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preface

This *Maintenance and Service Guide* is a troubleshooting guide that can be used for reference when servicing the Compaq Armada 1500c Series.

Compaq Computer Corporation reserves the right to make changes to the computer without notice.

Additional information is available on the *Compaq Armada 1500c Series Illustrated Parts Map*.

Symbols

The following words and symbols mark special messages throughout this guide:

⚠	**WARNING:** Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.
△	**CAUTION:** Text set off in this manner indicates that failure to follow directions in the caution could result in damage to equipment or loss of information.

IMPORTANT: Text set off in this manner presents clarifying information or specific instructions.

NOTE: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Technician Notes

⚠	**WARNING:** Only authorized technicians trained by Compaq should attempt to repair this equipment. All troubleshooting and repair procedures are detailed to allow only subassembly/module level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard. Any indication of component replacement or printed wiring board modifications may void any warranty or exchange allowances.
⚠	**WARNING:** The computer is designed to be electrically grounded. To ensure proper operation, plug the AC power cord into a properly grounded electrical outlet only.
△	**CAUTION:** To properly ventilate your system, you must provide at least 3 inches (7.62 cm) of clearance on the left and right sides of the computer.

Serial Number

When requesting information or ordering spare parts, provide the computer serial number. The serial number is displayed on the rear of the computer.

Locating Additional Information

The following documentation is available to support the computer:

- Compaq Armada 1500c Series documentation set
- Microsoft operating system user's guide
- Service Training Guides
- Compaq Service Advisories and Bulletins
- *Compaq QuickFind*
- *Compaq Service Quick Reference Guide*
- *Compaq Armada 1500c Series Maintenance and Service Guide*
- *Compaq Armada 1500c Series Illustrated Parts Map*

Compaq Internet site at http://www.Compaq.com

chapter 1

COMPUTER PRODUCT DESCRIPTION

1.1 Computer Features and Models

The Compaq Armada 1500c Series is a line of multimedia notebook computers with advanced modularity, processors, and video graphics. This full-function, Celeron-based series of notebook computers allows full desktop functionality and connectivity through the use of an optional Convenience Base II.

Figure 1-1. *Compaq Armada 1500c Personal Computer*

1.2 Standard Features

The Compaq Armada 1500c Series models have the following standard features:

- 266- or 300-MHz Celeron processors with 128-Kbyte embedded cache memory
- 32MB of synchronous dynamic random access memory (SDRAM), expandable to 160 MB
- 4.0-, 5.0-, or 6.0-GB, 2.5-inch (12.7mm) internal hard drive
- 12.1-inch Color Thin Film Transistor (CTFT) SVGA or 12.1-inch Dual Supertwist Nematic (DSTN) SVGA display
- Nickel Metal Hydride (NiMH) modular battery pack
- SoundBlaster–compatible audio controller with internal stereo speakers and internal microphone
- Full-size 101 key compatible keyboard including 12 function keys, 8 cursor control keys, inverted-T cursor control keys, and embedded numeric keypad
- Four user-programmable keys
- Touchpad pointing device
- Power Sources include the following:
  - Internal Nickel-Metal Hydride (NiMH) modular battery pack
  - External AC adapter
- Power management and security features
- Two standard device slots that will accommodate two type I or II PC Cards, or one type III PC Card, PCMCIA, and CardBus cards
- 176 pin expansion connector provides the interface to the convenience base options
- Rear-panel ports provide connections for USB, parallel and serial, external monitor, and keyboard/mouse
- Integrated 56Kbps modem (North America only)
- CD-ROM Drive or DVD-ROM Drive
- Quick Restore CD

1.2.1 Software Fulfillment

Replacement software can be ordered directly from Compaq Computer Corporation. Both the model and the serial numbers of the computer are needed to identify the specific software available.

1.3 Options

The computer supports the following options:

- Convenience Base II pass through model
- Convenience Base II with Ethernet
- Memory expansion boards
- Li-Ion battery pack
- Aircraft/Automobile adapter
- External battery charger
- PCMCIA modem
- AC power cords
- Hard drive upgrade
- Internal DVD-ROM drive

1.3.1 Convenience Base II

The computer supports the following convenience base models:

- Convenience Base II pass through
- Convenience Base II with Ethernet

1.3.2 System Memory Options

The computer supports optional 16-, 32-, 64-, and 128-MB memory boards. The memory boards are 66-MHz SDRAM without parity. System memory can be expanded to 160 MB of DRAM.

Table 1-1 describes the possible memory configurations for the computer.

Table 1-1
Memory Configuration

SODIMM Module Present	Total System Memory
No SODIMM present	32 MB
16 MB	48 MB
32 MB	64 MB
64 MB	96 MB
128 MB	160 MB
Any EDO in Celeron	32 MB (EDO not usable)

If an EDO memory module is placed into a Celeron system, a POST error message may be printed to the screen. The new message will read “This expansion memory type (EDO) is not supported.”

1.3.3 External Battery Charger

The External Battery charger has the following features:

- Two battery charge slots
- Accepts both NiMH and Li-ion modular batteries
- Charges one battery in 3 hours or less

1.3.4 External Keyboards and Pointing Devices

Supports Compaq or Compaq-compatible PS/2 keyboards and pointing devices

1.3.5 External Monitors

The computer supports VGA Monitors up to 1280 x 1024.

1.4 Design Overview

This section presents a design overview of the computer. The overview is limited to field replaceable parts. All replacement parts are listed in Chapter 3.

1.4.1 System Unit

The computer is a traditional clamshell design with a display unit attached to a system unit. The computer opens to reveal a backlit LCD display and a full-sized keyboard. The display is designed for a continuously adjustable tilt angle.

1.4.2 Internal Boards

The system electronics are integrated on seven printed circuit assemblies: the LED status board, I/O fixture connector, audio board, system board, modem board, and the DC-DC converter board. An optional memory board is available that expands the system memory up to 160 MB.

- The LED status board connects the system board to the display cables and supports the status LEDs.
- The DC-DC converter board creates the system voltages (3.3v and 5.0v) from the battery or from the 14 VDC external power supply output.
- The system board integrates the processor, memory, local bus video adapter, PCMCIA/CardBus adapter, and audio controller.

Processor

The processor located on the system board is a 266- or 300-MHz Intel Celeron processor with 128-Kbyte embedded cache.

Memory

Base memory is 32 MB with, 16, 32, 64, or 128 MB of optional expansion memory. Base memory is onboard memory built into the system board. Expansion memory consists of one memory expansion board available as a user-installable option.

Cache

128-Kbyte cache is integrated with the Celeron processor. It is not user upgradable.

Audio Controller

The audio controller is located on the system board. The audio amplifiers and connectors are on the audio board printed circuit assembly.

PCMCIA/CardBus and Video Adapter Controller

The PCMCIA/CardBus adapter is based on the Texas Instrument PCI1225 PC to CardBus controller unit. The local bus video adapter is the Chips and Technologies 69000 controller.

- The serial-parallel port board expands the serial and parallel signals from the system board to the serial and parallel expansion connectors.
- The audio board supports the microphone and headphone jacks, the volume control switches, and the amplifier and equalization circuitry.

1.4.3 Video System

The standard video subsystem consists of:

- 12.1 inch STN SVGA display
- 12.1 inch CTFT SVGA display
- An inverter to supply AC power to the LCD back-light system
- A standard external VGA connector for use with CRTs and other VGA-compatible displays

1.5 External Computer Components

The external computer components are illustrated and described in this section.

1.5.1 Front and Left Side Components

The front and left side external components are shown in the following figure and identified in this section:

❶ Display latches
❷ Power connector
❸ RJ-11 connector (on some models)
❹ PC Card eject levers
❺ PC Card slots
❻ DualBay compartment
❼ Power/Suspend light
❽ Battery charge light

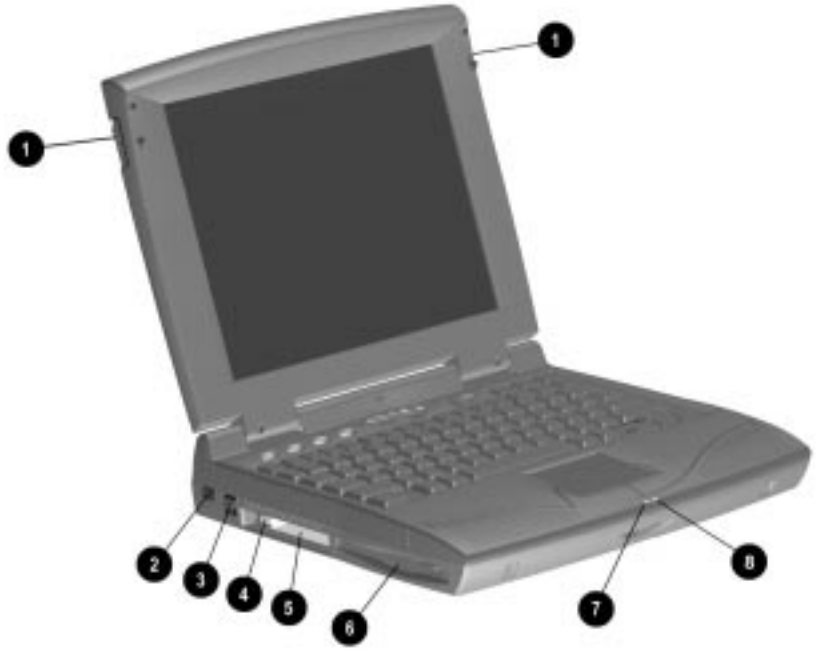


***Figure 1-2**. Front and Left Side Components*

1.5.2 Right Side Components

The right side external components are shown in the following figure and identified in this section:

❶ Battery bay
❷ Stereo/speaker headphone jack
❸ Microphone jack
❹ Volume control buttons
❺ CD-ROM drive or DVD-ROM drive
❻ Cable lock provision

Figure 1-3. *Right Side Components*

1.5.3 Rear Components

The rear components are shown in the following figure and identified in this section:

❶ Serial connector
❷ Serial number
❸ Parallel connector
❹ External monitor connector
❺ Docking connector
❻ Airflow vents
❼ USB connector
❽ Keyboard/Mouse connector

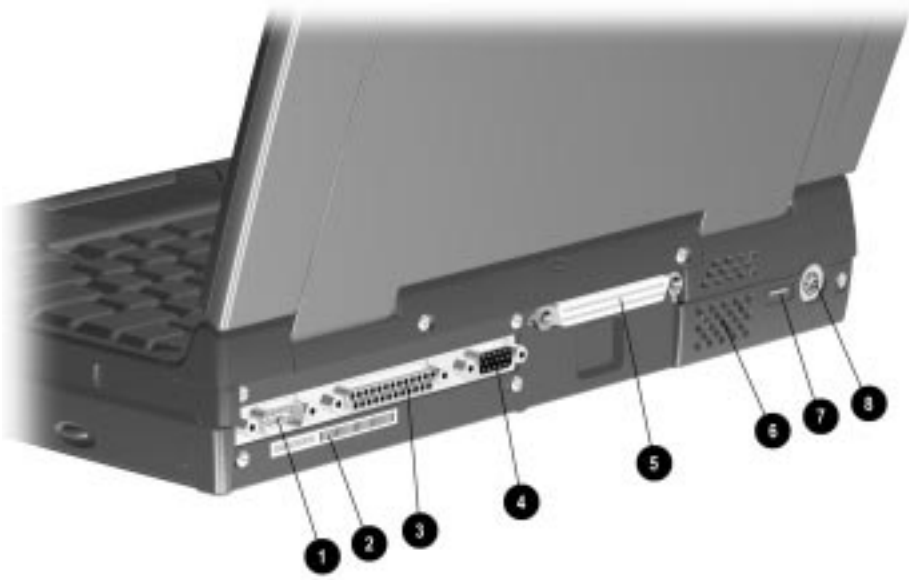


Figure 1-4. *Rear Components*

1.5.4 Bottom Components

The bottom external components are shown in the following figure and are identified in this section:

❶ Docking latch receptacles
❷ Docking alignment guide
❸ Modem compartment
❹ Diskette drive
❺ Diskette drive release latch
❻ Battery with traction grip
❼ Docking restraint latch recess

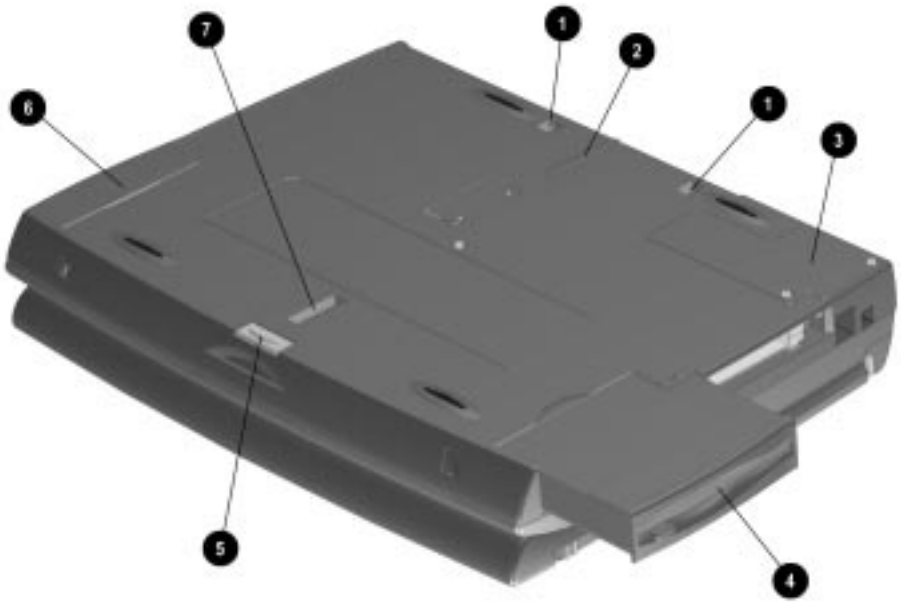


Figure 1-5. *Bottom Components*

1.5.5 Status Panel Lights

The status panel lights are shown in the following figure and are identified in this section:

❶ Hard drive light
❷ Diskette drive light
❸ NumLk light
❹ Caps Lock light
❺ Scroll Lock light

Figure 1-6. *Status Panel Lights*

chapter 2

TROUBLESHOOTING

Follow these basic steps when beginning the troubleshooting process:

1. Complete the preliminary steps listed in Section 2.1.
2. Run the Power-On Self-Test (POST) as described in Section 2.3.
3. Run Computer Setup as described in Section 2.5.1.
4. Run the Computer Checkup (TEST) as described in Section 2.6.
5. If you are unable to run POST or Computer Checkup, or if the problem persists after running POST and Computer Checkup, perform the recommended actions described in the diagnostic tables in Section 2.5.

Follow these guidelines when troubleshooting:

- Complete the recommended actions in the order in which they are given.
- Repeat POST and Computer Checkup after each recommended action until the problem is resolved and the error message does not return.
- When the problem is resolved, stop performing the troubleshooting steps and do not complete the remaining recommended actions.
- Refer to Chapter 5, "Computer Removal and Replacement Procedures," for removal and replacement procedures that are recommended.
- If the problem is intermittent, check the computer several times to verify that the problem is solved.

The following table describes the troubleshooting actions:

If You Want To:	**Then Run:**
Check for POST error messages	POST
Check that computer components are recognized and running properly	Computer Checkup (TEST) under Compaq Utilities
View information about the computer and installed or connected devices	View System Information (INSPECT) under Compaq Utilities
Perform any of the following: ■ Check the system configuration. ■ Set the system power management parameters. ■ Return the system to its original configuration. ■ Check system configuration of installed devices.	Computer Setup

2.1 Preliminary Steps

IMPORTANT: Use the external power supply when running POST, Computer Setup, or Computer Checkup. A low battery condition could initiate Hibernation and interrupt the test.

Before running POST and Computer Checkup:

1. Obtain established passwords. If you must clear the passwords, go to Section 2.2.
2. Ensure that the hard drive is installed in the computer.
3. Ensure that the battery pack is installed in the computer and the power cord is connected to the computer and plugged into an AC power source.
4. Turn on the computer.
5. If a power-on password has been established, type the password and press **Enter.**

NOTE: The key icon appears on the display when he computer is turned on to indicate that QuickLock/QuickBlank has been initiated. Type the power-on password to exit QuickLock/QuickBlank. If the password is unknown, it must be cleared (see Section 2.2).

6. Run Computer Setup (Section 2.5). If a Setup password has been established, type the password and press **Enter.**
7. Use the Hotkey (**Fn**+**F10**) to adjust brightness to midrange and leave the display open.
8. Turn off the computer and all external devices.
9. Disconnect external devices that you do not want to test. If you want to use the printer to log error messages, leave it connected to the computer.

NOTE: If a problem only occurs when an external device is connected to the computer, the problem could be with the external device or its cable. Isolate the problem by running POST with and without the external device connected.

10. Use Compaq Utilities to test these ports.

    To run Compaq Utilities:

    a. If you are running Compaq Utilities from the hard drive, turn on or restart the computer. Press **F10** when the cursor appears in the upper right corner of the screen. If you do not press **F10** in time, restart the computer and try again.

       If you are running Compaq Utilities from diskette, insert the Compaq Utilities diskette in drive A. Turn on or restart the computer.

    b. Press **Enter** to accept OK**.**

    c. Select Computer Checkup (TEST).

    d. Select Prompted Diagnostics.

    e. After “Identifying System Hardware” completes, select “Interactive Testing” and follow the instructions on the screen.

2.2 Clearing Passwords

The power-on password prevents use of the computer until the password is entered. The setup password prevents unauthorized changes to Computer Setup. To clear the passwords, you must remove all power from the system board. If you do not know the passwords, use the following procedure to clear the password:

1. Remove all battery packs from the battery bay and DualBay, if applicable.
2. Disconnect the external power supply.
3. Remove the real-time clock battery.
4. Wait five minutes.
5. Reconnect the external power supply.
6. Restart the computer. During Power-On Self Test (POST), a "162 System Options not set" message appears.
7. Shut down the computer, then disconnect the external power supply again.
8. Replace the real-time clock battery.
9. Install the battery pack(s).
10. Proceed with the troubleshooting procedures.

2.3 Power-On Self-Test (POST)

The Power-On Self-Test (POST) is a series of tests that run every time the computer is turned on. POST verifies that the system is configured and functioning properly.

To run POST:

1. Complete the preliminary steps (Section 2.1).
2. Turn on the computer.

If POST does not detect any errors, the computer beeps once or twice to indicate that POST has run successfully. The computer boots from the hard drive or from a bootable diskette if one is installed in the diskette drive.

2.4 POST Error Messages

If the system is not functioning well enough to run POST, or if the display is not functioning well enough to show POST error messages, refer to the Troubleshooting tables in Section 2.6.

If POST detects an error, one of the following events occurs:

- A message with the prefix "WARNING" appears, informing you where the error occurred. The system pauses until you press **F1** to continue.
- A message with the prefix "FATAL" appears, informing you where the error occurred. After the message, the system emits a series of beeps and stops.

WARNING messages indicate that a potential problem, such as a system configuration error, exists. When **F1** is pressed, the system should resume. You should be able to correct problems that produce WARNING messages.

IMPORTANT: When a WARNING message includes the prompt to "RUN SCU," press **F10** to run Computer Setup. (Computer Setup replaces the SCU utility.)

If you receive one of the error messages listed below, follow the recommended action.

Table 2-1
Warning Messages

Message	Description	Recommended Action
CMOS checksum invalid, run SCU	CMOS RAM information has been corrupted and needs to be reinitialized.	Run Computer Setup to reinitialize CMOS-RAM.
CMOS failure, run SCU	CMOS RAM has lost power.	Run Computer Setup to reinitialize CMOS-RAM.
Diskette controller error	The diskette drive controller failed to respond to the recalibrate command.	If there is no diskette drive in the system, run Computer Setup to properly configure the CMOS-RAM to show no diskette drive present. If the problem persists, or if a diskette drive is present, complete these steps until the problems is solved: 1. Power-down the system and check diskette drive connections. 2. Replace diskette drive. 3. Replace system board.
Diskette track 0 failed	The diskette drive cannot read track 0 of the diskette in the drive.	Try another diskette. If the problem persists, you may need to replace the diskette drive.

Continued

Table 2-1 Warning Messages *Continued*

Message	Description	Recommended Action
Diskette information invalid, run SCU	The drive parameters stored in CMOS RAM do not match the diskette drives detected in the system.	Run Computer Setup.
Hard disk controller error	The hard drive controller failed to respond to the reset command.	Check the drive parameters. Turn off the system and check all related connections.
Hardware information does not match video card, run SCU	The video adapter type specified in CMOS RAM does not match the installed hardware.	Run Computer Setup.
Keyboard controller failure	The keyboard failed the self-test command.	Replace the system board.
Keyboard failure	The keyboard failed to respond to the RESET ID command.	Replace the keyboard. If the problem persists, replace the system board.
No interrupts from Timer 0	The periodic timer interrupt is not occurring.	Replace the system board.
RAM parity error at location xxxx	A RAM parity error occurred at the specified (hex) location.	Press **F1**
ROM at xxxx (LENGTH yyyy) with nonzero checksum (zz)	An illegal adapter ROM was located at the specified address.	Check the external adapter (such as a video card) to determine if it is causing the conflict.
Time/Date corrupt - run SCU	The time and date stored in the real-time clock have been corrupted, possibly by a power loss.	1. Run Computer Setup. 2. If problem persists, replace auxiliary battery. 3. If problems persists, replace system board.
Unexpected amount of memory, run SCU	The amount of memory detected by POST does not match the amount specified in CMOS RAM.	Run Computer Setup.
Hard disk xx failure (or error)	A failure or an error occurred when trying to access the hard drive.	1. Run Scan disk. 2. Check disk in DOS and Windows 95 or later. 3. If problem persists, refer to Table 2-10.
Unsupported memory module	An EDO memory module was installed in the memory expansion slot.	Remove the EDO memory module and replace with SDRAM memory module.

Fatal errors emit a beep and may display a FATAL message. Fatal errors indicate severe problems, such as a hardware failure. Fatal errors do not allow the system to resume. Some of the Fatal error beep codes are listed at the end of this section.

Table 2-2
Fatal Error Messages

Message	Description	Beep Code
CMOS RAM test failed	A walking bit test of CMOS RAM location 0E (Hex) - 3F (Hex) failed.	3
DMA controller faulty	A sequential read/write of the transfer count and transfer address registers within the primary and secondary DMA controllers failed.	4
Faulty DMA page registers	A walking bit read/write of the 16 DMA controller page registers starting at location 80 Hex failed.	0
Faulty refresh circuits	A continuous read/write test of port 61h found that bit 4 (Refresh Detect) failed to toggle within an allotted amount of time.	1
Interrupt controller failed	A sequential read/write of various Interrupt Controller registers failed.	5
ROM checksum incorrect	A checksum of the ROM BIOS does not match the byte value at F000:FFFF.	2
RAM error at location xxxx	RAM error occurred during memory test.	None

Table 2-3
Fatal Error Beep Codes

Beep Code	Beep Sequence	Description	Recommended Action
0	S-S-S-P-S-S-L-P	The DMA page registers are faulty.	Replace system board.
1	S-S-S-P-S-L-S-P	The refresh circuitry is faulty.	
2	S-S-S-P-S-L-L-P	The ROM checksum is incorrect.	
3	S-S-S-P-L-S-S-P	The CMOS RAM test failed.	
4	S-S-S-P-L-S-L-P	The DMA controller is faulty.	
5	S-S-S-P-L-L-S-P	The interrupt controller failed.	
6	S-S-S-P-L-L-L-P	The keyboard controller failed.	
7	S-S-L-P-S-S-S-P	Graphics adapter is faulty.	
8	S-S-L-P-S-S-L-P	Internal RAM is faulty.	Replace memory board or system board if memory on system board is faulty.

S = Short, L = Long, P = Pause

2.5 Compaq Utilities

Compaq Utilities contain several functions that

- Determine if various computer devices are recognized by the system and are operating properly.
- Provide information about the system after it is configured.

Compaq Utilities include the following programs:

- Computer Setup
- Computer Checkup (TEST)
- View System Information (INSPECT)

To access Compaq Utilities:

1. Turn on or restart the computer by clicking Start ⇒ Shut Down ⇒ Restart the computer.
2. Press **F10** when the blinking cursor appears in the upper-right corner of the display.
3. Select a menu option.

2.5.1 Computer Setup

Computer Setup contains utilities that give you an overall picture of the computer hardware configuration and aid in troubleshooting. These utilities also allow you to set custom features such as security options, power conservation levels, and startup preferences.

