COMPAQ

# Maintenance & Service Guide

Compaq Deskpro EN Series
of Personal Computers

Small Form Factor Models

COMPAQ

# Addendum #1 to Deskpro EN Maintenance & Service Guide

Compaq Deskpro EN Series of Personal Computers

Small Form Factor

**Part number 201579-002**

**Spare part number 201844-001**

## The complete MSG follows this addendum.

## This addendum contains changes to the original document.

## Spare Part Numbers

*Front Trim #219816-001*

| Description | Spare Part Number | Warranty Tier |
|---|---|---|
| Front trim (below front bezel) (167113-002) Use only with system board 217056-001 without onboard audio | 219816-001 | D |
| System board without onboard audio (011035-101) | 217056-001 | B |
| Intel Celeron Processor | | |
| 566 MHz/66 MHz with heatsink and retainer clip | 203967-001 | B |
| Graphics Controller | | |
| nVIDIA TNT2 PRO, 16-MB SGRAM | 179997-001 | A |
| 10-GB Ultra ATA hard drive, 5400 RPM, Quiet Drive | 203139-001 | B |

System board 217056-001 does not support front-mounted audio. Computers with this board installed will not have a speaker mounted in the chassis but will have a piezo speaker mounted on the system board that supports diagnostic beeps.

## Specifications – Graphics Controller

| nVIDIA TNT2 Pro Graphics Controller | | | |
|---|---|---|---|
| **Resolution** | **Real-Time 3D Shading** | **Refresh Rate/Display** | |
| | | **Vertical** | **Horizontal** |
| 640 x 480 | 256, 65K, 16.7M | 60 – 200 Hz | 31 – 102 kHz |
| 800 x 600 | 256, 65K, 16.7M | 60 – 200 Hz | 38 – 114 kHz |
| 1024 x 768 | 256, 65K, 16.7M | 60 – 140 Hz | 48 –113 kHz |
| 1152 x 864 | 256, 65K | 60 – 120 Hz | 54 – 110 kHz |
| 1280 x 1024 | 256, 65K | 60 – 100 Hz | 64 – 107 kHz |
| 1600 x 1200 | 256 | 60 – 90 Hz | 75 – 113 kHz |
| 1800 x 1440 | 65K | 60 – 70 Hz | 89 – 1 04 kHz |
| 1920 x 1080 | 256 | 60 – 80 Hz | 70 – 94 kHz |
| 1920 x 1200 | 256, 65K | 60 – 76 Hz | 75 – 95 kHz |

## Service Notes

**WARNING:** Removing the heatsink from the processor destroys the integrity of the thermal interface pad between the two parts. Whenever the heatsink is removed from the processor, the old thermal interface must be completely removed and a new one installed in its place.

Before installing a heatsink, prepare for its installation by doing one of the following:

- New heatsink: if the heatsink has a thermal interface attached to its bottom, peel off the protective paper before installing the heatsink.
- Reinstalled heatsink: Note where the thermal interface is located on the heatsink. Carefully remove the thermal interface pad and all residue from the heatsink surface. If any thermal interface remains on the die of the processor, scrape it off with your fingernail. A Q-Tip dipped in alcohol can be used to clean both surfaces. Add thermal interface pad to the bottom of the heatsink before reinstalling the original heatsink to insure an efficient thermal interface.

**CAUTION:** Thermal interface heat transmission is reduced if residue remains on the heatsink or the heatsink thermal interface surface is scratched. This could lead to the processor running at a higher than normal temperature, fan turning at a higher than normal speed, and possible loss of data if processor shuts down from overheating. Installing the heatsink assembly backwards will cause the processor to overheat, since the aluminum core will only make partial contact with the processor die.

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Small Form Factor Models

# Notice

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Printed in the U.S.A.



## *Maintenance & Service Guide*

**Compaq Deskpro EN Series of Personal Computers**

**Small Form Factor Models**

Second Edition (September 2000)
First Edition (June 2000)
Part Number 201579-002
Spare Part Number 201844-001

**Compaq Computer Corporation**

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# *preface*

# ABOUT THIS GUIDE

This *Maintenance & Service Guide* is a troubleshooting and repair guide that can be used for reference when servicing the Compaq *Deskpro EN Series of Personal Computers*. Only authorized technicians trained by Compaq should attempt to repair this equipment.

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

## Symbols and Conventions

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

**WARNING**: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

**CAUTION:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of data.

Text set off in this manner presents commentary, sidelights, clarifying information, or specific instructions.

## 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 indications of component replacement or printed wiring board modifications may void any warranty.

**WARNING:** To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
- Disconnect the power from the computer by unplugging the power cord either from the electrical outlet or the computer.

**CAUTION:** To properly ventilate your system, you must provide at least 3 inches (7.6 cm) of clearance at the front and back of the computer.

## Locating Additional Information

The following documentation is available to support these products:

- User Documentation
- Technical Training Guides
- Compaq Service Advisories and Bulletins
- Compaq QuickFind
- *Technical Reference Guide*
- *Compaq Quick Reference Guide*
- *Compaq Service Reference Guide*
- *Compaq Quick Troubleshooting Guide*

*chapter* 1

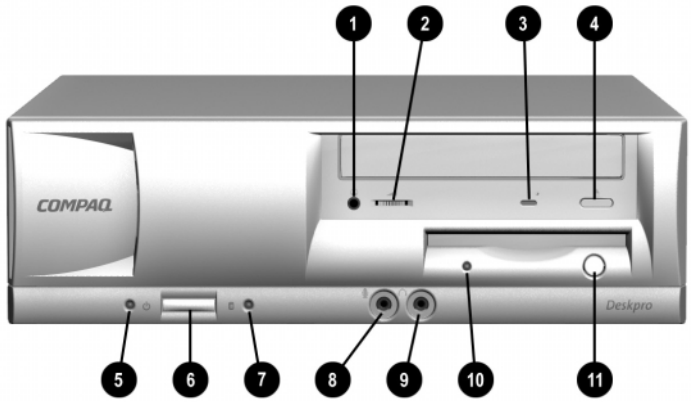
# PRODUCT DESCRIPTION

This chapter describes the features of the Compaq Deskpro EN Small Form Factor Series of Personal Computers.

## 1.1 Product Features

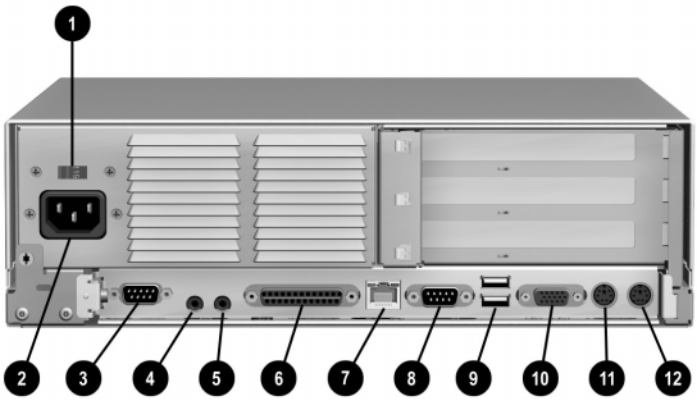
The Small Form Factor models ship with a mouse and keyboard. A Compaq color monitor or other compatible monitor, which is also required to operate the computer, must be purchased separately.

### 1.1.1 Front Panel Controls and LEDs




❶ Stereo Headphone Jack
❷ CD-ROM Drive Volume Control
❸ CD-ROM Drive Busy Indicator
❹ CD-ROM Drive Eject Button
❺ Power-On Light
❻ Power Button
❼ Drive Activity Light
❽ Microphone Jack
❾ Headphone Jack
❿ Diskette Drive Activity Light
⓫ Diskette Eject Button

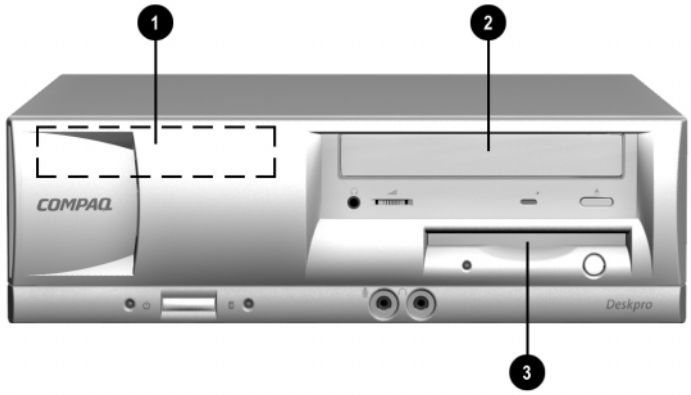
## 1.1.2 Rear Panel Connectors




❶ Voltage Select Switch (115V/230V)
❷ Power Cord Connector
❸ Serial Connector
❹ Audio Line Out Connector
❺ Audio Line In Connector
❻ Parallel Connector
❼ Ethernet RJ-45 Connector
❽ Serial Connector
❾ Double-stacked USB Connectors
❿ Monitor Connector
⓫ Keyboard Connector
⓬ Mouse Connector

Connectors include icons for ease of identification.

### 1.1.3 Drive Positions




❶ 3.5-inch, internal, third-height, standard hard drive bay

❷ 5.25-inch drive bay for optional drives

❸ 3.5-inch, third-height, standard, 1.44-MB diskette drive

To verify the type, size, and capacity of the mass storage devices installed in the computer, run the F10 setup utility available at computer startup.

## 1.2 Serial Number Location

Provide the computer serial number to Compaq when requesting information or ordering spare parts. The serial number is displayed on the top of the computer cover at the right front corner and also on the side near the back of the computer.

## 1.3 Locating Additional Information

The following documentation is available to support these products:

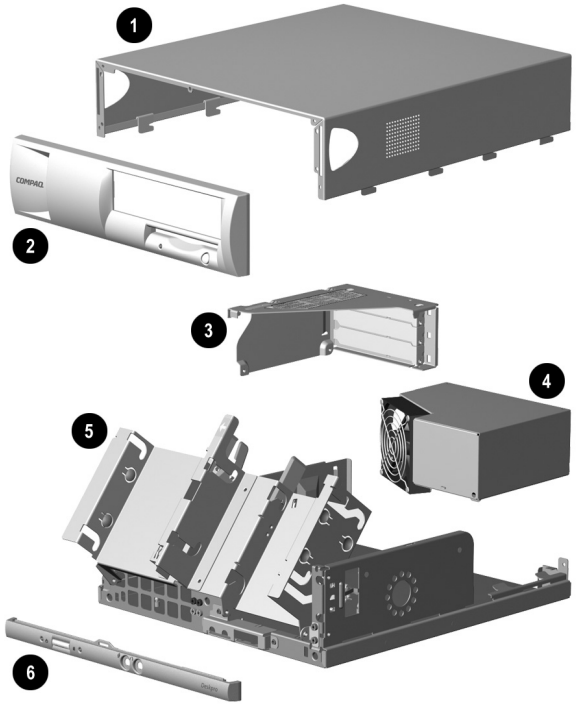
- User Documentation
- Technical Training Guides
- Compaq Service Advisories and Bulletins
- Compaq QuickFind
- *Technical Reference Guide*
- *Compaq Quick Reference Guide*
- *Compaq Service Reference Guide*
- *Compaq Quick Troubleshooting Guide*

*chapter* 2

# SPARE PARTS

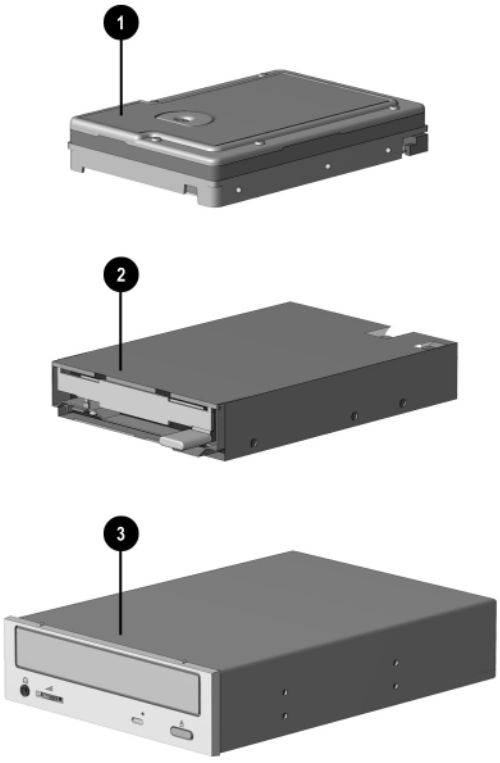
This chapter provides an illustrated parts breakdown and a reference for spare parts for the Small Form Factor models.

## 2.1 System Unit




| | Description | Spare Part Number | Warranty Tier |
|---|---|---|---|
| 1 | Computer cover | 226774-001 | |
| 2 | Front bezel | 201488-001 | D |
| 3 | Expansion card cage | Not spared | |
| 4 | Power supply, 120 W | 176763-001 | B |
| 5 | Chassis assembly, including drive cage | Not spared | |
| 6 | Front trim | 201487-001 | D |

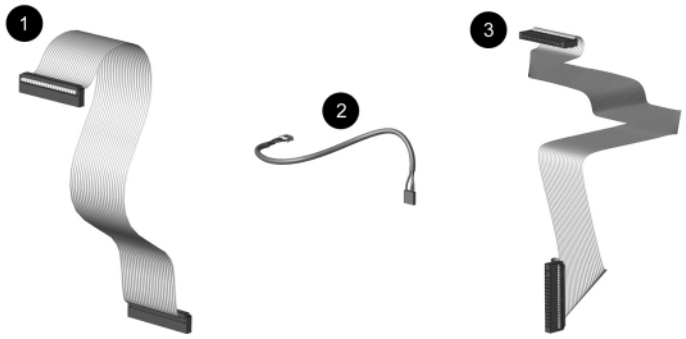
## 2.2 Mass Storage Devices




| | Description | Spare Part Number | Warranty Tier |
|---|---|---|---|
| 1 | 10.0-GB Ultra ATA Hard drive 66/7200 RPM | 135364-001 | B |
| * | 15.0-GB Ultra ATA Hard drive 66/7200 RPM | 192060-001 | B |
| 2 | 3.5-inch, 1.44-MB diskette drive | 191714-001 | B |
| 3 | 48X Max IDE CD-ROM drive, opal | 187263-001 | B |

*Not shown.

