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# HP OmniBook 900



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Service Manual

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# Contents

<b>1. Product Information .....</b>	<b>1-1</b>
Features and Operation .....	1-3
Turning the OmniBook On and Off.....	1-4
Checking the Status of the OmniBook.....	1-5
Using Fn Hot Keys.....	1-6
Resetting the OmniBook.....	1-6
System Resources .....	1-7
Specifications.....	1-9
Internal Design.....	1-12
<b>2. Removal and Replacement .....</b>	<b>2-1</b>
Removing the Battery (User-Replaceable) .....	2-3
Removing a RAM Board (User-Replaceable).....	2-4
Removing the Hard Disk Drive (User-Replaceable) .....	2-5
Replacing Small Parts (User-Replaceable).....	2-7
Removing the LCD Module (HP Authorized Service Providers Only).....	2-8
Removing the Keyboard (HP Authorized Service Providers Only) .....	2-10
Removing the CPU Module (HP Authorized Service Providers Only).....	2-12
Removing the Display Assembly (HP Authorized Service Providers Only).....	2-14
Removing the Top Case (HP Authorized Service Providers Only).....	2-16
Removing the Motherboard or Bottom Case (HP Authorized Service Providers Only) .....	2-18
Removing the BIOS IC (HP Authorized Service Providers Only).....	2-21
Removing Other Components (HP Authorized Service Providers Only).....	2-23
<b>3. Troubleshooting and Diagnostics.....</b>	<b>3-1</b>
Troubleshooting .....	3-2
Troubleshooting the Problem.....	3-2
Verifying the Repair .....	3-3
Suggestions for Troubleshooting .....	3-4
Diagnostic Tools.....	3-12
OmniBook Diagnostic Program.....	3-12
Power-On Self-Test .....	3-17
Sycard PCCTest 450 CardBus Card (Optional).....	3-20
Desktop Management Interface (DMI).....	3-21
BIOS Setup Utility.....	3-23
<b>4. Replaceable Parts .....</b>	<b>4-1</b>
<b>5. Reference Information .....</b>	<b>5-1</b>
Password Removal Policy .....	5-1
Hewlett-Packard Display Quality Statement .....	5-2

## Figures

Figure 1-1. OmniBook - Front View .....	1-3
Figure 1-2. OmniBook - Side View .....	1-3
Figure 1-3. OmniBook - Rear View .....	1-3
Figure 1-4. Replaceable Module Diagram .....	1-12
Figure 2-1. Removing the Battery .....	2-3
Figure 2-2. Removing a RAM Board .....	2-5
Figure 2-3. Removing the Hard Disk Drive .....	2-6
Figure 2-4. Installing a Hard Drive in the Cover .....	2-6
Figure 2-5. Removing the LCD Module .....	2-9
Figure 2-6. Removing the Keyboard .....	2-11
Figure 2-6. Removing the CPU Module .....	2-13
Figure 2-8. Removing the Display Assembly .....	2-15
Figure 2-9. Removing the Top Case .....	2-17
Figure 2-10. Removing the Motherboard .....	2-19
Figure 2-11. Removing the BIOS IC .....	2-22
Figure 3-1. Basic Troubleshooting Steps .....	3-2
Figure 3-2. OmniBook Diagnostic Screens — Basic and Advanced .....	3-12
Figure 3-3. Serial and Parallel Loopback Connectors .....	3-14
Figure 4-1. Exploded View .....	4-2
Figure 4-2. Display Components .....	4-5

## Tables

Table 1-1. OmniBook 900 Models .....	1-1
Table 1-2. Product Comparisons .....	1-2
Table 1-3. Activating Power Modes .....	1-4
Table 1-4. Main Status Lights (Motherboard) .....	1-5
Table 1-5. Keyboard Status Lights (Motherboard) .....	1-5
Table 1-6. Fn Hot Keys .....	1-6
Table 1-7. System Interrupts .....	1-7
Table 1-8. System Memory .....	1-7
Table 1-9. System Input/Output Addresses (100-3FF) .....	1-8
Table 1-10. DMA Channels .....	1-8
Table 1-11. OmniBook 900 Specifications .....	1-9
Table 1-12. OmniBook 900 Accessories .....	1-11
Table 1-13. Functional Structure .....	1-13
Table 2-1. Removal Cross-Reference .....	2-1
Table 2-2. Required Equipment .....	2-2
Table 2-3. Recommended Screw Torques .....	2-2
Table 2-4. RAM Board Replacement Part Numbers .....	2-4
Table 2-5. Hard Disk Drive Replacement Part Numbers .....	2-5
Table 2-6. Replacing Small Parts (User-Replaceable) .....	2-7
Table 2-7. Removing Display Components .....	2-24
Table 2-8. Removing Top Case Components .....	2-25
Table 2-9. Removing Bottom Case Components .....	2-25
Table 3-1. Scope of Diagnostic Tools .....	3-4
Table 3-2. Troubleshooting Suggestions .....	3-5
Table 3-3. OmniBook Diagnostic Error Codes .....	3-14
Table 3-4. POST Terminal-Error Beep Codes .....	3-17
Table 3-5. POST Messages .....	3-18

Table 3-6. BIOS Setup Menus and Parameters .....	3-23
Table 4-1. OmniBook Replaceable Parts .....	4-3
Table 4-2. Assembly-Component Breakdown.....	4-6
Table 4-3. Accessory Replaceable Parts.....	4-6
Table 4-4. Part Number Reference .....	4-7
Table 5-1. OmniBook 900 LCD Guidelines (TFT).....	5-3

## Introduction

This service manual provides reference information for the HP OmniBook 900. It is intended to be used by HP-authorized service personnel in the installation, servicing, and repair of these products.

The manual is designed self-contained. It is intended that you can follow this manual without having equipment available.

The following table lists additional places where you can get supplementary information about OmniBook products.

**Sources of OmniBook Information**

Source	Address or Number	Comments
HP External Web	<a href="http://www.hp.com/omnibook">http://www.hp.com/omnibook</a> ( <a href="http://www.europe.hp.com/omnibook">http://www.europe.hp.com/omnibook</a> , European mirror)	No usage restriction.
HP US Reseller Web	<a href="http://partner.americas.hp.com">http://partner.americas.hp.com</a>	Restricted to Authorized Resellers only.
HP Asia Pacific Channel Support Centre for DPSP Partners	<a href="http://www.hp.com.au">http://www.hp.com.au</a>	Restricted to DPSP Partners only.
America Online	Keyword: HP	Call (800) 827-6364 for membership within the US.
CompuServe	GO HP	Call (800) 524-3388 for membership within the US.
HP Bulletin Board Service		Refer to the latest Product Support Plan for non-US BBS numbers.
HP First (automated fax)	(800) 333-1917	US and Canada.
	(801) 344-4809	Outside US and Canada.
	(800) 544-9976	Reseller support number (enter outlet id number).
HP Support Assist CD-ROM	(800) 457-1762	US and Canada.
	(801) 431-1587	Outside US and Canada.
Microsoft Web	<a href="http://www.microsoft.com">http://www.microsoft.com</a>	Information and updates for Windows operating systems.

## Product Information

The HP OmniBook 900 provides desktop-quality performance and expandability in a highly portable form. It uses high-performance component technologies that make it capable of serving as a desktop computer that you can conveniently take anywhere.

**Table 1-1. OmniBook 900 Models**

OmniBook Product *	CPU **	Display	Hard Drive	Floppy Drive	CD-ROM Drive	Standard RAM
F1711x	Pentium II 300 MHz	12.1-inch SVGA TFT	4.3 GB (none)	1.44 MB (F1472A)	None	32 MB
F1712x	Pentium II 366 MHz		6.4 GB (F1707A)			
<p>This table lists only base product configurations—custom configurations are not included.</p> <p>* For the products listed: "x" suffix means "N", "NT", or "NV" for Windows NT 4.0 installed (marketing distinction only), or "W", "WT", or "WV" for Windows 95/98 installed (marketing distinction only).</p> <p>** Intel Mobile Pentium II processor.</p>						

**Table 1-2. Product Comparisons**

	<b>OmniBook 900</b>	<b>OmniBook 7150</b>	<b>OmniBook 4150</b>	<b>OmniBook 2100</b>
<b>Processor *</b>	Intel Pentium II (366 or 300(PE) MHz).	Intel Pentium II (300 MHz).	Intel Pentium II (366, 333, or 300 MHz).	Pentium II (300, 266, or 233 MHz), or Pentium (233 or 200 MHz).
<b>Memory</b>	32 MB RAM on motherboard. Expandable to 160 MB.	64 MB RAM in system slot. Expandable to 320 MB.	128 or 64 MB RAM in slot. Expandable to 256 MB.	32 MB RAM on motherboard. Expandable to 160, 192, or 288 MB.
<b>Display</b>	12.1-inch TFT SVGA display.	14.1-inch TFT XGA display.	14.1-inch TFT XGA display.	13.3-inch TFT XGA display, or 12.1-inch TFT or DSTN SVGA display.
<b>Video</b>	AGP video. 256-bit graphics controller with 2.5 MB internal video RAM. Up to 16M colors (XGA). Zoomed Video enabled.	AGP video. 64-bit graphics controller with 4 MB external video RAM, 3D graphics acceleration. Up to 16M colors (XGA). Zoomed Video enabled.	AGP video. 256-bit graphics controller with 2.5 MB internal video RAM. Up to 16M colors (XGA). Zoomed Video enabled.	PCI local bus video. 128-bit graphics controller with 2 MB internal video RAM. Up to 64K colors (XGA), 16M colors (SVGA). Zoomed Video enabled.
<b>Operating System</b>	Windows 95, Windows 98, or Windows NT 4.0 preinstalled.	Windows 95, Windows 98, or Windows NT 4.0 preinstalled.	Windows 95, Windows 98, or Windows NT 4.0 preinstalled.	Windows 95, Windows 98, or Windows NT 4.0 preinstalled.
<b>Desktop Management Interface</b>	DMI 2.0. HP TopTools 3.0.	DMI 2.0. HP TopTools 3.0.	DMI 2.0. HP TopTools 3.0.	DMI 2.0. HP TopTools 2.6 or 3.0.
<b>Power Management</b>	APM 1.2. ACPI compliant.	APM 1.2. ACPI compliant.	APM 1.2. ACPI compliant.	APM 1.2. ACPI compliant.
<b>Power States</b>	On, Standby, Suspend, Hibernate, Off.	On, Standby, Suspend, Hibernate, Off.	On, Standby, Suspend, Hibernate, Off.	On, Standby, Suspend, Hibernate, Off.
* Intel Mobile Pentium or Mobile Pentium II processor.				

This chapter describes

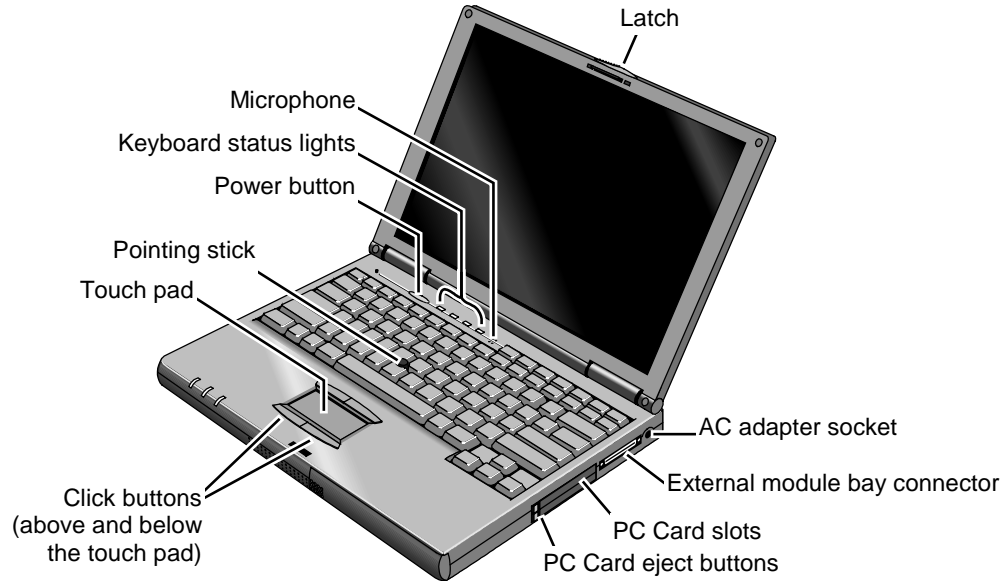
- Features and operation (below).
- Specifications (page 1-9).
- Internal design (page 1-12).



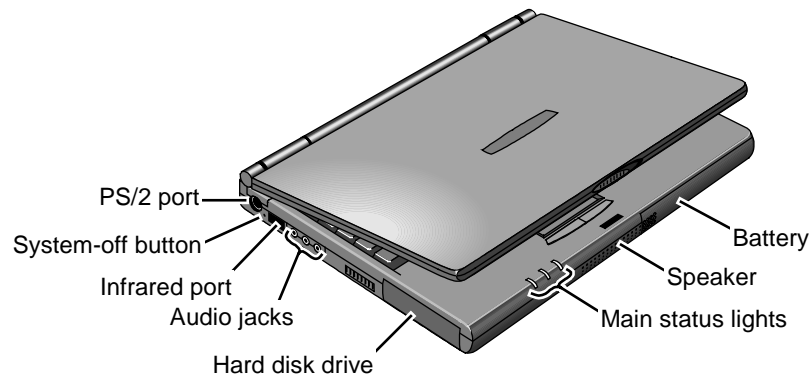
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# Features and Operation

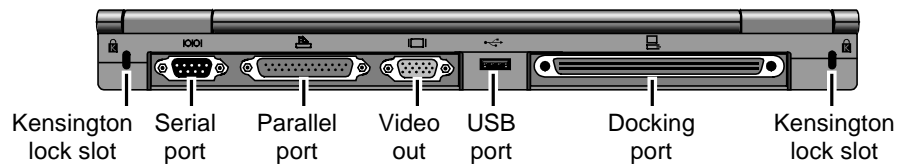
The following three illustrations point out the main external features of the computer. They are followed by highlights of the computer's operation. For an internal, exploded view, see page 4-2.



**Figure 1-1. OmniBook - Front View**



**Figure 1-2. OmniBook - Side View**



**Figure 1-3. OmniBook - Rear View**

## Turning the OmniBook On and Off

- **On.** Press the blue power button to turn on the OmniBook.
- **Standby.** The display turns off automatically if the computer is inactive for about 2 minutes.
- **Suspend.** Click Start, Suspend (Windows 95) or press the blue power button briefly (about 1 second) to suspend activity when the OmniBook is on. When you turn on the computer, it resumes your previous work session.

Closing the lid (for more than 2 seconds) also suspends the computer.

- **Hibernate.** Press Fn+F12. This is like Off, except that your current work session is first saved to disk. When you turn on the computer, it reboots and restores your previous session.
- **Off.** Click Start, Shut Down. If the OmniBook does not respond, press and hold the blue power button until the display shuts down. When you turn on the computer, it reboots. Unsaved data is lost.





**Table 1-3. Activating Power Modes**

Power Mode	To Enter Mode	To Turn Back On
<b>Standby</b> Reduced-power/stopped state. Display is off. Everything is in a reduced-power state. Network devices are maintained. Your current work session continues at turn-on (any key or pointer action).	Press Fn+S (not Windows 98) –or– allow time-out.	Press any key or move a pointing device to display the current session ("Instant-On").
<b>Suspend</b> Low-power/stopped state. Lower power state than Standby. Everything is off or in a low-power state. Network devices are off. Your previous work session resumes at turn-on. For plug-and-play operating systems, network connections resume at turn-on.	Press blue power button for about 1 second –or– click Start, Shut Down, Standby (Windows 98) –or– click Start, Suspend (Windows 95) –or– allow time-out.	Press blue power button to display the current session ("Instant-On").
<b>Hibernate</b> No-power/stopped state. Session is saved on the hard disk. Everything is shut down. Computer reboots at turn-on and restores previous session and network connections (if plug-and-play).	Press Fn+F12 –or– allow time-out.	Press blue power button to restart and restore the previous session.
<b>Off</b> No-power/stopped state. Everything is shut down (battery continues charging if ac adapter is connected). Computer reboots at turn-on and restores network connections.	Click Start, Shut Down –or– Press and hold the blue power button until the display shuts down.	Press blue power button to restart with a new session.

## Checking the Status of the OmniBook


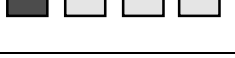



The main OmniBook status lights, located at the front-right edge of the display bezel at the top of the display, indicate power status and drive activity. (These lights are on the motherboard.)

**Table 1-4. Main Status Lights (Motherboard)**

	Meaning
	<b>Power mode</b> Steady green light: OmniBook is running (On mode). Steady orange light: OmniBook is suspended (Suspend or Standby mode). No light: OmniBook is off (Off or Hibernate mode). Green and orange lights: OmniBook failed when resuming, requires reset.
	<b>Drive access</b> Green light: OmniBook is accessing the hard disk drive or a drive in the external module bay.
	<b>Charging</b> Steady green light: AC adapter is connected, battery is full or stopped charging. Blinking green light: AC adapter is connected, battery is charging. No light: AC adapter is not connected or battery is not present.

The keyboard status lights, located above the keyboard, indicate the states of the keyboard locks. (These lights are on the motherboard.)

**Table 1-5. Keyboard Status Lights (Motherboard)**

	Meaning
	<b>Caps Lock</b> Caps Lock is active.
	<b>Keypad Lock</b> The embedded keypad is active (Fn+F8 or Fn held down). Num Lock must also be on for the numeric keys—otherwise, cursor control is active.
	<b>Num Lock</b> Num Lock is active. Keypad Lock must also be on to use the embedded keypad.
	<b>Scroll Lock</b> Scroll Lock is active.

In addition, the battery module has five lights that indicate its charge level. To view the lights, you have to remove the battery and press the pad on the back next to the connector. The number of lights that turn on indicates the charge.

## Using Fn Hot Keys

The Fn key combined with another key is a hot key—a shortcut key sequence for various system controls. For an external keyboard, CTRL+ALT is normally equivalent to the Fn key.

**Table 1-6. Fn Hot Keys**

Hot Key	Effect
Fn + F1	Decreases the display's brightness.
Fn + F2	Increases the display's brightness.
Fn + F5	Switches among the built-in display, an external display, and simultaneous displays.
Fn + F7	Toggles audio output on and off (mute).
Fn + F8	Toggles the embedded keypad on and off. Does not affect an external keyboard. If Num Lock is on, then the numeric functions are active—otherwise, cursor control is active.
Fn + F12	Enters Hibernate mode.
Fn + R	Enters Suspend mode.
Fn + S	Enters Standby mode (Windows 95, Windows NT) or Suspend mode (Windows 98).
Fn + ScrLk	Toggles Scroll Lock on and off.
Fn + UP ARROW Fn + DOWN ARROW	Increases and decreases the sound volume.

## Resetting the OmniBook

1. Use a pen or a straightened paper clip to push the system-off button on the left side of the OmniBook. (The switch is on the motherboard.)  
—or—  
Press and hold the blue power button until the display shuts down. (The switch is on the motherboard.)
2. After the computer shuts down, press the blue power button to turn it back on.

### Note

The OmniBook can boot from a CD if all these conditions are true:

- You have an OmniBook CD-ROM drive installed in the external module bay,
- You have a bootable CD in the drive, such as the OmniBook Recovery CD, and
- You select the CD-ROM drive as the boot device. You can do this during reboot by pressing ESC to cancel the OmniBook screen, then ESC to display the boot-device menu for a one-time selection.

## System Resources

The tables in this section show typical resource usage as set up by the OmniBook BIOS. Plug-and-play operating systems, drivers, and BIOS Setup settings may change some of the entries.

To see other, non-default possibilities, use the BIOS Setup utility (see page 3-23), which lists port and audio device configurations in the System Devices menu.

**Table 1-7. System Interrupts**

0	System timer
1	Keyboard
2	Cascade IRQ 9
3	Free (or COM2 infrared port, if enabled)
4	COM1 (serial port)
5	Audio
6	Floppy drive
7	Video controller
8	Real-time clock
9	Video controller
10	USB and CardBus - assigned by Windows driver
11	Free
12	Pointing device
13	Numeric data processor
14	Internal hard disk (primary IDE controller)
15	Internal CD-ROM drive (secondary IDE controller)

**Table 1-8. System Memory**

00000 - 9FFFF	System memory
A0000 - BFFFF	Video
C0000 - CBFFF	Video BIOS
CC000 - DBFFF*	Free**
DC000*- FFFFF	System BIOS
* Approximate boundary.	
** Valid uses for memory addresses CC000-DBFFF: Upper memory blocks (UMBs). PC card memory windows.	

**Table 1-9. System Input/Output Addresses (100-3FF)**

120-127	Audio
170-177	Internal CD-ROM drive (secondary IDE controller)
1F0-1F7	Internal hard disk (primary IDE controller)
220-22F	Audio
376	Internal CD-ROM drive (secondary IDE controller)
378-37F	LPT1 (printer port)
388-38B	Audio
3B0-3BB	Video adapter
3C0-3DF	Video adapter
3E0-3E1	PCMCIA controller
3F0-3F5	Floppy controller
3F6	Internal hard disk (primary IDE controller)
3F7	Floppy controller
3F8-3FF	COM1 (serial port)

**Table 1-10. DMA Channels**

0	Sound record
1	Sound playback
2	Floppy drive
3	LPT1 (ECP parallel port)
4	Cascade
5	Free
6	Free
7	Free

# Specifications

The following tables list descriptions for the OmniBook and its accessories.