If you are running Windows 95 or later, the computer automatically recognizes and configures the system for new devices. If you have a configuration problem, or want to view or reset configuration settings, you can use Computer Setup.

NOTE: If you are running Windows 95 or later, you should use Computer Setup only to adjust system features such as battery conservation level. Windows 95 or later may override other configuration changes.

If you are running Windows NT, the computer does not automatically recognize new devices added to the system. All devices ordered with your system have been configured for you. Use Computer Setup to view settings for a new device you have added or to reset configuration settings for preinstalled devices.

Computer Setup provides two methods of viewing the computer configuration: by type (factory setting) or connection.

Categories by type:

- System features—security, power, boot management
- Communication—port, modem, and other communication devices
- Storage—storage-related devices such as hard drive, CD-ROM drive, DVD-ROM drive, diskette drive
- Input devices—keyboard, mouse, and other input devices
- Network—network adapter or other network-related devices
- Audio—sound properties and audio device settings
- Video—display timeouts and video device resources
- Other—miscellaneous devices

Categories by connection:

- System features—security, power, boot management
- System devices—keyboard, mouse, parallel and serial ports
- ISA—ISA bus and connected devices
- PCI—PCI bus and connected devices
- PC Card—PC Card devices

Running Computer Setup

1. Turn on or restart the computer by clicking Start ⇒ Shut Down ⇒ Restart the computer.
2. Press **F10** when the blinking cursor appears in the upper-right corner of the screen.

   NOTE: If your a setup password is enabled, it must be used to access Computer Setup.
3. Click a language and press **Enter.**
4. Click Computer Setup and press **Enter**.
5. When you are finished, click Exit.

Exiting Computer Setup

1. Click Exit.
2. Select one of the following Exit options:
   - Save—Saves the new settings and exits Computer Setup.

     NOTE: Some settings may not take effect until the computer is restarted.
   - Ignore—Exits Computer Setup and restores previous settings.
   - Cancel—Returns to Computer Setup.

2.5.2 Computer Checkup (TEST)

Computer Checkup (TEST) determines whether the various computer components and devices are recognized by the computer and are functioning properly. You can display, print, or save the information that Computer Checkup generates.

NOTE: Compaq Utilities are intended for testing only Compaq-supplied components. Testing non-Compaq components may be inconclusive.

Running Computer Checkup (TEST)

1. Plug the external power supply into the computer. A low battery condition can interrupt the program.
2. Connect a printer if you want to print a log of error messages.
3. Turn on the external devices that you want to test.
4. Turn on or restart the computer.
5. Access Compaq Utilities by pressing **F10** when the blinking cursor appears in the upper-right corner of the display.
6. Click Computer Checkup ⇒ View the Device List.
   - If the list of installed devices is correct, click OK.
   - If the list is incorrect, ensure that any new devices are installed properly.
7. Select one of the following from the Test Option menu:
   - Quick Check Diagnostics
   - Automatic Diagnostics
   - Prompted Diagnostics
8. Follow the instructions on the screen as the devices are tested.
9. Click Exit Diagnostics ⇒ Exit from this utility.

Computer Checkup (TEST) Error Codes

Computer Checkup (TEST) error codes occur if the system recognizes a problem while running Computer Checkup. These error codes help identify possible defective assemblies. Table 2-4 through Table 2-14 list Computer Checkup error codes, a description of the error condition, and the recommended action for resolving the condition. For removal and replacement procedures, refer to Chapter 5, "Computer Removal and Replacement Procedures."

IMPORTANT: Run Computer Checkup each time you complete a recommended action step. If the problem is resolved when POST and Computer Checkup are rerun (in other words, with no error codes), do not perform the remaining recommended action steps.

NOTE: The error codes in the following tables are listed in an "AYE-XX" format, where:

A or AA = Number that represents the faulty assembly

YY = Test or action that failed

XX = Specific problem

Table 2-4
Processor Test Error Codes

Error Code	Description	Recommended Action
101-xx	CPU test failed.	Replace the processor board and retest.
103-xx	DMA page registers test failed.	Replace the system board and retest.
104-xx	Interrupt controller master test failed.	
105-xx	Port 61 error.	
106-xx	Keyboard controller self-test failed.	
107-xx	CMOS RAM test failed.	
108-xx	CMOS interrupt test failed.	
109-xx	CMOS clock test failed.	
110-xx	Programmable timer load data test failed.	
113-xx	Protected mode test failed.	

Table 2-5
Memory Test Error Codes

Error Code	Description	Recommended Action
200-xx	Memory machine ID test failed.	The following steps apply to error codes 200-xx and 202-xx:
202-xx	Memory system CMOS checksum failed.	1. Flush the system CMOS and retest. See note. 2. Replace the system board and retest.
203-xx	Write/Read test failed.	The following applies to error codes 203-xx through 215-xx:
204-xx	Address test failed.	Remove and replace the SODIMM memory board or system board (if the memory on the system board is faulty) and retest.
211-xx	Random pattern test failed.	
214-xx	Noise test failed.	
215-xx	Random address test failed.	

Table 2-6
Keyboard Test Error Codes

Error Code	Description	Recommended Action
300-xx	Failed ID Test	1. Reseat the keyboard assembly.
301-xx	Failed Self Test/Interface Test	2. Replace the keyboard and retest.
302-xx	Failed Individual Key Test	3. Replace the system board and retest.
304-xx	Failed Keyboard Repeat Test	

Table 2-7
Parallel Printer Test Error Codes

Error Code	Description	Recommended Action
401-xx	Printer failed or not connected.	1. Connect the printer.
402-xx	Failed Port Test	2. Check power to the printer.
403-xx	Printer pattern test failed.	3. Use Compaq Utilities to test port.
		4. Check port and IRQ configuration.
		5. Replace the system board and retest.

NOTE: **Fn**+**F11** clears the ESCD configuration information. If the **Fn**+**F11** sequence is pressed very early after powering the machine on (after you see the keyboard LEDs blink, but before the video is initialized), CMOS memory will be invalidated. The ESCD is cleared, the machine is reset and boots with the "162 - System Options Not Set" message. This is a way to clear out configuration information, such as the Windows 95 or later knowledge about a docking station. It may help clear up problems if the configuration information has been corrupted. Timing of this keystroke sequence is critical, because there is a **very** narrow window during which the keys will be recognized. These keys are not documented to end users.

Table 2-8
Diskette Drive Error Codes

Error Code	Description	Recommended Action
600-xx	Diskette ID drive types test failed.	The following steps apply to error codes 600-xx through 698-xx:
601-xx	Diskette format failed.	1. Replace the diskette.
602-xx	Diskette read test failed.	2. Replace the diskette drive and retest.
603-xx	Diskette write/read/compare test failed.	3. Replace the system board and retest.
604-xx	Diskette random read test failed.	
605-xx	Diskette ID media test failed.	
606-xx	Diskette speed test failed.	
609-xx	Diskette reset controller test failed.	
610-xx	Diskette change line test failed.	
697-xx	Diskette type error	
698-xx	Diskette drive speed not within limits.	
699-xx	Diskette drive/media ID error	1. Replace media. 2. Run Compaq Utilities.

Table 2-9
Serial Test Error Codes

Error Code	Description	Recommended Action
1101-xx	Serial port test failed.	1. Check port configuration. 2. Replace the system board and retest.

Table 2-10
Hard Drive Test Error Codes

Error Code	Description	Recommended Action
1701-xx	Hard drive format test failed.	1. Run Compaq Utilities and verify drive type.
1702-xx	Hard drive read test failed.	2. Verify that all secondary drives have secondary drive capability.
1703-xx	Hard drive write/read/compare test failed.	3. Replace the hard drive and retest.
1704-xx	Hard drive random seek test failed.	4. Replace the system board and retest.
1705-xx	Hard drive controller test failed.	
1706-xx	Hard drive ready test failed.	
1707-xx	Hard drive recalibration test failed.	
1708-xx	Hard drive format bad track test failed.	
1709-xx	Hard drive reset controller test failed.	
1710-xx	Hard drive park head test failed.	
1715-xx	Hard drive head select test failed.	
1716-xx	Hard drive conditional format test failed.	
1717-xx	Hard drive ECC* test failed.	
1719-xx	Hard drive power mode test failed.	
1724-xx	Network preparation test failed.	
1736-xx	Drive monitoring test failed.	

***** ECC = Error Correction Code

Table 2-11
Video Test Error Codes

Error Code	Description	Recommended Action
501-xx	Video controller test failed.	The following actions apply to error codes 501-xx through 516-xx:
502-xx	Video memory test failed.	1. Disconnect external monitor and test with internal LCD display.
503-xx	Video attribute test failed.	2. Replace the display assembly and retest.
504-xx	Video character set test failed.	3. Replace the system board and retest.
505-xx	Video 80 × 25 mode 9 × 14 character cell test failed.	
506-xx	Video 80 × 25 mode 8 × 8 character cell test failed.	
507-xx	Video 40 × 25 mode test failed.	
511-xx	Video screen memory page test failed.	
512-xx	Video gray scale test failed.	
514-xx	Video white screen test failed.	
516-xx	Video noise pattern test failed.	
2402-xx	Video memory test failed.	The following actions apply to error codes 2402-xx through 2456-xx:
2403-xx	Video attribute test failed.	1. Run Compaq Utilities.
2404-xx	Video character set test failed.	2. Disconnect external monitor and test with internal LCD display.
2405-xx	Video 80 × 25 mode 9 × 14 character cell test failed.	3. Replace the display assembly and retest.
2406-xx	Video 80 × 25 mode 8 × 8 character cell test failed.	4. Replace the system board and retest.
2411-xx	Video screen memory page test failed.	
2412-xx	Video gray scale test failed.	
2414-xx	Video white screen test failed.	
2416-xx	Video noise pattern test failed.	
2418-xx	ECG/VGC memory test failed.	
2419-xx	ECG/VGC ROM checksum test failed.	
2421-xx	ECG/VGC 640 × 200 graphics mode test failed.	
2422-xx	ECG/VGC 640 × 350 16 color set test failed.	
2423-xx	ECG/VGC 640 × 350 64 color set test failed.	
2424-xx	ECG/VGC monochrome text mode test failed.	
2425-xx	ECG/VGC monochrome graphics mode test failed.	
2431-xx	640 × 480 graphics test failed.	
2448-xx	Advanced VGA Controller test failed.	

Continued

Table 2-11 Video Test Error Codes *Continued*

Error Code	Description	Recommended Action
2451-xx	132-column Advanced VGA test failed.	
2456-xx	Advanced VGA 256 Color test failed.	
2458-xx	Advanced VGA Bit BLT test failed.	The following step action to error codes 2458-xx to 2480-xx:
2468-xx	Advanced VGA DAC test failed.	Replace the system board and retest.
2477-xx	Advanced VGA data path test failed.	
2478-xx	Advanced VGA Bit BLT test failed.	
2480-xx	Advanced VGA Linedraw test failed.	

Table 2-12
Audio Test Error Codes

Error Code	Description	Recommended Action
114-01	Speaker test failed.	1. Check system configuration. 2. Verify that the audio/led board is properly seated. 3. Verify display audio cable connection.
3206-xx	Audio System Internal Error	Replace the audio board and retest.

Table 2-13
Pointing Device Interface Test Error Codes

Error Code	Description	Recommended Action
8601-xx	Pointing device test failed.	Replace the keyboard/CPU cover assembly.
8602-xx	Interface test failed.	

Table 2-14
CD-ROM Drive Test Error Codes

Error Code	Description	Recommended Action
3301-xx	CD-ROM drive read test failed.	1. Replace the CD and retest. 2. Verify that drivers are loaded and properly installed.
3305-xx	CD-ROM drive seek test failed.	3. Replace the CD-ROM drive and retest. 4. Replace the system board and retest.
6600-xx	ID test failed.	
6605-xx	Read test failed.	
6608-xx	Controller test failed.	
6623-xx	Random read test failed.	

2.5.3 Running View System Information (INSPECT)

The View System Information (INSPECT) utility provides information about the computer and installed or connected devices. You can display, print, or save the information.

To access the INSPECT utility:

1. Connect a printer if you want to print the INSPECT information.
2. Turn on or restart the computer.
3. Access Compaq Utilities by pressing **F10** when the cursor blinks in the upper-right corner of the display.
4. If prompted, select a language.
5. Click View System Information (INSPECT).
6. Click the item you want to view. The list includes:

- System
- ROM
- Keyboard
- System ports
- System storage
- Graphics
- Memory
- Audio
- Operating system
- System files
- Windows files
- Miscellaneous
- Network (applicable only if computer is docked in the Convenience Base II)

7. Follow the instructions on the screen to cycle through the screens, to return to the list and choose another item, or to print the information.
8. Select Exit Inspect.

2.5.4 Running Compaq Diagnostics

Compaq Diagnostics provides computer component information when the operating system is working.

If you are running Windows 95 or later, access Compaq Diagnostics for Windows by double-clicking My Computer ⇒ Control Panel ⇒ Compaq Diagnostics.

2.5.5 Boot Sequencing

1. Run Computer Setup.
2. Click the System Features icon ⇒ Boot Management box ⇒ MultiBoot tab.
3. Designate the hard drive boot (startup) sequence you want.
4. Click **OK** to accept the changes.

2.5.6 Factory Default Settings

Table 2-15
Factory Default Settings

Initialization	
Enable POST Memory Test	Checked (enabled)
Keyboard NumLk	Unchecked (Off)
1	Hard drive in the computer
2	Hard drive in the computer MultiBay
Boot display	Auto
Language	Language of country
Ports	
Serial ports	
Serial port	3F8, IRQ4
Unassigned	2F8, IRQ3
Parallel port	378, IRQ7
Ethernet port	300, IRQ9

Continued

Table 2-15 Factory Default Settings *Continued*

Power	
Low Battery Warning Beep	Checked (enabled)
External Energy-Saving Monitor Connected	Unchecked (not connected)
Power Management	
Enabled	While operating power on battery
Conservation Level	Medium
Level Definition	
High	Suspend Time: 5 minutes Hibernation Timeout: Immediate Drive Timeout: 2 minutes Screen Timeout: 2 minutes
Medium	Suspend Time: 10 minutes Hibernation Timeout: 1 hour Drive Timeout: 6 minutes Screen Timeout: 4 minutes
Custom	Suspend Time: disabled Hibernation Timeout: low battery Drive Timeout: always on Screen Timeout: always on
Security	
Enable QuickLock/QuickBlank	Unchecked (Disabled)
Enable Power-On Password	Unchecked (Disabled)
Disable Serial/Infrared Ports	Unchecked (Enabled)
Disable Parallel Port	Unchecked (Enabled)
Disable PC Card Slots	Unchecked (Enabled)
Setup Password	Password blank
Power-On Password	Password blank
Diskette Drives	
Disable Diskette Drives	Unchecked (Enabled)
Disable Diskette Boot	Unchecked (Enabled)

2.6 Troubleshooting Without Diagnostics

This section provides information about how to identify and correct some common hardware, memory, and software problems. It also explains several types of messages that may be displayed on the screen.

Since symptoms can appear to be similar, carefully match the symptoms of the computer malfunction against the problem description in the Troubleshooting tables to avoid a misdiagnosis.

2.6.1 Before Replacing Parts

When troubleshooting a problem, check the following items for possible solutions before replacing parts:

- Verify that cables are connected properly to the suspected defective parts.
- Verify that all required device drivers are installed.
- Verify that all printer drivers have been installed.

2.6.2 Checklist for Solving Problems

If you encounter a minor problem with the computer or software applications, go through the following checklist for possible solutions:

- Is the computer connected to an external power source, or does it have a fully charged battery pack installed?
- Are all cables connected properly and securely?
- Did the diskette drive contain a nonbootable diskette when you turned on the computer?
- Have you installed all the needed device drivers? For example, if you are using a mouse, you may need to install a mouse device driver.
- Are printer drivers installed?

Eliminating the typical problems described in this Troubleshooting section may save you time and money. If the problem appears related to a software application, check the documentation provided with the software. You may discover something you can easily resolve by yourself.

Solving Audio Problems

Table 2-16
Solving Audio Problems

Problem	Probable Cause	Recommended Action(s)
Computer does not beep after the Power-On Self-Test (POST).	Speaker volume has been turned down.	Adjust the volume with the volume control buttons located at the top-right corner of the computer.
Computer beeped five times and battery light is blinking.	Computer has entered a low-battery condition.	Immediately save open files and resolve the low-battery condition.
Computer does not beep to indicate a low-battery condition.	Low-battery warning beeps have been turned off.	Enable low-battery warning beeps in Windows 95 or later Power Properties or in Computer Setup power management.
	System beeps have been turned down too low.	Press **Fn+F5**, then press the right arrow key to increase the volume of the system beeps.
Audio playback is too low or too loud.	The computer volume control and/or the software volume control needs to be adjusted.	In Windows 95 or later, adjust the computer volume control buttons and adjust the volume control in Multimedia Properties. **NOTE**: The volume control in Multimedia Properties only affects the "Wave" audio sources such as system sounds and *.wav file playback. To change other sources such as MIDI, video sound, and game effects, use the Volume Control application in accessories/Multimedia. In Windows NT, adjust the multimedia volume control under the Accessories folder.
Internal speakers produce no sound.	Volume has been muted.	Press the increase volume control button to increase the volume. Press **Fn+F5**, then press the right arrow key to increase the volume of the system beeps.
	External speakers or headphones are connected to the computer.	Use the external speakers or headphones or use the Convenience Base II speakers.
		To use the internal speakers, disconnect the external speakers or headphones or undock the computer.
	Speaker wires are not connected.	Make sure the speaker wires are connected properly.
	Speakers are bad.	Replace the speakers.

Continued

Table 2-16 Solving Audio Problems *Continued*

Problem	Probable Cause	Recommended Action(s)
Internal speaker does not produce sound when an external audio source is connected to the stereo line-in jack.	Volume may be turned off or set too low.	■ Adjust the volume control located at the top-right corner of the computer. ■ Use the volume control and mixing features available in Control Panel ⇒ Multimedia. ■ Adjust the volume using the speaker icon on the taskbar.
	Line input may not be connected properly.	Check line input connection.
	Headphones or speakers are connected to the stereo speaker/headphone jack, which disables the internal speakers.	Disconnect the headphones or speakers to enable the internal speakers.
External microphone does not work.	The wrong type of microphone or microphone plug is being used.	Check to see if a monophonic electric condenser microphone with a 3.5-mm plug is being used.
	The microphone may not be connected properly.	Ensure that the microphone plug is properly connected to the mono microphone jack.
	Sound source is not selected.	Ensure that microphone is selected as the recording source in Control Panel ⇒ Multimedia and that the recording level is adjusted.
No sound from game program	Audio settings are not set correctly.	Check the game program audio settings.
	Computer volume control is turned down.	Adjust the volume with the volume control buttons located at the top right corner of the computer.
	Headphones are connected.	Use or disconnect the headphones.
No sound from headphones	Volume or mixing controls set incorrectly.	■ Adjust the volume with the volume control buttons located at the top right corner of the computer. ■ Use the volume control and mixing features available in Control Panel ⇒ Multimedia.
	Sound source not selected.	Verify that the sound source is selected in Control Panel ⇒ Multimedia.
	Volume or mixing controls set incorrectly.	■ Adjust the volume with the volume control buttons located on the right side of the computer. ■ Check the volume and mixer controls in Control Panel ⇒ Multimedia.

Solving Battery Problems

The following table lists some common battery problems and recommended actions to take when they occur. The "Solving Power Problems" section in this chapter also may be applicable.

Table 2-17
Solving Battery and Battery Gauge Problems

Problem	Probable Cause	Recommended Action(s)
The computer turns on the first time it is used, but the battery does not charge.	The battery pack is in ship mode.	Remove and reinsert the battery pack.
Computer does not turn on when battery pack is inserted and power cord is unplugged.	Battery is discharged.	Ensure that the battery pack is properly installed. Connect the computer to an external power source and charge the battery pack. Replace the battery pack with a fully charged battery pack. Check battery status by pressing Fn+F8.
Computer beeped five times and battery light is blinking.	Computer has entered a low-battery condition.	Immediately save any open file(s). Then do one of the following: 1. Connect the computer to an external power source. 2. **Turn the computer off and replace the battery pack.**
Computer battery light blinks to indicate low-battery condition, but computer does not beep.	Low-battery beeps were turned off. Volume is turned off or turned down too low.	Run Computer Setup and turn on the low battery warning beeps. Press **Fn**+**F5** to adjust the volume of the system warning beeps.
Battery light does not turn on to indicate battery pack Is charging.	Battery pack is already charged. Battery pack was exposed to temperature extremes. Battery pack is at the end of its life.	No action is necessary. Allow time for the battery pack to return to room temperature. Replace the battery pack.
Battery pack is warm to the touch after charging.	Warming occurs during charging.	No action is required.

Continued

Table 2-17 Solving Battery and Battery Gauge Problems *Continued*

Problem	Probable Cause	Recommended Action(s)
Computer turned off and information in memory was lost when the battery pack was replaced.	Hibernation was disabled, Suspend was not initiated, or AC power was not connected before the discharged battery pack was removed.	To prevent loss of information next time, initiate Suspend, enable Hibernation, or connect AC power before changing batteries..
You have to set the date and time every time you turn on the computer.	Real-time clock (RTC) battery is at the end of its life.	Replace the RTC battery.
Battery pack charge does not last as long as expected.	Battery pack is being exposed to high temperatures or extremely cold temperatures.	Keep the battery pack within the recommended operating temperature range 50°F to 95°F (10°C to 35°C) or recommended non-operating range -22°F to 140°F (-30°C to 60°C). Recharge the battery pack.
	Battery pack has partially self-discharged.	If the computer is disconnected from the external power for more than two weeks, remove the battery pack to reduce the self-discharge rate.
	Power management is disabled.	Press **Fn**+**F7** and set the power conservation level.
	An external device or PC Card is draining the battery.	Turn off or disconnect external devices when not using them.
Computer is beeping and battery power light is blinking.	Battery pack charge is low.	Do one of the following: ■ Charge the battery pack. ■ Replace the battery pack. ■ Connect the computer to an external power source. ■ Initiate Hibernation.

Solving CD-ROM Drive or DVD-ROM Drive Problems

Table 2-18
Solving CD-ROM Drive or DVD-ROM Drive Problems

Problem	Probable Cause	Recommended Action(s)
Cannot read a compact disc.	Compact disc is not properly seated in the drive.	Open the CD loading tray, lay the compact disc on it, then close the tray.
	Compact disc is loaded in the CD loading tray upside down.	Open the CD loading tray, turn over the compact disc (label facing up), then close the tray.
	Compact disc has a scratch on its surface.	Insert a different compact disc.
Drive is not recognized by the computer.	Drive is not connected properly.	Turn off the computer, remove the drive and reinsert it.

Solving Diskette and Diskette Drive Problems

Table 2-19
Solving Diskette and Diskette Drive Problems

Problem	Probable Cause	Recommended Action(s)
Diskette drive cannot read a diskette.	Diskette media has a bad sector.	Copy remaining files to the hard drive or another formatted diskette. Reformat the diskette.
	Using the wrong diskette type for the diskette drive type.	Use the required diskette type.
	Diskette is not formatted.	Format the diskette. If you are using Windows 95 or later: 1. From the Windows 95 or later desktop, double-click My Computer. 2. Click 3 ½ Floppy (A:) ⇒ File ⇒ Format. 3. Fill in the appropriate information, then click Start. If you are using Windows NT, format the diskette by entering **format a:** at the system prompt.
Diskette drive cannot write to a diskette.	Diskette is not formatted.	Format the diskette. If you are using Windows 95 or later: 1. From the Windows 95 or later desktop, double-click My Computer. 2. Click 3 ½ Floppy (A:) ⇒ File ⇒ Format. 3. Fill in the required information, then click Start. If you are using Windows NT, format the diskette by entering **format a:** at the system prompt.
	Diskette is write-protected.	Use another diskette that is not write-protected or disable the write-protect feature.
	Writing to the wrong drive.	Check the drive letter in your path statement.
	Not enough space is left on the diskette.	Save the information to another diskette.
	Disable diskette write ability is turned on.	Run Computer Setup. Click on the Storage icon. Make sure Disable diskette write ability is not checked.

Solving Hard Drive Problems

CAUTION: To prevent loss of information, always maintain an up-to-date backup of the hard drive.