## 2.3 Cables

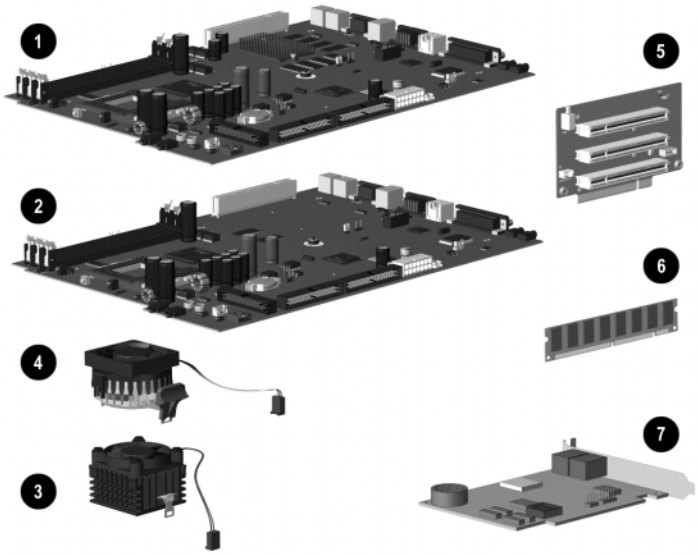



| Description | | Spare Part Number | Warranty Tier |
|---|---|---|---|
| Cable kit, includes: | | 201486-001 | D |
| 1 | Diskette drive data cable, 8.5" (168999-001) | | |
| 2 | CD-ROM audio cable, 12" (387527-001) | | |
| 3 | Hard drive data cable, 18" (108950-016) | | |
| * | Solenoid cable (174311-001) | | |
| * | CD-ROM data cable, 18" (108950-017) | | |

| | | | |
|---|---|---|---|
| Cable kit, includes: | | 192263-001 | D |
| * | CD-ROM data cable, 18" (108950-017) | | |
| * | CD-ROM audio cable, 12" (387527-002) | | |

*Not shown.

## 2.4 Standard and Optional Boards




| Description | | Spare Part Number | Warranty Tier |
|---|---|---|---|
| 1 | System board, including 16 MB integrated AGP graphics | 187499-001 | B |
| 2 | System board, including 4 MB integrated graphics | 187500-001 | B |
| | Intel Pentium III Microprocessor | | |
| 3 | 600/66 MHz, includes fansink assy (174989-002) (use with system board 187500-001 only) | 194972-001 | B |
| 3 | 667/133 MHz, includes fansink assy (174989-002) (use with system board 187500-001 only) | 194973-001 | B |
| 3 | 733/133 MHz, includes fansink assy (174989-002) (use with system board 187499-001 and 187500-001) | 194974-001 | B |
| 3 | 800/133 MHz, includes fansink assy (174989-002) (use with system board 187499-001 and 187500-001) | 194975-001 | B |
| 4 | 866/133 MHz, includes fansink assy (200478-001) (use with system board 187499-001 and 187500-001) | 194976-001 | B |
| 4 | 933/133 MHz, includes fansink assy (200478-001) (use with system board 187499-001 only) | 201490-001 | B |
| 5 | Riser Board | 171489-001 | B |
| | Memory Module (SDIMM, SDRAM, 133MHz) | | |
| 6 | 64 MB | 170080-001 | B |
| * | 128 MB | 170081-001 | B |
| * | 256 MB | 192014-001 | B |
| 7 | Modem, 56K, PCI | 157071-B21 | B |

*Not shown.

## 2.5 Keyboards

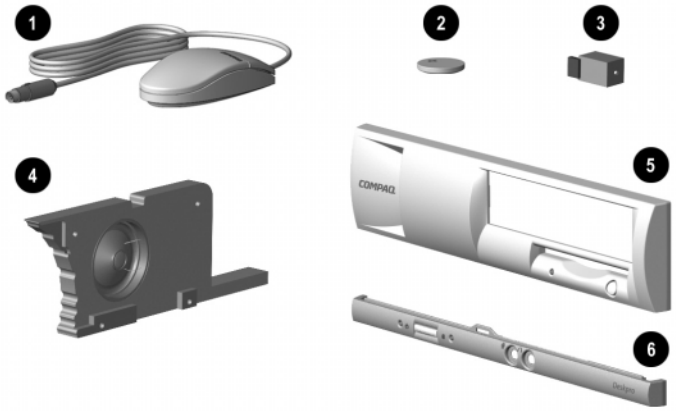
| | Description | Spare Part Number | Warranty Tier |
|---|---|---|---|
| * | Easy Access Keyboard-US | 123130-xxx | D |
| * | USB Easy Access Keyboard-US | 173304-xxx | D |
| * | Enhanced, Smart Card-US | 125761-xxx | D |
| * | Basic, Smart Card-US | 125790-xxx | D |
| * | Spacesaver, Opal | 269513-xxx | D |
| * | Arabic | -171 | |
| * | Belgian | -181 | |
| * | Brazilian | -201 | |
| * | BHCSY (Bosnia-Herzegovina, Croatia, Slovenia, and Yugoslavia) | -B41 | |
| * | Czech | -221 | |
| * | Danish | -081 | |
| * | Dutch/Netherlands | -B31 | |
| * | Finnish | -351 | |
| * | French | -051 | |
| * | French Canadian | -121 | |
| * | German | -041 | |
| * | Greek | -151 | |
| * | Hungarian | -211 | |
| * | Italian | -061 | |
| * | Japanese | -191 | |
| * | Korean (Hanguel) | -AD1 | |
| * | International | -B31 | |
| * | Latin American Spanish | -161 | |
| * | Norwegian | -091 | |
| * | Polish | -B31 | |
| * | Portuguese | -131 | |
| * | Russian | -251 | |
| * | Slovakian | -231 | |
| * | Spanish | -071 | |
| * | Swedish | -101 | |
| * | Swiss | -111 | |
| * | Taiwanese | -AB1 | |
| * | Thai | -281 | |
| * | Turkish | -141 | |
| * | UK | -031 | |
| * | US | -001 | |

*Not shown

## 2.6 Miscellaneous Plastics Kit


| Description | Spare Part Number | Warranty Tier |
|---|---|---|
| Miscellaneous Plastics Kit, includes: | 201489-001 | D |
| 1 Bezel blank (171991-001) | | |
| 2 Foot, rubber (4 ea.) (166939-002) | | |

## 2.7 Miscellaneous Parts




| | Description | Spare Part Number | Warranty Tier |
|---|---|---|---|
| 1 | Two-button mouse | 334689-002 | D |
| 2 | Battery | 153099-001 | D |
| 3 | Solenoid, 2-coil | 201485-001 | B |
| 4 | Speaker | 201273-001 | D |
| 5 | Front bezel | 201488-001 | D |
| 6 | Front trim (below front bezel) | 201487-001 | D |
| * | Tamper Resistant T-15 Wrench | 166527-001 | A |
| * | Tamper Resistant T-15 Bit (5 ea) | 166527-002 | A |

*Not shown.

## 2.8 Shipping Boxes

| Description | Spare Part Number | Warranty Tier |
|---|---|---|
| PC Return kit (shipping box with packing) | 212545-001 | A |

## 2.9 Documentation

| Description | Spare Part Number |
|---|---|
| Documentation | |
| *Maintenance & Service Guide* | 201844-001 |
| *Illustrated Parts Map* | 203723-001 |
| *Compaq Deskpro Service Reference Guide* | 152611-001 |
| *Compaq Quick Troubleshooting Guide* | 153837-001 |

*chapter* 3

# REMOVAL & REPLACEMENT PRELIMINARIES

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

**CAUTION:** When the computer is plugged into an AC power source there is always voltage applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

## 3.1 Electrostatic Discharge Information

A sudden discharge of static electricity from your finger or other conductor can destroy static-sensitive devices or microcircuitry. Often the spark is neither felt nor heard, but damage occurs. An electronic device exposed to electrostatic discharge (ESD) may not be affected at all and can work perfectly throughout a normal cycle. The device 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.

### 3.1.1 Generating Static

The following table shows that:

- Different activities generate different amounts of static electricity.
- Static electricity increases as humidity decreases.

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

*Dual Inline Packaging (DIP) is the packaging around individual microcircuitry. These are then multi-packaged inside plastic tubes, trays, or Styrofoam.

✎ 700 volts can degrade a product.

### 3.1.2 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 to electric components and accessories.

- To avoid hand contact, transport products in static-safe containers such as tubes, bags, or boxes.
- 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.
- Avoid contact with pins, leads, or circuitry.
- Place reusable electrostatic-sensitive parts from assemblies in protective packaging or conductive foam.

### 3.1.3 Personal Grounding Methods and Equipment

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

- **Wrist straps** are flexible straps with a minimum of one-megohm +/- 10% resistance in the ground cords. To provide proper ground, a strap must be worn snug against bare skin. The ground cord must be connected and fit snugly into the banana plug connector on the grounding mat or workstation.
- **Heel straps/Toe straps/Boot straps** can be used at standing workstations and are compatible with most types of shoes or boots. On conductive floors or dissipative floor mats, use them on both feet with a minimum of one-megohm +/- 10% resistance between the operator and ground.

**Static Shielding Protection Levels**

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

### 3.1.4 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, foot 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.
- 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 nonconductive materials such as ordinary plastic assembly aids and Styrofoam.
- Use field service tools, such as cutters, screwdrivers, and vacuums, that are conductive.

### 3.1.5 Recommended Materials and Equipment

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 tabletop workstations with ground cord of one-megohm +/- 10% resistance
- Static-dissipative table or floor mats with hard tie to ground
- Field service kits
- Static awareness labels
- Wrist straps and footwear straps providing one-megohm +/- 10% resistance
- Material handling packages
- Conductive plastic bags
- Conductive plastic tubes
- Conductive tote boxes
- Opaque shielding bags
- Transparent metallized shielding bags
- Transparent shielding tubes

## 3.2 Routine Care

### 3.2.1 General Cleaning Safety Precautions

1. Never use solvents or flammable solutions to clean the computer.
2. Never immerse any parts in water or cleaning solutions; apply any liquids to a clean cloth and then use the cloth on the component.
3. Always turn off the computer when cleaning with liquids or damp cloths.
4. Always turn off the computer before cleaning the keyboard, mouse, or air vents.
5. Disconnect the keyboard before cleaning it.
6. Wear safety glasses equipped with side shields when cleaning the keyboard.

### 3.2.2 Cleaning the Computer Case

Follow all safety precautions in Section 3.2.1 before cleaning the computer.

To clean the computer case, follow the procedures described below:

- To remove light stains or dirt, use plain water with a clean, lint-free cloth or swab.
- For stronger stains, use a mild dishwashing liquid diluted with water. Rinse well by wiping it with a cloth or swab dampened with clear water.
- For stubborn stains, use isopropyl (rubbing) alcohol. No rinsing is needed as the alcohol will evaporate quickly and not leave a residue.
- After cleaning, always wipe the unit with a clean, lint-free cloth.
- Occasionally clean the air vents on the computer. Lint and other foreign matter can block the vents and limit the airflow.

### 3.2.3 Cleaning the Keyboard

Follow all safety precautions in Section 3.2.1 before cleaning the keyboard.

To clean the tops of the keys or the keyboard body, follow the procedures described in Section 3.2.2.

When cleaning debris from under the keys, review all rules in Section 3.2.1 before following these procedures:

**CAUTION:** Use safety glasses equipped with side shields before attempting to clean debris from under the keys.

- Visible debris underneath or between the keys may be removed by vacuuming or shaking.
- Canned, pressurized air may be used to clean debris from under the keys. Caution should be used as too much air pressure can dislodge lubricants applied under the wide keys.
- If you remove a key, use a specially designed key puller to prevent damage to the keys. This tool is available through many electronic supply outlets.

**CAUTION:** Never remove a wide leveled key (like the space bar) from the keyboard. If these keys are improperly removed or installed, the keyboard may not function properly.

- Cleaning under a key may be done with a swab moistened with isopropyl alcohol and squeezed out. Be careful not to wipe away lubricants necessary for proper key functions. Use tweezers to remove any fibers or dirt in confined areas. Allow the parts to air dry before reassembly.

### 3.2.4 Cleaning the Monitor

- Wipe the monitor screen with a clean cloth moistened with water or with a towelette designed for cleaning monitors. Do not use sprays or aerosols directly on the screen, the liquid may seep into the housing and damage a component. Never use solvents or flammable liquids on the monitor.
- To clean the monitor body follow the procedures in Section 3.2.2.

### 3.2.5 Cleaning the Mouse

Before cleaning the mouse, ensure that the power to the computer is turned off.

- Clean the mouse ball by first removing the retaining plate and the ball from the housing. Pull out any debris from the ball socket and wipe the ball with a clean dry cloth before reassembly.
- To clean the mouse body, follow the procedures in 3.2.2.

## 3.3 Service Considerations

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

### 3.3.1 Power Supply Fan

The power supply fan is a variable-speed fan based on the temperature in the power supply.

**CAUTION:** The cooling fan is off **only** when the computer is turned off or the power cable has been disconnected.

The cooling fan is always on in all other instances (when the computer is either in the "On," "Standby," or "Suspend" mode).

