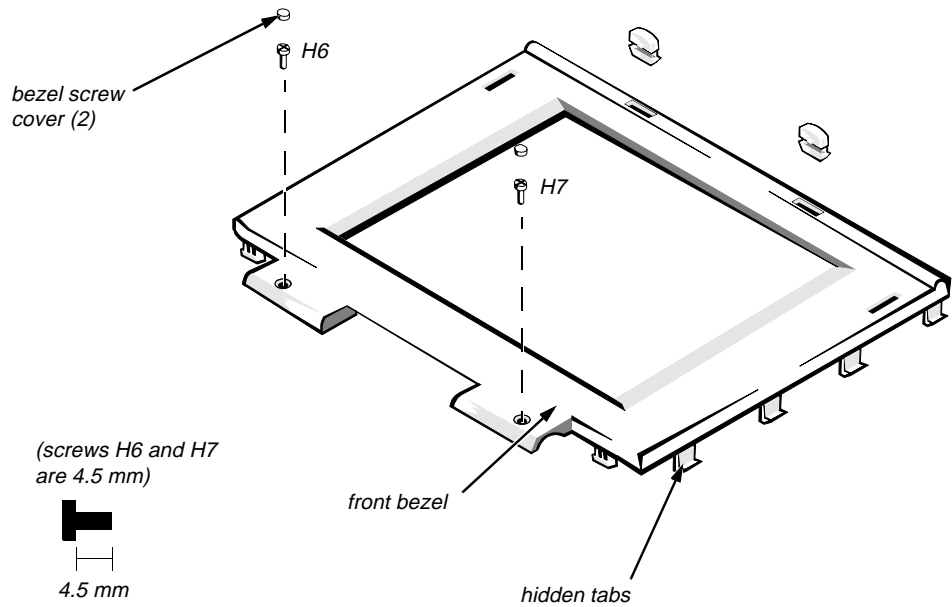
NOTE: This figure shows the STN LCD assembly, which has the same front bezel as the TFT LCD assembly.

Figure 4-19. Front Bezel Removal

To remove the front bezel, follow these steps:

1. Remove the LCD assembly.

See the previous section, "LCD Assembly."

2. With the front facing you, open the computer

3. Lay the LCD assembly back on a book or something similar to prop the assembly.

4. Use a scribe to pry the front-bezel screw covers out of the screw holes in the bezel.

5. Remove front bezel screws H6 and H7.

6. Separate the front bezel from the back bezel.

Insert your fingertips in the crevice between the front and back bezel, and lift up on the front bezel to release the hidden tabs spaced around the sides.

When replacing the front bezel, orient the bezel in its original position on the assembly and press firmly near each tab until the bezel snaps into place.

LCD Panel

There are two types of LCD panels: the dual-scan color display (STN) and the active-matrix color display (TFT). The removal process for both LCD panels is the same.
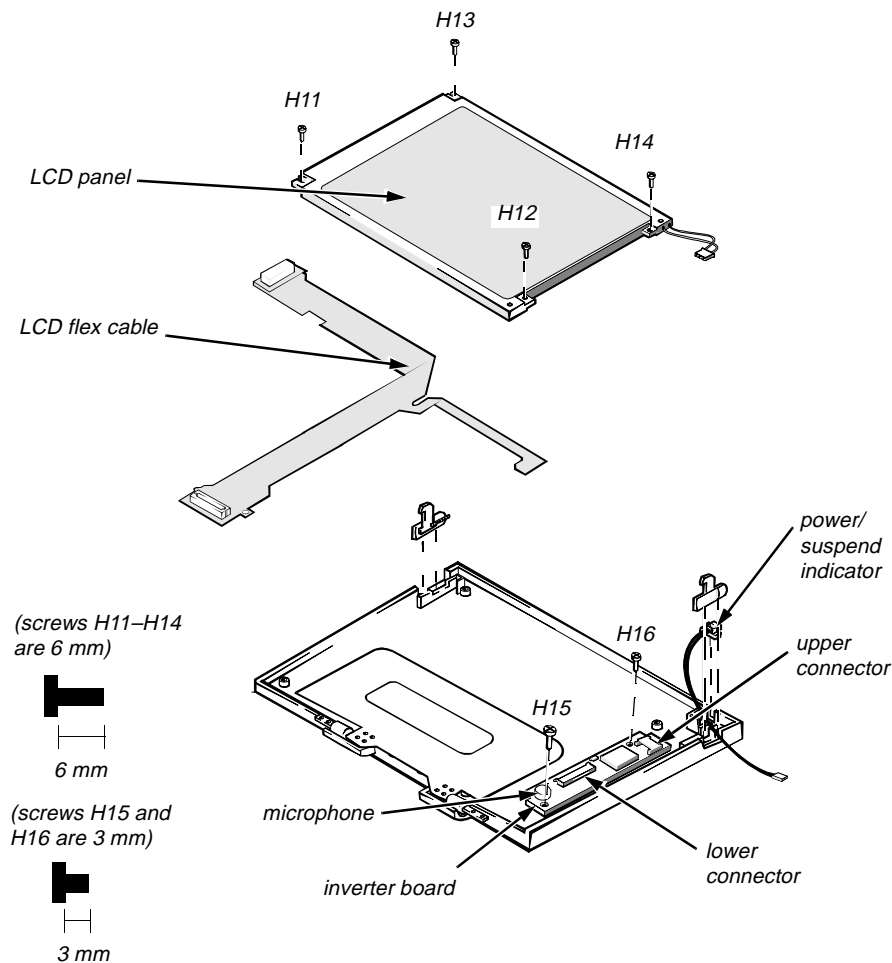
Figure 4-20. LCD Panel Removal

To remove an LCD panel, follow these steps:

1. **Remove the front bezel.**

   See the previous subsection, "Front Bezel."

2. **Remove LCD panel screws H11, H12, H13, and H14.**

3. **Remove the LCD Panel.**

   NOTE: Be careful when removing any part of the LCD flex cable.

   Lift up the LCD panel, and disconnect the LCD flex-cable connector. Disconnect the LCD panel cable from the upper inverter-board connector. Disconnect the LCD flex cable from the lower inverter-board connector.