**Table 1-11. OmniBook 900 Specifications**

<b>Physical Attributes</b>	Notebook size: 11.8 x 8.8 x 1.26 in (30.0 x 22.5 x 3.2 cm). Notebook weight: 4 lb (1.8 kg).
<b>Processor and Bus Architecture</b>	366-MHz or 300(PE)-MHz Intel Mobile Pentium II processor. 1.6-V core, 2.5-V external, low-power processor. 32-KB (16-KB instruction, 16-KB data) L1 cache. 256-KB four-way set-associative L2 cache. 32-bit PCI bus.
<b>Graphics</b>	12.1-inch diagonal 800x600 SVGA TFT display (800x600x262K colors). 256-bit NeoMagic MagicGraph graphics accelerator with 2.5-MB video RAM. Zoomed Video support for lower PC Card slot. 1x AGP graphics capability.
<b>Power</b>	Rechargeable 6-cell lithium ion battery with LED charge-level gauge (10.8 Vdc, 3.0 AH, 33 watt-hours). Battery life: up to 2.5 hours (varies with type of usage). Fast battery recharge: 80% in 1 hour, 100% in 1.5 hours. Low-battery warning. Suspend/resume capability. 60-watt ac adapter: 100 to 240 Vac (50 to 60 Hz) input, 19 Vdc, 3.16 A output.
<b>Mass Storage</b>	6.4-GB or 4.3-GB removable hard drive. 1.44-MB floppy drive module for use in external module bay. Optional modules for use in external module bay: 24X CD-ROM drive module. LS-120 SuperDisk drive module. 2X DVD drive module.
<b>RAM</b>	32-MB RAM built in. One slot for RAM expansion up to 160 MB.
<b>Audio System</b>	16-bit Sound Blaster Pro-compatible stereo sound. Built-in speaker. 3D-enhanced PCI bus audio with Zoomed Video support (lower slot). Built-in microphone. Line-in, headphone-out, and microphone-in.
<b>Keyboard and Pointing Device</b>	87/88-key touch-type QWERTY keyboard with 101/102 key emulation. Embedded numeric keypad. 12 function (Fn) keys. Two pointing devices: pointing stick (TrackPoint technology licensed from IBM) and touch pad.
<b>Input/Output</b>	FDD/IDE interface for external module bay. Universal serial bus (USB). 9-pin, 115,200-bps serial (16550 UART). 25-pin bi-directional ECP/EPP parallel. Video-out (Resolution: up to 1280x1024x256 colors. Refresh rate: 60 to 85 Hz.) Dual display. PS/2 keyboard/mouse. 4-Mbps IrDA-compliant infrared port.
<b>Expandability</b>	One Type III or two Type II 16-/32-bit PC Card slots (3.3- and 5-V support). CardBus enabled. External plug-in module bay for accessory modules. Optional port replicator, mini dock, and docking system.

<b>Software</b>	<p>Microsoft Windows 95/Windows 98, or Windows NT 4.0.  Windows 95/Windows 98-compatible Plug-and-Play.  Windows NT 4.0 and PC Card Plug-and-Play.  Advanced Power Management (APM).  DMI with HP TopTools.  Adobe Acrobat Reader.  Agaté Tioman for HP (Hot Swap).  DiagTools.  McAfee VirusScan.  Online <i>Reference Guide</i>.  OmniBook <i>Recovery CD</i> included.  Centralized worldwide BIOS and driver update service</p>
<b>Security Features</b>	<p>User and administrator passwords.  System, hard drive, and docking passwords.  PC identification displayed at boot.  DMI-accessible electronic serial number.  Kensington MicroSaver lock slot.</p>
<b>Environmental Limits</b>	<p>Operating temperature: 5 to 35 °C (41 to 95 °F).  Operating humidity: 20 to 90 percent RH (5 to 35 °C).  Storage temperature: -20 to 50 °C (-4 to 122 °F).</p>
<b>Major ICs</b>	<p>CPU: Intel Mobile Pentium II processor.  South Bridge: PIIX4E.  Video: NeoMagic MagicGraph NM2200 (NMG5).  Audio: NeoMagic MagicGraph NM2200 (NMG5) and NeoMagic Audio NMA2.  CardBus: TI PCI 1225.  Keyboard controller: National PC87570.  Super I/O: SMC 769.</p>



**Table 1-12. OmniBook 900 Accessories**

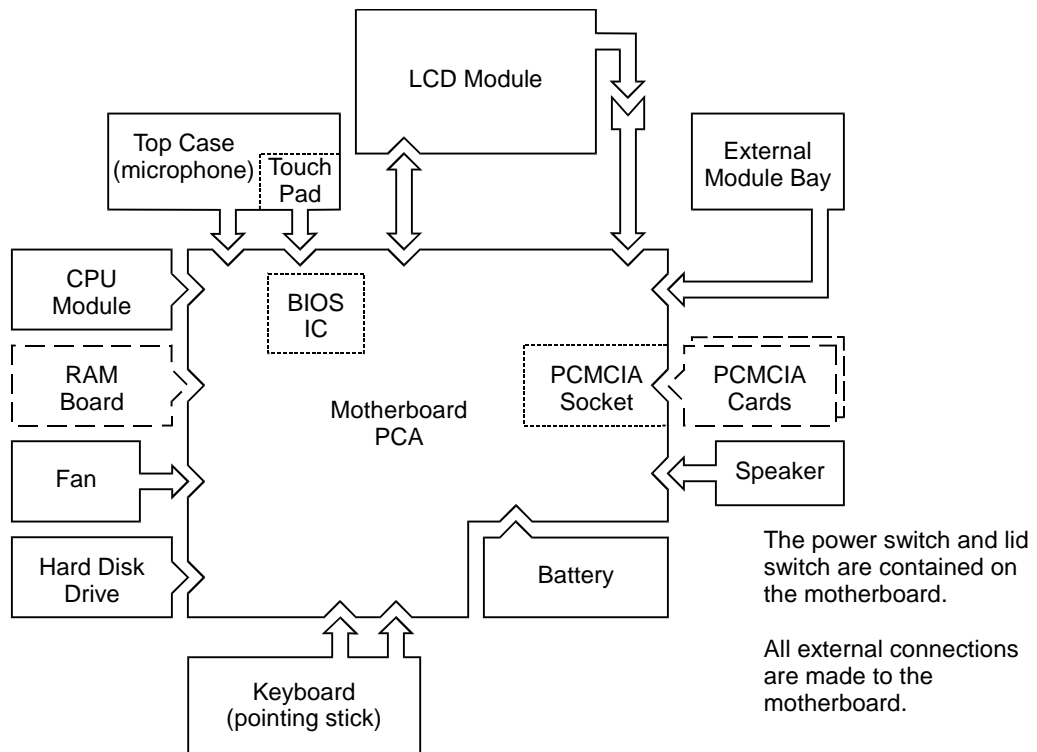
Accessory	Description	OmniBook	Compatibility	
		900	4150	2100/7100
<b>Memory</b>				
F1456A	32-MB SDRAM expansion module	•	•	•
F1457A	64-MB SDRAM expansion module	•	•	•
F1622A	128-MB SDRAM expansion module	•	•	•
<b>Hard Drives</b>				
F1707A	6.4-GB internal hard disk drive	•		
<b>Modules</b>				
F1465A	DVD drive module (with DVD player card)	•	•	
F1470A	LS-120 SuperDisk drive module	•	•	
F1472A	Floppy drive module	•	•	
F1473A	Floppy drive cable for external use	•	•	
F1474A	24X CD-ROM drive module	•	•	
F1704A	External module bay	•		
<b>Power Options</b>				
F1454A	60-watt ac adapter	•	•	•
F1455A	75-watt auto/airline power adapter	•	•	•
F1705A	Lithium-ion battery	•		
F1706A	Battery charger (external)	•		
8120-6312	Replacement power cord (Australia)	•	•	•
8120-6313	Replacement power cord (U.S., Canada, Taiwan)			
8120-6314	Replacement power cord (Europe)			
8120-6316	Replacement power cord (Japan)			
8120-6317	Replacement power cord (India, South Africa)			
8120-8367	Replacement power cord (Argentina)			
8120-8373	Replacement power cord (People's Republic of China)			
8120-8452	Replacement power cord (Chile)			
8120-8699	Replacement power cord (Hong Kong, Singapore, U.K.)			
<b>Adapters</b>				
F1469A	PS/2 Y adapter	•	•	•
<b>PC Cards</b>				
F1623A	10/100-Mbps Ethernet + 56-Kbps modem PC Card by Xircom	•	•	•
F1625A	56-Kbps global modem PC Card by Xircom	•	•	•
F1626A	10/100-Mbps Ethernet PC Card by 3Com	•	•	•
F1627A	56-Kbps US modem PC Card by Xircom	•	•	•
TCM3C589	10-Mbps Ethernet PC Card by 3Com	•	•	•
<b>Docks</b>				
F1451A	Port replicator (tray: page 4-6)	•	•	•
F1452A	Mini dock (tray: page 4-6)	•	•	•
F1453A	Monitor stand (short) for F1451A and F1452A	•	•	•
F1468A	Docking module bay adapter	•	•	
F1477A	Docking system and monitor stand (tall) (tray: page 4-6)	•	•	•

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## Internal Design

The motherboard PCA is the central component of the OmniBook design. It plays a role in virtually all system functions. The CPU module and most other subsystems connect to the motherboard.

The following figure shows the connections among the replaceable electrical modules. As a substitute for a functional block diagram, see the table on page 1-13—it lists the roles that the replaceable modules play in each of the functional subsystems.



**Figure 1-4. Replaceable Module Diagram**

**Table 1-13. Functional Structure**

<b>Bootup</b>	CPU module Motherboard BIOS IC Floppy disk module Hard disk drive	Main processor. Primary system circuitry. Code for basic system functions. First source of disk-based startup code. Second source of disk-based startup code.
<b>Processor</b>	CPU module Motherboard	Main processor, numeric data processor, L1 and L2 cache. Primary system circuitry.
<b>Memory</b>	Motherboard RAM board	First 32 MB of RAM, video RAM. Changeable RAM.
<b>Power</b>	Battery Motherboard  AC adapter	Power storage. AC adapter socket, power switch, lid switch, system-off switch, power supply, power control circuitry. AC-to-dc converter.
<b>Display</b>	Motherboard  LCD module	Display/graphics controller, PCMCIA/zoomed video controller, video RAM, power converter for backlight. Display output, backlight.
<b>Hard disk</b>	Motherboard Hard disk drive	Hard disk controller. Hard disk mechanism.
<b>Floppy drive</b>	Motherboard Floppy disk module	Floppy disk controller. Floppy disk mechanism.
<b>Keyboard</b>	Motherboard BIOS IC Keyboard	Keyboard controller. Keyboard BIOS. Key switches.
<b>Pointer</b>	Motherboard BIOS IC Keyboard Top case	Keyboard controller, pointing stick controller (PS/2 output). Keyboard BIOS. Pointing stick sensor. Touch pad sensor, controller (PS/2 output).
<b>Audio</b>	Motherboard  Speaker	Audio controller, audio decoder, speaker amplifier, headphone amplifier, zoomed video controller, external audio jacks, microphone. Speaker (mixed left and right channels).
<b>Status</b>	Motherboard	Keyboard controller, main LEDs, keyboard LEDs.
<b>Serial</b>	Motherboard	I/O controller, serial connector.
<b>Parallel</b>	Motherboard	I/O controller, parallel connector.
<b>Infrared</b>	Motherboard	I/O controller, infrared transmitter/receiver.
<b>PS/2 port</b>	Motherboard	Keyboard controller, PS/2 processor, PS/2 connector.
<b>USB</b>	Motherboard	Bus controller (South Bridge), USB connector.
<b>Docking port</b>	Motherboard	Docking logic, docking connector.
<b>PCMCIA</b>	Motherboard PCMCIA socket	PCMCIA controller. PCMCIA connectors.



# Removal and Replacement

This chapter tells you how to remove and replace the following components and assemblies. The ones marked by • are user-replaceable.

**Table 2-1. Removal Cross-Reference**


<ul style="list-style-type: none"> <li>• Battery (page 2-3)</li> <li>  Bezel, display (page 2-24)</li> <li>• Bumper, display (page 2-7)</li> <li>  Cable, display flex (page 2-24)</li> <li>  Cable, display power (page 2-24)</li> <li>• Cap, pointing stick (page 2-7)</li> <li>  Case, bottom (page 2-18)</li> <li>  Case, display (page 2-24)</li> <li>• Case, HDD kit (page 2-5)</li> <li>  Case, top (page 2-16)</li> <li>• Cover, display screw (page 2-7)</li> <li>• Cover, hinge (page 2-7)</li> <li>• Cover, keyboard screw (page 2-7)</li> <li>  CPU module (page 2-12)</li> <li>• Door, HDD (page 2-7)</li> <li>  Door, module bay connector (table starting on page 2-25)</li> <li>• Drive, hard disk (page 2-5)</li> <li>  Fan (table starting on page 2-25)</li> </ul>	<ul style="list-style-type: none"> <li>• Foot (page 2-7)</li> <li>  Heatsink (table starting on page 2-25)</li> <li>  Hinge, display (page 2-24)</li> <li>  IC, BIOS (page 2-21)</li> <li>  Insulator, bottom case (table starting on page 2-25)</li> <li>  Keyboard (page 2-10)</li> <li>  Latch, display (page 2-24)</li> <li>  LCD module (page 2-8)</li> <li>  Lens, infrared (table starting on page 2-25)</li> <li>  Overlay, serial number (page 2-20)</li> <li>  Pads, thermal (table starting on page 2-25)</li> <li>  PCA, motherboard (page 2-18)</li> <li>  Socket, PCMCIA (table starting on page 2-25)</li> <li>  Speaker (table starting on page 2-25)</li> <li>  Support, hinge left (table starting on page 2-25)</li> <li>  Support, hinge right (table starting on page 2-25)</li> <li>  Support, touch-pad (page 2-25)</li> <li>  Touch pad (page 2-25)</li> </ul>
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## Caution

Always provide proper grounding when performing repairs. Without proper grounding, an electrostatic discharge may damage the OmniBook and its components.

## Notes

Reassembly steps are the reverse of the removal steps. Reassembly notes are included at the end of each section below.

 Symbols like this throughout this chapter show approximate full-size screw outlines. You can use them to verify the sizes of screws before you install them. Installing a wrong-size screw can damage the unit. (The symbol at the left represents an M2.5x5mm T-head screw.)

**Table 2-2. Required Equipment**

- Small Phillips screwdriver (#1), preferably magnetized.
- Fine Phillips screwdriver (#0).
- 4-mm thin-wall hex driver (or 5/32 inch).
- Small plastic blade for prying, such as an angled plastic tweezers.
- Pointed knife or probe.
- Small flat-blade screwdriver.
- IC (PLCC) removal tool (similar to OK Industries EX-5).

**Table 2-3. Recommended Screw Torques**

Screw Thread Size	Torque (kgf•cm)	Torque (lbf•in)
<b>M1.4</b>	0.9 – 1.2	0.8 – 1.0
<b>M2</b>	1.5 – 2.0	1.3 – 1.7
<b>M2.5</b> (4–5 mm long) except those in next line	3.0 – 3.5	2.6 – 3.0
<b>M2.5</b> (4–5 mm long) for HDD case, PCMCIA socket	2.0 – 2.5	1.7 – 2.2
<b>M2.5</b> (8 mm long)	3.5 – 4.0	3.0 – 3.4
<b>M3</b> except those in next line	4.0 – 4.5	3.4 – 3.9
<b>M3</b> for HDD case	2.0 – 2.5	1.7 – 2.2

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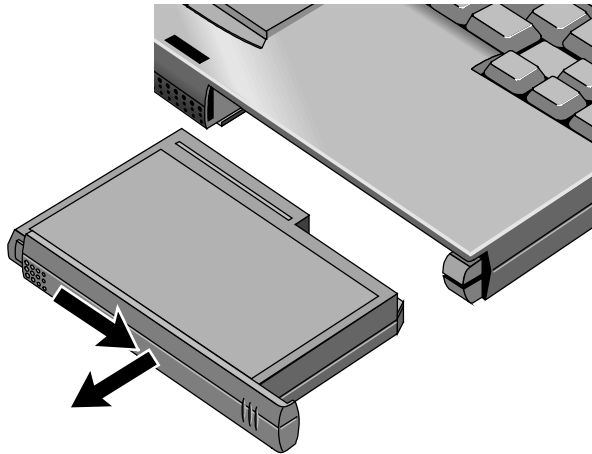
## Removing the Battery (User-Replaceable)

### Required Equipment

- None.

### Removal Procedure

1. Unplug the ac adapter, if present.
2. Slide the battery's front panel to the right.
3. Pull the battery out of the bay.



**Figure 2-1. Removing the Battery**

### Reassembly Notes

- Make sure the front panel of the battery is open before inserting the battery.

---

## Removing a RAM Board

(User-Replaceable)

Table 2-4. RAM Board Replacement Part Numbers

Description	Part Number	Exchange Part Number
RAM board, 32-MB SDRAM	1818-7413	F1456-69001
RAM board, 64-MB SDRAM	1818-7414	F1457-69001
RAM board, 128-MB SDRAM	1818-7549	F1622-69001

### Caution

Handle the RAM board only by its edges and provide proper grounding. Otherwise, you may damage the board due to electrostatic discharge.

### Required Equipment

- Small Phillips screwdriver.

### Removal Procedure

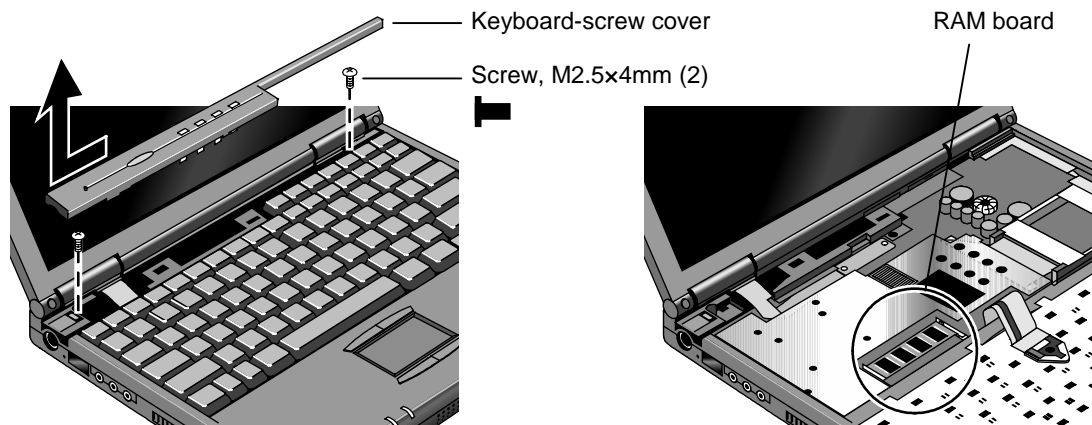
1. Unplug the ac adapter, if present, and remove the battery.
2. Put your finger above the F8 key and slide the keyboard-screw cover to the left about 3 mm (1/8 inch)—then lift off the cover.
3. Remove the two screws holding the keyboard above the F1 and HOME keys. If your screwdriver has a fat shaft, protect or remove the right hinge cover.
4. Lift up the keyboard tab above the F1 key about 10 mm (1/2 inch), then free the snap at the center of the back edge.
5. Slide the keyboard toward the display about 5 mm (1/4 inch), then fold the keyboard forward onto the front of the top case.

### Warning

Do not touch the heatsink until it has cooled. It could be hot if the computer was running recently.

6. Release the two latches at the sides of the RAM board, so the free edge of the board pops up.
7. Pull the board out of the connector.





**Figure 2-2. Removing a RAM Board**

### Reassembly Notes

- Insert the RAM board into the connector at about a 30° angle until it is fully inserted. Then press down at both sides until both latches snap closed.
- Fold the keyboard back into place. Slip its front tabs into the slots, then snap the back edge into place.
- Push the keyboard toward the back as you tighten the two screws. This helps engage the tab at the back-center of the keyboard.

## Removing the Hard Disk Drive (User-Replaceable)

### Exchange Information

When returning a bad hard disk drive to HP, describe the symptoms on a piece of paper and attach it to the part—do not use tape.

**Table 2-5. Hard Disk Drive Replacement Part Numbers**

Description	Part Number	Exchange Part Number
Drive, hard disk (4.3GB, 9.5mm, IBM) *	0950-3409	F1711-69100
Drive, hard disk (6.4GB, 9.5mm, IBM) *	0950-4332	F1711-69101

\* These hard drives are the preferred drives at the time of publication. Drives shipped in units are subject to change without notice. For current information about preferred and approved drives for these products, see the latest versions of service notes HDD4G-01 and HDD6G-01.

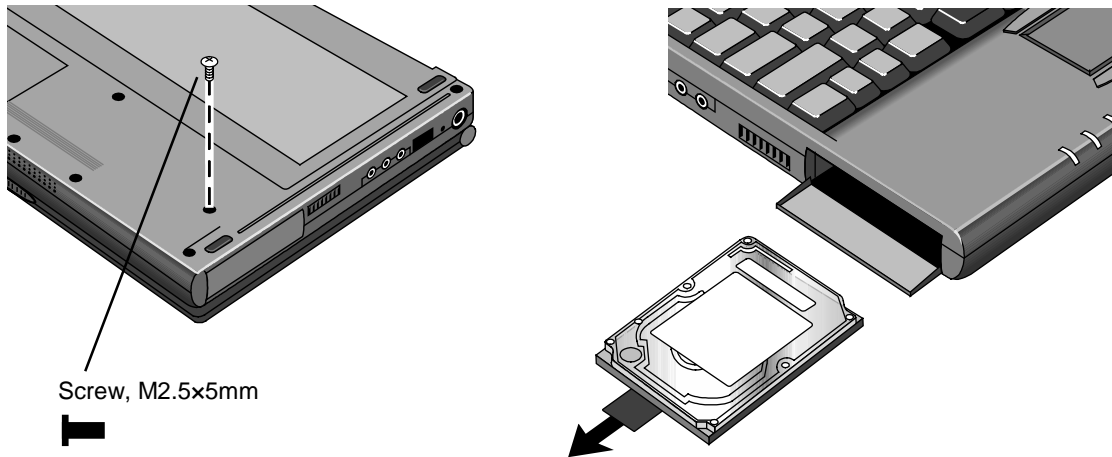
### Required Equipment

- Small Phillips screwdriver.