You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

### 3.3.2 Tools and Software Requirements

To service the computer, you need the following:

- Torx T-15 screwdriver (Compaq screwdriver with bits PN 161946-001)
- Flat-bladed screwdriver (may sometimes be used in place of the Torx screwdriver)
- Diagnostics software
- Compaq tamper-resistant T-15 wrench (Smart Cover FailSafe Key, PN 166527-001) or Compaq tamper-resistant bits (Smart Cover FailSafe Key, PN 166527-002)

### 3.3.3 Screws

The screws used in the computer are not interchangeable. They may have standard or metric threads and may be of different lengths. If an incorrect screw is used during the reassembly process, it can damage the unit. Compaq strongly recommends that all screws removed during disassembly be kept with the part that was removed, then returned to their proper locations.

✎ As each subassembly is removed from the computer, it should be placed away from the work area to prevent damage.

### 3.3.4 Cables and Connectors

Most cables used throughout the unit are flat, flexible cables. These cables must be handled with care to avoid damage. Apply only the tension required to seat or unseat the cables during insertion or removal from the connector. Handle cables by the connector whenever possible. In all cases, avoid bending or twisting the cables, and ensure that the cables are routed in such a way that they cannot be caught or snagged by parts being removed or replaced.

**CAUTION:** When servicing this computer, ensure that cables are placed in their proper location during the reassembly process. Improper cable placement can damage the computer.

### 3.3.5 Hard Drives

Handle hard drives as delicate precision components, avoiding all physical shock and vibration. This applies to failed drives as well as replacement spares.

- If a drive must be mailed, place the drive in a bubble-pack mailer or other suitable protective packaging and label the package "Fragile: Handle With Care."
- Do not remove hard drives from the shipping package for storage. Keep hard drives in their protective packaging until they are actually mounted in the CPU.
- Avoid dropping drives from any height onto any surface.
- If you are inserting or removing a hard drive, turn off the computer. Do not remove a hard drive while the computer is on or in standby mode.
- Before handling a drive, ensure that you are discharged of static electricity. While handling a drive, avoid touching the connector. For more information about preventing electrostatic damage, refer to Section 3.1, "Electrostatic Discharge."
- Do not use excessive force when inserting a drive.
- Avoid exposing a hard drive to liquids, temperature extremes, or products that have magnetic fields such as monitors or speakers.

### 3.3.6 Lithium Coin Cell Battery

The battery that comes with the computer provides power to the real-time clock and has a minimum lifetime of about three years.

See Chapter 4, "Removal and Replacement Procedures," for instructions on the replacement procedures.

**WARNING:** This computer contains a lithium-ion battery. There is a risk of fire and chemical burn if the battery is handled improperly. Do not disassemble, crush, puncture, short external contacts, dispose in water or fire, or expose it to temperatures higher than 140ºF (60ºC).

**CAUTION:** Batteries, battery packs, and accumulators should not be disposed of together with the general household waste.

*chapter* 4

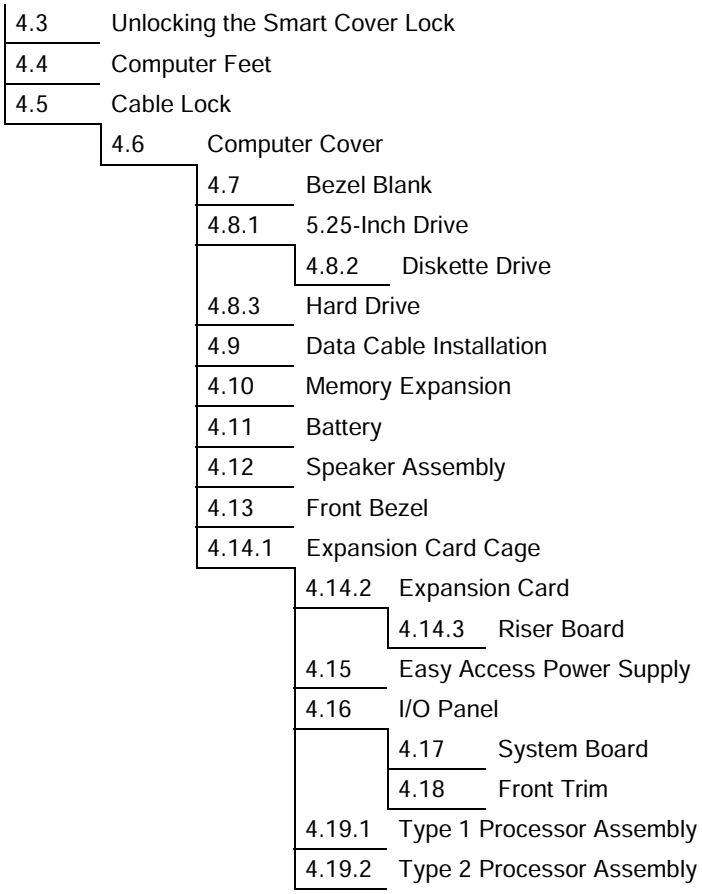
# REMOVAL & REPLACEMENT PROCEDURES

This chapter provides subassembly/module level removal and replacement procedures for the Small Form Factor.

After completing all necessary removal and replacement procedures, run Diagnostics utility to verify that all components operate properly.

**CAUTION:** When the computer is plugged into an AC power source, there is always voltage applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

# 4.1 Disassembly Sequence Chart



## 4.2 Preparation for Disassembly

See Chapter 3, "Removal and Replacement Preliminaries," for initial procedures.

1. Unlock the Smart Cover Lock (Section 4.3).
2. Close any open software applications.
3. Exit Windows.
4. Remove any diskette or compact disc from the computer.
5. Turn off the computer and any peripheral devices that are connected to it.

**CAUTION:** Turn off the computer before disconnecting any cables.

**CAUTION:** When the computer is plugged into an AC power source there is always voltage applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

**CAUTION:** The cooling fan is off **only** when the computer is turned off or the power cable has been disconnected.

The cooling fan is always on in all other instances (when the computer is either in the "On," "Standby," or "Suspend" mode).

You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

6. Disconnect the power cord from the electrical outlet and then from the computer.
7. Disconnect all peripheral device cables from the computer.

During disassembly, label each cable as you remove it, noting its position and routing. Keep all screws with the units removed.

**CAUTION:** The screws used in the computer are of different thread sizes and lengths; using the wrong screw in an application may damage the unit.

## 4.3 Unlocking the Smart Cover Lock

The Smart Cover Lock is a software-controllable cover lock, controlled by the setup password. This lock prevents unauthorized access to the internal components. The computer ships with the Smart Cover Lock in the unlocked position. For more information about locking the Smart Cover Lock, refer to the *Desktop Management* guide.

### Using the Smart Cover FailSafe Key

If you enable the Smart Cover Lock and cannot enter your password to disable the lock, you will need a Smart Cover FailSafe Key (see Section 3.3.2) to open the computer cover. You will need the key in any of the following circumstances:

- Power outage
- Startup failure
- PC component (e.g., processor or power supply) failure
- Forgotten password

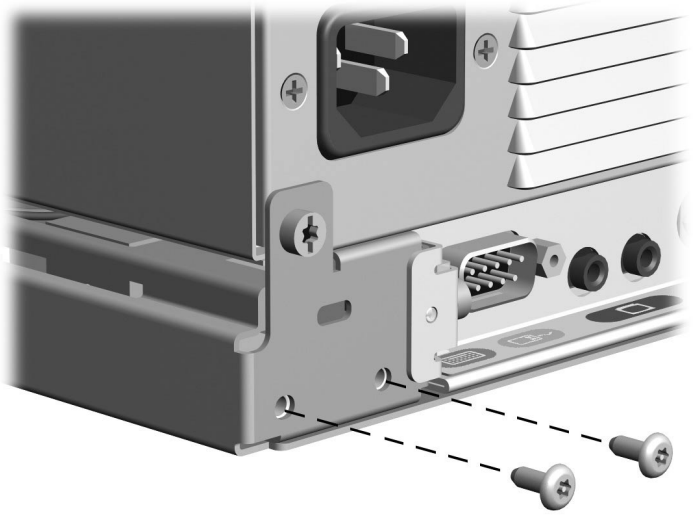
**CAUTION:** The Smart Cover FailSafe Key is a specialized tool available from Compaq. Be prepared; order this key before you need one.

To obtain a FailSafe Key:

- Contact your authorized Compaq reseller or service provider.
- Refer to the Compaq World Wide Web site (www.compaq.com) for ordering information.
- Call the appropriate number listed in the warranty.

To open the computer cover:

1. Prepare the computer for disassembly (Section 4.2).
2. Remove the two tamper-proof screws that secure the Smart Cover Lock to the chassis. Use the tamper resistant wrench (Compaq PN 166527-001) or the tamper resistant bit (Compaq PN 166527-002).

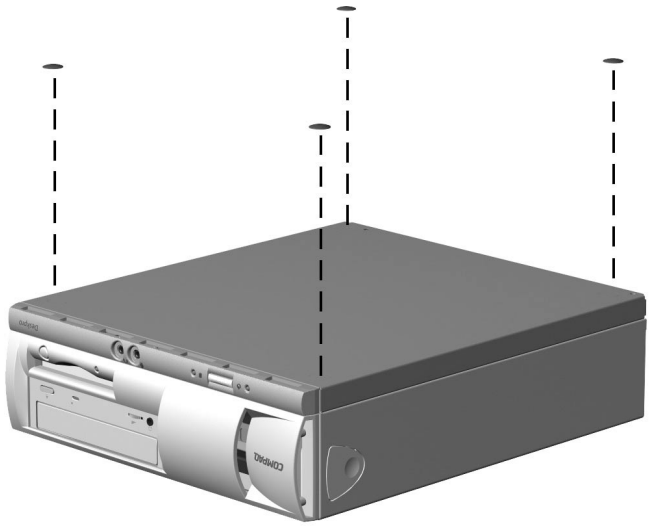


3. Remove the computer cover (Section 4.6).

To reattach the Smart Cover Lock, secure the lock in place with the tamper-proof screws.

## 4.4 Computer Feet

1. Remove the four rubber feet mounted to the bottom of the chassis.
2. If necessary, scrape the residue of the old feet from the chassis using a small, flat-bladed screwdriver.
3. Remove the protective strip from the adhesive on the back of the new feet and press them into place.

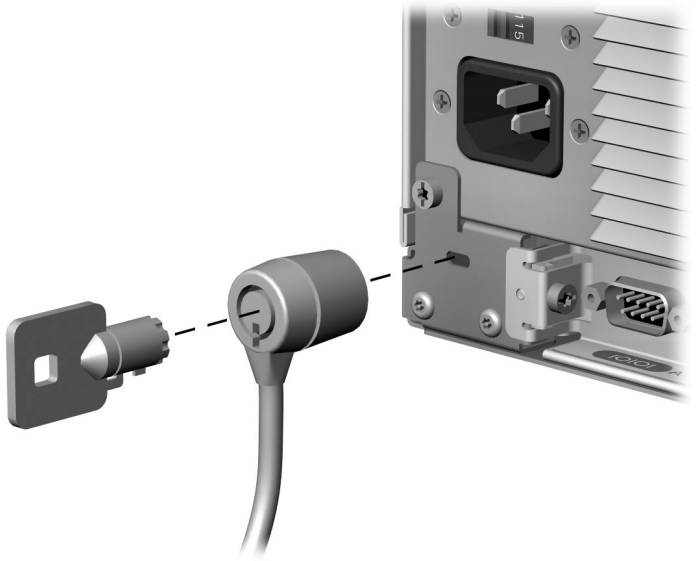


## 4.5 Cable Lock Installation

The rear panel of the computer accommodates a cable lock so that the computer can be physically secured to a work area.

The cable lock can be purchased from Kensington Microware Limited or Compaq authorized dealers, resellers, and service providers. Ask for the Kensington MicroSaver Security System, Model 64068.

1. Loop the cable around a heavy, fixed object to which you want to secure the computer.
2. Insert the cable lock end of the cable through the loop end of the cable.
3. Insert the lock into the appropriate slot on the rear of the computer and lock with the key.



To remove the cable lock provision, reverse the installation procedure.

## 4.6 Computer Cover

1. Prepare the computer for disassembly (Section 4.2).

**CAUTION:** Turn off the computer before disconnecting any cables.

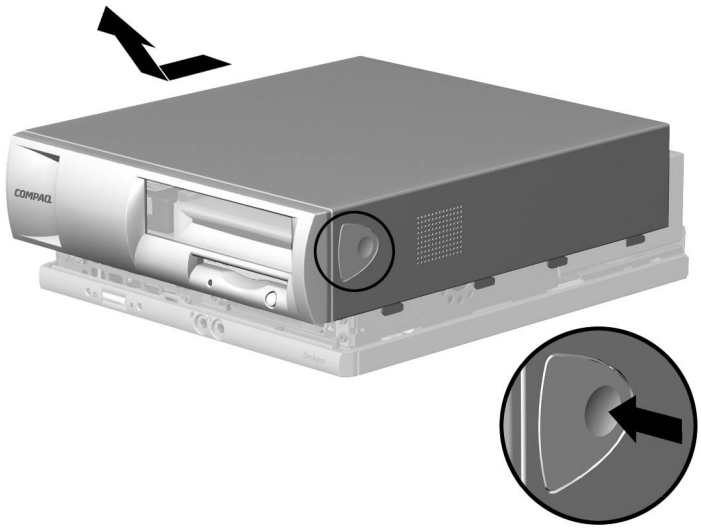
**CAUTION:** When the computer is plugged into an AC power source there is always voltage applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

**CAUTION:** The cooling fan is off only when the computer is turned off or the power cable has been disconnected.

The cooling fan is always on in all other instances (when the computer is either in the "On," "Standby," or "Suspend" mode).