Inverter Board
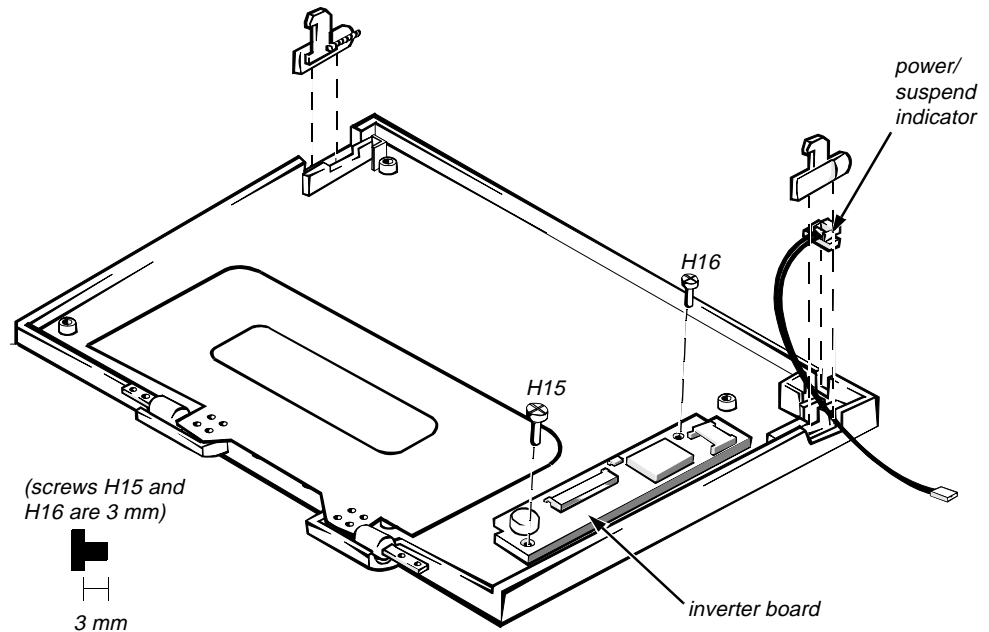
Figure 4-21. Inverter Board Removal

To remove the inverter board, follow these steps:

1. **Remove the front bezel.**

    See "Front Bezel" found earlier in this section.

2. **Remove the LCD panel.**

    See the previous subsection, "LCD Panel."

3. **Disconnect the power/suspend indicator connector.**

4. **Remove inverter board screws H15 and H16.**

5. **Remove the inverter board from the back bezel.**

Microphone

The microphone cannot be removed separately; it is part of the inverter board.

LCD Assembly Latches
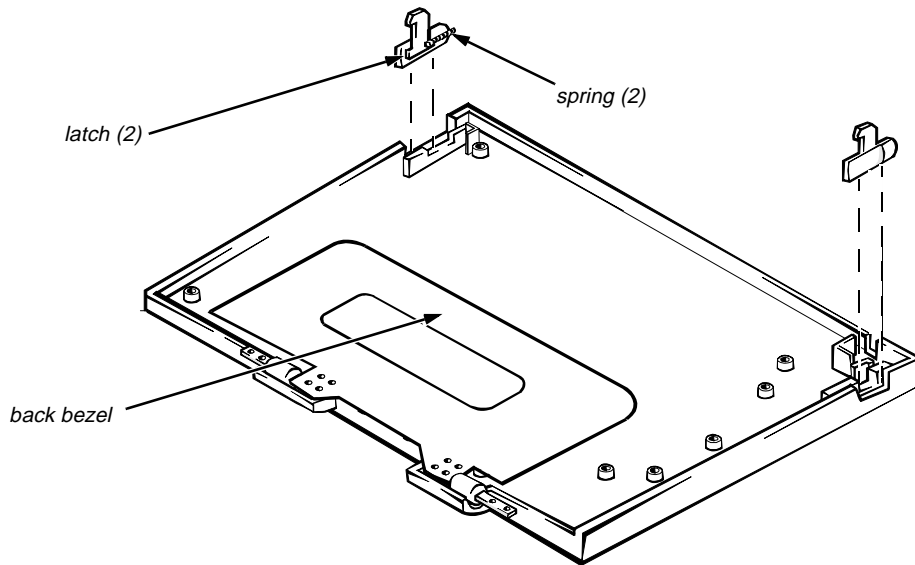
Figure 4-22. LCD Assembly Latches Removal

To remove the LCD assembly latches, follow these steps:

1. **Remove the front bezel.**

   See "Front Bezel" found earlier in this section.

2. **Place the back bezel down on a work surface.**

3. **Use a scribe to pry the latches from the back bezel.**

   Be careful not to lose the small spring that is part of each latch.

Power/Suspend Indicator
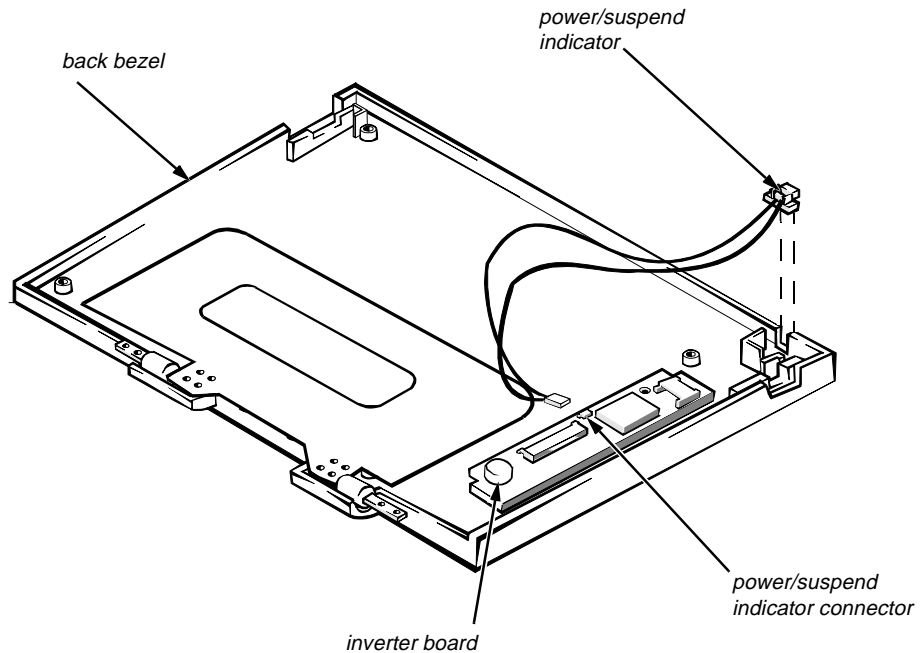
Figure 4-23. Power/Suspend Indicator Removal

To remove the power/suspend indicator, follow these steps:

1. **Remove the front bezel.**

   See "Front Bezel" found earlier in this section.