Table 2-20
Solving Hard Drive Problems

Problem	Probable Cause	Recommended Action(s)
Cannot access hard drive.	Hard drive is not seated.	Shut down the computer, remove and reinsert the hard drive, then turn on the computer.
	Hard drive was inserted while computer was on, in Suspend, or in Hibernation.	Shut down the computer, then turn it on again to initialize it during power on.
	Hard drive may be damaged.	Try inserting another hard drive.
Reading hard drive takes an unusually long time after restarting the computer.	Hibernation was initiated and system is now exiting from it.	Give the system time to restore the previously saved data.
Hard drive error occurs.	Hard drive has bad sectors or has failed.	Do one of the following: ■ If you are running Windows 95 or later, access ScanDisk by clicking Start ⇒ Programs ⇒ Accessories ⇒ System Tools ⇒ ScanDisk, then check the Automatically fix errors box. Click Start to begin scanning. If you are running Windows NT, go to the system prompt and type **chkdsk** to scan for errors. ■ Reformat the hard drive. ■ Contact your Compaq authorized dealer, reseller, or service provider or Compaq customer support for assistance.
Hard drive error occurs.	Hard drive may be damaged.	Try inserting another removable drive, if the hard drive is in the MultiBay.
Errors occur after starting from an additional hard drive.	Additional hard drive does not have the software and drivers necessary to boot and operate correctly.	Boot from the hard drive supplied with the computer or another hard drive that has the necessary software and drivers.
Hard drive does not work.	Hard drive is not seated.	Turn off and unplug the computer, remove the hard drive, then reinsert it.

Solving Hardware Installation Problems

Table 2-21
Solving Hardware Installation Problems

Problem	Probable Cause	Recommended Action(s)
New device is not recognized as part of the computer system.	The system did not automatically configure the new device.	In Windows 95 or later, double-click the Add New Hardware icon in Control Panel.
		Refer to the documentation that came with the new device for installation instructions.
	Cable(s) of new external device are loose or power cables are unplugged.	Ensure that all cables are properly and securely connected and the power cord is plugged into an electrical outlet.
	Power switch of new external device is not turned on.	1. Turn off the computer. 2. Turn on the external device. 3. Turn on the computer to integrate the device with the computer system.
	New device is not configured for Windows NT.	Use Computer Setup to view settings for the new device or to reset the configuration settings for preinstalled devices.

Solving Modem Problems

Table 2-22
Solving Modem Problems

Problem	Probable Cause	Recommended Action(s)
Modem loses connection.	The connection from the phone line to the modem is loose.	Check to make sure the telephone cable is properly connected.
	Call Waiting has not been disabled.	Disable Call Waiting. 1. Click Start ⇒ Control Panel ⇒ double-click Modems. 2. From the General tab of the Modems Properties page, click Dialing Properties. 3. From the My Locations tab of the Dialing Properties page, check the box labeled This location has call waiting. Select *70, 70#, or 1170 from the drop-down list to disable call waiting for your dialing area.
Noisy telephone line	Phone line noise causing garbled or missing characters, or slow data transfer speeds.	Check your telephone and modem cable connections. If they are a little loose, they can cause noise on the line. Check with your local telephone company for a phone line filter.
Phone line noise causing a disconnection.	Hang-up Delay S Register (S10) set too low.	Change S10 default to 150. 1. Click Start ⇒ Programs ⇒ Accessories ⇒ HyperTerminal. 2. Go to Command Mode. 3. Type **ATS10=150** and press **Enter.** This command causes the modem to take longer to disconnect even if there is noise on the line.

Continued

Table 2-22 Solving Modem Problems *Continued*

Problem	Probable Cause	Recommended Action(s)
No dial tone	Phone service is not connected to the telephone wall jack.	Verify service from the local phone company: 1. Unplug the telephone cable from the telephone wall jack. 2. Connect a telephone to the jack, pick up the handset, and listen for a dial tone. If there is a dial tone, reconnect the modem to the telephone wall jack with the telephone cable and make sure all connections are secure. 3. If there is still no dial tone, contact your local phone company or building manager.
	The modem is not responding to commands from the computer keyboard.	Verify that the modem and computer are connected: 1. Click Start ⇒ Programs ⇒ Accessories ⇒ HyperTerminal. 2. Go to Terminal Mode, then type **AT** and press the **Enter** key. 3. If the modem displays OK, the modem and computer are working together. If the modem displays ERROR, or does not respond, restart the computer and repeat step 1. 4. Type **ATDT** and listen for a dial tone. 5. Type **ATH0** (zero) to hang up.
	Speaker Control AT Command (ATM) is set to 0.	Set the Speaker Control to 1: 1. Click Start ⇒ Programs ⇒ Accessories ⇒ HyperTerminal. 2. Go to Command Mode, type **ATM1** and press **Enter.** 3. Type **ATH1** and listen for a dial tone. 4. Type **ATH0** (zero) to hang up.
	The modem is plugged into a digital PBX line rather than an analog line.	Plug the modem into an analog line. If you are in an office, the analog line is often the one connected to a fax machine or modem. To get an analog line in a hotel, request a room with a "data" line.
Characters are garbled and transfer rates are slow.	There is noise in the telephone line.	■ Check your telephone and modem cable connections. If they are loose, they can cause noise on the line. ■ Check with your local telephone company for a phone line filter.

Continued

Table 2-22 Solving Modem Problems *Continued*

Problem	Probable Cause	Recommended Action(s)
Ten-digit dialing does not work correctly under Windows 95 or later.	Ten-digit dialing doesn't work correctly under Windows 95 or later, making it difficult to dial numbers in a different area code that are not long distance calls.	Since Windows 95 or later does not limit the number of digits you can enter in the Phone Number field, set the Area Code field to match your local area code. Then type the ten-digit telephone number in the Phone Number field.
Modem cable disables/interferes with other telephony devices (Germany, Austria, and Switzerland only).	The modem cable does not provide the additional 4-wire connection required in Germany, Austria, and Switzerland to form the serial pass-through necessary so that other devices can work on the same phone line.	To use another telephony device on the same line in these countries, unplug the modem cable from the wall jack first.
Modem does not dial correctly under Windows 95 or later (Switzerland and Germany only).	The "Wait for dial tone before dialing" check box is checked. This causes Windows 95 or later to issue an ATDT; command. A typical dial string would look like this: ATDT; ATDTnnn-nnnn In Germany and Switzerland, the ';' dial modifier is not permitted to be used in this fashion by regulatory agencies since ATDT; takes the modem off-hook without dialing. Therefore, the modem returns an error message when attempting to dial. The error message reads: "The computer is not receiving a response from the modem. Check that the modem is plugged in, and if necessary, turn the modem off, then turn it back on."	1. Click Start ⇒ Settings ⇒ Control Panel. 2. Double-click the Modems icon. 3. Click the Properties button. 4. Select the Connection tab. 5. Click the "Wait for dial tone before dialing" check box to clear it. 6. Click **OK** ⇒ Close.

Solving PC Card Problems

Table 2-23
Solving PC Card Problems

Problem	Probable Cause	Recommended Action(s)
Computer does not beep when PC Card is inserted but PC Card works correctly.	System beeps are turned down.	Press Fn+F5, then press the right arrow key to increase the system beeps volume.
	PC Card sound effects have been disabled.	In Windows 95 or later, double-click PC Card icon ⇒ Global Settings tab. Deselect Disable PC Card Sound Effects.
Computer does not beep when PC Card is inserted and PC Card does not work.	PC Card is not inserted properly.	Remove and reinsert the card gently to avoid damaging the pins.
	The PC Card slots have been disabled.	Run Computer Setup to enable the PC Card slots. When the system starts, press F10 then select Computer Setup ⇒ Other Devices ⇒ PC Card Controller ⇒ Resources. Deselect the "Disabled" check box.
		In Windows 95 or later, click Start ⇒ Settings ⇒ Control Panel ⇒ System ⇒ Device Manager ⇒ PCMCIA Socket. Double-click the Texas Instruments TI-1131 CardBus controller to view device properties. Deselect the "Disable in this hardware profile" check box.
	Card or card driver is not compatible with the computer or with the operating system.	Contact service provider for a list of compatible PC Cards.
Computer beeps twice, but modem and/or fax does not work.	Telephone cord is not plugged in all the way.	Verify that the telephone connection is secure.
	The wrong COM port is being used to access the card.	Verify the COM port assigned to the card and within the application is correct.
		In Windows 95 or later, click Start ⇒ Help ⇒ Contents ⇒ Troubleshooting ⇒ Problem. Follow the instructions on the screen.
Computer beeps twice but network card does not work.	Network server is unavailable.	Contact system administrator.
Computer beeps twice when a storage card is inserted, but the card does not work.	The wrong drive letter is being used to access the storage card.	Open Windows Explorer and verify the drive letter.
PC Card does not work	Windows NT was running when the PC Card was inserted.	Turn off the computer and reinsert the PC Card.

Solving Power Problems

Table 2-24
Solving Power Problems

Problem	Probable Cause	Recommended Action(s)
Computer will not turn on.	Computer is not connected to a power source.	Insert battery pack or connect an external power source.
	Power cord to the external power source is unplugged.	Ensure that power cord connecting the computer and the external power source is plugged in properly.
	Battery pack is discharged.	Insert a fully charged battery pack or connect an external power source.
	CMOS data is corrupt.	Flush CMOS memory.
Computer will not turn on when connected to external power if battery pack is in the computer.	Battery pack may be defective.	Remove battery pack, insert another battery pack, and try again.
Computer turned off while it was left unattended and the power/suspend light is off.	System initiated Hibernation after a preset timeout.	Turn on the computer to restore information at the point where Hibernation was initiated. **NOTE:** To change the Hibernation timeout setting in Windows 95 or later, click the Hibernation tab in Power Properties. In Windows NT, run Computer Setup and select Power Management.
Computer turned off while it was left unattended and will not turn on.	System initiated Hibernation and/or shut down because of a critical low-battery condition.	Replace the battery pack with a fully charged battery pack or connect an external power source, then turn on the computer.
Computer initiated Suspend or turned off when it was docked.	The maximum operating temperature was exceeded.	Computer is in a high temperature environment and the fan is not able to cool it. Let the computer cool down and turn it on again.
		Make sure the ventilation intake and exhaust are not obstructed.
Hibernation does not work properly.	Hibernation was not reset after a memory upgrade.	Reset Hibernation in the Power Management utility.
Computer does not turn on when connected to external power and no batteries are installed.	Internal power supply is bad.	Replace the internal power supply.

Solving Display Problems

IMPORTANT: Conduct all tests on a working monitor. If the recommended actions do not solve the problem, replace the display. If the problem persists with a new display, replace the system board.

Table 2-25
Solving Display Problems

Problem	Probable Cause	Recommended Action(s)
Characters are dim.	The brightness or contrast control (if applicable) is not set properly.	Adjust the control(s) with the hotkeys: **Fn**+**F9** and **Fn**+**F10**.
	Computer screen is in direct light.	Tilt the display or move computer.
	Display is damaged.	Replace the display.
Screen is blank.	QuickLock/QuickBlank was initiated.	Enter the password to exit QuickLock/QuickBlank.
	Screen save was initiated after the Power Management timeout period.	Press any key or click the mouse.
	Brightness or contrast needs adjusting.	Adjust the control(s) with the hotkeys: **Fn**+**F9** and **Fn**+**F10**.
	Screen has overheated.	If computer is in direct sunlight, move it and allow it to cool.
Computer screen is blank and the screen on an external monitor displays information.	Display was switched to the external monitor.	Press the **Fn**+**F4** hotkeys to display information on the computer screen.
Screen is blank and the power/suspend light is blinking.	System initiated Suspend.	Press the suspend button to exit Suspend. Enter the power-on password if prompted.
Screen is blank and the power/suspend light and the battery light are blinking.	System has entered a critical low-battery condition.	Immediately connect the computer to an external power source or replace the battery pack.

Continued

Table 2-25 Solving Display Problems *Continued*

Problem	Probable Cause	Recommended Action(s)
External monitor does not display information.	External monitor was connected after the computer was turned on.	Press the **Fn**+**F4** hotkeys to switch to the external monitor.
	The external monitor signal cable or power cord is not properly connected.	Ensure that the cables are properly connected.
Small red, green, or blue spots appear on the computer CTFT display.	Small spots, called on-pixels, often appear on CTFT screens. Compaq limits the number of these on-pixels to 0.003 percent.	No action is required.
Display on an external monitor is distorted.	Incorrect display device drivers are installed or incorrect resolution is set.	Double-click the Display icon in Control Panel, click the Settings tab, and set the correct display type and resolution for the external monitor.
	The external monitor is not Energy Star compliant, but monitor energy saving feature is enabled.	Complete these steps: 1. Press any key or move the pointing device to restore the display. 2. If display remains distorted, turn off the monitor, then turn it on again. 3. Disable the monitor energy saving feature in Display Properties or in Computer Setup Power Management.
The image has a black border and does not fill the screen.	The Desktop Area setting is smaller than the Resolution setting.	Adjust the settings for the Desktop Area and Resolution. Double-click Control Panel Display ⇒ Settings ⇒ Compaq.
		Press the **Fn**+**T** keys to expand the image.
Computer screen and external monitor do not display information simultaneously.	Display was switched using the hotkeys.	
	External monitor was not turned on before the system was turned on.	Initiate Suspend, connect the external monitor, and turn on the monitor, then exit Suspend.
	External monitor was connected after the computer was turned on.	Initiate Suspend, connect the external monitor, and turn on the monitor, then exit Suspend.
Unrecognizable characters on internal display or flashing internal display when connected to external monitor.	Toggled to internal monitor from an external monitor that is using higher resolution than that supported by the computer.	Restart the system. If simultaneous display is desired, use the resolution supported by the computer.

Solving USB Problems

Table 2-26
Solving USB Problems

Problem	Probable Cause	Recommended Action(s)
External device connected to a USB connector does not work.	The operating system limits external devices connected by USB to two tiers that can include no more than two hubs on the first tier and no more than one keyboard and one pointing device on the first or second tier.	Reduce the number of connected external USB devices to no more than two hubs on the first tier, and no more than one keyboard and one pointing device on the first or second tier.
External device connected to a USB connector does not work during startup (before Windows 95 or later loads).	During startup, only two tiers are supported by the USB connector. These tiers can include no more than two hubs on the first tier and no more than one keyboard and one pointing device on the first or second tier.	■ Use the external device only after Windows 95 or later has loaded. ■ Reduce the number of connected external USB devices to no more than two hubs on the first tier, and no more than one keyboard and one pointing device on the first or second tier.
External devices in lower tiers do not work.	An unpowered hub is connected to another unpowered hub.	■ Use only powered hubs. ■ Make sure that all unpowered hubs are immediately preceded by powered hubs in the USB chain.

Solving Memory Problems

Some common causes and solutions for memory problems are listed in the following table.

Table 2-27
Solving Memory Problems

Problem	Probable Cause	Recommended Action(s)
Memory count during POST is incorrect	Optional memory expansion board is installed incorrectly, is incompatible with the computer, or is defective	Ensure that the optional memory expansion board is installed correctly
"Out of Memory" message is displayed on the screen or insufficient memory occurs during operation.	System ran out of memory for the application	■ Check the application documentation for memory requirements ■ Install additional memory.
	Too many terminate and stay resident (TSR) applications are running.	Remove from memory any TSR applications that you do not need

Solving Software Application Problems

Most software application or installation problems occur as a result of one or more of the following:

- The application was not installed correctly.
- Memory was not allocated correctly.
- A conflict exists between applications.

Table 2-28
Solving Software Application Problems

Problem	Probable Cause	Recommended Action(s)
Cannot use an application	The application has not been added to the PATH statement	Run the program with the full path name.
Insufficient memory to run application	System ran our of memory for the application	■ Check the application documentation for memory requirements. ■ Install additional memory
	Too many terminate and stay resident (TSR) applications are running.	Remove from memory any TSR applications you do not need

Solving Keyboard and Mouse Problems

Table 2-29
Solving Keyboard Problems

Problem	Probable Cause	Recommended Action(s)
External keyboard does not work	External keyboard may not be securely connected ro may be connected to an incorrect external connector.	Ensure that the external keyboard is properly and securely connected to the external keyboard connector.

Table 2-30
Solving Mouse Problems

Problem	Probable Cause	Recommended Action(s)
External mouse does not work	External mouse may not be securely connected or may be connected to an incorrect external connector.	Ensure the external mouse is securely connected to the mouse connector or the correct external connector.
	Mouse was connected after system was turned on.	Turn off the unit, connect the mouse, and turn the unit on to integrate the mouse.

Solving External Device Installation Problems

Table 2-31
Solving External Device Installation Problems

Problem	Probable Cause	Recommended Action(s)
A new device is not recognized as part of the computer system	Power switch of the new external device was not turned on before the system was turned on.	Initiate Suspend, ensure the external device is connected properly, and turn on the external device, then exit Suspend.

chapter 3

ILLUSTRATED PARTS CATALOG

This chapter provides illustrated parts and references for spare parts for the Armada 1500c Series. To review an illustrated parts breakdown of the computer, refer to the *Illustrated Parts Map* that comes with this guide.

3.1 System Unit

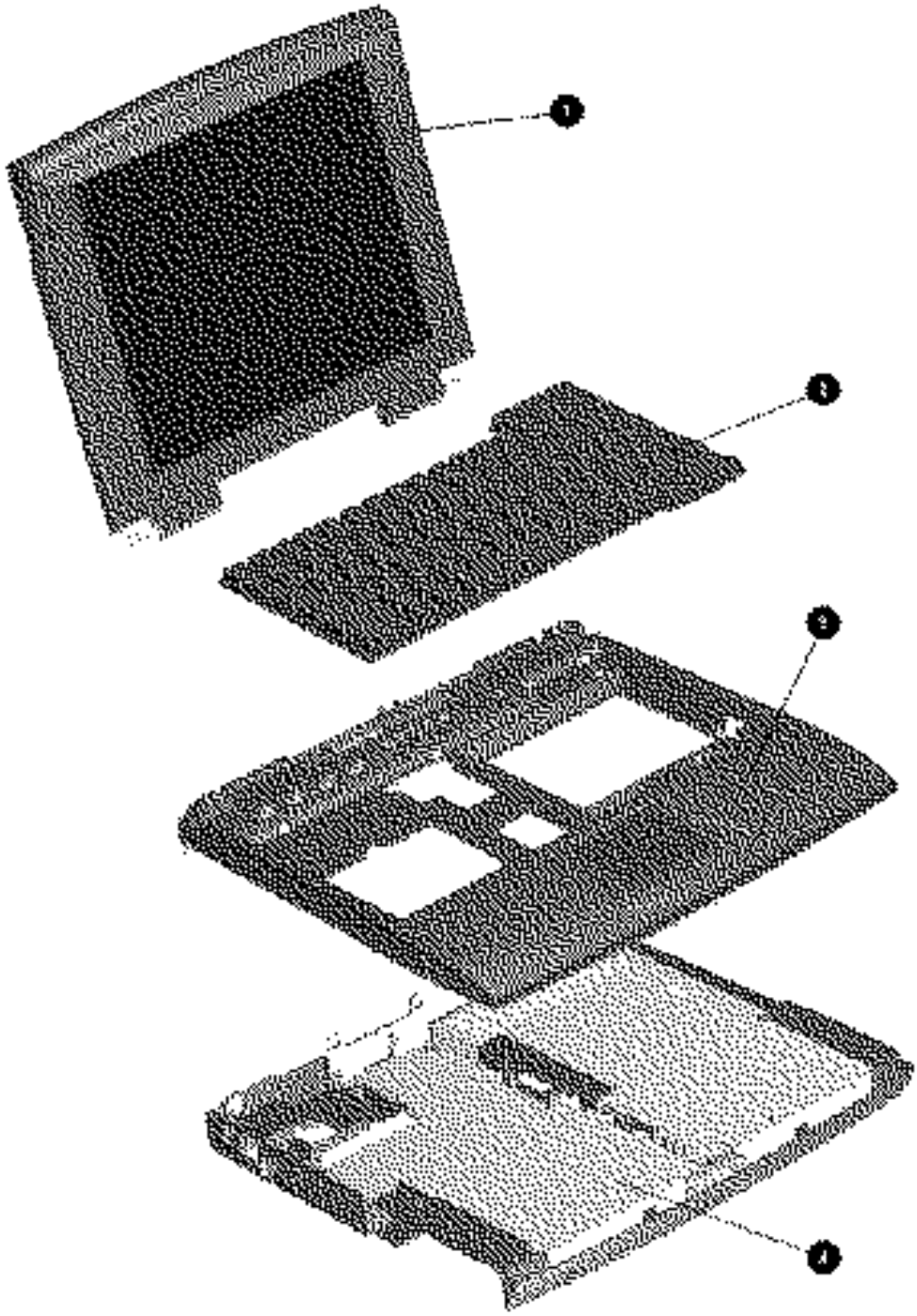


Figure 3-1. *System Unit*

Table 3-1
System Unit

Item	Description	Spares Part Number
□	12.1-inch CSTN display assembly	105999-001
*	12.1-inch CTFT display assembly	106001-001
□	Keyboard (US/Canada)	254968-001
*	Keyboard (Belgian)	254968-181
*	Keyboard (Brazilian)	254968-035
*	Keyboard (Danish)	254968-081
*	Keyboard (French)	254968-051
*	Keyboard (French Canadian)	254968-121
*	Keyboard (German)	254968-041
*	Keyboard (Italian)	254968-061
*	Keyboard (Japanese)	254968-191
*	Keyboard (Korean)	254968-033
*	Keyboard (Latin American Spanish)	254968-161
*	Keyboard (Norwegian)	254968-101
*	Keyboard (Portuguese)	254968-131
*	Keyboard (Spanish)	254968-071
*	Keyboard (Swedish/Finnish)	254968-091
*	Keyboard (Swiss)	254968-111
*	Keyboard (Taiwanese)	254968-034
*	Keyboard (UK English)	254968-031
□	Top cover assembly	401108-001
□	Base enclosure assembly	401101-001

***** Not illustrated

3.2 Mass Storage and DualBay Devices

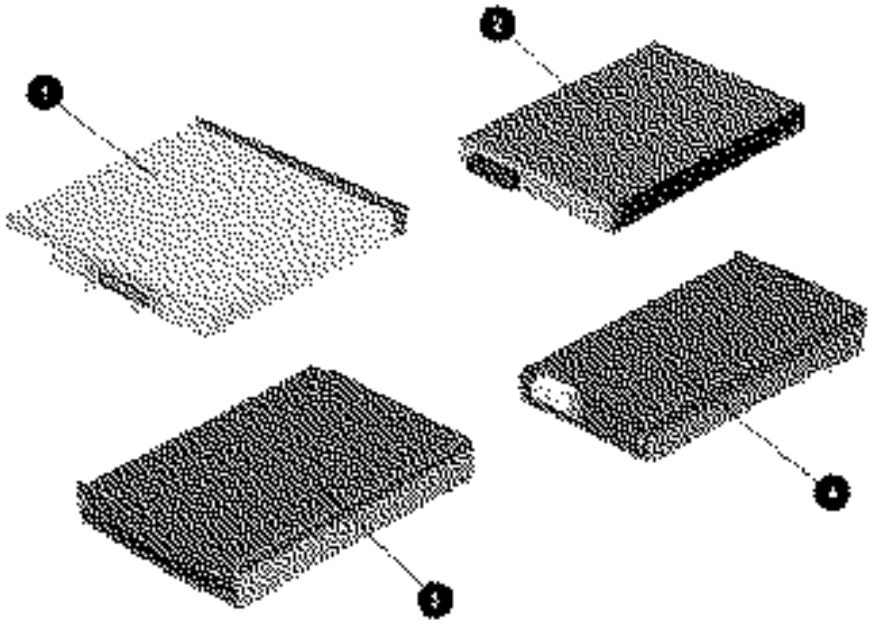


Figure 3-2. *Mass Storage Devices and DualBay Devices*

Table 3-2
Mass Storage Devices and DualBay Devices

Item	Description	Spares Part Number
□	24x CD-ROM drive	401102-001
*	DVD-ROM drive	401097-001
□	4.0-GB hard drive	310344-001
*	5.0-GB hard drive	310364-001
*	6.0-GB hard drive	310365-001
	10.0-GB hard drive	102139-001
□	1.44-MB, diskette drive	254962-001
□	Lithium Ion battery pack	107163-001
*	Nickel Metal Hydride battery pack	107150-001