### Removal Procedure

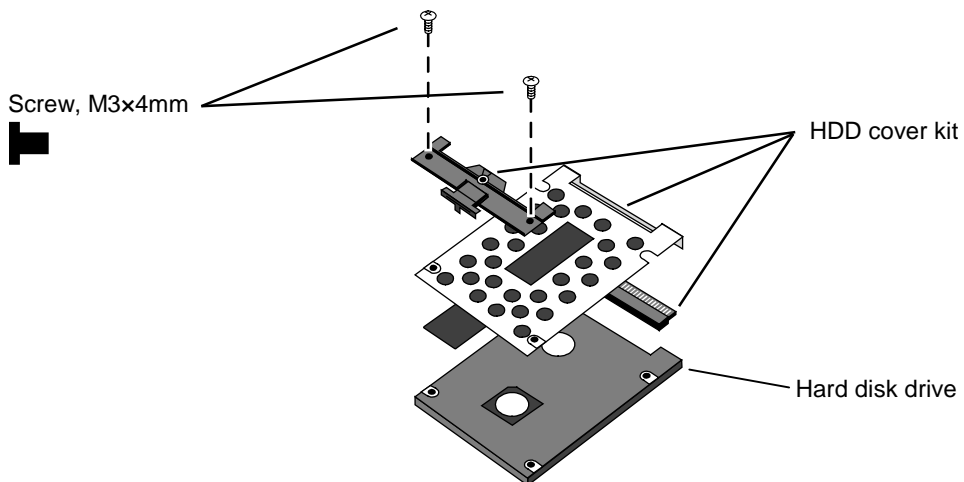
1. Unplug the ac adapter, if present, and remove the battery.
2. Turn the unit bottom side up and remove the hard drive screw from the bottom case.

3. Open the hard drive door, then pull out the hard drive by its plastic tab.



**Figure 2-3. Removing the Hard Disk Drive**

4. If you are installing a new hard drive that does not have a cover, you can remove the cover parts from the old hard drive:
  - Remove the two screws from the case, then lift the plastic tab and remove the plastic cover and metal shield from the hard disk drive.
  - Carefully pry the connector off the end of the hard disk drive. Work alternately at each end so that the connector slides off evenly.



**Figure 2-4. Installing a Hard Drive in the Cover**

### Reassembly Notes

#### Caution

Do not cover the vent hole in the top surface of the hard drive or in the case. If you cover the hole, the hard drive could fail prematurely.

- The small plastic tabs on the connector face the top of the drive, and the metal shield fits behind the tabs.

**Important**

- If you are installing a new hard drive, create a Hibernate partition on the drive before loading any software—see the steps below.

**Creating a Hibernate Partition**

1. Connect an external module bay and CD-ROM drive to the OmniBook.

If you do not have an OmniBook CD-ROM module or external module bay, you must attach another type of CD-ROM drive, connect a floppy drive (in an external bay or with a parallel floppy cable), and create a Support Utility floppy disk. To create the disk, on any computer that has a CD-ROM drive, insert a formatted floppy disk in the floppy drive and run **makesupp** from the \OmniBook\Drivers\Hputils directory on the OmniBook 900 Recovery CD. See the readme file on the disk for additional instructions about setting up drivers for the CD-ROM drive.

2. Insert the Recovery CD in the CD-ROM drive. If the Support Utility disk is needed, insert it in the floppy drive.
3. Reboot the computer. If you are using an OmniBook CD-ROM drive, press ESC during reboot to cancel the OmniBook screen, ESC to display the boot-device menu, then select the CD-ROM drive as the boot device.
4. When prompted, select “Create Hibernate Partition.”

We recommend that you create a partition the same as the default option.

---

## Replacing Small Parts (User-Replaceable)

The following small parts are user-replaceable.

**Table 2-6. Replacing Small Parts (User-Replaceable)**

Part	Replacement Procedure
<b>Bumper, display (upper)</b>	Insert a small flat-blade screwdriver under the bumper and pry it loose. To replace, firmly press the adhesive side of the bumper into the recess.
<b>Cap, pointing stick</b>	Pull the cap off the pointing stick.
<b>Cover, display screw (lower)</b>	Insert a small flat-blade screwdriver under the cover and pry it loose. To replace, firmly press the adhesive side of the cover into the recess.
<b>Cover, hinge</b>	Put your finger above the F8 key and slide the keyboard-screw cover to the left about 3 mm (1/8 inch)—then lift off the cover. Open the display fully. Push in at the bottom-front of the cover to unsnap it from the top case.
<b>Cover, keyboard screw</b>	Put your finger above the F8 key and slide the keyboard-screw cover to the left about 3 mm (1/8 inch)—then lift off the cover.
<b>Door, hard disk</b>	Open the door about 45° and flex the door until one side tab releases.
<b>Foot</b>	Insert a small flat-blade screwdriver under the foot and pry it loose. To replace, firmly press the adhesive side of the foot into the recess.

---

# Removing the LCD Module

## (HP Authorized Service Providers Only)

### Exchange Information

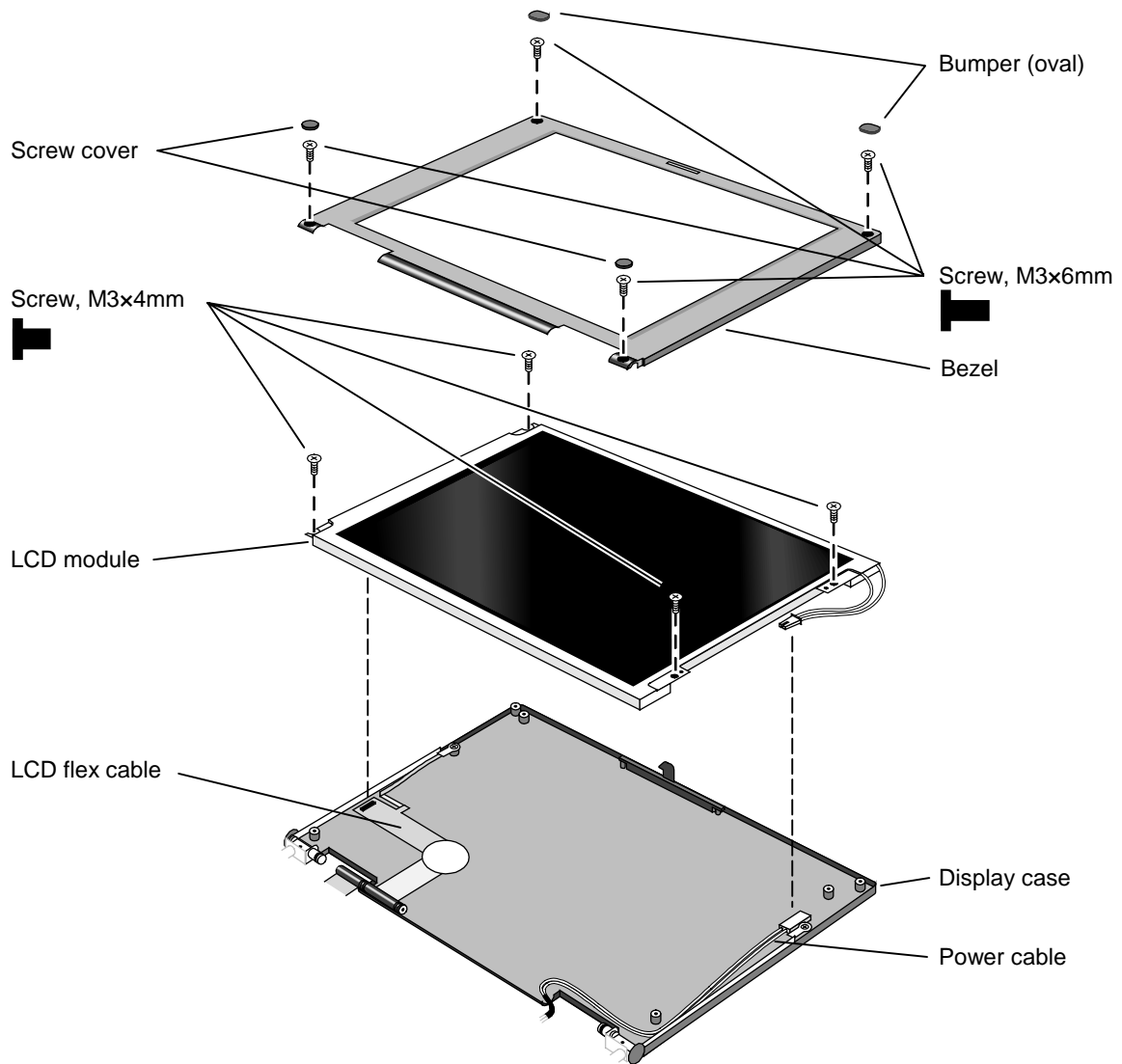
When returning a bad LCD module to HP, describe the symptoms on a piece of paper and attach it to the part—do not use tape.

### Required Equipment

- Small Phillips screwdriver.
- Small flat-blade screwdriver.
- Pointed knife or probe.

### Removal Procedure

1. Unplug the ac adapter, if present, and remove the battery.
2. On the display bezel, remove the two upper bumpers and two lower screw covers (using a pointed knife or probe), then remove the four screws.
3. Along the top of the display, pull the bezel upward, toward the edge of the case, until the snaps release.
4. Starting at the top corners, repeat along the left and right sides, pulling outward to release the left and right edges.
5. Lift the top of the bezel away from the case about 7 cm (3 inches). The snaps along the bottom of the bezel should release.
6. At the top-right corner of the LCD module, unplug the LCD power wires from the power cable.
7. Remove the four screws holding the LCD module.
8. Lift up the right edge of the LCD module about 90°.
9. Using a small flat-blade screwdriver, insert the tip under the narrow end of the flex cable connector—not the wide end—and twist the screwdriver to release the connector from the LCD module.



**Figure 2-5. Removing the LCD Module**

### Reassembly Notes

- Make sure the LCD module and flex cable have small foam pads present to ensure good connections:
  - Two pads on the back of the LCD module on the internal connections near the top-left and bottom-left corners. If a pad is missing, replace the LCD module.
  - One pad on the LCD flex cable behind the connector that plugs into the LCD module. If the pad is missing, replace the flex cable.

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# Removing the Keyboard

(HP Authorized Service Providers Only)

## Required Equipment

- Small Phillips screwdriver.
- Probe or tweezers.

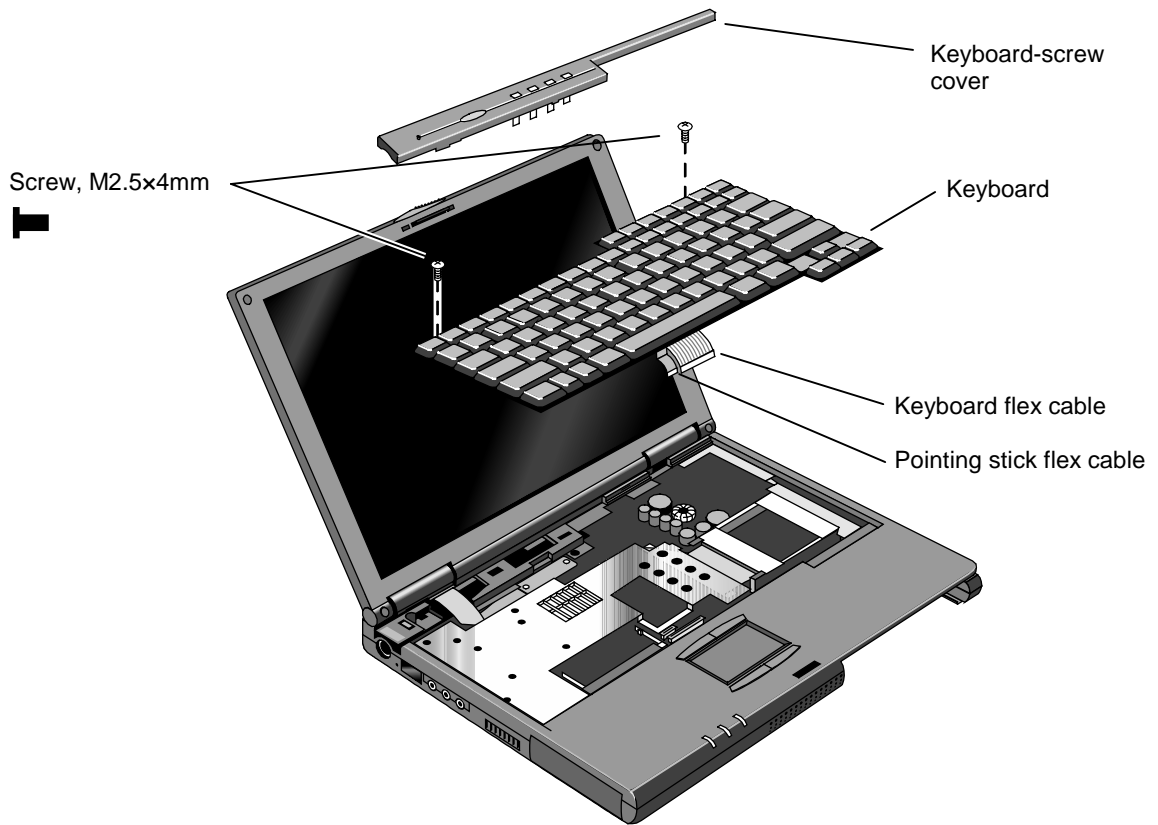
## Removal Procedure

1. Unplug the ac adapter, if present, and remove the battery.
2. Put your finger above the F8 key and slide the keyboard-screw cover to the left about 3 mm (1/8 inch)—then lift off the cover.
3. Remove the two screws holding the keyboard above the F1 and HOME keys. If your screwdriver has a fat shaft, protect or remove the right hinge cover.
4. Lift up the keyboard tab above the F1 key about 10 mm (1/2 inch). If necessary, free the snap at the center of the back edge.
5. Slide the keyboard toward the display about 5 mm (1/4 inch), then fold the keyboard forward onto the front of the top case.

### **Warning**

Do not touch the heatsink until it has cooled. It could be hot if the computer was running recently.

6. Release the pointing stick flex cable from the motherboard.
7. Release the keyboard flex cable from the motherboard, then remove the keyboard.



**Figure 2-6. Removing the Keyboard**

#### **Reassembly Notes**

- To connect the flex cables, lay the keyboard upside-down on the front section of the top case.
- Fold the keyboard back into place. Slip its front tabs into the slots, then snap the back edge into place.
- Push the keyboard toward the back as you tighten the two screws. This helps engage the tab at the back-center of the keyboard.

---

# Removing the CPU Module

(HP Authorized Service Providers Only)

## Required Equipment

- Small Phillips screwdriver.
- Small plastic blade for prying, such as an angled plastic tweezers.

## Removal Procedure

### Warning

Do not touch the heatsink until it has cooled. It could be hot if the computer was running recently.

1. Unplug the ac adapter, if present, and remove the battery.
2. Remove the keyboard (page 2-10)—but you don't have to release the flex cables.
3. Remove the eight screws from the heatsink and lift off the heatsink.

### Caution

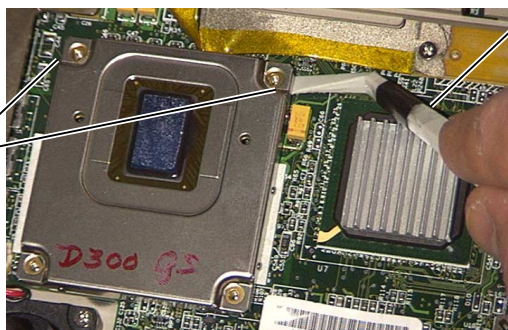
Do not spin the fan blade with your finger. Pressure on the fan blade can damage the bearings.

### Caution

In the next step, follow these precautions to prevent damage to the CPU connectors:

- Use only a non-metallic tool for releasing the CPU module. A metal tool may damage the motherboard.
- To release the CPU module, insert the non-metallic blade under the CPU module and twist it against the motherboard.

Pry up at these two places.



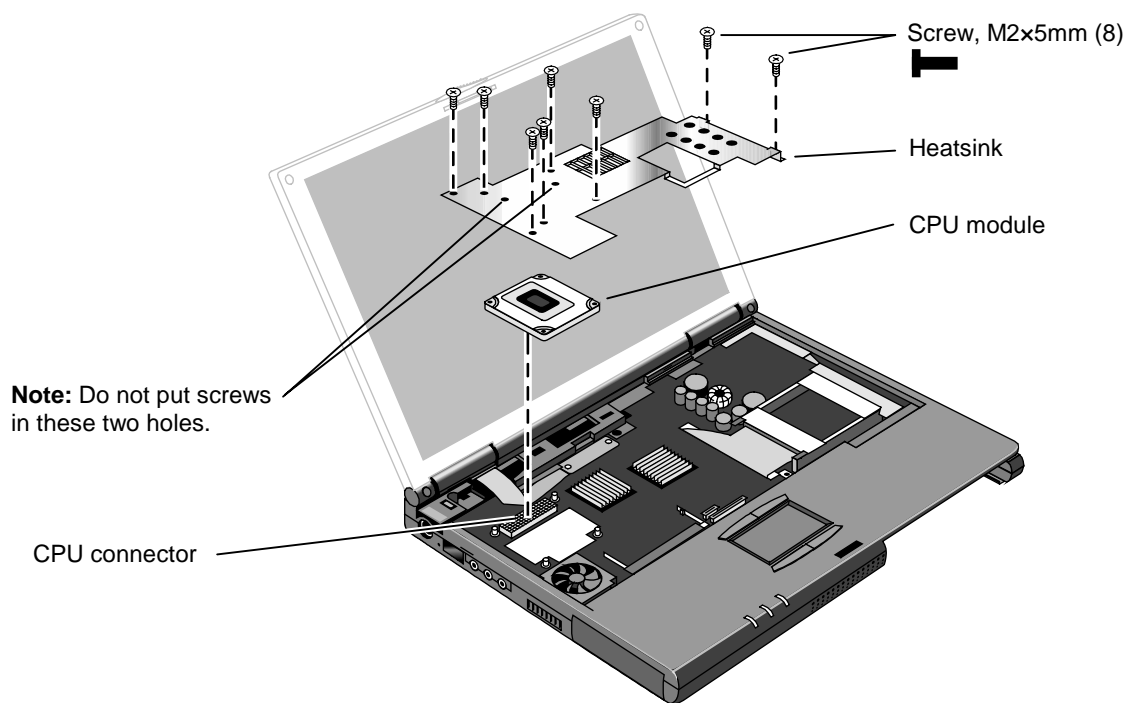
Non-metallic tool.

- Do not raise the front end or the CPU module higher than the back end during removal.

To reinstall the CPU assembly, see the precautions under "Reassembly Notes."

4. At the side of the CPU module near the back-right corner, pry up the corner of the CPU module about 1-2 mm. Then pry up the back-left corner. Lift off the CPU module.





**Figure 2-7. Removing the CPU Module**

#### Reassembly Notes

##### **Caution**

Follow these precautions while installing the CPU module to prevent damage to the CPU connectors:

- Place the CPU module on the connector carefully. Use the screw holes as a guide.
- Place your fingers on top of the CPU module above the left and right ends of the connector. Do not push at other locations.
- Press firmly at the left end while holding down the right—until the left engages. Then press down the right down while holding the left.
- Press firmly until the CPU module seats in the connector—you should feel a slight click.

Install or replace thermal pads on the heatsink that are missing or damaged.

Do not install screws in the middle area of the heatsink. The only screws in the CPU area are at the four corners of the CPU module.