2. **Remove the LCD panel.**

   See "LCD Panel" found earlier in this section.

3. **Remove the power/suspend indicator.**

   Disconnect the power status connector from the inverter board. Lift the indicator out of the recess in the top of the back bezel.

Back Bezel
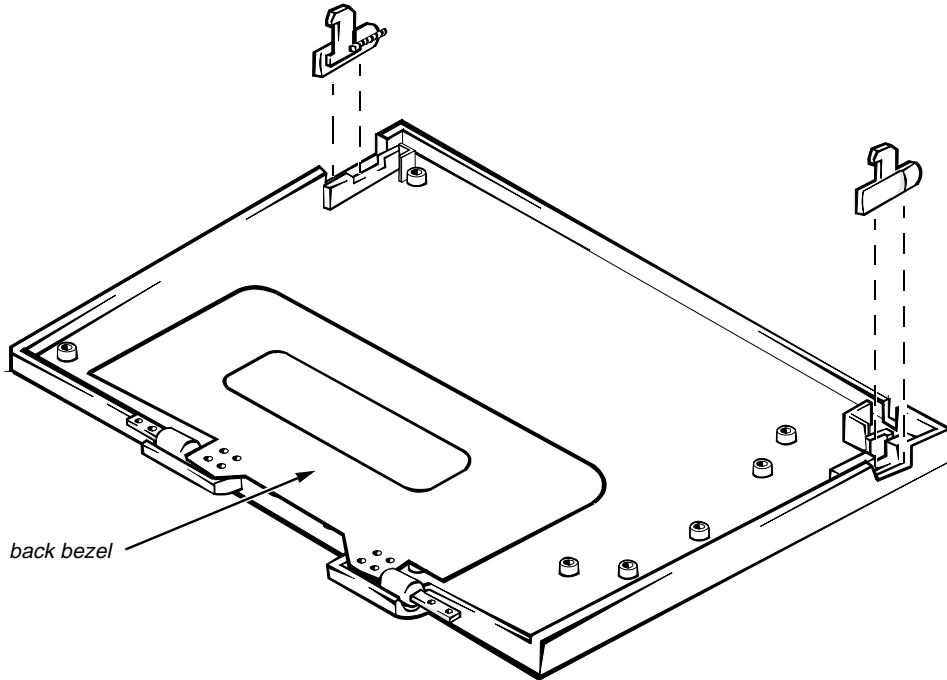
Figure 4-24. Back Bezel Removal

To remove the back bezel, follow these steps:

1. **Remove the front bezel.**

   See "Front Bezel" found earlier in this section.

2. **Remove the LCD panel.**

   See "LCD Panel" found earlier in this section.

   NOTE: Be careful when removing any part of the LCD flex cable.

3. **Remove the inverter board.**

   See "Inverter Board" found earlier in this section.

4. **Remove the latches.**

   See "LCD Assembly Latches" found earlier in this section.

5. **Remove the power/suspend indicator.**

   See the previous subsection, "Power/Suspend Indicator."

Keyboard

This section provides the removal procedure for the keyboard. Also, it includes the removal procedure for the heat sink.
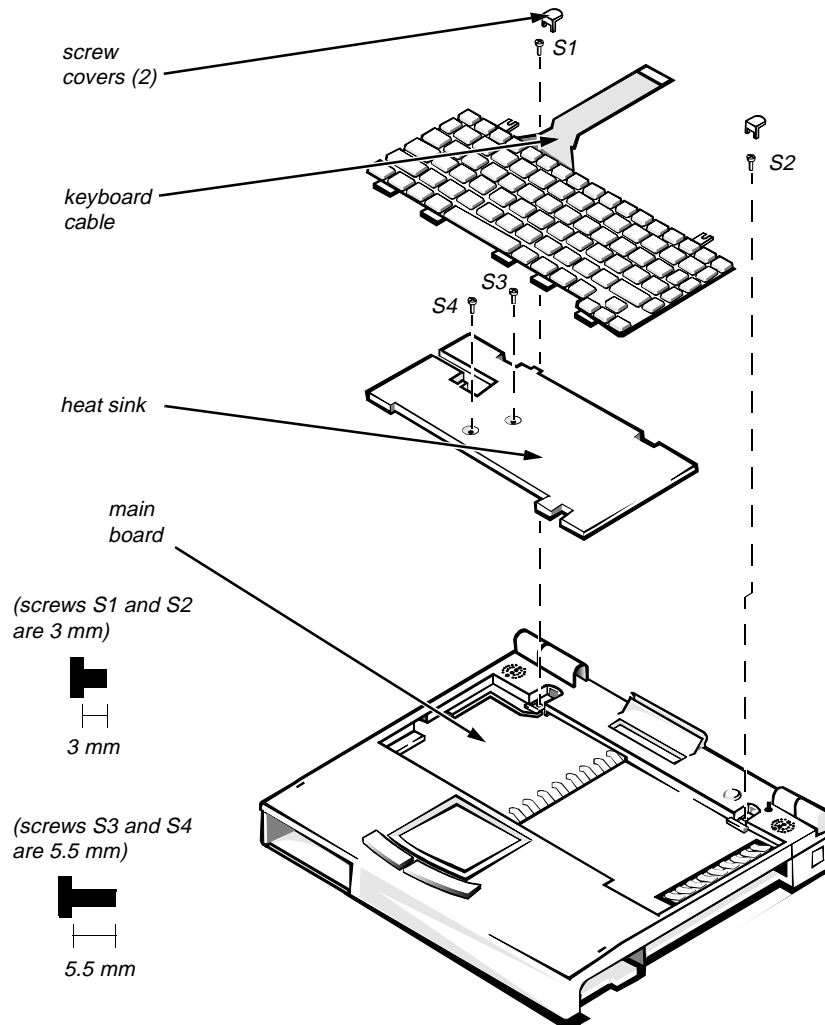
Figure 4-25. Keyboard Removal

To remove the keyboard, follow these steps:

1. **Open the computer.**

2. **Remove the keyboard screw covers.**

3. **Remove keyboard screws S1 and S2.**

    Lay the keyboard back against the LCD assembly or a prop to avoid detaching the keyboard cable.

4. **Remove heat sink screws S3 and S4.**

Lift off the heat sink.