***** Not illustrated

3.3 Cables and Power Cords

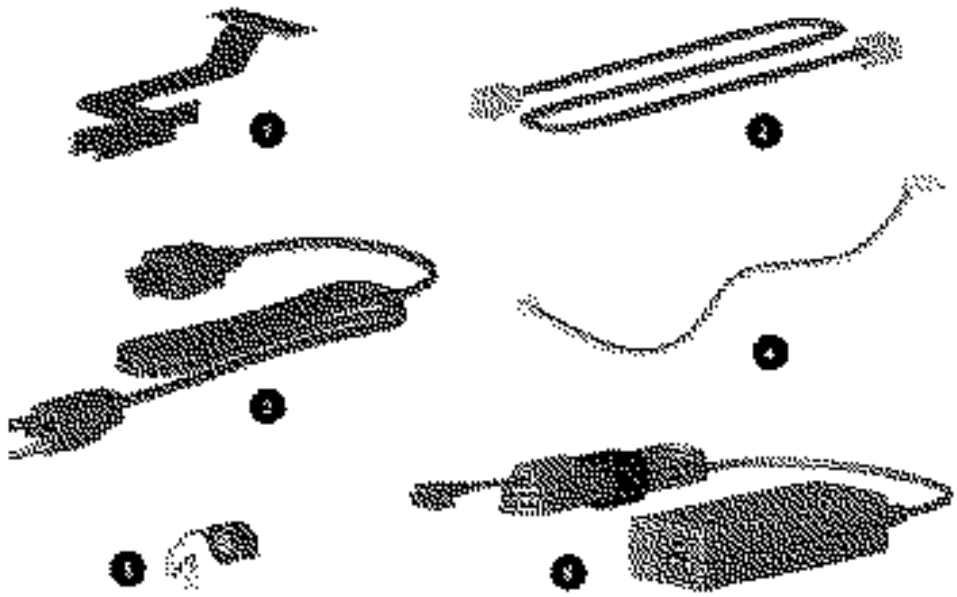


Figure 3-3. *Cables and Power Cords*

Table 3-3
Cables and Power Cords

Item	Description	Spares Part Number
1	CD-ROM/DVD-ROM cable (part of base enclosure assembly)	4011101-001
2	Modem cable	165224-001
3	6' AC Power cord (US/Canada)	246959-001
*	6' AC Power cord (Australia/New Zealand)	246959-011
*	6' AC Power cord (Denmark)	246959-081
*	6' AC Power cord (Europe)	246959-021
*	6' AC Power cord (Italy)	246959-061
*	6' AC Power cord (Japan)	246959-291
*	6' AC Power cord (Korea)	246959-AD1
*	6' AC Power cord (Swiss)	246959-111
*	6' AC Power cord (UK)	246959-031
4	RTC Battery	254971-001
5	Microphone (part of plastics kit)	254981-001
6	External AC adapter (includes DC power cord)	401095-001

***** Not illustrated

3.4 Standard and Optional Boards

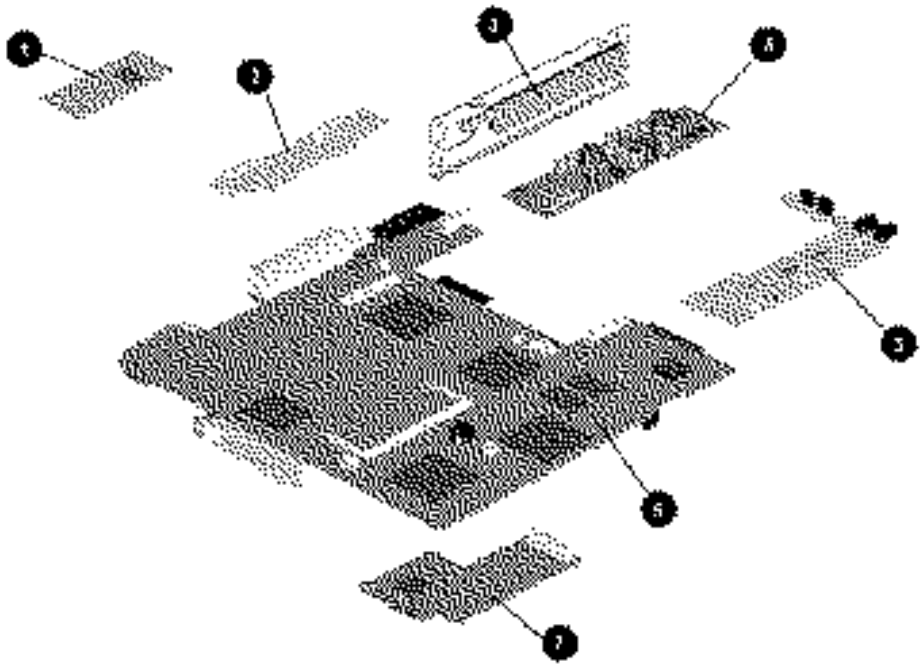


Figure 3-4. *Standard and Optional Boards*

Table 3-4
Standard and Optional Boards

Item	Description	Spares Part Number
□	Memory board (SODIMM), 16-MB, 66 MHz, SDRAM	313917-001
*	Memory board (SODIMM), 32-MB, 66 MHz, SDRAM	313911-001
*	Memory board (SODIMM), 64-MB, 66 MHz, SDRAM	313918-001
*	Memory board (SODIMM), 128-MB, 66 MHz, SDRAM	310345-001
□	LED status board, 12.1-inch CSTN display	401098-001
*	LED status board, 12.1-inch CTFT display	401103-001
□	I/O connector	254956-001
□	DC-DC converter	401106-001
□	Audio board	401096-001
□	System board, 266-MHz CPU with 128K cache	401104-001
*	System board, 300-MHz CPU with 128K cache	401100-001
□	56K modem	401105-001

***** Not illustrated

3.5 Options

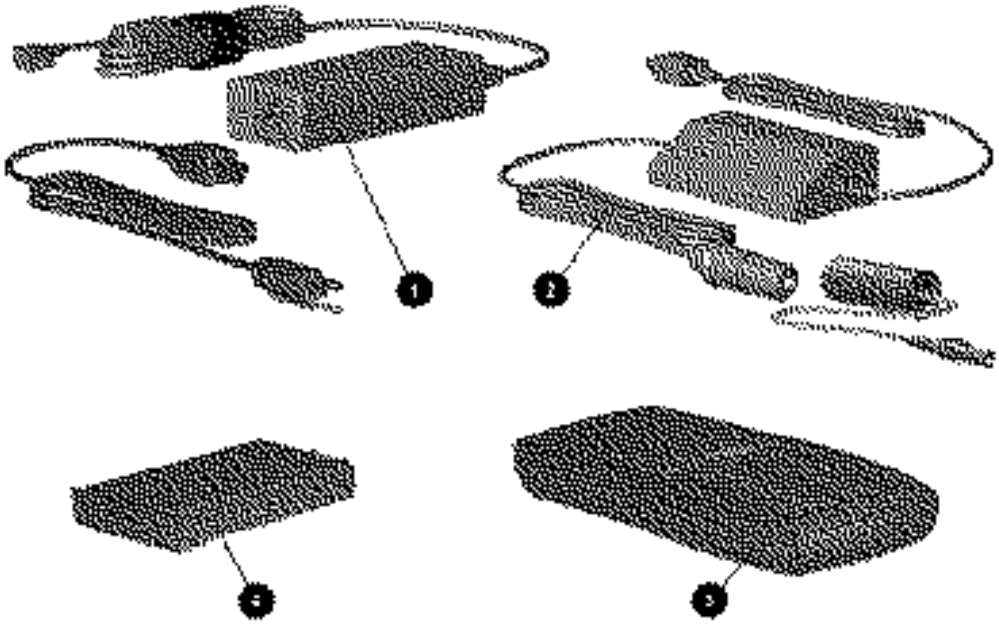


Figure 3-5. *Options*

Table 3-5
Options

Item	Description	Spares Part Number
1	External AC adapter with DC power cord (US/Canada)	401095-001
2	Automobile/Aircraft adapter	313919-001
3	Lithium Ion battery pack	254960-001
4	External battery charger	254970-001

***** Not illustrated

3.6 Miscellaneous Parts

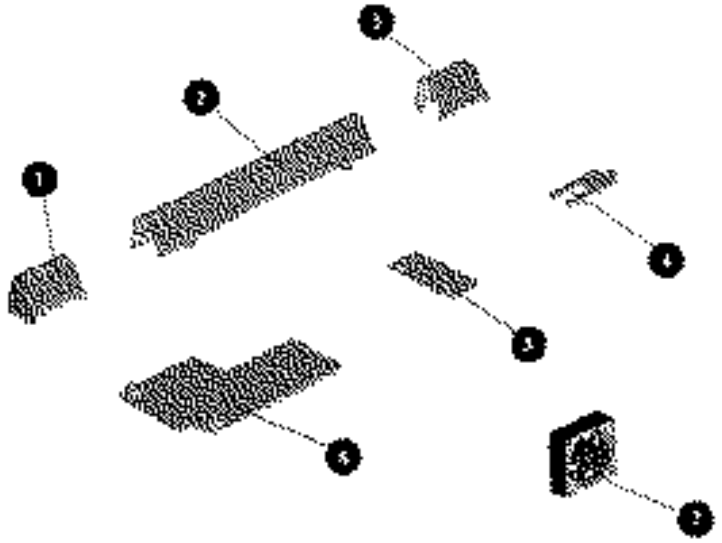


Figure 3-6. *Miscellaneous Parts*

Table 3-6
Miscellaneous Parts

Item	Description	Spares Part Number
	Plastics kit includes:	254981-001
□	Left clutch cover	
□	Microphone/Display cable cover	
□	Right clutch cover	
□	RTC battery cover	
□	CD-ROM/DVD-ROM access door	
□	Modem access door	
*	Rubber feet for base enclosure assembly	
□	Fan	108857-001
*	Logo kit	401099-001
*	Miscellaneous parts kit (includes microphone)	254981-001
*	Screw kit	254980-001
*	Return Kit	254972-001

* Not illustrated

3.8 Documentation

Table 3-7
Documentation

Item	Description	Spares Part Number
*	*Armada 1500c Series Illustrated Parts Map* (10 ea)	104694-001
*	*Armada 1500c Series Maintenance and Service Guide*	104695-001
*	*Armada 1500c Series Reference Guide*	104726-001
*	Country kit	103591-001

chapter 4

REMOVAL AND REPLACEMENT PRELIMINARIES

This chapter provides general service information for the Armada 1500c Series. Adherence to the procedures and precautions described in this chapter is essential for proper service.

4.1 Electrostatic Discharge

A sudden discharge of static electricity from a finger or other conductor can destroy static-sensitive devices or microcircuitry. Often the spark is neither felt or heard, but damage occurs. An electronic device exposed to electrostatic discharge (ESD) may not be affected at all and will work perfectly throughout a normal cycle. Or it may function normally for a while, then degrade in the internal layers, reducing its life expectancy.

Networks built into many integrated circuits provide some protection, but in many cases, the discharge contains enough power to alter device parameters or melt silicon junctions.

Generating Static

Table 4-1 shows how different activities generate static electricity and at different electrostatic voltage levels.

Table 4-1
Typical Electrostatic Voltages

	Relative Humidity		
Event	**10%**	**40%**	**55%**
Walking across carpet	35,000 V	15,000 V	7,500 V
Walking across vinyl floor	12,000 V	5,000 V	3,000 V
Motions of bench worker	6,000 V	800 V	400 V
Removing DIPS from plastic tubes	2,000 V	700 V	400 V
Removing DIPS from vinyl trays	11,500 V	4,000 V	2,000 V
Removing DIPS from Styrofoam	14,500 V	5,000 V	3,500 V
Removing bubble pack from PCBs	26,000 V	20,000 V	7,000 V
Packing PCBs in foam-lined box	21,000 V	11,000 V	5,000 V

NOTE: 700 volts can degrade a product.

Preventing Electrostatic Damage to Equipment

Many electronic components are sensitive to ESD. Circuitry design and structure determine the degree of sensitivity. The following proper packaging and grounding precautions are necessary to prevent damage:

- Protect all electrostatic parts and assemblies with conductive or approved containers or packaging.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.
- Place items on a grounded surface before removing them from their container.
- Always be properly grounded when touching a sensitive component or assembly.
- Place reusable electrostatic-sensitive parts from assemblies in protective packaging or conductive foam.

Use transporters and conveyors made of antistatic belts and metal roller bushings. Mechanized equipment used for moving materials must be wired to ground and proper materials selected to avoid static charging. When grounding is not possible, use an ionizer to dissipate electric charges.

Removing Batteries

Compaq recommends that you remove all batteries from the computer before beginning the disassembly procedures. Failure to do so could cause damage to computer components.

Preventing Damage to Drives

To prevent static damage to hard drives:

- Handle drives gently, using static-guarding techniques.
- Store drives in the original shipping containers.
- Avoid dropping drives from any height onto any surface.
- Handle drives on surfaces that have at least one inch of shockproof foam.
- Always place drives with the PCB assembly-side down on the foam.

Grounding Methods

The method for grounding must include a wrist strap or a foot strap at a grounded workstation. When seated, wear a wrist strap connected to a grounded system. When standing, use footstraps and a grounded floor mat. Table 4-2 shows the protection levels for each grounding method.

Table 4-2
Static-Shielding Protection Levels

Method	Voltages
Antistatic plastic	1,500
Carbon-loaded plastic	7,500
Metallized laminate	15,000

Grounding Workstations

To prevent static damage at the workstation:

- Cover the workstation with approved static-dissipative material. Provide a wrist strap connected to the work surface and properly grounded tools and equipment.
- Use static-dissipative mats, heel straps, or air ionizers to give added protection.
- Handle electrostatic sensitive components, parts, and assemblies by the case or PCB laminate. Handle them only at static-free workstations.
- Avoid contact with pins, leads, or circuitry.
- Turn off power and input signals before inserting and removing connectors or test equipment.
- Use fixtures made of static-safe materials when fixtures must directly contact dissipative surfaces.
- Keep work area free of non-conductive materials such as ordinary plastic assembly aids and Styrofoam.
- Use field service tools, such as cutters, screwdrivers, and vacuums that are conductive.
- Use a portable field service kit with a static dissipative vinyl pouch that folds out of a work mat. Also use a wrist strap and a ground cord for the work surface. Ground the cord to the chassis of the equipment undergoing test or repair.

Grounding Equipment

Use the following equipment to prevent static electricity damage to the equipment:

Wrist Straps are flexible straps with a minimum of 1 megohm +/- 10% resistance to the ground cords. To provide proper ground, a strap must be worn snug against the skin. On grounded mats without banana-plug connectors, connect a wrist strap with alligator clips.

Heel straps/Toe straps/Bootstraps can be used at standing workstations and are compatible with most types of boots and shoes. On conductive floors or dissipative floor mats, use straps on both feet with a minimum of 1 megohm resistance between operator and ground. To be effective, the conductive strips must be worn in contact with the skin.

Recommended Materials and Equipment

Other materials and equipment that are recommended for use in preventing static electricity include:

- Anti-static tape
- Anti-static smocks, aprons, and sleeve protectors
- Conductive bins and other assembly or soldering aids
- Conductive foam
- Conductive table-top workstations with ground cord of 1 megohm of resistance
- Static dissipative table and floor mats with hard tie to ground
- Field service kits
- Static awareness labels
- Wrist straps and footwear straps providing 1 megohm +/- 10% resistance
- Material handling packages
- Conductive plastic bags
- Conductive plastic tubes
- Conductive tote boxes
- Metal tote boxes
- Opaque shielding bags
- Transparent metallized shielding bags
- Transparent shielding tubes

4.2 Service Considerations

Following are some considerations to keep in mind during the disassembly and assembly of the computer.

Tool Requirements

- Magnetic Torx T-8 screwdriver
- Flat-bladed screwdriver (optional)
- 7-mm socket wrench
- 5-mm socket wrench/screw driver
- Preloaded application diskettes

IMPORTANT: To reassemble the computer, set the Torx T-8 screwdriver to 3-inch lbs.

Cables and Connectors

Apply only the tension required to seat or unseat the cables during insertion or removal from connectors. Handle cables by the connector or pull tabs whenever possible. In all cases, avoid bending, twisting, or tearing the cables, and ensure that cables are placed in such a way that they cannot be caught or snagged by parts being removed or replaced.

CAUTION: Improper cable placement can cause severe damage to the unit. Ensure that cables are placed in their proper location during the reassembly process when servicing these computers.

4.3 Serial Number

The computer serial numbers should be provided to Compaq whenever requesting information or ordering spare parts. The serial number is located on the rear of the computer.

chapter 5

COMPUTER REMOVAL AND REPLACEMENT PROCEDURES

This chapter provides the removal and replacement procedures for the computer.

5.1 Serial Number

The computer serial number should be provided to Compaq support when requesting information or ordering spare parts. The serial number is displayed on the rear of the CPU (Figure 5-1).

Figure 5-1. *Serial Number*

NOTE: This model does not have an AC connector port. It has a recessed, sealed opening to allow docking with a convenience base.

5.2 Disassembly Sequence Chart

This chart shows the order in which disassembly procedures are performed:

- 5.3 Preparing the Computer for Disassembly
  - 5.3.1 Disconnecting the AC Power
  - 5.3.2 Undocking the Computer
  - 5.3.3 Battery Pack
  - 5.3.4 DualBay Devices
  - 5.3.5 PCMCIA
- 5.4 Modem
- 5.5 CD-ROM or DVD-ROM Drive
- 5.6 Keyboard
- 5.7 Memory Expansion Board
- 5.8 Hard Drive
- 5.9 Lithium Real-Time Clock Battery
- 5.10 Microphone/Display Cable Cover and Microphone
- 5.11 Clutch Covers/Display Assembly
  - 5.11.1 Clutch Covers
  - 5.11.2 Display Assembly
- 5.12 Top Cover Assembly
- 5.13 LED Status Panel
- 5.14 Audio Board and Audio Cable
- 5.15 DC-DC Converter
- 5.16 Fan
- 5.17 I/O Fixture Connector
- 5.18 System Board
- 5.19 External Computer Components
  - 5.19.1 Computer Logo
  - 5.19.2 Computer Feet

5.3 Preparing the Computer for Disassembly

Before beginning the removal and replacement procedures:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Remove the battery pack (Section 5.3.3).
3. Remove the DualBay device (Section 5.3.4).
4. Remove any PCMCIA cards (Section 5.3.5).

5.3.1 Disconnecting the AC Power

The first procedure that should be performed on the computer is to disconnect the power supply and any external devices.

1. Close all applications and turn off the computer.
2. Turn off and disconnect any external devices.
3. Disconnect the AC power cord from the power source.
4. Disconnect the external power supply from the computer.

If the computer is docked in the convenience base, see Section 5.3.2 for undocking instructions.

5.3.2 Undocking the Computer

If the computer is docked in the convenience base, it must be undocked before performing additional work. Complete the following steps to undock the computer. If the computer is not docked in the convenience base, proceed to Section 5.3.3.

1. Disconnect the AC power and any external cables (Section 5.3.1).
2. Close the computer.
3. Pull the docking lever forward to undock the computer.
4. Lift the computer from the convenience base.

5.3.3 Battery Pack

The battery pack should be removed before performing any internal maintenance on the computer.

WARNING: Metal objects can damage the battery pack as well as the battery contacts in the battery compartment. To prevent damage, do not allow metal objects to touch the battery contacts. Place only the battery pack for the Armada 1500c Series Personal Computer into the battery compartment. Do not force the battery pack into the handle if insertion does not occur easily.

WARNING: Do not crush, puncture, or incinerate the battery pack. Do not dispose of in water. Do not expose to temperatures higher than 60°C. Do not open a battery pack, because this damages the pack, makes it unserviceable, and exposes potentially harmful battery components. There are no field-serviceable parts located inside the battery pack.

To remove the battery pack from the computer:

1. Turn the computer bottom side up.
2. Slide the battery release latch ❶.
3. Remove the battery pack ❷.

Figure 5-2. *Removing the Battery Pack*

To install the battery pack:

1. Insert the battery into the battery compartment.
2. Push firmly until the battery pack is seated into place ❶.

Figure 5-3. *Inserting the Battery Pack*

CAUTION: Installing the battery pack upside down can cause the contacts to break.

5.3.4 DualBay Devices

⚠	**CAUTION:** The device in the DualBay must be removed prior to performing maintenance on the computer.
⚠	**WARNING:** Metal objects can damage the battery pack as well as the battery contacts in the battery compartment. To prevent damage, do not allow metal objects to touch the battery contacts. Place only the battery pack for the Armada 1500c Series into the battery compartment. Do not force the battery pack if insertion does not occur easily.
⚠	**WARNING:** Do not crush, puncture, or incinerate the battery pack. Do not dispose of in water. Do not expose to temperatures higher than 60°C. Do not open a battery pack, because this damages the pack, makes it unserviceable, and exposes potentially harmful battery components. There are no field-serviceable parts located inside the battery pack.

NOTE: If a battery pack is used in the DualBay, use the battery release latch to release the battery.

Either a diskette drive or a modular battery pack may be installed into the DualBay. The device in the DualBay must be removed prior to performing maintenance on the computer. For convenience, a diskette drive is depicted in this sequence. To remove the DualBay device:

1. Turn the computer bottom side up.
2. Pull the diskette drive release latch ❶ toward the front of the computer.
3. Remove the diskette drive ❷.

Figure 5-4. Removing the DualBay Device

To install the DualBay device:

1. Insert the diskette drive into the DualBay compartment
2. Push firmly until the diskette drive is seated into place.

Figure 5-5. Installing the DualBay Device

5.3.5 PCMCIA

Remove any installed PC (PCMCIA) cards before performing any service on the computer. To remove a PC Card:

1. Rotate the PC card eject lever to the forward position ❶.
2. Press the PC card eject button ❷.
3. Pull the PC card out of the PC Card slot ❸.

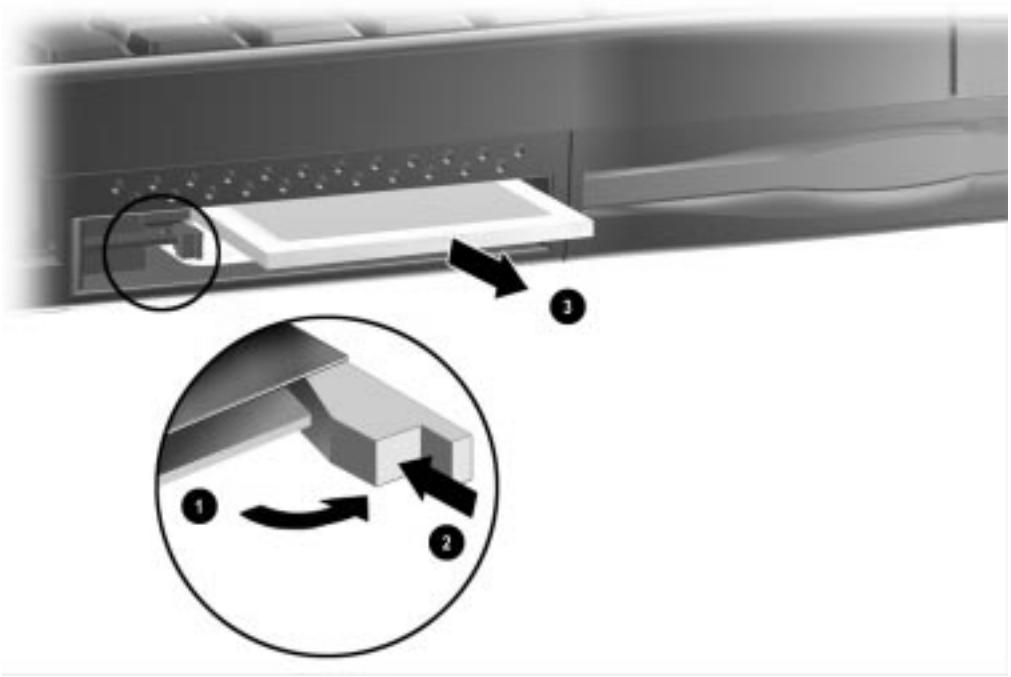


Figure 5-6. *Removing the PC Card*

To install a PC card, insert the card into the slot and press firmly until it is seated.

NOTE: Before replacing the system board, the PC card eject levers must be in the forward position. See Section 5.18 on removing the system board.

5.4 Modem

The modem is an upgrade for the Armada 1500c Series. If the model is not equipped with a modem, the modem compartment is sealed off by a protective plate.

For models equipped with a modem, complete the following steps for removal.