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# Removing the Display Assembly

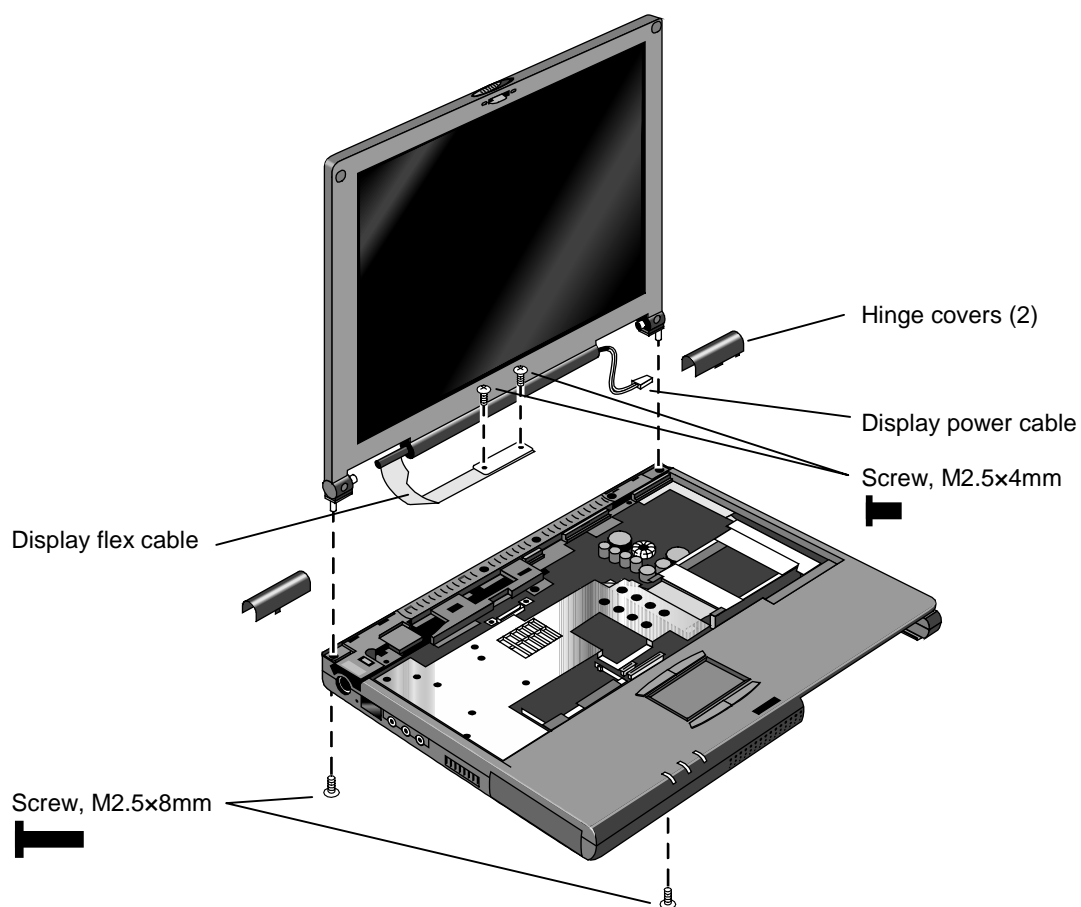
## (HP Authorized Service Providers Only)

### Required Equipment

- Small Phillips screwdriver.

### Removal Procedure

1. Unplug the ac adapter, if present, and remove the battery.
2. Remove the keyboard (page 2-10).
3. Open the display fully and remove the covers from the display hinges. Push in at the bottom-front of the covers.
4. Unplug the display power wires from the motherboard near the right hinge. Free the wires from the notch in the top case.
5. Remove the two screws from the end of the LCD flex cable and unplug the cable from the motherboard.
6. Close the display and turn over the computer.
7. Remove the two screws from the back corners of the bottom case.
8. Open the display about 90°, then lift it off.



**Figure 2-8. Removing the Display Assembly**

**Reassembly Notes**

- The flex cable wraps around the post only about 1/2 turn.
- Insert the display power wires into the notch in the top case before installing the hinge cover.

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# Removing the Top Case

## (HP Authorized Service Providers Only)

### Required Equipment

- Small Phillips screwdriver.

### Removal Procedure

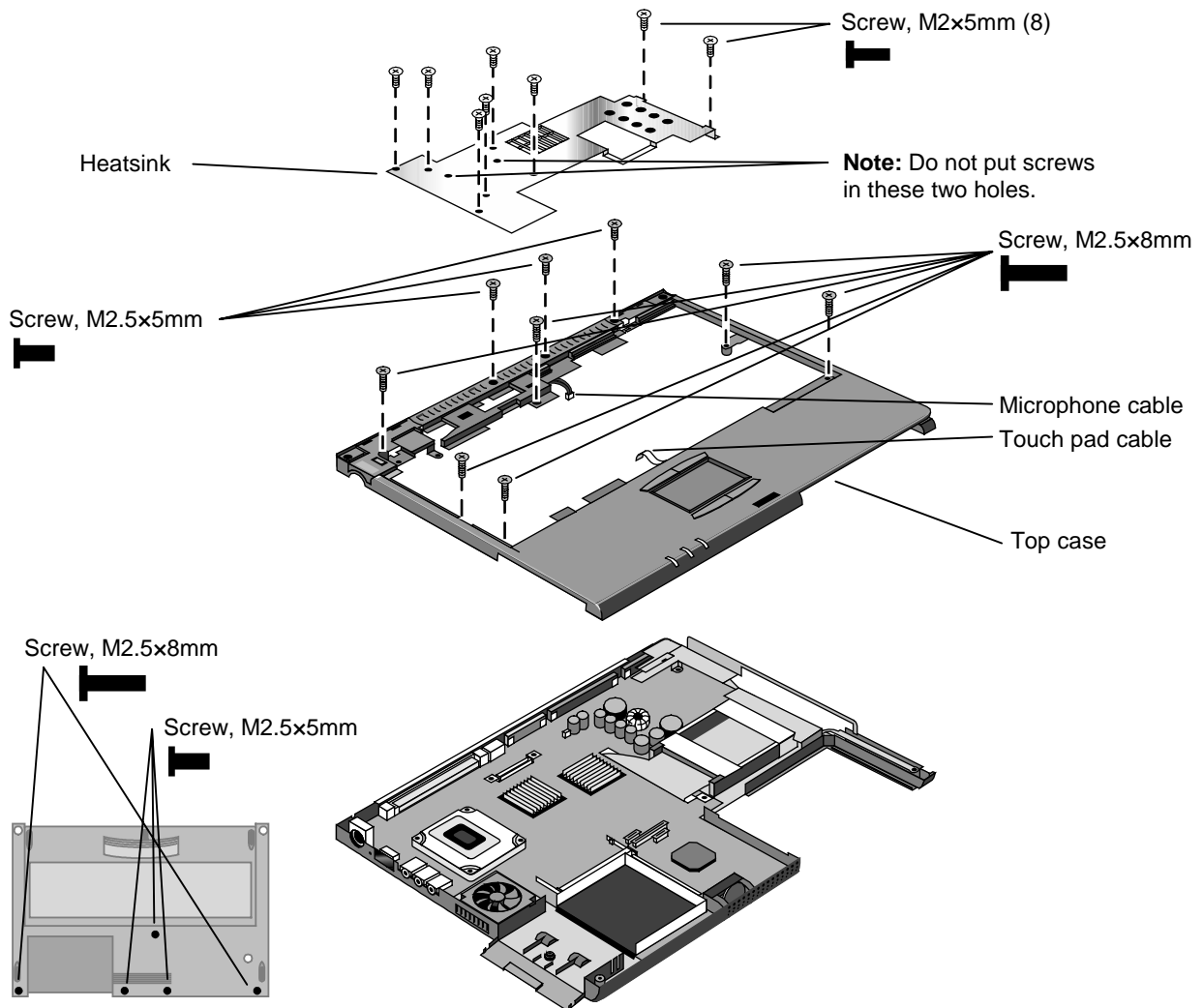
1. Unplug the ac adapter, if present, and remove the battery.
2. Remove these additional assemblies:
  - Hard disk drive (page 2-5)
  - Keyboard (page 2-10).
  - Display assembly (page 2-14).
3. Remove the eight screws from the heatsink and lift off the heatsink. (M2x5)

#### **Caution**

Do not spin the fan blade with your finger. Pressure on the fan blade can damage the bearings.

4. Unplug the microphone cable from the motherboard near the back.
5. Unplug the touch pad flex cable from the motherboard near the front.
6. On the bottom of the unit, remove the five screws from the front half of the case.
7. On the top of the unit, remove the three screws along the back of the top case.
8. Remove the six screws holding the top case to the motherboard and bottom case.
9. Near the docking connector, press down on the inner edge of the top case and lift the back edge until two snaps release in that area.
10. Near the right hinge area, push the top case toward the rear and lift the back edge until the top case releases from the right hinge support.
11. Hold the front of the bottom case with your thumbs. Lift the back of the top case about 5 mm (2 inches), then pull it forward with your fingers. Pull and work the top case until the middle snap releases.

The left hinge support comes off with the top case. The right hinge support stays in the bottom case.



**Figure 2-9. Removing the Top Case**

### Reassembly Notes

**Note: Installing a New Top Case**

- Transfer the following items from the old top case to the new one:
  - Touch pad and support.
  - Left hinge support.
- Press down on the support plate while sliding it into place. Make sure the support is held down at its left and right edges. Check the action of the click buttons before installing the top case.
- Engage the tab at the front of the top case, then lower the it onto the bottom case.
- It may be easier to plug in the touch pad flex cable while you are lowering the top case onto the bottom case—rather than waiting until after the top case is fully installed.

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# Removing the Motherboard or Bottom Case

## (HP Authorized Service Providers Only)

### Exchange Information

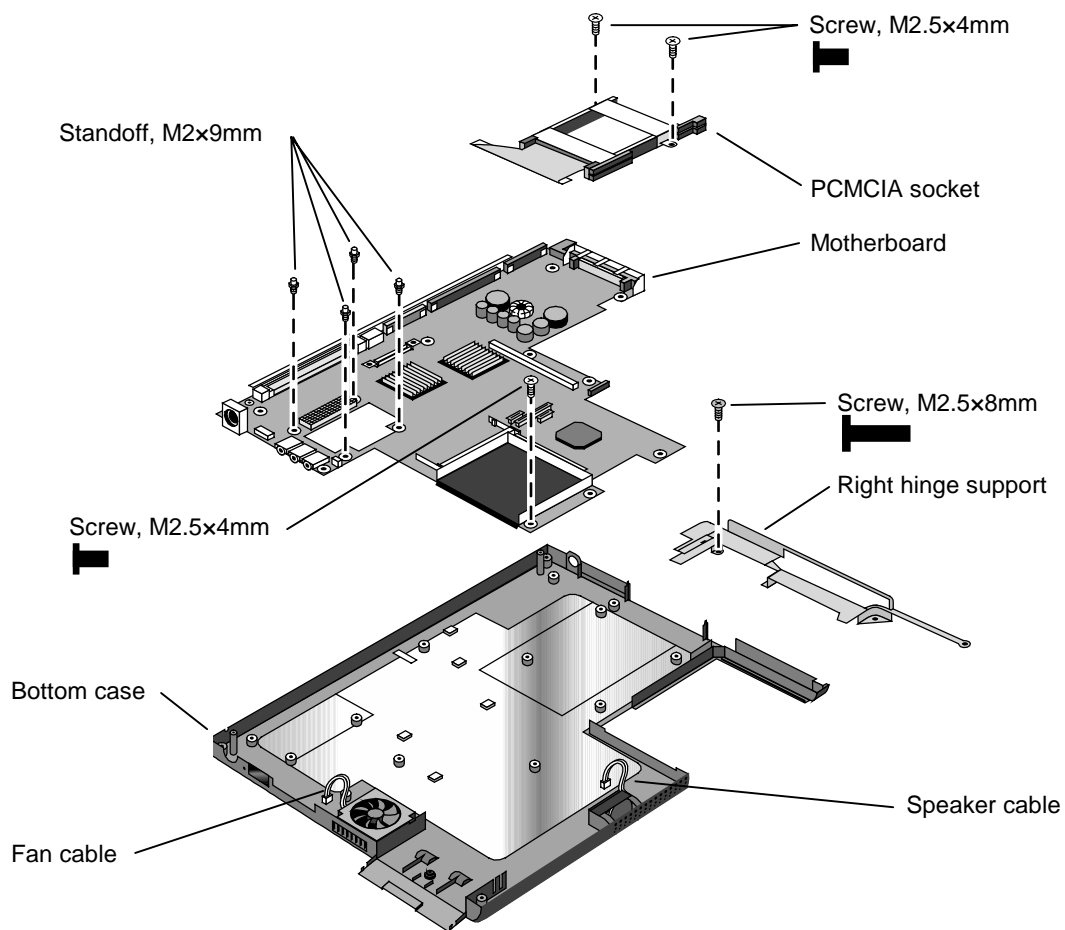
When returning a bad motherboard to HP, describe the symptoms on a piece of paper and attach it to the part—do not use tape.

### Required Equipment

- Small Phillips screwdriver.
- 4-mm thin-wall hex driver (or 5/32 inch). If necessary, grind the sides of a standard driver.

### Removal Procedure

1. Unplug the ac adapter, if present, and remove the battery.
2. Remove these additional assemblies:
  - Hard disk drive (page 2-5).
  - Keyboard (page 2-10).
  - Display assembly (page 2-14).
  - CPU module (page 2-12).
  - Top case (page 2-16).
3. Remove the screw holding the right hinge support near the back-right corner, then lift out the support.
4. Remove the screw holding the front-left corner of the motherboard.
5. Unplug the speaker wire from the front of the motherboard.
6. Unplug the fan wire from the left side of the motherboard.
7. Remove the two screws from the PCMCIA socket.
8. Unplug the PCMCIA socket flex cable from the motherboard and lift out the socket.
9. Remove the four hex standoffs in the CPU area.
10. Lift the front of the motherboard about 7 cm (3 inches), then slide the motherboard forward until it comes out of the bottom case.



**Figure 2-10. Removing the Motherboard**

### Reassembly Notes

#### **Note: Installing a New Motherboard**

- If a RAM board is present, transfer it from the old motherboard to the new one:
- Reprogram the BIOS IC—see the note below.
- Store the serial number electronically in the new motherboard—see the steps below.

#### **Note: Installing a New Bottom Case**

- Transfer these parts from the old bottom case to the new one:
  - HDD door and infrared lens.
  - Module bay door. (If the door does not stick to the case, the motherboard will hold it.)
  - Speaker. (If the covering is not reusable, install a new speaker.)
  - Fan. (Do not press or spin the fan blade with your finger.)
  - Mylar insulator (inside the bottom case).
- Install the original serial number label and a new overlay—see the steps below if you have to make a new serial number label.

- When lowering the motherboard into the bottom case, make sure the audio jack grounding tabs do not catch on the bottom case.
- Make sure the speaker and fan wires are not trapped under the motherboard.

**Note**

If you installed a new motherboard with a new BIOS IC, the IC contains only enough basic programming to boot the OmniBook. After installing the motherboard, you must reprogram the IC. Hewlett-Packard prefers that you program the IC with the latest BIOS. You can download it from the OmniBook website (see page vi)—follow the directions provided.

**Storing the Serial Number Electronically**

1. Exit Windows and boot to a DOS prompt.
2. Run ESN.EXE from one of these sources:
  - On a factory software installation, change to the \Omnibook\Drivers\Hputils directory and type **esn** at the prompt.
  - Otherwise, copy \Omnibook\Drivers\Hputils\Esn.exe from the OmniBook 900 Recovery CD, then run it on the OmniBook.
3. Store the serial number:
  - If you are prompted for the serial number, type the serial number shown on the bottom of the case.
  - If a serial number has already been stored, you must call an HP support center to change it.

**Installing a New Serial Number Label**

If you do not have a master file that creates serial number labels, get a copy from the Reseller website (see page vi) under Product Support Information in the Service and Support Library.

1. Using any PC connected to a laser printer, open the master serial label file, enter the serial number and product number from the old serial label, and print the new label on plain white paper. The new label does not have barcodes.
2. Carefully cut out the new serial label just inside the border and place it into the inner recess in the bottom case. The bottom of the label goes toward the front of the case.
3. While holding the paper label in place, attach a serial label overlay into the outer recess. It covers and protects the serial label.



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# Removing the BIOS IC

## (HP Authorized Service Providers Only)

**Note**

A replacement BIOS IC contains only enough basic programming to boot the OmniBook. After installing the IC, you must reprogram it. Hewlett-Packard prefers that you program the IC with the latest BIOS. You can download it from the OmniBook website (see page vi)—follow the directions provided.

**Required Equipment**

- Small Phillips screwdriver.
- IC (PLCC) removal tool (similar to OK Industries EX-5).

**Removal Procedure****Caution**

Remove all power before removing or installing the BIOS IC. Otherwise, the IC could be damaged.

1. Unplug the ac adapter, if present, and remove the battery.
2. Put your finger above the F8 key and slide the keyboard-screw cover to the left about 3 mm (1/8 inch)—then lift off the cover.
3. Remove the two screws holding the keyboard above the F1 and HOME keys. If your screwdriver has a fat shaft, protect or remove the right hinge cover.
4. Lift up the keyboard tab above the F1 key about 10 mm (1/2 inch), then free the snap at the center of the back edge.
5. Slide the keyboard toward the display about 5 mm (1/4 inch), then fold the keyboard forward onto the front of the top case.

**Warning**

Do not touch the heatsink until it has cooled. It could be hot if the computer was running recently.

6. Use an IC removal tool to remove the BIOS IC from its socket.

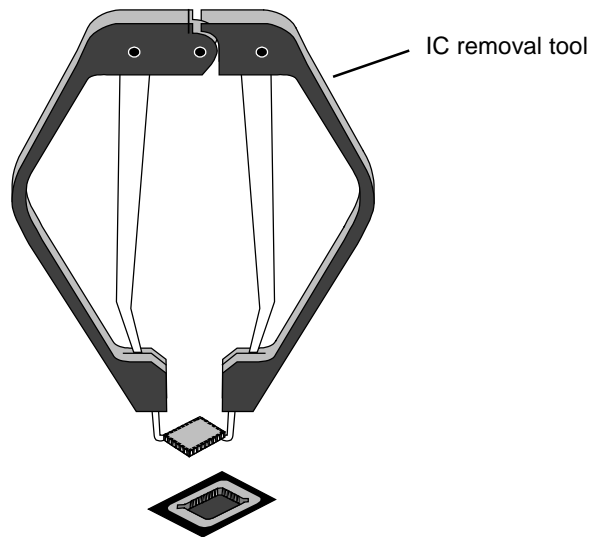


Figure 2-11. Removing the BIOS IC

#### Reassembly Notes

##### Caution

- Align the IC with the slot in the socket. The IC is keyed to fit correctly. If you insert the IC backward, the IC or motherboard could be damaged.
- Press down firmly on the IC with your thumb to ensure a proper connection.
- Fold the keyboard back into place. Slip its front tabs into the slots, then snap the back edge into place.
- Push the keyboard toward the back as you tighten the two screws. This helps engage the tab at the back-center of the keyboard.
- Reprogram the IC by programming the BIOS—see the note above.

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# Removing Other Components

## (HP Authorized Service Providers Only)

### Required Equipment

- Small Phillips screwdriver.
- Pointed knife or probe (for display components).
- Small flat-blade screwdriver (for display components).
- Fine Phillips screwdriver (for display latch only).
- 4-mm thin-wall hex driver (or 5/32 inch) (for bottom case components).
- Small plastic blade for prying, such as an angled plastic tweezers (for bottom case components).

### Removal Procedure

1. Unplug the ac adapter, if present, and remove the battery.
2. Remove the additional assemblies and follow the special steps indicated in the tables below. Components are separated into these groups:
  - Display components (page 2-24).
  - Top case components (page 2-25).
  - Bottom case components (page 2-25).

**Table 2-7. Removing Display Components**

Component	Removal Procedures	Additional Steps (See figure on page 4-5)
<b>Bezel, display</b>		Remove the display bezel (see page 2-8).
<b>Cable, display flex</b>	Keyboard (page 2-10). Display (page 2-14). LCD module (page 2-8).	<ol style="list-style-type: none"> <li>1. Unsnap the flex cable tube from the display case.</li> <li>2. Remove the screw holding the left hinge arm and release the flex cable grounding strap.</li> </ol> <p><b>Reassembly Notes:</b> The grounding strap goes between the left hinge arm and the display case. It is held by the hinge screw.</p> <p>The flex cable wraps around the tube only about 1/2 turn.</p>
<b>Cable, display power</b>	Keyboard (page 2-10).	<ol style="list-style-type: none"> <li>1. Remove the two hinge covers.</li> <li>2. Remove the display bezel (see page 2-8).</li> <li>3. Unplug the power cable from the LCD module wires.</li> <li>4. Unplug the power cable from the motherboard.</li> </ol> <p><b>Reassembly Notes:</b> Insert the display power cable into the notch in the top case before installing the hinge cover.</p>
<b>Case, display</b>	Keyboard (page 2-10). Display (page 2-14). LCD module (page 2-8).	<ol style="list-style-type: none"> <li>1. Remove the screws holding the hinge arms, then lift out the hinges.</li> <li>2. Unsnap the flex cable tube from the display case. Lift out the flex cable.</li> <li>3. Remove the two screws holding the display latch, then lift out the latch.</li> </ol> <p><b>Reassembly Notes:</b> Install the display latch and other components into the new display case.</p>
<b>Hinge</b>	Keyboard (page 2-10). Display (page 2-14).	<ol style="list-style-type: none"> <li>1. Remove the display bezel (see page 2-8).</li> <li>2. Remove the screw holding the hinge arm, then lift out the hinge.</li> </ol> <p><b>Reassembly Notes:</b> Insert the hinge fully into the case before installing the screw.</p>
<b>Latch, display</b>		<ol style="list-style-type: none"> <li>1. Remove the display bezel (see page 2-8).</li> <li>2. Remove the two screws holding the latch, then lift out the latch.</li> </ol>
<b>LCD module</b>	See page 2-8.	