> **CAUTION: Lift away the heat sink gently. Rough handling could damage the thermal pad on the bottom of the heat sink.**

5. **Disconnect the keyboard cable from the main board.**

Use a small flat-blade screwdriver to release the ZIF connector securing the keyboard cable.

> **CAUTION: Lift away the cable only after the ZIF connector is opened (see "ZIF Connectors" found earlier in this chapter). Pulling the cable from the connector damages the conductive coating on the end of the cable.**

6. **Remove the keyboard from the computer.**

Top Assembly

The top assembly consists of the plastic palm rest and its related components. The subsections that follow provide removal and replacement procedures for the components of the top assembly.

keyboard

hinge cover (2)

display close
button

top assembly

SD1

SD2

touch pad
connector

(screws SD1 and
SD2 are 5 mm)

5 mm

main board

SD3

SD4

hook

(screws SD3 and
SD4 are 3 mm)

3 mm

bottom
assembly
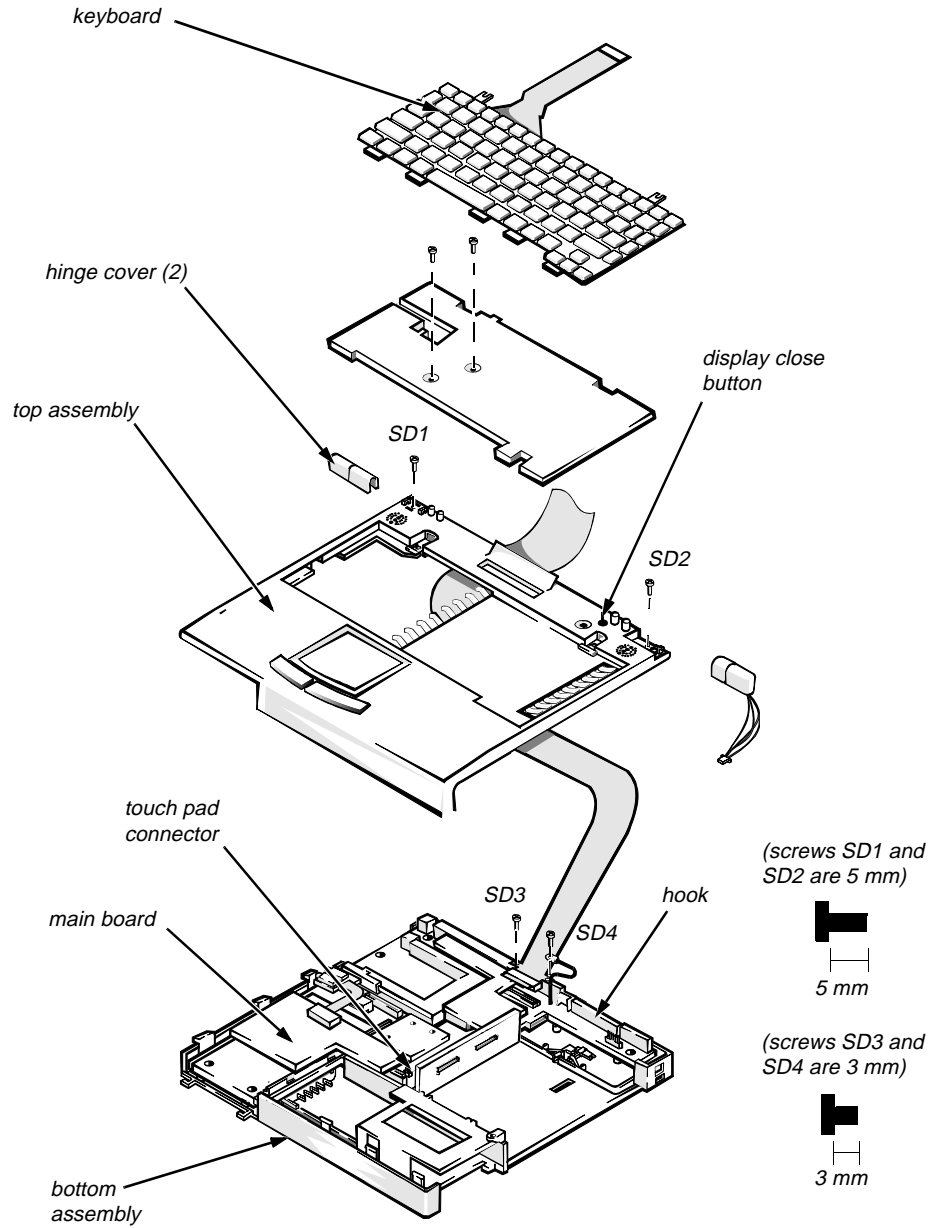
Figure 4-26. Top Assembly Removal

To remove the top assembly, follow these steps:

1. **Remove the LCD panel.**

   See "LCD Panel" found earlier in this chapter.

2. **Remove the keyboard.**

   See the previous section, "Keyboard."

3. **Remove side screws SD1 and SD2.**

4. **Disconnect the touch pad connector.**

   Use a small flat-blade screwdriver to release the connector from the main board.

5. **Separate the top assembly from the bottom assembly.**

   Insert your fingertips or a scribe in the crevice between the top assembly and the bottom assembly, and lift up on the top assembly to release the hidden tabs spaced around the sides, front, and back.

   When replacing the top assembly, orient the assembly in its original position on the bottom assembly and press firmly near each tab until the hidden tabs snap into place.

6. **Disconnect the status-display board connector.**

   Use a small flat-blade screwdriver to release the connector from the main board. Release the wire bundle from the hook on the I/O bracket.

7. **Remove the power supply board.**

8. **Disconnect the LCD flex-cable connector on the main board.**

   Remove flex-cable screws SD3 and SD4. There is a ground wire attached to screw SD4.

