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Maintenance and Service Guide

Compaq Armada 4100 and 4200 Families of Personal Computers

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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 4100 and 4200 Families of Personal Computers. Additional information is available in the *Service Quick Reference Guide* and in *QuickFind.*

Compaq Computer Corporation reserves the right to make changes to the Compaq Armada 4100 and 4200 Families of Personal Computers without notice.

Symbols

The following symbols and words 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 could result in damage to equipment or loss of data.**

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

NOTE: Text set off in this manner presents commentary, sidelights, or other 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.**
△	**CAUTION: To properly ventilate your system, you must provide at least 3 inches (7.62 cm) of clearance on the front and back of the computer.**
⚠	**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.**

Laser Safety

All Compaq systems, equipped with CD-ROM drives, comply with appropriate safety standard including IEC 825. With specific regard to the laser, the equipment complies with laser product performance standards set by government agencies as a Class 1 laser product. It does not emit hazardous light; the beam is totally enclosed during all modes of customer operation and maintenance.

CDRH Regulations

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States.

WARNING: Use of controls or adjustments or performance of procedures other than those specified herein or in the CD ROM installation guide may result in hazardous radiation exposure.

This system is classified as a CLASS 1 LASER PRODUCT. This label is located on the outside of your system. A similar label also appears on the internal CD-ROM installed in your system.

LASER INFO

Laser Type:	Semiconductor GaAIAs
Wave Length:	780 +/- 35 nm
Divergence Angle:	53.5 Degree +/- 1.5 Degree
Output Power:	Less than 0.2mW or 10,869 $W \bullet m^{-2} sr^{-1}$
Polarization:	Circular
Numerical Aperture:	0.45 +/- 0.04

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.

Locating Additional Information

The following documentation is available to support the products:

- *Quick Setup*
- *Reference Guide*
- *Introducing Microsoft Windows 95*
- *Compaq Service Quick Reference Guide*
- Service Training Guides
- *Compaq Service Advisories and Bulletins*
- *Compaq QuickFind*
- *Technical Reference Guide*

Product Description

1.1 Computer Features and Models

The Compaq Armada 4100 and 4200 Families are mobile notebook computers with advanced modularity, processors, and video graphics. Both families provide full-function, Pentium-based notebook computers that allow desktop functionality and connectivity through the use of an optional Mobile CD (MCD) Expansion Unit and a convenience base.

The 4100 Family provides light weight multimedia models with up to 166-MHz processors with MMx technology, 8- or 16-MB of system memory, hard drive capacity up to 2.0 GB, and primary battery power from the handle battery.

The 4200 Family provides slimline models with 233- or 266-MHz processor, 32-MB of system memory, hard drive capacity up to 4-GB, and primary battery power from the modular battery pack in the DualBay.

This chapter describes the features of these computer models.

- Compaq Armada 4100
- Compaq Armada 4110 and 4110D
- Compaq Armada 4115
- Compaq Armada 4120 and 4120T
- Compaq Armada 4125D and 4125T
- Compaq Armada 4130T
- Compaq Armada 4131T
- Compaq Armada 4140T
- Compaq Armada 4150 and 4150T
- Compaq Armada 4160T
- Compaq Armada 4160T Slimline
- Compaq Armada 4210T
- Compaq Armada 4220T

***Figure** 1-1. Compaq Armada 4100 and 4200*

1.2 Models

The following 4200 models are available:

Table 1-1
4200 Family of Personal Computers

Model	Processor	Display	Hard Drive	Cache	Memory/ Upgrade
4210T	233-MHz Pentium	12.1-inch CTFT	3.0-GB	256-KB (L2)	32/96
4220T	266-MHz Pentium	12.1-inch CTFT	4.0-GB	512-KB (L2)	32/96

The following 4100 Family models are available:

Table 1-2
Compaq Armada 4100 Family of Personal Computers

Model	Processor	Display	Hard Drive	Cache	Memory/ Upgrade
4120	120-MHz Pentium	11.3-inch CSTN	810-MB	256-KB	16/48*
4125D	120-MHz Pentium	11.3-inch CSTN	810-MB	256-KB	8/40
4120T	120-MHz Pentium	11.8-inch CTFT	810-MB	256-KB	8/40
4120T	120-MHz Pentium	11.8-inch CTFT	810-MB	256-KB	16/48*
4125T	120-MHz Pentium	11.8-inch CTFT	810-MB	256-KB	16/48*
4130T	133-MHz Pentium	11.8-inch CTFT	1.08-GB	256-KB	16/48
4131T	133-MHz Pentium	11.8-inch CTFT	1.4-GB	256-KB	16/48
4150	150-MHz Pentium w/ MMx	12.1-inch CSTN	1.6-GB	256-KB	16/80
4150T	150-MHz Pentium w/ MMx	12.1-inch CTFT	1.6-GB	256-KB	16/80
4160T	166-MHz Pentium w/ MMx	12.1-inch CTFT	2.0-GB	256-KB	16/80
4160T Slimline	166-MHz Pentium w/ MMx	12.1-inch CTFT	2.0-GB	256-KB	16/80

* Japan only

1.3 Standard Features

Depending upon your computer model, the processor, DRAM, hard drive space, and color monitor type and size may vary:

Available in the Compaq Armada 4200 models:

- 233- or 266-MHz Pentium processors, upgradable to future Pentium technology
- 64-bit graphics controller
- 32-MB of dynamic random access memory (DRAM), expandable to 96 MB
- 3-GB or 4-GB 2.5- inch hard drives (4-GB hard drive is not compatible with the 4100 modeles)
- 12.1-inch Color Thin Film Transistor (CTFT) SVGA displays
- External Diskette Drive Bay
- Modular Lithium Ion (Li-ion) battery in the DualBay as the primary battery power
- 32-bit cardbus PC card slot
- Handle battery in handle shell

Available in the Compaq Armada 4131T-4160T models:

- 4131T has a 133-MHz Pentium procesor and the 4150 has a 150-MHz Pentium processor.The 4150 and the 4150T have 150-MHz Pentium processors with MMx technology. The 4160T and the 4160T slimline have 166-MHz Pentium processors with MMx technology.
- Cirrus logic LCD graphic controller

- 16-MB of dynamic random access memory (DRAM), expandable to 40-, 48- or 80 MB
- 1.4-GB, 1.6-GB, and 2-GB hard drives
- Lithium Ion (Li-ion) handle battery pack primary battery power
- 16-bit PC card system

Available in the Compaq Armada 4100-4130T models:

- All models prior to and including the 4131T can be upgraded to a 133-MHz Pentium processor by replacing the processor board.
- 75-, 100-, 120-, or 133-MHz Pentium processors.
- 8- or 16-MB of dynamic random access memory (DRAM), expandable to 72- or 80-MB
- 630-MB, 810-MB, or 1.08-GB 2.5- inch hard drives
- 10.4-inch Color Super Twist Nematic (CSTN), 11.3-inch CSTN, or 11.8-inch Color Thin Film Transistor (CTFT) SVGA displays
- Lithium Ion (Li-ion) handle battery pack primary battery power

The following features are standard in both the Compaq Armada 4100 and 4200 Families:

- NTSC/PAL TV video allows full screen, full motion digital video presentation with interleaved synchronized stereo sound. MPEG accommodates full motion video in the range of 24 frames per second (cinema quality) to 30 frames per second (television quality).
- IDE hard drive in the dedicated hard drive bay. Cable select technology is employed for device 0/device 1 selection. The hard drive is secured in place with a pair of screws
- 3.5-inch 1.44-MB diskette drive DualBay module supports a single diskette drive
- Supports Lithium Ion (Li-ion) and Nickel Metal Hydride (NiMH) handle battery packs
- Sound Blaster–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
- Operates from an internal battery pack or an AC adapter that is compatible with domestic or international power sources
- Power management and security features

- Infrared interface for wireless communication with other IrDA-compliant devices at data rates up to 115 kbaud or 4 mbps on the 4210T, 4220T, 4150, 4150T, 4160T, and the 4160T Slimline models.
- Two PCMCIA standard device slots that will accommodate two types I and II and one type III PC Cards
- 120-pin expansion connector provides the interface to the Mobile CD Expansion Unit (MCD) and the convenience base
- Rear-panel ports provide connections for parallel and serial, video out, keyboard/mouse, and IrDA compliant infrared devices

1.3.1 Software Fulfillment

Backup software may be ordered directly from Compaq Computer Corporation through the Compaq Order Center. Both the model and serial numbers of the computer are needed to identify the specific software available.

For technical questions about software for the computer, contact a Compaq Technical Support Engineer. The model and serial numbers of the computer should be available before making the call.

1.3.2 Security Features

The computer has the following security features:

- Ability to secure the computer and MCD Expansion Unit to an immovable object with an optional cable lock.
- Ability to establish power-on and setup passwords and to disable ports and devices from the Security menu in Computer Setup.

1.3.3 Power Management

The computer supports three power management modes:

- Local Standby: The ability of individual subsystems to enter reduced power modes after predetermined periods of inactivity.
- Global Standby: The ability to place all subsystems in a reduced power mode after a predetermined period of inactivity.
- Hibernation: The ability to save the system configuration and user data to the hard disk, for restoration at a later time.
- ACPI Hardware Ready (Advanced Configuration and Power Interface): the 4200 Family models support the operation of hardware and software power specifications to interface in a single system and be used as needed.

In addition, there are the OFF and ON states. In the OFF state, the computer appears to be consuming no power; however, as long as there is a battery capable of supplying current, some components will be powered up, performing housekeeping tasks and

waiting to be awakened. In the ON state, all systems are powered up and the unit is completely functional.

1.4 Options

The 4100 and 4200 Families support the following options:

- MCD Expansion Unit
- Convenience base (Passthrough and Ethernet models)
- Memory expansion boards
- Li-ion handle battery packs
- Li-ion modular battery pack
- Automobile Adapter
- AC Adapter
- External Battery Charger
- PCMCIA modem
- Trackball pointing device
- AC power cords for international travelers
- Display upgrades (4100 Family models only)
- Hard drive upgrades (model dependent)
- Processor upgrades (4100 Family models only)
- External Battery Charger
- External keyboards
- External diskette drive bay
- Compaq mouse
- USB Cardbus PC card(4200 Family models only)

1.4.1 System Memory Options

The computer supports optional 4-, 8-, 16-, 32-MB or 64-MB memory board sets. The memory boards are 70 ns Fast Page Mode DRAM SODIMMs, without parity. System memory can be expanded to 40, 48, or 96-MB of DRAM depending on the model.

The 4210T and 4220T models can support standard EDO and FP memory upgrades. Compaq does not offer EDO memory upgrade kits.

The system includes two DIMM slots that must be populated in pairs with DIMMs of equal size and type. Either parity or non-parity DIMMs may be used, but parity checking will not be enabled by the memory controller.

1.4.2 Display Options

The 4100 Family models with 11.3-inch, 11.8-inch, or CSTN displays can be upgraded to an 12.1-inch Color Thin Film Transistor (CTFT) SVGA display.

1.4.3 Secondary Cache

The 4200 Family models are equipped with 256-KB or 512-KB secondary (L2) cache of write-back/write-through cache on the system I/O board.

Models 4110 through 4160T of the 4100 Family are equipped with 256-KB of write-back/write-through cache on the system I/O board.

1.4.4 Mobile CD Expansion Unit

The Mobile CD-ROM Expansion Unit provides the following multimedia capabilities:

- CD-ROM drive
- Integrated stereo speakers
- Game port with MIDI support
- Dedicated battery bay

The CD-ROM drive is available in the optional MCD Expansion unit. The drive supports the following formats:

- ISO-9660, the most common CD-ROM format
- CD-ROM XA eXtended Architecture, a standard for storing multimedia information
- Photo CD (Kodak's format for storing photographic images on CD-ROM)

1.4.5 Convenience Base

The convenience base provides the following added capabilities:

- Pass-through ports (serial, parallel, and video)
- Expansion features (mouse and keyboard ports, network support)
- Five-degree tilt for the notebook keyboard
- Charging of batteries in the system
- Integrated Ethernet (available on models with Ethernet capability)

1.4.6 Mass Storage Options

A 4-GB hard drive is available as options for the 4210T. The 3-GB hard drive supports both the 4100 and 4200 Family models. Only a single diskette drive may be used at any one time with the computer. This drive may be used in the DualBay or externally with an optional parallel cable.

1.4.7 AC Adapter

The AC adapter supplies DC voltage to the system converter to operate and/or charge the installed battery pack(s). The adapter provides sufficient power to charge each main battery pack in 1.5 hours or less with the system off, or in 2.5 hours or less with the system on. The AC adapter power specifications are presented in Chapter 6.

1.4.8 Automobile Adapter

The automobile adapter is used to charge the computer while traveling in an automobile. The Automobile Adapter power specifications are presented in Chapter 6.

1.4.9 Lithium Ion Battery Pack

Lithium Ion (Li-ion) battery packs offer superior performance over nickel metal hydride batteries. NiMH batteries are not recommended. Li-ion batteries weigh approximately half as much as the NiMH battery packs and are compatible with the External Battery Charger and its charging options. They are available in both battery handle and modular bay forms.

1.4.10 External Battery Charger

The External Battery charger has the following features:

- Two battery charge slots
- Accepts Li-ion handle and modular batteries
- Fast charges one battery in 1.5 hours
- Fast charges two batteries in 3 hours

1.4.11 External Keyboards

The following external full-size keyboards are supported:

- Enhanced III keyboard
- SpaceSaver keyboard
- Alternative design keyboard

1.4.12 External Monitors

The following external monitors are supported:

- QVision 172 Color Monitor
- 151 FS Color Monitor
- 171 FS Color Monitor
- V50 Color
- V70 Color

- P50 Color
- P70 Color
- P110 Color
- P1610 Color
- TFT500 Flat Panel

1.4.13 Compaq Mouse

The computer supports a PS/2 mouse or other external pointing device.

1.4.14 Trackball Pointing Device

The modular trackball provides an effective alternate to the touchpad or an external mouse when the machine is used in either a portable or desktop environment.

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 Cable lock provision

❷ Hard drive compartment

❸ PC Card slots

❹ PC Card eject buttons

❺ Audio connectors

❻ Display latch

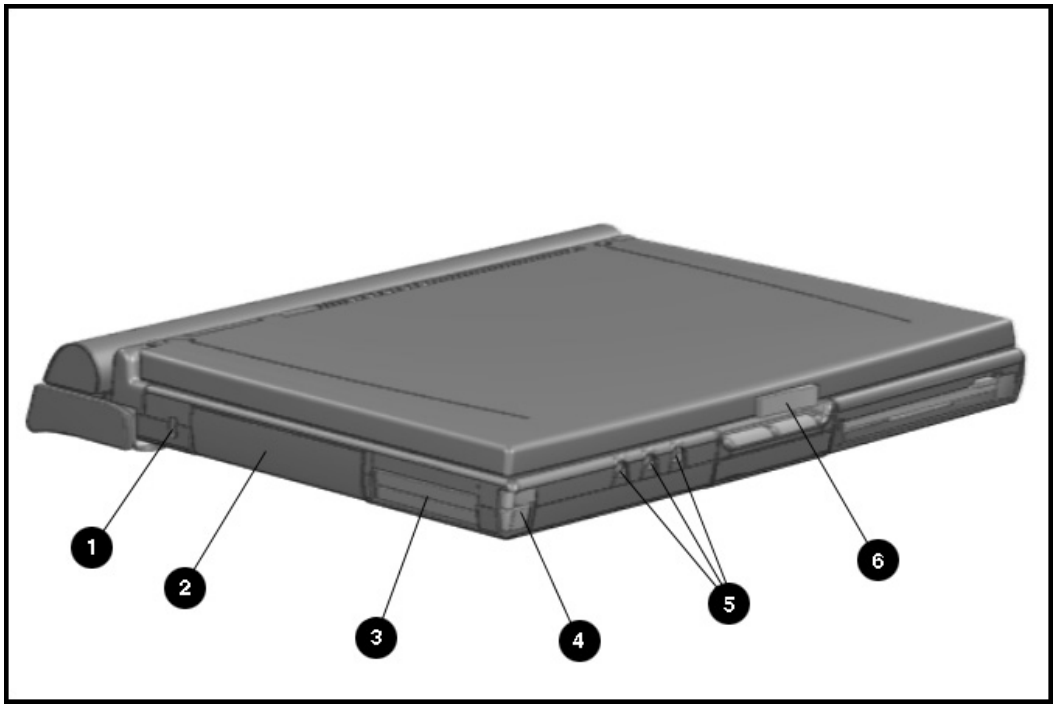
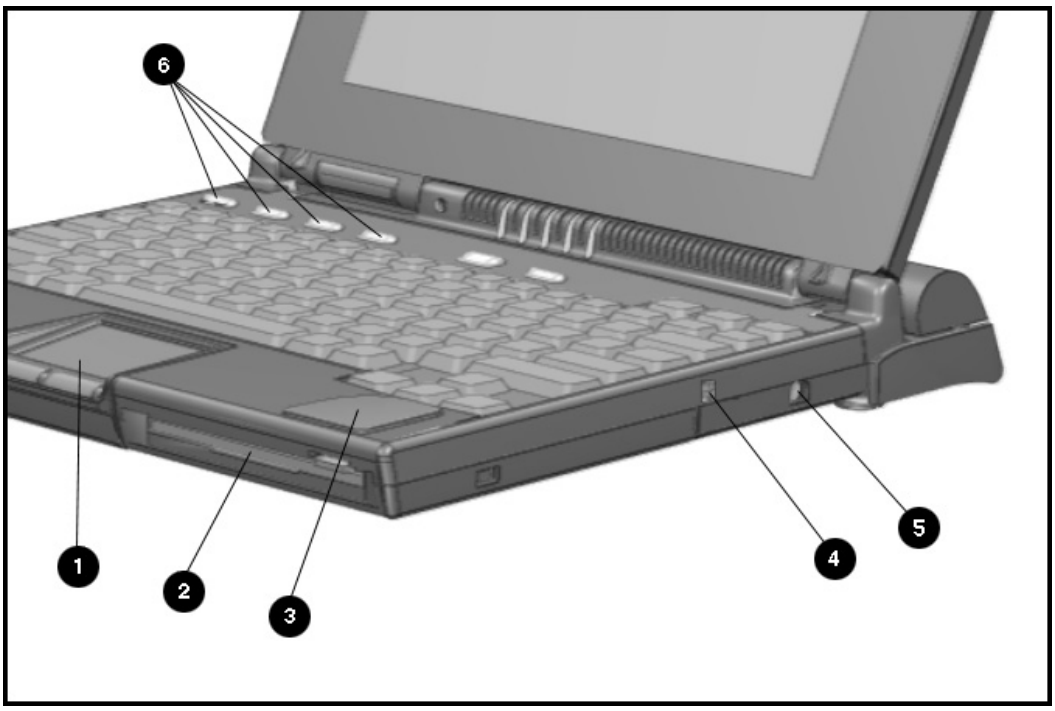


***Figure** 1-**2**. Front and Left Side Components*

1.5.2 Front and Right Side Components

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

❶ Pointing device
❷ DualBay module
❸ Speaker
❹ DualBay eject button
❺ AC power connector
❻ User programmable keys



***F*igure 1-3.** *Front and Right Side Components*

1.5.3 Rear Components

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

❶ Keyboard/mouse connector
❷ Parallel connector
❸ Serial connector
❹ Infrared lens (IrDA compliant)
❺ External monitor connector
❻ NTSC/PAL video
❼ Status panel indicator lights
❽ Handle

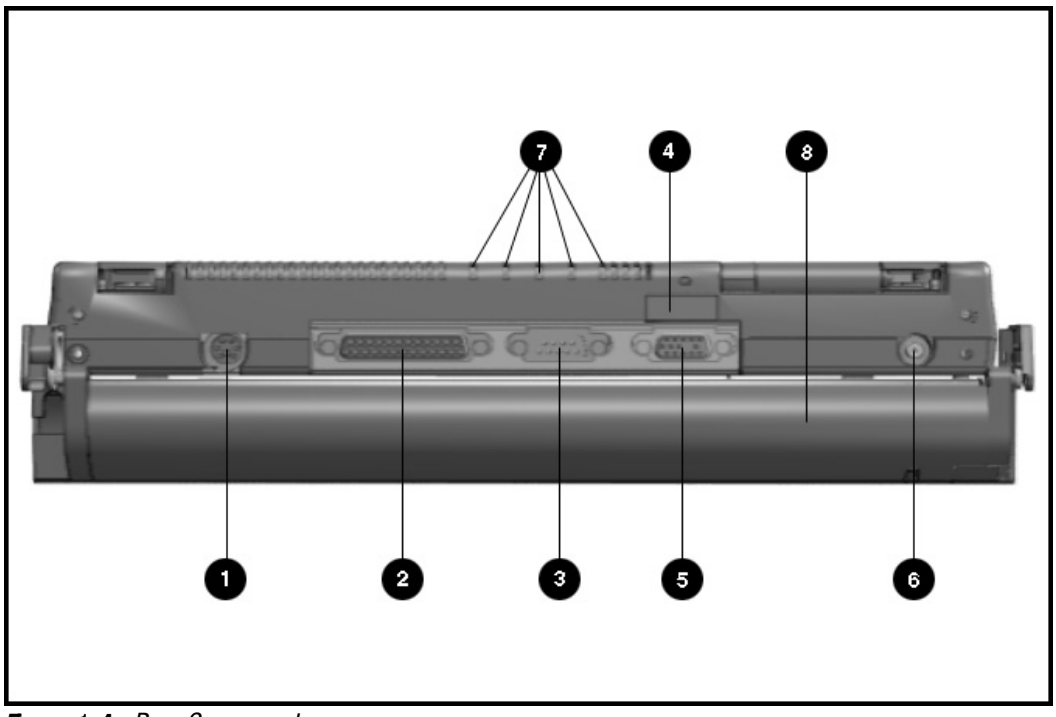


***Figure** 1-**4**. Rear Components*

1.5.4 Bottom Components

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

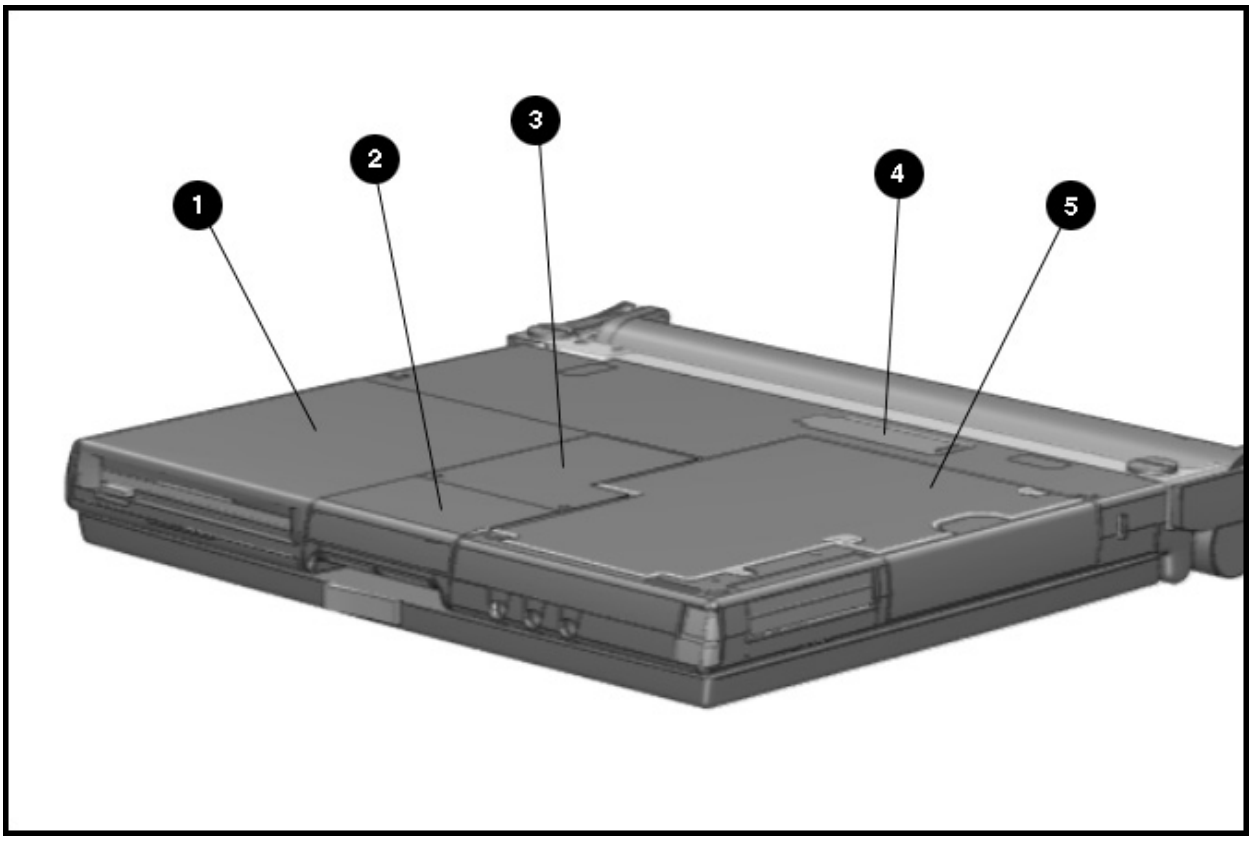
❶ DualBay

❷ Pointing device

❸ Memory compartment

❹ Expansion slot

❺ Hard drive compartment



***F*igure 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 Power/Suspend

❷ Battery charge

❸ Caps Lock

❹ Scroll Lock

❺ Num Lock

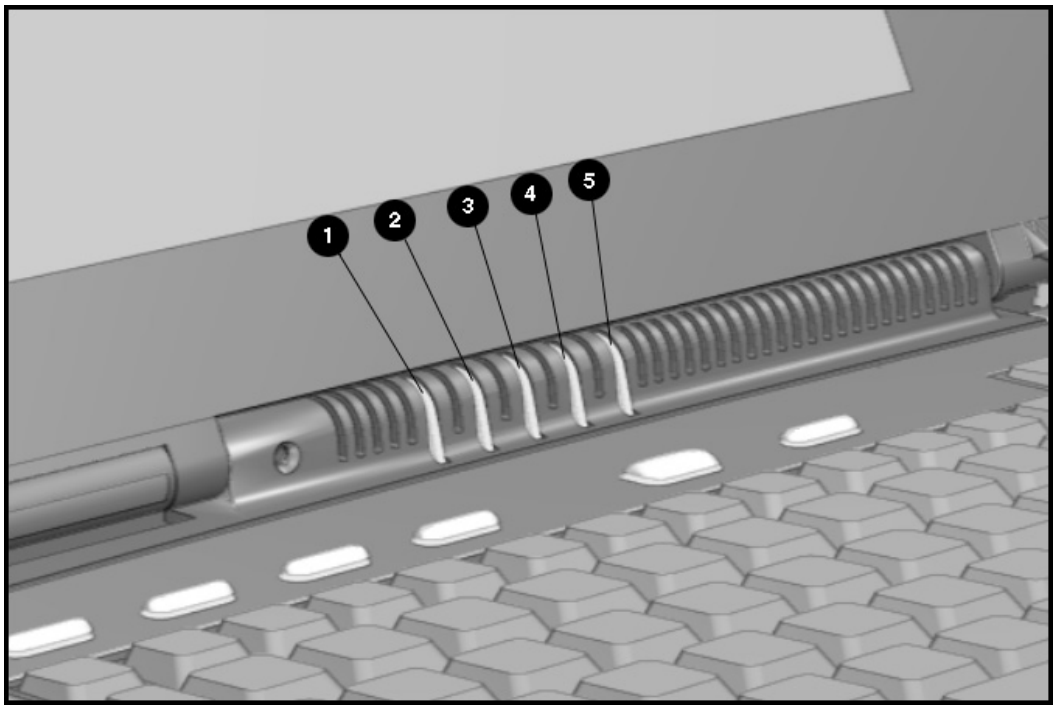


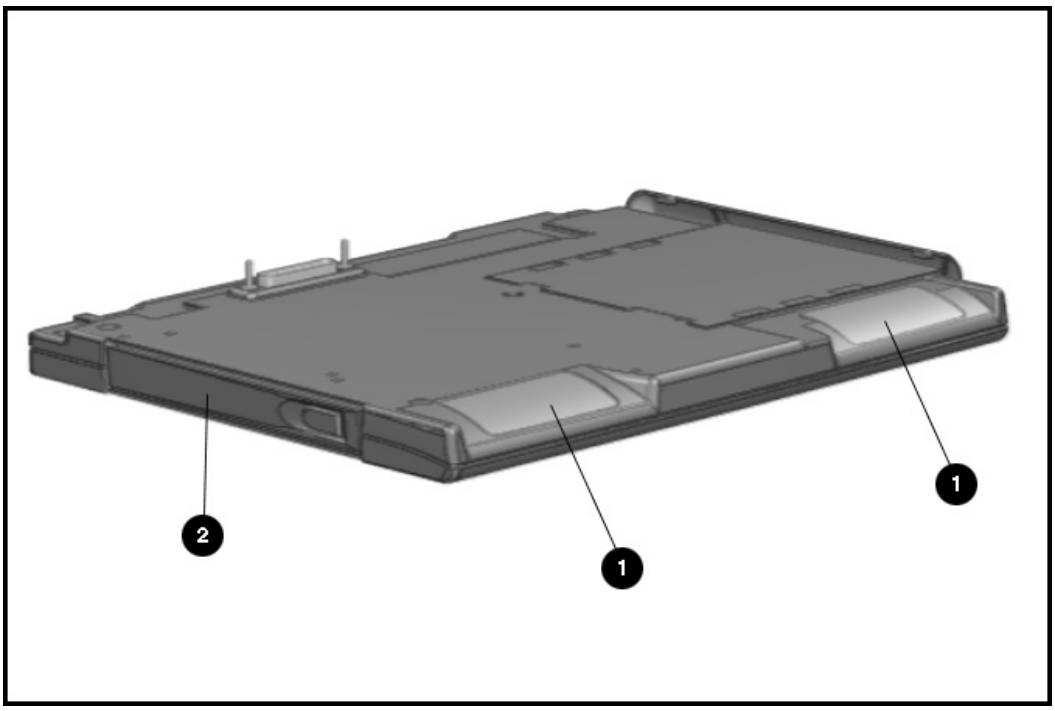
***Figure** 1-**6**. Status Panel Lights*

1.6 Mobile CD Expansion Unit Components

The front and left components of the Mobile CD Expansion Unit are shown in the following figure and are identified in this section:

❶ Stereo speakers

❷ CD-ROM drive



***F*igure** 1-7. *Left and Front Components*

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

❶ Battery bay

❷ MIDI/game device

❸ AC adapter connector

❹ Convenience Base expansion connector

❺ Computer expansion connector

❻ Unlocking lever

❼ Expansion posts

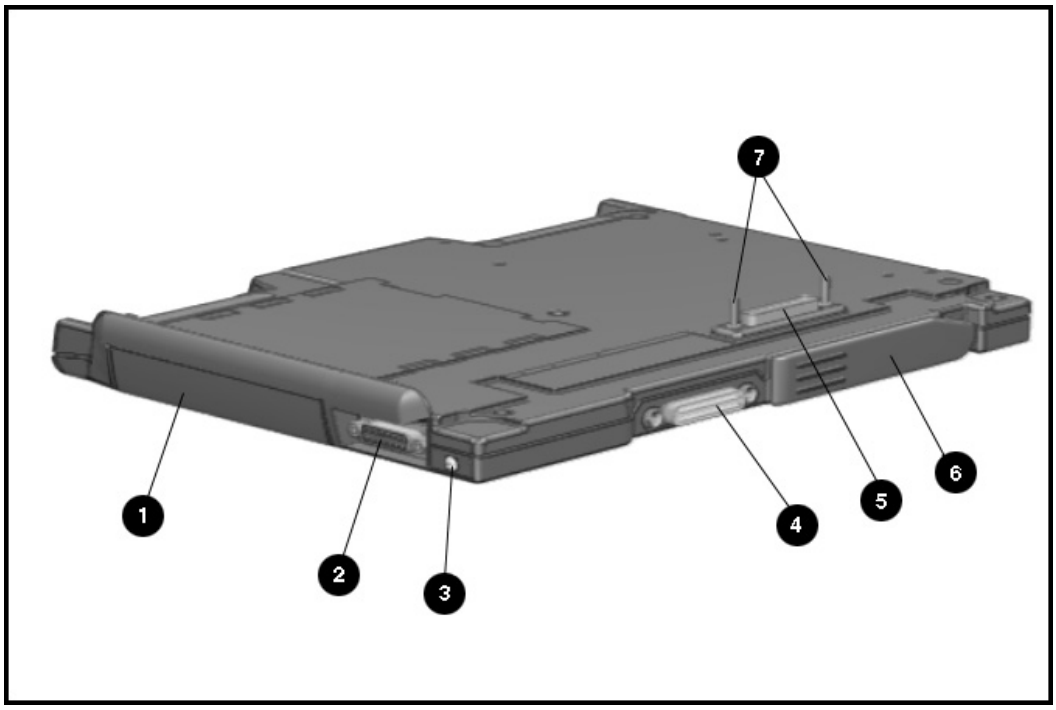


Figure 1-8. *Right and Rear Components*

1.7 Convenience Base Connectors

The convenience base connectors are shown in the following figure and are identified in this section:

❶ Stereo speaker connector
❷ External keyboard
❸ Mouse
❹ AC power
❺ Serial port
❻ Monitor
❼ Parallel port
❽ BNC (thin coaxial cable) connector*
❾ RJ-45 connector*

* These connectors are available on the convenience base with Ethernet capability.

WARNING: To reduce the risk of electrical shock, fire or damage to the equipment, do not plug telecommunications/telephone connectors into the Network Interface Card (NIC) receptacles.

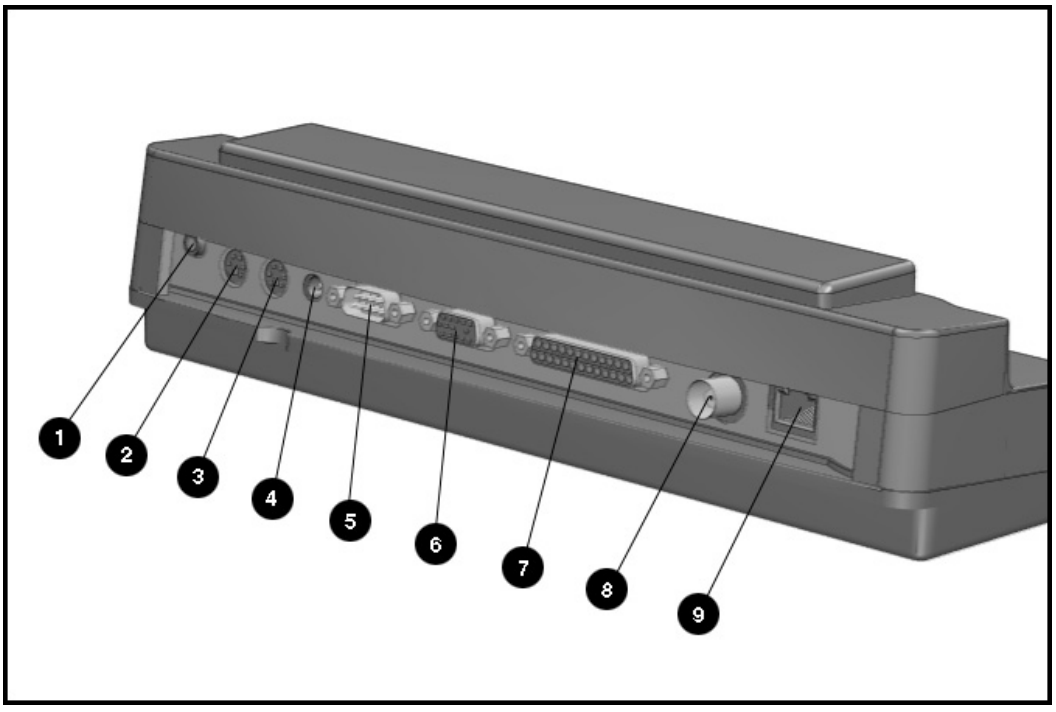


Figure 1-9. *Convenience Base Components*

1.8 Design Overview - Computer

This section presents a design overview of the 4100 and 4200 Families. The overview is limited to field replaceable parts. All replacement parts are listed in Chapter 3. Removal and replacement procedures are presented in Chapter 5.

The computer is a traditional clamshell design with a display unit attached to a system unit. The computer opens to reveal a backlighted LCD display and a full-sized keyboard. The display is designed for a continuously adjustable tilt angle. The system unit houses the keyboard, I/O ports, operator controls and indicators, and DualBay devices.

1.8.1 System Unit

The system unit contains the following field-replaceable parts:

- System board
- Processor board
- Display assembly
- CPU/keyboard cover
- Internal microphone
- Optional memory expansion boards
- Lithium Real Time clock battery
- Hard drive
- Diskette drive
- Handle
- Pointing device
- CPU base cover
- PCMCIA assembly

1.8.2 System Board

The Compaq Armada system electronics are integrated on two printed circuit assemblies; the system board and the processor board. The 4100 system boards are not compatible with the 4200 Family system boards. Similarly, the 4200 system boards are not compatible with the 4100 Family.