You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

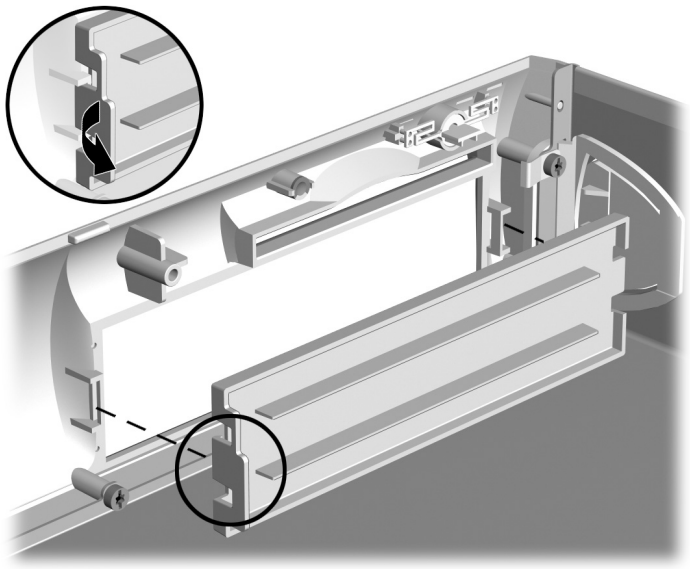
2. Press in the button on each side of the front bezel to release the quick release cover latches.
3. As you slide the computer cover forward, release the buttons and allow them to return to the original position, then lift the cover up and off the unit.




To replace the computer cover, reverse the removal procedure.

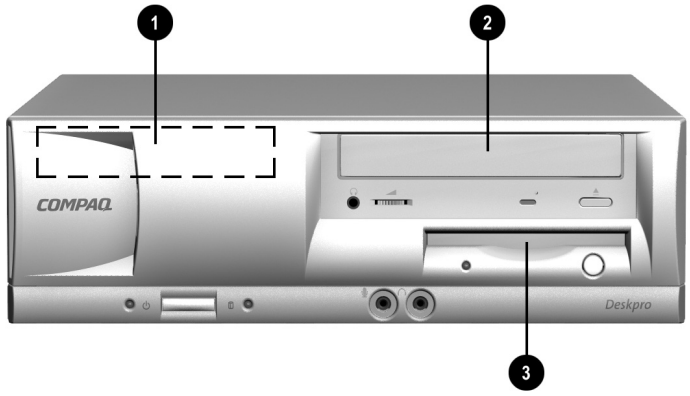
## 4.7 Bezel Blank

1. Prepare the computer for disassembly (Section 4.2).
2. Remove the computer cover (Section 4.6).
3. Twist the tab on the left end of the bezel blank.
4. Remove the bezel blank from the front bezel.



## 4.8 Drives

The Small Form Factor has one 5.25-inch drive bay, one 3.5-inch diskette drive bay, and one hard drive bay.




❶ 3.5-inch, internal, third-height, standard hard drive bay

❷ 5.25-inch drive bay for optional drives

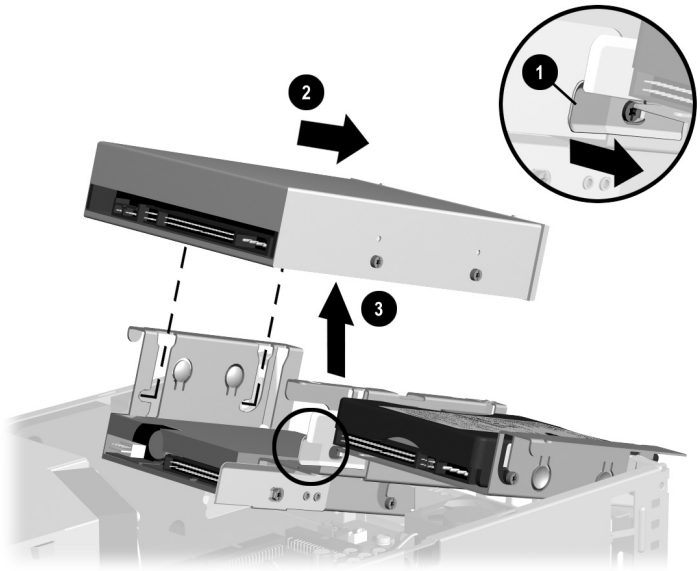
❸ 3.5-inch, third-height, standard, 1.44-MB diskette drive

Refer to Chapter 5, “Connectors and Jumpers,” for the location of the ribbon cable connections on the system board.

## 4.8.1 5.25-Inch Drive

**CAUTION:** All removable media should be taken out of the drives before removing the drive from the computer.

1. Prepare the computer for disassembly (Section 4.2).
2. Remove the computer cover (Section 4.6).
3. Rotate the drive cage to the upright position.
4. Rotate the power supply to the upright position.
5. Disconnect the audio, signal and drive power cables. The other end of the audio cable should remain connected to the audio connector on the system board.
6. Pull the drive release latch away from the drive ❶.
7. Slide the drive toward the front of the drive cage ❷, then lift the drive out of the computer ❸.



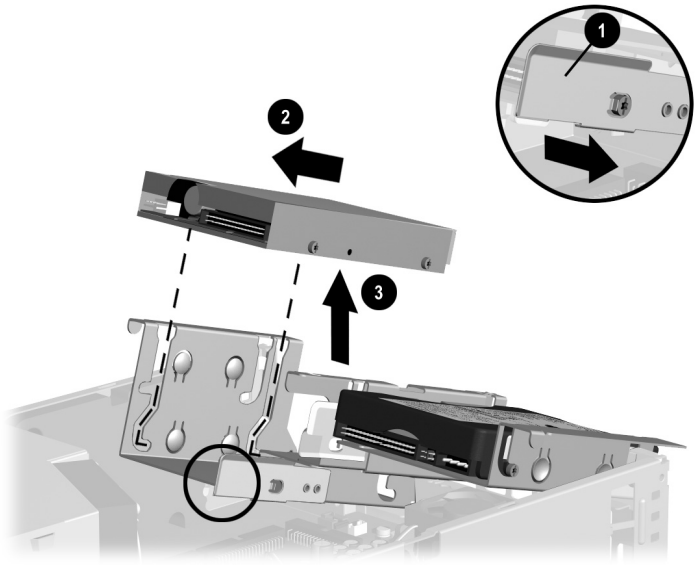

To replace the drive, reverse the removal procedures.

When replacing the drive, transfer the four screws from the old drive to the new one. The screws take the place of drive rails.

## 4.8.2 Diskette Drive

1. Prepare the computer for disassembly (Section 4.2).
2. Remove the computer cover (Section 4.6).
3. Remove the 5.25-inch drive (Section 4.8.1).
4. Disconnect the power and data cables from the back of the drive
5. Pull the drive release latch away from the drive ❶.
6. Lift the drive from the drive cage by first pulling the drive toward the back of the cage ❷, then lifting the drive up and out of the drive cage ❸.

✎ The guide screws on the sides of the drive must be guided along the J-slots to remove the drive from the drive cage.



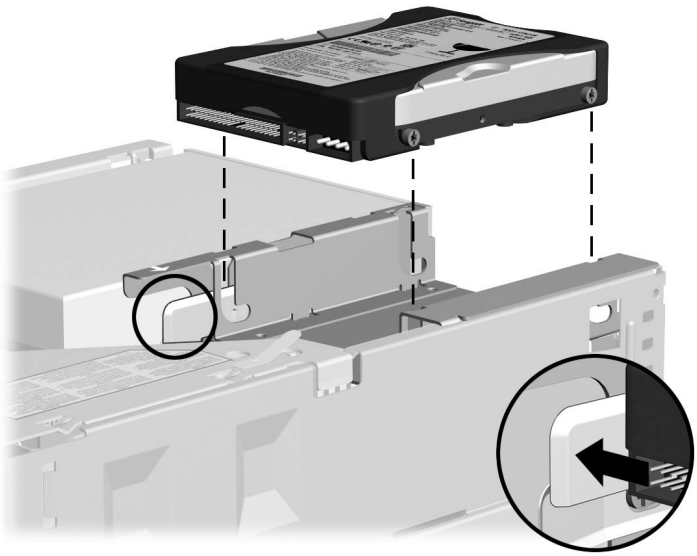

To replace the drive, reverse the removal procedures.

✎ When replacing the drive, transfer the four screws from the old drive to the new one. The screws take the place of drive rails.

**CAUTION:** When servicing the computer, ensure that cables are placed in their proper locations during the reassembly process. Improper cable placement can damage the computer.

### 4.8.3 Hard Drive

1. Prepare the computer for disassembly (Section 4.2).
2. Remove the computer cover (Section 4.6).
3. Push the drive release latch away from the drive.
4. Slide the drive toward the rear of the drive cage, then lift the drive from the computer.
5. Disconnect the power and data cables from the back of the drive.

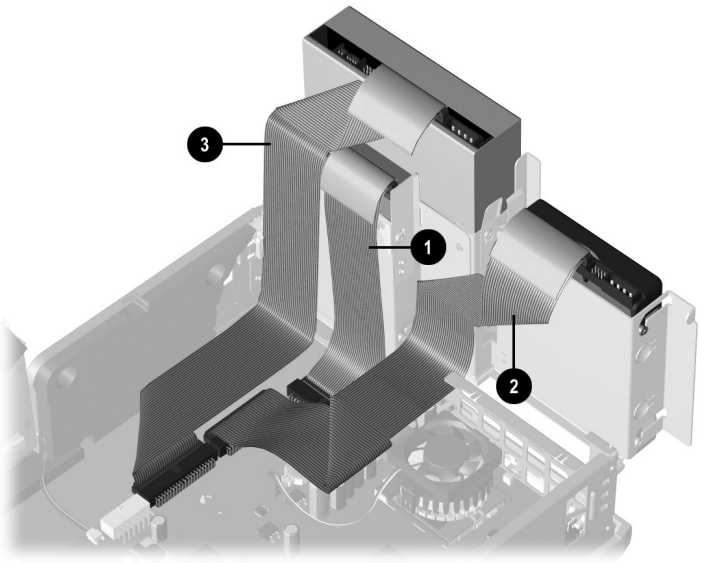


To replace the drive, reverse the removal procedures.

✎ When replacing the hard drive, transfer the four screws from the old drive to the new one. The screws take the place of drive rails.

## 4.9 Data Cable Installation

The data cables must be installed in the sequence shown to prevent damage.




❶ Diskette drive cable
❷ Hard drive cable
❸ CD-ROM cable

## 4.10 Memory Expansion

The computer comes with synchronous dynamic random access memory (SDRAM) dual inline memory modules (DIMMs).

### DIMMs

The memory sockets on the Intel 815e chipset–based system board can be populated with industry-standard DIMMs. These memory module slots are populated with at least one preinstalled memory module. To achieve the maximum memory support, you may be required to replace the preinstalled DIMM with a higher capacity DIMM.

For proper system operation, the DIMMs must be industry-standard 168-pin, unbuffered PC100– or PC133– compliant SDRAM DIMMs, depending on the model. The SDRAM DIMMs must support CAS Latency 2 or 3 (CL = 2 or CL = 3). They must also contain the mandatory Joint Electronic Device Engineering Council (JEDEC) Serial Presence Detect (SPD) information. DIMMs constructed with x4 SDRAM (16 ICs per side) are not supported; the system will not start using unsupported DIMMs.

The Intel 815e chipset supports both PC100 and PC133 SDRAM DIMMs. PC133 DIMMs should be used for optimal operation. If both PC100 and PC133 SDRAM DIMMs are installed in a computer, the system memory will run at the lower 100Mhz speed. Some configurations of PC133 SDRAMs may run at 100Mhz, instead of 133Mhz.

### Memory Module Installation

**CAUTION:** Your memory module sockets have gold metal contacts. When upgrading your memory, it is important to use memory modules with gold metal contacts to prevent corrosion and/or oxidation resulting from having incompatible metals in contact with each other.

**CAUTION:** Static electricity can damage the electronic components of the computer or optional cards. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object. Refer to Appendix F, “Electrostatic Discharge,” for more information.

**CAUTION:** When handling a memory module, be careful not to touch any of the contacts. Doing so may damage the module.

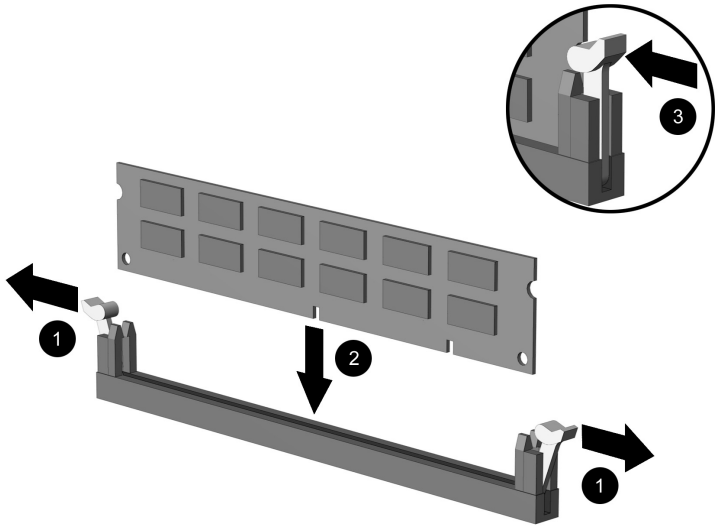
1. Prepare the computer for disassembly (Section 4.2).
2. Remove the computer cover (Section 4.6).
3. Rotate the drive cage to the upright position.

**CAUTION:** Check the position of all cables and wires before raising or lowering the drive cage to prevent damage.

4. Locate the memory module sockets.

**WARNING:** To reduce risk of personal injury from hot surfaces, allow the internal system components to cool before touching.