   > **CAUTION: Do not attempt to remove the LCD flex cable from the top assembly. The two connectors on the cable will not pass through the slot on the back of the top assembly.**

9. **Remove the top assembly from the computer.**

Speakers
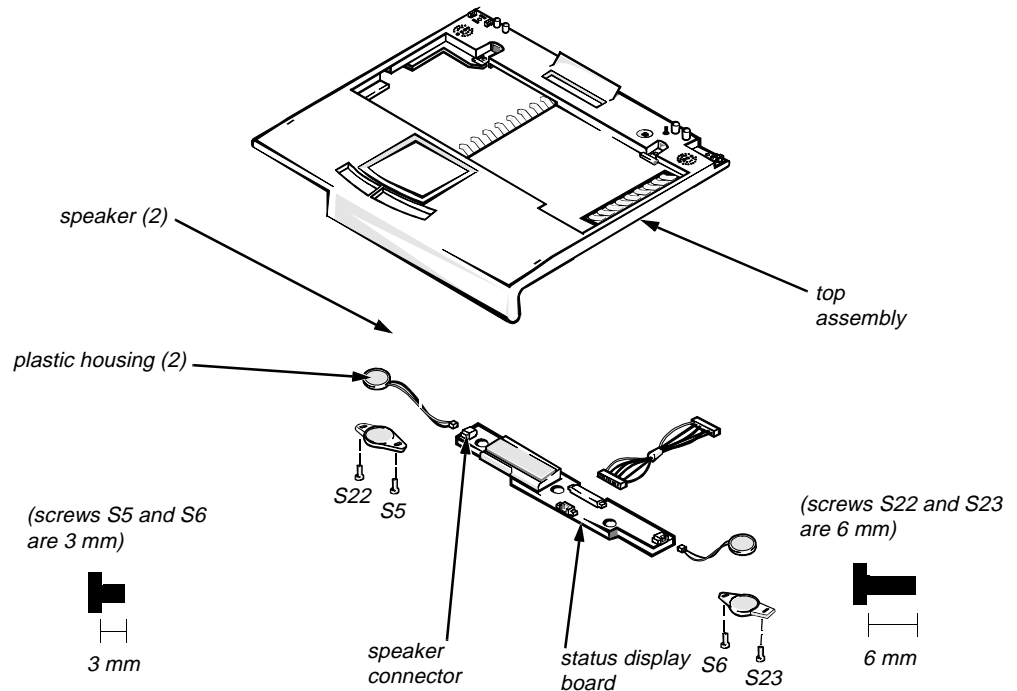
Figure 4-27. Speakers Removal

To remove the speakers, follow these steps:

1. **Remove the top assembly.**

   See the previous section, "Top Assembly."

2. **Remove speaker screws S5, S6, S22, and S23.**

   Remove the plastic housing holding the speakers.

3. **Disconnect the speaker connectors from both ends of the status display board.**

4. **Remove the pieces of plastic tape holding the connector wires to the top assembly.**

5. **Remove the speakers from the top assembly.**

Status Display Board
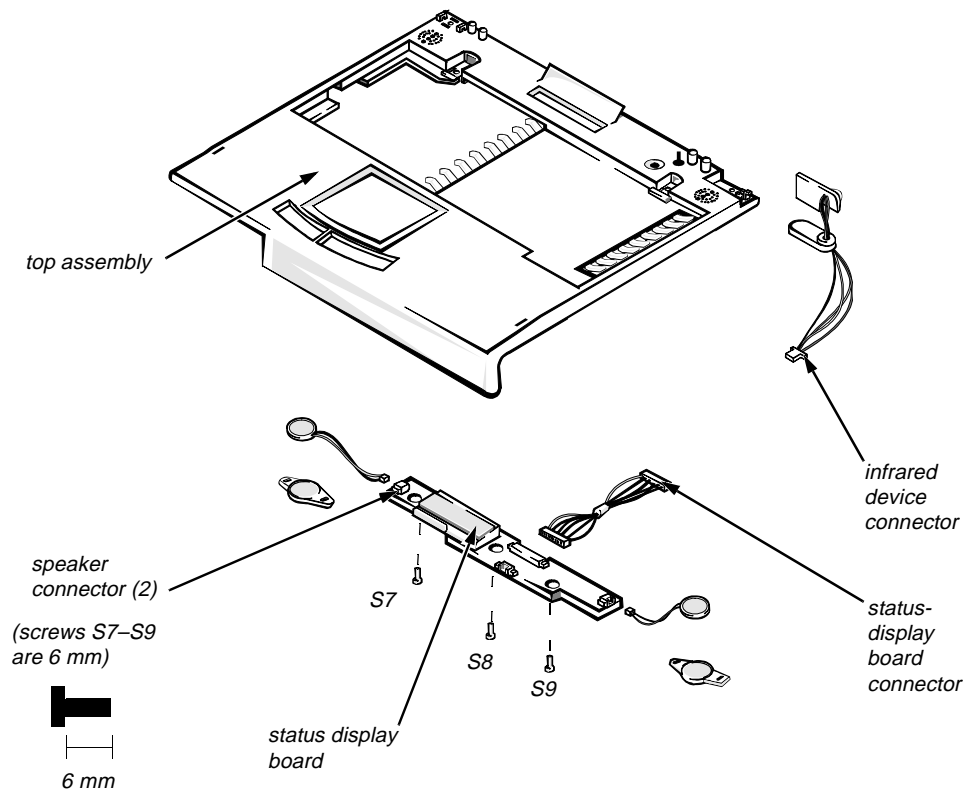
Figure 4-28. Status Display Board Removal

To remove the status display board, follow these steps:

1. **Remove the top assembly.**

   See "Top Assembly" found earlier in this section.

2. **Remove status-display board screws S7, S8, and S9.**

3. **Disconnect the two speaker connectors and the infrared device connector from the status display board.**

4. **Disconnect the status display board connector from the main board.**

   The connector wire assembly is held in place by a metal hook located on the I/O bracket.

5. **Remove the status display board from the top assembly.**

I/R Device

recess

top
assembly

I/R lens
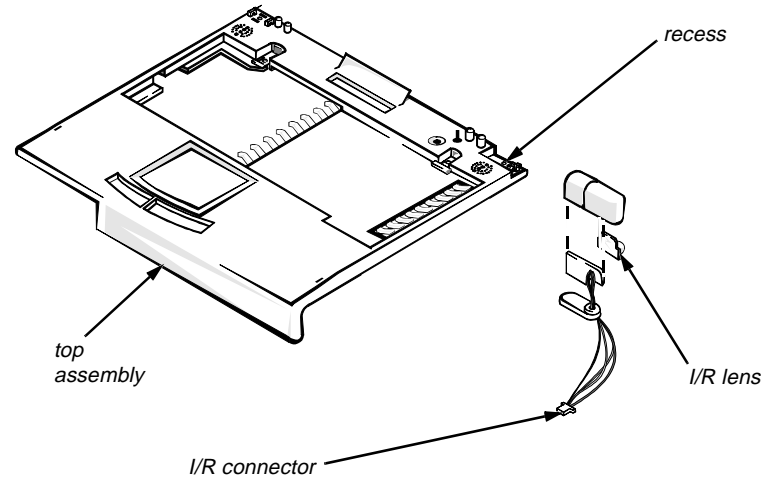
I/R connector

Figure 4-29. I/R Device Removal

To remove the infrared (I/R) device, follow these steps:

1. **Remove the top assembly.**

   See "Top Assembly" found earlier in this section.