1.8.3 Processor Board

Prior to the 4150 model, there are two processor board PCAs with either 8-MB or 16-MB of memory and with a level-2 cache populating the models with 100-, 120- and 133-MHz processors. The MMX processor on the 4150 , 4150T, and 4160T are P55CLM processors operating at 150 or 166 MHz. These processors are not compatible with 4131T, 4130T, 4120T, 4120, 4110, and 4100 models.

In each of the 4100 and 4200 systems there are two processor board PCAs with a level-2 cache. The processor board contains the CPU, the OPTi 82C557 system Controller, the OPTi 82C556 data buffer controller, and, if populated on the PCB, cache data RAM. Also mounted on the processor board is an electronic temperature sensor that interfaces to the system through the I^2C bus.

The 4210T and 4220T processor boards include the 233- and 266-MHz MMX processors and the MTXC controller, part of the Intel 430TX mobile chipset. The 4200 Family processor boards also include the electronic sensor that interfaces to the system through the I^2C bus.

1.8.4 Processor

The P54LM and the P55CLM Intel Pentium processors are fully compatible with the entire installed base of applications for DOS, Windows, and OS/2, branch predition, and separate code and data caches all provide increased performance over previous x86 processors. Reduced voltage operation and enhanced SL power management features provide significant power savings over other Pentium versions.

For the 4200 Family, the 233 MHz CPU core runs on a 1.8 V supply. The 266 MHz CPU core runs on a 2.0 V supply. The interface for the 4200 Family is 2.5 V to 3.3 V.

For the 4100 Family, the CPU core runs on a 2.9V supply for lower power operation, while the I/O buffers are powered at 3.3V for compatibility with the rest of the system.

1.8.5 System Memory

See Tables 1-1 and 1-2 for the system memory contained on models for the 4100 and 4200 Families. Up to 96-MB of expansion memory is available. Base memory is onboard memory built into the system I/O board. Expansion memory consists of memory expansion board kits available as user installable options.

1.8.6 Cache

The 4200 Family models have 256-KB or 512-KB of cache data RAM and 64-KB of cache tag RAM if populated on the PCB are mounted on the processor module.

The 4110-4160T models have 256-KB of cache data RAM and 32-KB of cache tag RAM if populated on the PCB are mounted on the processor module.

1.8.7 Local Bus Video

The standard Compaq Armada video subsystem consists of:

- An internal LCD display.
- One Megabyte frame buffer (Two Megabyte frame buffer for the 42210T and 4220T)
- 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
- 32-KB of video ROM (44KB of video ROM for the 4210T aand 4220T)
- NTSC/PAL encoder

Chapter 2

Troubleshooting

This chapter contains troubleshooting information for the computer and the convenience base. The basic steps in troubleshooting the computer include:

1. Completing the preliminary steps listed in Section 2.1.
2. Running the Power-On Self-Test (POST) as described in Section 2.2.
2. Running Computer Setup as described in Section 2.5
4. Running the Computer Checkup (TEST) as described in Section 2.5.
5. Performing the recommended actions described in the diagnostic tables in Section 2.6 if you are unable to exercise POST or Computer Checkup or if the problem persists after running POST and Computer Checkup.

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.
- Once the problem is resolved, do not complete the remaining recommended actions.
- Refer to Chapter 5 for any removal and replacement procedures.
- If the problem is intermittent, check the computer or convenience base several times to verify that the problem is solved.

Use the following table for quick reference to troubleshooting information:

If You Want To:	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 AC Power when running POST, Computer Setup, or Computer Checkup. A low-battery condition could initiate Suspend or Hibernation and interrupt the test.

Before running POST and Computer Checkup, complete the following steps:

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.
2. Ensure that the battery pack is installed in the computer and the AC power 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 the 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).
7. Use the Hotkeys to adjust the contrast (**Fn+F9**) and brightness (**Fn+F10**) to the center of their ranges and leave the display open. On models with color TFT displays, contrast is not applicable.
8. Turn off the computer and all external devices.
9. Disconnect any 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 Advanced Diagnostics and loopback plugs in the serial and parallel connectors if you plan to test these ports. You may run Advanced Diagnostics from the hard drive or from a diskette.

If you are running Diagnostics from the hard drive, complete the following steps:

a. Turn on or restart the computer.

b. 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. The Welcome screen appears.

If you are running Diagnostics from a diskette, complete the following steps:

a. Insert the Diagnostics diskette into the diskette drive and turn on the computer.

b. At the Welcome Screen, press **Enter** to accept **OK**.

c. Select Computer Checkup (TEST).

d. Select Prompted Diagnostics after "Identifying System Hardware" completes.

e. Select Interactive Testing and follow the displayed instructions.

Refer to Chapter 3 for the description and spare part number of the loopback plugs.

After completing the preliminary steps, run POST (Section 2.3) and Computer Checkup (Section 2.5).

2.2 Clearing the Power-On and Setup 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 AC power.
2. Remove the real time clock battery.
4. Wait five minutes.
5. Reconnect the AC power.
6. Restart the computer. During the Power-On Self Test (POST), a "162 System Options not Set" message appears. (See Section 2.4 for additional POST error messages).
7. Shut down the computer, then turn off the power 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, complete the following steps:

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 and boots from the hard drive or from a bootable diskette if one is installed in the diskette drive.

2.4 POST Error Messages

This section contains typical error messages that may occur during the power-on self-test (POST).

If you receive an error message read the description and follow the recommended action or run Computer Checkup from the Diagnostics diskette. Information about running Computer Checkup is presented later in this chapter.

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 audible beeps. The system then stops.
- The system emits a series of audible beeps. The system then stops.

Warning messages indicate a potential problem exists such as a system configuration error. 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," run Computer Setup. (Computer Setup replaces the SCU utility.)

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 2-1
Warning Messages

Message	Description
Clock not ticking correctly	The real-time clock is not ticking. Replace the real time clock
CMOS checksum invalid, run SCU	CMOS RAM information has been corrupted and needs to be reinitialized by running Computer Setup.
CMOS failure, run SCU	CMOS RAM has lost power and needs to be reinitialized by running Computer Setup.
Floppy controller failed	The diskette drive controller failed to respond to the reset command. Power - down the system and check all appropriate connections. If the diskette drive controller continues to fail, you may need to replace the system board.
Floppy disk 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.
Floppy 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. Power down the system and check all appropriate connections.
Hardware info 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 keyboard.
Keyboard failure	The keyboard failed to respond to the RESET ID command. Press F1.
No interrupts from Timer 0	The periodic timer interrupt is not occurring. Press F1.
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. An external adapter (such as a video card) may be causing the conflict. Run Computer Setup.
Time/Date corrupt - run SCU	The time and date stored in the real time clock have been corrupted, possibly by a power loss. Run Computer Setup.
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. Press F1 and continue.

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
Parity error at unknown location	Parity error occurred.	None

The following table lists some of the Fatal Error beep codes, along with the beep sequence (short, long, pause) and the meaning of the beeps.

Table 2-3
Fatal Error Beep Codes

Beep Code	Beep Sequence	Explanation	Remedy
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.	Replace system board.
2	S-S-S-P-S-L-L-P	The ROM checksum is incorrect.	1. Flash the ROM. 2.Replace system board.
3	S-S-S-P-L-S-S-P	The CMOS RAM test failed.	Replace system board.
4	S-S-S-P-L-S-L-P	The DMA controller is faulty.	Replace system board.
5	S-S-S-P-L-L-S-P	The interrupt controller failed.	Replace system board.
6	S-S-S-P-L-L-L-P	The keyboard controller failed.	Replace system board.
7	S-S-L-P-S-S-S-P	Graphics adapter is faulty.	Replace system board.
8	S-S-L-P-S-S-L-P	Internal RAM is faulty.	Replace processor board.

S = Short, L = Long, P = Pause

2.5 Compaq Utilities

Run the Compaq Utilities to view or test system information and installed or connected devices. Run Compaq Utilities from either the computer hard drive or from diskette.

If running Compaq Utilities from a diskette, note the following:

- Use version 10.13c or later.
- You will not be able to make a utilities diskette.
- Use the Computer Setup diskette to run Computer Setup.

The Utilities menu includes the following:

- Computer Setup
- Computer Checkup (TEST)
- View System Information (INSPECT)
- Create Diagnostics diskette (hard drive only)
- Manage Diagnostics Partition (diskette only)

If the problem persists, call for support. Follow these steps to prepare for the support call:

1. Run Computer Checkup and save the device list to a file and print or save the log of errors.
2. Run the View System Information (INSPECT) utility and print or save that information.
2. Have the files or the printed information available when calling for support.

2.5.1 Running Computer Setup

Computer Setup contains a group of utilities that give you an overall picture of the computer's hardware configuration and aid in troubleshooting. Use these utilities to set custom features, such as security options, power conservation levels, and startup preferences.

A computer running Windows 95 automatically recognizes and configures the system for new devices. However, if there is a configuration problem, or you want to view or reset configuration settings, use Computer Setup.

Computer Setup provides two methods to view the computer's configuration - by type or connection. The default method for viewing Computer Setup is by type.

Categories by type include:

- System Features—security, power, boot management
- Communication—ports, modem, other communication devices
- Storage—storage-related devices such as hard drive or diskette
- Input Devices—keyboard, mouse, and other input devices
- Network—Network adapter, or other network-related devices (Available only when docked or when PC Card is installed
- Audio—sound properties and audio device settings
- Video—monitor video device resources
- Other devices—devices that could not be categorized

Categories by connection include:

- System Features—security, power, boot management
- System Devices—keyboard, mouse, parallel and serial ports
- ISA—ISA bus and related devices
- PCI—PCI bus and connected devices
- PC Card (PCMCIA) —PC Card bus and PC Card devices

2.5.2 Running Computer Checkup (TEST)

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

Computer Checkup is installed on the hard drive. If the hard drive is nonfunctional, you can run it from a diskette.

NOTE: It is recommended that you make diskette copies of Computer Checkup and keep them available for future needs. A current copy can be obtained from the Compaq Customer Support Center.

Computer Checkup

To run Computer Checkup from the hard drive, complete the following steps:

1. Close all applications and shut down the computer.
2. Turn off the computer.
2. Turn on the computer.
4. When the cursor moves to the right side of the screen, press ***F***10.

   A Welcome Screen is displayed that is followed by the Compaq Utilities main menu.
5. From the Compaq Utilities main menu, select Computer Checkup (TEST).

   A diagnostics menu is displayed.
6. Select the option to view the device list.

   A list of the installed hardware devices is displayed.

   NOTE: Computer Checkup does not detect all non-Compaq devices.
7. Verify that Computer Checkup correctly detected the installed devices.

   If the list is correct, select OK. The Computer Checkup option menu is displayed again.

   If the list is incorrect, verify that the new devices are installed properly.
8. Select one of the following from the diagnostics menu:

   - Quick Check Diagnostics. Runs a quick, general test on each device with a minimal number of prompts. If errors occur, they display when the testing is complete. You cannot print or save the error messages.
   - Automatic Diagnostics. Runs an unattended, maximum testing of each device with minimal prompts. You can choose how many times to run the tests, to stop on errors, or to print or save a log of errors.
   - Prompted Diagnostics. Allows maximum control over testing the devices. You can choose attended or unattended testing, decide to stop on errors, or choose to print or save a log of errors.
9. Follow the instructions on the screen as the devices are tested. When testing is complete, the Diagnostics menu appears.
10. Exit the Diagnostics menu.

    NOTE: Exiting the Compaq Utilities menu restarts the computer and saves the changes.

11. Look up the Computer Checkup error codes that were displayed by referring to "Computer Checkup (TEST) Error Codes" and take the recommended action.

12. Rerun POST and Computer Checkup, taking the recommended actions in given order until the problem is solved and no error messages occur.

Computer Checkup (TEST) Error Codes

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

Computer Checkup (TEST) error codes occur if the system recognizes a problem while running Computer Checkup. These error codes help identify possible defective assemblies. Tables 2-4 through 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 for the computer, refer to Chapter 7. For removal and replacement procedures for the convenience base, refer to Chapter 8.

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.

Y = Test or action that failed.

XX = Specific problem.

2.5.3 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.

Follow these steps to run INSPECT from the hard drive:

1. Turn on the external devices that you want to test. Connect the printer if you want to print the information.
2. Turn on or restart the computer.
2. Press ***F***10 when the prompt appears in the right side of the display. The Compaq Utilities screen appears.
4. Select View System Information (INSPECT) from the Diagnostics menu.
5. Select the item you want to view from the following list:

System	***Me***m*ory*
RO***M***	***Audio***
K*eyboard*	O*perating* s*yste*m
System *ports*	***Syste***m f*iles*
System *storage*	W*indows files*
Graphics	***Miscellaneous***

6. 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.

2.6 Diagnostic Error Codes

Diagnostic error codes occur if the system recognizes a problem while running the Compaq Diagnostic program. These error codes help identify possibly defective subassemblies.

Tables 2-4 through 2-14 list possible error codes, a description of the error condition, and the action required to resolve the error condition.

IMPORTANT: Retest the system after completing each step. If the problem has been resolved, do not proceed with the remaining steps.

For assistance in the removal and replacement of a particular subassembly, see Chapter 5, "Removal and Replacement Procedures."

Table 2-4
Processor Test Error Codes

Error Code	Description	Recommended Action
101-xx	CPU test failed	Replace the processor board and retest.
102-xx	Coprocessor or Weitek Error	
102-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	
112-xx	Protected mode test failed	
114-01	Speaker test failed	1. Check system configuration. 2.Verify cable connections to speaker. 2. Replace the system board and retest.

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 ROM checksum failed	1. Flash the system ROM and retest. 2. Replace the system board and retest.
202-*xx*	Write/Read test failed	The following steps apply to error codes 202-*xx* through 215-*xx*:
204-*xx*	Address test failed	1. Remove the memory board and retest.
211-*xx*	Random pattern test failed	2 Install a new memory board and retest.
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	The following steps apply to error codes 300-*xx* through 304-*xx*:
301-*xx*	Failed Selftest/Interface Test	1. Check the keyboard connection. If disconnected, turn off the computer and connect the keyboard.
302-*xx*	Failed Individual Key Test	2. Replace the keyboard and retest.
304-*xx*	Failed Keyboard Repeat Test	2. Replace the system board and retest.

Table 2-7
Parallel Printer Test Error Codes

Error Code	Description	Recommended Action
401-*xx*	Printer failed or not connected	The following steps apply to error codes 401-*xx* through 402-*xx*:
402-*xx*	Failed Port Test	1. Connect the printer.
402-*xx*	Printer pattern test failed	2. Check power to the printer. 2. Install the loop-back connector and retest. 4. Check port and IRQ configuration. 5. Replace the system board and retest.

Table 2-8
Diskette Drive Test

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 media and retest.
602-*xx*	Diskette read test failed	2. Check and/or replace the diskette power and signal cables and retest.
602-*xx*	Diskette write, read, compare test failed	2. Replace the diskette drive and retest.
604-*xx*	Diskette random read test failed	4. Replace the system board and retest.
605-*xx*	Diskette ID media 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	Run Computer Setup.

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	The following steps apply to error codes 1701-*xx* through 1736-*xx*:
1702-*xx*	Hard drive read test failed	1. Run Computer Setup.
1702-*xx*	Hard drive write/read/compare test failed	2. Replace the hard drive and retest.
1704-*xx*	Hard drive random seek test failed	2. 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 apply to error codes 501-*xx* through 516-*xx*:
502-*xx*	Video memory test failed	1. Connect and external monitor and retest.
502-*xx*	Video attribute test failed	2.Replace the LED status board and retest.
504-*xx*	Video character set test failed	2. Replace the display and retest.
505-*xx*	Video 80 × 25 mode 9 × 14 character cell test failed	4. Replace the system board and retest.
506-*xx*	Video 80 × 25 mode 8 × 8 character cell test failed	
507-*xx*	Video 40 × 25 mode test failed	
508-*xx*	Video 320 × 200 mode color set 0 test failed	
509-*xx*	Video 320 × 200 mode color set 1 test failed	
510-*xx*	Video 640 × 200 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 steps apply to error codes 2402-*xx* through 2456-*xx*:
2402-*xx*	Video attribute test failed	1. Run Computer Setup.
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	2. 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.
2408-*xx*		
2409-*xx*	Video 320 × 200 mode color set 1 test failed	
2410-*xx*	Video 640 × 200 mode test failed	
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	

Continued

Table 2-11 Continued

Error Code	Description	Recommended Action
2419-*xx*	ECG/VGC ROM checksum test failed	The following steps apply to error codes 2402-*xx* through 2456-*xx*:
2421-*xx*	ECG/VGC 640 × 200 graphics mode test failed	1. Run Computer Setup.
2422-*xx*	ECG/VGC 640 × 350 16 color set test failed	2. Disconnect external monitor and test with internal LCD display.
2422-*xx*	ECG/VGC 640 × 350 64 color set test failed	2. Replace the display assembly and retest.
2424-*xx*	ECG/VGC monochrome text mode test failed	4. Replace the system board and retest.
2425-*xx*	ECG/VGC monochrome graphics mode test failed	
2431-*xx*	640 × 480 graphics test failure	
2432-*xx*	320 × 200 graphics (256 color mode) test failure	
2448-*xx*	Advanced VGA Controller test failed	
2451-*xx*	132-column Advanced VGA test failed	
2456-*xx*	Advanced VGA 256 Color test failed	
2458-*xx*	Advanced VGA BitBLT test	The following applies to error codes 2458-*xx* through 2480-*xx*:
2468-*xx*	Advanced VGA DAC test	Replace the system board and retest.
2477-*xx*	Advanced VGA data path test	
2478-*xx*	Advanced VGA BitBLT test	
2480-*xx*	Advanced VGA Linedraw test	

Table 2-12
Audio Test Error Codes

Error Code	Description	Recommended Action
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*	**Mouse test failed**	The following steps apply to 8601-*xx* and 8602-*xx*: 1. Replace the top cover assembly.
8602-*xx*	**Interface test failed**	2. Replace the system board and retest.

Table 2-14
CD-ROM Test Error Codes

Error Code	Description	Recommended Action
3301-*xx*	**CD-ROM drive read test failed**	The following steps apply to error codes 3301-*xx* through 3305-*xx* and 6600-*xx* through 6622-*xx*:
3305-*xx*	**CD-ROM drive seek test failed**	1. Replace the CD and retest.
6600-*xx*	**ID test failed**	2.Replace the CD-ROM drive and retest.
6605-*xx*	**Read test failed**	2. Replace the system board and retest.
6608-*xx*	**Controller test failed**	
6622-*xx*	**Random read test failed**	

2.7 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 common messages that may be displayed on the screen. The following pages contain troubleshooting information on:

- Audio
- Battery/Battery gauge
- Diskette/Diskette drive
- Hard drive
- CD-ROM drive
- Hardware installation
- Infrared connection
- Keyboard (Numeric keypad)
- Pointing device
- Memory
- PC Card
- Power
- Printer
- Screen (LCD and CRT)
- Software

2.7.1 Solving Minor Problems

Some minor problems and possible solutions are outlined in the following tables. If the problem appears related to a software application, check the documentation provided with the software.

Solving Audio Problems

Some common audio problems and solutions are listed in the following table.

Table 2-15
Solving Audio Problems

Problem	Probable Cause	Solution(s)
Computer beeps once after you turn it on.	This is typical; it indicates successful completion of the Power-On Self-Test (POST).	No action is required.
Computer does not beep after the Power-On Self-Test (POST).	Speaker volume is off or has been turned down.	If the speaker icon is not displayed on the display, press Fn+F5 to adjust the volume.
	Beeps have been turned off.	Run Computer Setup and turn on beeps.

Solving Battery and Battery Gauge Problems

Some common causes and solutions for battery problems are listed in the following table. The "Solving Power Problems" section in this chapter also may be applicable.

Table 2-16
Solving Battery and Battery Gauge Problems

Problem	Probable Cause	Solution(s)
Computer won't turn on when battery pack is inserted and power cord is unplugged.	Battery is discharged.	Connect the computer to an external power source and charge the battery pack.
		Replace the battery pack with a fully charged battery pack.
		Check the battery connectors on the system board to verify they are evenly spaced and that they are not bent or broken.
Computer is beeping and battery light is blinking.	Battery charge is low.	Immediately save any open file(s). Then do any one of the following: ■ Connect the computer to an external power source to charge the battery pack. ■ Initiate Suspend and replace the battery pack with a fully charged battery pack. ■ Turn the computer off or initiate Hibernation until you can find another power source or charge the battery pack.
Computer battery light blinks to indicate low- battery condition, but computer does not beep.	Low - battery beeps were turned off.	Run Computer Setup to turn on the low - battery warning beeps.
	Volume is turned off or turned down too low.	Press Fn+F5 to turn the speaker on and then adjust the volume.
Battery light doesn't light and battery pack won't fast charge.	Battery pack is already charged.	No action is necessary.
	Battery pack was exposed to temperature extremes.	Allow time for the battery pack to return to room temperature.
	Battery pack is at end of its life.	Replace battery pack.
Computer turned off and information in memory was lost when replacing the battery pack.	The battery pack was not replaced.	Turn off the computer and restart.

Continued

Table 2-16 Continued

Problem	Probable Cause	Solution(s)
Battery charge does not last as long as expected.	Battery is being exposed to high temperatures or extremely cold temperatures.	Keep the battery pack within the recommended temperature ranges. Operating: 50°F to 104°F (10°C to 40°C) Storage: -4°F to 86°F (-20°C to 30°C) Recharge the battery pack.
	Battery has partially self-discharged.	Recharge the battery. Discharge the battery completely and then recharge it.
	Power management is disabled.	Set a power management level in Computer Setup.
	An external device or PC Card is draining the battery.	Turn off or disconnect external devices when not using them.
Battery pack is warm to the touch after charging.	Normal warming has occurred due to charging.	No action is required.
Battery gauge is inaccurate.	The battery pack is new or has not been used for a long period.	Fully charge the battery pack until the battery light on the computer turns off. Condition the battery pack by fully charging, then fully discharging, and then fully recharging. If condition persists, replace the battery. If the battery gauge is still inaccurate, replace the system board.
Battery pack operating time is far less than the documented average operating time.	Power management is turned off or disabled.	Enable power management in Computer Setup and in Windows Power Properties. The power management icon should be visible on the status panel.
	An external device or PC Card is draining the battery.	Turn off or disconnect external devices when not using them.
	Battery pack has partially self-discharged.	To maintain the charge, leave battery packs in the computer when it is connected to external power. If the computer is disconnected from external power for more than two weeks, remove battery packs from the computer to reduce the discharge rate.
	Fuel gauge is inaccurate.	Use the low battery warning beeps to determine the low battery condition.
	Battery pack is being drained by high power-use accessory.	Reduce use of accessories which drain power such as the CD-ROM drive or PC Card.
	Battery pack is being exposed to high temperatures or extremely cold temperatures.	Keep the battery pack within the recommended temperature ranges: Operating: 50°F to 104°F (10°C to 40°C) Storage: -4°F to 86°F (-20°C to 30°C). Recharge the battery pack.

Solving Diskette and Diskette Drive Problems

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

Table 2-17
Solving Diskette and Diskette Drive Problems

Problem	Probable Cause	Solution(s)
Diskette drive light does not turn on.	Diskette drive is not installed properly.	Remove the diskette drive and install it properly.
Diskette drive light stays on.	Diskette is damaged.	Run SCANDISK on the diskette. At the system prompt, enter SCANDISK A:
	Diskette is incorrectly inserted.	Remove diskette and reinsert.
	Software program is damaged.	Check the program diskettes.
Diskette drive cannot write to a diskette.	Diskette is write-protected.	Disable the diskette's write-protect feature or use a diskette that is not write-protected.
	Computer is writing to the wrong drive.	Check the drive letter in the path statement.
	Not enough space is left on the diskette.	Use another diskette.
	Drive error has occurred.	Run Computer Checkup from the Compaq Diagnostics diskette.
	Diskette is not formatted.	Format the diskette. At the system prompt, enter FORMAT A:
Diskette drive cannot read a diskette.	The wrong type of diskette is being used.	Use the type of diskette required by the drive.
	Diskette has a bad sector.	Copy files to hard drive or another diskette. Reformat bad floppy.
	Drive error has occurred.	Run Computer Checkup from the Compaq Diagnostics diskette.
	Diskette is not formatted.	Format the diskette. At the system prompt, enter FORMAT A:
Cannot boot from diskette.	Bootable diskette is not in drive A.	Put the bootable diskette in drive A. If a diskette drive is in the computer DualBay, that is drive A.
	Diskette Boot is disabled in Computer Setup.	Run Computer Setup and enable Diskette Boot from the Boot Management menu.

Solving Hard Drive Problems

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

Table 2-18
Solving Hard Drive Problems

Problem	Probable Cause	Solution(s)
Reading hard drive takes an unusually long time after restarting the computer.	System entered Hibernation due to low-battery condition and is now exiting from it.	Give the system time to restore the previously saved data to its exact state before Hibernation.
Hard drive error occurs.	Hard drive has bad sectors or has failed.	Run Computer Checkup.
		See POST error messages.
Hard drive does not work.	Hard drive is not seated properly.	Turn off the computer, remove and reinsert the hard drive, then turn the computer on.
	Hard drive is damaged.	Replace the hard drive.

Solving CD-ROM Drive Problems

Some common causes and solutions for CD-ROM drive problems are listed in the following table.

Table 2-19
Solving CD-ROM Drive Problems

Problem	Probable Cause	Solution(s)
CD-ROM drive cannot read a compact disc.	Compact disc is upside down or is improperly inserted in the CD-ROM drive.	Open the CD loading tray, lay the compact disc in it (label side up), then close the tray.
CD-ROM drive does not work.	CD-ROM drive is not seated properly.	Shut down the computer, remove and reinsert the drive, then turn on the computer.
	CD-ROM drive was inserted while the computer was on, in Suspend, or in Hibernation.	Shut down computer, then turn it on again. The drive is initialized during power up.

Solving Hardware Installation Problems

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

Table 2-20
Solving Hardware Installation Problems

Problem	Probable Cause	Solutions(s)
A new device is not recognized as part of the computer system.	Cable(s) of new external device are loose or power cables are unplugged.	Ensure that all cables are properly and securely connected.
	Power switch of new external device is not turned on.	Turn off the computer, turn on the external device, then turn on the computer to integrate the device with the computer system.
	Device is not seated properly.	Turn off the computer and reinsert the device.

Solving Infrared Connection Problems

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

Table 2-21
Solving Infrared Connection Problems

Problem	Cause	Solution(s)
Cannot link with another computer.	Interrupt request (IRQ) conflict.	Check IRQ assignments for conflicts and reassign as necessary.
	Baud rate conflict.	Select the same baud rate for both computers.
Data transmission problem.	Direct sunlight, fluorescent light, or flashing incandescent light is close to the infrared connections.	Remove the interfering light sources.
	Interference from other wireless devices.	Keep remote control units such as wireless headphones and other audio devices away from the infrared connections
	Physical obstruction.	Do not place objects between the two units that will interfere with a line-of-sight data transmission.
	Movement.	Do not move either unit during data transmission.
	Orientation.	Adjust devices so that they point within 30 degrees of each other.
	Distance.	Verify that devices are not more than 3 feet (1 m) apart.

Solving Keyboard/Numeric Keypad Problems

Some common causes and solutions for keyboard/numeric keypad problems are listed in the following table.

Table 2-22
Solving Keyboard/Numeric Keypad Problems

Problem	Probable Cause	Solution(s)
Embedded numeric keypad on computer keyboard is disabled.	Num Lock function is not enabled.	Press the Fn+NumLk keys to enable the Num Lock function and embedded numeric keypad. The Num Lock icon on the status panel turns on.
Keyboard is locked.	QuickLock initiated.	Enter the password to exit QuickLock.

Solving Pointing Device Problems

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

Table 2-23
Solving Pointing Device Problems

Problem	Cause	Solution(s)
External pointing device does not work.	Incorrect device driver or no device driver is installed.	Install the device driver.
	The device driver is not installed in Windows.	Install the device driver in Windows.
Integrated pointing device does not work.	An external pointing device is connected and the system has disabled the internal pointing device.	Initiate Suspend and disconnect the external pointing device.

Solving Memory Problems

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

Table 2-24
Solving Memory Problems

Problem	Probable Cause	Solution(s)
Memory count during Power-On Self-Test (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 error occurs during operation.	System ran out of memory for the application.	Check the application documentation for memory requirements.
		Install additional memory.
	Too many TSR (terminate and stay resident) applications are running.	Remove from memory any TSR applications that you do not need.

Solving PC Card Problems

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

Table 2-25
Solving PC Card Problems

Problem	Probable Cause	Solution(s)
PC Card error messages appear when the computer is turned on.	The PC Card slot is disabled.	Run Computer Setup and enable the PC Card slots on the Security Menu.
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.
When turned on, the computer does not beep when a PC Card is inserted.	Card is not inserted properly	In Windows 95, double-click PC Card icon, click the Global Settings tab. Deselect Disable PC Card Sound Effects.
	PC Card beeps are disabled.	
	Speaker is turned off or volume is turned down.	Increase the volume.
	PC Card drivers are not installed.	Double-click the Add New Hardware icon in the Control Panel for installation instructions.
	The PC Card slots are disabled.	Run Computer Setup and then select the Security menu to enable PC Card slots.
	Card or card driver is not supported.	Check the list of PC Cards tested successfully in Compaq PC Card platforms.
The PC Card drivers (Socket Services, Card Services, Card ID) fail with error messages when the computer is turned on.	The PC Card slot is disabled.	Run Computer Setup and select the Security menu to enable PC Card slots.
PC Card modem, fax, or network card does not work.	Card is not fully inserted into the slot or is not inserted properly.	Ensure the card is inserted in the correct orientation.
	Telephone cord is not plugged in all the way.	Check and secure telephone connection.
	Necessary drivers are not installed (turned on).	Install drivers.

Continued

Table 2-25 Continued

Problem	Probable Cause	Solution(s)
PC Card modem or fax card does not work.	You are trying to access the card using the wrong COM port.	See Chapter 9 to verify COM port.
	The card conflicts with a serial device.	See Chapter 9 to verify address.
	The card is not supported.	Use supported cards only.
Modem network PC Card does not work.	Network driver is not installed or is not set up properly.	Install driver.
	Telephone cord is not properly connected.	Verify telephone connection.
Memory or storage card does not work.	SRAM and flash memory cards require the memory card driver to be loaded (turned on).	Install driver.
	Flash memory cards require the Microsoft FlashFile System to be loaded.	
	Hard drives on flash mass storage cards require the PC Card ATA driver to be loaded.	
	You are trying to access the hard drive card using the wrong drive letter.	Double-click My Computer to verify the drive letter assigned to the card.
	The card is not supported.	Check the list of PC Card cards tested successfully in Compaq PC Card platforms.

Solving Power Problems

Also see "Solving Battery and Battery Gauge Problems" in this chapter.

Table 2-26
Solving Power Problems

Problem	Probable Cause	Solution(s)
Computer won't turn on and LEDs aren't lit.	Computer is not connected to a power source.	Insert battery or connect an external power source.
	Power cords to the external power source are unplugged.	Ensure that power cords connecting the computer and the external power source are plugged in properly.
	DC-DC Converter is defective.	Replace the DC-DC power board.
	Integrated AC Power is defective.	Replace the integrated AC Power and restart.
Computer turned off while it was left unattended and the power/suspend light is off.	System initiated Hibernation due to a critical low-battery condition.	Replace the battery pack with a fully charged battery pack or connect the computer to an external power source. Then turn on the computer.
	System initiated Hibernation after a preset timeout.	Turn on the computer. NOTE: To change the Hibernation setting in Windows 95, click the Hibernation tab in Power properties. Windows NT, run Computer Setup and select Power Management.
Computer initiated Suspend automatically or turned off automatically when it was docked in expansion base.	The unit temperature was exceeded.	Computer is in an exceedingly hot environment. Let the computer cool down. Make sure the ventilation intake and exhaust are not obstructed.

Solving Printer Problems

If you experience problems printing, run a printer self-test. Refer to the documentation provided with the printer for instructions. If the self-test fails, it is a printer-specific problem. Also refer to the printing section of the application documentation.

Table 2-27
Solving Printer Problems

Problem	Probable Cause	Solution(s)
Printer will not turn on.	The signal cable may not be connected properly, or the printer is unplugged.	Ensure that the signal cable is properly connected and that the power cord is connected to the electrical outlet.
Printer will not print.	Printer is not turned on or is off line.	Turn the printer on and set it to on-line.
	The device drivers for the application are not installed.	Refer to the printer documentation to install the correct printer driver.
	Printer that is set up for a network is not connected to the network.	Connect the printer to the network.
	Printer cable is too long, unshielded, or defective.	Replace the cable.
	Paper tray is empty.	Fill the paper tray with paper and set the printer to on-line.
Printer prints garbled information.	Correct printer drivers are not installed.	Refer to the printer documentation to install the correct printer driver.
	Cable is not connected properly.	Ensure that the printer signal cable is properly connected to the computer.
	Cable is defective.	Replace the printer cable and retest.

Solving Screen Problems

This section lists some common causes and solutions for computer display and external monitor problems.

You can perform a monitor self-test on an external VGA color or monochrome monitor by disconnecting the monitor from the computer. To do so, complete the following steps:

1. Turn off the monitor.
2. Turn off the computer.
2. Disconnect the monitor signal cable from the computer.
4. Turn on the monitor and allow it to warm up for one minute.

   The screen should be white. A narrow black border may also appear on the left and right sides of the display. Either of these displays indicates that the monitor is working properly.

Table 2-28
Solving Screen Problems

Problem	Probable Cause	Solution(s)
Characters are dim.	The brightness or contrast (if applicable) control is not set properly.	Adjust the control(s) using Fn+F9 (contrast) and Fn+F10 (brightness).
	Computer screen is in direct light.	Tilt the display or move computer.
	Display is damaged.	Replace the display.
Screen is blank.	You initiated QuickLock/ QuickBlank.	Enter the password to exit QuickLock/QuickBlank.
	You may have another screen-blanking utility installed.	Press any key and/or enter the password.
	Screen save was initiated after the Power Management timeout period of inactivity	Press any key or click the mouse.
	If an STN screen is used, brightness/ contrast needs adjusting.	Use the hotkeys to adjust the brightness/contrast.
	Screen has overheated	If the computer is in direct sunlight, move it an allow it to cool.
	Suspend was initiated.	Press the suspend button to exit Suspend.
Computer screen is blank and the screen on an external monitor displays information.	Display was switched to the external monitor.	Press the Fn+F4 hotkey to display information on the computer screen.
Screen is blank and the power/suspend light is blinking	System is in Suspend	Press the Suspend button to exit Suspend. Enter the power-on password if prompted.
Screen is blank, the power/ suspend light is blinking, and the battery light is blinking	System has entered a low-battery condition	Immediately connect the computer to an external power source or replace the battery pack.
External monitor does not display information	External monitor was connected after the computer was turned on	Press the Fn+F4 hotkey to switch to the external monitor
	The external monitor signal cable or power cord is not properly connected.	Verify the cables are properly connected.
Distorted or garbled characters on the screen are mixed with text.	The ANSI.SYS driver is not in the CONFIG.SYS file or the path is incorrect.	Add the ANSI.SYS driver to the CONFIG.SYS file. Add the following line: DEVICE=C:\ANSI.SYS
Garbled characters on internal display or flashing internal display when connected to external monitor.	You are using 800 × 600 or higher resolution on external display and have toggled back to internal display, which only supports 640 × 480 resolution.	Restart the computer. If simultaneous display is desired, use 640 × 480 resolution.

Continued

Table 2-28 Continued

Problem	Probable Cause	Solution(s)
The image on the external monitor does not fill the screen.	You are using an external monitor and simultaneously displaying an image on the computer display.	This is typical; no action is required.
Small red, green, or blue spots appear on the computer TFT display.	Small spots, called on-pixels, often appear on TFT screens. Compaq limits the number of these on-pixels to 0.003% of the approximately 1 million transistors that are on a 12.1-, or 11.2-inch display.	This is typical; no action is required.
When in MS-DOS mode, the image on the computer display does not fill the screen. When displaying simultaneously, the image on the external monitor may not be centered.	To maintain a high-quality image, the 800 × 600 models do not stretch the lower-resolution image of MS-DOS mode to fill the screen.	This is typical; no action is required.

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 2-29
Solving Software Application Problems

Problem	Probable Cause	Solution(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 out of memory for the application.	Check the application documentation for memory requirements.
		Install additional memory.
	Too many TSR (terminate and stay resident) applications are running.	Remove from memory any TSR applications that you do not need.
	Application requires Windows to be run in enhanced mode.	Exit Windows and enter again using the following command to run in enhanced mode: WIN/3

Solving Convenience Base Problems

Table 3-30
Display Problems and Solutions

Problem	Possible Cause	Solution(s)
Garbled 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.
External monitor display is distorted.	Energy Star Monitor is selected on the Power Management menu, and the external monitor is not Energy Star compliant.	Press any key or move the mouse to restore the display. If the display remains distorted, turn the monitor off and then back on. Deselect the Energy Star Monitor setting.
Computer screen and external monitor do not display information simultaneously.	Display was switched using the hotkeys.	Press the Fn+F4 hotkeys to toggle through the three display possibilities.
	External monitor was not turned on before the system was turned on.	Initiate Suspend, turn on external monitor, then exit Suspend to integrate new monitor.
	External monitor was connected after the computer was turned on.	Initiate Suspend, connect external monitor, turn on the monitor, then exit Suspend.