1. Turn the computer bottom side up.
2. Remove two screws from the base enclosure and remove the modem access door ❶.
3. Carefully pull the modem board release tab ❷.

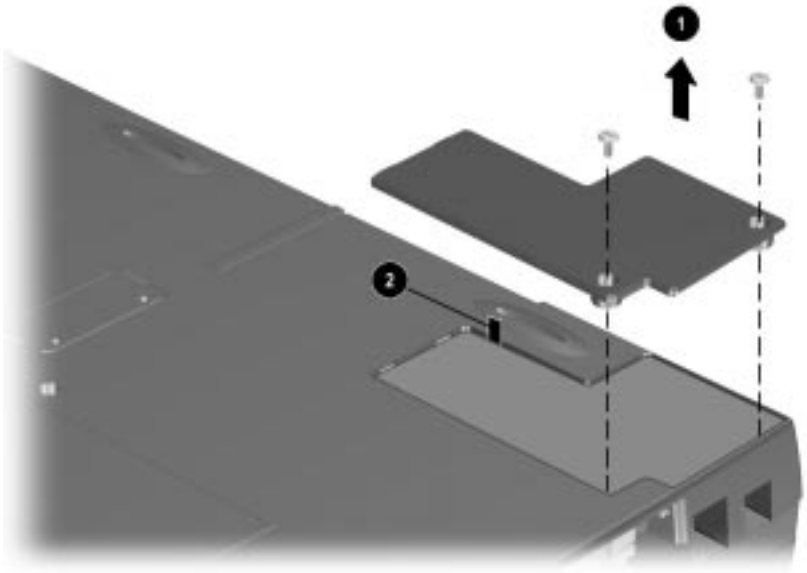


Figure 5-7. *Removing the Modem Access Door*

4. Carefully lift the modem board and remove.

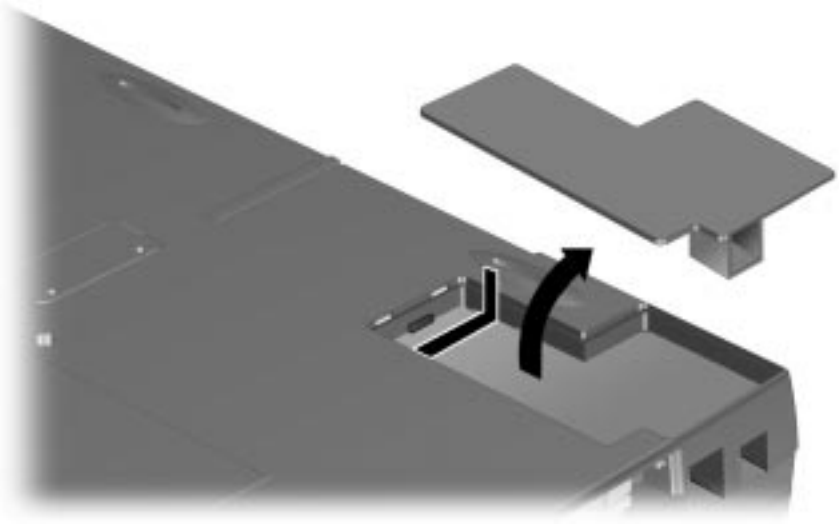


Figure 5-8. *Removing the Modem*

To replace or install the modem, reverse the procedure.

5.5 CD-ROM or DVD-ROM Drive

Either a CD-ROM drive or a DVD-ROM drive may be installed in the unit. For convenience, a CD-ROM drive is depicted in this sequence. To remove the CD-ROM or DVD-ROM drive and access door:

1. Turn the computer bottom side up.
2. Remove two screws from the CD-ROM access door.

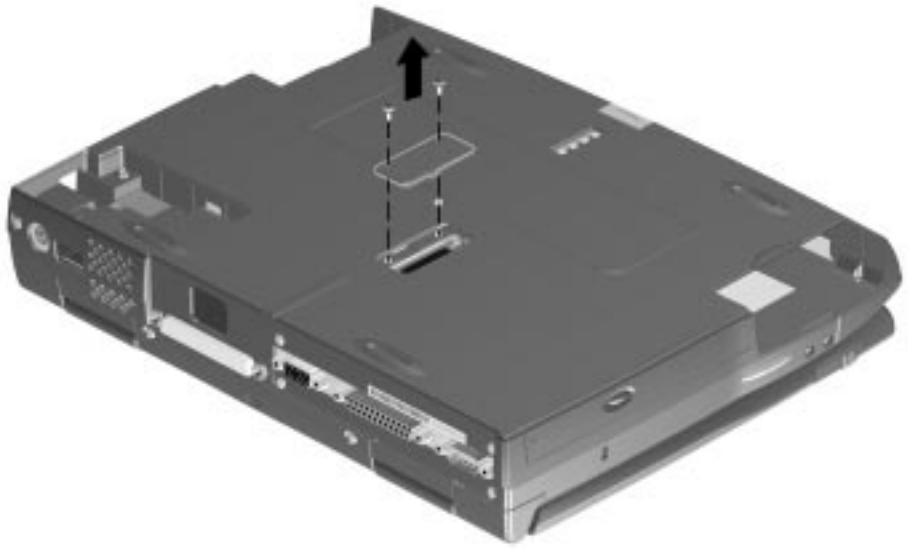


Figure 5-9. *Removing the CD-ROM or DVD-ROM Drive Access Door*

3. Remove the CD-ROM .

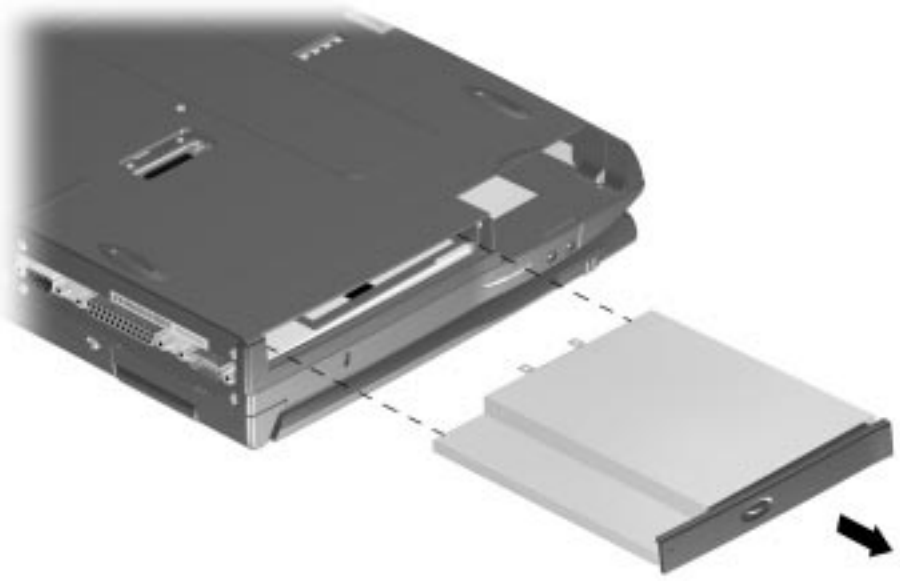


Figure 5-10. *Removing the CD-ROM or DVD-ROM Drive*

To install the CD-ROM drive, reverse the procedure.

5.6 Keyboard

To remove the keyboard:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Remove the battery pack (Section 5.3.3).
3. Remove the DualBay device (Section 5.3.4).
4. Remove any PCMCIA cards (Section 5.3.5).
5. Turn the computer bottom side up.
6. Remove the screws near the rear of the computer from the battery and DualBay compartments and from the bottom of the base ❶. These screws remove the keyboard.

NOTE: It is not necessary to remove the screws ❷ unless you are going to remove the top cover assembly.

7. Remove the upper screws ❷ from the battery and DualBay compartments. These are the remaining base enclosure screws.

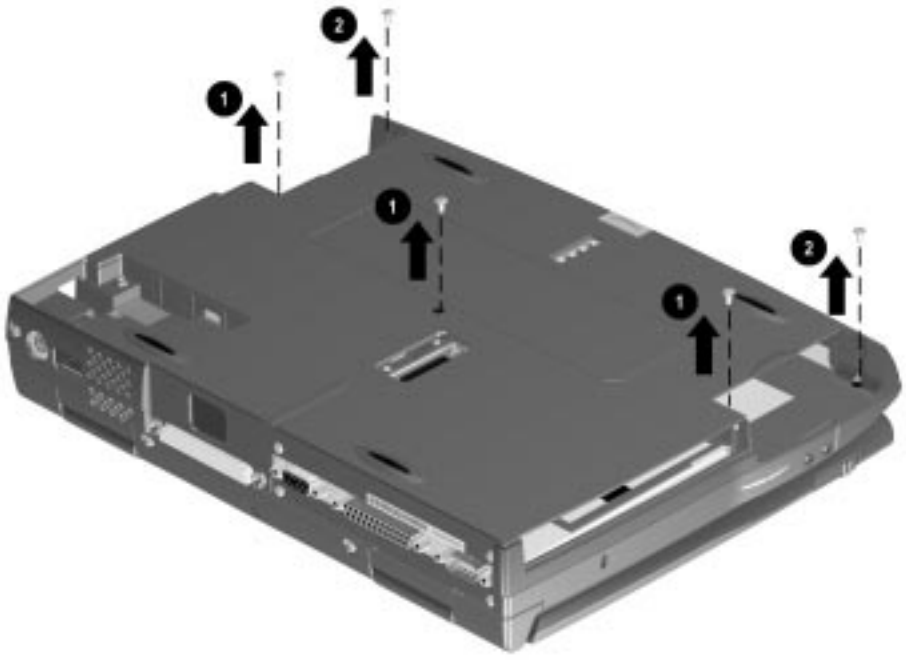


Figure 5-11. *Removing the Keyboard Screws*

8. Turn the computer top side up.
9. Lift the keyboard and rest it on the keyboard slots on the top cover.

NOTE: It is not necessary to disconnect the keyboard cable to remove the memory expansion board, hard drive, or RTC battery.

10. Slide back the ZIF connector to release the keyboard cable.

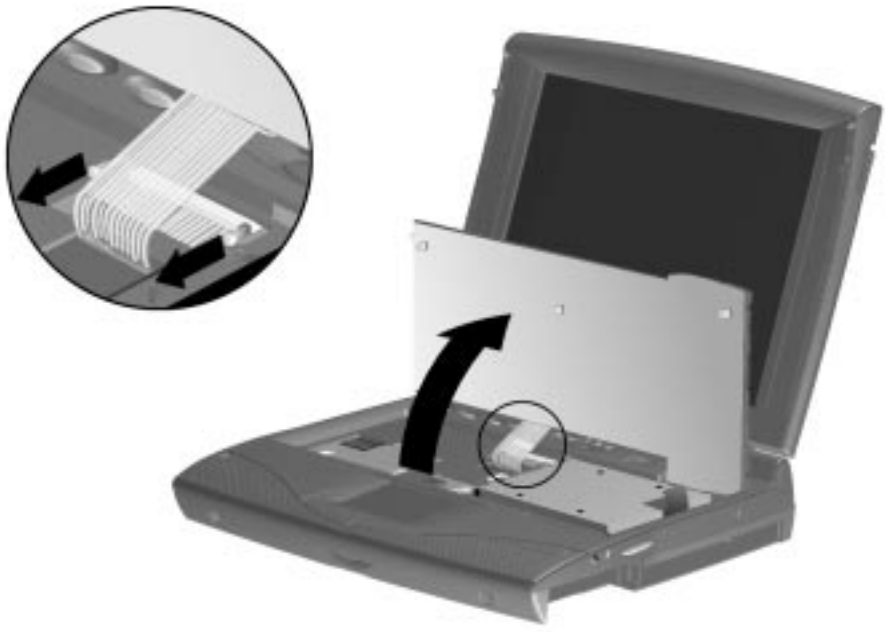


Figure 5-12. *Lifting the Keyboard*

11. Slide the keyboard cable strain relief tab toward you, then pull the tab up to remove it from the slot.
12. Carefully lift the keyboard up and away.

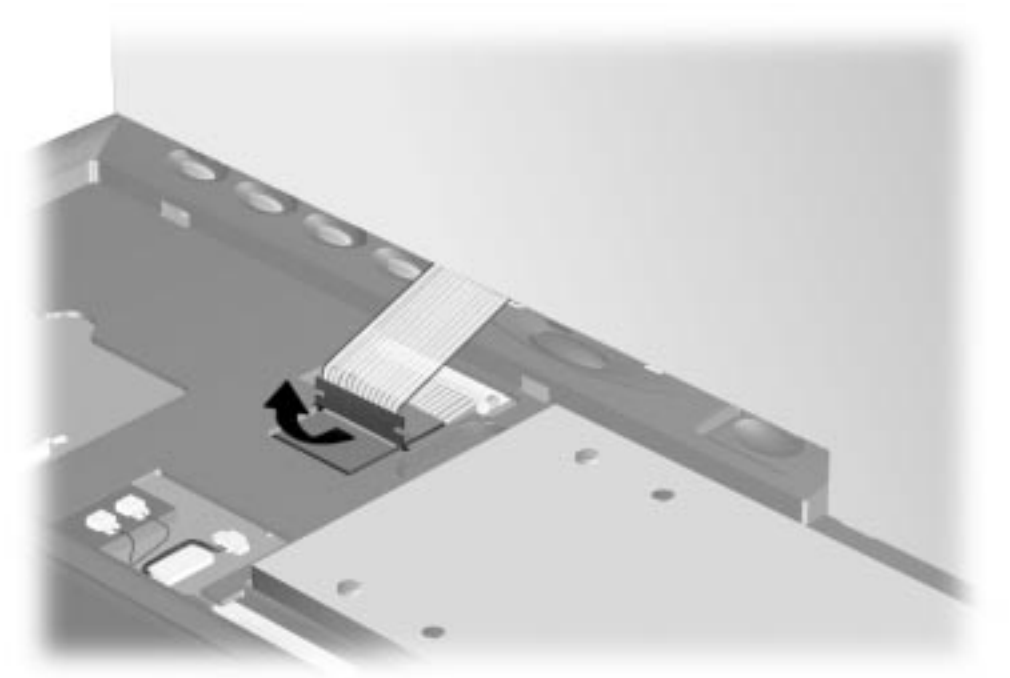


Figure 5-13. *Removing the Keyboard*

To replace the keyboard, reverse the steps.

5.7 Memory Expansion Board

If a memory expansion board option has been previously installed in the computer, it must be removed before another is installed. To remove the memory expansion board:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Remove the battery pack (Section 5.3.3).
3. Remove the DualBay device (Section 5.3.4).
4. Remove any PCMCIA cards (Section 5.3.5).
5. Raise the keyboard (Section 5.6).

CAUTION: Release the locking tabs that secure the memory expansion board in the slot. Failure to release the locking tabs can break the connectors and damage the system board.

6. Release the right ❶ and left ❷ locking tab at each end of the memory expansion board. This releases the memory expansion board and allows it to rotate upward to ease removal.

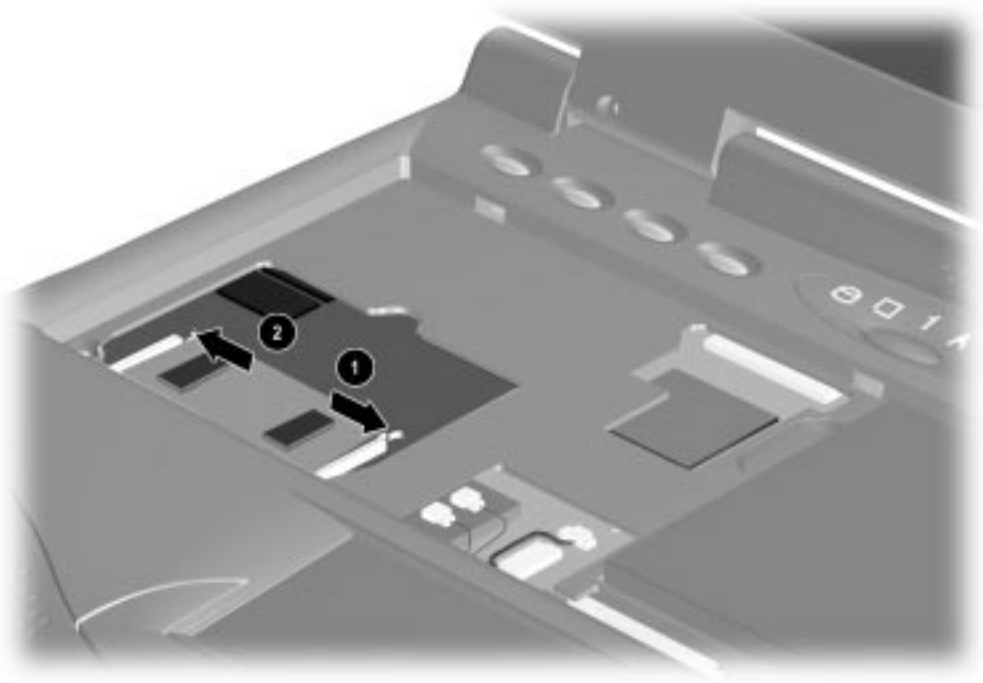


Figure 5-14. *Releasing the Memory Expansion Board*

7. Lift ❶ the free edge of the memory expansion board slightly and pull ❷ it straight out of the slot.

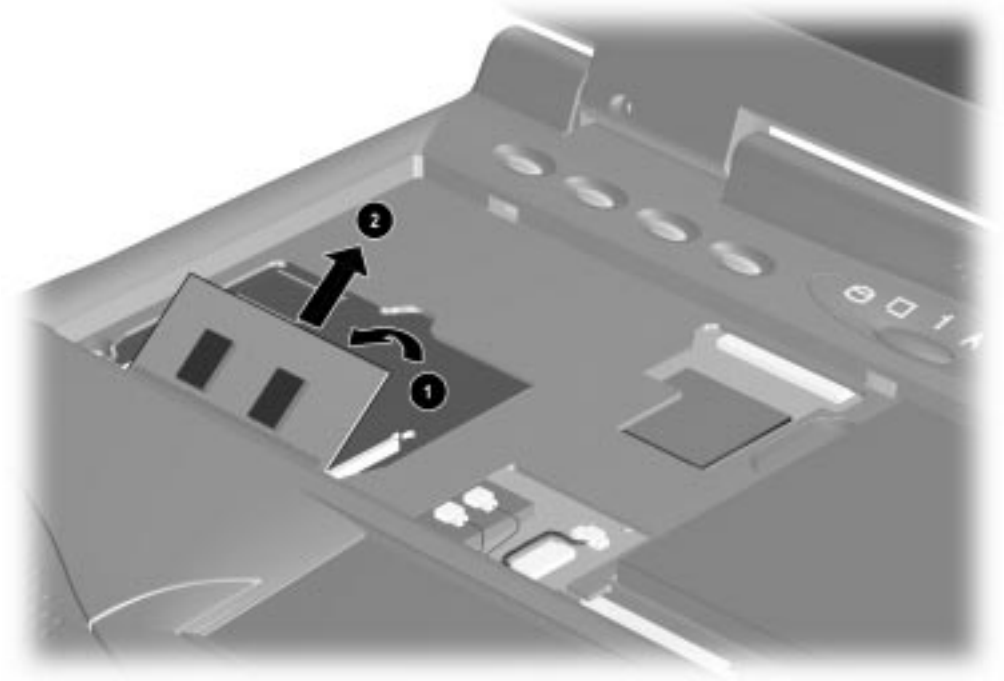


Figure 5-15. *Removing the Memory Expansion Board*

To install the memory expansion board:

1. Insert the memory expansion board into the memory slot ❶.
2. Pivot the memory expansion board so that it lays flat in the memory compartment ❷.
3. Push the memory expansion board firmly into place to seat the connections and to engage the locking tabs.

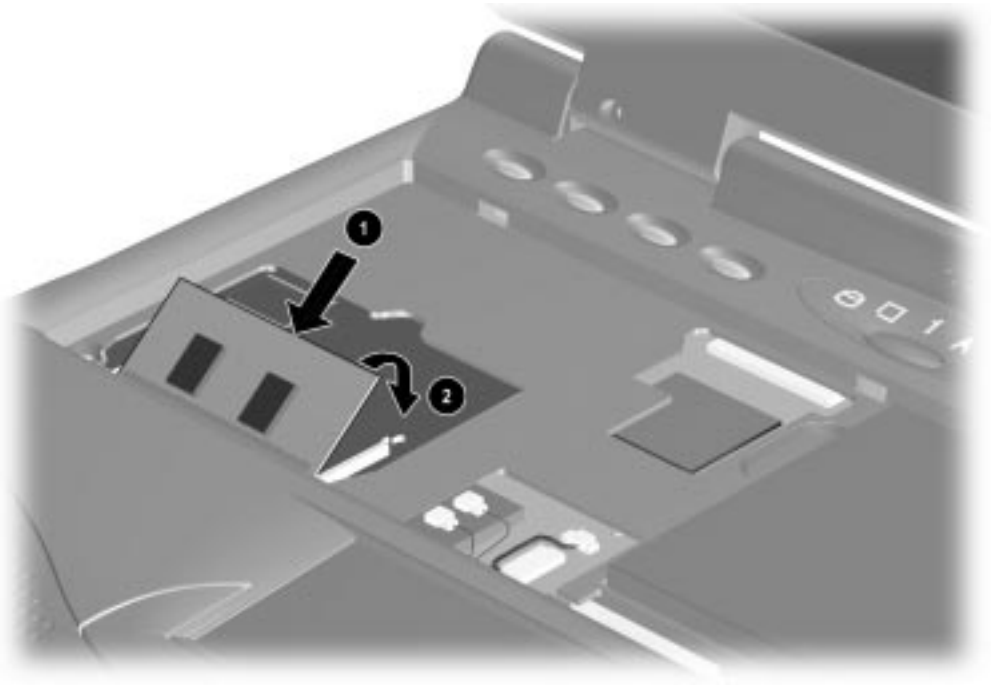


Figure 5-16. *Installing the Memory Expansion Board*

5.8 Hard Drive

To remove the hard drive and retaining clip:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Remove the battery pack (Section 5.3.3).
3. Remove the DualBay device (Section 5.3.4).
4. Remove any PCMCIA cards (Section 5.3.5).
5. Raise the keyboard (Section 5.6).
6. Remove hard drive retaining clip by squeezing both ends of the retaining clip ❶ together, then lifting up ❷.