**Table 2-8. Removing Top Case Components**

Component	Removal Procedures	Additional Steps (See figure on page 4-2)
Case, top	See page 2-16.	
Keyboard	See page 2-10.	
Support, touch-pad	Hard drive (page 2-5). Keyboard (page 2-10). Display (page 2-14). Top case (page 2-16).	<ol style="list-style-type: none"> <li>1. Remove the screw holding the support plate to the top case.</li> <li>2. Slide the support plate to the side and lift it out.</li> </ol> <p><b>Reassembly Notes:</b> Make sure the touch pad is seated properly before installing the support plate. Press down on the support plate while sliding it into place. Make sure it is held down at the left and right edges. Check the action of the click buttons before installing the top case.</p>
Touch pad	Hard drive (page 2-5). Keyboard (page 2-10). Display (page 2-14). Top case (page 2-16).	<ol style="list-style-type: none"> <li>1. Remove the screw holding the support plate to the top case.</li> <li>2. Slide the support plate to the side and lift it out.</li> <li>3. Lift out the touch pad and its flex cable.</li> </ol> <p><b>Reassembly Notes:</b> Make sure the touch pad is seated properly before installing the support plate. Press down on the support plate while sliding it into place. Make sure it is held down at the left and right edges. Check the action of the click buttons before installing the top case.</p>

**Table 2-9. Removing Bottom Case Components**

Component	Removal Procedures	Additional Steps (See figure on page 4-2)
Case, bottom	See page 2-18.	
CPU module	See page 2-12.	
Door, module bay connector	Hard drive (page 2-5). Keyboard (page 2-10). Display (page 2-14). CPU (page 2-12). Top case (page 2-16). Motherboard (page 2-18).	<p>Peel the rubber door from the bottom case.</p> <p><b>Reassembly Notes:</b> Position the new door in the center of the opening before sticking it onto the bottom case.</p>
Fan	Keyboard (page 2-10).	<p><b>Caution:</b> Do not spin the fan blade with your finger. Pressure on the fan blade can damage the bearings.</p> <ol style="list-style-type: none"> <li>1. Remove the eight screws from the heatsink and lift off the heatsink.</li> <li>2. Remove the two screws holding the fan.</li> <li>3. Unplug the fan cable from the motherboard and lift out the fan.</li> </ol> <p><b>Reassembly Notes:</b> The opening in the side of the fan faces the vent in the bottom case.</p>
Heatsink	Keyboard (page 2-10).	<p>Remove the eight screws from the heatsink and lift off the heatsink.</p> <p><b>Reassembly Notes:</b> Install or replace thermal pads on the heatsink that are missing or damaged.</p>
IC, BIOS	See page 2-20.	

Component	Removal Procedures	Additional Steps (See figure on page 4-2)
<b>Insulator, bottom case</b>	Hard drive (page 2-5). Keyboard (page 2-10). Display (page 2-14). CPU (page 2-12). Top case (page 2-16). Motherboard (page 2-18).	Lift the sheet out of the bottom case. <b>Reassembly Notes:</b> The small pads on the sheet face upwards.
<b>Lens, infrared</b>	Hard drive (page 2-5). Keyboard (page 2-10). Display (page 2-14). Top case (page 2-16).	Slide the infrared lens out of the bottom case.
<b>Pads, thermal</b>	Keyboard (page 2-10).	<ol style="list-style-type: none"> <li>1. Remove the eight screws from the heatsink and lift off the heatsink.</li> <li>2. Install or replace damaged or missing thermal pads on the bottom of the heatsink.</li> <li>3. Clean off the mating surfaces of the CPU module and the large IC next to it.</li> </ol> <b>Reassembly Notes:</b> Install the smaller pad in the recessed area of the same shape. Install the larger pad in the middle of the protruding area.
<b>PCA, motherboard</b>	See page 2-18.	
<b>Socket, PCMCIA</b>	Keyboard (page 2-10).	<ol style="list-style-type: none"> <li>1. Remove the eight screws from the heatsink and lift off the heatsink.</li> <li>2. Remove the two screws from the right side of the PCMCIA socket.</li> <li>3. Unplug the PCMCIA socket flex cable from the motherboard and slide out the socket.</li> </ol>
<b>Speaker</b>	Hard drive (page 2-5). Keyboard (page 2-10). Display (page 2-14). Top case (page 2-16).	<ol style="list-style-type: none"> <li>1. Unplug the speaker from the motherboard.</li> <li>2. Peel off the covering from the speaker chamber.</li> <li>3. Pull the speaker out of the bottom case.</li> </ol> <b>Reassembly Notes:</b> Make sure the foam pads are attached to the edges and back of the speaker. After inserting the speaker, carefully seal the speaker chamber with the new covering material.
<b>Support, hinge (left)</b>	Hard drive (page 2-5). Keyboard (page 2-10). Display (page 2-14). Top case (page 2-16).	Unsnap the left hinge support from the top case.
<b>Support, hinge (right)</b>	Hard drive (page 2-5). Keyboard (page 2-10). Display (page 2-14). Top case (page 2-16).	Remove the screw holding the right hinge support near the back-right corner, then lift out the support.

# Troubleshooting and Diagnostics

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This chapter includes troubleshooting and diagnostic information for testing the functionality of the OmniBook and identifying faulty modules:

- Troubleshooting information
  - Troubleshooting the problem (page 3-2).
  - Verifying the repair (page 3-3).
  - Suggestions for troubleshooting (page 3-4).
- Diagnostic tools
  - OmniBook hardware diagnostic program (page 3-12).
  - Power-on self-test (page 3-17).
  - Sycard PCCtest 450 PC Card (page 3-20).
  - Desktop Management Interface (page 3-21).
  - BIOS Setup utility (page 3-23).

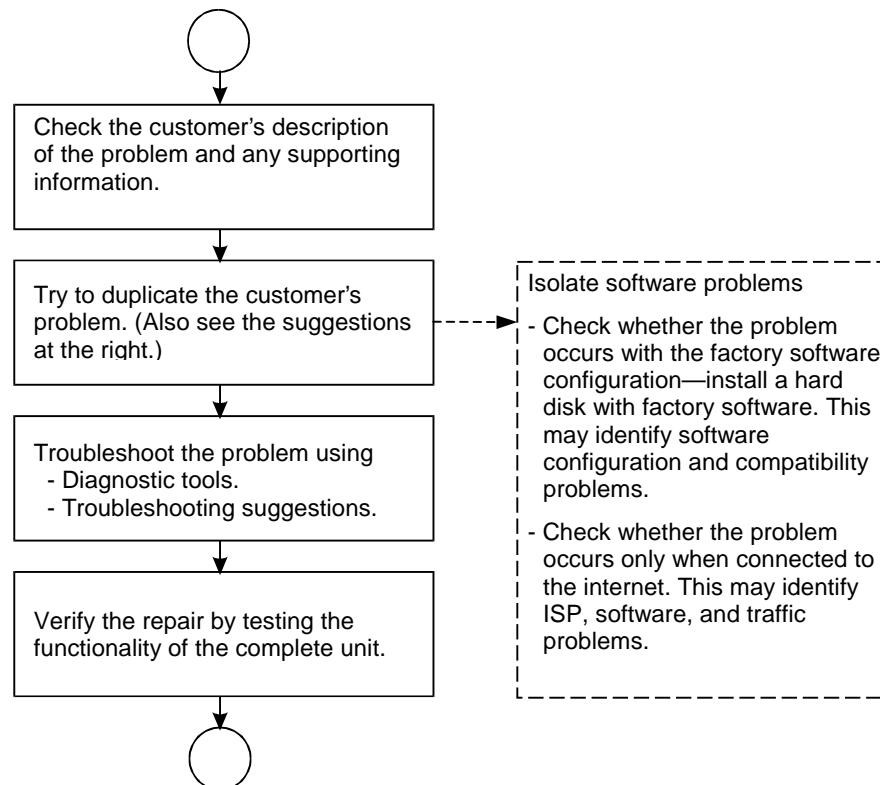
**Caution**

Do not unnecessarily remove the CPU module from the motherboard. The CPU connector is easily damaged during removal and insertion.

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# Troubleshooting

The suggestions in this section can help isolate and repair the cause of a problem. To ensure quality repair, HP recommends that you follow the basic troubleshooting steps shown in the illustration below.



**Figure 3-1. Basic Troubleshooting Steps**

## Troubleshooting the Problem

Record pertinent information about the unit:

- Model and serial number.
- Operating system and version.
- BIOS version.
- Accessories and peripherals used.

Analyze the problem:

- **Observe Symptoms.** Using the customer's information, try to duplicate the problem. Determine how the problem differs from proper behavior. Also, take note of the functions that *do* work properly.
- **Separate Problems.** If there is more than one symptom, separate them into distinct problems.



- **Consider Causes.** Keep in mind possible causes for each problem. Use the diagnostic tools and troubleshooting suggestions to help find possible causes.
  - The OmniBook diagnostic program is the primary hardware troubleshooting tool—it tests most components using automatic and interactive tests. The table on page 3-4 shows how you can use the different diagnostic tools to isolate the cause.
  - The troubleshooting suggestions on page 3-5 include general suggestions for repairing units with certain failure symptoms.

Swapping easily replaced modules with known-good modules is an ideal way to isolate the cause down to the module level. It is rare for more than one module to be responsible for one failure symptom. Therefore, replacement of more than one module for a particular symptom should be the exception rather than the normal expectation.

After replacing a module, it is normal for the unit to be in a confused state and lock up when power is applied. If this occurs, press the system-off button to restart the computer in a known state.

## Verifying the Repair

Before returning the repaired unit to the customer, verify the repair by running the following tests:

- **Basic Diagnostic Test.** Run the basic test of the OmniBook diagnostic program (page 3-12).  
–and–
- **Function Tests.** Run tests that check the repaired function, such as in the OmniBook diagnostic program (page 3-12).  
–and–
- **Failed Tests.** Run any other tests that failed during troubleshooting.

## Suggestions for Troubleshooting

Table 3-1. Scope of Diagnostic Tools

Function	OmniBook Diagnostics	Power-On Self-Test	Sycard PCCtest 450	DMI/TopTools (if installed)	BIOS Setup
<b>Bootup</b>		Tests		Describes (SafeTools)	Configures
<b>Processor</b>	Tests (System menu)	Tests		Describes (AssetTools)	
<b>Memory</b>	Tests (Memory menu)	Tests		Describes (AssetTools)	Describes
<b>Batteries</b>				Describes (AssetTools)	
<b>Display</b>	Tests (Video, Mem, User menus)			Describes (AssetTools)	
<b>Hard disk</b>	Tests (IDE menu)	Tests		Describes (AssetTools)	Configures
<b>Floppy drive</b>	Tests (FDD menu)	Tests		Describes (AssetTools)	Describes
<b>Keyboard</b>	Tests (KBD menu)	Tests		Describes (AssetTools)	
<b>Pointer</b>	Tests (Misc menu)			Describes (AssetTools)	Configures
<b>Audio</b>	Tests (System, Misc menus)				Configures
<b>Serial</b>	Tests* (Misc menu)			Describes (AssetTools)	Configures
<b>Parallel</b>	Tests* (Misc menu)			Describes (AssetTools)	Configures
<b>Infrared</b>	Tests† (Misc menu)			Describes (AssetTools)	Configures
<b>PS/2 port</b>	Tests† (KBD, Misc menus)				
<b>USB</b>	Tests† (System menu)			Describes (AssetTools)	
<b>Docking port</b>	Tests (using docks)				
<b>PCMCIA</b>	Tests (Misc menu)		Tests	Describes (AssetTools)	
<b>AC adapter</b>				Status (AssetTools)	
<b>Docking products</b>	Tests ports and internal bus			Status (AssetTools)	Configures
<b>CD-ROM drive</b>	Tests (IDE menu)	Tests (with boot CD)		Describes (AssetTools)	Configures
<b>Other plug-in modules</b>				Describes (AssetTools)	

\* The diagnostic test is more thorough if you use a loopback connector.

† Use an appropriate external device to exercise the port. See the help text for the tests in the menu.

If you can't isolate the cause of a problem using the diagnostic tools, you can use the suggestions in the following table to help find the problem.

**Table 3-2. Troubleshooting Suggestions**

Symptom	Call Center: Suggestions	Repair Center: Likely Causes	Repair Center: Comments
To help determine likely causes, check to see what replaceable modules are involved in the system function and what roles they play. See the table on page 1-13.			
<b>Startup</b>			
Does not boot on ac or battery	Check the power source. Push system-off button. Unplug the ac adapter and remove battery, then reconnect power. Remove any RAM board and try again. Reinsert and try again.	AC adapter. RAM board. CPU module. Motherboard. BIOS IC. LCD module. Hard drive.	Check ac adapter. Remove any RAM boards and retry. If power status light does not turn on, reprogram or replace BIOS IC, replace motherboard. If power status light turns on but display remains off, try external monitor. If monitor shows successful boot, replace LCD module. If monitor shows activity but BIOS does not complete, replace CPU module. If monitor is blank, replace CPU module, replace motherboard. If power status light and display turn on, BIOS completes, but OS does not start from hard disk or from floppy drive, replace CPU module, then motherboard. If OS starts from floppy drive, reload hard drive, replace hard drive.
Does not boot on battery (boots on ac)	Check battery level on battery LEDs. Check battery contacts. If available, try another battery.	Battery or contacts. Motherboard.	
Does not boot from floppy drive	Check floppy drive contacts. Try reseating the external module bay cable and the module into the bay. Try using alternate connection (with accessory floppy cable or external module bay). Check boot order in BIOS Setup. Check that floppy boot is enabled in BIOS Setup.	Floppy drive or contacts. Accessory floppy cable. External module bay. Motherboard.	
Error message such as "Invalid system disk" or "Auto IDE error"	Check for a disk in floppy drive. Remove and reinsert hard drive. Check boot order in BIOS Setup.	Hard drive contacts. Hard drive.	If unit boots from floppy drive, check for corrupt files on hard drive, reload hard drive, replace hard drive.

Symptom	Call Center: Suggestions	Repair Center: Likely Causes	Repair Center: Comments
Sluggish startup or shutdown	Run ScanDisk and Disk Defragmenter to check and optimize the hard drive. Delete temporary and unneeded files.		Use same suggestions shown at left.
Password has been forgotten	Verify proper ownership, then follow the removal procedure with the owner and log the appropriate data—see page 5-1.		The user must call Technical Support and provide proof of ownership. Password removal is restricted to certain sites. See page 5-1.
<b>Power/Battery</b>			
Short battery operating time	Turn down display brightness. Check power management settings in BIOS Setup. Try the default settings. Shut down and restart. During boot at the F2 prompt, press F6. This starts a process that recalibrates the battery gauge, possibly improving operating time. Inform user that certain applications can cause excess power usage. (User can get power monitor from <a href="http://www.intel.com">www.intel.com</a> and monitor CPU load.) Some PC cards (PCMCIA) draw power even while not in use. Heavy modem use can affect battery operating time.	Battery. Motherboard.	Battery capacity often decreases after a year or more.
Does not run on battery, empty battery indication	Check battery contacts. If available, try another battery.	Battery or contacts. Motherboard.	
Battery does not charge	Check the power source. Check battery contacts. If available, try another battery and ac adapter. Check for high ambient temperature and blocked air holes on the side and bottom. Do not charge in a small space or on a soft surface.	Battery or contacts. AC adapter. Motherboard. Fan.	Check ac adapter. Check fan.
Battery indicator is inaccurate	Completely charge and discharge the battery 2 to 4 cycles in the unit.	Battery. Motherboard.	Try cycling the battery charge. Press F6 during boot to cycle the battery charge.
<b>Display</b>			
Dark display, no light	Adjust display brightness. Press Fn+F5 several times. Try external monitor. Check for very low ambient temperature.	LCD module (backlight). LCD flex cable, power cable, or connections. Motherboard.	If an external monitor displays no image, replace the motherboard.

Symptom	Call Center: Suggestions	Repair Center: Likely Causes	Repair Center: Comments
White display	Adjust display brightness.	LCD module. Motherboard.	
Erratic display		LCD flex cable or connections. LCD module.	Make sure the LCD module and flex cable have small foam pads attached—see page 2-8.
Bright or missing pixels or lines	See quality statement on page 5-2.	LCD module. LCD flex cable or connections.	See quality statement on page 5-2.
<b>Hard disk</b>			
Hard disk never spins	Check the power source. Remove and reinsert the hard drive. Check the contacts.	Hard drive or contacts. Motherboard.	
Hard disk makes clunking or scratching noise	Back up the drive immediately. Was the computer or drive dropped?	Hard drive.	Check the computer and drive for evidence of customer abuse.
Hard disk makes buzzing or whining noise	Back up the drive immediately. Check for alternate noise sources, such as a PCMCIA drive or fan. If a keystroke causes the sound to change, it may be power supply noise.	Depends on the source of the noise.	
Files are corrupted	Run a virus scan program. Check the disk surface by running Scandisk (Windows 95/98) or Disk Administrator (Windows NT). Or boot to DOS and run CHKDSK to look for problems, run CHKDSK /f to fix. Use Recovery CD to restore original factory software.		Use same suggestions shown at left.
Drive capacity is less than normal	Check the disk surface by running Scandisk (Windows 95/98) or Disk Administrator (Windows NT). Check partitions using FDISK (Windows 95/98) or Disk Administrator (Windows NT).	Hard drive.	Use same suggestions shown at left. Recreate the Hibernate partition (see page 2-7), then partition and format the disk.
<b>Floppy drive</b>			
General problems	Check floppy drive contacts. Try reseating the external module bay cable and the module into the bay. Try using alternate connection (with accessory floppy cable or external module bay). Check settings in BIOS Setup.	Floppy drive or contacts. Accessory floppy cable. External module bay. Motherboard.	

Symptom	Call Center: Suggestions	Repair Center: Likely Causes	Repair Center: Comments
<b>Keyboard</b>			
Some or all keys do not work properly		Keyboard. Motherboard. BIOS IC.	Try reinserting the flex cable in the connector on the motherboard.
PS/2 keyboard and mouse with Y-adapter do not work	Check devices separately.	Y-adapter. PS/2 device. Motherboard.	
<b>Pointing stick</b>			
General problems	Check settings in Control Panel. Check that the pointing stick is enabled in BIOS Setup.	Keyboard assembly. Motherboard.	Try reinserting the flex cable in the connector on the motherboard.
Special TrackPoint driver features not working	If installed, remove TouchPad driver support using Add/Remove Program. In Mouse Properties, select the IBM TrackPoint driver from the track-point directory under \OmniBook\Drivers.	Keyboard assembly. Motherboard.	
Click button doesn't work		Touch pad. Top case. Motherboard.	
<b>Touch pad</b>			
General problems	Check settings in Control Panel. Check pointing stick settings in Control Panel. The IBM TrackPoint driver can redefine touch pad operation. Check that the touch pad is enabled in BIOS Setup.	Touch pad (or top case). Motherboard.	
Special TouchPad driver features not working	If installed, remove IBM TrackPoint support using Add/Remove Program, then in Mouse Properties, select the standard PS/2 mouse. Disable the pointing stick in BIOS Setup, enable the touch pad. Run Setup.exe from the touch-pad subdirectory under \Omnibook\Drivers.	Touch pad (or top case). Motherboard.	
Click button doesn't work		Touch pad. Top case. Motherboard.	

Symptom	Call Center: Suggestions	Repair Center: Likely Causes	Repair Center: Comments
<b>Audio</b>			
Sound does not play	<p>Check settings in BIOS Setup.</p> <p>Increase sound volume (Fn+UP and software controls).</p> <p>Check whether mute is active (Fn+F7 and software controls).</p> <p>Check for sound resource conflicts in Device Manager (Windows 95/98) or Administrative Tools or Control Panel System (Windows NT).</p>	<p>Speaker.</p> <p>Motherboard.</p>	<p>Check operation using headphones or external speakers.</p>
Sound does not record	<p>Check settings in BIOS Setup.</p> <p>Check software controls for microphone—it should not be muted in recording panel.</p> <p><b>Note:</b> The microphone should normally be muted in the master output panel.</p>	<p>Top case (microphone).</p> <p>Motherboard.</p>	<p>Check operation using external microphone.</p>
<b>Serial/Parallel</b>			
General problems	<p>Check settings in BIOS Setup.</p> <p>Check settings in Control Panel (and in Windows NT Diagnostics).</p>	<p>Motherboard.</p>	<p>Use loopback connector during test—see page 3-14.</p>
<b>Infrared</b>			
General problems	<p>Infrared communication is not supported in Windows NT 4.0.</p> <p>Infrared is disabled when shipped. Drivers are included but not installed when shipped.</p> <p>Check settings in BIOS Setup.</p> <p>Standard IrDA and fast-IrDA are incompatible (they use different drivers).</p> <p>For fast-IrDA, check for DMA conflict with ECP parallel port.</p>	<p>Motherboard.</p>	
<b>USB</b>			
General problems	<p>USB is not supported in Windows NT 4.0.</p>	<p>Motherboard.</p>	

Symptom	Call Center: Suggestions	Repair Center: Likely Causes	Repair Center: Comments
<b>PCMCIA</b>			
General problems	<p>Make sure Card Executive is installed for Windows NT. If the card requires an IRQ, check that there is one available.</p> <p>Check for conflicts or refresh the device list in Device Manager (Windows 95) or Administrative Tools or Control Panel System (Windows NT).</p> <p>Reboot the computer.</p> <p>Try the card in the other slot or in another computer.</p> <p>Check the OmniBook website for installation instructions (page vi).</p> <p>Download current drivers from the card manufacturer's website.</p>	<p>Motherboard.</p> <p>PCMCIA socket.</p>	<p>Using a flashlight, look for bent pins inside the PCMCIA socket.</p> <p>If both slots have problems, replace the motherboard. If only one slot has a problem, try replacing the PCMCIA socket.</p>
<b>AC adapter</b>			
Does not power the OmniBook	Try another ac adapter, if available.	AC adapter. Motherboard.	The ac adapter is not repairable—it must be replaced.
<b>Miscellaneous</b>			
Clock loses time	Plug in ac adapter for 24 hours to charge backup battery.	Motherboard.	Charge backup battery.
Computer gets hot	<p>It is normal for the computer to get hot.</p> <p>Make sure the air holes in the side and bottom are clear.</p> <p>Make sure computer is not resting on a soft surface.</p> <p>DOS games and other programs that drive CPU usage toward 100% can contribute.</p>	<p>Fan.</p> <p>Thermal connections.</p> <p>Heatsink damage.</p>	<p>Check the fan. (Do not press or spin the blade with your finger.)</p> <p>Check for proper contact between heatsink, thermal pads, CPU, and Northbridge IC.</p>



Symptom	Call Center: Suggestions	Repair Center: Likely Causes	Repair Center: Comments
Computer pauses or runs sluggishly	<p>May be normal Windows behavior (background processing can affect response time).</p> <p>If the hard disk has spun down to conserve power, it can take several seconds to spin up. You can hear this. You can run BIOS Setup and change the hard disk time-out to match the Suspend time-out.</p> <p>Certain background operations (such as HP COE virus scans) can affect performance while they're running.</p> <p>Some file browsers may be unresponsive while they're processing a graphic image or waiting for broken network connections to time out.</p> <p>Check for overheating—see the previous symptom.</p> <p>Run BIOS Setup and try turning off smart CPU mode.</p>	<p>CPU module.</p> <p>Motherboard.</p> <p>Thermal connections.</p>	<p>If computer slows after a period of continuous activity, check thermal connections and parts—see the previous symptom.</p>
<b>Accessories</b>			
Docking product I/O problems	<p>Check that ac power is connected.</p> <p>Check settings in BIOS Setup.</p> <p>Try using the corresponding OmniBook port.</p>	<p>Docking product.</p> <p>Motherboard.</p>	<p>Test the corresponding OmniBook ports while undocked.</p> <p>The port replicator and mini dock are not repairable—they must be exchanged.</p> <p>The docking system is repairable—see its service manual.</p>
Can not boot from CD in CD-ROM drive	<p>Check that the CD is bootable.</p> <p>During boot, do not press ESC before the F2 prompt—or check boot order in BIOS Setup.</p>	<p>CD-ROM drive.</p> <p>External module bay.</p>	<p>The CD-ROM drive is not repairable—it must be exchanged.</p>
General plug-in module problems	<p>Check contacts on the module, in external bay, on cable, and on OmniBook connector.</p> <p>Push system-off button and reboot.</p>	<p>Plug-in module or contacts.</p> <p>External module bay.</p> <p>Motherboard.</p>	<p>Plug-in modules are not repairable—they must be exchanged.</p>

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## Diagnostic Tools

This section describes the following diagnostic tools you can use for troubleshooting and repairing the OmniBook:

- OmniBook hardware diagnostic program (below).
- Power-on self-test (page 3-17).
- Sycard PCCtest 450 PC Card (page 3-20).
- Desktop Management Interface (page 3-21).
- BIOS Setup utility (page 3-23).