Table 3-31
Docking Problems and Solutions

Problem	Possible Cause	Solution(s)
The computer is not properly docked in the convenience base.	The computer is not properly centered over docking latch.	Slide computer forward from convenience base. Center over docking latch and replace. Push docking lever back to dock.
	The computer is not coupled to docking connector.	Pull docking lever forward to release computer and re-dock.

Table 3-32
Undocking Problems and Solutions

Problem	Possible Cause	Solution(s)
The computer will not undock.	Connectors are tight.	Grasp the computer with one hand and pull forward while pulling forward on docking lever with other hand.
	Security cable is locked.	Unlock security cable.
	PC Card cable is attached to the computer.	Remove cable from PC Cards before undocking.
	The docking lever in the convenience base may be defective.	Replace the Convenience Base.

Table 3-33
External Device Installation Problems and Solutions

Problem	Possible Cause	Solution(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, turn on external devices with power switches, then exit Suspend to integrate the new device.
	External device was connected after system was turned on.	Windows 95: Initiate Suspend, plug in and turn on external devices with power switches, then exit Suspend to integrate the new device. Windows NT: Power off computer and external devices. Power back on to integrate new device.
	The signal cable or power cord of the new device is loose or disconnected.	Ensure that all cables are properly and securely connected. Ensure that all power cords are properly and securely plugged into an electrical outlet.
	The signal cable or power cord of the new device may be defective.	Try connecting a different signal cable and/or power cord.

Table 3-34
Keyboard Problems and Solutions

Problem	Possible Cause	Solution(s)
External keyboard does not work.	External keyboard may not be securely connected or may be connected to an incorrect external connector.	Ensure that the external keyboard is properly and securely connected to the external keyboard connector.

Table 3-35
Mouse Problems and Solutions

Problem	Possible Cause	Solution(s)
External mouse does not work.	External mouse may not be securely connected or may be connected to an incorrect external connector.	Ensure that 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, then turn the unit on to integrate the mouse.

Solving Network Problems

This section provides guidelines for troubleshooting common Ethernet network problems. Refer to these guidelines when you have determined that the computer in the convenience base is not communicating with the network. These guidelines do not discuss the process of debugging the network cabling.

These are common problems to check first. Refer to the tables on the following pages for additional problems and solutions.

- Ensure that the cabling is securely attached to the convenience base. A loose cable is the most common cause of network problems. If the cable is loose, secure it and see if the computer can communicate with the network.
- Determine whether the current computer or another computer has communicated with the network from the convenience base. If so, determine whether anything was added or changed that could have stopped the network interface from working.
- Run Diagnostics before installing the network drivers to verify that the network interface is working correctly.

Table 3-36
Solving Ethernet Network Problems

Problem	Possible Cause	Solution(s)
When turned on, the computer does not detect the network.	The computer is not connected to the Ethernet network.	Connect the computer to the Ethernet network.
	Suspend or Hibernation was initiated.	Exit Suspend or Hibernation. Windows 95: Restart the computer by clicking Start, Shut Down, Restart the Computer. Windows NT: Click Start, Shut Down. Power the computer back on.
After installing network operating system, computer does not detect network interface.	The network driver fails to load during system initialization. If using a network interface card connected to a parallel port, the port has been disabled.	Ensure that network drivers are loaded and that the drive path is correct. Enable the parallel port. Restart the computer. Press F10 immediately when the cursor moves to the top right side of the screen.
	Suspend or Hibernation was initiated.	Exit Suspend or Hibernation. Windows 95: Restart the computer by clicking Start, Shut Down, Restart the Computer. Windows NT: Click Start, Shut Down. Power computer back on.

Continued

Solving Ethernet Network Problems Continued

Problem	Possible Cause	Solution(s)
Diagnostics reports a failure.	The cable is not securely connected to the network connector on the Ethernet network.	Ensure that the cable is securely connected to the proper network connector on the Ethernet network.
	There is a problem with the cable or a device at the other end of the cable.	Ensure that the cable and device at the other end of the network connection are operating properly.
	Possible hardware failure.	Replace the Convenience Base.
Diagnostics reports no errors, but the computer does not communicate with the network.	Network drivers are not loaded.	Load the network drivers. Windows 95: Restart the computer by clicking Start, Shut Down, Restart the Computer. Windows NT: Click Start, Shut Down. Power the computer back on.
	A network configuration error may have occurred (i.e., *.ini, *.inf, *.nif, or CONFIG.SYS files may need to be modified).	Contact the network administrator.
	Suspend or Hibernation was initiated.	Exit Suspend or Hibernation. Windows 95: Restart the computer by clicking Start, Shut Down, Restart the Computer. Windows NT: Click Start, Shut Down. Power computer back on.
The computer stopped communicating with the network after exiting Suspend.	The computer does not detect network drivers.	Windows 95: Restart the computer by clicking Start, Shut Down, Restart the Computer. Windows NT: Click Start, Shut Down. Power computer back on.
The computer stopped communicating with the network for no apparent reason.	The cable is not securely connected to the network connector on the Ethernet.	Ensure that the cable is securely connected to the convenience base and Ethernet network.
	General network failure.	Ensure that the network you are connected to is running and has not experienced problems that would prevent the connection.
	The files for the network drivers have been corrupted.	Reinstall the network drivers.

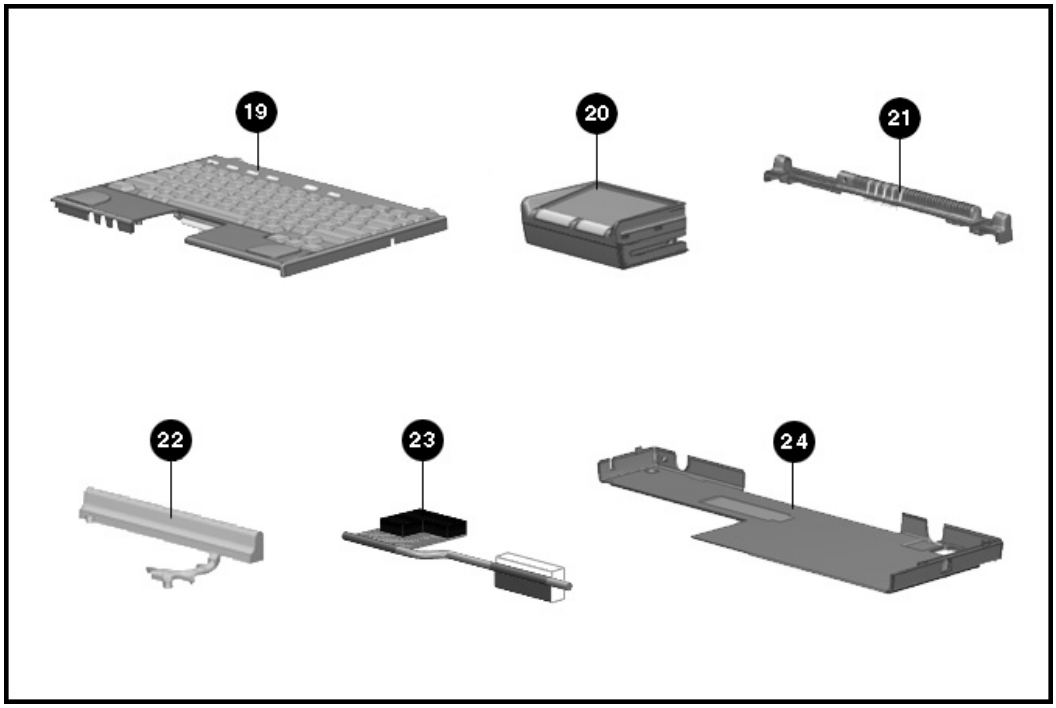
IMPORTANT: If the 100BaseT Ethernet upgrade module has been installed, remove this module before returning the convenience base for replacement.

Chapter 3

Illustrated Parts

This chapter provides illustrated parts and references for spare parts for the Compaq Armada 4100 and 4200 Families. To review an illustrated parts breakdown of the computers, refer to the *Illustrated Parts Map* that comes with this guide.

3.1 System Unit



F*igure* 3-*1*. **System Unit**

Table 3-1
System Unit

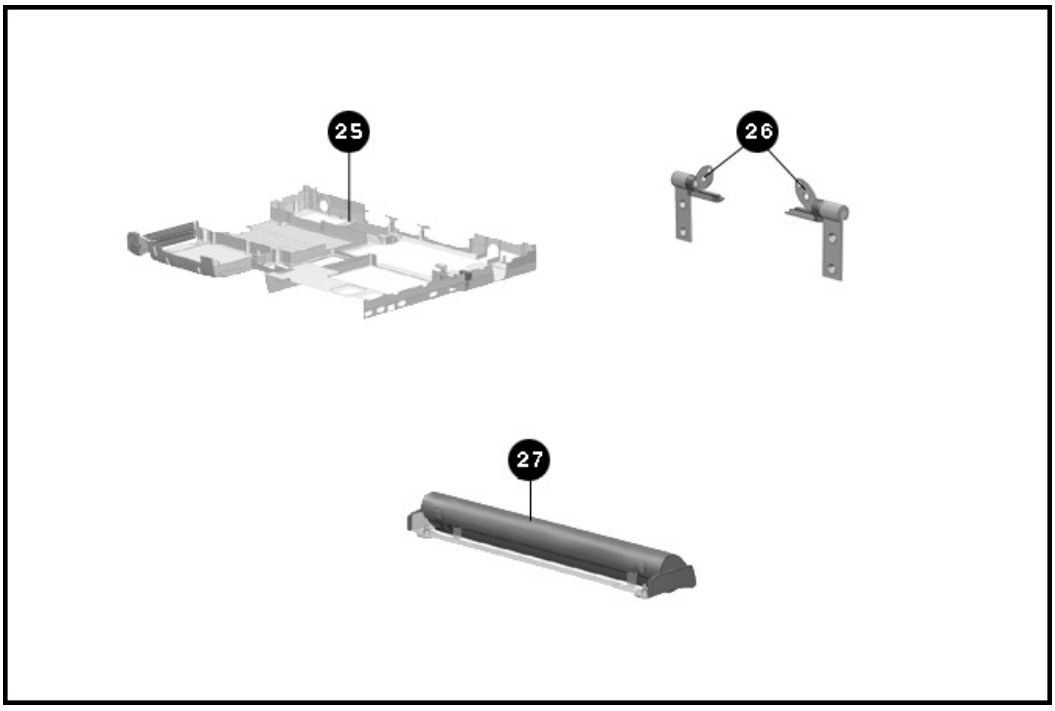
Item	Description	Spares Part Number
1*	CPU cover (Belgian)	290865-181
2*	CPU cover (Brazilian)	290865-201
3*	CPU cover (Danish)	290865-081
4*	CPU cover (French)	290865-051
5*	CPU cover (French Canadian)	290865-121
6*	CPU cover (German)	290865-041
7*	CPU cover (Hangeul)	290865-AB1
8*	CPU cover (Int)	290865-002
9*	CPU cover (Italian)	290865-061
10*	CPU cover (Japanese)	290865-291
11*	CPU cover (Latin American Spanish)	290865-161
12*	CPU cover (Norwegian)	290865-091
13*	CPU cover (Portuguese)	290865-131
14*	CPU cover (Spanish)	290865-071
15*	CPU cover (Swedish/Finnish)	290865-101
16*	CPU cover (Swiss)	290865-111
17*	CPU cover (Thai)	290865-AB1
18*	CPU cover (UK English)	290865-031
19	CPU cover (US/Canada)	290865-001
20	Touchpad	218078-001
21	Clutch cover assembly (includes)	258620-001
	Clutch cover	
*	Microphone	
*	Microphone housing	
*	Ir lens	
22	Heatsink assembly (includes)	258632-001
	Heatsink	
*	Thermal pad	
23	Heatpipe assy, CPU board	287310-001

Continued

Table 1-1 **Continued**

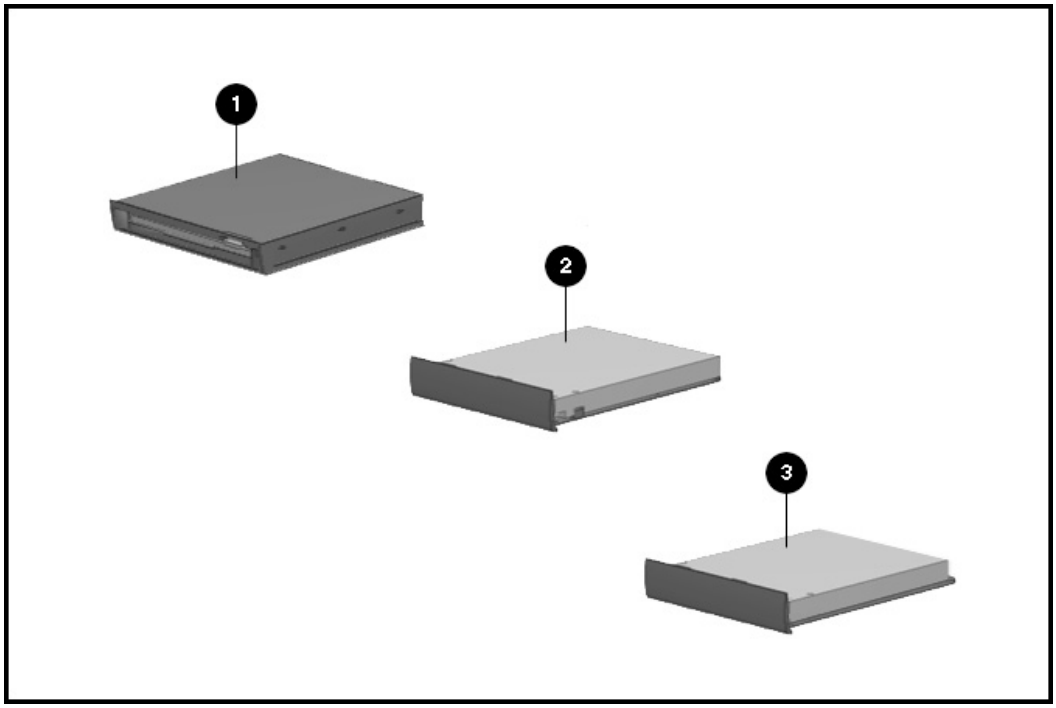
Item	Description	Spares Part Number
24	CPU base assembly (includes)	258626-001
	CPU base	
*	Expansion door	
*	Foot (3 ea)	
*	Foot (1 ea)	
25	Magnesium frame assembly (includes)	258619-001
*	Right speaker gasket	
*	Front cover	
*	Right cover	
**	Upper PCMCIA door	
**	Lower PCMCIA door	
**	Upper PCMCIA door spring	
**	Lower PCMCIA door spring	
**	Diskette eject hook	
**	Diskette eject button	
*	Eject shoulder screw	
**	Eject module spring	
**	Latch module spring	
**	Display ground bracket	
**	Front foot	
*	Hard drive insulator	
26	Clutch kit (includes)	258621-001
	Left clutch assembly	
	Right clutch assembly	
27	Handle assembly	258618-001
28	Diskette Drive	290837-001

* Not illustrated
** Included in Small Mechanical Parts Kit #258607-001



F*igure* 3-2. **System Unit** *(***continued***)*

3.2 Mass Storage Devices



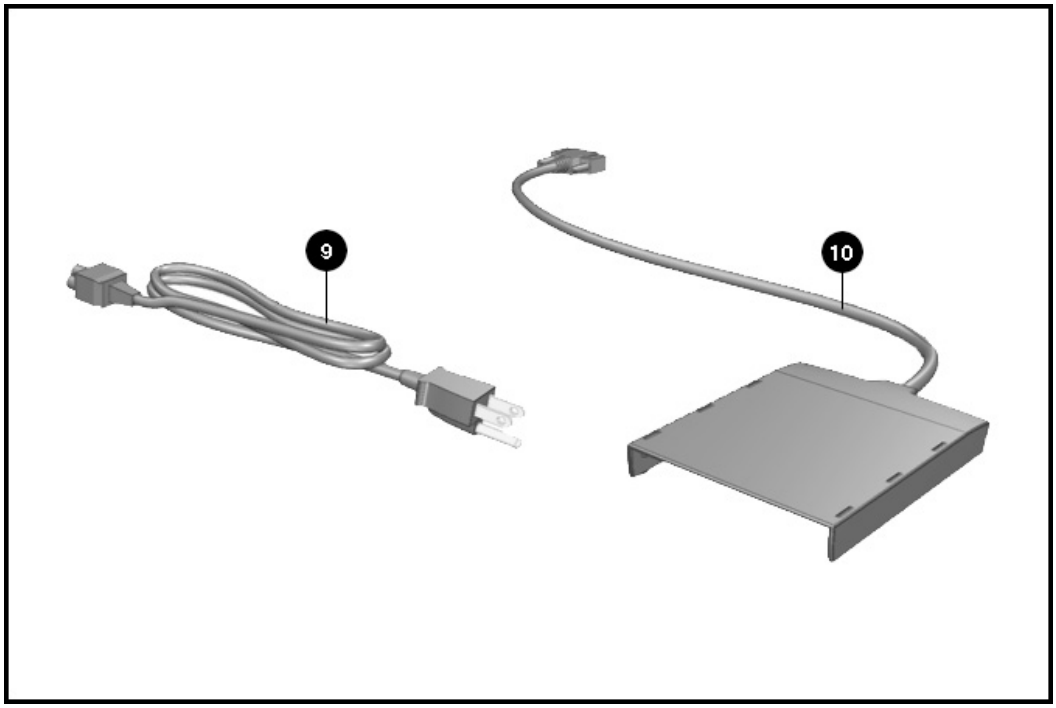
F*igure* 3-3. **Mass Storage Devices**

Table 3-2
Mass Storage Devices

Item	Description	Spares Part Number
1	3.5-inch, 1.44-MB, diskette drive	258611-001
2	630-MB hard drive	258612-001
3	810-MB hard drive	258614-001
*4	1.08-GB hard drive	258616-001
*5	1.4-GB hard drive	259263-001
*6	1.6-GB hard drive	287290-001
*7	2-GB hard drive	287207-001
*8	3-GB hard drive	290810-001
*9	4-GB hard drive	290811-001

* Not illustrated

3.3 Cables and Power Cords



F*igure* 3-4. **Cables**

Table 3-3
Cables and Power Cords

Item	Description	Spares Part Number
1*	AC Power cord (Australia/New Zealand)	246959-011
2*	AC Power cord (Denmark)	246959-081
3*	AC Power cord (Europe)	246959-021
4*	AC Power cord (Italy)	246959-061
5*	AC Power cord (Japan)	246959-291
6*	AC Power cord (Korea)	246959-AD1
7**	AC Power cord (Switzerland)	246959-AG1
8*	AC Power cord (UK and Singapore)	246959-031
9	AC Power cord (US/Canada)	246959-001
10	Diskette drive cable, parallel port to external drive unit (External Diskette Drive Bay)	258575-001
11*	Cable for SpeedPaq 288 Telephony modems	
	Australia	234409-011
	Belgium	234409-181
	Denmark	234409-081
	Finland	234409-351
	France	234409-051
	Germany	234409-041
	Italy	234409-061
	Korea	234409-AD1
	Netherlands	234409-331
	Norway	234409-091
	Singapore, Thailand, Malasia	234409-AF1
	Spain	234409-071
	Sweden	234409-101
	Switzerland	234409-111
	UK	234409-031
	US/Canada	234409-001

* Not illustrated

3.4 Standard and Optional Boards

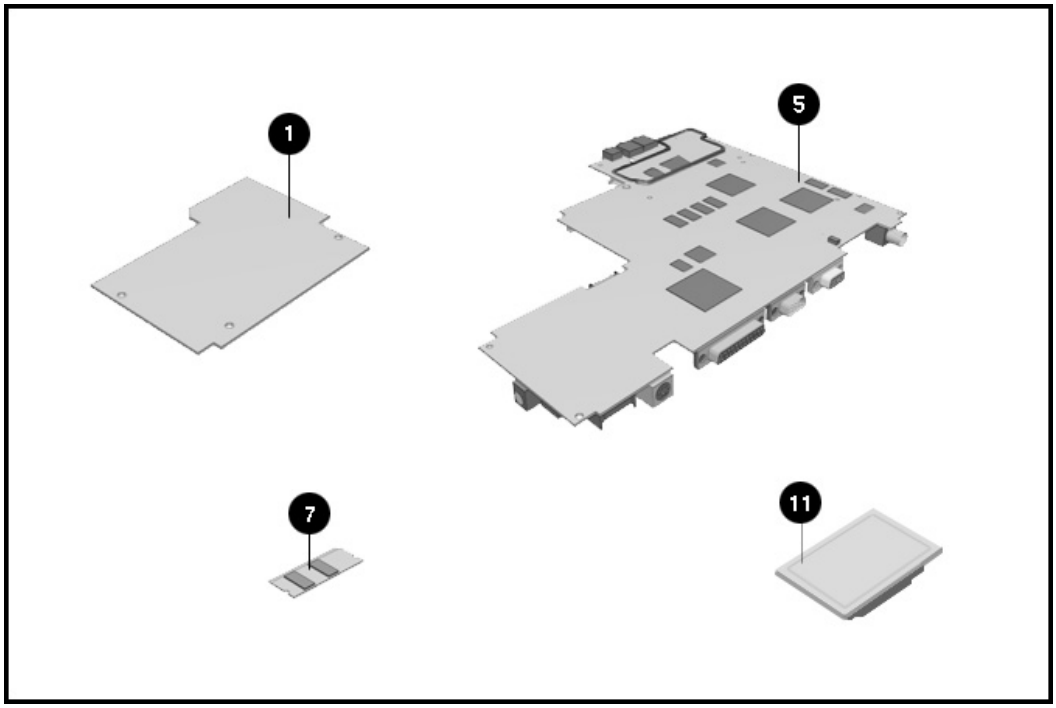


Figure 3-5. **Standard and Optional Boards**

Table 3-4
Standard and Optional Boards

Item	Description	Spares Part Number
1	Processor board, 75-MHz CPU	258627-001
2*	Processor board, 100-MHz CPU with L2 cache	258628-001
3*	Processor board, 120-MHz CPU with L2 cache	258629-001
4*	Processor board, 133-MHz CPU with L2 cache	258630-001
5*	Processor board, 150-MHz MMX CPU with L2 cache	287286-001
6*	Processor board, 166-MHz MMX CPU with L2 cache	287287-001
7*	Processor board, 200-MHz CPU with L2 cache	290827-001
8*	Processor board, 233-MHz CPU with L2 cache	290828-001
9*	Processor board, 266-MHz CPU with L2 cache	290830-001
10*	System Board, 8-MB RAM (includes Left speaker gasket, battery shroud	258631-001
11*	System Board, 16-MB RAM (includes) Left speaker gasket, battery shroud	287288-001
12*	System Board, 32-MB RAM (includes) Left speaker gasket, battery shroud	290829-001
13*	Memory board (DIMM), 4-MB, 70 ns, nonparity (2 ea)	218069-001
14*	Memory board (DIMM), 8-MB, 70 ns, nonparity (2 ea)	218070-001
15*	Memory board (DIMM), 16-MB, 70 ns, nonparity (2 ea)	218071-001
16*	Memory board (DIMM), 32-MB, 70 ns, nonparity (2 ea)	218072-001
17*	Netelligent 56K PC Card Fax Modem (North America)	295050-001

* Not illustrated

3.5 Display Assembly

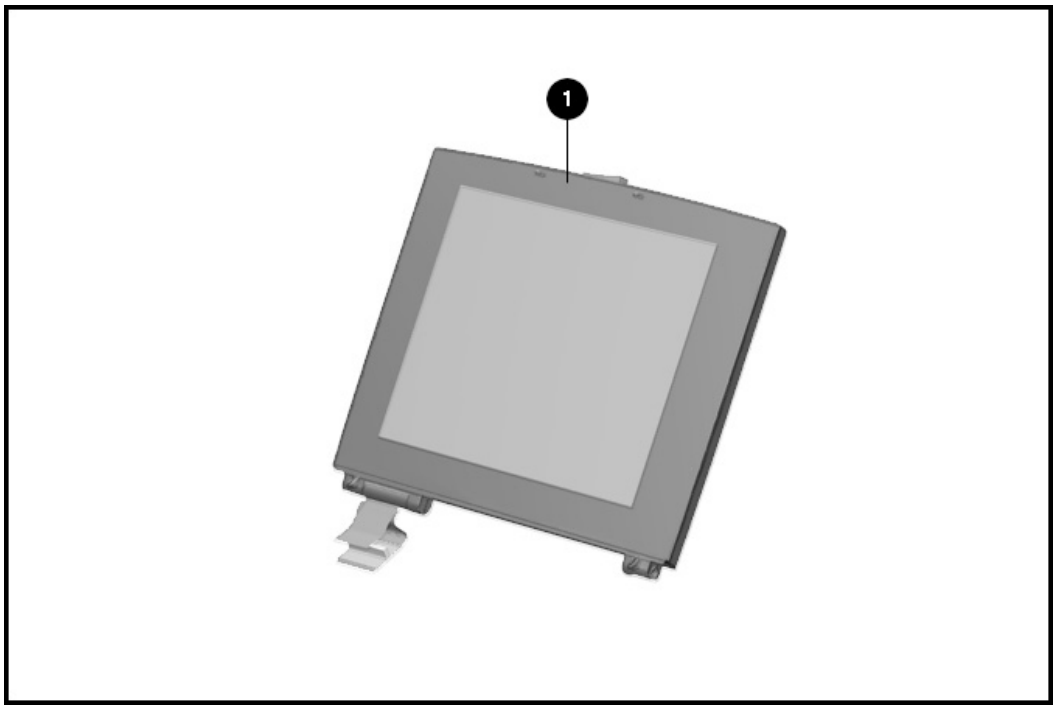


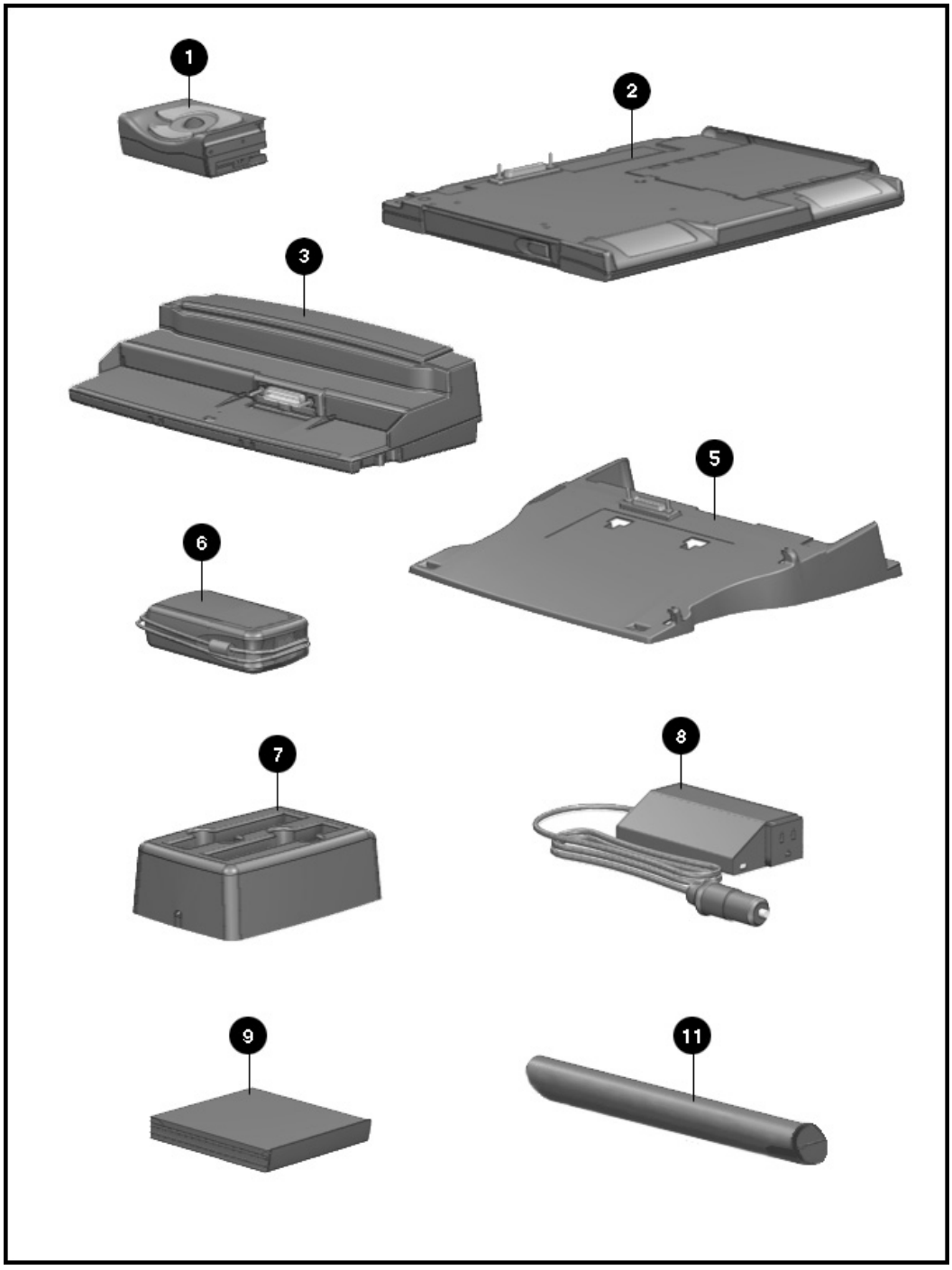
Figure 3-6. **Display Assembly**

Table 3-5
Display Assembly

Item	Description	Spares Part Number
1	10.4-inch CSTN display assembly	258608-001
2*	11.3-inch CSTN display assembly	258609-001
3*	11.8-inch CTFT display assembly	258610-001
4	12.1-inch CSTN display assembly	287283-001
5*	12.1-inch CTFT display assembly	290766-001

* Not illustrated

3.6 Options



F*igure* 3-7. **Options**

Table 3-6
Options

Item	Description	Spares Part Number
1	Trackball	246970-001
2	Mobile CD Expansion Unit	218073-001
3	Convenience base (pass thru) US	218075-001
4*	Convenience base (Ethernet) US	218074-001
5	Convenience base adapter	258541-001
6	AC adapter without power cord (for domestic and international use)	246960-001
7	External battery charger	218076-001
8	Automobile adapter	218079-001
9	Li-ion modular battery pack	218077-001
10*	Li-ion handle battery pack	246957-001
11	NiMH handle battery pack	258509-001
12*	Portfolio Carrying Case	246958-001
13*	USB Cardbus PC Card	296501-001

* Not illustrated

3.8 Miscellaneous Parts

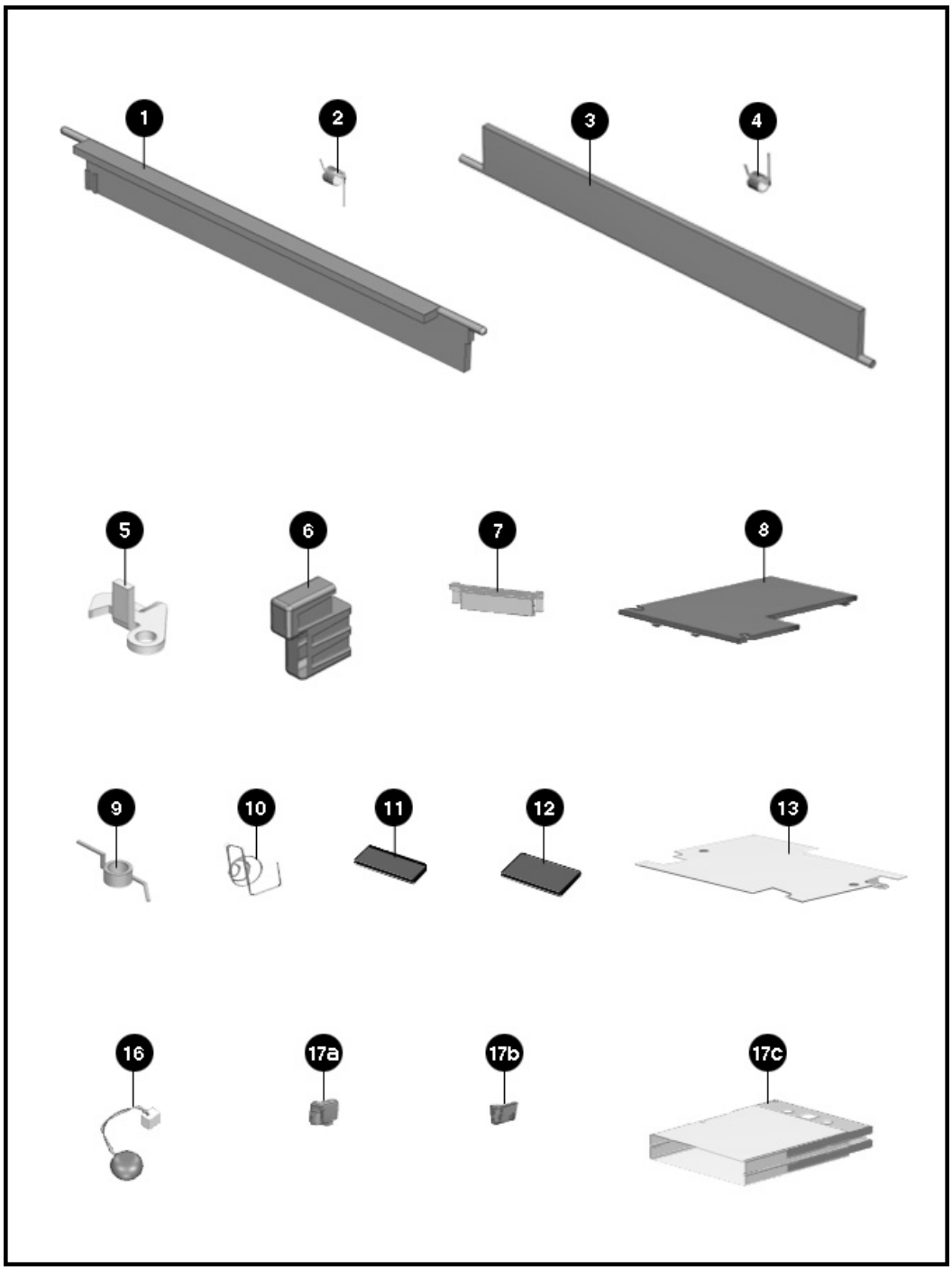


Figure 3-8. **Miscellaneous Parts**

Table 3-7
Miscellaneous Parts

Item	Description	Spares Part Number
	Small mechanical parts kit (includes)	258607-001
1	Upper PCMCIA door	
2	Upper PCMCIA door spring (5 ea)	
3	Lower PCMCIA door	
4	Lower PCMCIA door spring (5 ea)	
5	Diskette eject hook	
6	Diskette eject button	
7	Display ground bracket	
8	Memory cover	
9	DualBay latch spring (1 ea)	
10	DualBay eject spring (1 ea)	
11	Rear foot (3 ea)	
12	Front foot (1 ea)	
13	Processor board shield	
14*	Screw kit (For 5 units. See table 3-8 for contents and where-used matrix)	258819-001
15*	Tool kit (includes connector removal tool, loop back plugs, and case utility tool)	100767-001
16	Real-Time clock battery	258634-001
	PCMCIA rail kit (includes)	258818-001
17a	Top PCMCIA button	
17b	Bottom PCMCIA button	
17c	PCMCIA assembly	

* Not illustrated

Table 3-8
Miscellaneous Screw Kit Contents and Use (258819-001)

Description	Size	Quantity	Where Used
CPU aligning socket	7 mm socket	10	expansion connector
Shoulder screw, diskete eject	T8/Slotted	5	diskette drive eject mechanism
4-40 × 5/16-inch screwlock	3/16 socket	30	I/O connectors at rear of unit
M2 × 0.4 × 4.0 mm	T8/Slotted	10	secures hard drive to magnesium frame
M2 × 0.4 × 12.0 mm	T8/Slotted	10	secures PCMCIA assembly
M2.5 × 0.45 × 6.5 mm	T8/Slotted	45	secures processor board shield
			secures heatsink to system board
			secures system board to magnesium frame
M2.5 × 0.45 × 21.0 mm	T8/Slotted	20	secures front cover
			secures CPU cover/keyboard to magnesium frame
M2.5 × 0.45 × 7.5 mm	T8/Slotted	25	secures plastic to clutches
			secures base plastic to magnesium frame
M3 × 0.5 × 8.0 mm	T8/Slotted	10	secures clutches to display assembly

3.8 Shipping Boxes

Table 3-9
Shipping Boxes

Description	Spares Part Number
Shipping Carton (5 ea)	213623-001
Shipping Carton w/packing (1 ea)	213619-001
Shipping Carton, display (1 ea)	213620-001

3.9 Documentation

Table 1-10
Documentation

Description	Spare Part Number
Armada 4100 Family Illustrated Parts Map (10 ea)	258623-001
Armada 4200 Family Illustrated Parts Map (10 ea)	258624-002
Armada 4100 Family Quick Setup poster and Reference Guide	258625-001
Armada 4200 Family Quick Setup poster and Reference Guide	258625-002

Removal and Replacement Preliminaries

This chapter provides general service information for the Compaq Armada 4100 and 4200 Families.

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.

4.1.1 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.

4.1.2 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 electronic-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.