2. **Disconnect the I/R device connector from the status display board.**

3. **Dislodge the I/R device from the recess on the top assembly.**

   Thread the I/R connector and wires through the opening on the top
   assembly.

4. **Remove the I/R device from the top assembly.**

Power Button

power button

spring
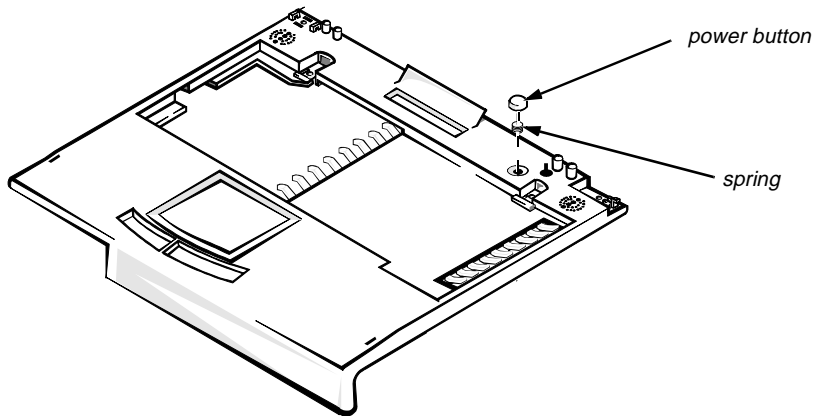
Figure 4-30. Power Button Removal

To remove the power button, follow these steps:

1. **Remove the top assembly.**

   See "Top Assembly" found earlier in this section.

2. **Remove the status display board.**

   See "Status Display Board" found earlier in this section.

3. **Remove power button.**

   There are four plastic retainers that hold the power button and spring in place.

4. **Remove the power button and spring from the top assembly.**

Touch Pad

button (2)

top assembly

touch pad

touch pad bracket

touch-pad cable connector

S14   S15

flex cable

(screws S11–S15 are 3 mm)

S11
S12
S13

touch-pad button board

3 mm
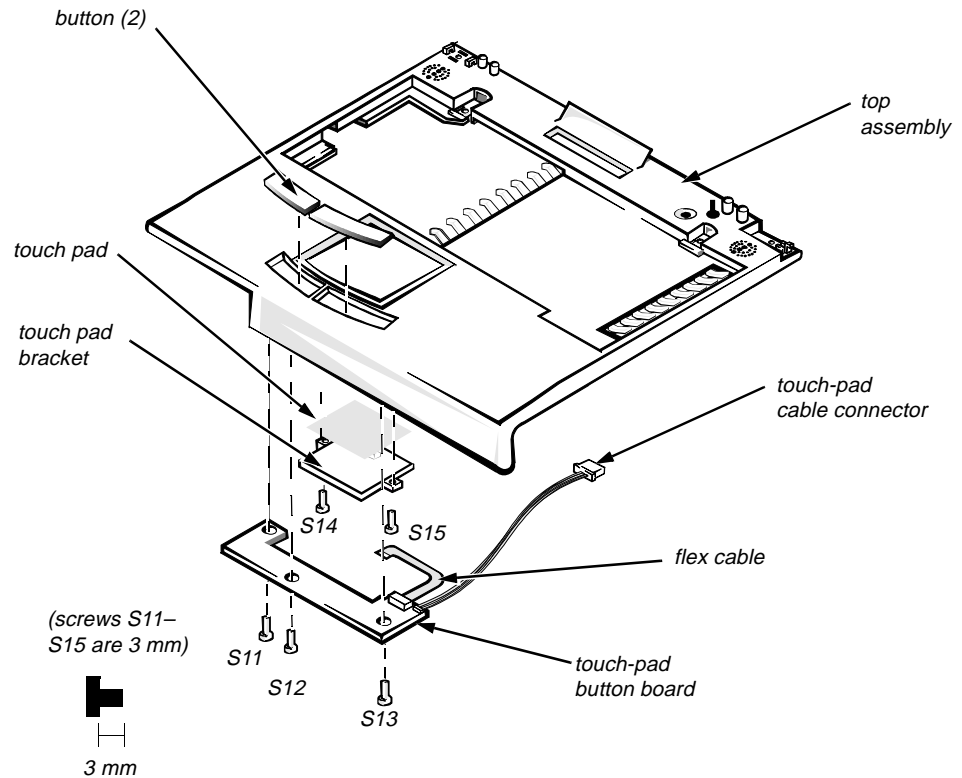
Figure 4-31. Touch Pad Removal

To remove the touch pad, follow these steps:

1. **Remove the top assembly and turn it over.**

   See "Top Assembly" found earlier in this section.

2. **Remove touch pad screws S11, S12, and S13.**

   Place the touch-pad button board to one side. The board has a flex cable that attaches to the touch pad.

3. **Remove the touch pad buttons.**

   Press down on the touch-pad button projections, and pull the touch pad button out of the recess on the front of the top assembly.

4. **Remove touch-pad bracket screws S14 and S15.**

   Remove the touch pad bracket.

5. **Remove the touch pad bracket and touch pad from the top assembly.**

Bottom Assembly

This bottom assembly consists of a plastic base, the main board, and the main board components. The subsections that follow provide removal and replacement procedures for the components of the bottom assembly.