### OmniBook Diagnostic Program

The OmniBook hardware diagnostic program provides two levels of testing:

- User-level testing using the basic hardware test.
- Advanced testing using the individual hardware tests.

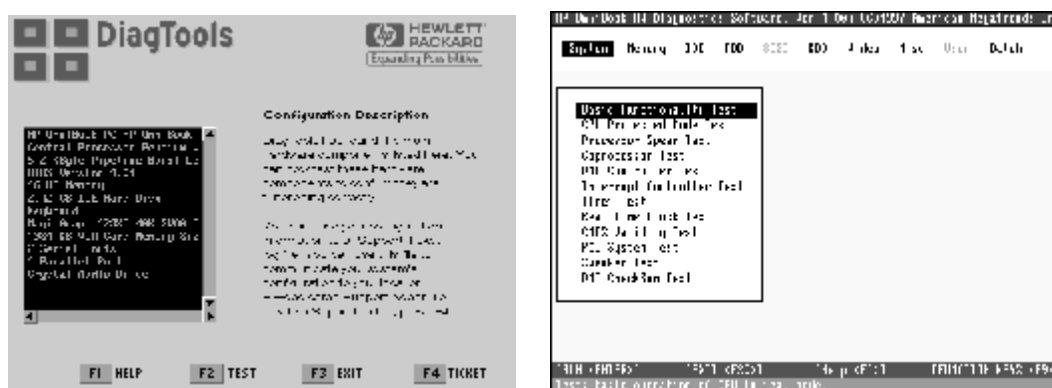


Figure 3-2. OmniBook Diagnostic Screens — Basic and Advanced

The tests are designed to run after the system reboots. This ensures that the computer will be in a predictable state, so the diagnostic program can properly test the hardware components. The tests are non-destructive and are intended to preserve the state of the computer. The OmniBook reboots when you exit the program so drivers can be loaded.

### Creating a Diagnostic Floppy Disk

You do not have to create a diagnostic floppy disk unless you want to create a Support Ticket file containing test results. Otherwise, you can run the diagnostics from the hard disk drive.

After inserting a formatted floppy disk in the floppy drive, do one of the following to create a diagnostic floppy disk:

- On an OmniBook with a factory software installation, run **diaginst** from the `\Dmi\Hpdiags` directory on the hard disk.  
—OR—  
If TopTools is installed, use the DiagTools page to create the disk.

- On any computer with a CD-ROM drive, run **diaginst** from the \Omnibook\Drivers\Hputils directory on the OmniBook Recovery CD.
- On any computer with World Wide Web access, download the diagnostic software package from the OmniBook website (see page vi), run this file to unpack the files, then run **diaginst** to create the diagnostic disk.

## Running the Diagnostic Test

You can run the DiagTools diagnostic test two ways:

- **F10 method.** You can't create a Support Ticket file containing test results, but you don't need a floppy drive or diagnostic floppy disk to run the test. (F10 is not supported if you've removed the Hibernate partition from the hard drive.)

–or–

- **Diagnostic floppy method.** You can save test results in a Support Ticket file, but you need an external module bay, floppy drive, and diagnostic floppy disk (see the steps above).

1. **F10 method.** Reboot the OmniBook. When you see the HP logo, press F10 to start the diagnostic test.

**Diagnostic floppy.** Connect the floppy drive and insert the diagnostic disk. Then reboot the OmniBook.

2. Go through the first several screens.
3. When the hardware detection finishes, check the list of detected hardware. The following information and devices should be listed if applicable:

Product name	Cache memory	Graphics adapter
Processor type	Main memory	Serial ports
BIOS version	IDE drives	Parallel port
Serial number	Floppy drive, if present	Audio device

### Note

If a device is not detected or fails its test below, it may be configured incorrectly in the BIOS Setup utility (page 3-23). You can confirm the problem by running BIOS Setup and checking the settings.

4. **Run the basic test.** Press F2 to start the basic hardware test.
5. For the diagnostic floppy method, if you intend to exit without running advanced tests, press F4 to save system and test information in the Support Ticket log file, HPSUPPT.TXT. Then remove the diagnostic disk and press F3 to exit.
6. **Run the advanced tests.** Press F2 to open the advanced test screen.
7. Select and run the appropriate tests. Tests are not listed if no such hardware is detected. Press the following keys to run tests:

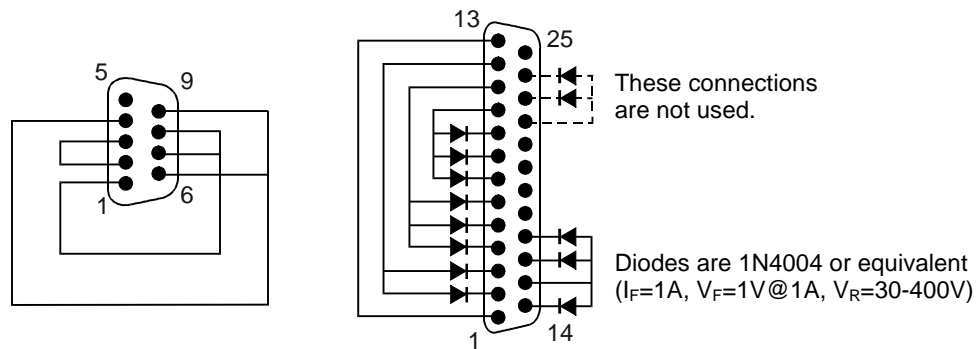
ENTER	Runs the highlighted test.
F5 or SPACE	Marks or unmarks the highlighted test.
F6	Marks or unmarks all tests in the current menu.
F7	Marks or unmarks all tests in all menus.
F10	Runs all marked tests.

If any test fails, the error is logged (error code and description) and displayed temporarily (error code). If several errors occur, look for patterns that might indicate a common cause. See the table

on page 3-14 for repair suggestions. Consider these suggestions in combination with other troubleshooting information.

8. When you are finished running tests, press ESC to exit the advanced tests.
9. **Optional: Save the Support Ticket.** For the diagnostic floppy method, press F4 to save system and test information in the Support Ticket log file, HPSUPPT.TXT.
10. **Exit.** Remove the diagnostic disk and press F3 to exit and reboot.
11. **Optional: Check the log.** For the diagnostic floppy method, open the HPSUPPT.TXT log file on the diagnostic disk using Notepad or other text editor—you can do this on any computer. It contains a hardware summary and a list of all test results and errors.

Note that the serial and parallel port tests are more thorough if you connect a loopback connector to the port before running the test for that port. See the wiring diagrams below.



**Figure 3-3. Serial and Parallel Loopback Connectors**

### Interpreting the Results

- The following table lists test groups, error codes, and suggestions for follow-up actions. Consider these suggestions in combination with other troubleshooting information.

**Table 3-3. OmniBook Diagnostic Error Codes**

Code	Suggestions	Code	Suggestions
<b>System Tests</b>			
0001h - 0008h	Reseat or replace the CPU module.	0074h	Bad CMOS time. Reset the system, then run BIOS Setup and check settings. Replace the motherboard.
0009h	Replace the motherboard.	0075h - 0076h	Reset the system. Replace the motherboard.
0010h - 002Fh	Reseat or replace the CPU module.	0077h	Replace the motherboard.
0030h - 0040h	Replace the motherboard.	0078h	Bad CMOS checksum. Reset the system, then run BIOS Setup and check settings. Replace the motherboard.
0041h	Unrecognized interrupts. Run BIOS Setup and check IRQ assignments for all devices.	0079h	Replace the motherboard.
0050h - 0070h	Replace the motherboard.	0083h - 0086h	Replace the BIOS IC. Replace the motherboard.
0071h	Bad CMOS checksum. Reset the system, then run BIOS Setup and check settings. Replace the motherboard.	0087h	Replace the motherboard.
0072h	Configuration mismatch in CMOS. Reset the system, then run BIOS Setup and check settings. Replace the motherboard.	0088h	Replace the BIOS IC.
0073h	Bad CMOS RAM size. Reset the system, then run BIOS Setup and check settings. Replace the motherboard.	0090h - 009Eh	Replace the BIOS IC. Replace the motherboard.
		009Fh	Insufficient DOS memory. Load fewer device drivers.
		00A0h	No repair. (ESCD not supported.)
		00A1h	Replace the BIOS IC. Replace the motherboard.

Code	Suggestions
00A2h - 00A3h	No repair. (ESCD not supported.)
00A4h	Replace the BIOS IC.
00A5h - 00A6h	No repair. (ESCD not supported.)
00A7h	Replace the BIOS IC. Replace the motherboard.
00C0h - 00CCh	Replace the CPU module.
00FFh	Rerun the test. (Possible diagnostic programming error.)
<b>Memory Tests</b>	
The addresses below are absolute (32-bit) address. These addresses are not in the segment:offset format.	
0100h - 0101h	Replace the motherboard.
0102h	Replace the BIOS IC.
0120h - 0150h	For 01FFFFFFh and below, replace the motherboard. Above that, replace the RAM board (each 01000000h represents 16MB).
0160h	Address bus short. Remove any RAM board and rerun the test. Check the CPU module for shorts. Replace the motherboard.
0170h - 0172h	Replace the motherboard.
0180h	For 01FFFFFFh and below, replace the motherboard. Above that, replace the RAM board (each 01000000h represents 16MB).
0181h	Replace the CPU module.
0182h	Make sure that another application is not using all extended memory allocated by HIMEM.SYS.
0183h	No extended memory. Check installation of any RAM board. Replace the motherboard.
0184h	Remove any RAM board. Replace the CPU module, replace the motherboard.
0190h - 01A0h	For 01FFFFFFh and below, replace the motherboard. Above that, replace the RAM board (each 01000000h represents 16MB).
01A1h - 01A4h	Replace the CPU module.
<b>Hard Disk Tests</b>	
0201h	Replace the hard disk. Replace the motherboard.
0202h - 0204h	Rerun the test. If error persists, replace the hard disk.
0205h	Replace the motherboard.
0207h	Run BIOS Setup and check the hard disk type. Check internal and external hard disk connectors and motherboard connector. Replace the hard disk.
0208h - 0209h	Transient DMA error. Rerun the test.
020Ah - 0211h	Rerun the test. Run SCANDISK or equivalent.
0220h	Replace the motherboard.
0240h	Replace the hard disk. Replace the motherboard.

Code	Suggestions
0280h	Check internal and external hard disk connectors and motherboard connector. Replace the hard disk.
0281h	Replace the hard disk.
0290h	Rerun the test. If the error persists, replace the hard disk.
0293h - 0296h	Replace the hard disk.
02AAh	Check internal and external hard disk connectors and motherboard connector. Replace the hard disk.
02CCh	Run BIOS Setup and check the hard disk type. Replace the hard disk or the motherboard.
02EEh	For the performance test, run BIOS Setup and temporarily select a drive type that has more than 200 cylinders.
02F1h	Recreate the Hibernate partition, then run FDISK to partition the hard disk.
02F2h	Run FDISK to make one partition active. If necessary, recreate the Hibernate partition, then run FDISK to partition the hard disk.
02F3h	Run FDISK to check for overlapping partitions. If necessary, recreate the Hibernate partition, then run FDISK to partition the hard disk.
02F4h	Check for the presence of a boot sector virus. If necessary, recreate the Hibernate partition, then run FDISK to partition the hard disk.
02F5h	Reformat the partition.
02F6h	Recreate the Hibernate partition, then run FDISK to partition the hard disk.
02FFh	Check internal and external hard disk connectors and motherboard connector. Replace the hard disk. Replace the motherboard.
<b>Floppy Disk Tests</b>	
0301h	Replace the floppy drive. Replace the motherboard.
0302h	Run BIOS Setup and check the floppy drive type. Replace the floppy drive.
0303h	Insert a floppy disk without write protection.
0304h	Run BIOS Setup and check the floppy drive type. Replace the floppy drive.
0305h	Replace the motherboard.
0307h	Run BIOS Setup and check the floppy drive type. Check the connectors on the floppy drive, external module bay, and motherboard. Replace the floppy drive.
0308h - 0309h	Transient DMA error. Rerun the test.
030Ah - 0310h	Rerun the test with a good floppy disk. Replace the floppy drive.
0311h	Rerun the test with another floppy disk.
0321h - 0322h	Replace the floppy drive.
0340h	Replace the motherboard.
0380h - 03AAh	Make sure the floppy disk is fully inserted. Check the connectors on the floppy drive, external module bay, and motherboard. Replace the floppy drive.

Code	Suggestions
03CCh	Run BIOS Setup and check the floppy drive type. Rerun the test with another floppy disk. Replace the floppy drive. Replace the motherboard.
03EEh - 03FFh	Check the connectors on the floppy drive, external module bay, and motherboard. Rerun the test with another floppy disk. Replace the floppy drive. Replace the motherboard.
<b>Keyboard Tests</b>	
0400h - 0401h	Replace the motherboard.
0410h - 0414h	Check the keyboard flex cable connection. Replace the keyboard. Replace the motherboard.
0415h	Replace the motherboard.
0416h - 0418h	Replace the keyboard. Replace the motherboard.
<b>Serial Port Tests</b>	
0601h	For the external loopback test, make sure the loopback connector is installed and constructed properly. For the external or internal loopback test, replace the motherboard.
0602h	Replace the motherboard.
0603h	For the external loopback test, make sure the loopback connector is installed and constructed properly. For the external or internal loopback test, replace the motherboard.
0604h - 0605h	Replace the motherboard.
0606h	For the external loopback test, make sure the loopback connector is installed and constructed properly. For the external or internal loopback test, replace the motherboard.
0607h	Make sure the loopback connector is installed and constructed properly. Replace the motherboard.
0608h - 0617h	Replace the motherboard.
<b>Parallel Port Tests</b>	
0701h	For the external loopback test, make sure the loopback connector is installed and constructed properly. For the external or internal loopback test, replace the motherboard.
0702h	Replace the motherboard.
0703h	Run BIOS Setup and disable ECP for the parallel port, then rerun the test. Replace the motherboard.
0704h - 0706h	Replace the motherboard.
0707h	Connect the loopback connector.
0708h	Replace the motherboard.
<b>Audio Tests</b>	
0810h	If this error also occurs for an external headphone, replace the motherboard. Otherwise, check the speaker connection, replace the speaker.
<b>Video Tests</b>	
0900h - 0920h	Replace the motherboard.
8000h	(See LCD Test near end of table.)

Code	Suggestions
<b>CD-ROM Tests</b>	
0A00h	Insert a CD in the drive.
0A01h	Rerun the test. Replace the CD-ROM drive.
0A02h	No repair. (Automatic close not supported.)
0A03h	Insert a different CD in the drive. Check the connectors on the CD-ROM drive, external module bay, and motherboard. Replace the CD-ROM drive.
0A04h	Insert a computer CD in the drive.
0A05h	Insert a different CD in the drive. Check the connectors on the CD-ROM drive, external module bay, and motherboard. Replace the CD-ROM drive.
0A06h	Insert an audio CD in the drive.
<b>SMBus Tests</b>	
0E00h - 0E10h	Replace the motherboard.
<b>ATAPI Removable Tests (LS-120)</b>	
0F02h - 0F03h	Rerun the test. Insert a different disk in the LS-120 drive. Check the connectors on the LS-120 drive, external module bay, and motherboard. Replace the LS-120 drive.
0F04h - 0F05h	Replace the LS-120 drive.
<b>TI CardBus Tests</b>	
1201h	Memory space not available. Remove any attached ISA or PCI cards.
1202h - 1203h	Replace the motherboard.
1205h - 1206h	Insert a different PC Card. Replace the PCMCIA socket. Replace the motherboard.
<b>USB Tests</b>	
1301h	Reprogram the BIOS IC. Replace the BIOS IC. Replace the motherboard.
1302h - 1312h	Replace the motherboard.
9006h	(See USB Port Test near end of table.)
<b>LCD Test</b>	
8000h	If the test fails with an external monitor (must support VESA mode 105h), replace the motherboard. Otherwise: - If the shaded-band test fails, check the LCD flex cable connection in the bottom case, replace the LCD flex cable, replace the motherboard. - If only a solid-color test fails, see chapter 5 for cosmetic guidelines, replace the LCD module.
<b>Suspend/Resume Test</b>	
9005h	Run BIOS Setup and restore default settings. Reprogram the BIOS IC. Replace the BIOS IC. Replace the motherboard.
<b>USB Port Test</b>	
9006h	Make sure a USB device is connected to the port you are testing. Select the correct speed for the device. Replace the motherboard (or dock component, if applicable).

Code	Suggestions
<b>IR Tests (FIR enabled, undocked)</b>	
9002h, 9007h - 9008h	Rerun the test. Replace the motherboard.
9009h	Do not run this test in Windows. For the one-unit test, replace the motherboard. For the two-unit test, make sure the IR ports on the reflector and test computers are lined up, replace the motherboard.

Code	Suggestions
900Ah	Rerun the test. For the two-unit test, make sure the IR ports on the reflector and test computers are lined up. Replace the motherboard.
900Ch	Rerun the test. Make sure the IR ports on the reflector and test computers are lined up. Restart the reflector unit. Replace the motherboard.

## Power-On Self-Test

### Note

If Quiet Boot is enabled in BIOS Setup (the default setting), press ESC during boot to see POST messages.

The POST (Power-On Self-Test) is a series of initialization routines and diagnostic tests that the system BIOS runs when the computer boots. The system BIOS will not boot the operating system if system memory, the CPU, DMA, or the interrupt controller fails the POST diagnostic tests. POST progress is indicated by a sequence of codes. If possible, error messages are displayed.

You should not interpret the failure of one or more POST tests as a hardware, software, or firmware failure. First, confirm the failure with a “clean” boot:

- Remove all accessories, including RAM boards, floppy drive, port replicator, PC Cards, printer, external monitor, pointing device, and keyboard.
- Provide “clean” ac power—no auto adapter or unusual ac adapter configuration.
- Press the system-off button to start from a known state.

If the computer fails to boot with a clean boot, it requires repair. If an error message is displayed, *confirm the problem using other diagnostic tools*. Not all POST messages indicate a hardware, software, or firmware failure—some messages are informational messages.

If the BIOS detects a terminal error condition, it halts POST after issuing a terminal error beep code—up to four groups of 1 to 4 short beeps. The beep code indicates the POST routine in which the terminal error occurred. The BIOS also issues a beep code (one long tone followed by two short tones) during POST if the video configuration fails (no card installed or faulty) or if an external ROM module does not properly checksum to zero.

**Table 3-4. POST Terminal-Error Beep Codes**

Beep Codes	POST Description
1	One short beep before boot
1-2	Search for option ROMs. One long, two short beeps on checksum failure
1-2-2-3	BIOS ROM checksum
1-3-1-1	Test DRAM refresh
1-3-1-3	Test 8742 Keyboard Controller
1-3-4-1	RAM failure on address line xxxx
1-3-4-3	RAM failure on data bits xxxx of low byte of memory bus
1-4-1-1	RAM failure on data bits xxxx of high byte of memory bus
2-1-2-3	Check ROM copyright notice
2-2-3-1	Test for unexpected interrupts

The following table lists POST messages and explanations for reported problems. If the system fails after you make changes in BIOS Setup, reset the computer, enter BIOS Setup, and install the defaults or correct the error.