4.1.3 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.

4.1.4 Preventing Damage to Drives

To prevent static damage to hard drives, use the following precautions:

- 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.

4.1.5 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
Static-Shielding Protection Levels

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

4.1.6 Grounding Workstations

To prevent static damage at the workstation, use the following precautions:

- 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.

4.1.7 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.

4.1.8 Recommended Materials and Equipment

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

- Antistatic tape
- Antistatic smocks, aprons, or 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 or 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

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

4.2.1 Tool Requirements

- Torx T-8 screwdriver
- Flat-bladed screwdriver
- Tool kit, Compaq part number 100767-001 (includes case utility tool, connector removal tool, and loop back plugs)
- 7-mm socket wrench
- 3/16-inch socket wrench
- Preloaded application diskettes

4.2.2 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: When servicing these computers, ensure that cables are placed in their proper location during the reassembly process. Improper cable placement can cause severe damage to the unit.

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 bottom of the CPU on the left front corner.

Chapter 5

Removal and Replacement Procedures

This chapter presents the removal and replacement procedures for both the 4100 and 4200 Families.

5.1 Serial Number

The computer serial number should be provided to Compaq when requesting information or ordering spare parts. The serial number is displayed on the bottom of the CPU on the left front corner (Figure 5.1).

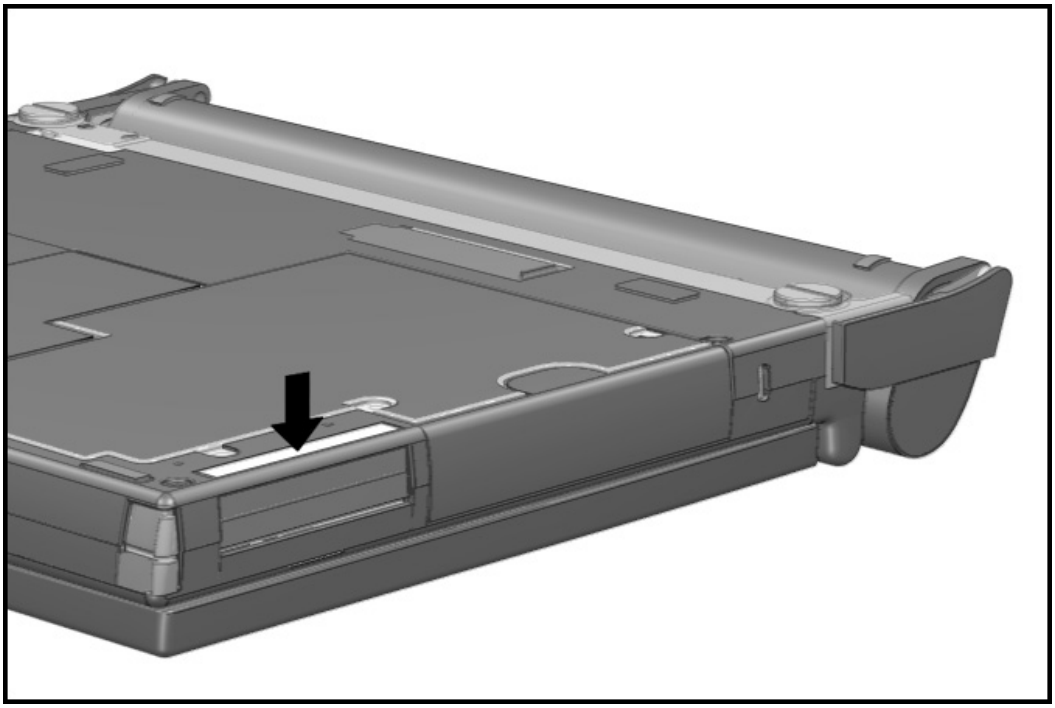


Figure 5-1. Serial Number Location

5.2 Disassembly Sequence Chart

Use the chart below to determine the section number and disassembly sequence for removing components from the computer.

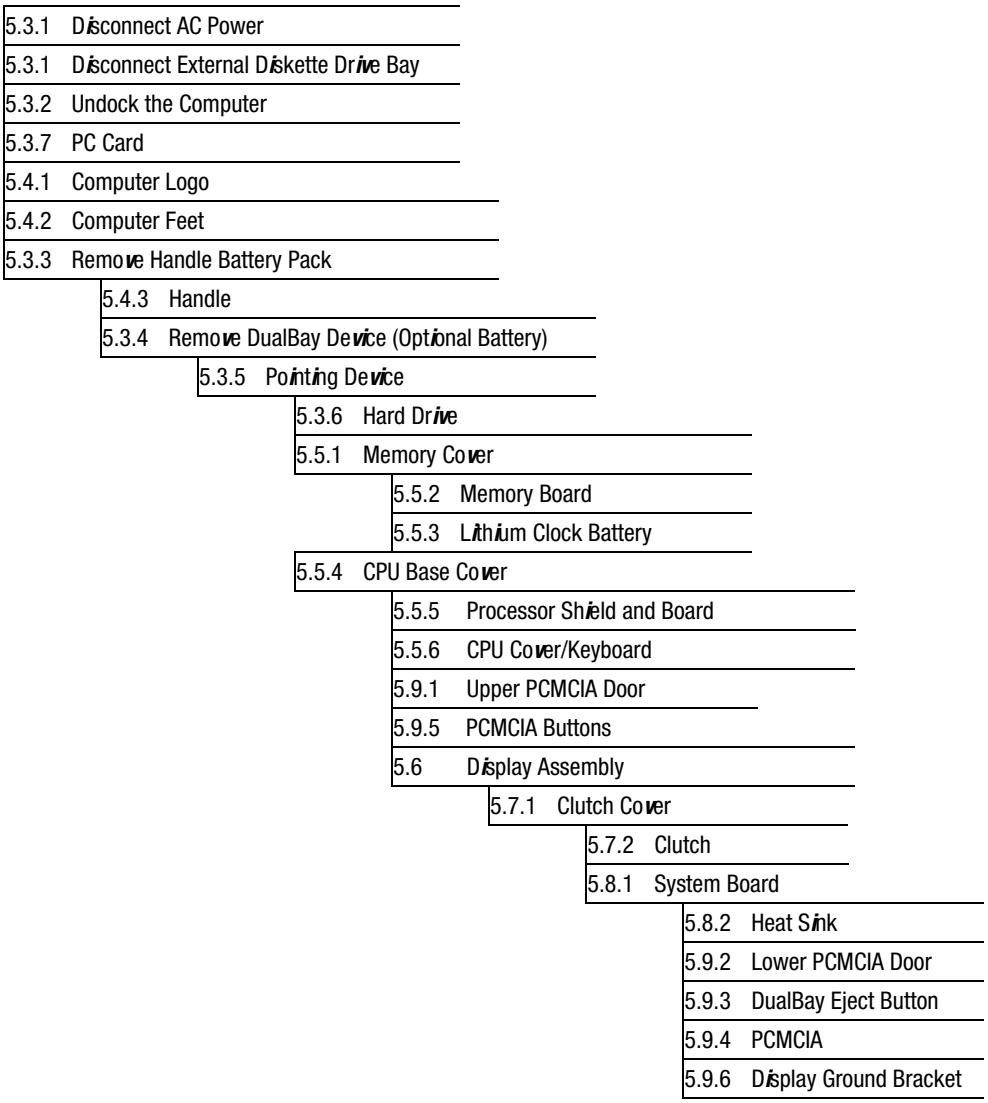


Figure 5-2. Computer Disassembly Chart

5.3 Preparing the Computer for Disassembly

Before beginning the removal and replacement procedures, complete the following procedures:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base, if necessary (Section 5.3.2).
3. Remove the handle battery or DualBay pack (Section 5.3.3).
4. Remove the DualBay device (Section 5.3.4).
5. Remove the pointing device (Section 5.3.5).
6. Remove any PC Cards (Section 5.3.7).
7. Disconnect the External Diskette Drive Bay, if connected.

5.3.1 Disconnecting the AC Power and External Diskette Drive Bay

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

1. Turn off the computer.
2. Disconnect the AC adapter power cord from the wall.
3. Disconnect the AC adapter from the computer.

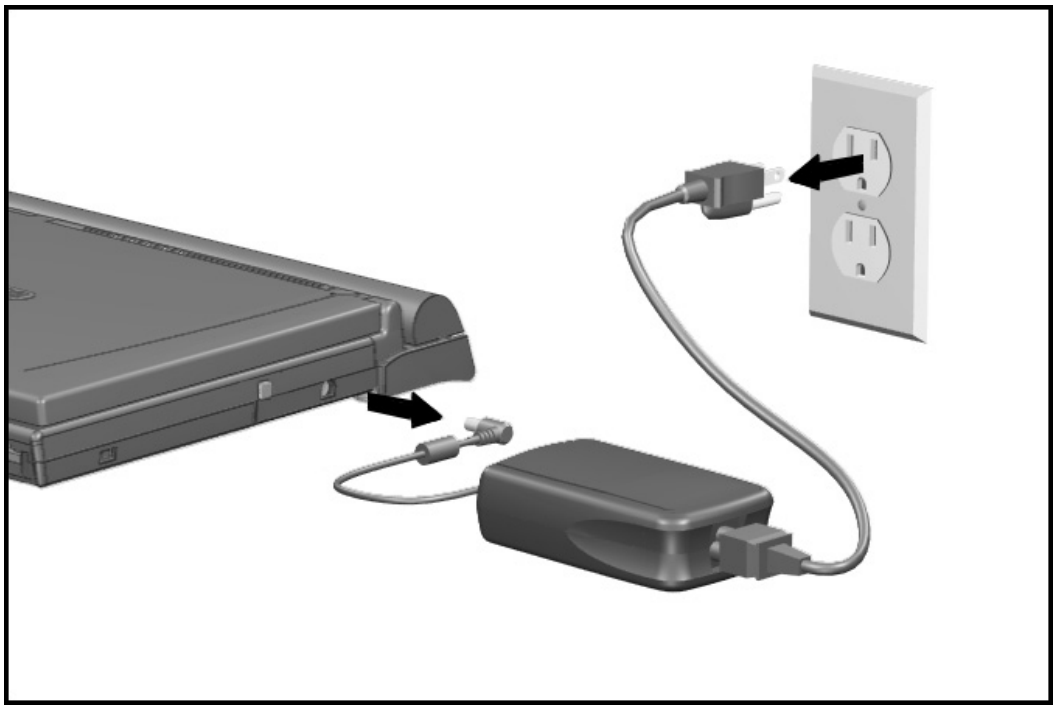


Figure 5-3. Disconnecting the AC Power

4. Disconnect the External Diskette Drive Bay from the computer.
5. Turn off and disconnect any external devices.

If the computer is docked in an auxiliary station, see Section 5.3.2 for undocking instructions.

5.3.2 Undocking the Computer

If the computer is docked in an auxiliary station, it must be undocked from the convenience base and from the adapter or detached from the Mobile CD Expansion Unit (MCD) before performing additional work. Complete the following steps to undock the computer. If the computer is not docked in an auxiliary station, proceed to Section 5.3.3.

Convenience Base

The computer must be undocked from the convenience base before performing additional work. The same procedure is followed for removing the adapter and removing the MCD from the convenience base. These procedures are shown in Figures 5-4 and 5-5, respectively. To remove and replace the convenience base, complete the following steps:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Close the computer.

If you are removing an adapter from the convenience base proceed with step 3. If detaching an MCD, go to step 5.

3. Grasp the adapter and the convenience base and lift the convenience base slightly to disengage it from the adapter.
4. Pull the two pieces apart.

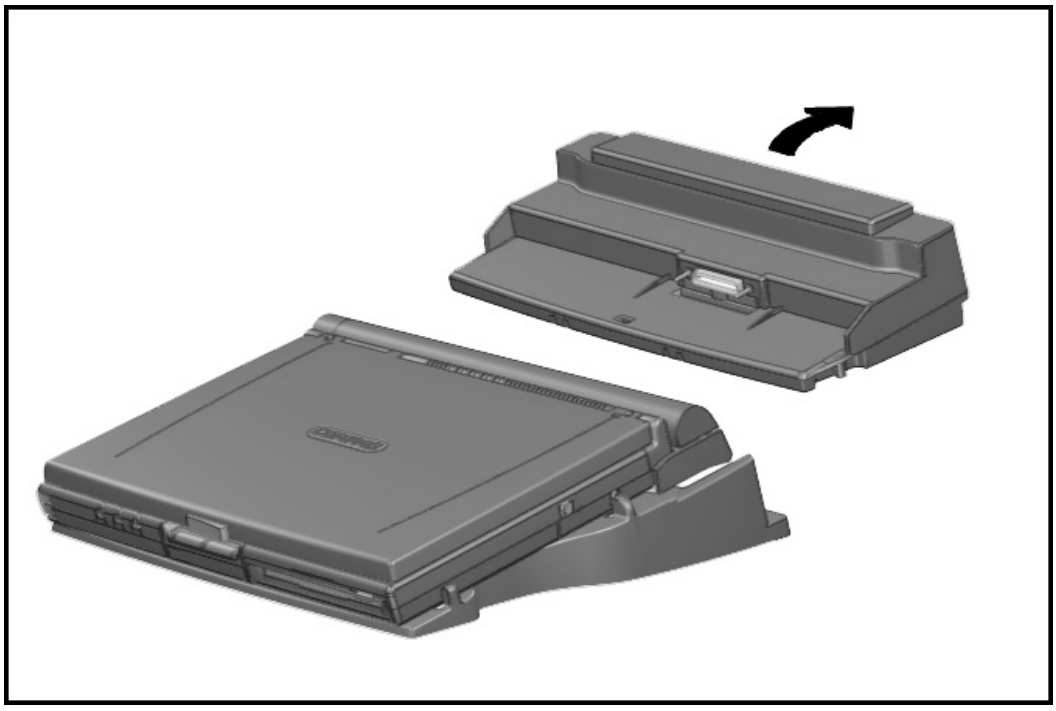


Figure 5-4. Disconnecting the Convenience Base from the Adapter

5. To remove the convenience base from the MCD, lift the assembly slightly and pull the lever on the right bottom of the convenience base. This will separate the two pieces.

6. Grasp the MCD and the convenience base, then pull apart.

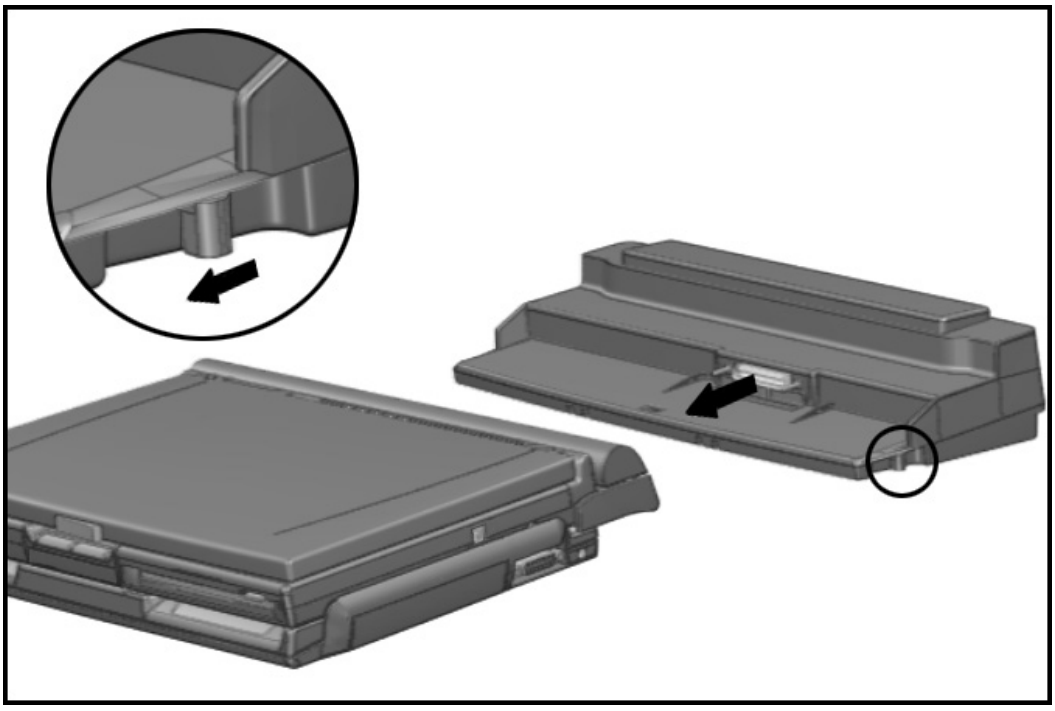


Figure 5-5. Disconnecting the Mobile CD Expansion Unit from the Convenience Base

Reverse the above procedure to dock the convenience base and the MCD.

Convenience Adapter Base

To undock the computer from the adapter, complete the following steps:

1. Grasp both the computer and adapter, then pull apart.

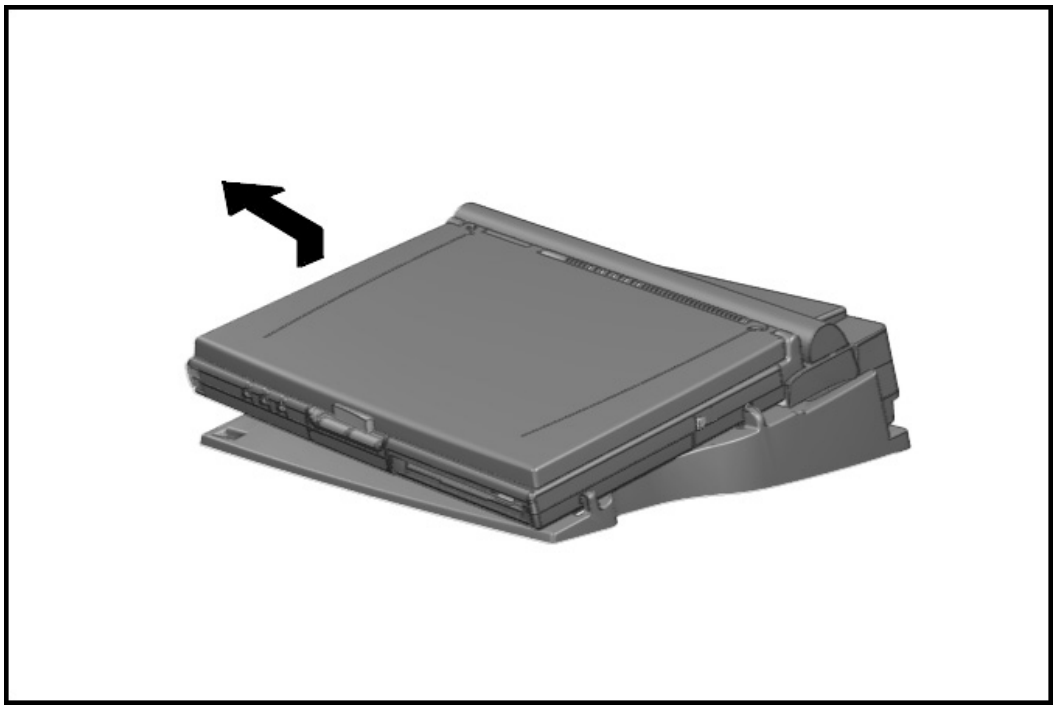


Figure 5-6. Undocking the Computer from the Adapter Base

2. Reach underneath the computer and close the expansion cover on the bottom of the computer.

Reverse the above procedure to dock the computer into the adapter base.

Mobile CD Expansion Unit

Before detaching the computer from the MCD, disconnect it from the convenience base.

CAUTION: Make sure the computer display is closed before beginning this procedure.

To detach the computer from the MCD, complete the following steps:

1. Turn the computer and MCD assembly over, bottom side up. Turn the two thumbscrews on the bottom of the MCD counterclockwise to loosen the MCD from the computer.

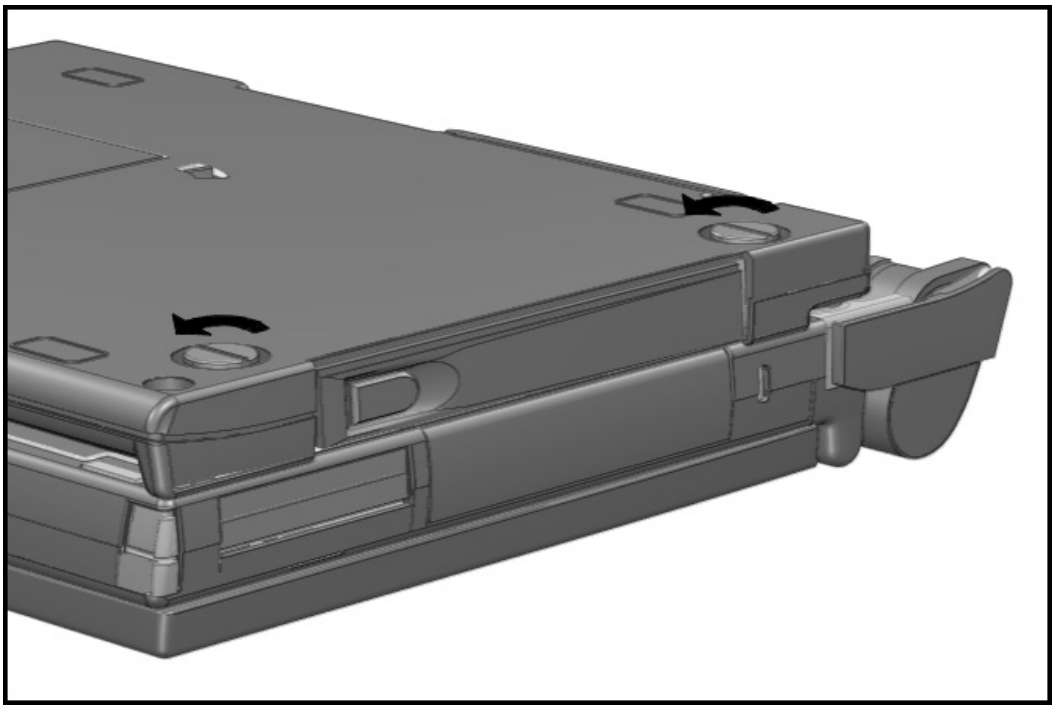


Figure 5-7. Loosening the Thumbscrews

2. Turn the computer and MCD over, top side up.

3. Rotate the eject lever on the back of the MCD ❶ down to pry the two pieces apart. Remove the computer from the guide hooks on the MCD by sliding the computer ❷ up and away from the MCD.

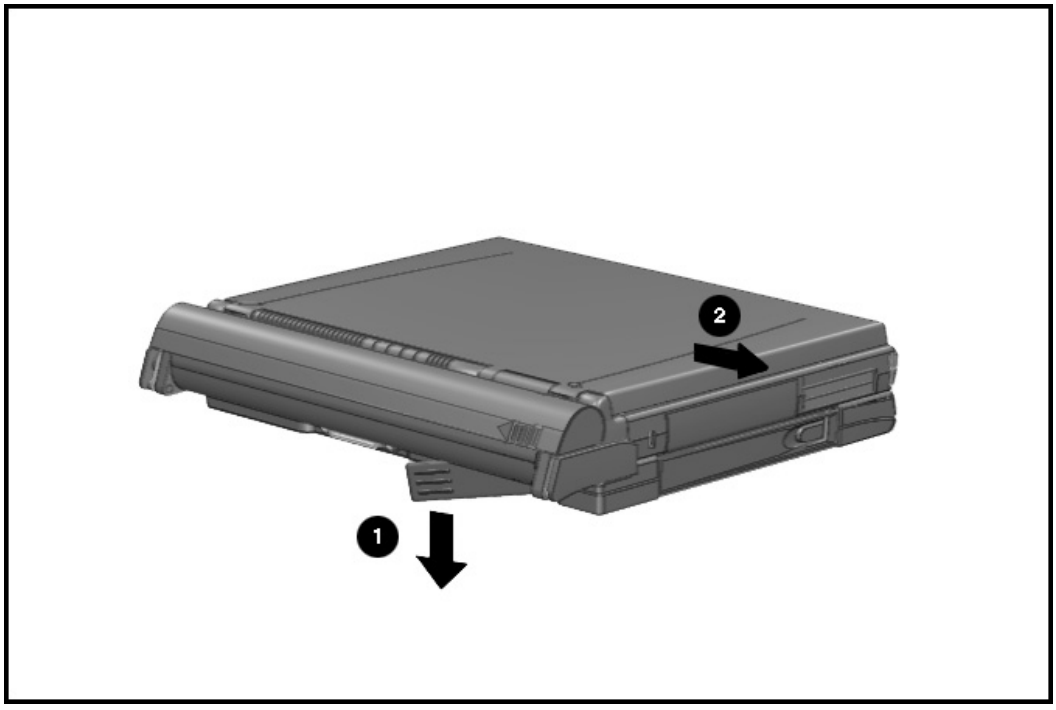


Figure 5-8. Detaching the Computer from the MCD

4. Close the expansion slot cover on the bottom of the computer.

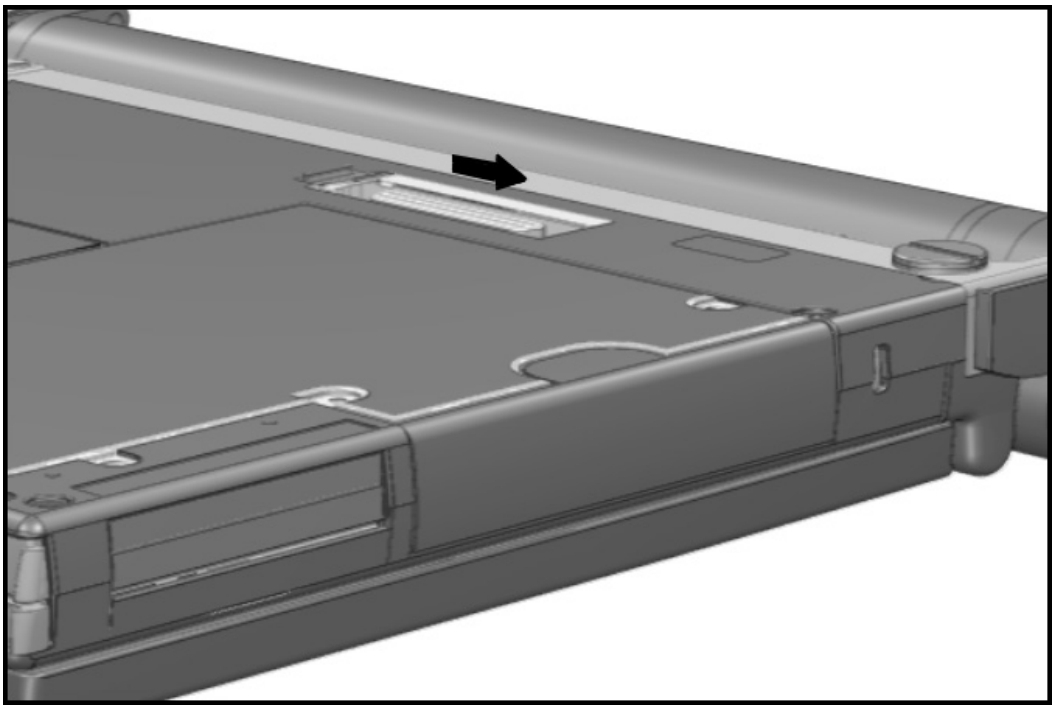


Figure 5-9. Closing the Expansion Slot Cover

Reverse the above procedures to attach the computer to the MCD.

> *CA***UTION:** Power to the computer should be turned off when connect*i*ng the computer to the MCD. Falure to do so may cause damage to the hard dr*iv*e.

5.3.3 Battery Packs

The handle battery pack and the DualBay 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 Compaq Armada 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, as 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 handle, complete the following steps:

1. Place the computer in its normal operating position with the handle in the carry position.
2. Grasp the battery cap on the top and bottom ❶ and pull the battery pack out of the handle❷.

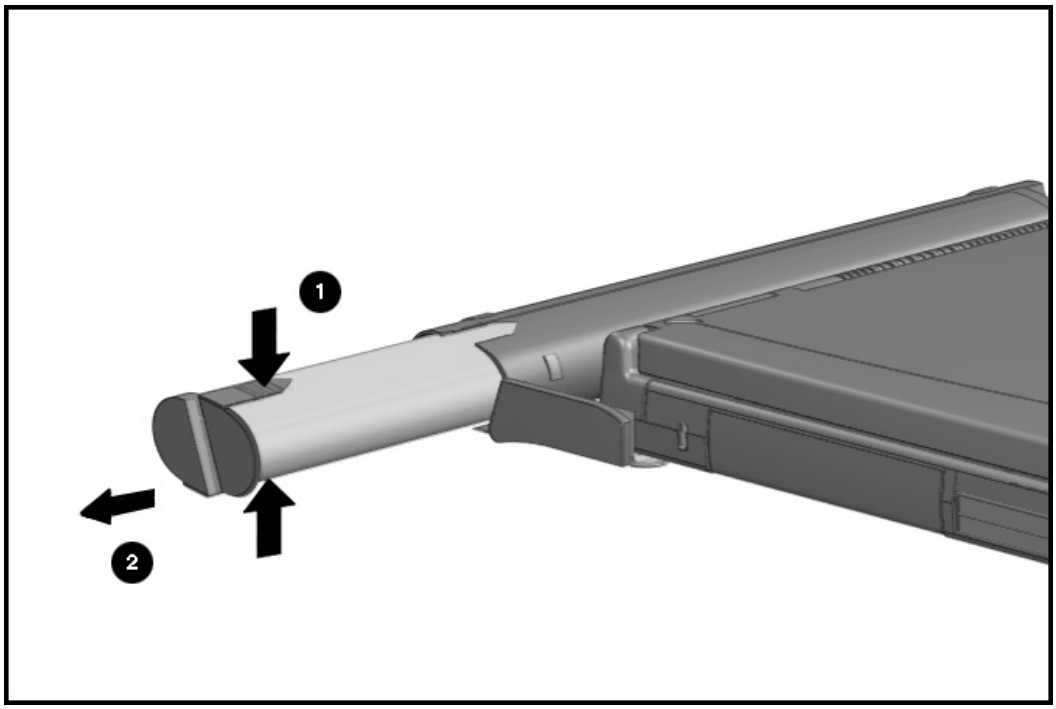


Figure 5-10. Removing the Battery Pack from the Handle

To install the battery pack into the handle, orient the battery pack with the sleeve and insert the battery pack with its contacts facing into the handle. Push firmly until the battery pack clicks into place.

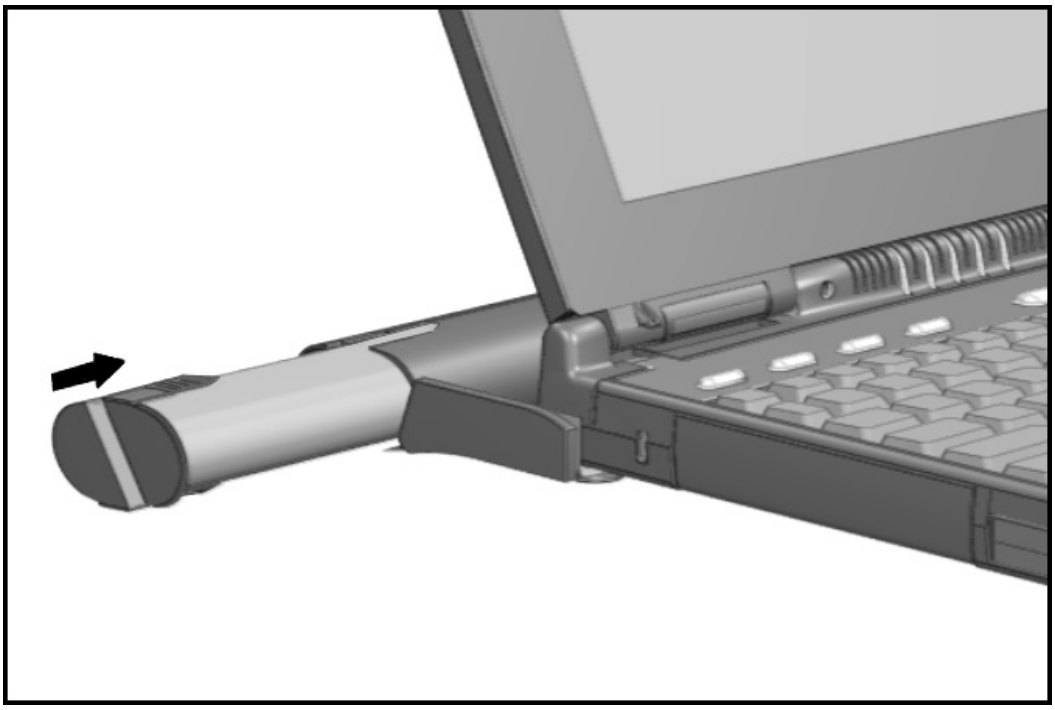


Figure 5-11. Inserting a Battery Pack into the Handle

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

5.3.4 DualBay Battery Pack and Devices

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, but the procedure is the same regardless of the device. To remove the DualBay device, complete the following steps:

1. With the computer open and the display screen in the upright position, lift the front of the computer slightly. Push inward on the front of the DualBay device while pressing in the DualBay eject button ❶ on the right side of the computer. Lifting the computer prevents the rubber foot on the bottom of the DualBay device from dragging.
2. Pull the DualBay device ❷ out of the DualBay.

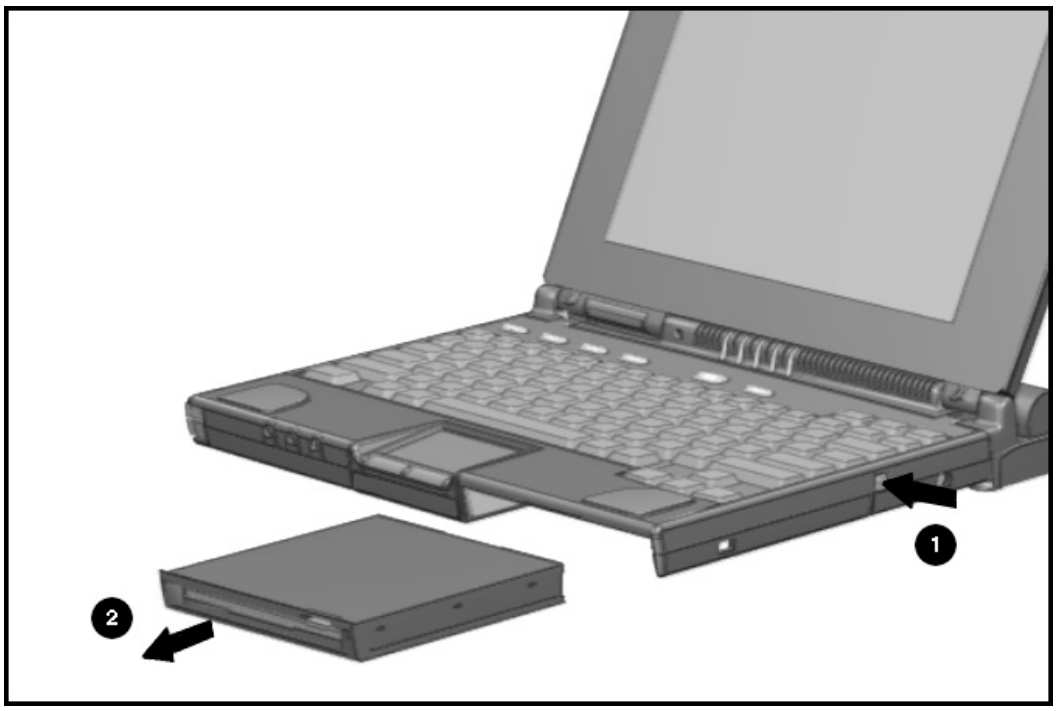


Figure 5-12. Removing the DualBay Device

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 Compaq Armada 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, as 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 install the DualBay device, complete the following steps:

1. Lay the computer flat on a table or work surface. If installing a battery pack, orient the battery pack with its label facing up and the battery contacts facing into the DualBay.
2. Lift the computer slightly, align the DualBay device with the metal rails in the DualBay, and push it into the computer until it clicks into place. Lifting the computer prevents the rubber foot on the bottom of the DualBay device from dragging.