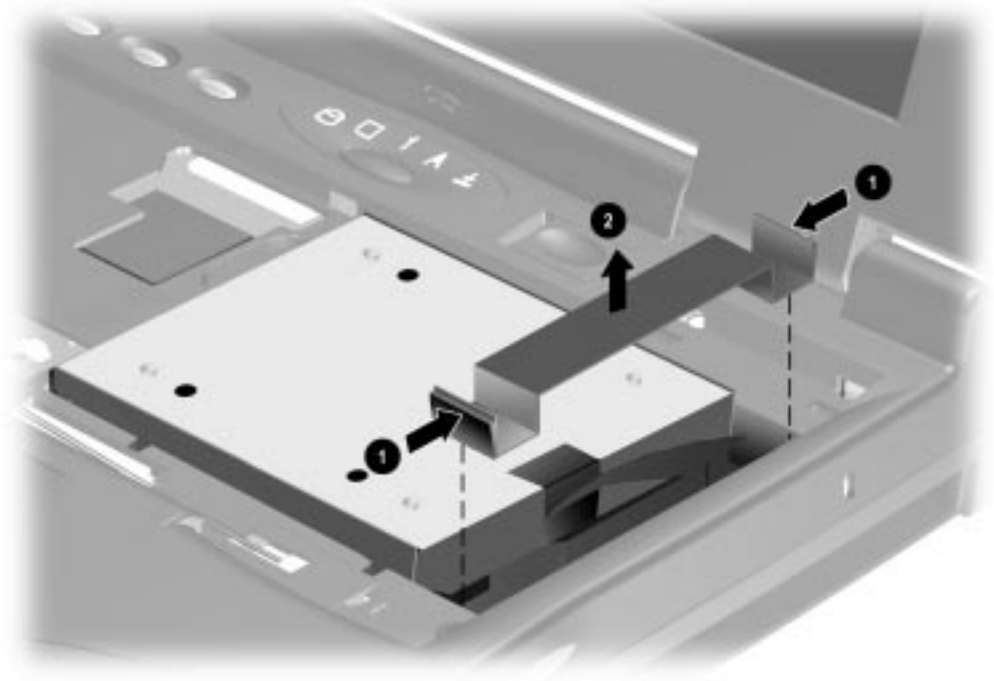


Figure 5-17. *Removing the Hard Drive Retaining Clip*

7. Slide the hard drive to the right.
8. Lift the hard drive from the hard drive compartment.

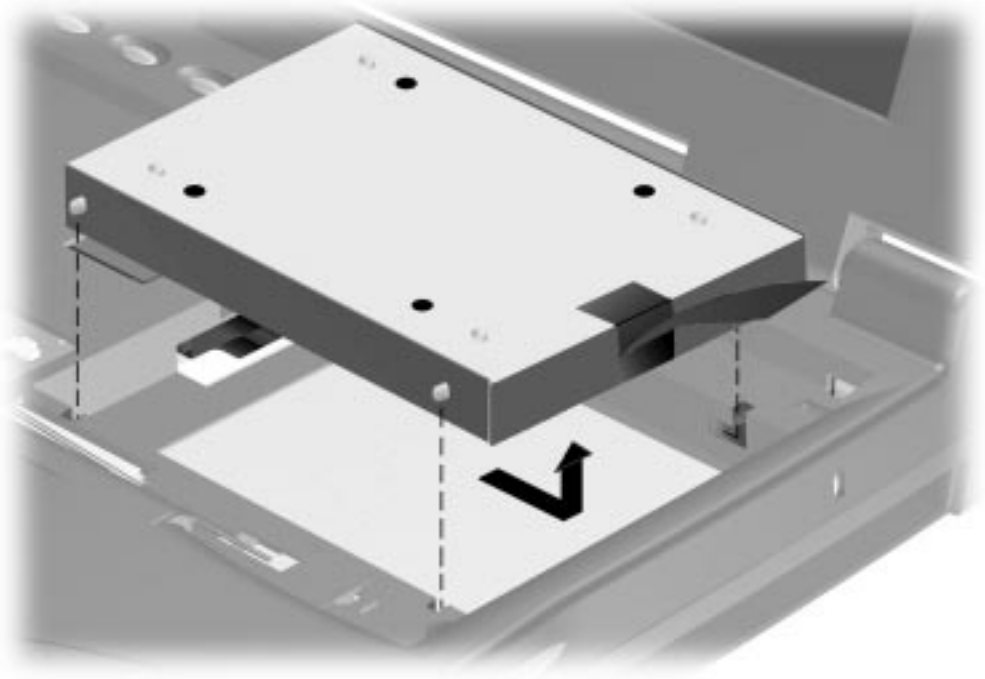


Figure 5-18. *Removing the Hard Drive*

Reverse the above procedure to install the hard drive.

5.9 Lithium Real-Time Clock Battery

WARNING: Incorrect replacement or improper handling of the battery increases the risk of explosion and injury. Do not attempt to recharge, disassemble, immerse in water, or dispose of it in fire. Replacement should be done using the Compaq spare part for this computer.

CAUTION: Rock the RTC battery cable connector from side to side to disconnect it. Failure to do so can damage the RTC battery cable.

To remove the Lithium real-time clock (RTC) battery:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Remove the battery pack (Section 5.3.3).
3. Remove the DualBay device (Section 5.3.4).
4. Remove any PCMCIA cards (Section 5.3.5).
5. Raise the keyboard (Section 5.6).
6. Remove the Lithium real-time clock (RTC) battery cover.

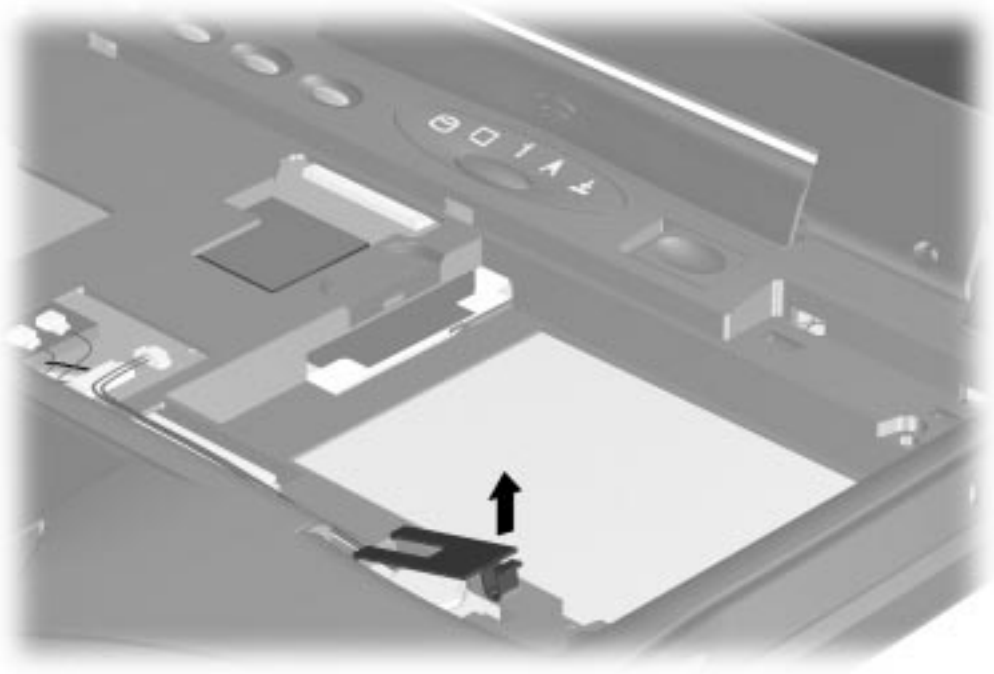


Figure 5-19. *Removing the RTC Battery Cover*

7. Disconnect the RTC battery connector from the system board ❶.
8. Remove the RTC battery ❷.

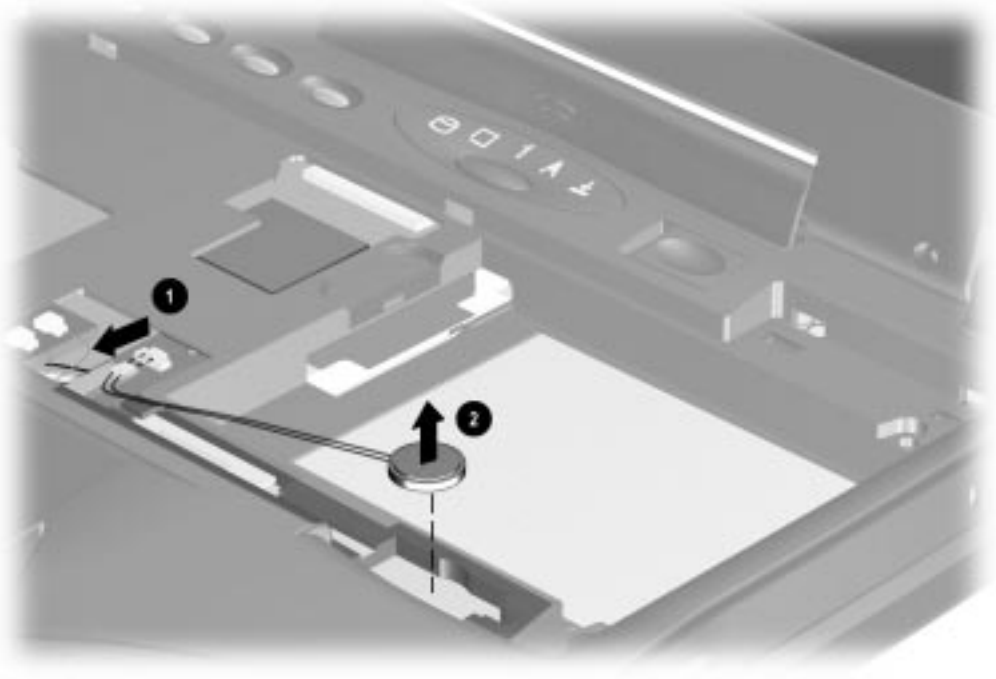


Figure 5-20. *Removing the RTC Battery*

Reverse the procedure to install a replacement RTC battery.

5.10 Microphone/Display Cable Cover and Microphone

To remove the microphone and microphone/display cable cover:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. From the rear of the computer, remove two screws securing the microphone/display cable cover from the base enclosure.

Figure 5-21. *Removing the Microphone/Display Cable Cover Screws*

3. Remove the microphone/display cable cover by rotating the cover ❶ and lifting it from the rear of the computer ❷.

Figure 5-22. *Removing the Microphone/Display Cable Cover*

4. Disconnect the microphone from the audio cable.
5. Remove the microphone.

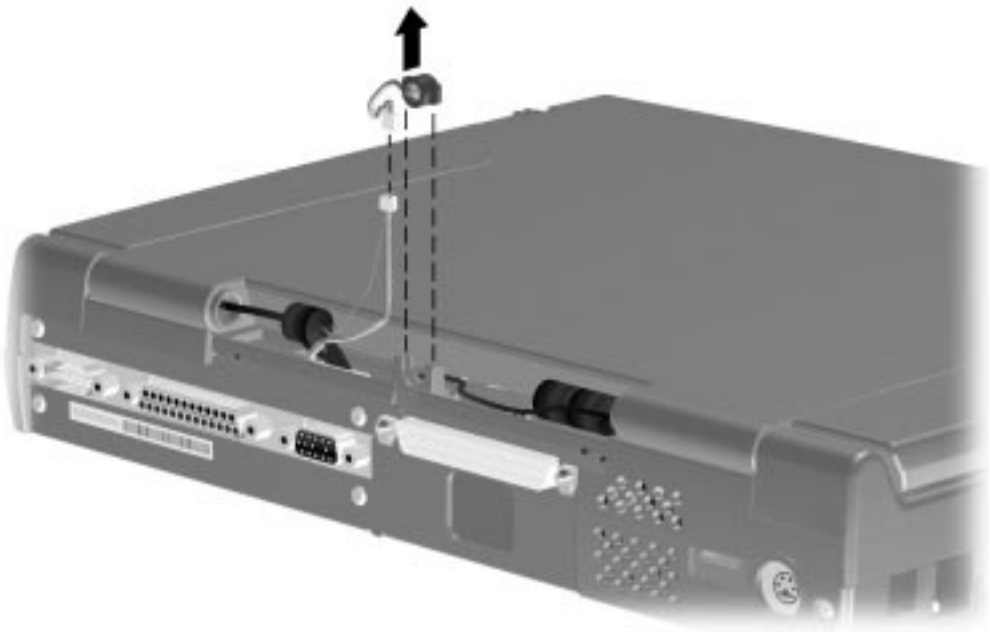


Figure 5-23. *Removing the Microphone*

5.11 Clutch Covers/Display Assembly

5.11.1 Clutch Covers

To remove the left and right clutch covers, lift them from the ends of the computer.

Figure 5-24. *Removing the Clutch Covers*

Reverse the procedure to install the clutch covers.

5.11.2 Display Assembly

To remove the display assembly:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Remove the battery pack (Section 5.3.3).
3. Remove the DualBay device (Section 5.3.4).
4. Remove any PCMCIA cards (Section 5.3.5).
5. Remove the microphone/display cable cover (Section 5.10).
6. Remove the clutch covers (Section 5.11.1).
7. Remove two screws from each clutch and the clutch tension plate that secure the display to the base enclosure ❶.
8. Disconnect the display cables from the base enclosure ❷.
9. Lift the display assembly from the base enclosure.

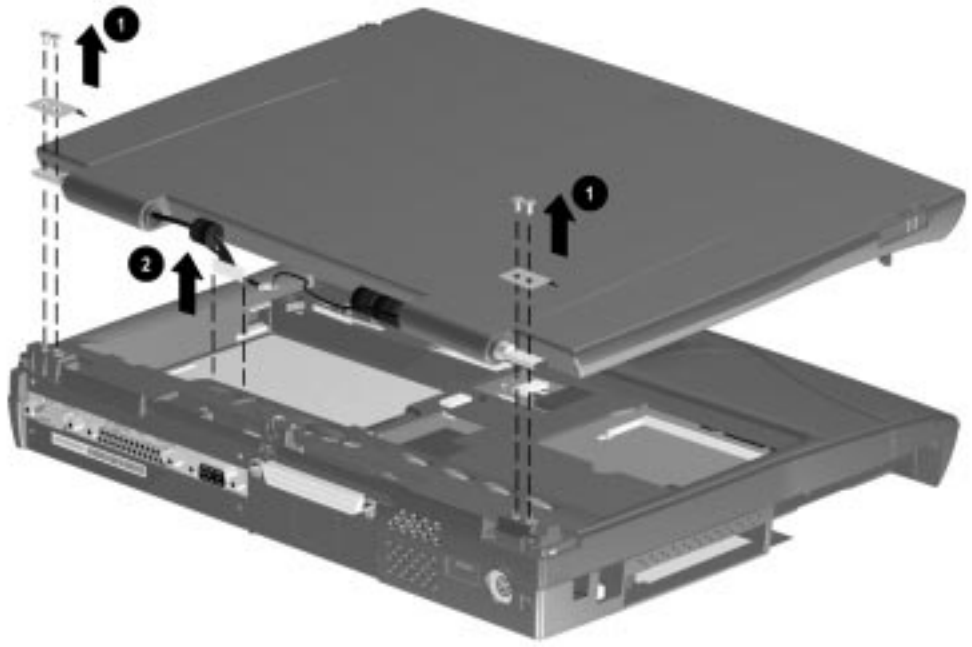


Figure 5-25. *Removing the Display Assembly*

Reverse the procedure to replace the display assembly.

CAUTION: Attach the ground cable before attaching the display cables when replacing the display assembly to avoid damaging the display and ground cables.

CAUTION: Use the new screws from the screw kit when replacing the display assembly. Using the old screws can damage the display assembly and ground cables.

5.12 Top Cover Assembly

To remove the top cover assembly:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Remove the battery pack (Section 5.3.3).
3. Remove the DualBay device (Section 5.3.4).
4. Remove any PCMCIA cards (Section 5.3.5).
5. Remove the keyboard (Section 5.6).
6. Remove the microphone/display cable cover (Section 5.10).
7. Disconnect speaker connectors ❶ and touchpad cable ❷ and RTC battery connector ❸ from the system board.

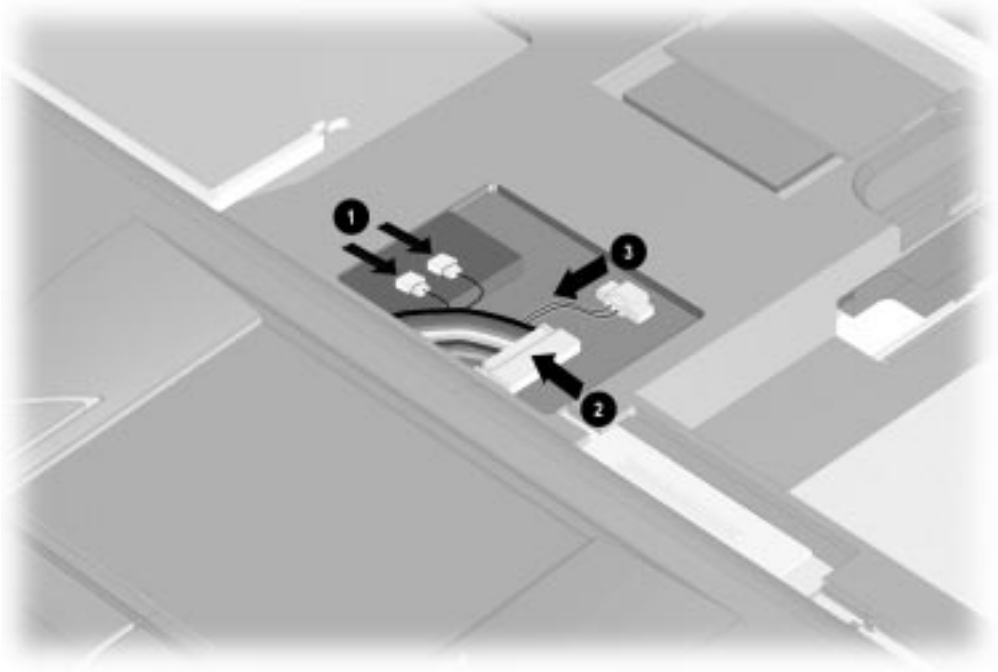


Figure 5-26. *Disconnecting the Speaker Connectors, Touchpad Connector, and RTC Battery Connector From the System Board*

8. From the rear of the computer, remove four screws securing the top cover assembly to the base enclosure.

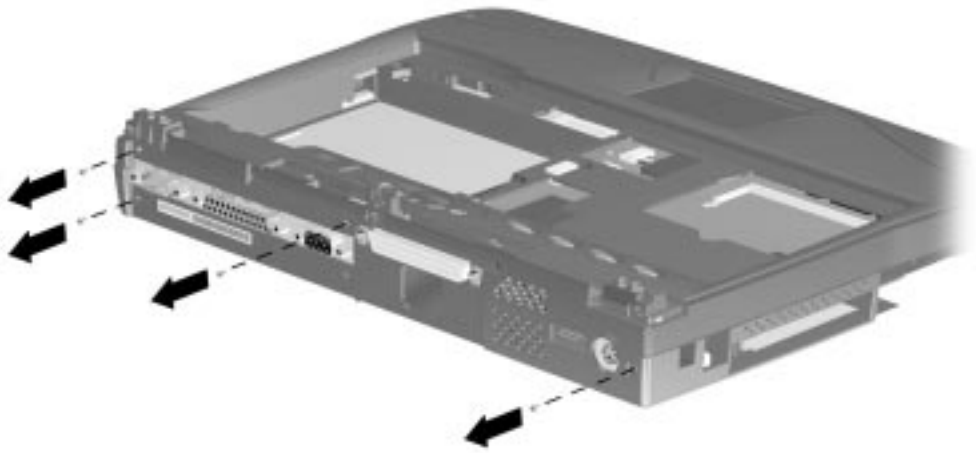


Figure 5-27. *Removing Top Cover Assembly Screws*

9. Carefully remove the top cover assembly from the base enclosure.

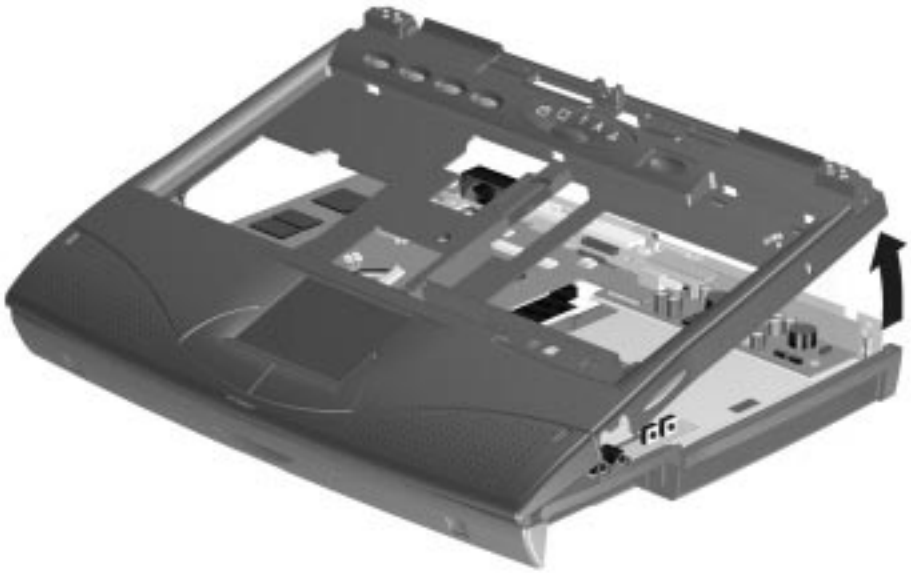


Figure 5-28. *Removing the Top Cover Assembly*

To replace the top cover assembly, reverse the steps.

5.13 LED Status Panel

To remove the LED status panel board:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Remove the battery pack (Section 5.3.3).
3. Remove the DualBay device (Section 5.3.4).
4. Remove any PCMCIA cards (Section 5.3.5).
5. Remove the keyboard (Section 5.6).
6. Remove the microphone/display cable cover and microphone (Section 5.10).
7. Remove the clutch covers/display assembly (Section 5.11.1).
8. Remove the top cover assembly (Section 5.12).
9. Remove the 2 screws ❶ securing the status panel board.
10. Disconnect the LED status panel board ❷ from the system board.

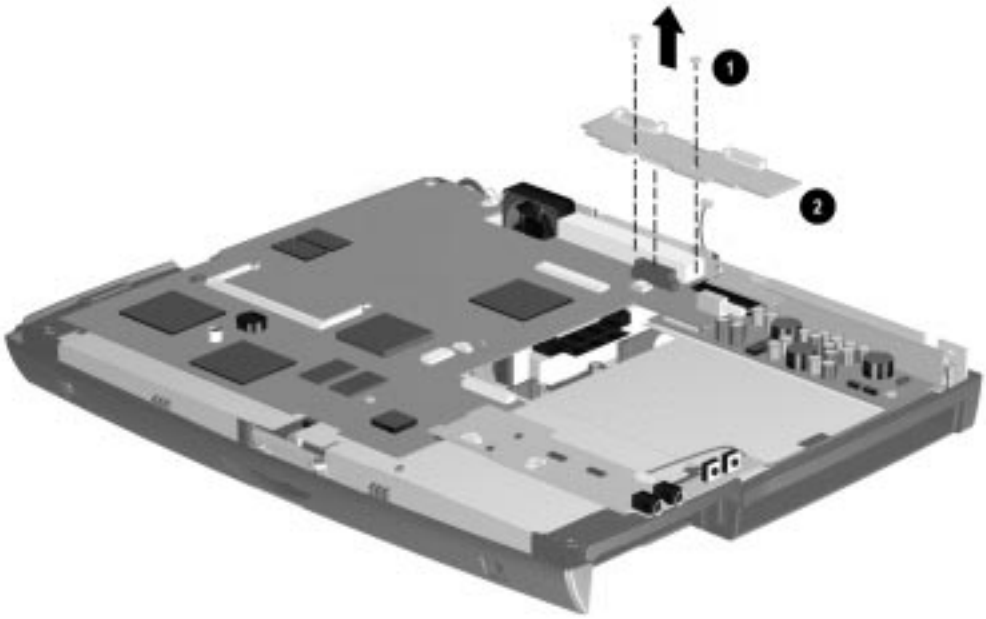


Figure 5-29. *Removing the LED Status Panel Board*

To replace the LED status panel, reverse the steps.

5.14 Audio Board and Audio Cable

1. To remove the audio board and audio cable:
2. Disconnect the AC power and any external devices (Section 5.3.1).
3. Remove the battery pack (Section 5.3.3).
4. Remove the DualBay device (Section 5.3.4).
5. Remove any PCMCIA cards (Section 5.3.5).
6. Remove the keyboard (Section 5.6).
7. Remove the microphone/display cable cover and microphone (Section 5.10).
8. Remove the clutch covers/display assembly (Section 5.11.1).
9. Remove the screw ❶ from the audio board.
10. Disconnect the audio cable ❷.
11. Slide the audio board ❸ from the connector on the system board and remove the audio board.

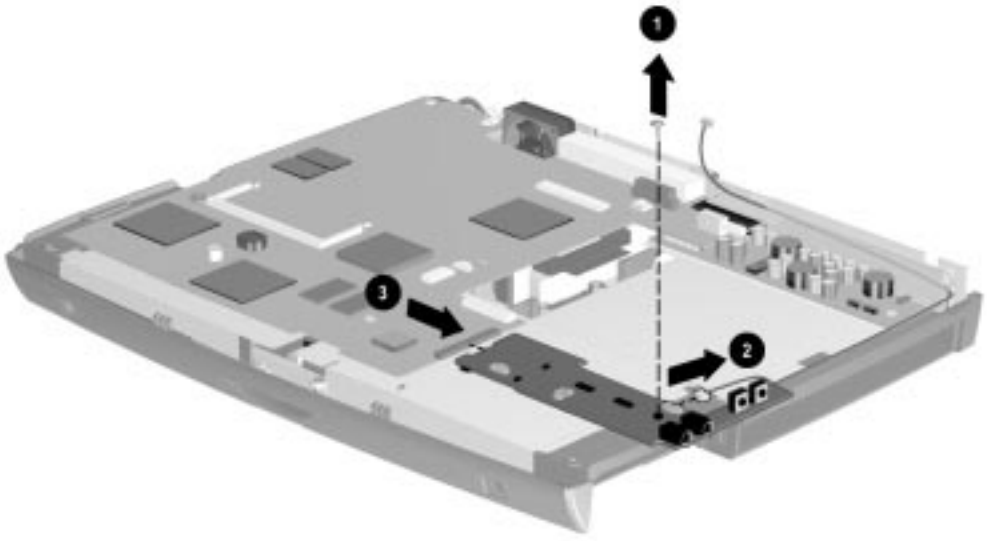


Figure 5-30. *Removing the Audio Board*

CAUTION: Do not use the long T-8 screw to secure the Audio board. Use of the long screw can damage the system board.