**Table 3-5. POST Messages**

Message	Description
<b>0200 Failure Fixed Disk</b>	Fixed disk is not working or not configured properly. Check to see if fixed disk is attached properly. Run Setup. Find out if the fixed-disk type is correctly identified.
<b>0210 Stuck key</b>	Stuck key on keyboard.
<b>0211 Keyboard error</b>	Keyboard not working.
<b>0212 Keyboard Controller Failed</b>	Keyboard controller failed test. May require replacing keyboard controller.
<b>0213 Keyboard locked - Unlock key switch</b>	Unlock the system to proceed.
<b>0220 Monitor type does not match CMOS - Run SETUP</b>	Monitor type not correctly identified in Setup
<b>0230 Shadow Ram Failed at offset: <i>nnnn</i></b>	Shadow RAM failed at offset <i>nnnn</i> of the 64k block at which the error was detected.
<b>0231 System RAM Failed at offset: <i>nnnn</i></b>	System RAM failed at offset <i>nnnn</i> of in the 64k block at which the error was detected.
<b>0232 Extended RAM Failed at offset: <i>nnnn</i></b>	Extended memory not working or not configured properly at offset <i>nnnn</i> .
<b>0250 System battery is dead - Replace and run SETUP</b>	The CMOS clock battery indicator shows the battery is dead. Connect the ac adapter for at least 24 hours, replace the motherboard.
<b>0251 System CMOS checksum bad - Default configuration used</b>	System CMOS has been corrupted or modified incorrectly, perhaps by an application program that changes data stored in CMOS. The BIOS installed Default Setup Values. If you do not want these values, enter Setup and enter your own values. If the error persists, check the system battery. Connect the ac adapter for at least 24 hours, replace the motherboard.
<b>0260 System timer error</b>	The timer test failed. Requires repair of system board.
<b>0270 Real time clock error</b>	Real-time clock fails BIOS test. May require board repair.
<b>0280 Previous boot incomplete - Default configuration used</b>	Previous POST did not complete successfully. POST loads default values and offers to run Setup. If the failure was caused by incorrect values and they are not corrected, the next boot will likely fail. This error is cleared the next time the system is booted.
<b>0281 Memory Size found by POST differed from CMOS</b>	Memory size found by POST differed from CMOS.
<b>02B0 Diskette drive A error</b> <b>02B1 Diskette drive B error</b>	Drive A: or B: is present but fails the BIOS POST diskette tests. Check to see that the drive is defined with the proper diskette type in Setup and that the diskette drive is attached correctly.
<b>02B2 Incorrect Drive A type - run SETUP</b>	Type of floppy drive A: not correctly identified in Setup.
<b>02B3 Incorrect Drive B type - run SETUP</b>	Type of floppy drive B: not correctly identified in Setup.
<b>02D0 System cache error - Cache disabled</b>	RAM cache failed and BIOS disabled the cache. On older boards, check the cache jumpers. You may have to replace the cache. See your dealer. A disabled cache slows system performance considerably.
<b>02F0: CPU ID:</b>	CPU socket number for Multi-Processor error.
<b>02F4: EISA CMOS not writeable</b>	ServerBIOS2 test error: Cannot write to EISA CMOS.



Message	Description
<b>02F5: DMA Test Failed</b>	ServerBIOS2 test error: Cannot write to extended DMA (Direct Memory Access) registers.
<b>02F6: Software NMI Failed</b>	ServerBIOS2 test error: Cannot generate software NMI (Non-Maskable Interrupt).
<b>02F7: Fail-Safe Timer NMI Failed</b>	ServerBIOS2 test error: Fail-Safe Timer takes too long.
<b>device Address Conflict</b>	Address conflict for specified device.
<b>Allocation Error for: device</b>	Run ISA or EISA Configuration Utility to resolve resource conflict for the specified device.
<b>CD ROM Drive</b>	CD ROM Drive identified.
<b>Entering SETUP...</b>	Starting Setup program
<b>Failing Bits: nnnn</b>	The hex number nnnn is a map of the bits at the RAM address which failed the memory test. Each 1 (one) in the map indicates a failed bit. See errors 230, 231, or 232 above for offset address of the failure in System, Extended, or Shadow memory.
<b>Fixed Disk n</b>	Fixed disk n (0-3) identified.
<b>Invalid System Configuration Data</b>	Problem with NVRAM (CMOS) data.
<b>I/O device IRQ conflict</b>	I/O device IRQ conflict error.
<b>PS/2 Mouse Boot Summary Screen:</b>	PS/2 Mouse installed.
<b>nnnn kB Extended RAM Passed</b>	Where nnnn is the amount of RAM in kilobytes successfully tested.
<b>nnnn Cache SRAM Passed</b>	Where nnnn is the amount of system cache in kilobytes successfully tested.
<b>nnnn kB Shadow RAM Passed</b>	Where nnnn is the amount of shadow RAM in kilobytes successfully tested.
<b>nnnn kB System RAM Passed</b>	Where nnnn is the amount of system RAM in kilobytes successfully tested.
<b>Operating system not found</b>	Operating system cannot be located on either drive A: or drive C:. Enter Setup and see if fixed disk and drive A: are properly identified.
<b>Parity Check 1 nnnn</b>	Parity error found in the system bus. BIOS attempts to locate the address and display it on the screen. If it cannot locate the address, it displays ?????. Parity is a method for checking errors in binary data. A parity error indicates that some data has been corrupted.
<b>Parity Check 2 nnnn</b>	Parity error found in the I/O bus. BIOS attempts to locate the address and display it on the screen. If it cannot locate the address, it displays ?????.
<b>Press &lt;F1&gt; to resume, &lt;F2&gt; to Setup, &lt;F3&gt; for previous</b>	Displayed after any recoverable error message. Press <F1> to start the boot process or <F2> to enter Setup and change the settings. Press <F3> to display the previous screen (usually an initialization error of an Option ROM, such as an add-on card). Write down and follow the information shown on the screen.
<b>Press &lt;F2&gt; to enter Setup</b>	Optional message displayed during POST.
<b>PS/2 Mouse:</b>	PS/2 mouse identified.
<b>System BIOS shadowed</b>	System BIOS copied to shadow RAM.
<b>UMB upper limit segment address: nnnn</b>	Displays the address nnnn of the upper limit of Upper Memory Blocks, indicating released segments of the BIOS which can be reclaimed by a virtual memory manager.
<b>Video BIOS shadowed</b>	Video BIOS copied to shadow RAM.

## Sycard PCCtest 450 CardBus Card (Optional)

The PCCtest 450 CardBus Card (version 1.05) available from Sycard Technology is an optional diagnostic tool. It is the only recommended tool that tests the functionality of the PCMCIA slots. It is a Type II CardBus Card that works with compatible test software to exercise PCMCIA functions. (See the Sycard Technology website, <http://www.sycard.com>.) The PCCtest 450 product contains these components:

- PCCtest 450 CardBus Card, version 1.05.
- PCCtest 450 software disk. (Software updates are available at the Sycard Technology website, <http://www.sycard.com>.)
- Configuration headers (PC Card/16-bit and CardBus/32-bit), which attach to the card.

You will also need:

- CardBus extender card to avoid wear on the Sycard PCMCIA connector. The Sycard PCCextend 70 extender card is an example.

The Sycard PCCtest 450 provides the following tests. See the Sycard documentation for details about running the tests.

- PCMCIA PC Card (16-bit) test, PCT450 (version 1.17).  
Requires the PC Card configuration header.  
Run the test for the Texas Instruments PCI1225 socket controller—suggested commands  
Upper slot: **PCT450 -b69 -1 -v**  
Lower slot: **PCT450 -b69 -0 -v**
- CardBus (32-bit) test, TESTCB (version 2.05).  
Requires the CardBus configuration header.  
Run the test for the Texas Instruments PCI1225 socket controller—suggested commands  
Upper slot: **TESTCB -b69 -1 -v -jsd000**  
Lower slot: **TESTCB -b69 -0 -v -jsd000 -k6**

## Desktop Management Interface (DMI)

The Desktop Management Interface (DMI) is basically a set of rules for accessing information about a personal computer. Using DMI, an application program can determine, for example, which hardware and software components are present in a personal computer, the operating system that is being used, and the number of accessory board slots that are available. Using the DMI interface, a local or remote application program can check what hardware and software components are installed on your computer, and may be able to tell how well they are working or whether any needs replacing. All this information is stored in a special Management Information Format (MIF) file, installed on each personal computer as part of the DMI package.

### Installing the DMI Package

The DMI package is included with the OmniBook, but it must be properly installed before it can be used. The following steps explain how.

To install the DMI preloaded on the hard disk:

1. Start Windows, if it is not already running.
2. Click Start, Programs, HP DMI, Setup.

To install the DMI from the OmniBook Recovery CD or from floppy disks:

1. If you do not have a CD-ROM drive, create installation floppy disks
  - On any computer with a CD-ROM drive, copy the DMI software from the dmi directory of the Recovery CD (under \omnibook\drivers) to two or more floppy disks (for example, copy the contents of the \disk1 subdirectory to disk #1).
  - On any computer with World Wide Web access, download the Top Tools package from the OmniBook website (see page vi), then create the floppy disks as directed.
2. Start Windows, if it is not already running.
3. Insert the Recovery CD into the CD-ROM drive, or insert disk #1 into the floppy drive.
4. Select and run the SETUP program from the dmi\disk1 directory on the CD (under \omnibook\drivers), or from floppy disk #1.

### Uninstalling the DMI Package

1. Click Start, Programs, HP DMI, Uninstall DMI.
2. Reboot the PC.

### Using the DMI Interface

For a complete explanation of how to fully take advantage of DMI, the following documentation is provided with the OmniBook:

- A README.TXT file.
- A Windows online help file describing Hewlett-Packard's implementation of DMI (group and attribute definitions). Since not all Hewlett-Packard enhanced features are supported on all models, this document also describes any restrictions that apply.

## Description of DMI

The Desktop Management Interface (DMI) is the result of the efforts of the Desktop Management Task Force (DMTF). This task force was founded in 1992 by a group of leading computer manufacturers, including Hewlett-Packard, to define a standard method of managing the physical and logical components of personal computers.

Hewlett-Packard has developed a number of extensions to DMI to allow the enhanced features of HP OmniBook computer to be managed with DMI, including features such as passwords and tattooing (identifying a computer using a unique string of characters).

For full details of the structure of the MIF file, including an explanation of the meaning of the fields of groups and attributes and how to write an application program that accesses this information, you can access the DMTF FTP server <ftp.dmtf.org> or the DMTF web pages at the <http://www.dmtf.org>.

## Contents of the DMI Package

The DMI software and associated documentation is supplied either preinstalled on the OmniBook's hard disk drive or on two floppy disks. The contents of the package are the same in both cases.

Since the information accessed by the DMI software is specific to a particular computer, it must be installed on each computer separately. The DMI package included with the OmniBook can be used only with the OmniBook.

The following software is supplied with the DMI package:

- A Microsoft Windows utility, SETUP.EXE, to install and initialize the DMI software.
- A Windows utility, HP TopTools. After DMI is installed, this utility can be used to display information about the computer through the DMI.
- A Management Information Format (MIF) file. This file contains information about everything on the computer that can be controlled using DMI facilities, and is initialized during installation.
- A component code, identifying the version of MIF file to use for specific models of HP OmniBook computers.
- Windows-compatible DMTF Service Layer software, which controls access to the DMI.
- A client agent. The HP Remote DMI Agent is a DMI application and also a network server-side stream-based application. The Remote Agent is listening for Remote Application connection requests. If the main window of the Remote Agent is hidden, then no icon will appear on the screen when it is running.

## BIOS Setup Utility

The BIOS Setup utility provides access to basic configuration settings. It is independent of the operating system.

### Running the BIOS Setup Utility

1. Close all applications, then shut down Windows and reboot the OmniBook. If necessary, you can press CTRL+ALT+DEL to reboot.
2. During reboot, press F2 to start the BIOS Setup utility.
3. The pointing device or mouse is not active in the BIOS Setup utility. Press the RIGHT and LEFT arrow keys to move among menus. Press the DOWN and UP arrow keys to move among parameters in a menu. Press ENTER to change a setting. See the table below for more information.
4. After you select the options you want, press F10 or use the Exit menu to exit the BIOS Setup utility.

If the settings cause a conflict between devices during reboot, the system prompts you to run BIOS Setup, and the conflicting settings are marked.

**Table 3-6. BIOS Setup Menus and Parameters**

<b>Main Menu</b>		<b>Default</b>
Language	Sets the language for this utility and BIOS messages.	English.
BIOS Revision	Shows the current BIOS version.	Detected automatically.
System Time	Sets the time using 24-hour format. Values set take effect immediately.	
System Date	Sets the date using mm/dd/yy (English) or dd/mm/yy format.	
Floppy Drive	Sets the floppy drive type.	Detected and set automatically.
Internal Hard Disk	Sets the hard disk drive type and various parameters.	Detected and set automatically.
Quiet Boot	When enabled, hides summary of power-on self-test and messages during boot.	Enabled
Video Display Device	Sets whether the built-in and external display signals automatically switch when an external display is detected, or whether both signals are active. Pressing Fn+F5 temporarily switches displays.	Auto
Video Expansion	Sets whether the video image expands to fill the display in lower resolution modes (VGA). When disabled, the video image is centered in the display.	Disabled
Primary Video Adapter	Sets whether the internal (built-in) video adapter automatically switches to an external video adapter connected to the docking system, if one is detected. (Select Internal to use multiple-monitor capability of Windows 98.)	Auto
System Memory	Shows the system memory size.	640KB
Extended Memory	Shows the extended memory size.	Detected automatically.
<b>System Devices Menu</b>		<b>Default</b>
PS/2 Pointing Devices	Sets whether internal pointing devices are automatically disabled when an external PS/2 pointing device is detected, or whether both internal and external devices are active. This is required for the scroll wheel on a PS/2 mouse to function.	Auto

Internal Pointing Devices	Enables one or both built-in PS/2 devices.	Both
External Fn Key	Sets whether left-CTRL + left-ALT on an external keyboard is interpreted as the Fn key.	Enabled
IDE Controller	Enables the primary (hard drive) and secondary (optional CD-ROM drive) controllers.	Both
FDD Controller	Enables the floppy drive.	Enabled
Serial Port	Sets how the serial port is configured by the BIOS (specified or automatic).	Enabled
Base I/O address	Sets the I/O address and interrupt.	3F8h, IRQ4
Infrared Port	Sets how the infrared port is configured by the BIOS (specified or automatic).	Disabled
Mode	Sets the hardware to support SIR (Standard IR), ASK IR (amplitude shift keyed IR), or FIR (Fast IR) infrared communications. (Driver installation required.)	SIR
Base I/O address	Sets the I/O address and interrupt.	2F8h, IRQ3
DMA channel	For Fast IR mode, sets the DMA channel.	DMA3
Parallel Port	Sets how the parallel port is configured by the BIOS (specified or automatic).	Enabled
Mode	Sets the port to normal, bidirectional, EPP, or ECP.	ECP
Base I/O address	Sets the I/O address.	378h
Interrupt	Sets the interrupt.	IRQ7
DMA channel	For ECP mode, sets the DMA channel.	DMA3
Audio	Sets how the audio system is configured by the BIOS (specified or automatic).	Enabled
SB I/O address	Sets the Sound Blaster I/O address.	220h
WSS I/O address	Sets the Windows Sound System I/O address.	530h
AdLib I/O address	Sets the AdLib synthesizer I/O address.	388h
Interrupt	Sets the interrupt.	IRQ5
1st DMA channel	Sets the DMA channel for playback.	DMA1
2nd DMA channel	Sets the DMA channel for recording.	DMA0
<b>Security Menu</b>		<b>Default</b>
User Password Is	Shows if a user password is set.	Clear
Administrator Password Is	Shows if an administrator password is set.	Clear
Set User Password	Press ENTER to set, change, or clear user password. Password length can be no longer than 8 characters, 0-9, A-Z, and cannot include special or accented characters.	
Set Administrator Password	Press ENTER to set, change, or clear administrator password. This password protects BIOS Setup settings. Password length can be no longer than 8 characters, 0-9, A-Z, and cannot include special or accented characters.	
Boot	Sets whether a password is required when the computer boots.	Enabled
Resume	If boot security is enabled, sets whether a password is required when resuming from a suspended state.	Enabled
Undock	If boot security is enabled, sets whether a password is required when undocking the OmniBook.	Disabled
Internal Hard Disk Drive Lock	If boot security is enabled, sets whether a password is stored on the hard disk. Secures data on the disk if the disk is moved to another computer.	Disabled
Floppy Boot	Sets whether the floppy drive is a boot device.	Enabled

<b>Power Menu</b>		<b>Default</b>
If ACPI is activated in Windows 98, ACPI settings override settings in this menu.		
Power Management Mode	Disables time-outs, selects a combination of time-outs, or allows customized time-outs.	Max Power Savings
Smart CPU Mode	Enables automatic CPU power savings. Absence of keyboard, mouse, and hard disk activity could cause slower CPU response. This should normally be Off.	Off
Standby Time-out	Sets the period of inactivity after which the computer goes from On to Standby power mode.	2 minutes
Suspend Time-out	Sets the period of inactivity after which the computer goes from Standby to Suspend power mode. (Skips Standby mode if that time-out is disabled.)	4 minutes
Hibernate Time-out	Sets whether the computer goes from Suspend to Hibernate power mode after the indicated period of inactivity. (Skips Suspend mode if that time-out is disabled.)	4 hours
Hard Disk Time-out	Sets the period of hard disk inactivity after which the hard disk stops spinning. Also affects a hard disk drive in the plug-in module bay.	2 minutes
Time-out on AC	Sets whether power management time-outs occur while the ac adapter is connected.	Disabled
Power Button Mode	Sets the action of the blue power button when pressed for less than 4 seconds.	Suspend
Lid Switch Mode	Sets the action when the OmniBook lid closes.	Turn Off LCD
Resume on Serial Ring	Sets whether the system resumes from Suspend if a ring signal is received.	Enabled
Resume on Time of Day	Sets whether the system resumes from Suspend at a defined time of day.	Disabled
Resume Time	Sets the 24-hour time when the system resumes from Suspend if enabled.	
Auto Suspend on Undock	Sets whether the OmniBook suspends after undocking.	When Lid Closed
Auto Turn-on on Dock	Sets whether the OmniBook turns on after docking.	Enabled
<b>Boot Menu</b>		<b>Default</b>
Diskette Drive Hard Drive CD-ROM/DVD Drive	Shows the order of boot devices. Move the entries to change the order.	1. Diskette drive 2. Hard drive 3. CD-ROM/DVD drive
<b>Exit Menu</b>		
Save Changes and Exit	Saves Setup changes, exits, and reboots.	
Discard Changes and Exit	Discards Setup changes since last save, exits, and reboots. Does not affect Security and date/time changes.	
Get Default Values	Restores default settings, stays in Setup. Does not affect Security and date/time settings.	
Load Previous Values	Discards Setup changes since last save, stays in Setup. Does not affect Security and date/time changes.	
Save Changes	Saves Setup changes, and stays in Setup. Security settings are saved when changed.	





## Replaceable Parts

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This chapter contains an exploded view of the OmniBook and the following lists of parts:

- OmniBook replaceable parts (page 4-3).
- Assembly-component breakout (page 4-6)
- Accessory replacement parts (page 4-6).
- Part number reference (page 4-7).