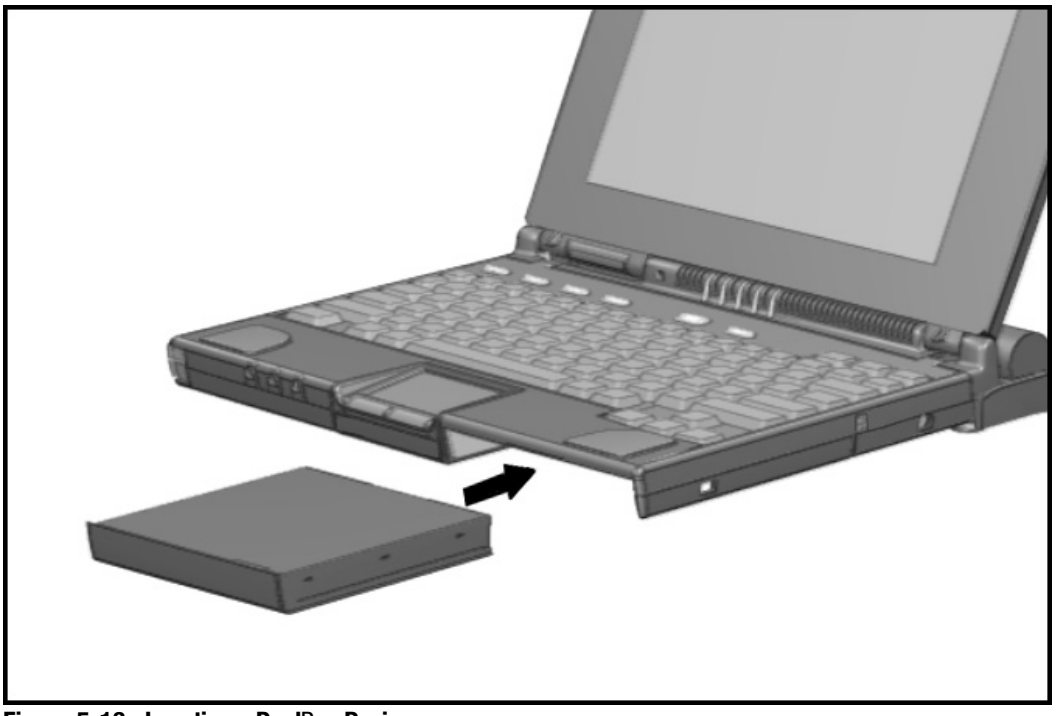


Figure 5-13. Inserting a DualBay Device

5.3.4 Pointing Devices

There are two pointing devices available for the computer: a modular touchpad and a modular trackball. Both devices are removed and installed the same way.

To remove the pointing device, complete the following steps:

1. Disconnect the AC power (section 5.3.1).
2. Undock the computer from its auxiliary base, if necessary (See Section 5.3.2).
3. Remove the handle battery pack (Section 5.3.3).
4. Remove the DualBay device (Section 5.3.4).
5. To release the pointing device, push in the metal retaining clip ❶ located in the wall between the DualBay and the pointing device bay.
6. While holding in the retaining clip, pull the pointing device straight out of the computer base ❷.

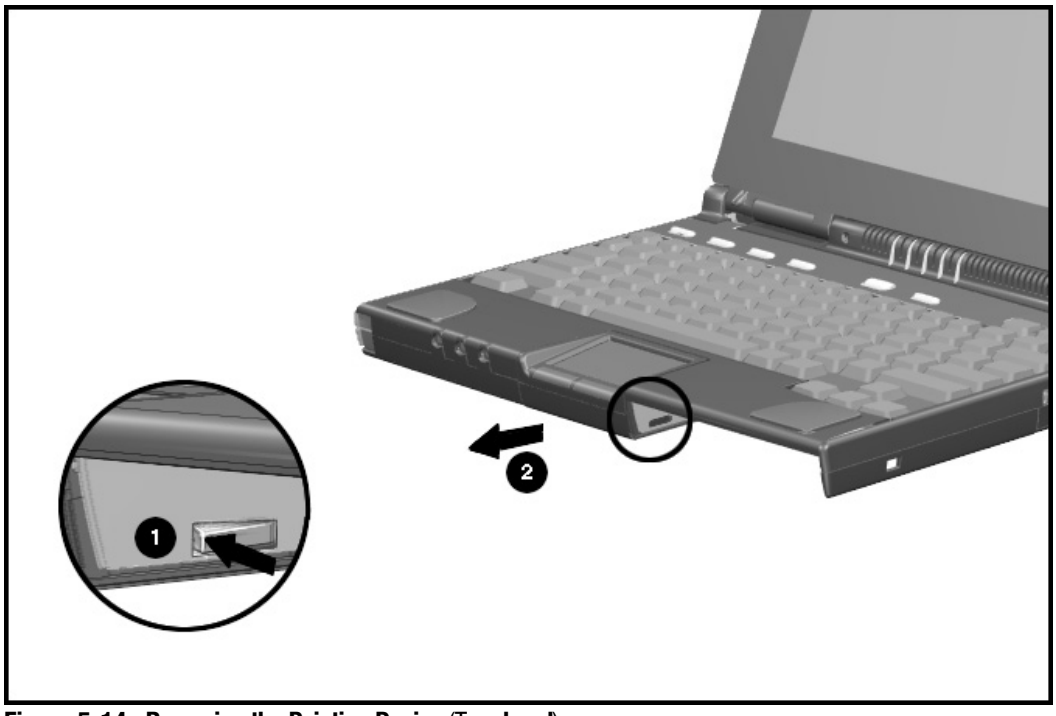


Figure 5-14. Removing the Pointing Device (Touchpad)

To install the pointing device, complete the following steps:

1. Align the slots in the sides of the pointing device with the guide rails in the pointing device bay.
2. Slide the pointing device forward in the bay until it snaps into place.

> **CAUTION:** Do not bend the metal retaining clip when inserting the device.

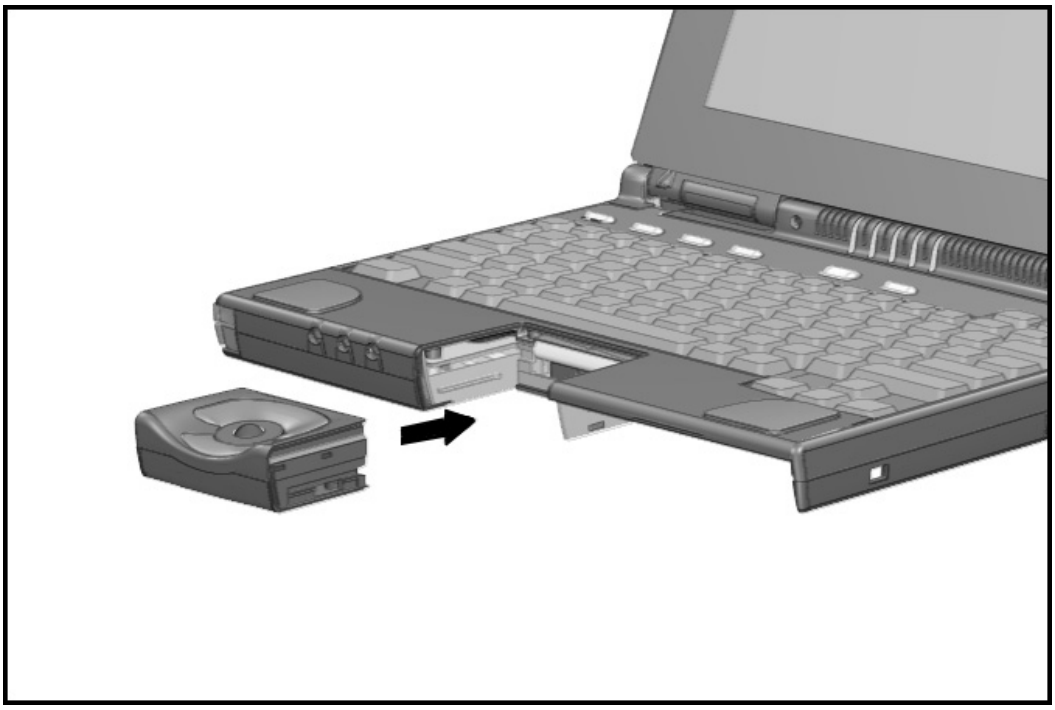


Figure 5-15. Installing the Pointing Device (Trackball)

3. Replace the DualBay device (section 5.3.4).

5.3.5 Hard Drive

The hard drive is held in place with two screws. To remove the hard drive, complete the following steps:

1. Disconnect the AC power (section 5.3.1).
2. Undock the computer from its auxiliary base, if necessary (See Section 5.3.2).
3. Remove the handle battery pack (Section 5.3.3).
4. Remove the modular battery pack, if present (Section 5.3.4).
5. Remove the two screws ❶ from the bottom of the computer that secure the hard drive in place.
6. Grasp the hard drive at the thumb tab ❷ and slide it straight out of the computer.

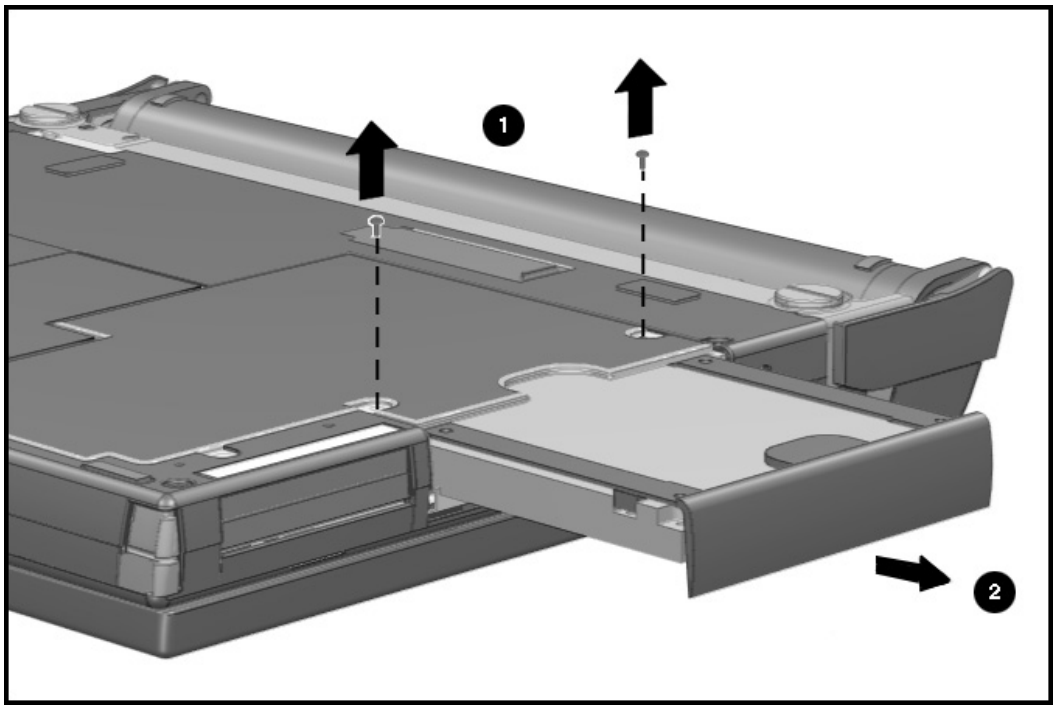


Figure 5-16. Removing the Hard Drive

Reverse the above procedure to install the hard drive.

5.3.6 PC Card

Compaq recommends that you remove any installed PC (PCMCIA) cards before performing any service on the computer. To remove a PC card, complete the following step:

Press the PC card eject button ❶ and slide the card out of the drive ❷.

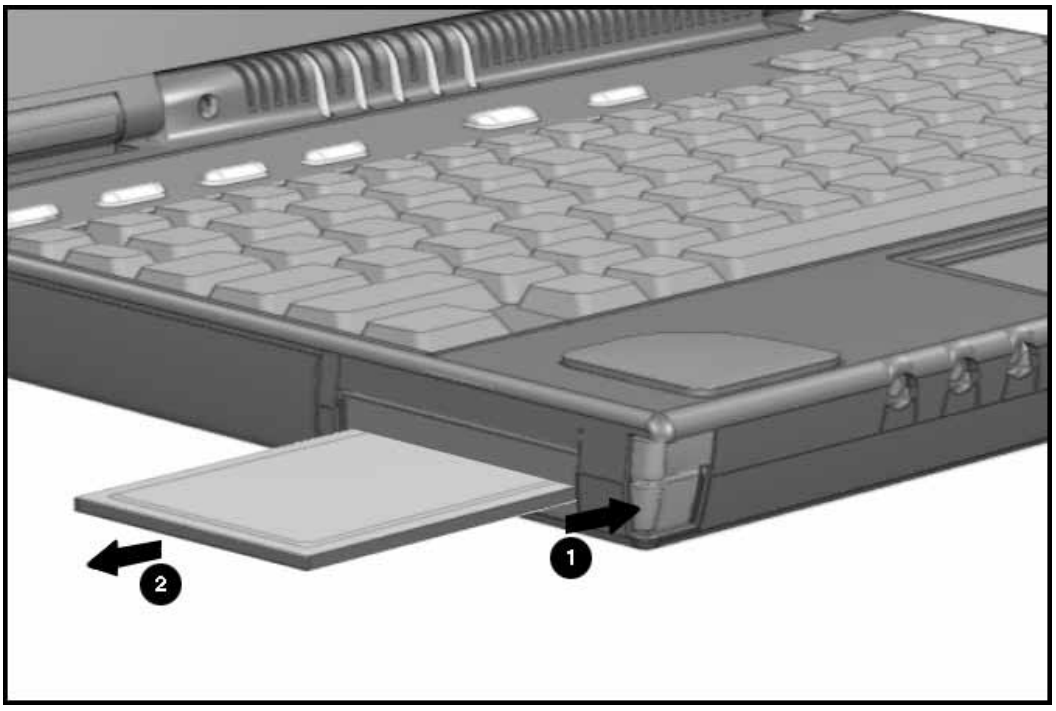


Figure 5-17. Removing the PC Card

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

5.4 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
- Computer handle

5.4.1 Computer Logo

The computer logo is on the outside of the display assembly and may be replaced if damaged. To replace the logo, complete the following steps:

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

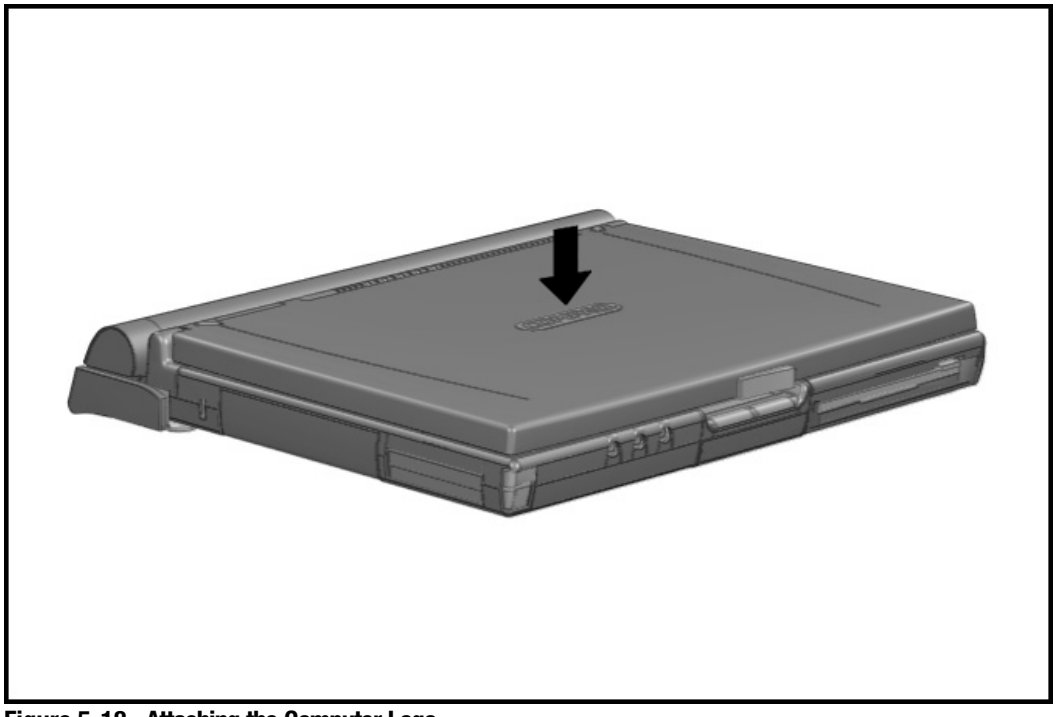


Figure 5-18. Attaching the Computer Logo

5.4.2 Computer Feet

There are four locations where the two different computer feet may be applied. The locations are: one on the hard drive and three on the CPU base cover. To replace the computer feet, complete the following steps:

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.

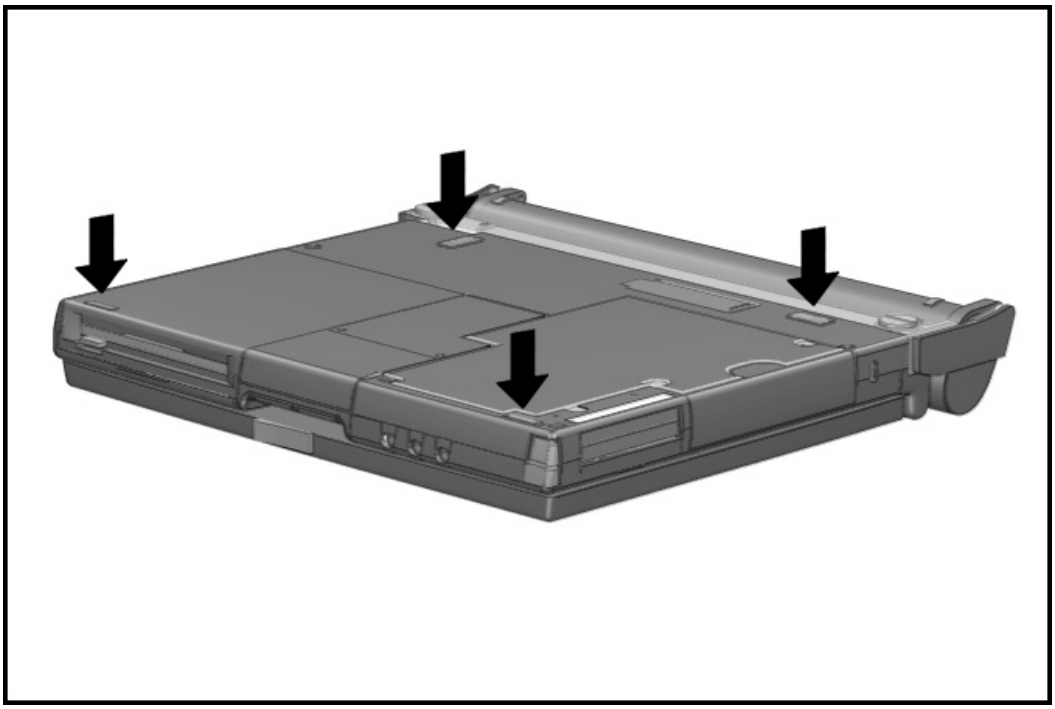


Figure 5-19. Computer Feet Locations

5.4.3 Handle

This section describes the removal and replacement of the handle. To remove the handle, complete the following steps:

To attach the handle to the computer, follow these steps:

1. If a charged battery is installed in the DualBay, initiate Suspend. (If not, initiate Hibernation by pressing *Fn*+ suspend.) Close the computer, detach external devices, then turn the computer bottom side up.
2. Line up the metal tabs on the handle with the slots on the back of the computer.
3. Attach the handle to the computer.

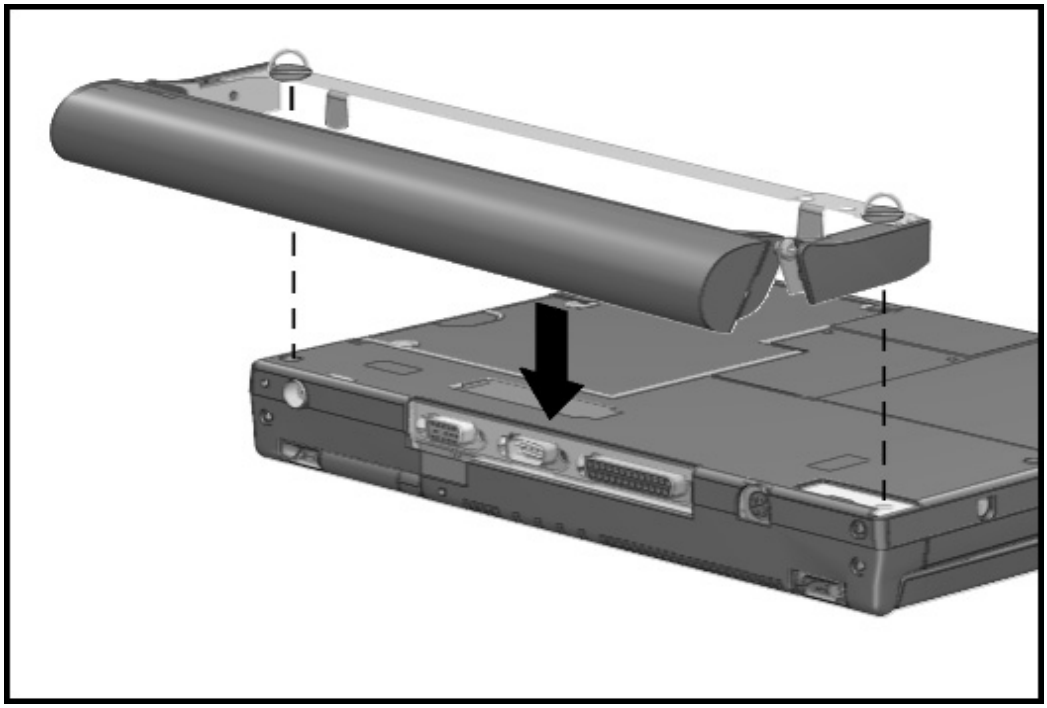


Figure 5-20. Attaching the Handle to the Computer

4. Tighten the thumbscrews on the handle by turning them clockwise.
5. Turn the computer right side up, open the display, attach external devices, and press the suspend button to exit Suspend.

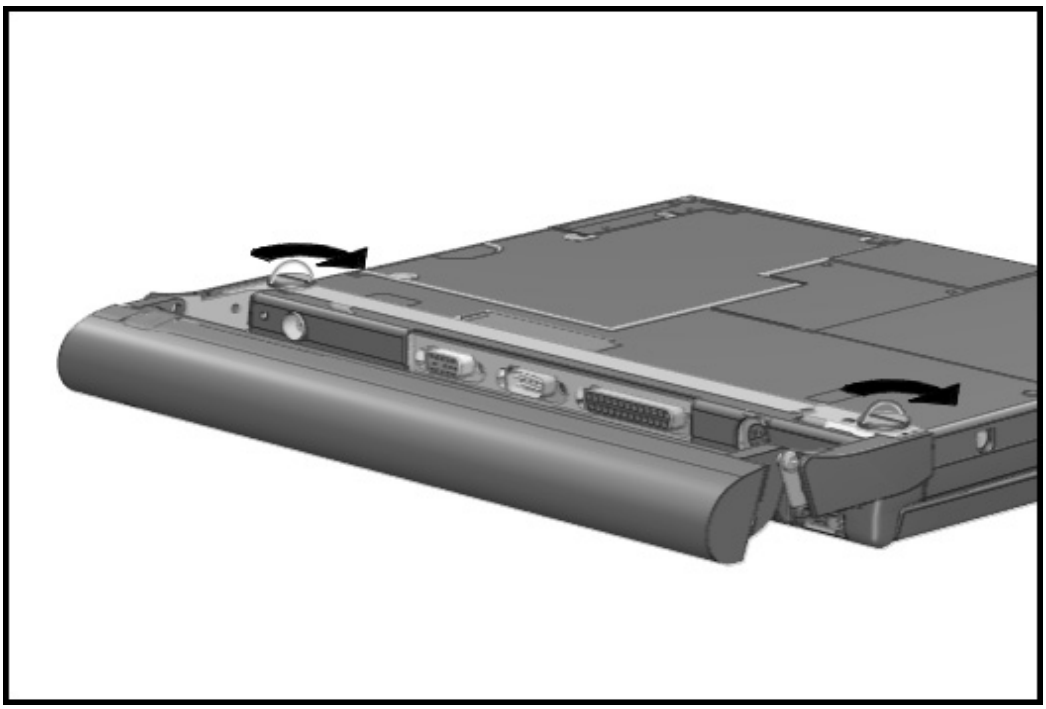


Figure 5-21. Turning Thumbscrews to Tighten Handle

CAUTION: If no other battery is installed and the computer is not attached to external power, save your work, exit all applications, turn off the computer, and disconnect external devices.

To remove the handle from the computer, follow these steps:

1. Close the computer and turn it bottom side up, with the handle in the carry position.
2. Remove the battery from the handle. (See " Battery Packs” in Section 5.3.3 for instructions.)
3. Loosen the thumbscrews on the metal strip along the back of the computer by turning them counterclockwise.

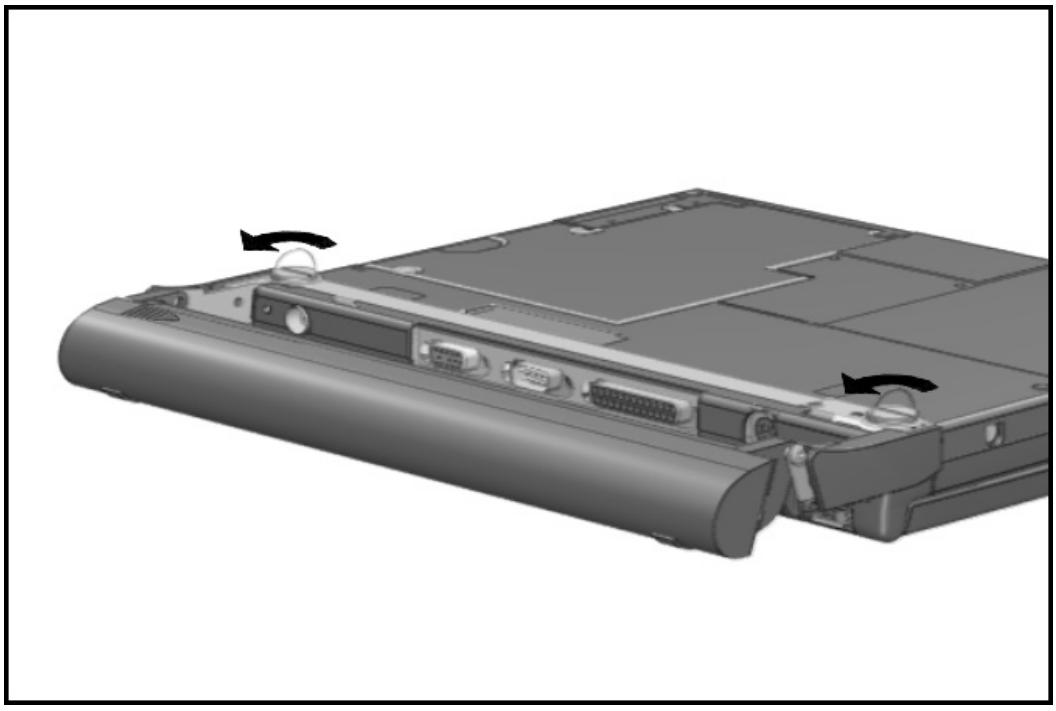


Figure 5-22. Turning Thumbscrews to Loosen the Handle

4. Lift the handle and remove.

5. Turn the computer right side up, open the display, turn on the computer, and attach external devices.

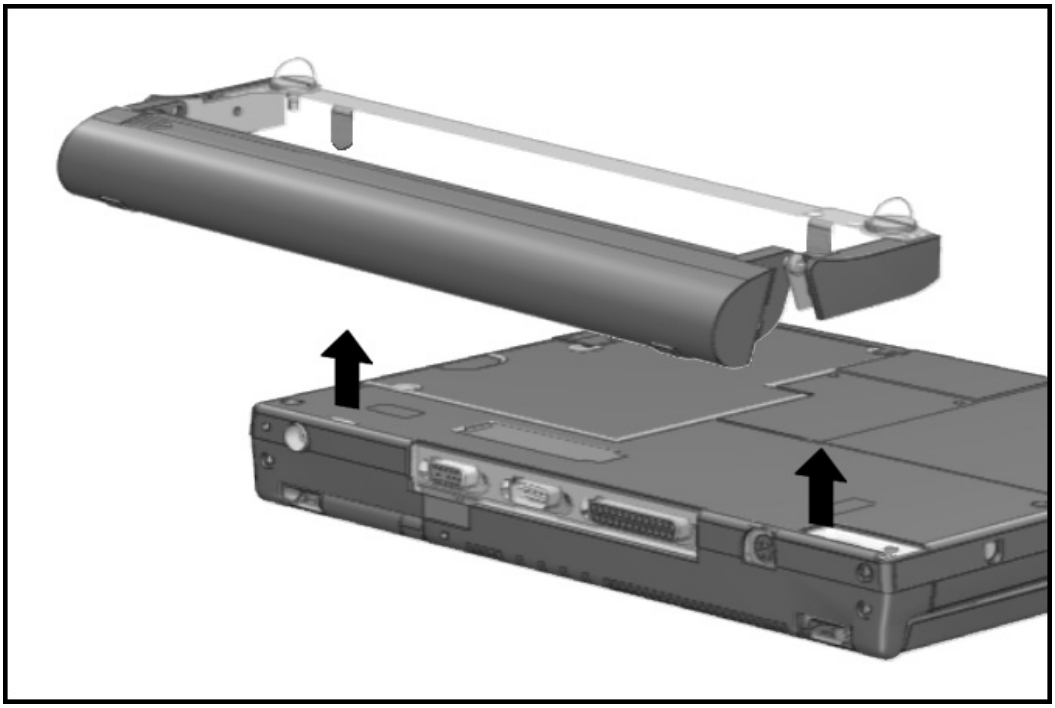


Figure 5-23. Removing the Handle

*CA***UTION:** To pre*v*ent corros*i*on, do not touch the electr*i*cal connectors on the battery handle.

5.5 CPU Base Assembly

This section describes the removal and replacement of the CPU base assembly and the doors associated with it. It includes the following:

- Memory cover
- Memory boards
- CPU base
- Processor board
- Lithium real time clock battery

5.5.1 Memory Cover

The memory cover must be removed before either the memory boards or the Lithium clock battery can be removed. To remove the memory cover, complete the following steps:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base, if necessary (Section 5.3.2).
3. Remove all battery packs (Section 5.3.3).
4. Unsnap the door by pulling up on the wide end of the door. The case utility tool may be used if needed.

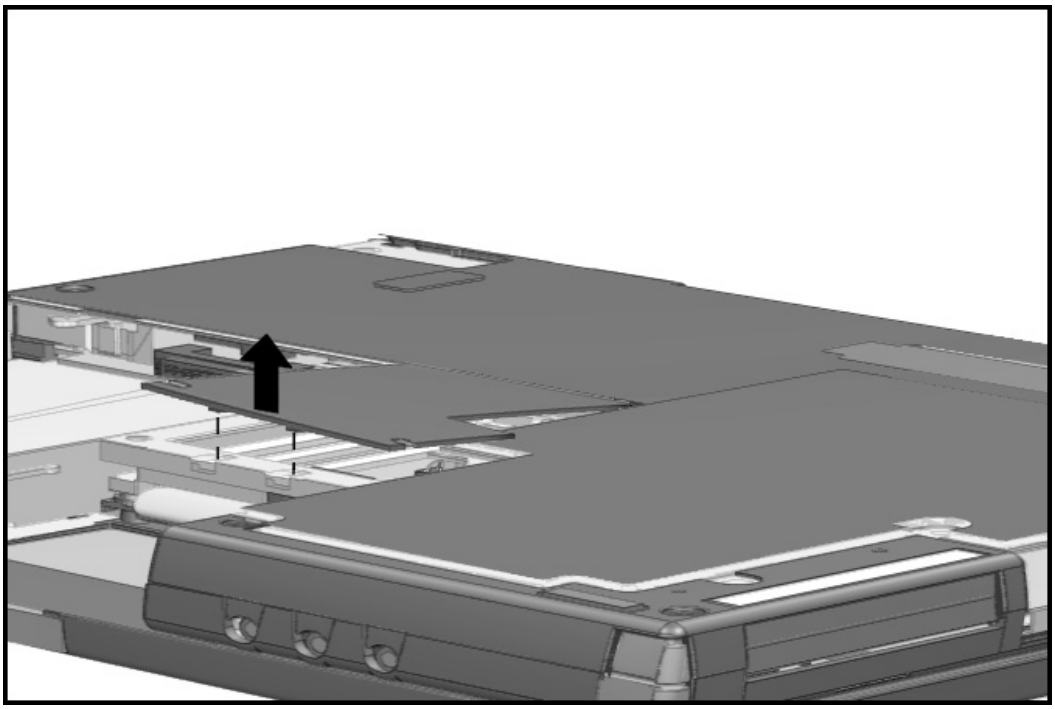


Figure 5-24. Removing the Memory Cover

Reverse the procedure to install the memory cover.

5.5.2 Memory Boards

Memory boards that are in the computer must be removed before others are installed. Memory expansion boards come in two matched boards.To remove the memory boards, complete the following steps:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base if necessary (Section 5.3.2).
3. Remove all battery packs (Section 5.3.3).
4. Remove the memory cover (Section 5.5.1).

> **CAUTION:** If you need to remove the memory expansion boards, be sure to release the locking tabs that secure the memory boards in the slots. If the tabs are not released, the connectors may break and cause irreparable damage to the system board.

5. Release the locking tab ❶ at each end of the upper memory board. This releases the memory board and allows it to rotate upwards to ease removal.
6. Lift the free edge of the memory board slightly ❷ and pull it straight out of the ❸ slot.

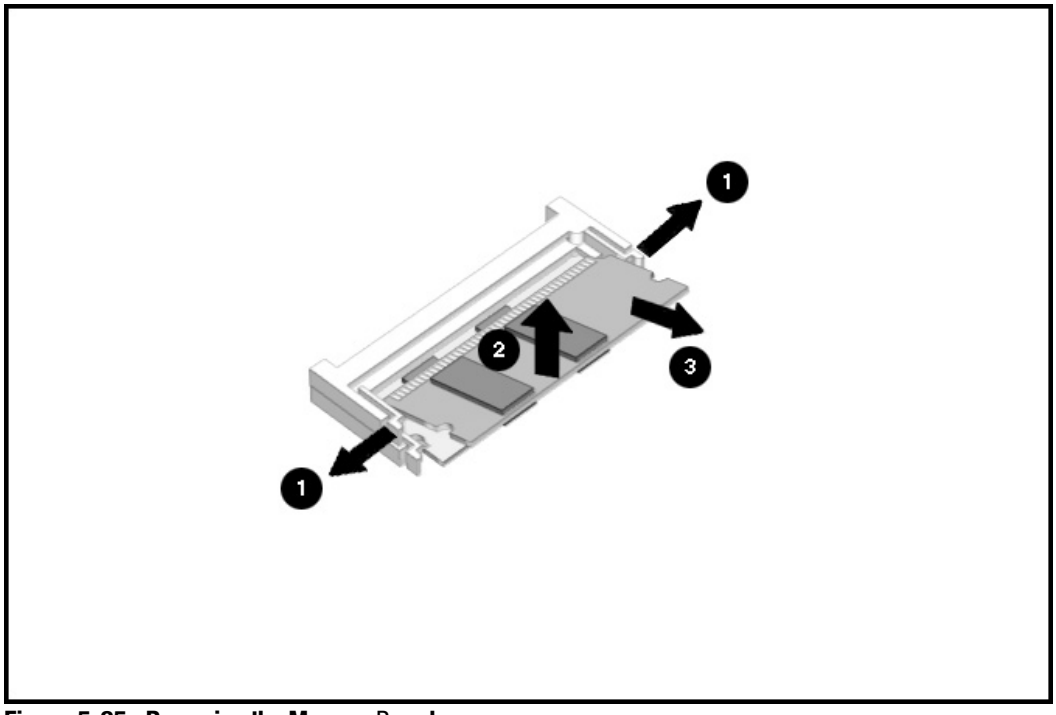


Figure 5-25. Removing the Memory Board

After removing the upper memory board, the lower memory board may be removed by completing the following steps:

1. Release the latch at each end of the lower memory board. This releases the memory board and allows it to rotate upwards for removal.
2. Rotate the board upwards about 25 degrees, pull the board out 2-mm (1/8-inch), and rotate the board up about 40 degrees.
3. Pull the memory board out of the slot.

Memory boards must be installed in matched pairs. You must install the lower memory board before the upper one.

NOTE: Align the star on the memory board with the star on the system board to ensure proper installation.

To install the memory boards, complete the following steps:

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

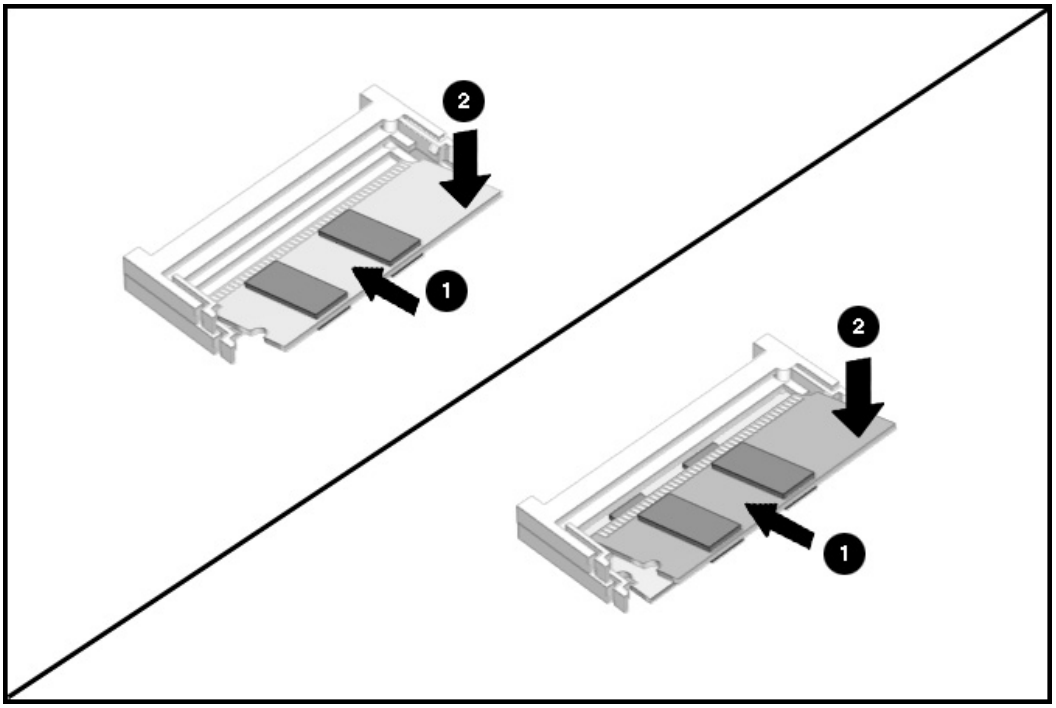


Figure 5-26. Installing the Memory Boards

5.5.3 Lithium Real Time Clock Battery

To remove the Lithium real time clock (RTC) battery, complete the following steps:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base if necessary (Section 5.3.2).
3. Remove all battery packs (Section 5.3.3).
4. Remove the memory cover (Section 5.5.1).
5. Remove the Lithium RTC battery by lifting it up from the system board.
6. Disconnect the RTC battery cable from the connector.