To replace the audio cable or audio board, reverse the steps.

5.15 DC-DC Converter

To remove the DC-DC converter:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Remove the battery pack (Section 5.3.3).
3. Remove the DualBay device (Section 5.3.4).
4. Remove any PCMCIA cards (Section 5.3.5).
5. Remove the keyboard (Section 5.6).
6. Remove the microphone/display cable cover and microphone (Section 5.10).
7. Remove the clutch covers/display assembly (Section 5.11.1).
8. Remove the top cover assembly (Section 5.12).
9. Remove the screw that secures the DC-DC converter to the base enclosure.

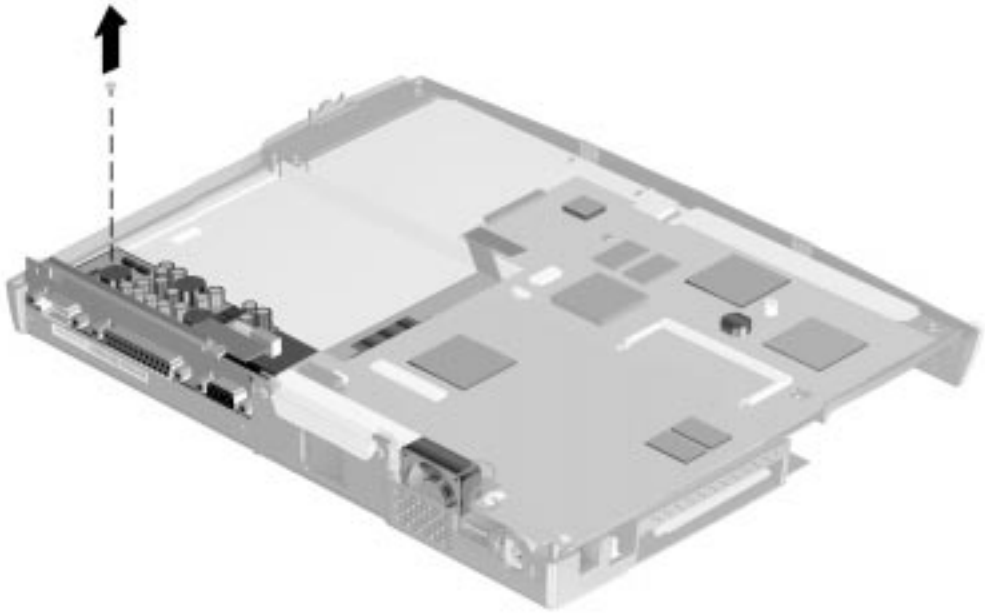


Figure 5-31. *Removing the DC-DC Converter Screw*

10. Disconnect the DC-DC converter from the system board.
11. Pull the DC-DC converter away from the plastic tab separating the DC-DC converter from the I/O fixture connector ❶.
12. Remove the DC-DC converter ❷.

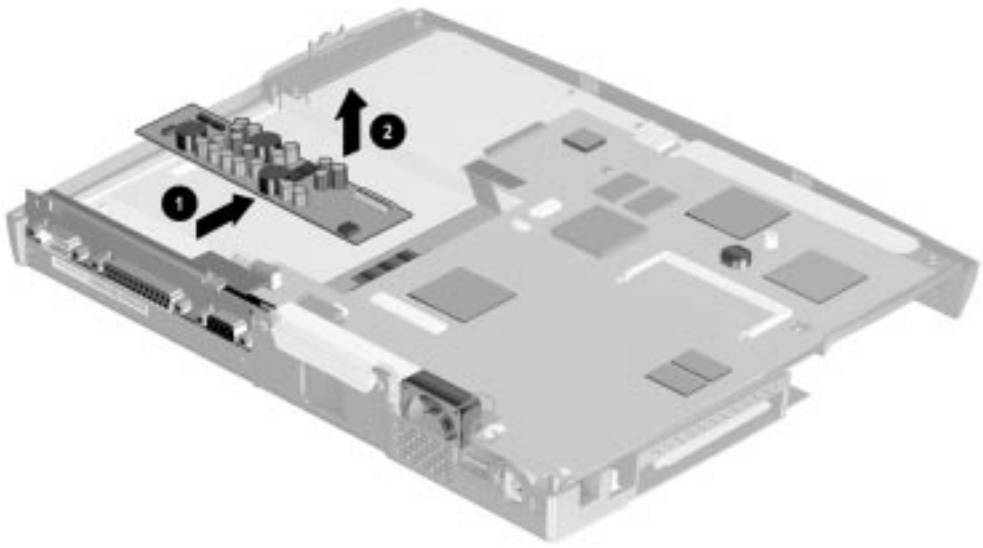


Figure 5-32. *Disconnecting and Removing the DC-DC Converter*

To replace the DC-DC converter, reverse the steps.

CAUTION: The DC-DC converter board is secured by a short T-8 screw. Do not use the long T-8 screw to secure the DC-DC converter board. Use of the long screw can damage the system board.

5.16 Fan

To remove the fan:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Remove the battery pack (Section 5.3.3).
3. Remove the DualBay device (Section 5.3.4).
4. Remove any PCMCIA cards (Section 5.3.5).
5. Remove the keyboard (Section 5.6).
6. Remove the microphone/display cable cover and microphone (Section 5.10).
7. Remove the clutch covers/display assembly (Section 5.11.1).
8. Remove the top cover assembly (Section 5.12).
9. Disconnect the fan from the system board.
10. Remove the fan from the base enclosure.

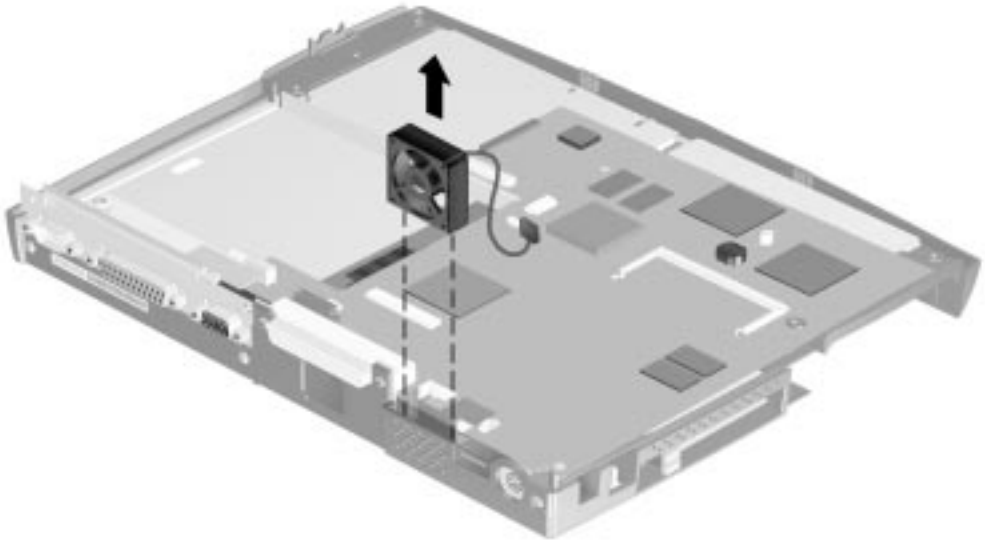


Figure 5-33. *Removing the Fan*

Reverse the procedure to install the fan.

IMPORTANT: When installing the fan, orient the fan so that the label and airflow direction arrow point to the rear of the computer.

5.17 I/O Fixture Connector

To remove the I/O fixture connector:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Remove the battery pack (Section 5.3.3).
3. Remove the DualBay device (Section 5.3.4).
4. Remove any PCMCIA cards (Section 5.3.5).
5. Remove the keyboard (Section 5.6).
6. Remove the microphone/display cable cover (Section 5.10).
7. Remove the clutch covers/display assembly (Section 5.11.1).
8. Remove the top cover assembly (Section 5.12).
9. Remove the LED status panel board (Section 5.13).
10. Remove three screws securing the I/O fixture to the rear of the computer.

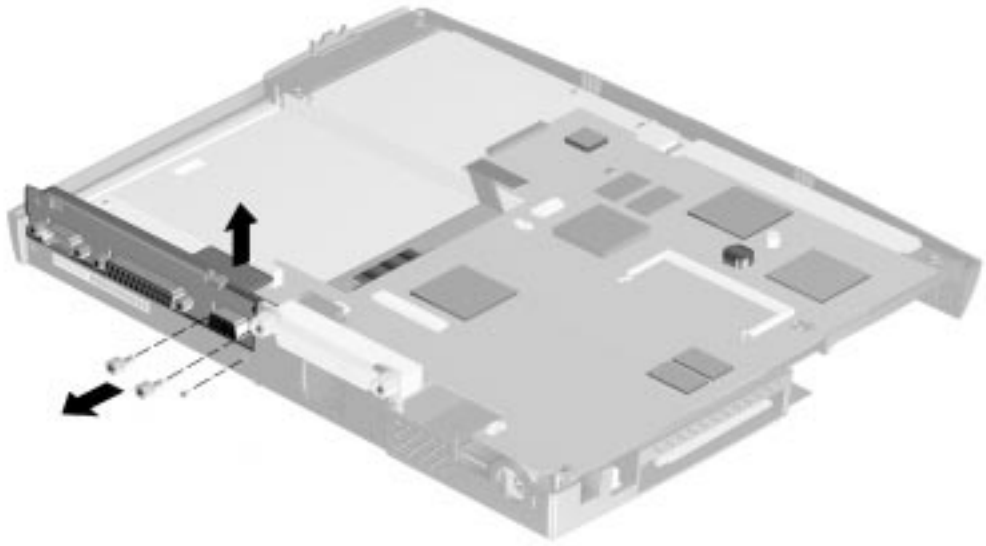


Figure 5-34. *Removing the Screws from the I/O Fixture Connector*

11. Remove the I/O fixture connector.

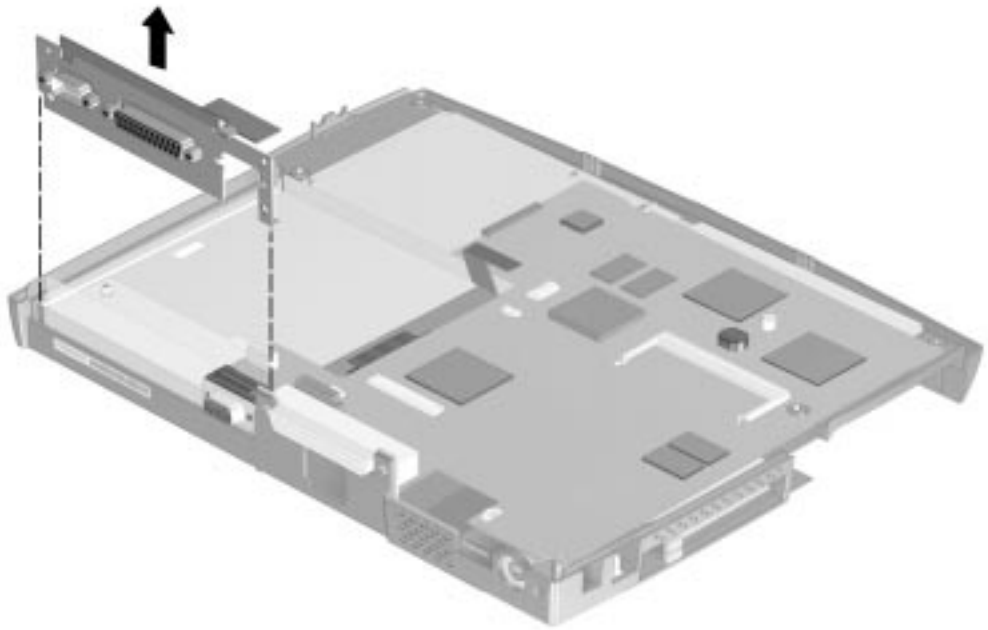


Figure 5-35. *Removing the I/O Fixture Connector*

To replace the I/O fixture connector, reverse the steps.

5.18 System Board

To remove the system board:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Remove the battery pack (Section 5.3.3).
3. Remove the DualBay device (Section 5.3.4).
4. Remove any PCMCIA cards (Section 5.3.5).
5. Remove the top cover assembly (Section 5.12).
6. Remove the I/O fixture connector (Section 5.17).
7. Remove the screws ❶ securing the system board to base enclosure.
8. Disconnect the CD-ROM/DVD-ROM cable ❷.
9. Remove the two screws ❸ from the rear of the computer that secure the expansion connector to the base enclosure.

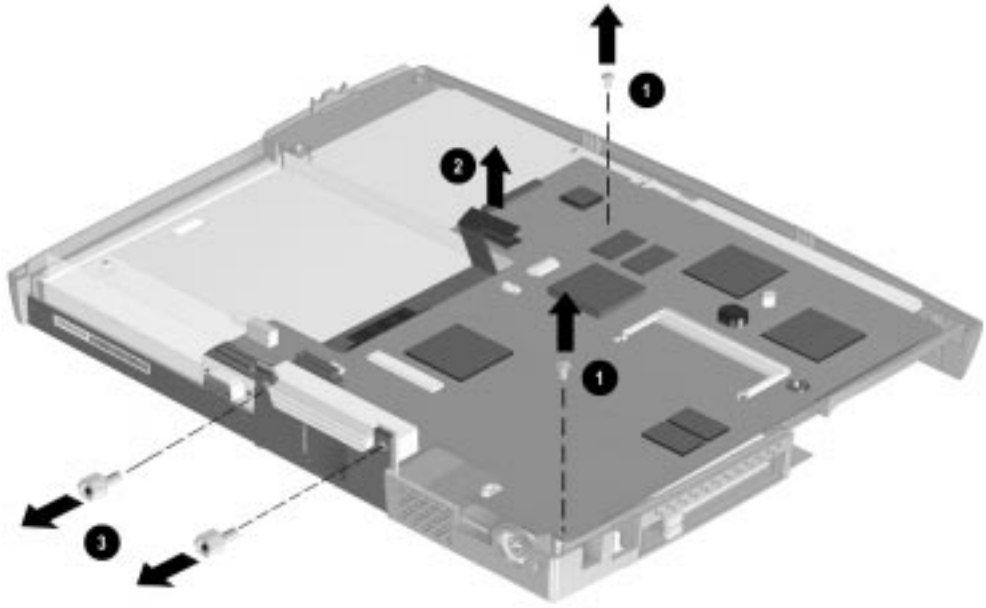


Figure 5-36. *Disconnecting the System Board*

10. Tilt up the system board ❶.
11. Lift the system board away from the base enclosure ❷.

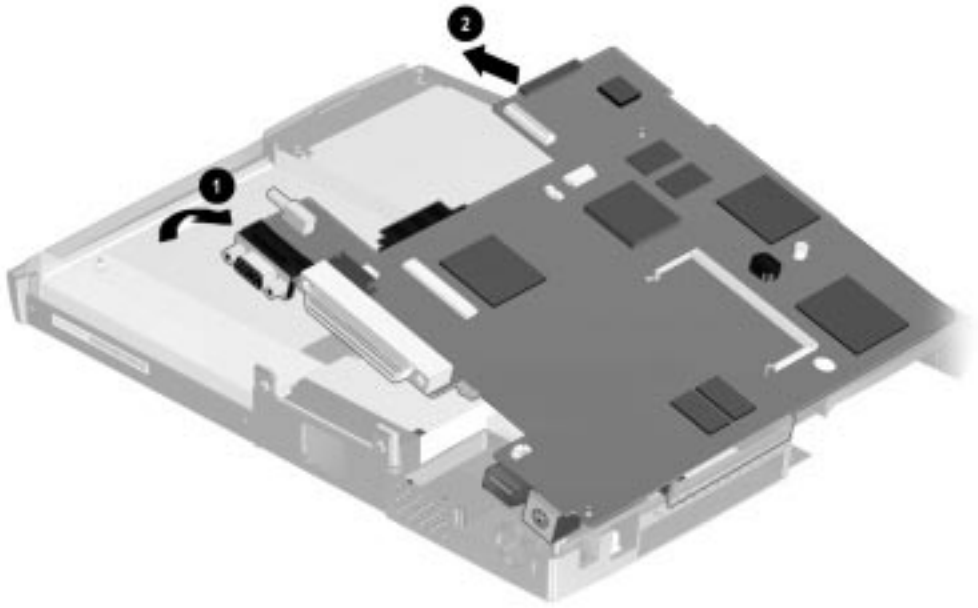


Figure 5-37. *Removing the System Board*

To replace the system board, reverse the steps.

NOTE: Before replacing the system board, the PC card eject levers must be in the forward position. See Section 5.3.5 for proper positioning of the PC card eject levers.

5.19 External Computer Components

This section describes the removal and replacement procedures that do not require access to the internal components of the computer. This includes:

- Computer logo
- Computer feet

5.19.1 Computer Logo

The computer logo is on the outside of the display assembly and can be replaced if damaged. To replace the logo:

1. Use a small, sharp, flat-bladed screwdriver to pry up the existing logo.
2. Clean the area with a clean dry cloth.
3. Apply the new logo.

5.19.2 Computer Feet

There are four locations where the computer feet can be applied. To replace the computer feet:

1. Peel the old foot from the computer. Use a razor blade if needed to lift a corner of the foot free from the base cover.
2. Clean the area where the new foot is to be applied with a clean dry cloth.
3. Install the new foot, pressing it firmly into place.

chapter 6

SPECIFICATIONS

This chapter provides physical and performance specifications for the following:

- Computer
- Displays
- Hard drive
- Diskette drive
- CD-ROM drive
- DVD-ROM drive
- Battery packs
- External power supplies

The chapter also includes:

- System interrupts
- System DMA
- System I/O addresses
- System memory map

6.1 Computer

Table 6-1
Computer Specifications

	U.S.	Metric
Dimensions		
Height	2.09 in.	53.01 mm
Depth	9.65 in.	245.11 mm
Width	12.24 in.	310.90 mm
Weight		
With NiMH battery, 12.1 CTFT display, modem, floppy diskette drive, CD-ROM, and AC adapter	7.7 lb	3.49 kg
Standalone (Battery) Power Requirements		
Nominal operating voltage (Li-Ion)	14.4 VDC	
Nominal operating voltage (NiMH)	9.6 VDC	
Maximum operating power	39.0 W	
External AC Adapter Requirements		
Operating voltage	90 to 264 VAC RMS	
Operating current	1.10 A RMS	
Operating frequency range	47 to 63 Hz AC	
Maximum transient	4/50 kV	
Maximum input power	< 75W	
Automobile/Aircraft Adapter DC Input Requirements		
Operating voltage	11 to 16 VDC	
Operating power	85.0 W	
Temperature		
Operating	50 to 95°F	10 to 35°C
Non-operating	-22 to 140°F	-30 to 60°C
Relative Humidity (noncondensing)		
Operating	10 to 90%	
Non-operating (t_W = 38.7°C max)	5 to 90%	
Altitude		
Operating	0 to 10,000 ft	0 to 3,480 m
Non-operating	0 to 30,000 ft	0 to 9,144 m
Shock		
Operating	10 G, 11 ms, half sine	
Non operating	240 G, 2 ms, half sine	
Vibration		
Operating	0.5 G, 10 to 500 Hz, 0.25 Oct/Min sweep rate	
Non-operating	1.5 G, 10 to 500 Hz, 0.5 Oct/Min sweep rate	

NOTE: Applicable product safety standards specify thermal limits for plastic surfaces. The Compaq Armada 1500c Series operates well within this range of temperatures.

6.2 Displays

Table 6-2
12.1-Inch DSTN, SVGA Display

	U.S.	Metric
Dimensions (maximum)		
Height	7.97 in.	202.5 mm
Width	10.80 in.	275.0 mm
Number of Colors	262 K	
Contrast Ratio	40:1 typical	
Pixel Resolution		
Pitch	0.29 × 0.29 mm	
Format	800 × 600	
Configuration	RGB Stripe	
Brightness	100cd/m² (nits) typical	
Minimum (No flickering)	90cd/m² (nits) minimum	
Backlight	Edge Lit	
Character Display	80 × 25	

Table 6-3
12.1-Inch CTFT, SVGA Display

	U.S.	Metric
Dimensions (maximum)		
Height	7.67 in.	195.0 mm
Width	10.80 in.	275.0 mm
Number of Colors	262 K	
Contrast Ratio	100:1 minimum	
Pixel Resolution		
Pitch	.03075 x 0.3075 mm	
Format	800 x 600	
Configuration	RGB Stripe	
Brightness	130 cd/m² (nits) typical 120 cd/m² (nits) minimum	
Backlight	Edge Lit	
Character Display	80 × 25	

6.3 Hard Drive

Table 6-4
Hard Drive Specifications

	4.0-GB
Logical Capacity per Drive (MB)	4,099,866,624
Drive Type	65
Drive Height	
With drive frame	2.5 in./12.7mm
Drive Size	
Inches	2.5 x 0.5
Millimeters	102.0 x 75
Transfer Rate	
Media (Mb/s)	51.4-83.4 MB/s
Interface (Mb/s)	16.6 MB/sec
Sector Interleave	1:1
Typical Seek Time (Including setting)	
Single Track (ms)	4 ms
Average (ms)	13 ms (read)
Full Stroke (ms)	32 ms (read)
Disk Rotational Speed (RPM)	4009
Physical Configuration	
Cylinders	6975
Data Heads	6
Sectors/Track	144 to 240
Bytes/Sector	512
Logical Configuration	
Cylinders	7944
Heads	16
Sectors per Track	63
Bytes per Sector	512
Buffer Size	512 KB

6.4 Diskette Drive

Table 6-5
Diskette Drive Specifications

Diskette size	3.5-inch (88.9 mm)
High density	1.44 MB/1.2 MB
Low density	720 KB
Light	None
Height	0.43 in. (11 mm)
Bytes per sector	512
Sectors per Track	
High density	18 (1.44 MB)/15 (1.2 MB)
Low density	9
Tracks per Side	
High density	80 (1.44 MB)/80 (1.2 MB)
Low density	80
Read/Write heads	2
Average Seek Times	
Track-to-Track (high/low)	3 ms/6 ms
Average (high/low)	94 ms/174 ms
Settling Time	15 ms
Latency Average	100 ms

6.5 CD-ROM Drive

Table 6-6
CD-ROM Drive Specifications

Applicable Disc	CD-ROM mode 1, mode 2 CD-Digital Audio CD-XA mode 2 (Form 1, Form 2) CD-I mode 2 (Form1, Form 2) CD-I Ready CD-Bridge CD-R CD-WO (fixed/variable packets) Photo CD (single/multisession)
Center Hole Diameter	15 mm
Disc Diameter	12 cm, 8 cm
Disc Thickness	1.2 mm
Track Pitch	1.6 μm
Laser	
Beam divergence	53.5 ± 1.5 degrees
Output power	0.24 ± 0.1 mw
Type	Semiconductor Laser GaA1As
Wave length	780 nm ± 25 nm
Access time	
Random	<350 ms
Full stroke	<750 ms
Audio output level	
Line out	0.7 Vrms
Headphone	None
Cache Buffer	128 KB
Data transfer rate	
Sustained, 24x	3.6 MB/s
Sustained, single	150 KB/sec
Burst	8.3 MB/sec
Startup time	<8 seconds typical
Capacity	
Mode 1, 12 cm	550 MB
Mode 2, 12 cm	640 MB
8 cm	180 MB

6.6 DVD-ROM Drive

Table 6-7
DVD-ROM Drive Specifications

Disc Formats Supported	DVD-5, DVD-9, DVD-10, DVD-18 CD-ROM mode 1, mode 2 CD-Digital Audio CD-XA mode 2 (Form 1, Form 2) CD-I mode 2 (Form1, Form 2) CD-I Ready CD-Bridge CD-R Photo CD (single/multisession) Video CD
Center Hole Diameter	15 mm
Disc Diameter	12 cm, 8 cm
Disc Thickness	1.2 mm
Track Pitch	1.6 μm
Capacity	4.7-GB - DVD-5 8.5-GB - DVD-9 9.4-GB - DVD-10 550-Mbytes (Mode 1, 12) 640 Mbytes (Mode 2, 12 cm) 180 Mbytes (8 cm) 17.1 - DVD -18
Laser	
Output power	5mw
Type	Semiconductor laser GaA1As
Wave length	650 nm ± 25 nm (DVD Mode) 795 nm ± 25 nm (CD-ROM mode)
Access time	
Random	<200 ms
Full stroke	<250 ms
Audio output level	
Line out	0.7 Vrms
Headphone	None
Cache Buffer	128 KB
Data Transfer Rate	
Sustained, 1x (CD-ROM mode)	150 KB/sec
Sustained, 20x CD-ROM CAV mode	1200-3000 KB/sec
Sustained, DVD mode	2760 Kbytes/s sustained, DVD mode
Burst	16.6 MB/sec
Startup time	<15 seconds typical

6.7 Battery Packs

Table 6-8
Nickel Metal Hydride Battery Pack

	U.S.	Metric
Dimensions		
Height	0.82 in.	20.8 mm
Length	5.8 in.	147.32 mm
Width	3.2in.	81.3 mm
Electrical		
Voltage	9.6 V	
Watt-hour capacity	36 Wh	
Battery Life	> 2 hours	
Environmental Requirements		
Operating temperatures	50°F to 95°F	10°C to 35°C
Non-operating temperatures	-22°F to 140°F	-30°C to 60°C

Table 6-9
Lithium-Ion Battery Pack

	U.S.	Metric
Dimensions		
Height	0.82 in.	20.8 mm
Length	5.8 in.	147.32 mm
Width	3.2 in.	81.3 mm
Electrical		
Voltage	14.4 VDC	
Watt-hour capacity	39 Wh	
Battery Life	up to 2.5 hours	
Environmental Requirements		
Operating temperatures	50°F to 95°F	10°C to 35°C
Non-operating temperatures	-22°F to 140°F	-30°C to 60°C

6.8 External Power Supplies

The automobile adapter allows the computer to be used in an automobile without causing a drain on the computer's batteries.