5. Open both latches of the memory module socket ❶, and insert the memory module into the socket ❷.

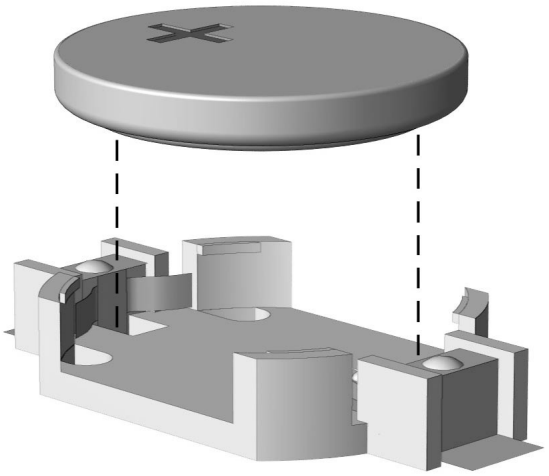



6. Begin by installing a module into the socket nearest the preinstalled module, and install the modules following the numerical order of the sockets.
7. A memory module can be installed in only one way. Match the notch on the module with the tab on the memory socket. Push the module down into the socket, ensuring that the module is fully inserted and properly seated with the latches pushed in ❸.
8. Repeat step 6 for any additional modules that you want to install.
9. Replace the computer cover.
10. The computer should automatically recognize the additional memory the next time the computer is powered on.

## 4.11 Battery

The battery that comes with the computer provides power to the real-time clock and has a lifetime of about three years. When replacing the battery, use the appropriate 3-volt lithium coin-cell battery. To replace the battery:

1. Prepare the computer for disassembly (Section 4.2).
2. Remove the computer cover (Section 4.6).
3. Rotate the drive cage to the upright position.
4. Lift the battery out of its holder.



5. Slide the replacement battery into position with the "plus" side up.
   The battery holder automatically secures the battery in the proper position.
6. Replace the computer cover.
7. Plug in the computer and turn on power.
8. Reset the date, time, passwords, and any special system settings using Compaq Computer F10 Setup.

If you previously saved CMOS settings to a diskette with F10 setup, you can restore these CMOS settings using F10 setup and the diskette with the saved CMOS configuration.

**WARNING:** This computer contains a lithium-ion battery pack. There is a risk of fire and chemical burn if the battery pack is handled improperly. Do not disassemble, crush, puncture, short external contacts, dispose in water or fire, or expose it to temperatures higher than 60ºC (140ºF).

In North America, dispose of nickel metal hydride or lithium-ion batteries by taking advantage of the Compaq battery recycling program. You will be provided with a postage-paid battery pack mailer preaddressed to a reclamation facility where the metals are recycled. Call the telephone number listed for your location in the *Contacting Customer Support* guide for more information.

In Europe, do not dispose of batteries with general household waste. Dispose of or recycle them by using the public collection system or returning them to Compaq, your authorized Compaq partners, or their agents.

## 4.12 Speaker Assembly

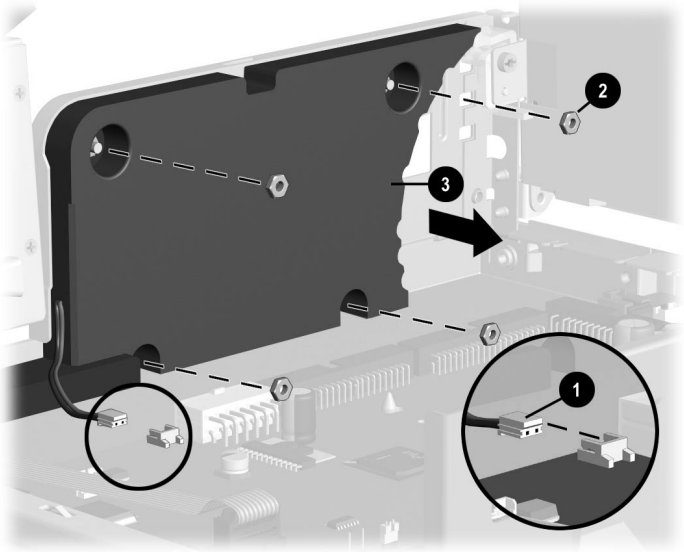
1. Prepare the computer for disassembly (Section 4.2).

**CAUTION:** When the computer is plugged into an AC power source, there is always voltage applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

2. Remove the computer cover (Section 4.6).
3. Rotate the drive cage to the upright position.
4. Disconnect the speaker wire from the P6 connector on the system board ❶.
5. Remove the four nuts that connect the speaker assembly to the chassis ❷.

✎ Use a 5/16-inch socket to remove the nuts from the speaker assembly.

6. Remove the speaker assembly ❸.



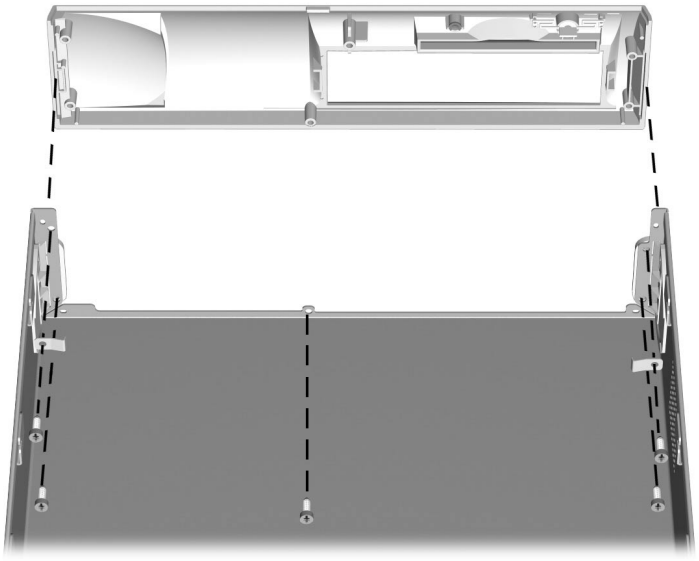

To replace the speaker assembly, reverse the removal procedures.

## 4.13 Front Bezel

1. Prepare the computer for disassembly (Section 4.2).
2. Remove the computer cover (Section 4.6).
3. Lay the cover on its back on a protected surface.
4. Remove the five screws that connect the front bezel to the computer cover.

✎ When removing the screws, the computer cover release latches will also come loose.

5. Remove the bezel from the computer cover.



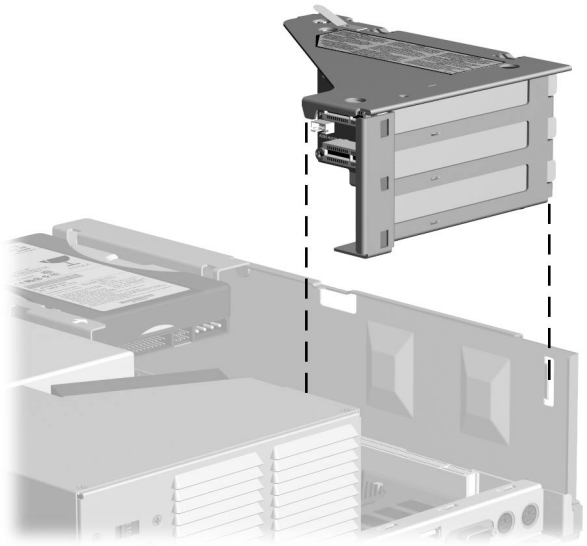
To replace the bezel, reverse the removal procedures.

✎ When replacing the front bezel, be sure to also replace the grounding straps.

## 4.14 Expansion Card Cage Components

### 4.14.1 Expansion Card Cage

1. Prepare the computer for disassembly (Section 4.2).
2. Remove the computer cover (Section 4.6).
3. Pull the expansion card cage straight up to remove it from the chassis.

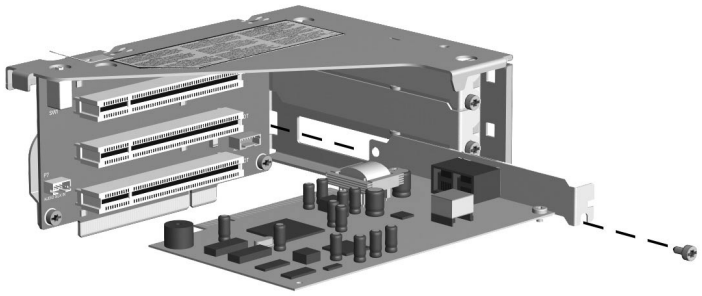


To replace the expansion card cage, reverse the removal procedures.

✎ When reinstalling the expansion card cage, ensure that the tab on the brace latches into the slot on the side of the power supply.

### 4.14.2 Expansion Card

1. Prepare the computer for disassembly (Section 4.2).
2. Remove the computer cover (Section 4.6).
3. Remove the expansion card cage (Section 4.14.1).
4. Remove the retaining screw that secures the expansion card to the expansion card cage, and remove the expansion card.



To replace an expansion card, reverse the removal procedures.

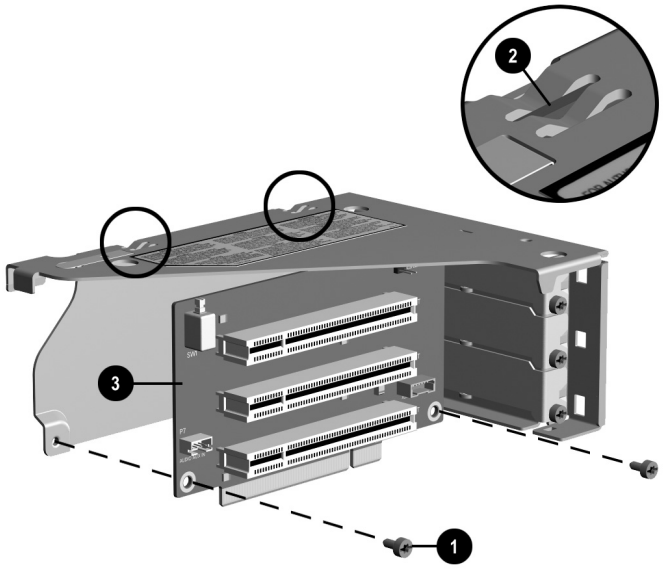
✎ If you are installing an expansion card for the first time, remove the desired expansion card slot cover before installing the expansion card.

The computer should automatically recognize the added Plug and Play expansion card.

✎ Windows NT does not have Plug and Play capability.

### 4.14.3 Riser Board

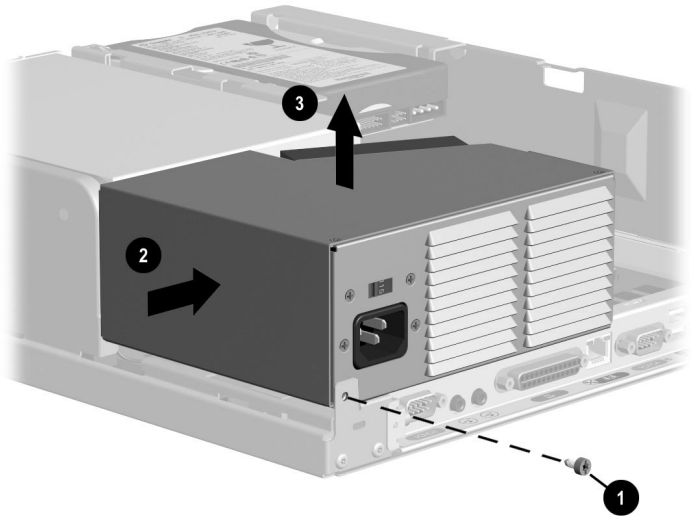
1. Prepare the computer for disassembly (Section 4.2).
2. Remove the computer cover (Section 4.6).
3. Remove the expansion card cage (Section 4.14.1).
4. Remove any expansion cards (Section 4.14.2).
5. Disconnect any cables from the riser board.
6. Remove the two screws that secure the riser board to the expansion card cage ❶.
7. Slide the board down slightly so it clears the slots on the top of the expansion card cage ❷.
8. Remove the riser board from the expansion card cage ❸.




To replace the riser board, reverse the removal procedures.

## 4.15 Easy Access Power Supply

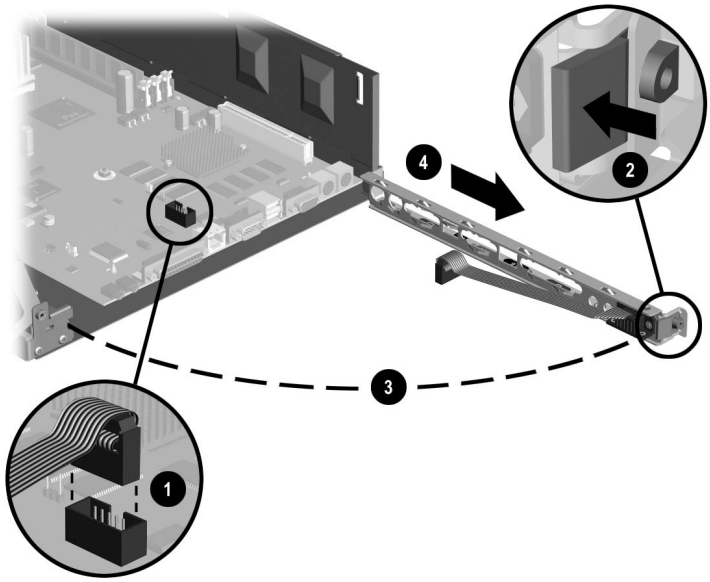
1. Prepare the computer for disassembly (Section 4.2).
2. Remove the computer cover (Section 4.6).
3. Remove the expansion card cage (Section 4.14.1).
4. Disconnect all power cables from the mass storage devices and the system board.
5. Remove the screw that secures the power supply to the back of the chassis ❶.
6. Slide the back of the power supply toward the right ❷, then lift the power supply out of the computer ❸.




To replace the power supply, reverse the removal procedures.

## 4.16 I/O Panel

1. Prepare the computer for disassembly (Section 4.2).
2. Remove the computer cover (Section 4.6).
3. Remove the expansion card cage (Section 4.14.1).
4. Rotate the power supply to the upright position.
5. Unplug the I/O panel cable from the system board ❶.
6. Press the green release tab on the end of the I/O panel ❷.
7. Swing the I/O panel away from the computer ❸ until it is at a 90 degree angle.
8. Remove the panel from the chassis ❹.