WARNING: There is a risk of explosion and injury if the battery is incorrectly replaced or handled improperly. 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: To prevent damaging the RTC battery cable, rock the connector from side to side to disconnect it.

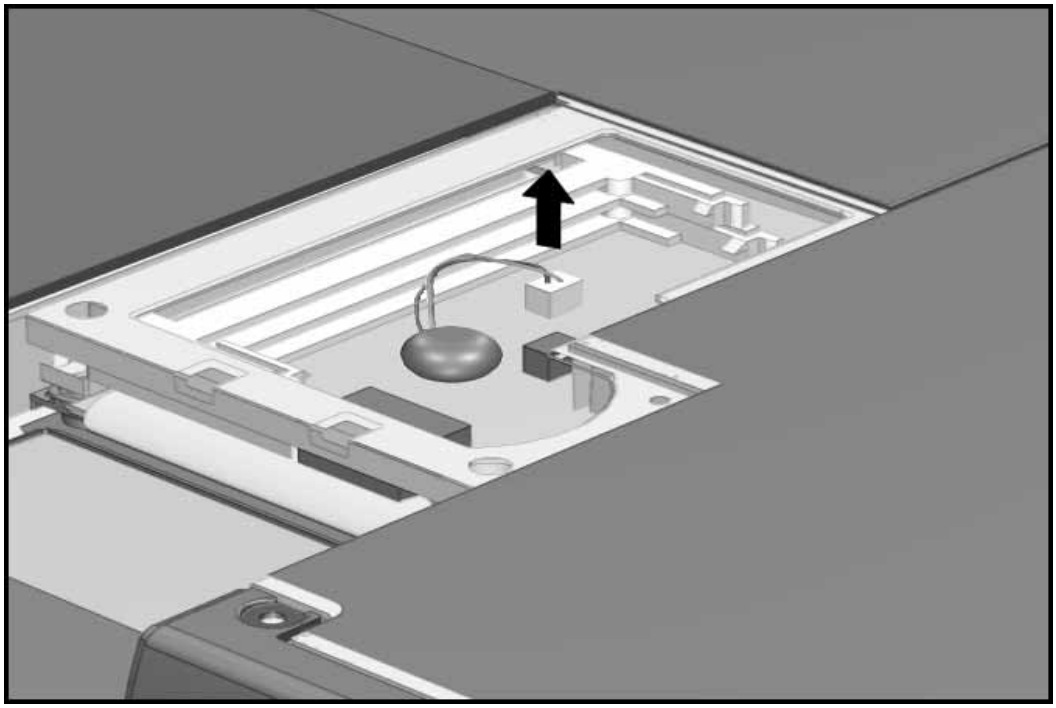


Figure 5-27. Removing the Lithium Real Time Clock Battery

Reverse the procedure to install a replacement RTC battery.

5.5.4 CPU Base Cover

To remove the CPU base cover, complete the following steps:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base, if necessary (Section 5.3.2).
3. Remove all battery packs (Section 5.3.3).
4. Remove the handle (Section 5.4.3), if attached.
5. Using a Torx T-8 screwdriver, remove the two screws from the bottom and the two lower screws from the rear of the CPU base.

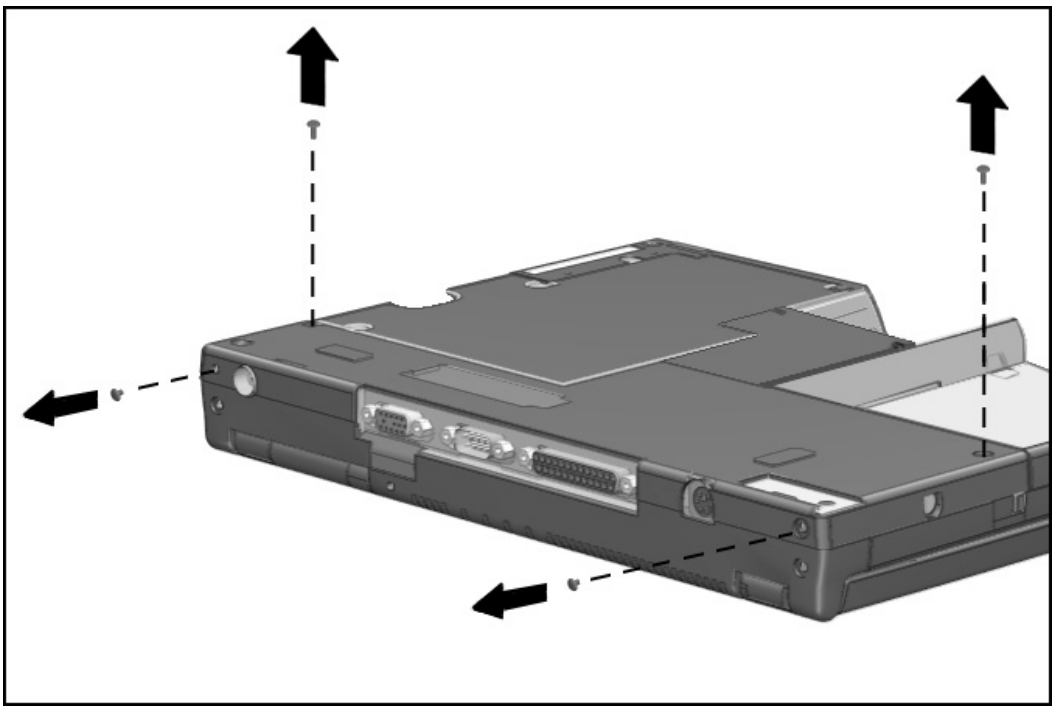


Figure 5-28. Removing the Four Screws from the CPU Base

7. Use the case utility tool to gently lever the side of the cover ❶ from the CPU base on the right end. This will release the tab that holds the base in position.

8. Lift up the base cover slightly ❷ to clear the frame.

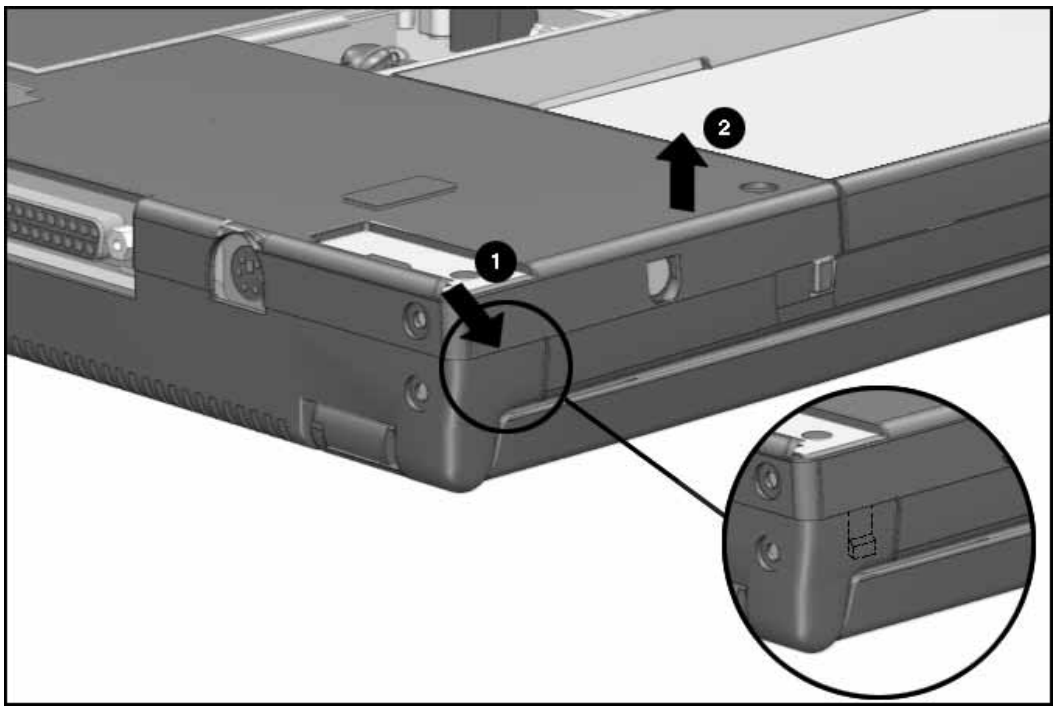


Figure 5-29. Levering the CPU Base Cover to Release the Tabs and Lifting the Base

9. Use the case utility tool again to gently lever the side of the cover from the CPU base ❶ on the left end. This will release the tab that holds the rest of the base in position.

10. Lift the base cover ❷ from the magnesium frame.

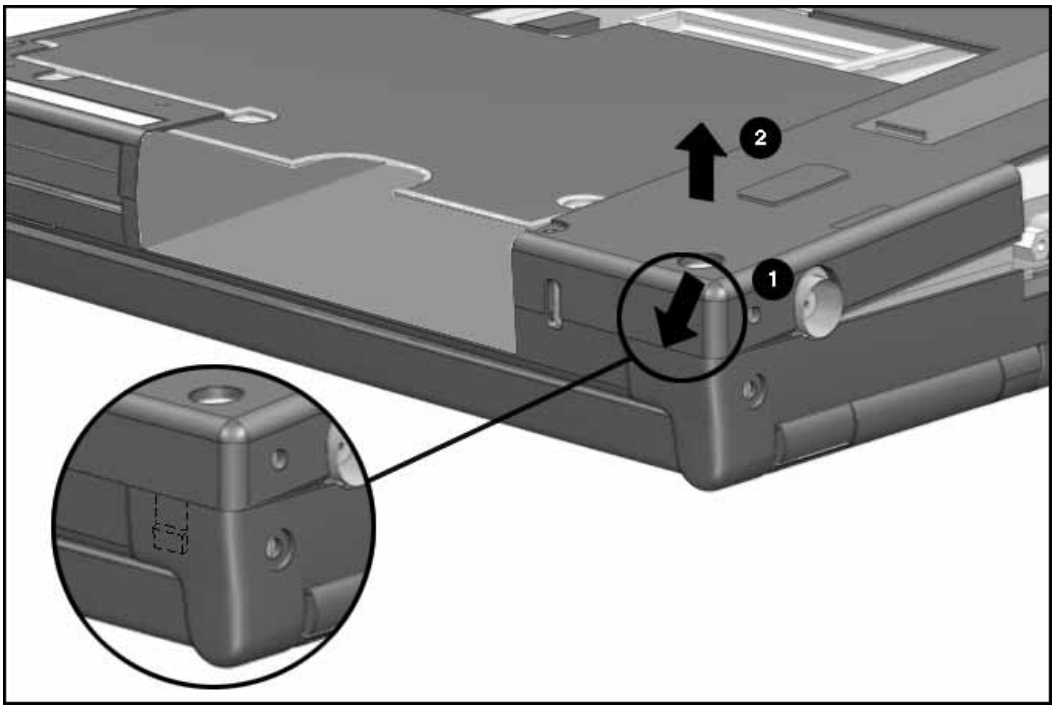


Figure 5-30. Releasing the Left Tab

Reverse the procedure to install the base. It is not necessary to use a tool to snap the cover into position.

5.5.5 Processor Shield and Board

To remove the processor shield and board, complete the following steps:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base, if necessary (Section 5.3.2).
3. Remove all battery packs (Section 5.3.3).
4. Remove the hard drive. (Section 5.3.6).
5. Remove the handle (Section 5.4.3).
6. Remove the CPU base cover(Section 5.5.3).
7. Use a Torx T-8 screwdriver to remove the three screws that secure the processor board to the magnesium frame.
8. Using the slot opening, lift the processor board to disconnect it from the system board.

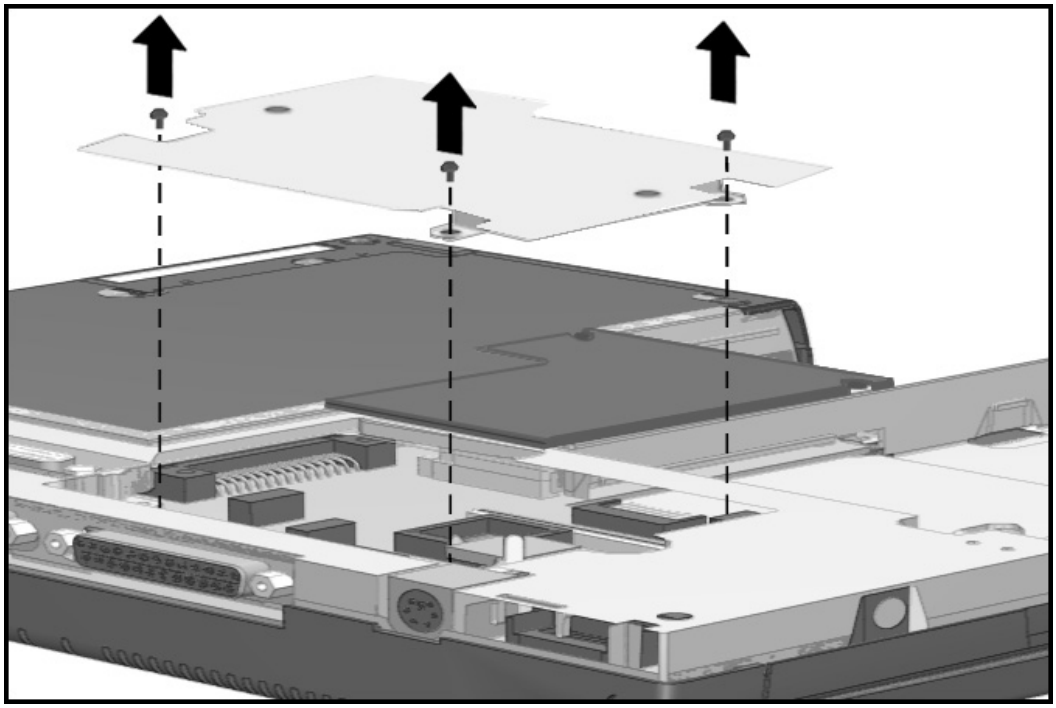


Figure 5-31. Removing the Processor Board

To install the processor board, Compaq recommends that you first remove the CPU cover as described in Section 5.5.6. This allows you to squeeze the new board into position and prevents bending the system board.

CAUTION: Installing the processor board without completing the recommended disassembly can flex the system board. This could cause an incomplete connection or damage to the system board.

After the CPU cover has been removed (Section 5.5.6), place the processor board in position and squeeze it into place. Complete the assembly process by reversing the steps described in Section 5.5.6.

5.5.6 CPU Cover and Keyboard Assembly

To remove the CPU cover and keyboard assembly, complete the following steps:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base, if necessary (Section 5.3.2).
3. Remove all battery packs (Section 5.3.3).
4. Remove the pointing device (Section 5.3.5).
5. Remove the hard drive (Section 5.3.6).
6. Remove two screws from the bottom left side of the CPU.

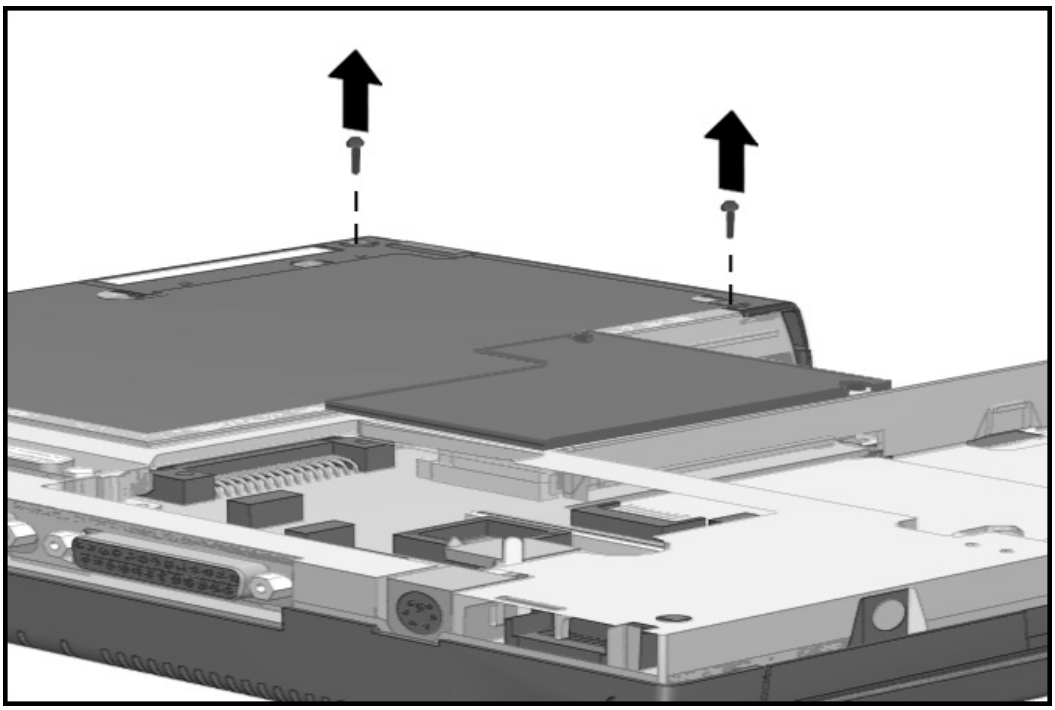


Figure 5-32 Removing the Screws from the Bottom of the CPU

8. Remove the two screws in the center of the unit near the memory compartment opening.

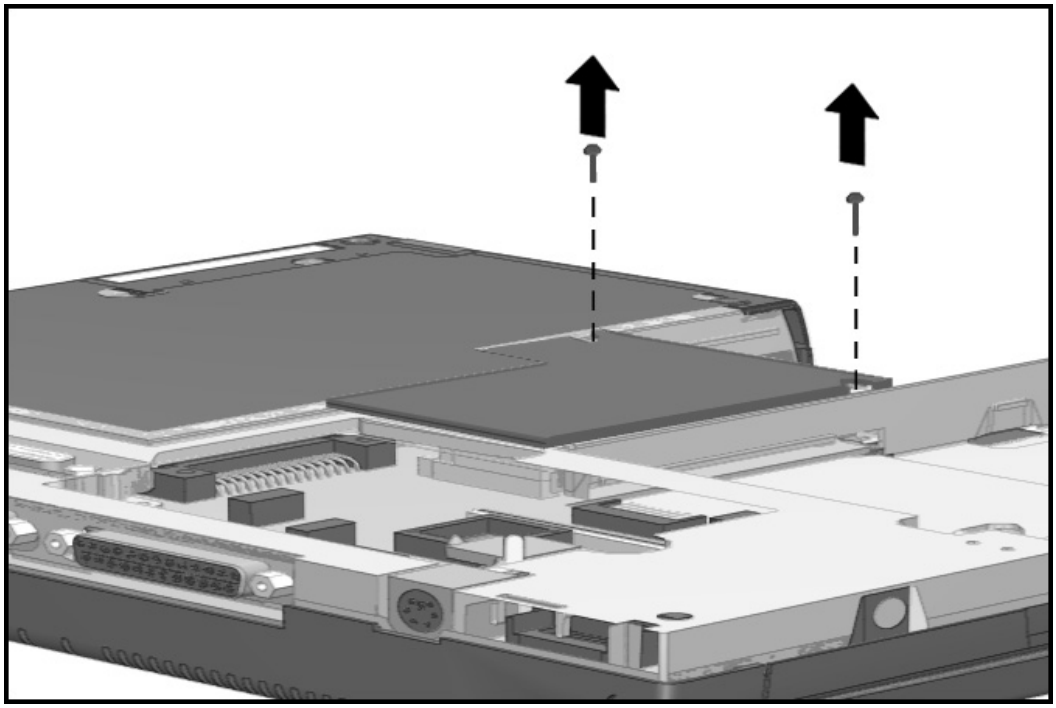


Figure 5-33. Removing the Screws Near the Memory Compartment Opening

9. Turn the unit top side up, then open the display so it is in the upright position.
10. Lift up the left front of the keyboard assembly about 1/2 inch ❶ to allow a boss to clear the frame. Rotate the assembly to the right ❷, then pull it forward and away ❸ from the frame.

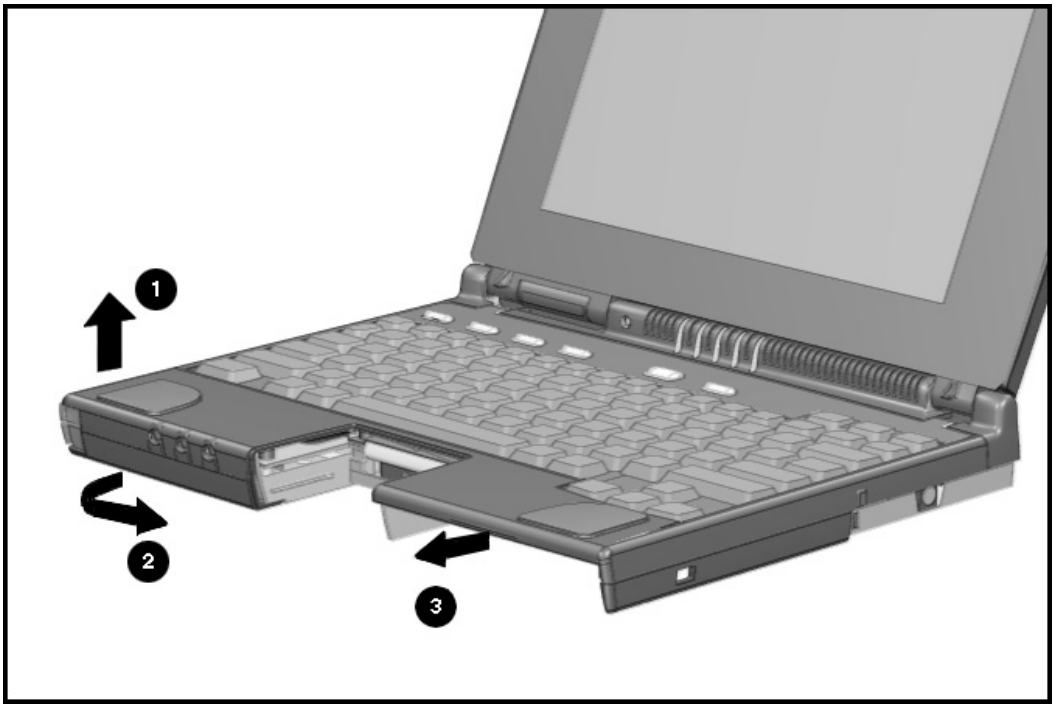


Figure 5-34. Removing the CPU Cover and Keyboard Assembly

To install the CPU cover, reverse the procedure above and use the following steps to ensure proper keyboard alignment.

1. It is critical for purposes of keyboard alignment that the screw identified below as ❶ be installed first whenever a CPU bottom is reattached. Failure to follow this directive will result in sporadic keyboard performance.
2. Screw ❷ must be tightened next to firm up the keyboard location.
3. Screws ❸ and ❹ should follow next. All screws should be snug.

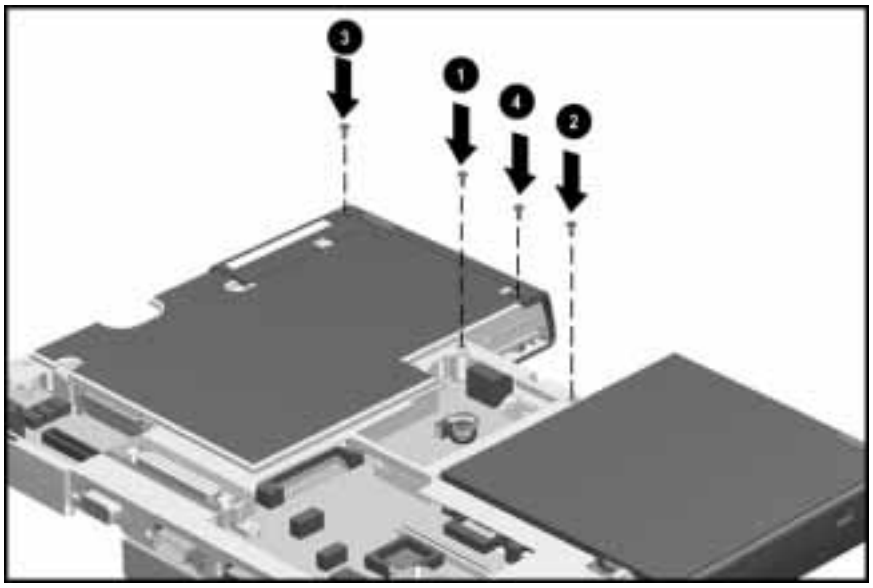


Figure 5-35. Reinstalling Screws to the Bottom of the CPU

5.6 Display Assembly

To remove the display assembly, complete the following procedures:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base, if necessary (Section 5.3.2).
3. Remove all battery packs (Section 5.4.3).
4. Remove the CPU base cover (Section 5.5.4).
5. Disconnect the display ground cable by pulling it out of the clip on the magnesium frame.

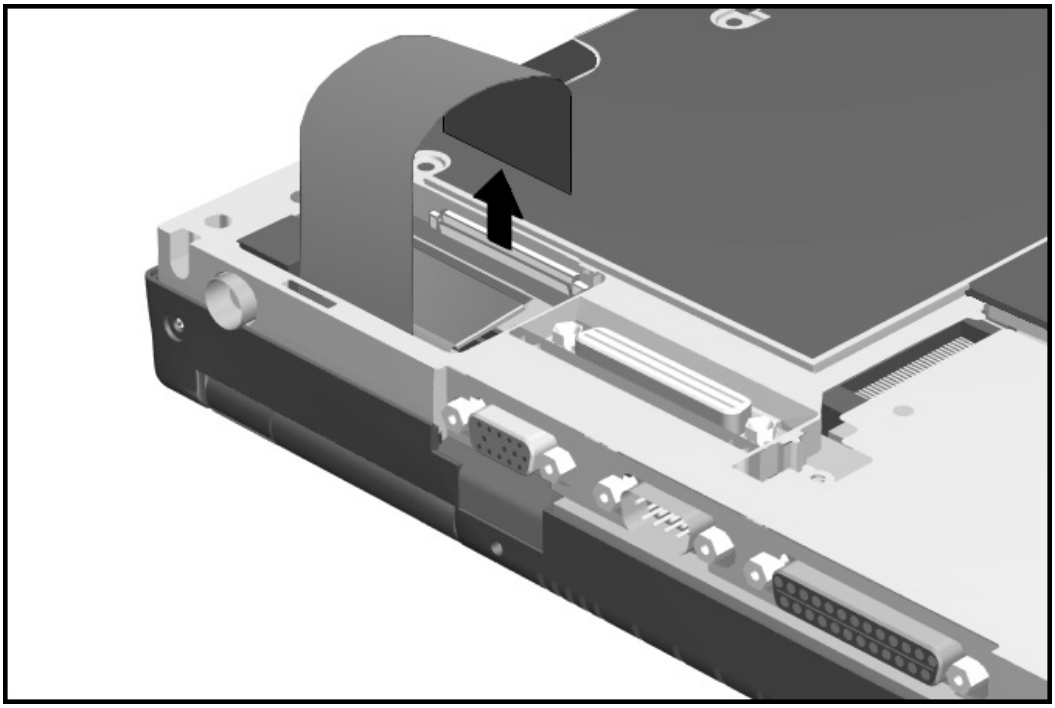


Figure 5-39. Disconnecting the Ground Cable from the Magnesium Frame

6. Disconnect the display cable from the system board by pulling up on the pull tabs attached to the flat ribbon cable.

CAUTION: Do not pull on the flat cable as it is easily damaged.

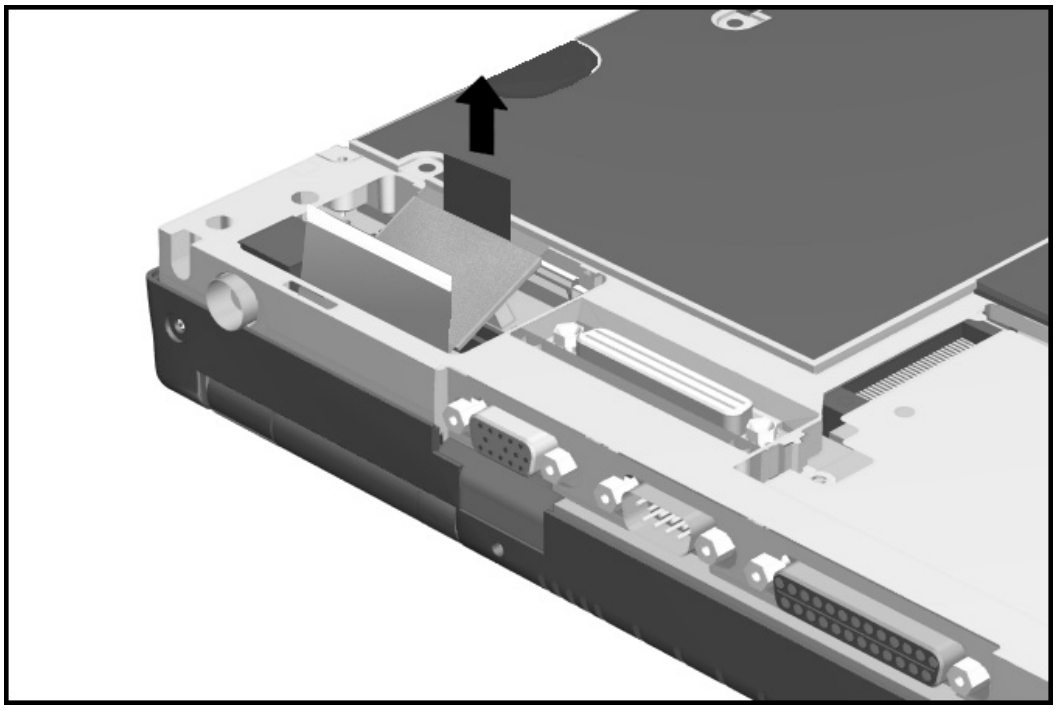


Figure 5-40. Disconnecting the Display Connector from the System Board

7. Turn the computer top side up and open the display to a vertical position,
8. Remove the four clutch screws at the back of the display assembly.
9. Lift the display assembly from the CPU base. As you lift the display , guide the flat ribbon display cable and the ground cable through the slot to prevent damage.

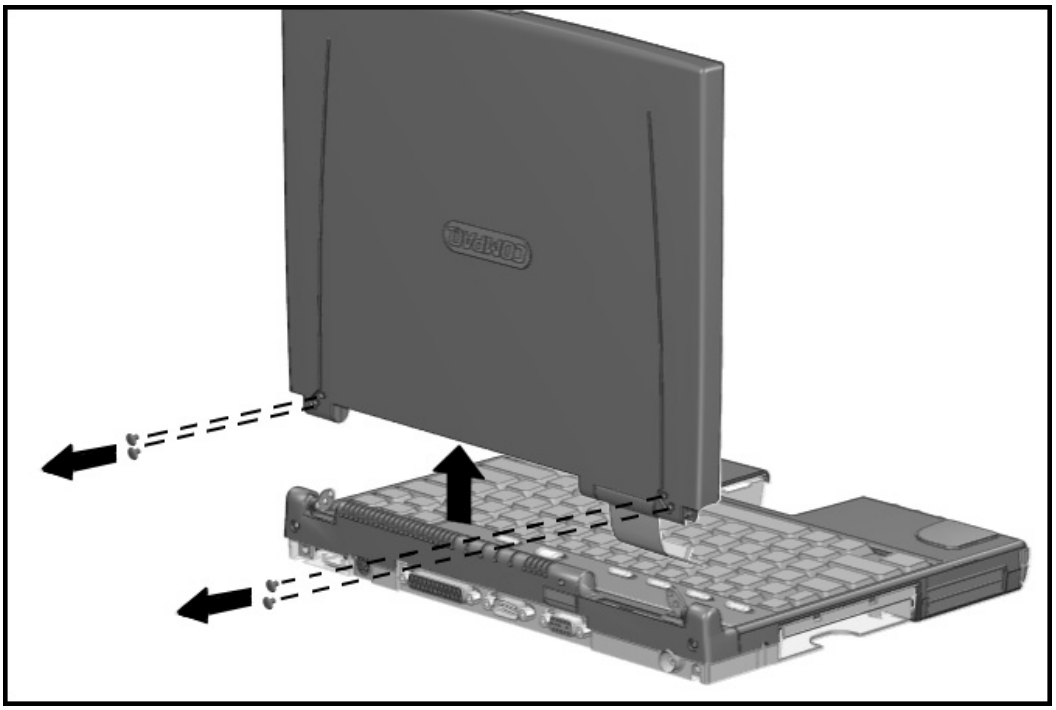


Figure 5-41. Removing the Screws and Lifting the Display Assembly from the Clutches

CAUTION: Do not pull out the clutch cover when removing the display assembly. Doing so may damage the microphone cable harness.

To install the display assembly, complete the following procedures:

1. Guide the flat ribbon display cable and the display ground cable through the slot in the CPU base.
2. Position the display assembly onto the two clutch assemblies and align the screw holes on the back of the display assembly with those in the clutch assembly.
3. Install the four screws to secure the display assembly to the clutches.

*CA***UTION:** Do not reuse the clutch screws removed from the old display. These screws may back out of the display clutches and cause the display assembly to loosen from the CPU base.

4. Close the display, turn the computer bottom side up, and reconnect the display cable to the CPU, pressing firmly to ensure that the connector seats properly.
5. Reconnect the display ground cable to the ground clip.

5.7 Clutch Assembly Components

This section covers the removal and replacement of the clutch cover and the clutches.

5.7.1 Clutch Cover

To remove the clutch cover, complete the following procedures:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base, if necessary (Section 5.3.2).
3. Remove all battery packs (Section 5.4.3).
4. Remove the CPU base cover (Section 5.5.4).
5. Remove the CPU base cover (Section 5.5.4).
6. Remove the CPU cover/keyboard assembly (Section 5.5.6).
7. Remove the display assembly (Section 5.6).
8. Remove the two screws that secure the clutch cover to the clutches and secure it to the magnesium frame.

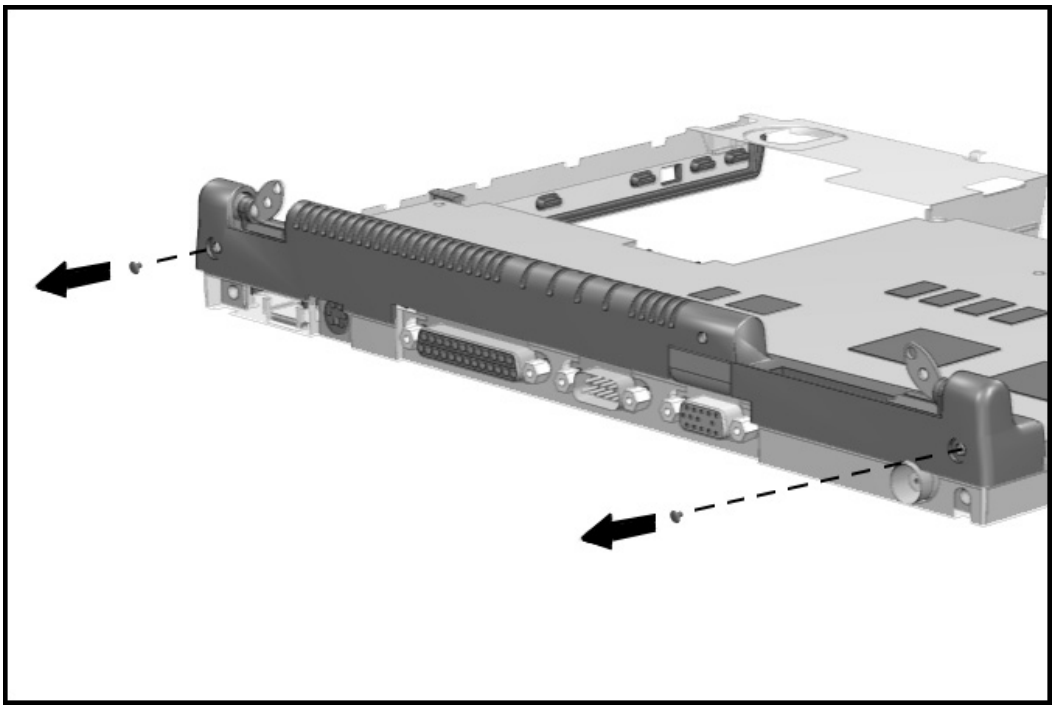


Figure 5-42. Removing the Clutch Cover

9. Lift the right side of the clutch cover about 0.5 inch to gain access to the microphone cable harness, then disconnect the harness from the system board.