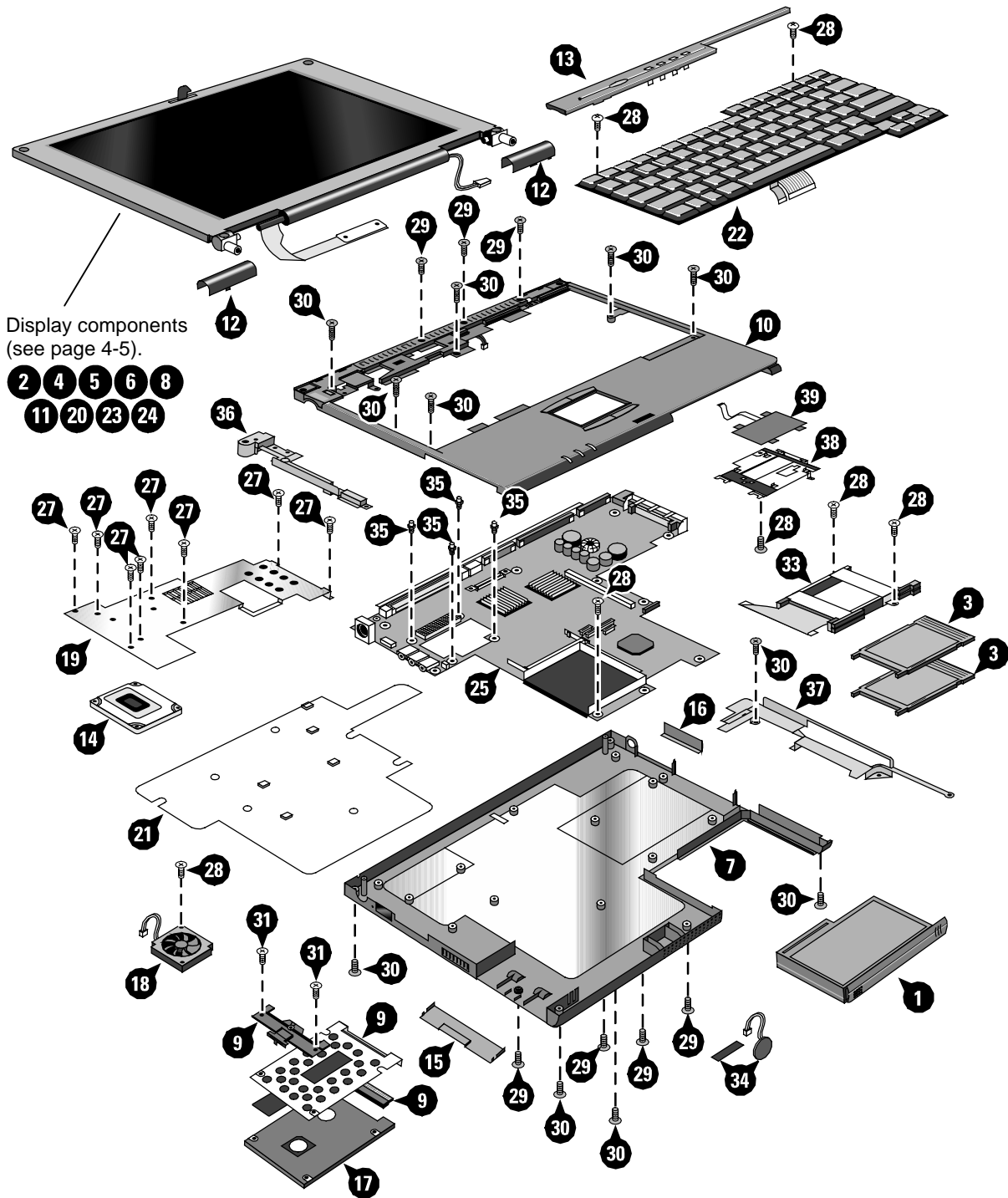


Figure 4-1. Exploded View

**Table 4-1. OmniBook Replaceable Parts**

	Description	Part Number	Exchange Part Number	User Replaceable
	Assembly, external module bay	F1711-60901		Yes
1	Battery, lithium-ion	F1711-60902		Yes
2	Bezel, display (IBM)	F1711-60915		
3	Blank, PCMCIA filler	5182-5194		Yes
4	Bumper, display (upper)	F1711-60913		Yes
5	Cable, display flex	F1711-60918		
6	Cable, display power	F1711-60919		
	Cap, pointing stick	F1320-60971		Yes
7	Case, bottom *	F1711-60922		
8	Case, display *	F1711-60917		
9	Case, HDD kit	F1711-60904		Yes
10	Case, top *	F1711-60920		
11	Cover, display screw (lower)	F1711-60914		Yes
12	Cover, hinge (left, right pair)	F1711-60937		Yes
13	Cover, keyboard screw	F1711-60912		Yes
14	CPU, 300MHz Pentium II (mini-cartridge)	1821-4833	F1711-69103	
14	CPU, 366MHz Pentium II (mini-cartridge)	1821-4834	F1711-69104	
15	Door, HDD	F1711-60905		Yes
16	Door, module bay connector	F1711-60961		
	Drive, floppy disk module (no cable)	F1472-80001		Yes
17	Drive, hard disk (4.3GB, 9.5mm, IBM) *	0950-3409	F1711-69100	Yes
17	Drive, hard disk (6.4GB, 9.5mm, IBM) *	0950-4332	F1711-69101	Yes
18	Fan	F1711-60926		
	Foot	F1711-60931		Yes
19	Heatsink (with thermal pads) *	F1711-60932		
20	Hinge, display (left, right pair)	F1711-60938		
	Holder, business card	F1460-60962		
	IC, BIOS	F1711-60927		
21	Insulator, bottom case	F1711-60963		
22	Keyboard, Canadian	5182-5167		
22	Keyboard, Danish	5182-5175		
22	Keyboard, French	5182-5170		
22	Keyboard, German	5182-5168		
22	Keyboard, International English	5182-5166		
22	Keyboard, Italian	5182-5174		
22	Keyboard, Norwegian	5182-5176		
22	Keyboard, Spanish	5182-5169		
22	Keyboard, Swedish	5182-5172		
22	Keyboard, Swiss	5182-5171		
22	Keyboard, UK English	5182-5173		
22	Keyboard, US English	5182-5165		
	Label, regulatory	F1711-60929		
23	Latch, display	F1711-60916		
24	LCD module (12" TFT, IBM)	F1711-60939	F1711-69039	
	Lens, infrared	F1711-60928		
	Overlay, serial number	7121-7525		

	Description	Part Number	Exchange Part Number	User Replaceable
	Pads, thermal (set of 2)	F1711-60959		
25	PCA, motherboard *	F1711-60925	F1711-69025	
26	Screw, M1.4x4mm (tapping)	F1711-60934		
27	Screw, M2x5mm	F1443-60921		
28	Screw, M2.5x4mm	F1460-60990		Yes
29	Screw, M2.5x5mm	F1460-60984		Yes
30	Screw, M2.5x8mm	F1440-60987		
31	Screw, M3x4mm	F1629-60911		
32	Screw, M3x6mm	F1580-60956		
33	Socket, PCMCIA	F1711-60924		
34	Speaker (with foam pads)	F1711-60923		
35	Standoff, M2x9mm hex (CPU)	F1711-60935		
	Standoff, 4-11258-2 (docking)	F1391-60953		
	Standoff, 4-40UNC hex (I/O)	F1711-60936		
36	Support, hinge (left)	F1711-60910		
37	Support, hinge (right)	F1711-60911		
38	Support, touch-pad	F1711-60960		
	Tape, Kapton roll	F1391-60963		
39	Touch pad (with cable)	F1711-60921		
* See Table 4-2 for components.				
** These hard drives are the preferred drives at the time of publication. Drives shipped in units are subject to change without notice. For current information about preferred and approved drives for these products, see the latest versions of service notes HDD4G-01 and HDD6G-01.				

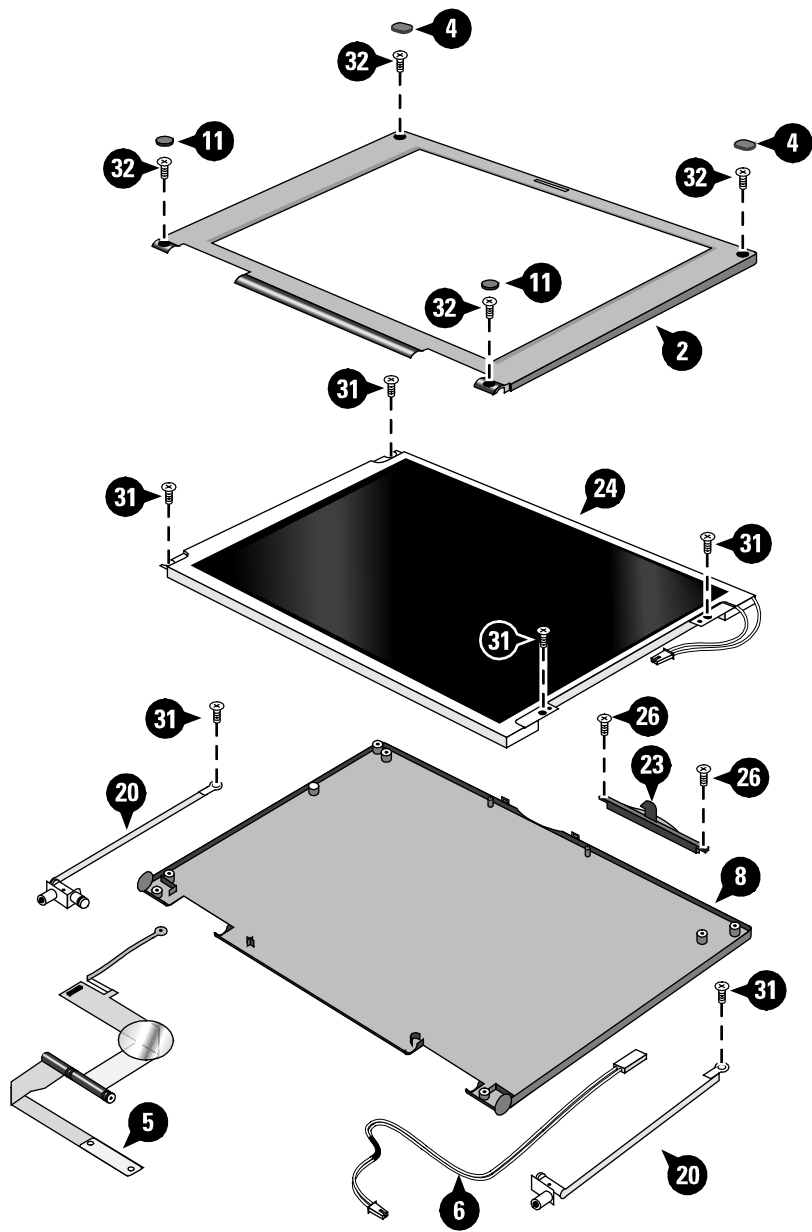


Figure 4-2. Display Components

**Table 4-2. Assembly-Component Breakdown**

Assembly	Part Number	Components	Part Numbers	Incl.
Case, bottom	F1711-60922	Door, HDD	F1711-60905	No
		Door, module bay connector	F1711-60961	No
		Feet (4)	F1711-60931	Yes
		Insulator, bottom case	F1711-60963	No
		Label, regulatory	F1711-60929	Yes
		Label, serial number	(see page 2-20)	No
		Lens, infrared	F1711-60928	No
		Overlay, serial number	7121-7525	No
		Speaker	F1711-60923	No
Case, display	F1711-60917	Latch, display	F1711-60916	No
Case, top	F1711-60920	Support, touch pad	F1711-60960	No
		Touch pad	F1711-60921	No
Heatsink	F1711-60932	Pads, thermal	F1711-60959	Yes
PCA, motherboard	F1711-69025	IC, BIOS	F1711-60927	Yes
		Socket, PCMCIA	F1711-60924	No

**Table 4-3. Accessory Replaceable Parts**

Description	Part Number	Exchange Part Number	User Replaceable
Adapter, ac (60W)	0950-2790		Yes
Adapter, auto plug (from airline)	5182-5131		Yes
Adapter, auto/airline (75W)	F1455-80001		Yes
Adapter, docking module bay	F1468-60901		Yes
Adapter, PS/2 "Y"	F1469-80001		Yes
Assembly, external module bay	F1711-60901		Yes
Battery, lithium-ion	F1711-60902		Yes
Cable, external FDD	F1473-80001		Yes
Cable, MPEG PC card	F1465-60904		Yes
Card, PC (MPEG)	F1465-60902		Yes
CD, DVD player (MPEG)	F1465-60903		Yes
Charger, battery (external)	F1706-60901		Yes
Docking system (with tall monitor stand)	(see Docking System Service Manual)		
Drive, CD-ROM module	F1474-80001		Yes
Drive, DVD module	F1465-80001		Yes
Drive, floppy disk module (no cable)	F1472-80001		Yes
Drive, LS-120 module	F1470-80001		Yes
Mini dock	F1452-60901		Yes
Monitor stand (short)	F1453-60901		Yes
Monitor stand (tall)	(see Docking System Service Manual)		
Port replicator	F1451-60901		Yes
RAM board, 32MB SDRAM	1818-7413	F1456-69001	Yes
RAM board, 64MB SDRAM	1818-7414	F1457-69001	Yes
RAM board, 128MB SDRAM	1818-7549	F1622-69001	Yes
Tray, docking "D" (OB900 with docking system)	F1477-60958		Yes
Tray, standard "D" (OB900 with port replicator, mini dock)	F1452-60909		Yes

**Table 4-4. Part Number Reference**

Part Number	Exchange Part Number	Description	User Replaceable
0950-2790		Adapter, ac (60W)	Yes
0950-3409	F1711-69100	Drive, hard disk (4.3GB, 9.5mm, IBM) *	Yes
0950-4332	F1711-69101	Drive, hard disk (6.4GB, 9.5mm, IBM) *	Yes
1818-7413	F1456-69001	RAM board, 32MB SDRAM	Yes
1818-7414	F1457-69001	RAM board, 64MB SDRAM	Yes
1818-7549	F1622-69001	RAM board, 128MB SDRAM	Yes
1821-4833	F1711-69103	CPU, 300MHz Pentium II (mini-cartridge)	
1821-4834	F1711-69104	CPU, 366MHz Pentium II (mini-cartridge)	
5182-5131		Adapter, auto plug (from airline)	Yes
5182-5165		Keyboard, US English	
5182-5166		Keyboard, International English	
5182-5167		Keyboard, Canadian	
5182-5168		Keyboard, German	
5182-5169		Keyboard, Spanish	
5182-5170		Keyboard, French	
5182-5171		Keyboard, Swiss	
5182-5172		Keyboard, Swedish	
5182-5173		Keyboard, UK English	
5182-5174		Keyboard, Italian	
5182-5175		Keyboard, Danish	
5182-5176		Keyboard, Norwegian	
5182-5194		Blank, PCMCIA filler	Yes
7121-7525		Overlay, serial number	
8120-6312		Power cord, replacement (Australia)	Yes
8120-6313		Power cord, replacement (US, Canada, Taiwan)	Yes
8120-6314		Power cord, replacement (Europe)	Yes
8120-6316		Power cord, replacement (Japan)	Yes
8120-6317		Power cord, replacement (South Africa, India)	Yes
8120-8367		Power cord, replacement (Argentina)	Yes
8120-8373		Power cord, replacement (China)	Yes
8120-8452		Power cord, replacement (Chile)	Yes
8120-8699		Power cord, replacement (UK, Singapore, Hong Kong)	Yes
F1320-60971		Cap, pointing stick	Yes
F1391-60953		Standoff, 4-11258-2 (docking)	
F1391-60963		Tape, Kapton roll	
F1440-60987		Screw, M2.5x8mm	
F1443-60921		Screw, M2x5mm	
F1451-60901		Port replicator	
F1452-60901		Mini dock	
F1452-60909		Tray, standard "D" (OB900)	Yes
F1453-60901		Monitor stand (short)	Yes
F1455-80001		Adapter, auto/airline (75W)	Yes
F1460-60962		Holder, business card	
F1460-60984		Screw, M2.5x5mm	Yes
F1460-60990		Screw, M2.5x4mm	Yes
F1462-60901		OmniBook Performance 98 Group training kit	

Part Number	Exchange Part Number	Description	User Replaceable
F1465-60902		Card, PC (MPEG)	Yes
F1465-60903		CD, DVD player (MPEG)	Yes
F1465-60904		Cable, MPEG PC card	Yes
F1465-80001		Drive, DVD module	Yes
F1468-60901		Adapter, docking module bay	Yes
F1469-80001		Adapter, PS/2 "Y"	Yes
F1470-80001		Drive, LS-120 module	Yes
F1472-80001		Drive, floppy disk module (no cable)	Yes
F1473-80001		Cable, external FDD	Yes
F1474-80001		Drive, CD-ROM module	Yes
F1477-60958		Tray, docking "D" (OB900)	Yes
F1580-60956		Screw, M3x6mm	
F1629-60911		Screw, M3x4mm	
F1706-60901		Charger, battery (external)	Yes
F1711-60963		Insulator, bottom case	
F1711-60901		Assembly, external module bay	Yes
F1711-60902		Battery, lithium-ion	Yes
F1711-60904		Case, HDD kit	Yes
F1711-60905		Door, HDD	Yes
F1711-60910		Support, hinge (left)	
F1711-60911		Support, hinge (right)	
F1711-60912		Cover, keyboard screw	Yes
F1711-60913		Bumper, display (upper)	Yes
F1711-60914		Cover, display screw (lower)	Yes
F1711-60915		Bezel, display (IBM)	
F1711-60916		Latch, display	
F1711-60917		Case, display	
F1711-60918		Cable, display flex	
F1711-60919		Cable, display power	
F1711-60920		Case, top	
F1711-60921		Touch pad (with cable)	
F1711-60922		Case, bottom	
F1711-60923		Speaker (with foam pads)	
F1711-60924		Socket, PCMCIA	
F1711-60925	F1711-69025	PCA, motherboard	
F1711-60926		Fan	
F1711-60927		IC, BIOS	
F1711-60928		Lens, infrared	
F1711-60929		Label, regulatory	
F1711-60931		Foot	Yes
F1711-60932		Heatsink (with thermal pads)	
F1711-60934		Screw, M1.4x4mm (tapping)	
F1711-60935		Standoff, M2x9mm hex (CPU)	
F1711-60936		Standoff, 4-40UNC hex (I/O)	
F1711-60937		Cover, hinge (left, right pair)	Yes
F1711-60938		Hinge, display (left, right pair)	
F1711-60939	F1711-69039	LCD module (12" TFT, IBM)	
F1711-60941		Recovery CD, English (OB900, W95/98)	



Part Number	Exchange Part Number	Description	User Replaceable
F1711-60942		Recovery CD, German (OB900, W95/98)	
F1711-60943		Recovery CD, Spanish (OB900, W95/98)	
F1711-60944		Recovery CD, French (OB900, W95/98)	
F1711-60945		Recovery CD, Swedish (OB900, W95/98)	
F1711-60946		Recovery CD, Italian (OB900, W95/98)	
F1711-60947		Recovery CD, Norwegian (OB900, W95/98)	
F1711-60948		Recovery CD, Danish (OB900, W95/98)	
F1711-60949		Recovery CD, Finnish (OB900, W95/98)	
F1711-60950		Recovery CD, English (OB900, WNT4)	
F1711-60951		Recovery CD, German (OB900, WNT4)	
F1711-60952		Recovery CD, Spanish (OB900, WNT4)	
F1711-60953		Recovery CD, French (OB900, WNT4)	
F1711-60954		Recovery CD, Swedish (OB900, WNT4)	
F1711-60955		Recovery CD, Italian (OB900, WNT4)	
F1711-60956		Recovery CD, Norwegian (OB900, WNT4)	
F1711-60957		Recovery CD, Danish (OB900, WNT4)	
F1711-60958		Recovery CD, Finnish (OB900, WNT4)	
F1711-60959		Pads, thermal (set of 2)	
F1711-60960		Support, touch-pad	
F1711-60961		Door, module bay connector	
F1711-60963		Insulator, bottom case	
<p>* These drives are the preferred drives at the time of publication. Drives shipped in units are subject to change without notice. For current information about preferred and approved drives for these products, see the latest versions of service notes HDD4G-01 and HDD6G-01.</p>			



## Reference Information

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This chapter includes the following reference information:

- Password removal policy.
- Display quality statement.

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### Password Removal Policy

If the user forgets the system password, the user calls Technical Support to determine the proper removal procedure. The user must provide proof of ownership, and the OmniBook must be operated during the procedure.

The password removal procedure is protected as HP Company Private information. There are a restricted number of locations that can perform password removal. It may not be disclosed or distributed outside those locations.

Password removal is strictly controlled. Hewlett-Packard and authorized support providers must ensure with written evidence that the OmniBook being “cleansed” is actually in the possession of the unit’s actual and current owner. This requires a sales receipt showing the unit serial number and owner’s name, or a written statement from the owner attesting that he or she is the owner of the unit. The statement can be a fax copy of the document. The fact that the unit is in the hands of an HP representative on behalf of the customer is not evidence of ownership. In addition, HP will not remove the password of a unit for any non-owner, even if it is requested by law enforcement agencies. If you receive such a request, you should notify management and HP Corporate Legal immediately. (These requests may require a court order prior to our participation.)

Further, the entity removing the password must log the name, serial number and date of the removal, and file the written backup with the log. The log and backup are subject to standard record retention process and review.

The final issue relating to removal of passwords is that HP cannot provide information to users that would assist them in improperly removing a password and opening a unit.

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## Hewlett-Packard Display Quality Statement

TFT display manufacturing is a high precision but imperfect technology and manufacturers cannot currently produce large displays that are cosmetically perfect. Most, if not all, TFT displays will exhibit some level of cosmetic imperfection. These cosmetic imperfections may be visible to the customer under varying display conditions and can appear as bright, dim, or dark spots. *This issue is common across all vendors supplying TFT displays in their products and is not specific to the HP OmniBook display.*

HP OmniBook TFT displays meet or exceed all TFT manufacturer's standards for cosmetic quality of TFT displays. HP does not warrant that the displays will be free of cosmetic imperfections. *TFT displays may have a small number of cosmetic imperfections and still conform to the display manufacturer's cosmetic quality specifications.*

Here are some guidelines to use in determining what action to take on customers' complaints of cosmetic imperfections in their TFT displays:

1. The unit should be viewed in the customer's normal operating condition.  
This means if the customer uses the unit predominately in DOS, in Windows, or in some other application or combination of applications, that is where you should make the determination. Self test is not a normal operating condition and is not a sufficient tool to interpret display quality.
2. Use the table below to determine whether the display should be considered for replacement.  
These are the only conditions in this guideline that may call for a replacement due to a defect in material or workmanship based on the HP Limited Warranty Statement.
3. If a display is considered for replacement, it should be clear to the customer that cosmetic variations on the replacement display may also exist, and may require the customer to use a work-around to obscure the cosmetic imperfection.
4. Customers with cosmetic-based complaints only, that do not conform to the above conditions and tests will not normally be considered for display replacement. It will be left to the judgment of the HP-responsible person working with the customer, to identify work-arounds that are reasonable and appropriate for the individual customer. Customers who must have a more perfect display solution should consider switching to an OmniBook with a DSTN display.

We expect over time that the industry will continue to improve in its ability to produce displays with fewer inherent cosmetic imperfections, and we will adjust our HP guidelines as the improvements are implemented.

**Table 5-1. OmniBook 900 LCD Guidelines (TFT)**

Type of Imperfection	Imperfections Not Allowed
<b>IBM 12" TFT, SVGA</b>	
<b>Electrical Imperfections:</b> Bright dots (a) Dark dots (a)	<ul style="list-style-type: none"> <li>• 6 or more single bright dots.</li> <li>• 6 or more single dark dots.</li> <li>• 10 or more total bright and dark dots.</li> <li>• Any occurrence of double bright dots.</li> <li>• 2 or more double dark dots.</li> <li>• Any occurrence of triple bright dots (or triple dark dots).</li> <li>• Any occurrence of 2 bright or dark dots within 20 mm.</li> </ul>
Definitions of imperfections: a Bright or dark dot: A subpixel (red, green, or blue dot) that is stuck on or off.	





- 1. Product Information**
- 2. Removal and Replacement**
- 3. Troubleshooting and Diagnostics**
- 4. Replaceable Parts**
- 5. Reference Information**