To replace the I/O panel, reverse the removal procedures.

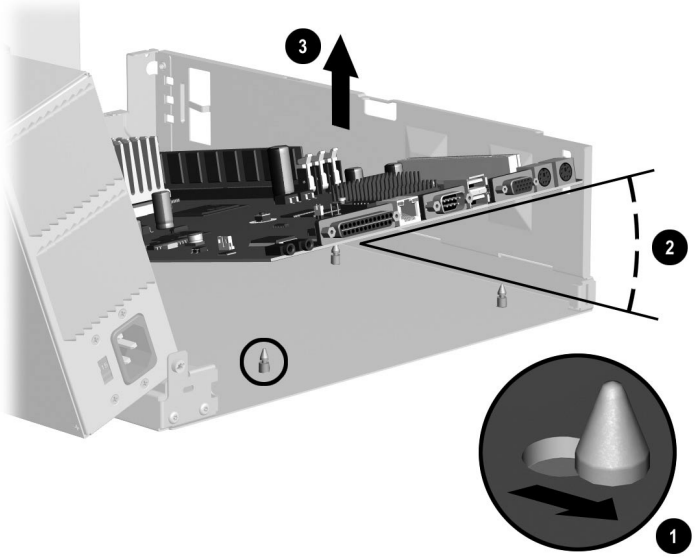
## 4.17 System Board

More information on the system board, including troubleshooting criteria, can be found in the Compaq Quick Troubleshooting Guide (part number 153837-001) and the Compaq Service Reference Guide (part number 152611-001).

1. Prepare the computer for disassembly (Section 4.2).
2. Remove the computer cover (Section 4.6).
3. Remove the expansion card cage (Section 4.14.1).
4. Remove the I/O panel (Section 4.16).
5. Rotate the drive cage to the upright position.

**CAUTION:** Check the position of all cables and wires before raising or lowering the drive cage to prevent cable damage.

6. Rotate the power supply to the upright position.
7. Disconnect all cables from the system board.
8. Slide system board toward the rear of computer until the six metal standoffs that extend up from the base pan are positioned in the larger part of the keyhole slots in the system board ❶.
9. Raise the rear of the system board until it is at a 30 degree angle ❷.
10. Remove the system board by pulling it toward the rear of the computer, then lifting it up and out of the chassis ❸.




To replace the system board, reverse the removal procedures.

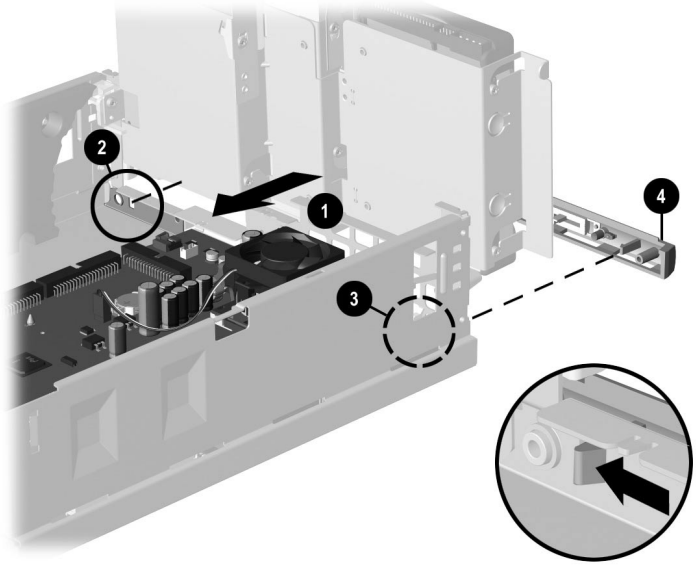
## 4.18 Front Trim

The front trim is the removable plastic piece located below the front bezel.

1. Prepare the computer for disassembly (Section 4.2).
2. Remove the computer cover (Section 4.6).
3. Remove the I/O panel (Section 4.16).
4. Rotate the drive cage to the upright position.
5. Slide the system board back until the six metal standoffs that extend up from the base pan are positioned in the larger part of the keyhole slots in the system board ❶.

It is not necessary to remove the system board from the computer to remove the front trim.

6. Press the left tab that connects the front trim to the chassis ❷.
7. Press the right tab that connects the front trim to the chassis ❸.
8. Remove the front trim from the computer ❹.




To replace the front trim, reverse the removal procedures.

# 4.19 Processors

## 4.19.1 Type 1 Processor Assembly

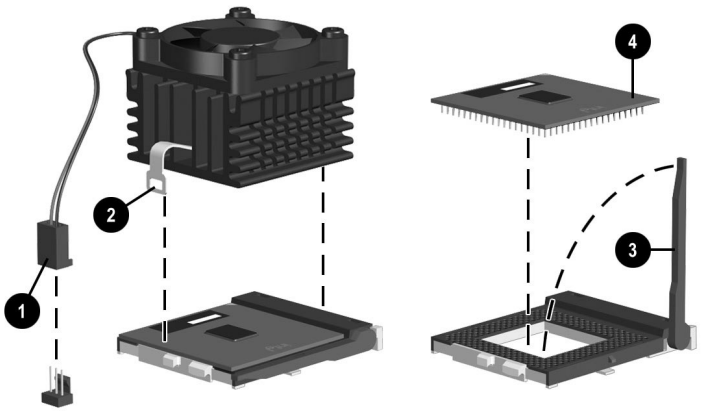
1. Prepare the computer for disassembly (Section 4.2).
2. Remove the computer cover (Section 4.6).

**CAUTION:** To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching.

3. Remove the expansion card cage (Section 4.14.1).
4. Rotate the drive cage to the upright position.

**CAUTION:** Check the position of all cables and wires before raising or lowering the drive cage to prevent cable damage.

5. Unplug the fansink wire from the system board ❶.
6. Remove the heatsink retaining clip ❷ by pressing down on the clip's extended tab until it releases from the safety catch.
7. Release the processor from the socket by pulling the handle on the ZIF socket out and upward ❸.
8. Lift the processor out of the socket ❹.



Before installing a fansink, prepare for its installation by doing one of the following:

- New heatsink: if the heatsink has a thermal interface attached to its bottom, peel off the protective paper before installing the heatsink.
- Reinstalled heatsink: Note where the thermal interface is located on the heatsink. Carefully remove the thermal interface pad and all residue from the heatsink surface. If any thermal interface remains on the die of the processor, scrape it off with your fingernail. A Q-Tip dipped in alcohol can be used to clean both surfaces. Add thermal interface pad to the bottom of the heatsink before reinstalling the original heatsink to insure an efficient thermal interface. Use Compaq part number 210397-001 thermal interface pad.

**CAUTION:** Thermal interface heat transmission is reduced if residue remains on the heatsink or the heatsink thermal interface surface is scratched. This could lead to the processor running at a higher than normal temperature, fan turning at a higher than normal speed, and possible loss of data if processor shuts down from overheating.

To replace the fansink, reverse the removal procedures.

## 4.19.2 Type 2 Processor Assembly

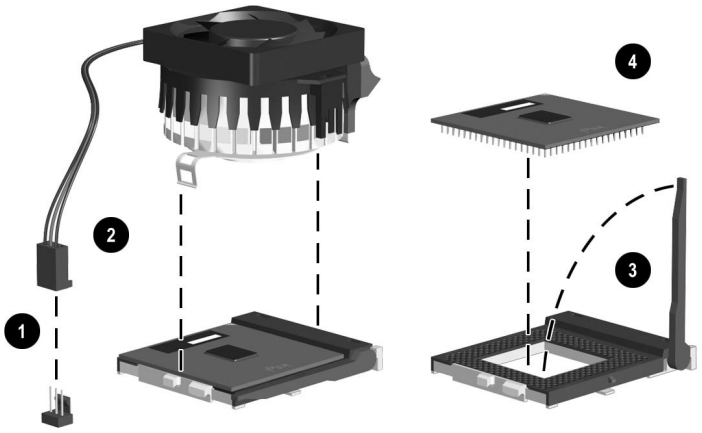
1. Prepare the computer for disassembly (Section 4.2).
2. Remove the computer cover (Section 4.6).

**CAUTION:** To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching.

3. Remove the expansion card cage (Section 4.14.1).
4. Rotate the drive cage to the upright position.

**CAUTION:** Check the position of all cables and wires before raising or lowering the drive cage to prevent cable damage.

5. Unplug the fansink wire from the system board ❶.
6. Press the tab down and inward toward the heatsink to release the metal clip on the bottom of the tab from the plastic retainer on the processor socket ❷.
7. Release the processor from the socket by pulling the handle on the ZIF socket out and upward ❸.
8. Lift the processor out of the socket ❹.



Before installing a fansink, prepare for its installation by doing one of the following:

- New heatsink: if the heatsink has a thermal interface attached to its bottom, peel off the protective paper before installing the heatsink.
- Reinstalled heatsink: Note where the thermal interface is located on the heatsink. Carefully remove the thermal interface pad and all residue from the heatsink surface. If any thermal interface remains on the die of the processor, scrape it off with your fingernail. A Q-Tip dipped in alcohol can be used to clean both surfaces. Add thermal interface pad to the bottom of the heatsink before reinstalling the original heatsink to insure an efficient thermal interface. Use Compaq part number 210397-001 thermal interface pad.

**CAUTION:** Thermal interface heat transmission is reduced if residue remains on the heatsink or the heatsink thermal interface surface is scratched. This could lead to the processor running at a higher than normal temperature, fan turning at a higher than normal speed, and possible loss of data if processor shuts down from overheating. Installing the Type 2 fansink assembly backwards will cause the processor to overheat, since the round aluminum core will only make partial contact with the processor die.

To replace the fansink, reverse the removal procedures.

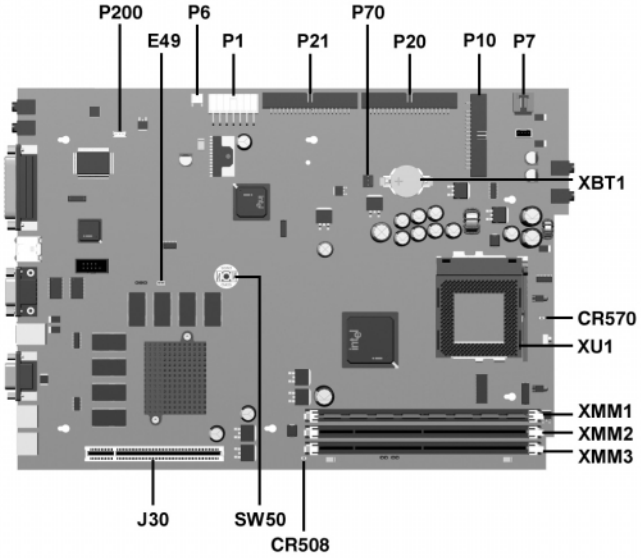
*chapter* 5

# CONNECTORS AND JUMPERS

This chapter provides connector and jumper information for system board jumpers, system I/O board connectors, riser board connectors and jumpers, and hard drives for the Small Form Factor models.

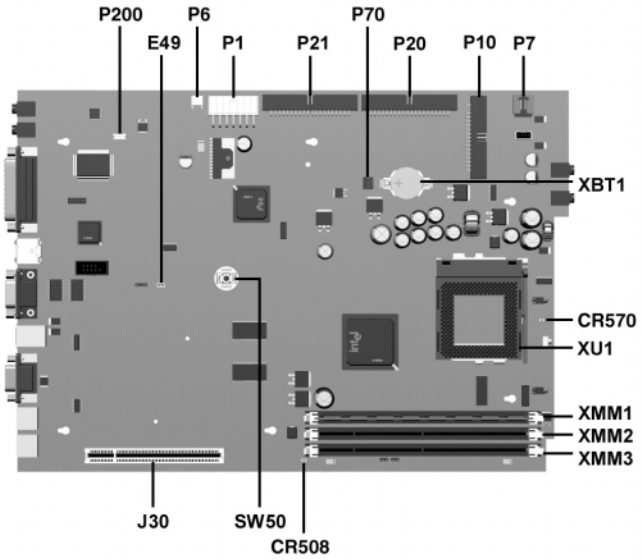
## 5.1 System Board

### 5.1.1 Connectors and Jumpers - System Board 187499-001




| | | | |
|---|---|---|---|
| CR508 | 3.3V Aux LED | P20 | Primary IDE Connector |
| CR570 | 5V Aux (ON)/PS_ON_ (OFF) LED | P21 | Secondary IDE Connector |
| E49 | Clear Password Header (Installed = Enabled, Removed = Cleared) | P70 | CPU Fan Connector |
| J30 | Riser Board | P200 | Hood Lock Solenoid Connector |
| P1 | Power Supply Connector | SW50 | Clear CMOS |
| P6 | Speaker Connector | XBT1 | External Battery |
| P7 | CD-ROM Audio | XMM1-3 | DIMM Memory Slots |
| P10 | Diskette Drive Connector | XU1 | Processor Socket |

## 5.1.2 Connectors and Jumpers - System Board 187500-001




| | | | |
|---|---|---|---|
| CR508 | 3.3V Aux LED | P20 | Primary IDE Connector |
| CR570 | 5V Aux (ON)/PS_ON_ (OFF) LED | P21 | Secondary IDE Connector |
| E49 | Clear Password Header (Installed = Enabled, Removed = Cleared) | P70 | CPU Fan Connector |
| J30 | Riser Board Connector | P200 | Hood Lock Solenoid Connector |
| P1 | Power Supply Connector | SW50 | Clear CMOS |
| P6 | Speaker Connector | XBT1 | External Battery |
| P7 | CD-ROM Audio Connector | XMM1-3 | DIMM Memory Slots |
| P10 | Diskette Drive Connector | XU1 | Processor Socket |

### 5.1.3 Clearing CMOS

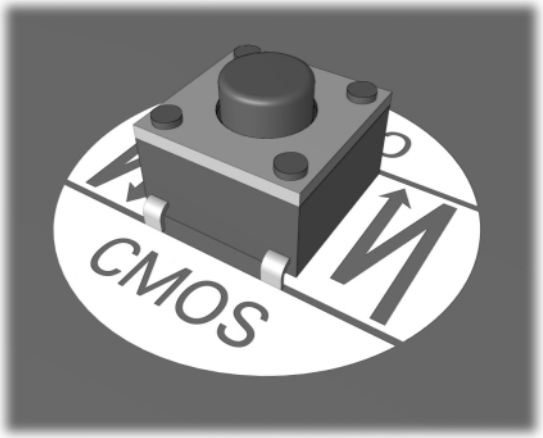
The computer's configuration (CMOS) may occasionally be corrupted. If it does, it is necessary to clear the CMOS memory using switch SW50.