> ***CAUTION:*** The microphone cable harness is delicate. Mishandling may damage the wiring.

10. Lift and remove the clutch cover assembly up and away from the computer.

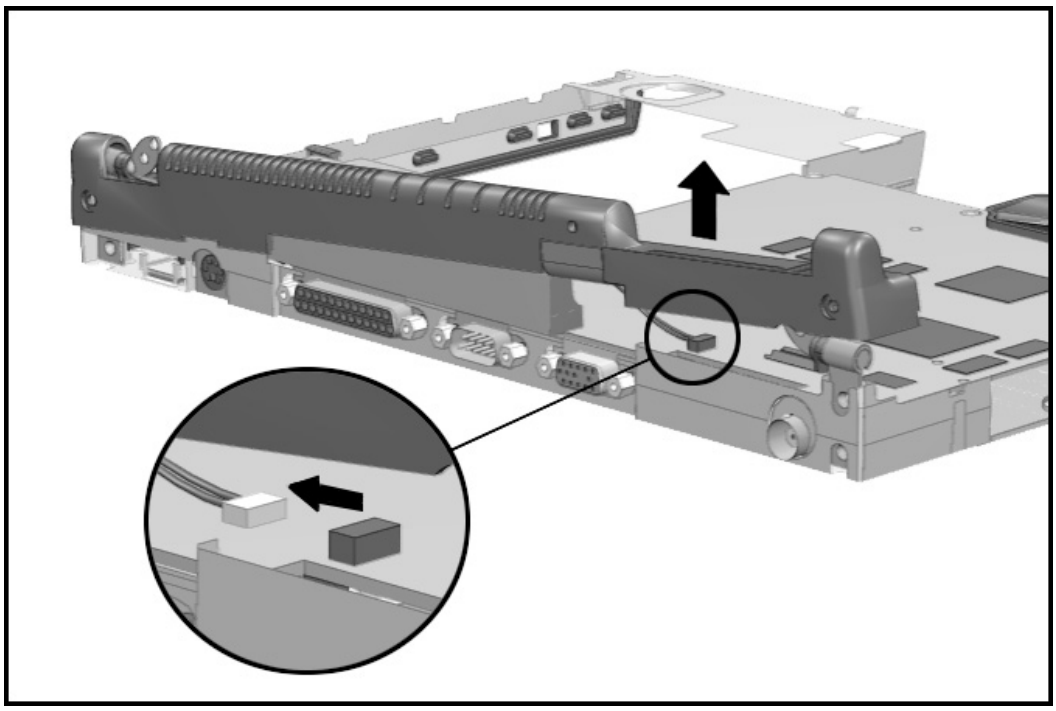


Figure 5-43. Disconnecting the Microphone and Removing the Clutch Cover

Reverse the procedure to install the clutch cover.

5.7.2 Clutches

The two clutches act as hinges for the display assembly. To remove the clutches, complete the following procedures:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base, if necessary (Section 5.3.2).
3. Remove all battery packs (Section 5.4.3).
4. Remove the CPU base cover (Section 5.5.4).
5. Remove the CPU cover/keyboard assembly (Section 5.5.6).
6. Remove the display assembly (Section 5.6).
7. Remove the clutch cover (Section 5.7.1).
8. Remove the clutches from the magnesium frame.

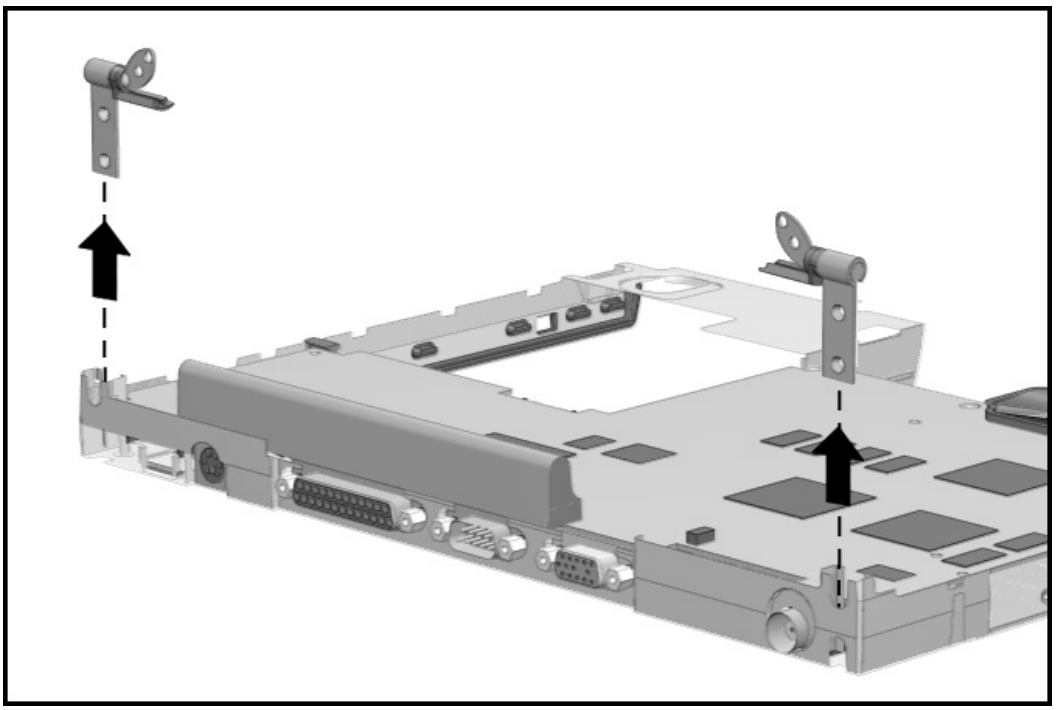


Figure 5-44. Removing the Clutches

Reverse the procedure to install the clutches. The clutches are not interchangeable with each other.

5.8 System Board Components

There are two major parts that comprise the system board: the system board, and the heat sink.

5.8.1 System Board

To remove the system board, complete the following procedures:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base, if necessary (Section 5.3.2).
3. Remove all battery packs (Section 5.4.3).
4. Remove the pointing device (Section 5.3.5).
5. Remove the hard drive. (Section 5.3.6).
6. Remove the CPU base cover (Section 5.5.4).
7. Remove the processor shield and the processor (Section 5.5.5).
8. Remove the CPU cover/keyboard assembly (Section 5.5.6).
9. Remove the display assembly (Section 5.6).
10. Remove the clutch cover (Section 5.7.1).

11. Use a 7-mm socket wrench to remove the two nuts that secure the expansion connector in place.

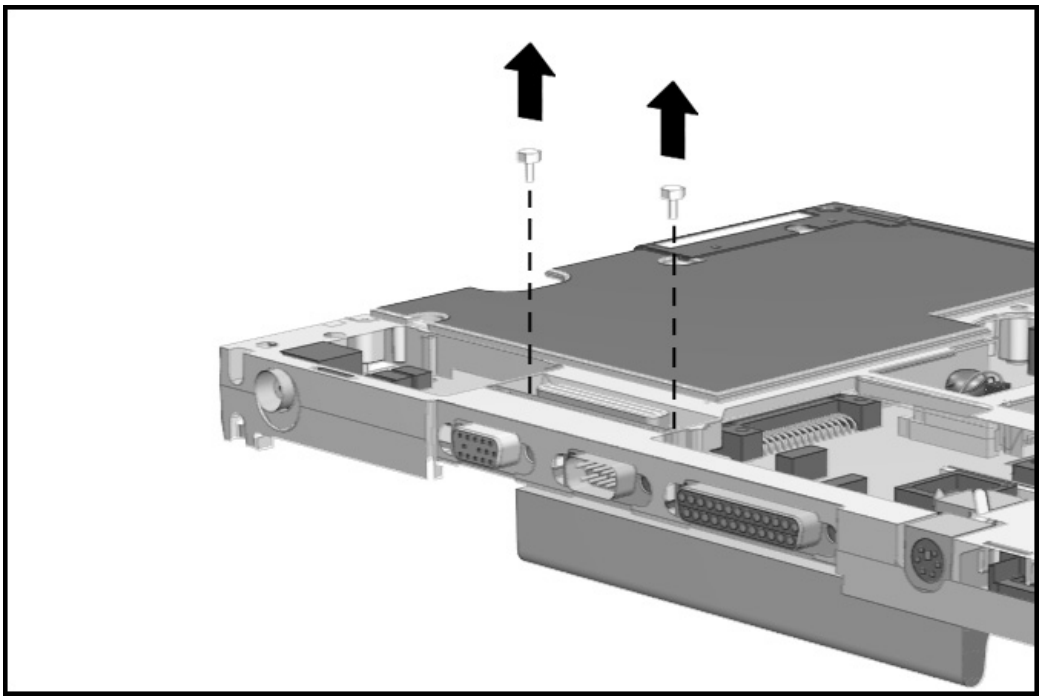


Figure 5-45. Removing the Expansion Connector Nuts

12. Turn the computer bottom side up and remove the five screws that secure the system board to the magnesium frame.

> ***CAUTION:*** To prevent electrostatic discharge damage to the system I/O board, follow the precautions described in Chapter 4, "Removal and Replacement Preliminaries."

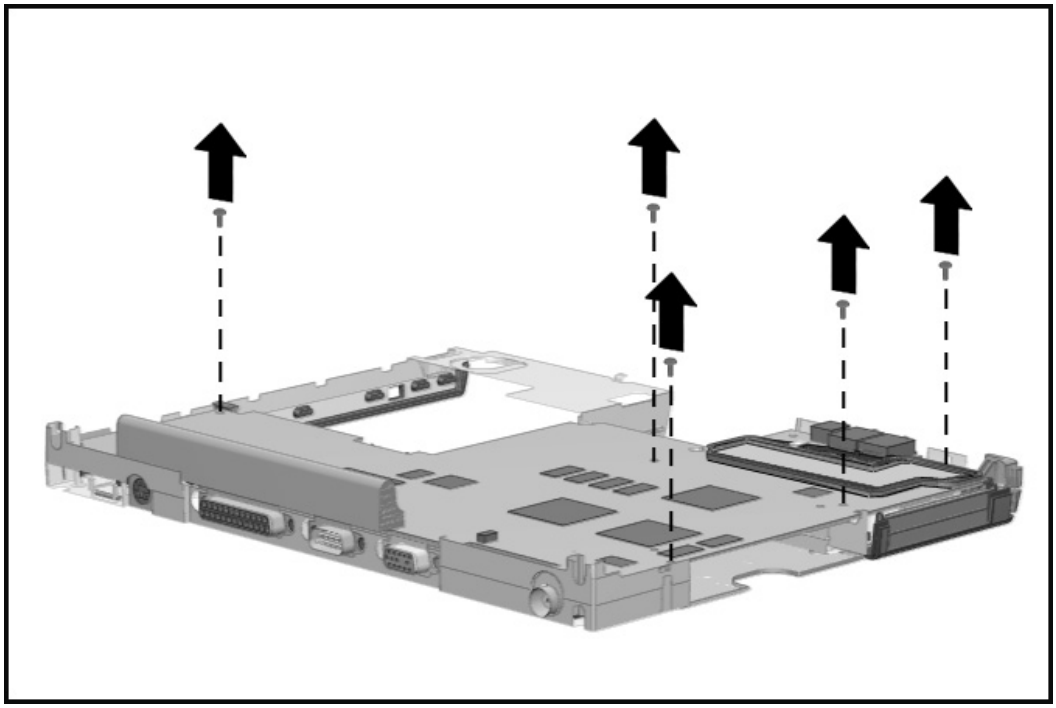


Figure 5-46. Removing the Screws from the System Board

13. Use a 3/16-inch socket wrench to remove the six screwlocks that secure the I/O connectors to the magnesium frame at the back of the unit.

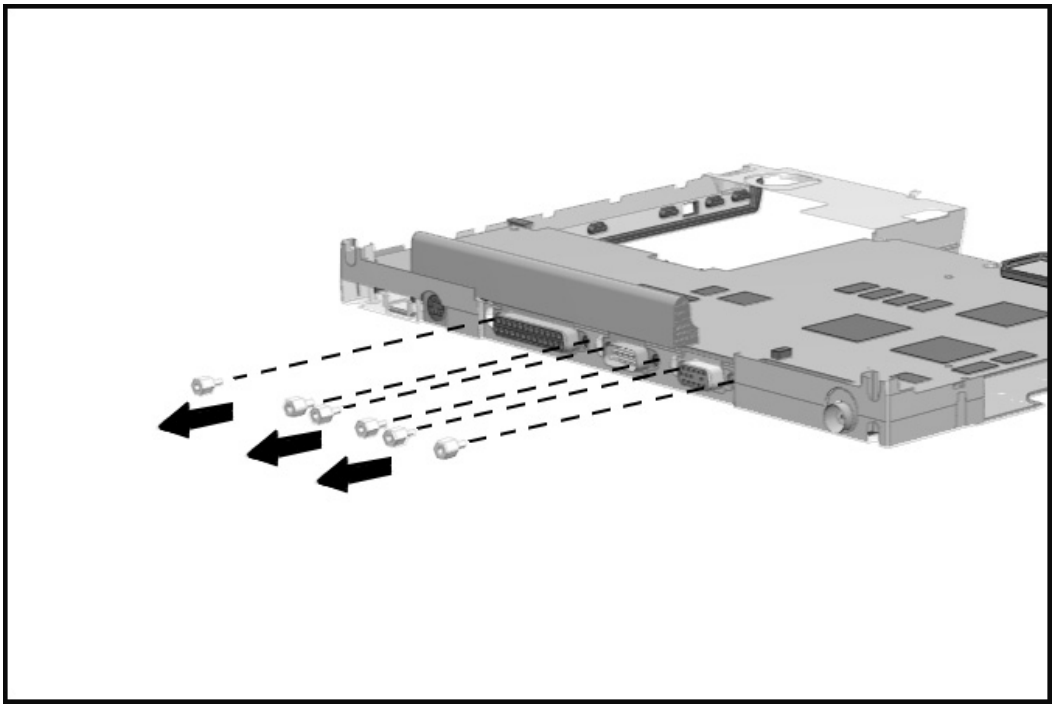


Figure 5-47. Removing the Screwlocks from the System Board

14. Lift the front end of the system board then slide the board out from the magnesium frame.

To replace the system board, complete the following procedures:

1. Insert the system board, rear end first, into the magnesium frame.
2. Replace the six screwlocks that secure the I/O connectors to the magnesium frame. Begin with the center pair of screwlocks and move outward, alternating from side to side.
3. Replace the five screws that secure the system I/O board to the magnesium frame. Begin with the left rear screw and move outwards. Follow the insertion sequence shown in the following figure.

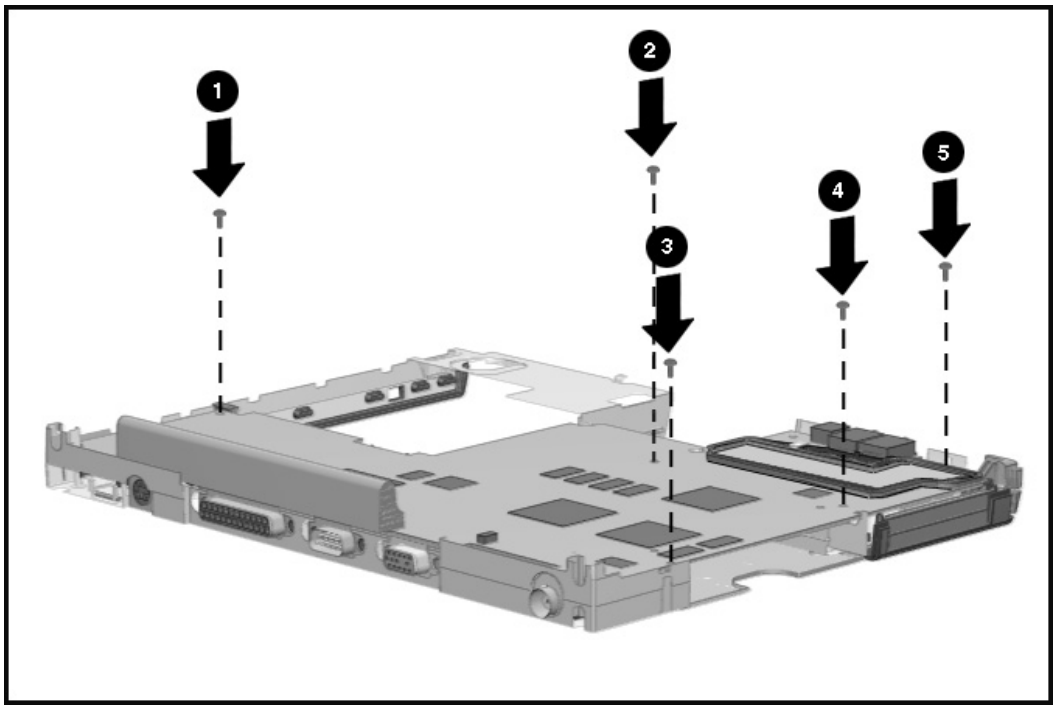


Figure 5-48. Installing the System Board Screws

4. Turn the computer top side up and install the two nuts that secure the expansion connector in place.

5.8.2 Ensuring ESD Protection

When reinstalling the system board, it is important to include the grounding clip to maximize the ESD (electrostatic discharge) protection of the computer The grounding clip is located on the system board and is placed underneath the left rubber speaker isolation strip.

Use the following precautions to ensure the grounding clip is in place when reinstalling the system board:

- The grounding clip is installed in computers that have serial numbers higher than 650XXXXXXX. When the system board is removed, the grounding clip is removed with it. Be sure to replace the grounding clip when reinstalling the system board.
- If you need to reinstall the clip, reinstall it by slipping the clip under the rubber speaker isolation strip. Be sure the fingers of the grounding clip make contact with the magnesium frame and left speaker frame. While replacing screws in the system board during reinstallation, secure the clip in place with screw number 2 as shown in Figure 5-55.
- Include or replace the grounding clip whenever any service activity involves the removal and replacement of the system board. Failure to do so compromises the ESD protection of the computer.

5.8.3 Heatsink and Video Chip Heatpipe

To remove the heatsink, complete the following procedures:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base, if necessary (Section 5.3.2).
3. Remove all battery packs (Section 5.4.3).
4. Remove the pointing device (Section 5.3.5).
5. Remove the hard drive. (Section 5.3.6).
6. Remove the memory cover (Section 5.5.1).
7. Remove the CPU base cover (Section 5.5.4).
8. Remove the processor shield and the processor (Section 5.5.5).
9. Remove the CPU cover/keyboard assembly (Section 5.5.6).
10. Remove the display assembly (Section 5.6).
11. Remove the clutch cover (Section 5.7.1).
12. Remove the clutch cover (Section 5.7.1).

CAUTION: To prevent electrostatic discharge damage to the System I/O board, follow the precautions described in Chapter 4, "Removal and Replacement Preliminaries" in this guide.

14. Remove the screw that secures the heatsink to the system board.
15. Slide the heatsink out and away from the system board.

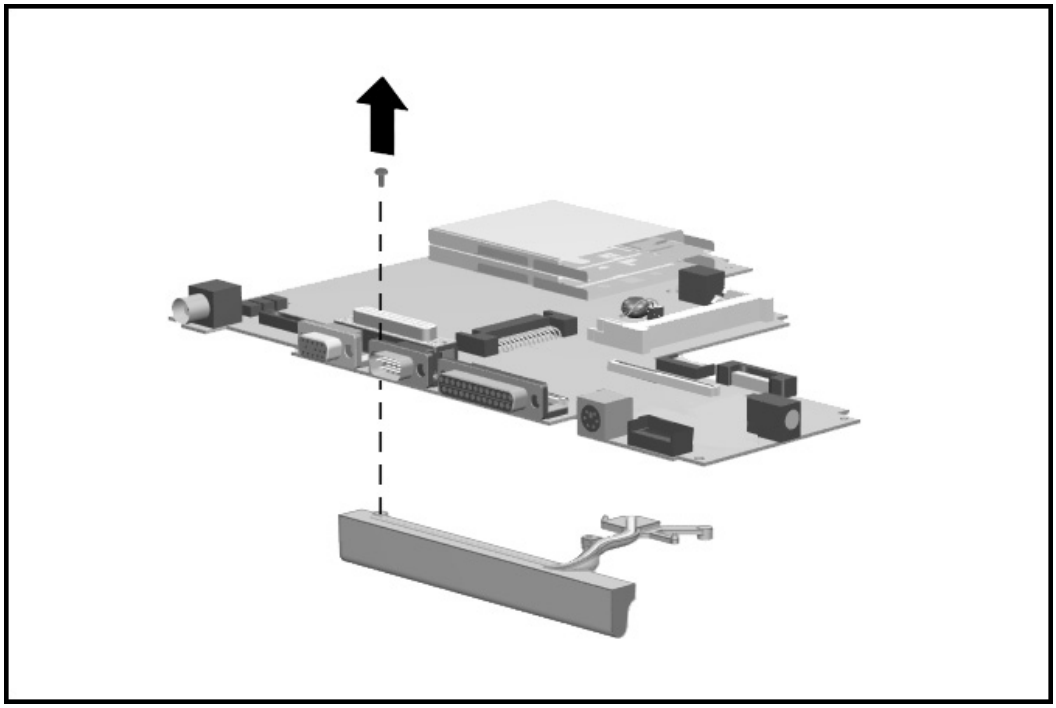


Figure 5-49. Removing the Heatsink

To install the heatsink, reverse the procedures.

To install the video chip heatpipe:

> **CAUTION:** The video chip heatpipe is easily bent. Please use extreme care when handling and installing to prevent damage. A bent video chip heatpipe may cause stack-up tolerance problems when reassembling the processor board.

1. Complete steps 1-12 in section 5.8.2.
2. Removing the release liner protecting the thermal-adhesive strip on the small fin of the video chip heatpipe.
3. Place the video chip heatpipe into the frame as shown in the figure below locating the small fin between the cylindrical features with the thermal-adhesive and against the frame.
4. Press firmly on the foam-rubber spacer for 10 seconds to set the adhesive.
5. Reverse the disassembly procedures to reassemble the computer.

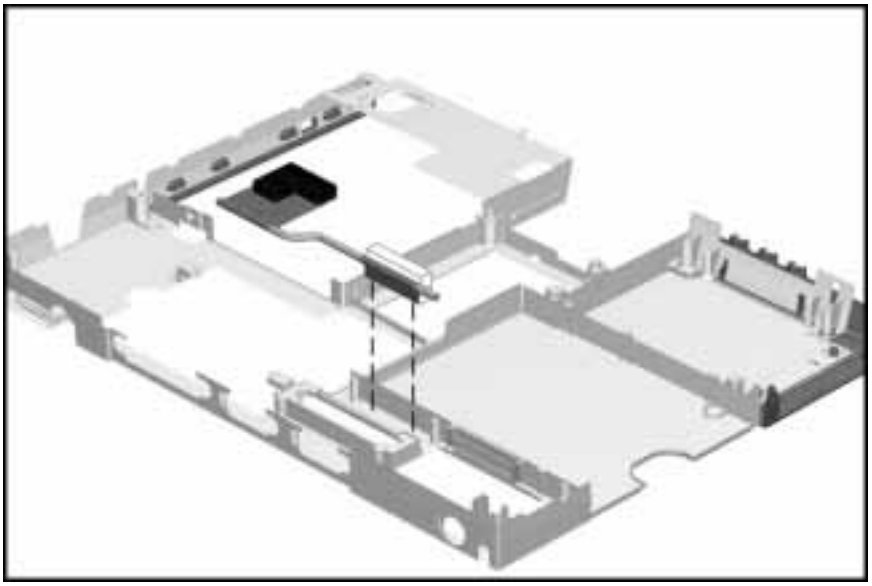


Figure 5-50 Installing the Video Chip Heatpipe

To remove the video chip heatpipe:

1. Complete steps 1-12 in section 5.8.2.
2. The video chip heatpipe is held in place with a double-sided thermal-adhesive strip. Lift the video chip heatpipe upward to loosen the adhesive bond. Use care to not bend the video chip heatpipe during removal.

5.9 Frame Components

Frame components include the upper and lower PCMCIA doors and the DualBay eject button components.

Important: When installing the PCMCIA doors, the lower door must be installed first.

5.9.1 Upper PCMCIA Door

To remove the upper PCMCIA door, complete the following procedures:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base, if necessary (Section 5.3.2).
3. Remove the handle battery pack (Section 5.3.3).
4. Remove the DualBay battery pack, if present (Section 5.3.4).
5. Remove the CPU cover/keyboard assembly (Section 5.5.6).
6. Grasp the upper door in the middle, slide it towards the front of the CPU, and flex it towards the inside of the computer. This allows the rear pin of the door to slide out of its slot while being compressed.

CAUTION: The spring is very small and is easily lost.

7. Remove the return spring by sliding it off the pin end that is towards the front of the computer frame.

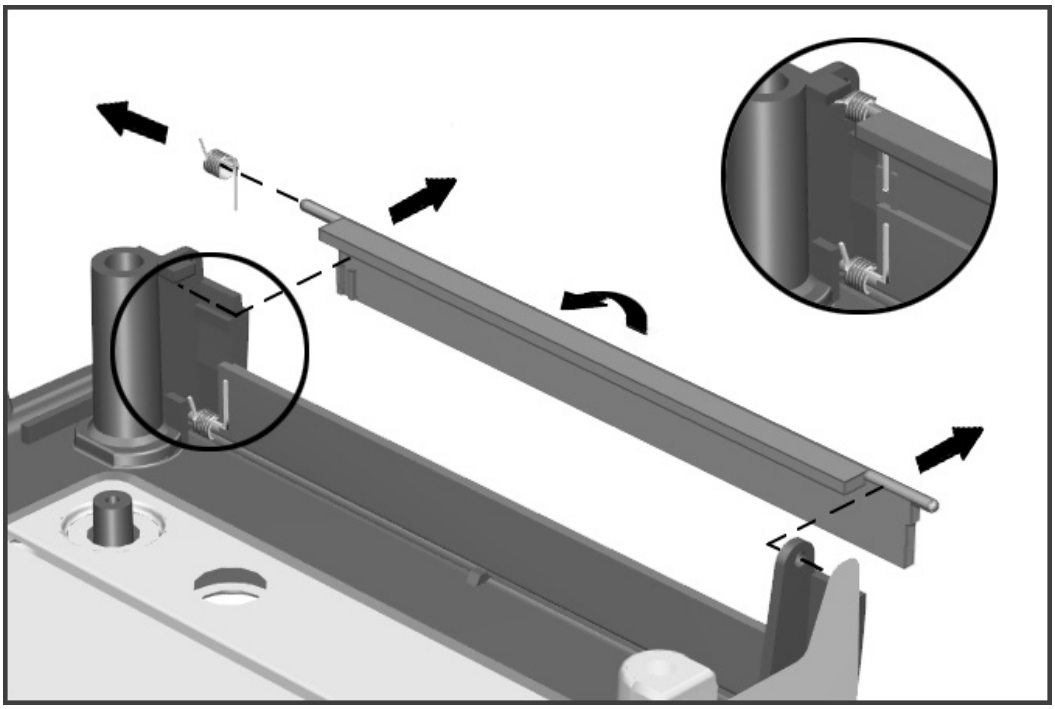


Figure 5-51. Removing the Upper PCMCIA Door

When installing the upper PCMCIA door, position the long straight leg of the spring so that it is against the door, and insert the crooked end into the cavity on the front cover plastic tab next to the PCMCIA button opening.

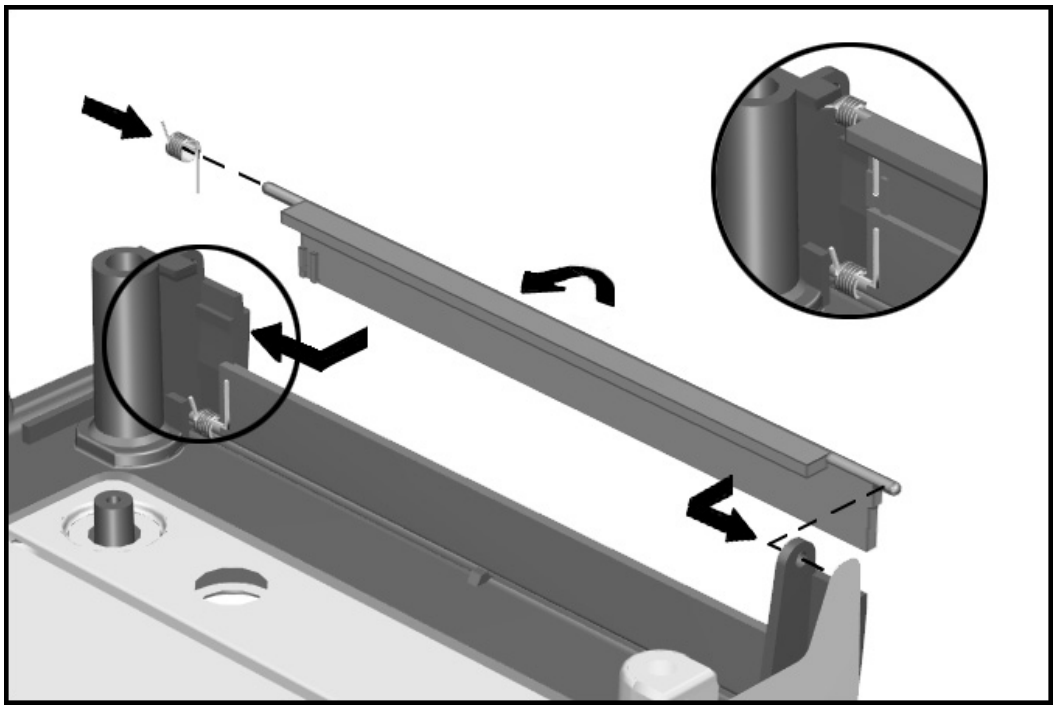


Figure 5-52. Replacing the Upper PCMCIA Door and Spring

5.9.2 Lower PCMCIA Door

To remove the lower PCMCIA door, complete the following procedures:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base, if necessary (Section 5.3.2).
3. Remove all battery packs (Section 5.4.3).
4. Remove the pointing device (Section 5.3.5).
5. Remove the hard drive. (Section 5.3.6).
6. Remove the CPU base cover (Section 5.5.4).
7. Remove the processor shield and the processor (Section 5.5.5).
8. Remove the CPU cover/keyboard assembly (Section 5.5.6).
9. Remove the display assembly (Section 5.6).
10. Remove the clutch cover (Section 5.7.1).
11. Remove the system board (Section 5.8.1).
12. Remove the upper PCMCIA door (Section 5.9.1).
13. Grasp the lower door in the middle, push it forward, and flex it towards the inside of the computer. This allows the rear pin of the door to slide out of its slot while the spring is being compressed.

CAUTION: The spring is very small and is easily lost.

14. Slide the return spring off the pin end that is nearer to the front of the computer frame.

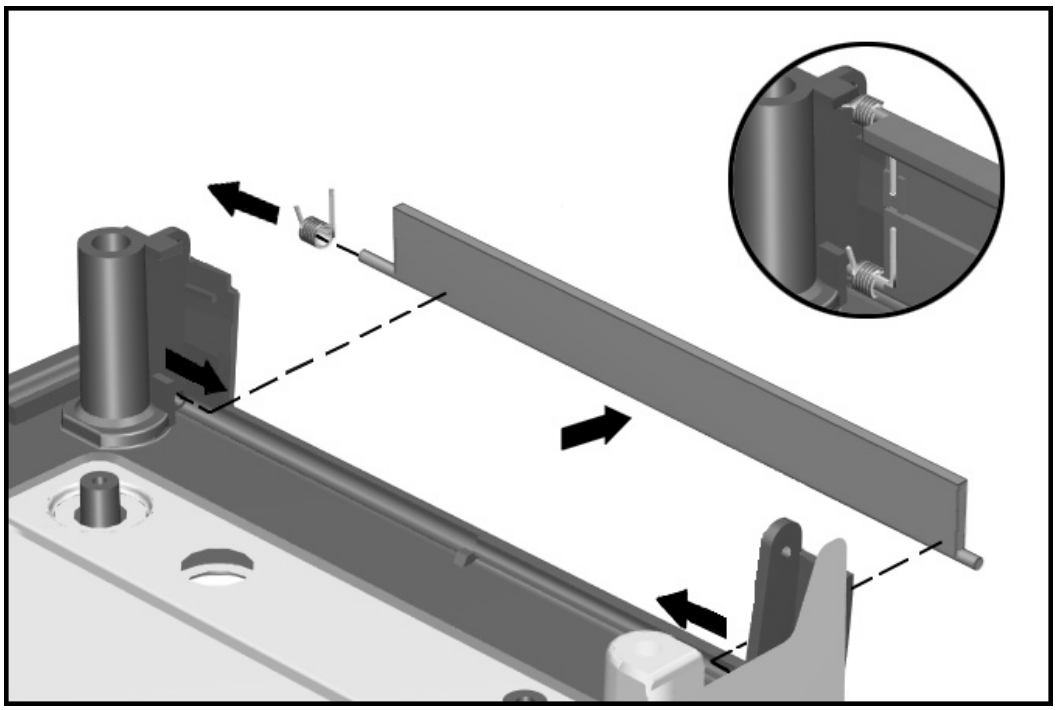


Figure 5-53. Removing the Lower PCMCIA Door

When installing the lower PCMCIA door, note the placement of the spring on the door pin and the way the spring nests in the cavity on the frame.

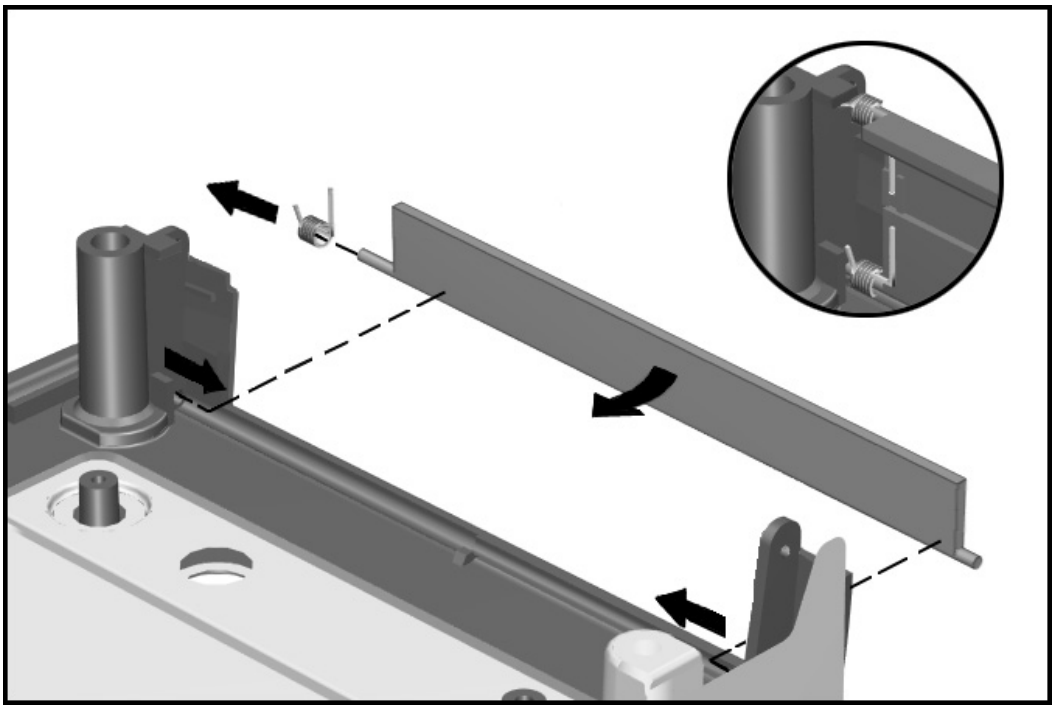


Figure 5-54. Replacing the lower PCMCIA Door and Spring

5.9.3 DualBay Eject Assembly

To remove the DualBay eject assembly components, complete the following procedures:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base, if necessary (Section 5.3.2).
3. Remove all the battery packs (Section 5.4.3).
4. Remove the pointing device (Section 5.3.5).
5. Remove the hard drive. (Section 5.3.6).
6. Remove the CPU base cover (Section 5.5.4).
7. Remove the processor shield and the processor (Section 5.5.5).
8. Remove the CPU cover/keyboard assembly (Section 5.5.6).
9. Remove the display assembly (Section 5.6).
10. Remove the clutch cover (Section 5.7.1).
11. Remove the clutches (Section 5.7.2)
12. Remove the system board (Section 5.8.1).

13. Lift the eject button ❶ out of the magnesium frame.
14. Remove the single screw that holds the hook in place, then lift the return spring and the hook ❷ from the magnesium frame.
15. Release the ejector spring arm ❸ from the post in the magnesium wall.