processor
board

power supply
board

audio board

main board

cache board

options
bay wall

base
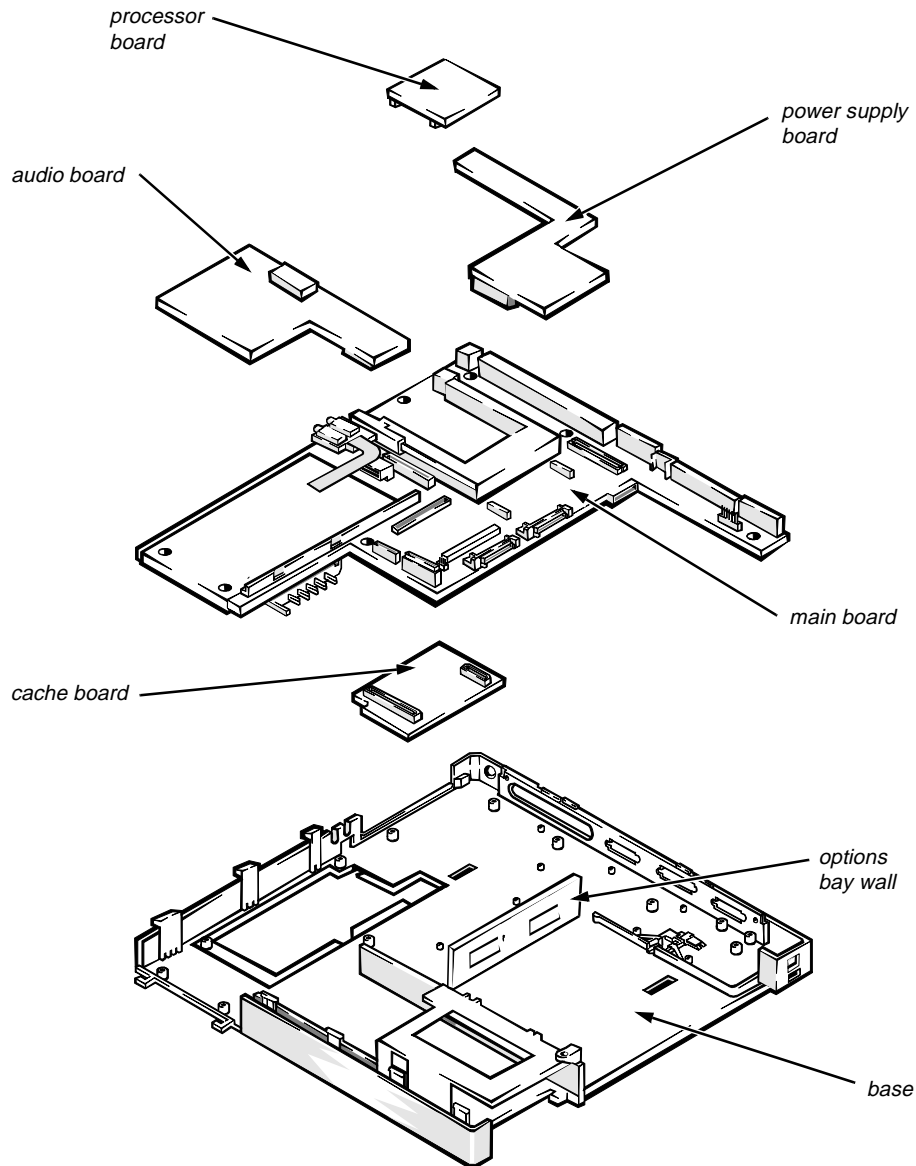
Figure 4-32. Bottom Assembly

Processor Board
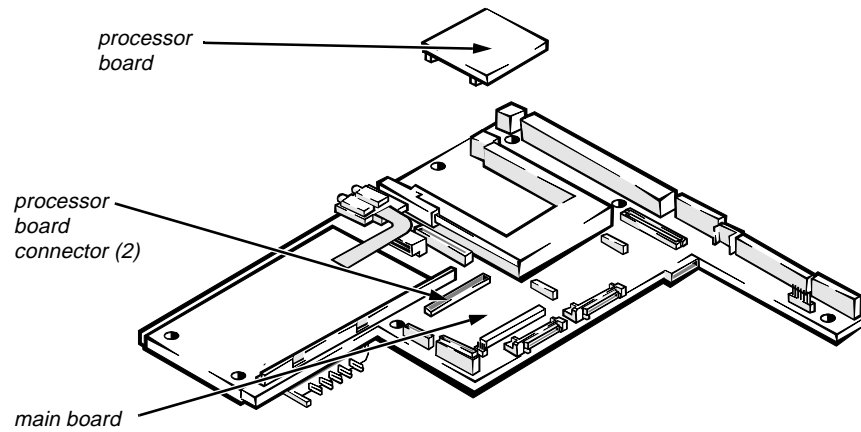
Figure 4-33. Processor Board Removal

To remove the processor board, follow these steps:

1. **Open the cover.**

2. **Remove the keyboard.**

   See "Keyboard" found earlier in this chapter.

3. **Remove the processor board from the main board.**

   The processor board is held in place on the main board by two connectors. Use a chip removal tool to remove the processor board.

Power Supply Board
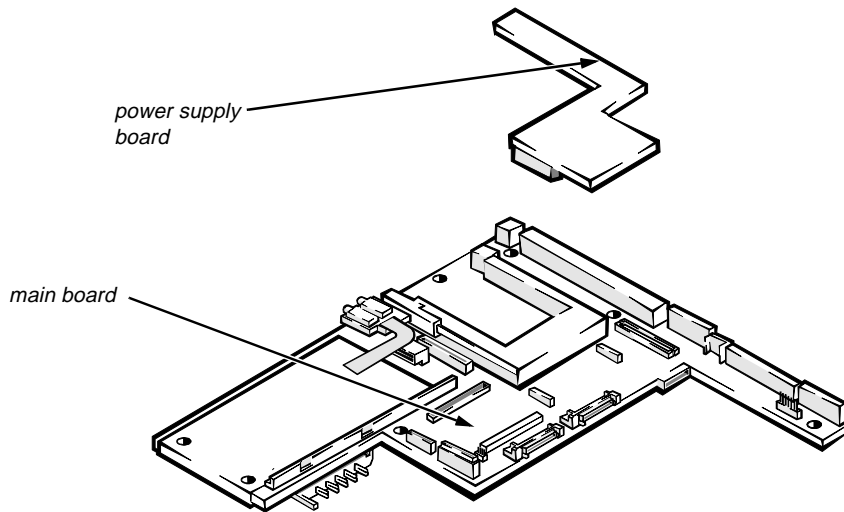
Figure 4-34. Power Supply Board Removal

To remove the power supply board, follow these steps:

1. **Open the cover.**

2. **Remove the top assembly.**

   See "Top Assembly" found earlier in this chapter.

3. **Remove the power supply board from the main board.**

   The power supply board is held in place on the main board by two connectors.