Table 6-10
Automobile/Aircraft Adapter

	U.S.	Metric
Dimensions		
Height	1.42 in.	36 mm
Width	2.83 in.	72 mm
Length	4.84 in.	123 mm
Weight	0.88 lb	400 gm
Input Cord Length	3.281 ft.	1.0 m
Power Supply (Input)		
Nominal voltage	13.8 VDC	
Operating voltage	10.5 - 14.8 VDC	
Maximum voltage	16.0 VDC	
Input fuse protection	8.0 A	
Temperature		
Operating	32 to 104°F	0 to 40°C
Non-operating	-4 to 140°F	-20 to 60°C
Relative Humidity		
Operating	10 to 90%	
Non-operating	5 to 95%	

The external AC adapter provides power for the system unit.

Table 6-11
External AC Adapter

	U.S.	Metric
Power Supply (Input)		
Nominal voltage	90 to 264 VAC	
Line frequency	47 to 63 Hz	
Power Supply (Output)		
Nominal voltage	+18 ± 0.5 VDC	
Power	45 W	
Temperature		
Operating	50º to 95ºF	10º to 35ºC
Non-operating	-22º to 140ºF	-30º to 60ºC
Relative Humidity		
Operating	10% to 90%	
Non-operating	10% to 95%	

Table 6-12
External Battery Charger

	U.S.	Metric
Dimensions		
Height	1.57 in	40 mm
Width	5.25 in	133 mm
Length	9.4 in	239 mm
Weight	1.1 lb	4.95 gm
Power Supply (Input)		
Nominal voltage	+18.5 +/- 0.25 VDC	
Current	40 to 42 W	
Power Supply (Output)		
Nominal voltage	+18.5 +/- 0.25 VDC	
Current	40 to 42 W	
Temperature		
Operating	41 to 104°F	5 to 40°C
Non-operating	-4 to 185°F	-20 to +85°C
Relative Humidity		
Operating	10 to 95%	
Non-operating	10 to 95%	

6.9 System Interrupts

Table 6-13
System Interrupts

Hardware IRQ	System Function
IRQ0	Timer interrupt
IRQ1	Keyboard
IRQ2	Interrupt controller cascade
IRQ3	COM 2 - used by MSIO or PCMCIA controller
IRQ4	COM 1 - used by MSIO or PCMCIA controller
IRQ5	Used by either audio or PCMCIA controller
IRQ6	Diskette drive controller
IRQ7	Used by either EPP parallel or audio
IRQ8	Real-time clock (MSIO)
IRQ9	Used by either audio or PCMCIA controller
IRQ10	Used by either audio or PCMCIA controller
IRQ11	Used by PCMCIA
IRQ12	Mouse
IRQ13	Floating point error input
IRQ14	Hard drive
IRQ15	Convenience base NIC interrupt

6.10 System DMA

Table 6-14
System DMA

Hardware DMA	System Function
DMA 0	Not assigned
DMA 1	Audio controller
DMA 2	Diskette drive controller
DMA 3	EPP Parallel port
DMA 4	Not assigned
DMA 5	Audio controller
DMA 6	Not assigned
DMA 7	Not assigned

6.11 System I/O Addresses

Table 6-15
System I/O Addresses

I/O Address (Hex)	System Function (Shipping Configuration)
000 - 00F	Master DMA controller # 1
010 - 011	Force software SMI
012 - 01F	Unused
020 - 021	Peripheral interrupt controller # 1
022 - 024	Opti chipset configuration registers
025 - 03F	Unused
040 - 043	Counter/timer registers
044 - 05F	Unused
060	Keyboard data
061	Port B
062 - 063	Unused
064	Keyboard command/status
065 - 06F	Unused
070	CMOS index address
071	CMOS data
072 - 073	Unused
074	Reserved
075	Unused
076	Reserved
077 - 077F	Unused
080 - 08F	DMA page registers
084 - 085	POST code output port
090 - 091	Unused
092	Fast reset register
093 - 09F	Unused
0A0 - 0A1	Interrupt controller # 2
0A2 - 0BF	Unused
0C0 - 0DF	DMA controller # 2
0E0 - 0E1	ESS audio configuration
0E2 - 0E5	Configuration registers
0E6 - 0EF	Unused
0F0 - 0F1	NCP numerics register
0F9	ESS configuration lock
0FA	Unused
0FB	ESS configuration unlock
0FC - 0FF	Unused
100 - 101	Unused
103 - 16F	Unused

Continued

Table 6-15 System I/O Addresses *Continued*

I/O Address (Hex)	System Function (Shipping Configuration)
170 - 177	Hard drive secondary registers
178 - 1EF	Unused
1F0 - 1F7	Hard drive primary registers
1F8 - 1FF	Unused
200 - 21F	Unused
220 - 22F	ESS audio registers (1st possible) (default)
230 - 23F	ESS audio registers (2nd possible)
240 - 24F	ESS audio registers (3rd possible)
250 - 25F	ESS audio registers (4th possible)
260 - 277	Unused
278 - 27A	LPT2 and high speed parallel port registers
27B - 27F	LPT2 high speed printer port registers
280 - 2F7	Unused
2F8 - 2FF	Serial control register COM2
300 - 36F	Unused
370 - 371	Reserved
372	Diskette digital output register
373	Unused
374	Reserved
375	Diskette main status/data registers
376	Reserved
377	Diskette input/control registers
378 - 37A	LPT1 and high speed parallel port registers
37B - 37F	Unused
380 - 387	Unused
388 - 38B	ESS FM synthesizer
38C - 3AF	Unused
3B0 - 3BB	Cirrus logic video controller
3BC - 3BE	LPT3 and high speed parallel port registers
3BF	LPT1 high speed parallel port registers
3C0 - 3CD	Cirrus logic video controller
3D0 - 3DF	Cirrus logic video controller
3F0 - 3F7	Diskette drive controller primary registers
3F8 - 3FF	COM1 serial controller registers
400 - 4CF	Unused
480 - 48F	Extended DMS registers
4D0 - CF6	Unused
CF7	Configuration/NVM data register
CF8 - CFB	PCI configuration index register
CFC - CFF	PCI configuration index register
D00 - FFF	Unused

6.12 System Memory Map

Table 6-16
System Memory Map

Size	Memory Address	System Function
640 K	00000000 - 0009FFFF	Base memory
128 K	000A0000 - 000BFFFF	Video memory
48 K	000C0000 - 000CBFFF	Video BIOS
160 K	000C8000 - 000E7FFF	Unused
64 K	000E8000 - 000FFFFF	System BIOS
15 M	00100000 - 00FFFFFF	Extended memory
58 M	01000000 - 047FFFFF	Super extended memory
58 M	04800000 - 07FFFFFF	Unused
2 M	08000000 - 080FFFFF	Video memory (direct access)
4 G	08200000 - FFFEFFFF	Unused
64 K	FFFF0000 - FFFFFFFF	System BIOS ("SHADOW")

appendix A

CONNECTOR PIN ASSIGNMENTS

This appendix contains the pin assignments for all external connectors.

Table A-1
External Keyboard

Connector	Pin	Signal
	1	Data
	2	Unused
	3	Ground
	4	+5 VDC
	5	Clock
	6	Unused

Table A-2
PS/2-Compatible Mouse

Connector	Pin	Signal
	1	Data
	2	Unused
	3	Ground
	4	+5 VDC
	5	Clock
	6	Unused

Table A-3
MIDI/Game

Pin	Signal	Pin	Signal
1	+5 V	9	+5 V
2	Joystick Button	10	Joystick Button
3	Joystick Direction	11	Joystick Direction
4	Ground	12	MIDI Out
5	Ground	13	Joystick Direction
6	Joystick Direction	14	Joystick Button
7	Joystick Button	15	MIDI In
8	+5 V		

Table A-4
Ethernet RJ-45

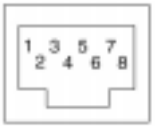
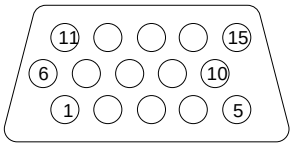
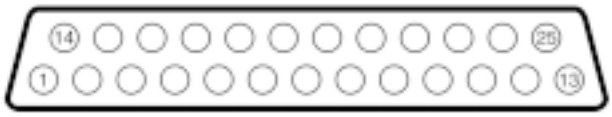
Connector	Pin	Signal
	1	(+) Transmit Data
	2	(-) Transmit Data
	3	(+) Receive Data
	4	Unused
	5	Unused
	6	(-) Receive Data
	7	Unused
	8	Unused

Table A-5
External Monitor



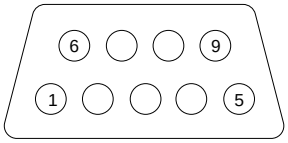
Pin	Signal	Pin	Signal
1	Red Analog	9	Blank
2	Green Analog	10	Ground
3	Blue Analog	11	Blank
4	Blank	12	Monitor ID (DD)
5	Ground	13	Horizontal Sync
6	Ground	14	Vertical Sync
7	Ground	15	Monitor ID (CC)
8	Ground		

Table A-6
Parallel



Pin	Signal	Pin	Signal
1	Strobe	14	Auto Linefeed
2	Data Bit 0	15	Error
3	Data Bit 1	16	Initialize Printer
4	Data Bit 2	17	Select In
5	Data Bit 3	18	Ground
6	Data Bit 4	19	Ground
7	Data Bit 5	20	Ground
8	Data Bit 6	21	External Diskette Positive Drive Detect
9	Data Bit 7	22	External Diskette Negative Drive Detect
10	Acknowledge	23	Ground
11	Busy	24	Ground
12	Paper End	25	External Diskette Drive Switched to +5 V
13	Select		

Table A-7
Serial Port

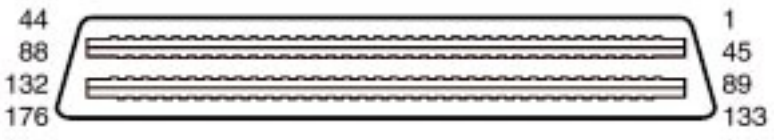


Pin	Signal	Pin	Signal
1	Carrier Detect	6	Data Set Ready
2	Receive Data	7	Ready to Send
3	Transmit Data	8	Clear to Send
4	Data Terminal Ready	9	Ring Indicator
5	Ground		

Table A-8
AC Power Connector

Pin	Signal	Pin	Signal
1	Neutral (right)	3	Live (left)
2	Ground (center)		

Table A-9
Expansion Connector



Pin	Signal	Pin	Signal
1	GND	31	GREEN
2	GND	32	CRTVSYNC
3	NC	33	RED
4	GND	34	DDCCLK
5	GND	35	PWRLED
6	NC	36	DDCDATA
7	GND	37	DOCK_PWR_EN
8	GND	38	GND
9	AD[31]	39	SPKL
10	DEVSEL	40	LINE_L
11	IRDY	41	SPK_R
12	STOP	42	LINE_R
13	TRDY	43	GND
14	GND	44	DOCK_LG
15	GND	45	GND
16	AD[12]	46	GND
17	AD[13]	47	REQ1
18	GND	48	REQ0
19	GND	49	GNTO
20	CLK1	50	RST
21	AD[0]	51	GND
22	GND	52	AD[23]
23	DOCK_S	53	AD[22]
24	CLK0	54	C/BE2
25	ACVCC	55	AD[20]
26	ACVCC	56	NC
27	ACVCC	57	AD[19]
28	ACVCC	58	FRAME
29	ACVCC	59	AD[17]
30	CRTHSYNC	60	GND

Continued

Table A-9 Expansion Connector *Continued*

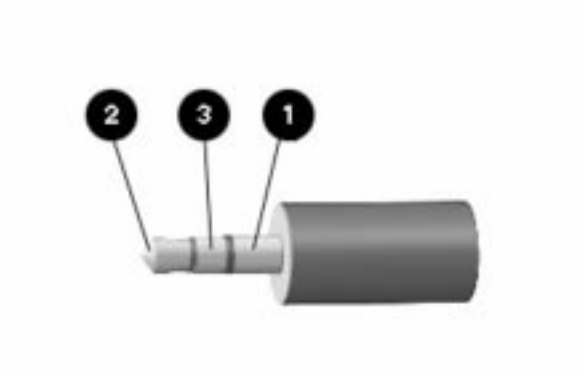
Pin	Signal	Pin	Signal
61	GND	96	GND
62	AD[14]	97	CBE3
63	AD[15]	98	AD[21]
64	AD[1]	99	NC
65	AD[3]	100	NC
66	AD[2]	101	AD[18]
67	GND	102	C/BE1
68	MDATA	103	PAR
69	KBDATA	104	GND
70	MCLK	105	AD[16]
71	KBCLK	106	AD[6]
72	ACVCC	107	C/BE0
73	PMVCC5	108	AD[5]
74	PMVCC5	109	AD[7]
75	NC	110	AD[4]
76	BLUE	111	BATTLED
77	NC	112	SWC
78	PBUSY	113	TA
79	PDATA7	114	SWB
80	PBDATA3	115	SWD
81	PSLIN	116	SWA
82	GND	117	PMVCC5
83	GND	118	PMVCC5
84	SPK_IN	119	PMVCC5
85	+5v	120	PMVCC5
86	NC	121	PSELECT
87	ERDY	122	PDADA6
88	SYSVCC5A	123	PACK
89	STANDBy_SW	124	PDATA2
90	NC	125	PDATA0
91	NC	126	PFAULT
92	NC	127	GND
93	NC	128	GND
94	GNT1	129	DSRA
95	GND	130	DCDA

Continued

Table A-9 Expansion Connector *Continued*

Pin	Signal	Pin	Signal
131	RTSA	154	AD[8]
132	RIA	155	PORT_REP
133	POWER_SW	156	MSI
134	INTB	157	MSO
135	NC	158	TC
136	INTA	159	TD
137	NC	160	TB
138	GND	161	PMVCC5
139	NC	162	PMVCC5
140	AD[27]	163	PPE
141	AD[30]	164	PMVCC5
142	AD[26]	165	PDATA4
143	AD[29]	166	PDATA5
144	AD[25]	167	PDATA1
145	AD[28]	168	PINIT
146	AD[24]	169	PSTB
147	BLOCK	170	PAFD
148	GND	171	GND
149	PERR	172	GND
150	SERR	173	CTSA
151	AD[11]	174	SINA
152	AD[9]	175	DTRA
153	AD[10]	176	SOUTA

Table A-10
Speaker Connector



Pin	Signal
1	Left channel
2	Right channel
3	Common

appendix B

POWER CORD SET REQUIREMENTS

3-Conductor Power Cord Set

The wide range input feature of your computer permits it to operate from any line voltage from 100 to 240 volts AC.

The power cord set received with the computer meets the requirements for use in the country where you purchased the equipment.

Power cord sets for use in other countries must meet the requirements of the country where you use the computer.

General Requirements

The requirements listed below are applicable to all countries:

1. The length of the power cord set must be at least 5.00 feet (1.5 m) and a maximum of 6.56 feet (2.0 m).
2. All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country where the power cord set will be used.
3. The power cord set must have a minimum current capacity of 10A and a nominal voltage rating of 125 or 250 volts AC, as required by each country's power system.
4. The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C5 connector, for mating with appliance inlet on the product.

Country-Specific Requirements

Table B-1
3-Conductor Power Cord Set Requirements — By Country

Country	Accredited Agency	Applicable Note Numbers
Australia	EANSW	1
Austria	OVE	1
Belgium	CEBC	1
Canada	CSA	2
Denmark	DEMKO	1
Finland	FIMKO	1
France	UTE	1
Germany	VDE	1
Italy	IMQ	1
Japan	JIS	3
Norway	NEMKO	1
Sweden	SEMKO	1
Switzerland	SEV	1
United Kingdom	BSI	1
United States	UL	2

Notes:

1. The flexible cord must be <HAR> Type HO3VV-F, 3-conductor, 0.75 mm^2 conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country where it will be used.
2. The flexible cord must be Type SPT-2 or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15A, 125V) or NEMA 6-15P (15A 250V) configuration.
3. The appliance coupler, flexible cord, and wall plug must bear a "T" mark and registration number in accordance with the Japanese Dentori Law. The flexible cord must be Type VCT or VCTF, 3-conductor, 0.75mm^2 conductor size. The wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (15A, 125V) configuration.

appendix C

CONVENIENCE BASE II

C.1 Models

The convenience bases provide a permanent desktop solution for the computer by eliminating the need to disconnect external devices such as a printer, keyboard, or monitor when you undock the computer. All necessary connections and disconnections are made automatically when the computer is docked and undocked. The following convenience models are available:

Table C-1
Models

Model	Serial Configuration
Convenience Base Pass through model	BNH3
Convenience Base with Ethernet	BNH1

Figure C-1. *Convenience Base*

C.2 Features

The Convenience Base II pass through model and the convenience base with Ethernet model include the following features:

	Convenience Base pass through	Convenience Base with Ethernet
Connections		
Speaker/headphone	■	■
Audio Line-In	■	■
Serial	■	■
Parallel	■	■
USB	■	■
External Monitor	■	■
Keyboard	■	■
Pointing Device	■	■
MIDI/Joystick	■	■
Other Features		
Monitor Stand	■	■
Cable lock provision	■	■
Pass through AC Power	■	■
RJ-45 connector		■
10/100 MB/s Ethernet autoswitching		■
Options		
Localized Power Cords	■	■
Cable lock	■	■

C.3 Convenience Base II Specifications

Table 3-2
Convenience Base II Specifications

	U.S.	Metric
Dimensions		
Height	4.9 in.	12.460 cm
Height w/monitor stand	5.2 in.	13.208 cm
Length	14.7 in.	37.340 cm
Width	14.2 in.	36.070 cm
Weight		
Expansion base	4.25 lb	1.93 kg
Expansion base w/monitor stand	5.80 lb	2.63 kg
Power Supply (Input)		
Operating voltage	100 to 240 VAC	
Operating current	1.10 Amp Maximum	
Rated voltage	100 to 240 VAC	
Rated current	1.0 Amp Maximum	
Line frequency	47 to 63 Hz	
Temperature		
Operating	50 to 95°F	10 to 35°C
Storage	-4 to 140°F	20 to 60°C
Relative Humidity		
Operating	10 to 90%	
Storage	5 to 95%	
Altitude		
Operating	10,000 ft	3.15 km
Non-operating	30,000 ft	10.14 km
Shock		
Operating	10 G, 11 ms, half sine	
Non-operating	140 G, 2 ms, half sine	
Vibration		
Operating	0.25 G, 5 to 500 Hz, 0.5 octave/min sweep rate	
Non-operating	1.0 G, 5 to 500 Hz, 0.5 octave/min sweep rate	

C.4 Components

The convenience base components are illustrated and described in this section.

C.4.1 Front and Right Side Components

The front and right side convenience base components are shown and identified in this section.

❶ Docking latches

❷ Docking alignment pins

❸ Docking connector

❹ Power switch

❺ Security cable lock

❻ Docking lever

❼ Pass-through AC power outlet

❽ Battery charge light

❾ Suspend button

❿ Power/suspend light

⓫ Retaining latches

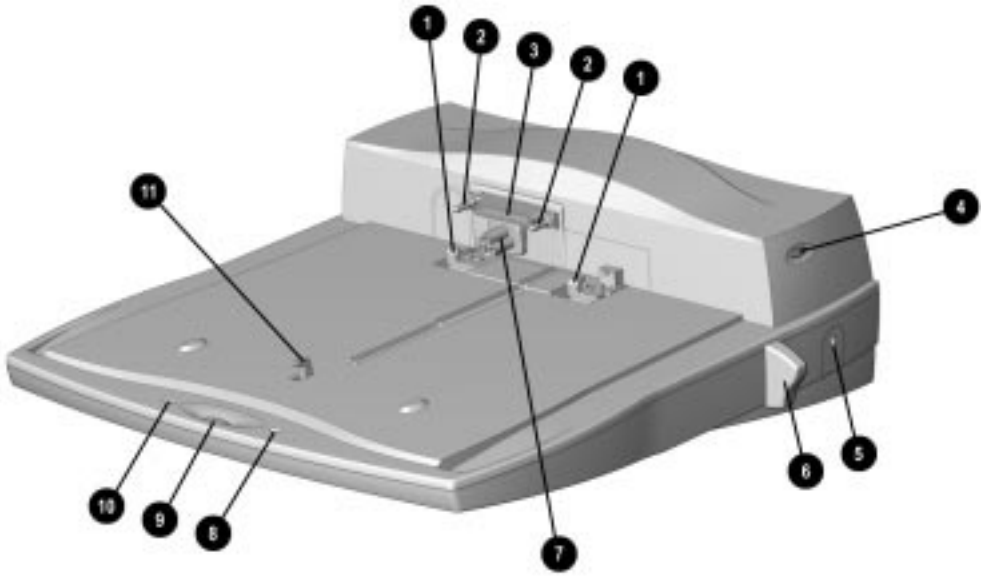


Figure C-2. *Convenience Base Front and Right Side Components*

C.4.2 Rear Components

The rear components are shown in the following figure and identified in this section:

❶ RJ-45 jack (Ethernet model only)

❷ Serial connector

❸ Parallel connector

❹ External monitor connector

❺ MIDI/Joystick connector

❻ Pointing device connector

❼ Keyboard connector

❽ Speaker/headphone jack

❾ Audio Line-in jack

❿ USB connector

⓫ AC power connector

⓬ Fan

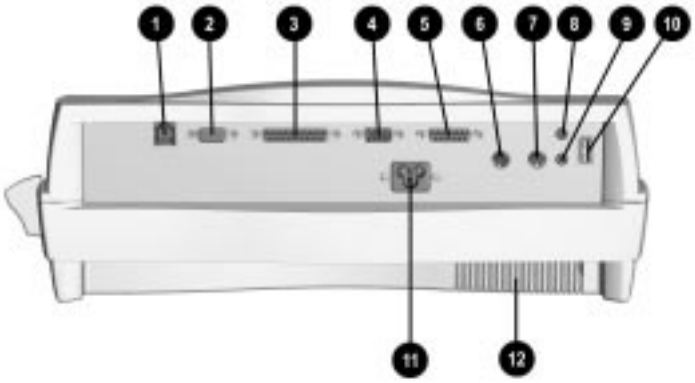


Figure C-3. *Convenience Base Rear Components*

C.5 Spare Parts

This section provides spare part references for the Convenience Base II models.

Table C-3
Convenience Base II Models

Item	Description	Spares Part Number
*	Convenience Base II (Pass through model)	316291-001
*	Convenience Base II (Ethernet model)	316312-001
*	Monitor Stand	254990-001

* Not illustrated