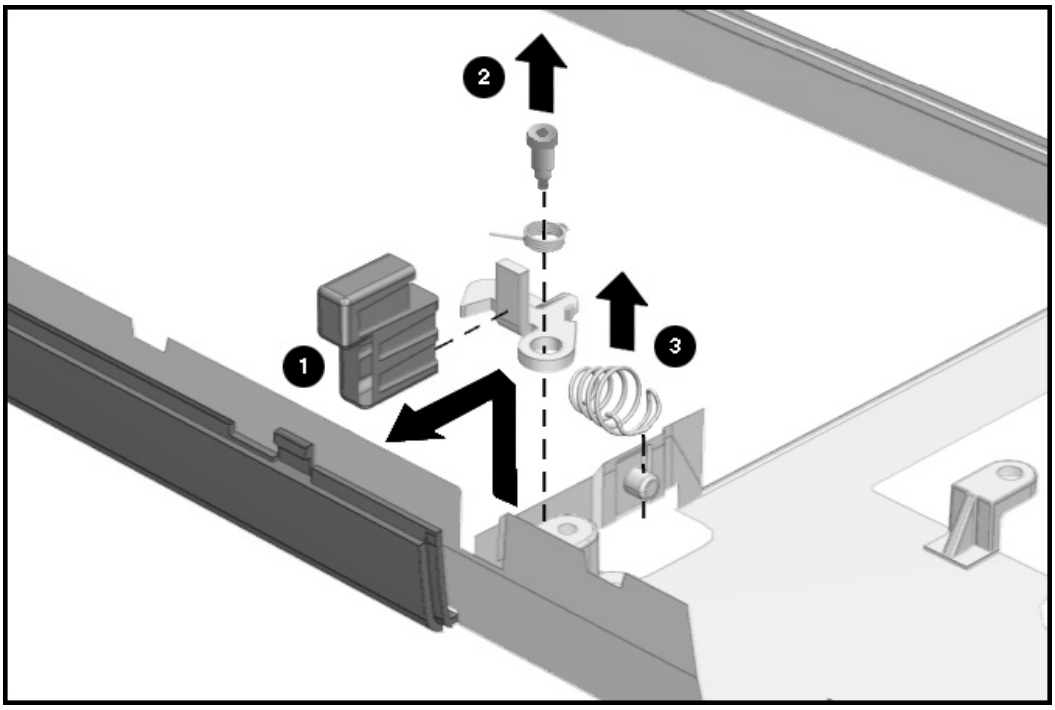


Figure 5-55. Removing the DualBay Eject Button and Spring

Reverse the procedures to install the DualBay eject button.

5.9.5 PCMCIA Assembly

To remove the PCMCIA assembly from the system board, complete the following procedures:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base, if necessary (Section 5.3.2).
3. Remove all battery packs (Section 5.4.3).
4. Remove the pointing device (Section 5.3.5).
5. Remove the hard drive. (Section 5.3.6).
6. Remove the CPU base cover (Section 5.5.4).
7. Remove the processor shield and the processor (Section 5.5.5).
8. Remove the CPU cover/keyboard assembly (Section 5.5.6).
9. Remove the display assembly (Section 5.6).
10. Remove the clutch cover (Section 5.7.1).
11. Remove the clutches (Section 5.7.2).
12. Remove the system board (Section 5.8.1).

13. With the system board bottom side up, remove the two screws that secure the PCMCIA assembly to the system board.

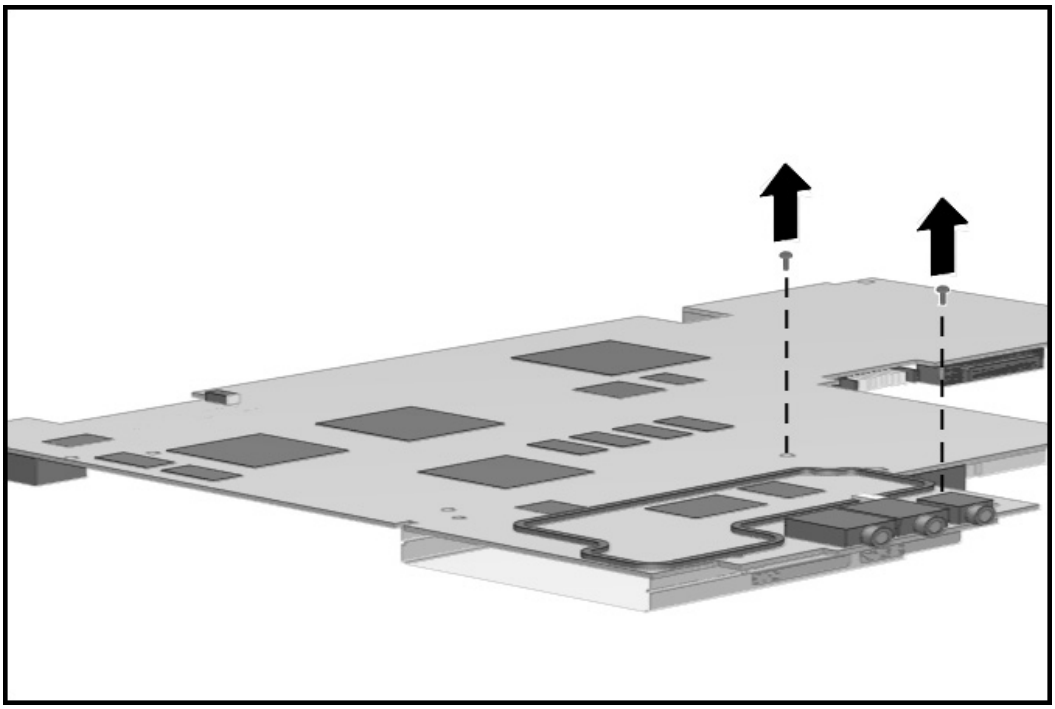


Figure 5-56. Removing the PCMCIA Retaining Screws

14. Turn the system board top side up and rotate the PCMCIA assembly until it clears the system board.

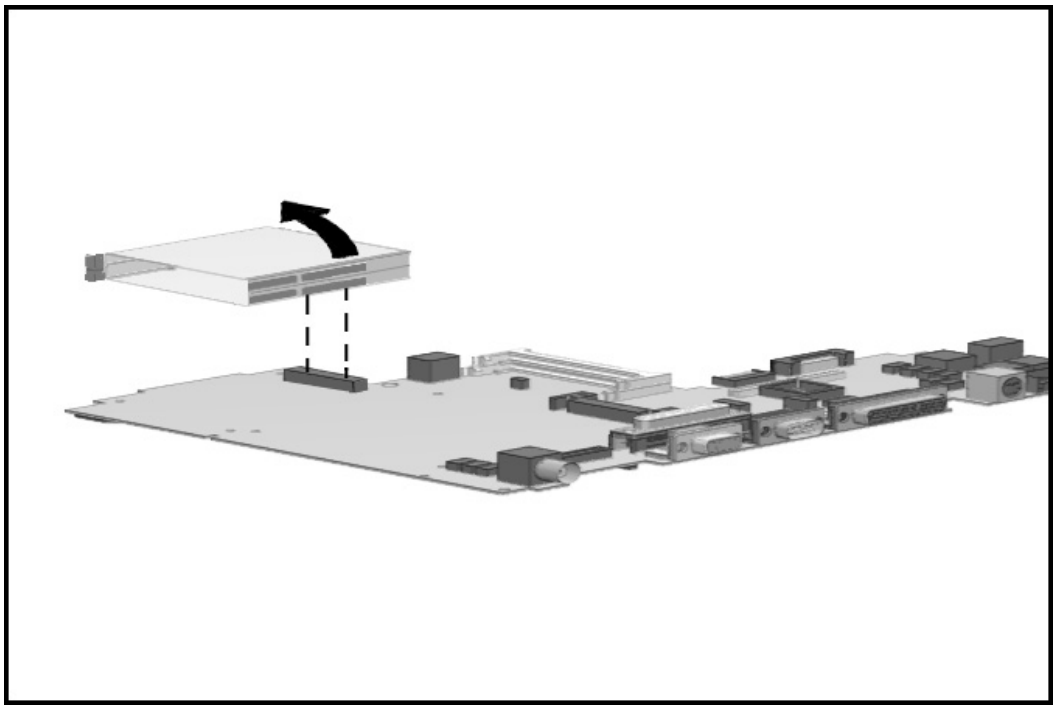


Figure 5-57. Removing the PCMCIA Assembly from the System Board

To reinstall the PCMCIA assembly, reverse the procedure.

5.9.6 PCMCIA Ejector Buttons

To remove the PCMCIA ejector buttons, complete the following procedures:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base, if necessary (Section 5.3.2).
3. Remove all battery packs (Section 5.3.3).
4. Remove the pointing device (Section 5.3.5).
5. Remove the hard drive (Section 5.3.6).
6. Remove the CPU cover/keyboard assembly (Section 5.5.6).

7. Rotate the upper PCMCIA button upwards ❶ to remove it from the push rod.
8. Rotate the lower PCMCIA button upwards ❷ to remove it from the push rod.

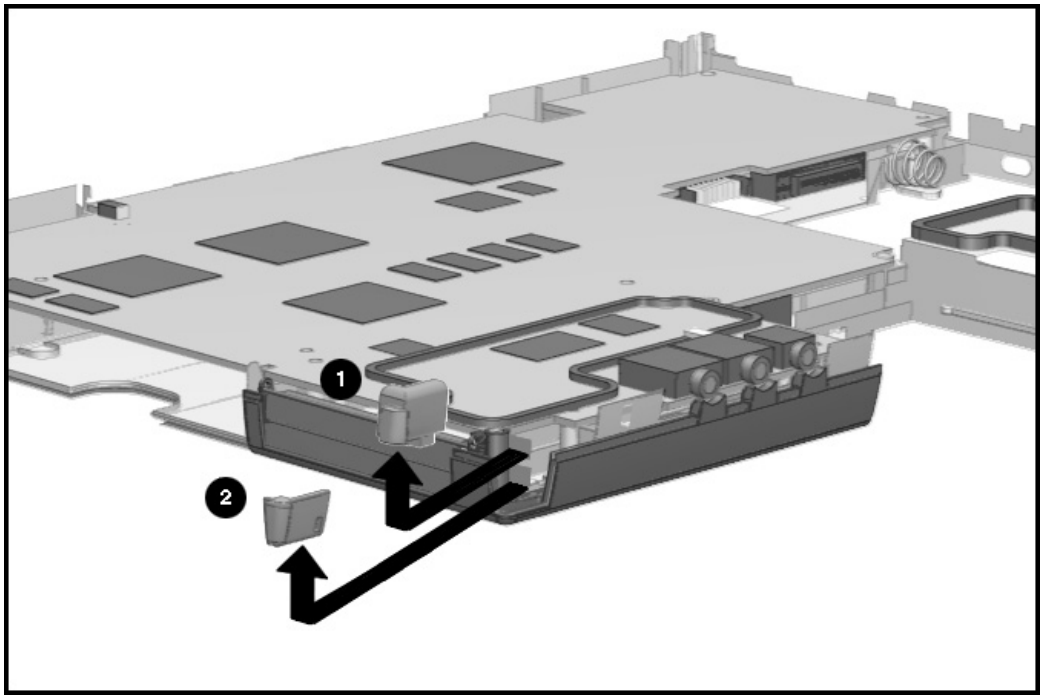


Figure 5-58. Removing the PCMCIA Ejector Button

To install the PCMCIA ejector buttons, reverse the procedure.

5.9.7 Display Ground Bracket

To remove the display ground bracket, complete the following procedures:

1. Disconnect the AC power and any external devices (Section 5.3.1).
2. Undock the computer from the auxiliary base, if necessary (Section 5.3.2).
3. Remove all battery packs (Section 5.4.3).
4. Remove the pointing device (Section 5.3.5).
5. Remove the hard drive. (Section 5.3.6).
6. Remove the CPU base cover (Section 5.5.4).
7. Remove the processor shield and the processor (Section 5.5.5).
8. Remove the CPU cover/keyboard assembly (Section 5.5.6).
9. Remove the display assembly (Section 5.6).
10. Remove the clutch cover (Section 5.7.1).
11. Remove the clutches (Section 5.7.2).
12. Remove the system board (Section 5.8.1).

13. Unclip the display ground bracket from the magnesium frame.

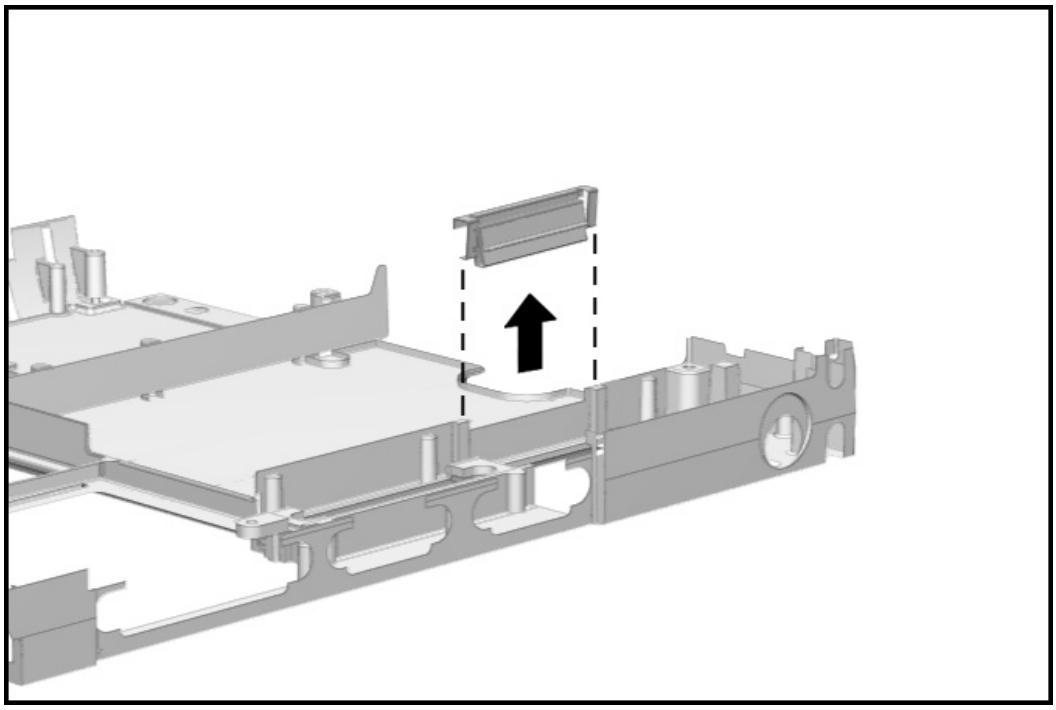


Figure 5-59. Removing the Display Ground Bracket

To install the display ground bracket, reverse the procedure.

Chapter 6

Specifications

This chapter provides physical and performance specifications for the following:

- Computer
- Displays
- Hard drives
- Diskette drive
- CD-ROM drive
- Battery packs
- MCD Expansion Unit
- External power sources

The chapter also includes:

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

6.1 Computer

Table 6-1
Computer

	U.S.	Metric
Dimensions		
Height	**1.49 in**	**37.85 mm**
Depth	**10.20 in**	**259.48 mm**
Width	**11.40 in**	**289.56 mm**
Weight: 4100		
With battery handle	**5.95 lbs**	**2.70 kg**
Without battery handle	**4.94 lbs**	**2.24 kg**
Weight: 4200		
With battery handle	**6.23 lbs**	**2.83 kg**
Without battery handle	**4.94 lbs**	**2.24 kg**
Standalone (Battery) Power Requirments		
Nominal Operating Voltage	**14.2 VDC**	**14.2 VDC**
Maximum Operating Power	**35.0 W**	**35.0 W**
Peak Operating Power	**40.0 W**	**40.0 W**
AC Adapter Power Requirements		
Operating Voltage	**100 to 240 VAC RMS**	**100 to 240 VAC RMS**
Operating Current	**1.10 A RMS**	**1.10 A RMS**
Operating Frequency Range	**50 to 60 Hz AC**	**50 to 60 Hz AC**
Maximum Transient	**4/50 kV**	**4/50 kV**
Automobile Adapter DC Input Requirements		
Operating Voltage	**11 to 16 VDC**	**11 to 16 VDC**
Operating Power	**85.0 W**	**85.0 W**
Temperature		
Operating	**5 to 95°F**	**10 to 35°C**
Nonoperating	**-4 to 140°F**	**-20 to 60°C**
Relative Humidity (noncondensing)		
Operating	**10 to 90%**	**10 to 90%**
Nonoperating *(t_W = 38.7°C max)*	**5 to 95%**	**5 to 95%**
Altitude		
Operating	**0 to 10,000 ft**	**0 to 3.15 km**
Nonoperating	**0 to 30,000 ft**	**0 to 9.14 km**
Shock		
Operating	**10 G, 11 ms, half sine**	
Non operating	**60 G, 11 ms, half sine**	
Vibration		
Operating	**0.25 G, 5-500 Oct/Min sweep rate**	
Nonoperating	**1.00 G, 5-500 Oct/Min sweep rate**	

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

6.2 Displays

Table 6-2
12.1-Inch CSTN, SVGA Display

	U.S.	Metric
Dimensions		
Height	6.3 in	158.38 mm
Width	8.4	211.18 mm
Number of Colors	256	
Contrast Ratio	20:1	
Brightness	70 CD/M^2 @ 4.0 mA	
Pixel Resolution		
Pitch	0.264 × 0.264 mm	
Format	800 × 600	
Configuration	RGB Stripe	
Backlight	Edge Lit	
Character Display	80 × 25	
Total Power Consumption	3.4 W	

Table 6-3
12.1-Inch CTFT, SVGA Display

	U.S.	Metric
Dimensions		
Height	6.3 in	16.0 cm mm
Width	8.4	21.3cm mm
Number of Colors	256	
Contrast Ratio	100:1	
Brightness	70 CD/M^2 @ 4.0 mA	
Pixel Resolution		
Pitch	0.264 × 0.264 mm	
Format	800 × 600	
Configuration	RGB Stripe	
Backlight	Edge Lit	
Character Display	80 × 25	
Total Power Consumption	3.4 W	

Table 6-4
11.8-Inch CTFT, SVGA Display

	U.S.	Metric
Dimensions		
Height	**7.05 in**	**179.1 mm**
Width	**9.40 in**	**238.8 mm**
Number of Colors	**262 K**	
Contrast Ratio	**100:1**	
Brightness	**70 CD/M^2 @ 4.0 mA**	
Pixel Resolution		
Pitch	**0.29 × 0.29 mm**	
Format	**800 × 600**	
Configuration	**RGB Stripe**	
Backlight	**Edge Lit**	
Character Display	**80 × 25**	
Total Power Consumption	**3.2 W**	

Table 6-5
11.3-Inch CSTN, SVGA Display

	U.S.	Metric
Dimensions		
Height	**6.77 in**	**171.88 mm**
Width	**9.02 in**	**229.18 mm**
Number of Colors	**262 M**	
Contrast Ratio	**22:1**	
Brightness	**70 CD/M^2 @ 4.3 mA**	
Pixel Resolution		
Pitch	**0.29 x 0.29 mm**	
Format	**800 x 600**	
Configuration	**RGB Stripe**	
Backlight	**Edge Lit**	
Character Display	**80 × 25**	
Total Power Consumption	**3.7 W**	

Table 6-6
10.4-Inch CSTN, SVGA Display

	U.S.	Metric
Dimensions		
Height	**6.24 in**	**158.38 mm**
Width	**8.31 in**	**211.18 mm**
Number of Colors	**262 K**	
Contrast Ratio	**20:1**	
Brightness	**70 CD/M^2 @ 4.0 mA**	
Pixel Resolution		
Pitch	**0.264 × 0.264 mm**	
Format	**800 × 600**	
Configuration	**RGB Stripe**	
Backlight	**Edge Lit**	
Character Display	**80 × 25**	
Total Power Consumption	**3.4 W**	

6.3 Hard Drives

Table 6-7

Standard Model Configurations	3-GB	4-GB
Formatted Capacity per Drive (MB)		
Physical	**3250.7**	**4114.0**
Logical	**3251.4**	**4099.8**
Drive Type		
Drive Height		
With drive frame (mm)	**12.7**	**12.7**
Drive Size		
Inches	**4.0x2.740x0.5**	**4.0x2.740x0.5**
Millimeters	**100x70x12.7**	**100x70x12.7**
Transfer Rate		
Media (Mb/s)	**39.6 to 71.5**	**51.7 to 83.4**
Interface (Mb/s)	**16.6**	**16.6**
Sector Interleave	1:1	1:1
Typical Seek Time (Including setting)		
Single Track (ms)	**2.5**	**4.0**
Average (ms)	**13.0**	**13.0**
Full Stroke (ms)	**23.0**	**23.0**
Disk Rotational Speed (RPM)	4000	4000
Physical Configuration		
Cylinders	**6371**	**6975**
Data Heads	**6**	**6**
Sectors/Track	**117 to 216**	**144 to 240**
Logical Configuration		
Cylinders	**6300**	**7944**
Heads	**16**	**16**
Sectors per Track	**63**	**63**
Buffers Size (KB)		

Continued

Table 6-7 Continued

Standard Model Configurations	*1.4 GB*	*1.6-GB*	*2-GB*
Formatted Capacity per Drive (MB)			
Physical	**1443.0**	**1632.1**	**2167.6**
Logical	**1443.0**	**1631.1**	**2167.6**
Drive Type	**65 (soft)**	**65**	**65 (soft)**
Drive Height			
With drive frame (mm)	**12.7**	**12.49**	**12.7**
Drive Size			
Inches	**2.5x0.5**	**3.9x2.7**	**2.5x0.5**
Millimeters	**102x75**	**100x69.8**	**102x75**	
Transfer Rate			
Media (Mb/s)	**61.8 to 39.5**	**61.8 to 39.5**	**61.6 to 39.1**
Interface (Mb/s)	**16.67 MB**	**16.67 MB**	**16.67 MB**
Sector Interleave			
Typical Seek Time (Including setting)			
Single Track (ms)	**4.0**	**4.0**	**4.0**
Average (ms)	**13.0**	**12.0**	**13.0**
Full Stroke (ms)	**23.0**	**23.0**	**23.0**
Disk Rotational Speed (RPM)	**4009**	**4009**	**4006**
Physical Configuration			
Cylinders	**4975**	**5159**	**4975**
Data Heads	**4**	**4**	**6**
Sectors/Track	**180-110**	**108-198**	**180-110**
Logical Configuration			
Cylinders	**2796**	**3163**	**4200**
Heads	**16**	**16**	**16**
Sectors per Track	**63**	**63**	**63**
Buffers Size (KB)	**96 KB**	**96 KB**	**96 KB**

Continued

Table 6-7 Continued

Standard Model Configurations	630-MB	810-MB	1.08-GB
Formatted Capacity per Drive (MB)			
Physical	631.7	815.9	1088.1
Logical	630.6	814.3	1085.8
Drive Type	65	65	65
Drive Height			
With drive frame (mm)	12.7	12.7	12.7
Drive Size			
Inches	2.5 x 0.5	2.5 x 0.5	2.5 × 0.5
Millimeters	102 x 75	102 x 75	102 × 75
Transfer Rate			
Media (Mb/s)	23.7 to 39.05	27.4 to 54.0	27.4 to 54.0
Interface (Mb/s)	16.6	16.6	16.6
Sector Interleave	1:1	1:1	1:1
Typical Seek Time (Including setting)			
Single Track (ms)	6	4	4
Average (ms)	18	15	15
Full Stroke (ms)	28	24	24
Disk Rotational Speed (RPM)	3968	3634	3634
Physical Configuration			
Cylinders	3302	3915	3915
Data Heads	2	5	6
Sectors/Track	67-115	90-180	90-180
Bytes/Sector	512	512	512
Logical Configuration			
Cylinders	1222	1581	2108
Heads	16	16	16
Sectors per Track	63	63	63
Bytes per Sector	512	512	512
Buffers Size (KB)	120	128	128

6.4 Diskette Drive

Table 6-8

Diskette size	**3.5-inch**
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 Drives

Table 6-9
20X Max CD-ROM Drive

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-WO (fixed/variable packets)** **Photo CD (singlemultisession)**
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	**0.13 ± 0.1 mw**
Type	**Semiconductor Laser GaA1As**
Wave Length	**780 nm ± 25 nm**
Access time	
Random	**<150 ms**
Full Stroke	**<600 ms**
Audio output level	
Line Out	**0.7 Vrms**
Headphone	**None**
Cache buffer	**256 KB**
Data transfer rate	
Sustained, quad	**300 MB/sec**
Sustained, single	**150 KB/sec**
Burst	**8.3 MB/sec**
Startup Time	**<10 seconds typical**
Capacity	
Mode 1, 12 cm	**550 MB**
Mode 2, 12 cm	**640 MB**
8 cm	**180 MB**

Table 6-10
8 X CD-ROM Drive Table

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-WO (fixed/variable packets)** **Photo CD (singlemultisession)**
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	**<300 ms**
Full Stroke	**<700 ms**
Audio output level	
Line Out	**0.7 Vrms**
Headphone	**None**
Cache buffer	**128 KB**
Data transfer rate	
Sustained, 8x	**1.2 MB/sec**
Sustained, single	**150 KB/sec**
Burst	**8.3 MB/sec**
Startup Time	**<10 seconds typical**
Capacity	
Mode 1, 12 cm	**550 MB**
Mode 2, 12 cm	**640 MB**
8 cm	**180 MB**

Table 6-11
4X CD-ROM Drive

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-WO (fixed/variable packets)** **Photo CD (singlemultisession)**
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, quad	**600 KB/sec**
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 Battery Packs

Table 6-12
Lithium Ion Modular Battery Pack

	U.S.	Metric
Dimensions		
Height	**0.77 in**	**19.6 mm**
Length	**5.34 in**	**135.6 mm**
Width	**4.35 in**	**110.0 mm**
Weight	**0.88 lb**	**399 g**
Electrical		
Voltage	**14.4 V**	
Amp-hour capacity	**2.6 Ah**	
Watt-hour capacity	**40.0 Wh**	
Environmental Requirements		
Operating temperatures	**50°F to 104°F**	**10°C to 40°C**
Nonoperating temperatures	**-12°F to 140°F**	**-30°C to 60°C**

Table 6-13
Lithium Ion Handle Battery Pack

	U.S.	Metric
Dimensions		
Height	**0.89 in**	**15.2 mm**
Length	**11.00 in**	**279.0 mm**
Width	**1.53 in**	**38.8 mm**
Weight	**0.88 lb**	**399 g**
Electrical		
Voltage	**14.4 V**	
Amp-hour capacity	**2.6 Ah**	
Watt-hour capacity	**40 Wh**	
Environmental Requirements		
Operating temperatures	**50°F to 104°F**	**10°C to 40°C**
Nonoperating temperatures	**-12°F to 140°F**	**-30°C to 60°C**

6.7 Mobile CD Expansion Unit

Table 6-14
MCD Expansion Unit

	U.S.	Metric
Dimensions		
Height	0.96 in	2.43 cm
Depth	8.95 in	2.27 cm
Width	11.69 in	29.70 cm
Weight		
Expansion Base	2.0 lb	0.91 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
Nonoperating	-4 to 140°F	-20 to 60°C
Relative Humidity		
Operating	20 to 80%	
Nonoperating	5 to 90%	
Altitude		
Operating	10,000 ft	3.15 km
Nonoperating	30,000 ft	9.14 km
Shock		
Operating	5 G, 11 ms, half sine	
Nonoperating	140 G, 2 ms, half sine	
Vibration		
Operating	0.25 G, 5 to 500 Hz, 0.5 octave/min sweep rate	
Nonoperating	0.75 G, 5 to 500 Hz, 0.5 octave/min sweep rate	

The MCD Expansion Unit is designed in accordance with ANSI specifications (no. X3.131-1993, Rev 10h) and IEEE 802.3 specifications.

6.8 External Power Supplies

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

Table 6-15
Automobile 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	**39.4 in**	**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**	
Power Supply (Output)		
Nominal Voltage	**120 VAC**	
Load Regulated Voltage	**108 - 125 VAC**	
Line Regulated Voltage	**105 to 125 VAC**	
Output Frequency	**60 Hz +/- 3 Hz**	
Output Overload Protection	**150W @ 2 sec.**	
Temperature		
Operating	**32 to 104°F**	**0 to 40°C**
Nonoperating	**-4 to 140°F**	**-20 to 60°C**
Relative Humidity		
Operating	**10 to 90%**	
Nonoperating	**5 to 95%**	

The AC Adapter allows the computer to be used without batteries in an office environment.

Table 6-14
AC Adapter

	U.S.	Metric
Dimensions		
Height	**1.42 in**	**36 mm**
Width	**2.83 in**	**72 mm**
Length	**4.69 in**	**119 mm**
Weight	**0.66 lbs**	**300 gm**
Power Supply (Input)		
Nominal Voltage	**120 VAC**	
Current	**<1.11 A**	
Voltage Range	**90 - 265 VAC**	
Input Frequency	**47 to 63 Hz**	
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**
Nonoperating	**-4 to 185°F**	**-20 to 85°C**
Relative Humidity		
Operating	**10 to 95%**	
Nonoperating	**10 to 95%**	

The external battery charger controls the output voltage generated by the AC adapter.

Table 6-17
External Battery Charger

	U.S.	Metric
Dimensions		
Height	2.1 in	52.4 mm
Width	5.5 in	140 mm
Length	5.9 in	150 mm
Weight	0.49 lb	222 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
Nonoperating	-4 to 185°F	-20 to +85°C
Relative Humidity		
Operating	10 to 95%	
Nonoperating	10 to 95%	

6.9 System Interrupts

Table 6-18

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 audio or PCMCIA controller
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
IRQA	EPP parallel port

6.10 System DMA

Table 6-19

Hardware DMA	System Function
DMA 0/A (mappable)	Audio controller
DMA 1/B	PCMCIA controller
DMA 2	Diskette drive controller
DMA 3	EPP parallel port
DMA 4	Not assigned
DMA 5	PCMCIA controller
DMA 6	Not assigned
DMA 7	Not assigned

NOTE: PC Card controller can use DMA 1, 2, or 5.

6.11 System I/O Address

Table 6-20

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 6-4 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 6-15

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")

Connector Pin Assignments

This appendix contains the pin assignments for all external connectors.

Table A-1
External Keyboard

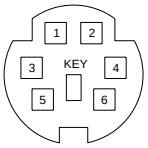
Connector	Pin	Signal
	1	Data
	2	Unused
	3	Ground
	4	+5 VDC
	5	Clock
	6	Unused

Table A-2
PS/2-Compatible Mouse

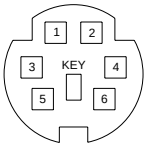
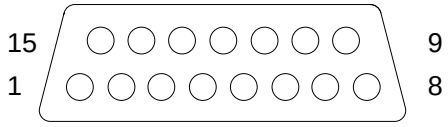
Connector	Pin	Signal
	1	Data
	2	Unused
	3	Ground
	4	+5 VDC
	5	Clock
	6	Unused

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

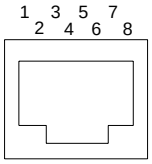
Connector	Pin	Signal
	1	(+) Transmit Data
	2	(-) Transmit Data
	3	(+) Receive Data
	4	Unused
	5	Unused
	6	(-) Receive Data
	7	Unused
	8	Unused

Table A-5
BNC

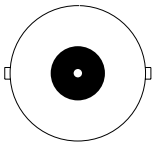
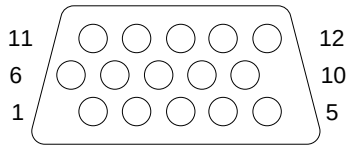
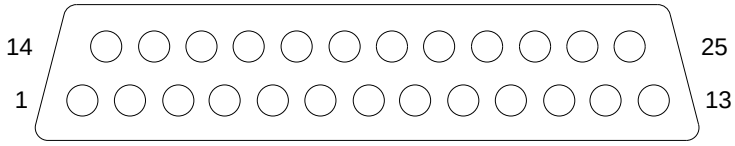
Connector	Pin	Signal
	1 (Inside)	Data
	2 (Outside)	Ground

Table A-6
External Monitor



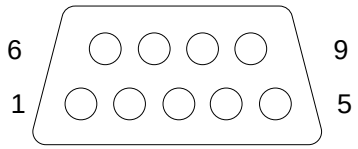
Pin	Signal	Pin	Signal
1	Red Analog	9	Blank
2	Green Analog	10	Ground
3	Blue Analog	11	Blank
4	Blank	12	Monitor ID (DD)
5	Ground	13	Horizontal Sync
6	Ground	14	Vertical Sync
7	Ground	15	Monitor ID (CC)
8	Ground		

Table A-7
Parallel



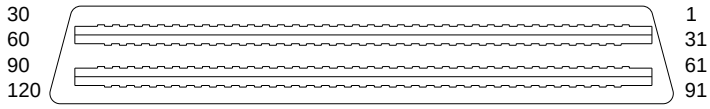
Pin	Signal	Pin	Signal
1	Strobe	14	Auto Linefeed
2	Data Bit 0	15	Error
3	Data Bit 1	16	Initialize Printer
4	Data Bit 2	17	Select In
5	Data Bit 3	18	Ground
6	Data Bit 4	19	Ground
7	Data Bit 5	20	Ground
8	Data Bit 6	21	External Diskette Positive Drive Detect
9	Data Bit 7	22	External Diskette Negative Drive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

Table A-8
Serial



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-9
Expansion Connector



Pin	Signal	Pin	Signal
1	Video - Green Gun	26	Signal Ground
2	Video - Blue Gun	27	Signal Ground
3	Video - Horizontal Sync	28	Audio Signal from CD Drive - Left Channel
4	Video - Vertical Sync	29	MIDI Serial Input
5	Convenience Base ID	30	MIDI Serial Output
6	Convenience Base ID	31	+5V Supply - Off when in Suspend
7	Convenience Base ID	32	Video - Red Gun
8	Convenience Base ID	33	Signal Ground
9	Convenience Base ID	34	Signal Ground
10	Convenience Base ID	35	Signal Ground
11	Convenience Base ID	36	Printer Strobe
12	Convenience Base ID	37	Signal Ground
13	Convenience Base ID	38	Printer Auto-Line Feed
14	Printer Acknowledge	39	IRQ from Convenience Base NIC
15	Printer Busy	40	Printer Error
16	Printer Paper Error	41	Ground
17	Serial Port Receive Data	42	Printer Initialize
18	Serial Port Transmit Data	43	Ground
19	Serial Port Data Set Ready	44	Printer Select In
20	Serial Port Clear to Send	45	Ground
21	External Keyboard Data Line	46	Printer Select
22	External Keyboard Clock Line	47	Serial Port Carrier Detect
23	Game Port - SWA	48	Serial Port Data Terminal Ready
24	Game Port - SWB	49	Serial Port Request to Send
25	MCD Dock	50	Serial Port Ring Indicator

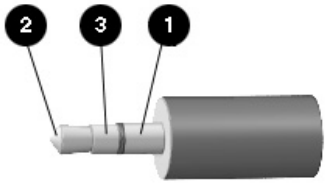
* Active Low

Continued

Table A-9 Continued

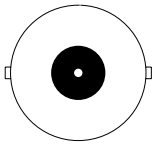
Pin	Signal	Pin	Signal
51	External Mouse Data Line	86	Wavetable RESET
52	External Mouse Clock Line	87	Ground
53	Game Port SWC	88	Battery Voltage Bus
54	Game Port SWD	89	Battery Voltage Bus
55	Select NIC or Printer Port Signals	90	Battery Voltage Bus
56	Ground	91	IDE Data D0
57	Ground	92	IDE Data D1
58	Audio Signal from CD Drive - Right Channel	93	IDE Data D4
59	Battery Voltage Bus	94	IDE Data D5
60	Battery Voltage Bus	95	IDE Data D8
61	Hard drive RESET	96	IDE Data D9
62	+5V Supply - Off when in Suspend	97	IDE Data D12
63	IDE Data D2	98	IDE Data D13
64	IDE Data D3	99	IDE Data D15
65	IDE Data D6	100	IDE Write Strobe
66	IDE Data D7	101	IDE Hard Drive Channel Ready
67	IDE Data D10	102	IDE IRQ14
68	IDE Data D11	103	IDE IO16
69	IDE Data D14	104	IDE Address A0
70	Ground	105	IDE Address A2
71	IDE Read Strobe	106	IDE Diagnostics
72	Ground	107	IDE ChipSelect 1
73	Port 84 Select	108	IDE Acknowledge
74	Ground	109	Ground
75	IDE Address A1	110	Game Port TB
76	Ground	111	Game Port TD
77	IDE ChipSelect 3	112	Game Port TC
78	Ground	113	External Audio Present
79	Ground	114	I^2C Clock Line
80	Ground	115	I^2C Data Line
81	Game Port - TA	116	Audio Output Signal - Right Channel
82	Ground	117	External Audio Right Ground
83	Master Battery Signal for Battery Protocol	118	Audio Output Signal - Left Channel
84	Wavetable Clock Signal	119	External Audio Left Ground
85	Wavetable Serial Data	120	Ground

Table A-10
Speaker Connector



Pin	Signal
1	**Shield**
2	**Phone** Jack #1
3	**Phone** Jack #**2**

Table A-11
NTSC/PAL Connector

Connector	Pin	Signal
	1 (**Inside**)	**+5 VDC**
	2 (**Outside**)	**Ground**

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 90 to 264 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 6.00 feet (1.8 m) and a maximum of 9.75 feet (3.0 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 2.5A 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 AC Adapter.

Country-Specific Requirements

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.

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