Audio Board

audio board

audio cable

plastic holder

audio board connector
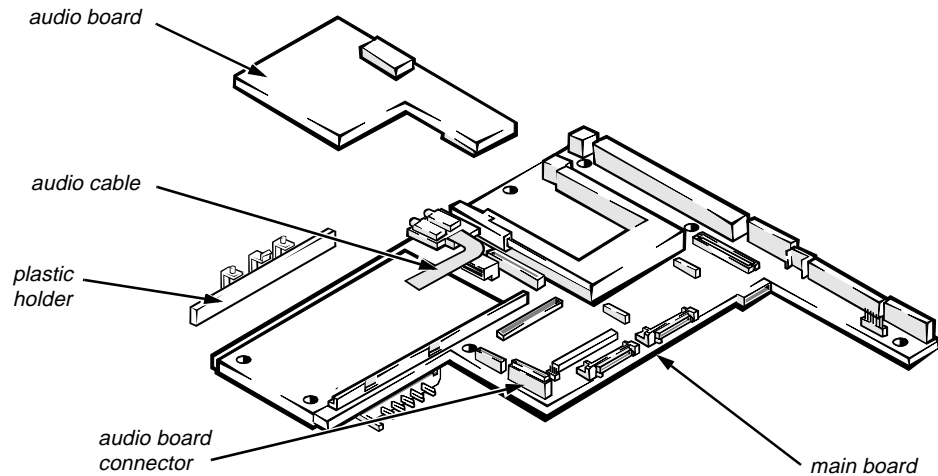
main board

Figure 4-35. Audio Board Removal

To remove the audio board, follow these steps:

1. **Open the cover.**

2. **Remove the top assembly.**

   See "Top Assembly" found earlier in this chapter.

3. **Remove the cable from the audio board.**

4. **Remove the audio board from the main board.**

   The audio board is held in place on the main board by a connector on one side of the audio board. On the other side of the main board, the audio board is held in place by a clasp and two projections. The clasp and projections are on a plastic holder. Lift out the plastic holder.

Main Board
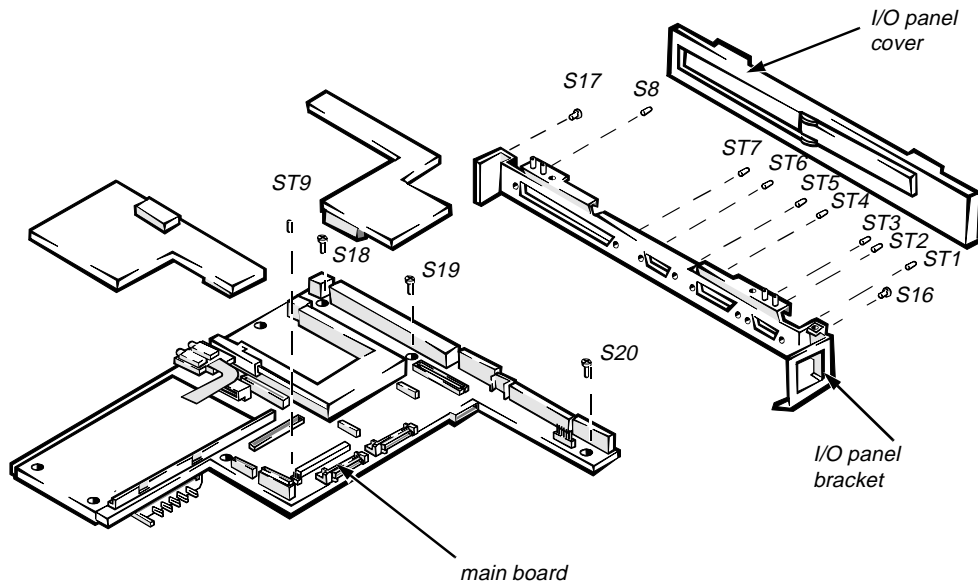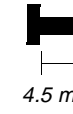
Figure 4-36. Main Board Removal

To remove the main board, follow these steps:

1. **Open the cover.**

2. **Remove the top assembly.**

    See "Top Assembly" found earlier in this chapter.

3. **Remove the power supply board.**

    See "Power Supply Board" found earlier in this section.

4. **Remove the audio card.**

    See the previous subsection, "Audio Board."

5. **Remove the black mylar cover on the PC Card cage.**

6. **Turn the computer around, open the I/O panel cover, and remove standoff nuts ST1, ST2, ST3, ST4, ST5, ST6, ST7, and ST8.**

   Use a 3/16 nut driver to remove standoff nuts ST1 through ST6 and a 7/32 nut driver for ST7 and ST8.

7. **Remove cover alignment screws S16 and S17.**

8. **Remove main board screws S18, S19, S20, and ST9.**

   S18 has a corner brace that must be removed. ST9 is a standoff screw and requires a 5/32 nut driver.

9. **Bend the options bay wall (see Figure 4-32).**

   Press gently on the ends of the wall just enough to free the option bay connectors on the main board. Be careful not to bend the wall in the middle. When reinstalling the main board, bend the wall back to the vertical position.

10. **Remove the main board.**

    Lift the end of the board nearest the front of the computer, and pull the board up and out of the computer.

Cache Board
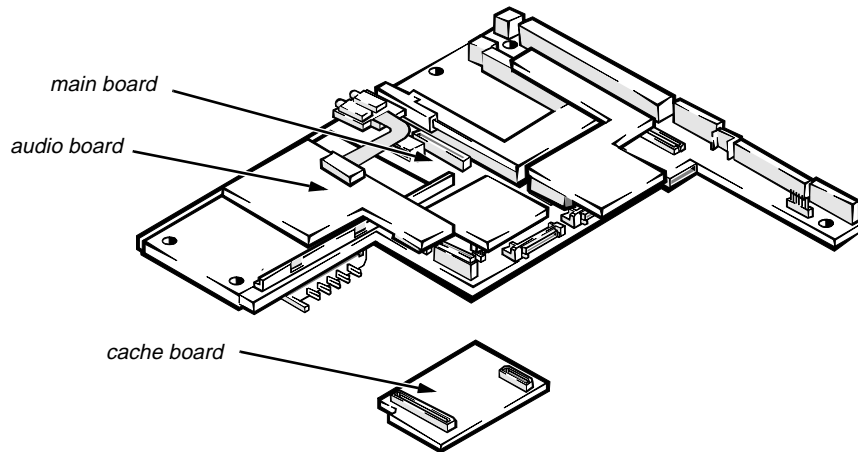
Figure 4-37. Cache Board Removal

To remove the cache board, follow these steps:

1. **Open the cover.**

2. **Remove the main board.**

   See the previous subsection, "Main Board."

3. **Turn the main board over.**

4. **Remove the cache board from the main board.**

   The cache board is held in place on the bottom of the main board by two connectors.

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