To clear and reset the configuration, perform the following procedure:

1. Prepare the computer for disassembly (Section 4.2).

**CAUTION:** The power cord must be disconnected from the power source before changing the jumpers. All LEDs on the system board should be off. Failure to do so may damage the system board.

2. Remove the computer cover (Section 4.6).
3. Press the CMOS button located on the system board and keep it depressed for 5 seconds.




4. Replace the computer cover.
5. Turn the computer on.
6. Run the Computer Setup utility to reconfigure the system.

When the jumper is removed, both the power-on password and the setup password become invalid because both are stored in the configuration memory. You will need to reset the passwords.

### 5.1.4 Disabling or Clearing the Power-On and Setup Passwords

1. Turn off the computer and any external devices, and disconnect the power cord from the power outlet.
2. Disconnect the keyboard, monitor, and any other external devices connected to the computer.
3. Remove the access panel.
4. Locate the header and jumper labeled E49.
5. Remove the jumper from pins 1 and 2. Place the jumper over pin 2 only, in order to avoid losing it.
6. Replace the access panel.
7. Reconnect the external equipment.
8. Plug in the computer and turn on power. Allow the operating system to start. This clears the current passwords and disables the password features.
9. To re-enable the password features, repeat steps 1-4, then replace the jumper on pins 1 and 2.
10. Repeat steps 6-8, then establish new passwords.

Refer to the Computer Setup (F10 Setup) instructions to establish new passwords.

### 5.1.5 CMOS Archive and Restore (Power Switch Override)

Each time the system starts, the system ROM saves a copy of NVRAM (including CMOS, passwords, and other system variables) in the flash ROM. Should the system become unstable, the last known good copy of NVRAM can be restored using a feature called "power button override." To restore NVRAM, do the following:

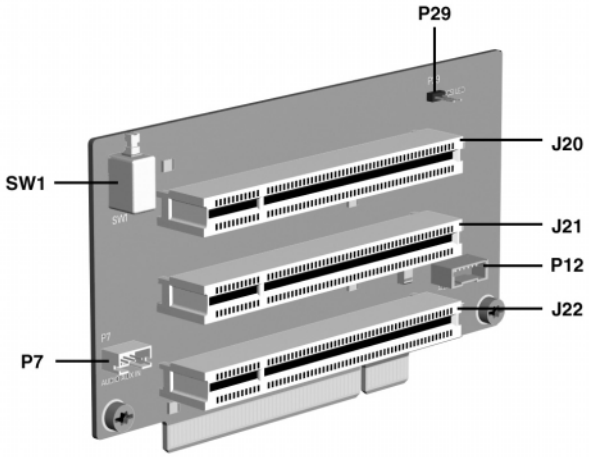
1. With the unit powered down, press and release the power button.
2. Immediately after pressing the power button (during POST), press and hold the power button until the unit powers down (about 4 seconds).

At the next startup, the ROM detects this "power button override" event and the backup copy of NVRAM is restored.

Because of this feature, users cannot power off the computer immediately after powering up. The video display must be active before the computer can be powered off.

**CAUTION:** Unplugging the power cord during POST can corrupt the splash screen. Flashing the ROM is required to restore the splash screen, although the computer will continue to function.

## 5.2 Riser Board – Connectors and Jumpers

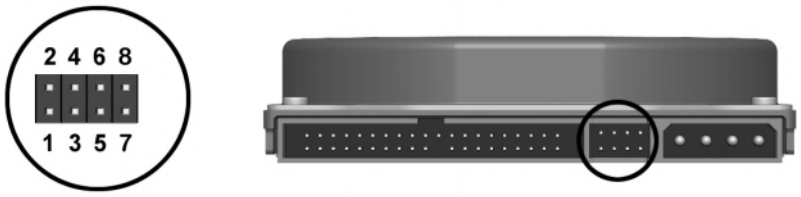



| | | | |
|---|---|---|---|
| J20 | PCI Slot | P12 | NIC SOS connector |
| J21 | PCI Slot | P29 | SCSI LED connector |
| J22 | PCI Slot | SW1 | Security Hood Switch |
| P7 | CD Audio connector | | |

## 5.3 Hard Drive Jumper Settings

### 5.3.1 Seagate, Fujitsu, and Western Digital

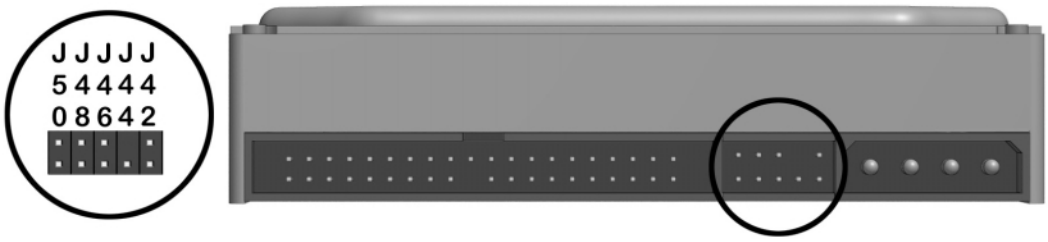
The drawings and tables below apply to a number of different size drives in the following paragraphs.




**Seagate, Fujitsu, and Western Digital Ultra ATA Hard Drive Jumper Settings**

| Definition | Seagate | Fujitsu | Western Digital |
|---|---|---|---|
| Single | 7 - 8 | 1 - 2 and 3 - 5 | 3 - 5 |
| Primary | 5 - 6 and 7 - 8 | 1 - 2 and 3 - 5 | 5 - 6 |
| Secondary | No connection | 3 - 5 | 3 - 4 |
| Cable Select | 5 - 6 | 2 - 4 and 3 - 5 | 1 - 2 |

## 5.3.2 Maxtor




### Maxtor Ultra ATA Hard Drive Jumper Settings

| Definition | J50 | J48 | J46 | J44 | J42 |
|---|---|---|---|---|---|
| Single | J | | | | |
| Primary (in a dual-drive system) | J | | | | |
| Secondary | O | | | | |
| Cable Select | | | | | |
| Disabled* | | O | | | |
| Enabled | | J | | | |
| 4092 Cylinder Limitation | | | | | |
| Disabled* | | | O | | |
| Enabled | | | J | | |
| Factory Reserved | | | | O | |
| Factory Reserved | | | | | O |

* = Default setting
J = Jumper
O = No jumper

*chapter* 6

# SPECIFICATIONS

This chapter provides physical, environmental, and performance specifications for the computer, keyboard, and mass storage devices.

## 6.1 System

### 6.1.1 Specifications

| | | |
|---|---|---|
| Desktop Dimensions | | |
| Height | 3.8 in | 9.7 cm |
| Width | 12.5 in | 31.8 cm |
| Depth | 14.6 in | 37.1 cm |
| Approximate Weight | 20 lb | 9.1 kg |
| Weight Supported (maximum distributed load) | 100.0 lb | 45.5 kg |
| Temperature Range | | |
| Operating | 50° to 95°F | 10° to 35°C |
| Nonoperating | -4° to 140°F | -20° to 60°C |
| Relative Humidity (noncondensing) | | |
| Operating | 8-90% | 8-90% |
| Nonoperating | 5-95% | 5-95% |
| Maximum Altitude (unpressurized) | | |
| Operating | 10,000 ft | 3048 m |
| Nonoperating | 30,000 ft | 9144 m |
| Power Supply | | |
| Operating Voltage Range | 90-132 VAC | 180-264 VAC |
| Rated Voltage Range | 100-127 VAC | 200-240 VAC |
| Rated Line Frequency | 50-60 Hz | 50-60 Hz |
| Power Output | 120 W | 120 W |
| Rated Input Current (maximum) | 4 A | 2 A |
| Heat Dissipation | | |
| Maximum | 630 Btu/hr | 160 kg-cal/hr |
| Nominal | 315 Btu/hr | 80 kg-cal/hr |

## 6.1.2 System Interrupts

| Hardware IRQ | System Function |
|---|---|
| 0 | Timer Interrupt |
| 1 | Keyboard |
| 2 | Interrupt Controller Cascade |
| 3 | Serial Port (COM B) |
| 4 | Serial Port (COM A) |
| 5 | Unused, available for PCI |
| 6 | Diskette Drive |
| 7 | Parallel Port (LPT 1) |
| 8 | Real-Time Clock |
| 9 | Unused |
| 10 | Unused, available for PCI |
| 11 | Unused, available for PCI |
| 12 | Mouse |
| 13 | Coprocessor |
| 14 | IDE Interface Hard Drive |
| 15 | CD-ROM |

## 6.1.3 System DMA

| Hardware DMA | System Function |
|---|---|
| 0 | Unused |
| 1 | Unused |
| 2 | Diskette Drive |
| 3 | ECP Parallel Port LPT1 (Default; Alternate = DMA 0) |
| 4 | DMA Controller Cascading |
| 5 | Unused |
| 6 | Unused |
| 7 | Unused |

## 6.1.4 ICH Fixed I/O Registers

| Port | Register Name |
|---|---|
| 00h, 02h, 04h, 06h | Channel 0, 1, 2, 3 DMA Base & Current Address Regsiter |
| C0h, C4h, C8h, CCh | Channel 4, 5, 6, 7 DMA Base & Current Address Register |
| 01h, 03h, 05h, 07h | Channel 0, 1, 2, 3 DMA Base & Current Count Register |
| C2h, C6h, Cah, CEh | Channel 4, 5, 6, 7 DMA Base & Current Count Register |
| 10h-1Fh | **Aliased at 00h-0Fh** |
| 20h | Master PIC ICW1 Init. Cmd Word 1 Register |
| | Master PIC OCW2 Op Ctrl Word 2 Register |
| | Master PIC OCW3 Op Ctrl Word 3 Register |
| 21h | Master PIC ICW2 Init. Cmd Word 1 Register |
| | Master PIC ICW3 Init. Cmd Word 1 Register |
| | Master PIC ICW4 Init. Cmd Word 1 Register |
| | Master PIC OCW1 Op Ctrl Word 3 Register |
| 24h-25h, 28-29h, 2Ch-2Dh, 30h-31h, 34h-35h, 38h-39h, 3Ch-3Dh | **Aliased at 20h-21h** |
| 40h | Counter 0 Interval Time Status Byte Format |
| | Counter 0 Counter Access Port Register |
| 41h | Counter 1 Interval Time Status Byte Format |
| | Counter 1 Counter Access Port Register |
| 42h | Counter 2 Interval Time Status Byte Format |
| | Counter 2 Counter Access Port Register |
| 43h | Timer Control Word Register |
| | Timer Control Word Register Read Back |
| | Counter Latch Command |
| 50h-53h | **Aliased at 40h-43h** |
| 61h | NMI Status and Control Register |
| 70h | NMI Enable Register |
| | Real-Time Clock (Standard RAM) Index Register |
| 71h | Real-Time Clock (Standard RAM) Target Register |
| 72h | Extended RAM Index Register |
| 73h | Extended RAM Target Register |
| 74h-75h | **Aliased at 70h-71h** |
| 76h-77h | **Aliased at 72h-73h or 70h-71h** |
| 81h, 82h, 83h | Channel 2, 3, 1 DMA Memory Low Page Register |
| 84h-86h, 88h | Reserved Page Registers |
| 89h, 8Ah, 8Bh | Channel 6, 7, 5 DMA Memory Low Page Register |
| 8CH-8Eh | Reserved Page Registers |
| 8Fh | Refresh Low Page Register |
| 91h-9Fh (except 92h) | **Aliased at 81h-8Fh** |
| 92h | Fast A20 and INIT Register |
| CF9h | Reset Control Register |

*continued*

**ICH Fixed I/O Registers cont.**

| Port | Register Name |
|---|---|
| A0h | Slave PIC ICW1 Init. Cmd Word 1 Register |
| | Slave PIC OCW2 Op Ctrl Word 2 Register |
| | Slave PIC OCW3 Op Ctrl Word 3 Register |
| A1 | Slave PIC ICW2 Init. Cmd Word 2 Register |
| | Slave PIC ICW3 Init. Cmd Word 3 Register |
| | Slave PIC ICW4 Init. Cmd Word 4 Register |
| | Slave PIC OCW1 Op Ctrl Word 1 Register |
| A4h-A5h, A8h-A8h, ACh-ADh, B0h-B1h, B4h-B5h, B8h-B9h, BCh-BDh | **Aliased at A0h-A1h** |
| B2h | Advanced Power Management Control Port Register |
| B3h | Advanced Power Management Status Port Register |
| C0h, C4h, C8h, CCh | Channel 4, 5, 6, 7 DMA Base and Current Address Register |
| C1h | **Aliased at C0h** |
| C5h | **Aliased at C4h** |
| C9h | **Aliased at C8h** |
| CDh | **Aliased at CCh** |
| C2h, C6h, CAh, CEh | Channel 4, 5, 6, 7 DMA Base and Current Count Register |
| C3h | **Aliased at C2h** |
| C7h | **Aliased at C6h** |
| CBh | **Aliased at CAh** |
| CFh | **Aliased at Ceh** |
| D0h | Channel 4-7 DMA Command Register |
| | Channel 4-7 DMA Status Register |
| D1h | **Aliased at D0h** |
| D4h | Channel 4-7 DMA Write Single Mask Register |
| D5h | **Aliased at D4h** |
| D6h | Channel 4-7 DMA Channel Mode Register |
| D7h | **Aliased at D6h** |
| D8h | Channel 4-7 DMA Clear Byte Pointer Register |
| D9h | **Aliased at D8h** |
| DAh | Channel 4-7 DMA Master Clear Register |
| DBh | **Aliased at DAh** |
| DCh | Channel 4-7 DMA Clear Mask Register |
| DEh | **Aliased at DCh** |
| DEh | Channel 4-7 DMA Write All Mask Register |
| DFh | **Aliased at DEh** |
| F0h | Coprocessor Error Register |
| 170h-177h | PIO Mode Command Block Offset for Secondary Drive |
| 1F0h-1F7h | PIO Mode Command Block Offset for Primary Drive |
| 376h | PIO Mode Control Block Offset for Secondary Drive |

*continued*

**ICH Fixed I/O Registers cont.**

| Port | Register Name |
|---|---|
| 3F6h | PIO Mode Control Block Offset for Primary Drive |
| 4D0h | Master PIC Edge/Level Triggered Register |
| 3F6h | PIO Mode Control Block Offset for Primary Drive |
| 4D0h | Master PIC Edge/Level Triggered Register |
| 4D1h | Slave PIC Edge/Level Triggered Register |
| 400-47F | Super I/O |
| F800-F87F | Reserved (power management) |
| FA00-FA3F | Reserved (GPIO management) |
| FC00-FC0F | Reserved (SMBUS controller) |

NOTE: When the POS_DEC_EN bit is set, additional I/O ports get positively decoded by the ICH.

## 6.1.5 System Memory Map

| Size | Memory Address | System Function |
|---|---|---|
| 512 KB | FFFFFFFFh to FFF80000 | System ROM |
| 3839 MB | FFFBFFFFh to 10000000h | PCI Memory Expansion |
| 511 MB | 0FFFFFFFh to 00100000h | HOST or PCI Memory Expansion |
| 128KB | 000FFFFFh to 000E0000h | System ROM |
| 96 KB | 000DFFFFh to 000C8000h | PCI Option ROMs |
| 32 KB | 000C7FFFh to 000C0000h | Video ROM |
| 128 KB | 000BFFFFh to 000A0000h | Video RAM |
| 640 KB | 0009FFFFh to 00000000h | Base Memory |

## 6.2 Drives

### 6.2.1 Diskette Drive

| | |
|---|---|
| **Size and Capacity** | |
| Size (in) | 3.5 |
| High Density (MB) | 1.44 |
| Low Density (KB) | 720 |
| **Compaq Spare Part Number** | 191714-001 |
| **Light** | Green |
| **Height (inches)** | 1 |
| **Bytes per Sector** | 512 |
| **Sectors per Track** | |
| High Density | 18 |
| Low Density | 9 |
| **Tracks per Side** | |
| High Density | 80 |
| Low Density | 80 |
| **Read/Write Heads** | 2 |
| **Average Seek Time (m/s)** | |
| Track-to-Track (high/low) | 3/6 |
| Average (high/low) | 94/173 |
| Latency Average (ms) | 100 |

## 6.2.2 Ultra ATA Hard Drives

| | 10.0 GB | 15.0 GB | 20.0 GB |
|---|---|---|---|
| **Formatted Capacity** | | | |
| Physical (MB) | 10005 | 15020 | 20020 |
| Logical (MB) | Not available | 8455 | 8455 |
| **Compaq Spare Part Number** | 135364-001 | 192060-001 | 157403-001 |
| **Total Logical Sectors** | 19541088 | 29336832 | 39102336 |
| **Logical Geometry** | | | |
| Cylinders | 16383 | 16383 | 16383 |
| Heads | 16 | 16 | 16 |
| Sectors | 63 | 63 | 63 |
| **Physical Geometry** | | | |
| Cylinders | 15011 | 24453 | 17494 |
| Heads | 8 | 3 | 6 |
| Sectors | 214-312 | 312-494 (20 zones) | 270-450 (20 zones) |
| **Data Bytes/Sector** | 512 | 512 | 512 |
| **Sector Interleave** | 1:1 | 1:1 | 1:1 |
| **ECC Bytes** | 34 | 18 bytes ON-THE-FLY<br>33 bytes FIRMWARE | 12 bytes ON-THE-FLY<br>34 bytes FIRMWARE |
| **Recording Method–EPR4** | PRML | 48/51 PRML | PRML |
| **Spin-Up Time (maximum)** | TYP / MAX<br>18 sec / 31 sec | 9 seconds | TYP<br>18 sec |
| **Spin-Down Time (maximum)** | Not available | 10 seconds | Not available |
| **Seek Times, Logical** (Busy to Seek Complete) | TYP / MAX | MAX / TYP | MAX / TYP |
| Track-to-Track | 1.7ms / 2.4ms | 5.0ms / 2.0ms | 2.4ms / 1.7ms |
| Average (Read) | 8.5 ms / 9.5ms | 15.0ms / 9.5ms | 9.5m s / 8.5ms |
| Full Stroke | 15ms / 18ms | 25.0ms / 21.0ms | 18.0ms / 15.0ms |
| **Average Latency** | 5.56ms | 4.17ms | 4.17ms |
| **Data Transfer Rate** | | | |
| **@Disk to Buffer** | 139.61 – 224.31 MB/s | 189.0 - 304.3 Mbits/s | 171-284 Mbits/s Max |
| **@Interface w/o IORDY** | | 12.5 MB/s | 16.6 MB/s |
| **PIO** | 16.6 MB/s | up to 16.6 MB/s | 16.6 MB/s |
| **DMA** | 16.6 MB/s | up to 33.3 MB/s | 66.6 MB/s |
| **UDMA** | 66.6 MB/s | up to 66.6 MB/s | |
| **RPM** | 7200+/-0.1% | 7200+/-0.1% | 7200+/- 0.1% |

## 6.2.3 CD-ROM Drive

| | 48X Max |
|---|---|
| **Compaq Spare Part Number** | 187263-001 |
| **Data Buffer (ms)** | 16.6 |
| **Data Transfer Rate** | 150 KB/s Min (audio)<br>CD: 3000-7200 KB/s |
| **Access Time (ms)** | |
| Random | <100 |
| Full-Stroke Seek | <150 |
| **Cache Buffer** | 128 KB |
| **Interface** | ATAPI |
| **Disk Formats Read** | Photo-CD/Multisession<br>CD-ROM<br>Multi Read<br>CD TEXT<br>Audio CD<br>CD-I<br>CD-RW<br>CD-R<br>CD EXTRA<br>CD-ROM XA |
| **Disk** | |
| Capacity | CD: 650 MB |
| Block Size | Mode 1 – 2048 bytes<br>Mode 2 – 2340, 2336 bytes<br>CD-DA – 2353 bytes<br>CD-XA – 2328 bytes |
| Diameter | 12 cm;8 cm |
| Thickness | 1.2 mm |
| Track Pitch | 1.6 um |
| **Audio Output Level** | |
| Line Out | 0.7 V @ 47 K ohm |
| Headphone | 0.6 V @ 32 ohm |
| **Startup Time** | <7 sec (typical); <30 sec with multisession |
| **Operating Conditions** | |
| Temperature | 5 – 45 C |
| Humidity | 10-80% relative humidity |
| **Dimensions (mm) (HxWxD)** | 42.9x150.1x208 |
| **Weight (grams)** | 1200 |
| **MPEG Playback Graphics Solution Support** | None |

## 6.3 Keyboards

| | Compaq Easy Access | Compaq Enhanced | Compaq Smart Card |
|---|---|---|---|
| **Dimensions** | | | |
| Height | 1.4 in | 1.4 in | 1.4 in |
| Width | 18.3 in | 18.3 in | 18.3 in |
| Depth | 6.3 in | 6.3 in | 6.3 in |

## 6.4 Mouse

| | | |
|---|---|---|
| **Dimensions** | | |
| Height | 1.48 in | 3.75 cm |
| Length | 4.76 in | 12.1 cm |
| Width | 2.44 in | 6.2 cm |
| **Weight** | 4.6 oz | 131 g |
| **Base Resolution** | 400 dpi | 400 dpi |
| **Tracking Speed** (maximum) | 10 in/sec | 25 cm/sec |
| **Temperature** | | |
| Operating | 50°F to 104°F | 0°C to 40°C |
| Non-operating | -4°F to 140°F | -20°C to 60°C |
| **Lifetime** | 3 million operations | 3 million operations |
| **Relative Humidity** | | |
| Operating | 10% to 90%, noncondensing | 10% to 90%, noncondensing |
| Non-operating | 10% to 90%, noncondensing | 10% to 90%, noncondensing |
| **ESD** | No soft error up to 10kV<br>No hard error up to 15kV | |

## 6.5 Supported Graphics Resolutions

### 6.5.1 Intel 3D Graphics (system board 187500-001)

| Colors | 256 | 65K | 16.7M |
|---|---|---|---|
| **640 x 480** | 85 Hz | 85 Hz | 85 Hz |
| **800 x 600** | 85 Hz | 85 Hz | 85 Hz |
| **1024 x 768** | 85 Hz | 85 Hz | 85 Hz |
| **1152 x 864** | 85 Hz | 85 Hz | 85 Hz |
| **1280 x 1024** | 85 Hz | 85 Hz | 85 Hz |
| **1600 x 1200** | 85 Hz | 85 Hz | 85 Hz |

### 6.5.2 nVIDIA TNT 3D AGP (system board 187499-001)

| Colors | 256 | 65K | 16.7M |
|---|---|---|---|
| **640 x 480** | 120 Hz | 120 Hz | 120 Hz |
| **800 x 600** | 120 Hz | 120 Hz | 120 Hz |
| **1024 x 768** | 120 Hz | 120 Hz | 120 Hz |
| **1280 x 1024** | 120 Hz | 120 Hz | 120 Hz |
| **1600 x 1200** | 85 Hz | 85 Hz | 85 Hz |
| **1800 x 1440** | 72 Hz | | |

*chapter* 7

# SERVICE NOTES

**CAUTION:** Use safety glasses equipped with side shields before attempting to clean debris from under the keys.

1. The processor chip is mounted upside down on a board. The heatsink mounts directly to the back of the chip. The chip is in the center of the processor package, but the processor is offset in the system board socket because of the hinge for the lever arm. The heatsink and clip must be properly aligned so that the clip pushes the heatsink flat against the chip.

   If the heatsink is mounted improperly, the processor runs at a higher-than-normal temperature and the computer posts an immediate processor failure message (before the computer completes Power-On Self Test [POST]). If the Compaq DMI software is installed, the user receives a warning about any elevated temperature in the processor.

2. Unplug the power cord before installing or removing any PCI boards since the PCI slots have auxiliary power applied. If the power cord is not unplugged, damage to the boards can occur.

3. Each time the system starts, the system ROM saves a copy of NVRAM (including CMOS, passwords, and other system variables) in the flash ROM. Should the system become unstable, the last known good copy of NVRAM can be restored using a feature called "power button override." To restore NVRAM, do the following:

   - With the unit powered down, press and release the power button.
   - Immediately after pressing the power button (during POST), press and hold the power button until the unit powers down (about 4 seconds).

   At the next startup, the ROM detects this "power button override" event and the backup copy of NVRAM is restored.

   Because of this feature, users cannot power off the computer immediately after powering up. The video display must be active before the computer can be powered off.

4. The following setup is required for system memory to run at 133 MHz:

   - A 133-MHz front-side bus processor must be installed
   - All installed DIMMs must be PC133
   - No more than four loads on the data lines (four sides of SDRAM)

   In all other cases, the system BIOS downshifts the memory to 100 MHz.

5. The major core BIOS for the Deskpro EN is significantly changed from previous versions. Some of the key changes include:
   - unique system ROM for models with integrated Intel graphics and models with integrated NVIDIA graphics
   - detailed F10 Setup help text via the F1 key
   - enhanced storage support from F10 Setup, including:
     - detailed device viewing information
     - choice of booting to IDE or SCSI hard drives
     - execution of IDE DPS self test
     - support for LS-120 and ZIP drive booting (without a 1.44-MB diskette drive
     - increased maximum drive capacity from 64 GB to 2 terabytes
     - SCSI SMART failure support
     - adjustment of configurable device parameters, including:
       - translation mode options: bit shift (default), LBA assisted, user (must specify desired geometry), and none (hard disk defaults used). Two "industry standard" translations inhibits "connect-and-go" access to hard disk data
       - emulation type option, which allows users to force the BIOS to treat the device as the specified device type
         For an LS-120 and ATAPI ZIP drive, emulation modes include:
         1. diskette (ZIP drive only; to boot as A:/ drive)
         2. hard disk
         3. none

         The device's native type is always "none". For the Zip drive, none means "other" device type: for the LS-120 drive, none means "diskette" device type.
   - new F10 Setup device information
   - service password that allows for back-door, power-on capability in the event a password is forgotten
   - advanced interrupt controller (APIC) that provides more interrupt requests (IRQs) for PCI IRQ mapping (this feature can be disabled in F10 Setup)
   - 10-second POST time (may vary with slower storage devices or removable media)
   - master boot record (MBR) security, which provides recovery from malicious or accidental damage to the boot disk's MBR
   - notifies user during POST if the boot disk or its MBR has changed
   - changes to either the boot disk or the MBR require:
     - saving a new MBR image
     - disabling MBR security
     - restoring the backup MBR to the disk (unless the boot disk has changed)
   - some administrative utilities (like fdisk) cause changes to the MBR that are detected in the next reboot

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