COMPAQ

Compaq PowerStorm 600
Graphics Controller
Hardware Guide for the Compaq Professional Workstation SP700

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Compaq PowerStorm 600 Graphics Controller Hardware Guide
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Contents

About This Guide

This guide is designed as a hardware reference for the Compaq PowerStorm 600 Graphics Controller installed in the Compaq Professional Workstation SP700.

Text Conventions

This document uses the following conventions to distinguish elements of text:

Keys	Keys appear in boldface. A plus sign (+) between two keys indicates that they should be pressed simultaneously.
USER INPUT	User input appears in a different typeface and in uppercase.
FILENAMES	File names appear in uppercase italics.
Menu Options, Command Names, Dialog Box Names	These elements appear in initial capital letters.
COMMANDS, DIRECTORY NAMES, and DRIVE NAMES	These elements appear in uppercase.
Type	When you are instructed to *type* information, type the information **without** pressing the **Enter** key.
Enter	When you are instructed to *enter* information, type the information and then press the **Enter** key.

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.

> **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 information.

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

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

Symbols on Equipment

These icons may be located on equipment in areas where hazardous conditions may exist.

> Any surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.
> **WARNING:** To reduce the risk of injury from electrical shock hazards, do not open this enclosure.

> Any RJ-45 receptacle marked with these symbols indicates a Network Interface Connection.
> **WARNING:** To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching.

Power Supplies or Systems marked with these symbols indicate the equipment is supplied by multiple sources of power.

WARNING: To reduce the risk of injury from electrical shock, remove all power cords to completely disconnect power from the system.

Getting Help

If you have a problem and have exhausted the information in this guide, you can get further information and other help in the following locations.

Compaq Technical Support

You are entitled to free hardware technical telephone support for your product for as long you own the product. A technical support specialist will help you diagnose the problem or guide you to the next step in the warranty process.

In North America, call the Compaq Technical Phone Support Center at 1-800-OK-COMPAQ[1]. This service is available 24 hours a day, 7 days a week.

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for world wide Technical Support Centers are listed on the Compaq website. Access the Compaq website by logging on to the Internet at www.compaq.com.

Be sure to have the following information available before you call Compaq:

■ Technical support registration number (if applicable)

■ Product serial number (s)

■ Product model name(s) and numbers(s)

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[1] For continuous quality improvement, calls may be recorded or monitored.

- Applicable error messages

- Add-on boards or hardware

- Third-party hardware or software

- Operating system type and revision level

- Detailed, specific questions

Compaq Website

The Compaq website has information on this product as well as the latest drivers and Flash ROM images. You can access the Compaq website by logging on to the Internet at www.compaq.com.

Compaq Authorized Reseller

For the name of your nearest Compaq Authorized Reseller:

- In the United States, call 1-800-345-1518.

- In Canada, call 1-800-263-5868.

- Elsewhere, see the Compaq website for locations and telephone numbers.

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Chapter **1**

Introduction

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The Compaq PowerStorm 600 Graphics Controller is a multicard, high-performance, 3-D workstation graphics solution for the Compaq Professional Workstation SP700. This controller consists of two modules: a PCI graphics rendering module and an AGP geometry acceleration module. A flat ribbon cable connects the two modules.

PowerStorm 600 Graphics Controller Features

The PowerStorm 600 graphics controller offers the following high-end 3D graphics features:

■   Performance up to 3.4 million triangles per second (3D, Z-buffered, 25 pixel, Gouraud shaded, lit)

■   Support for Microsoft Windows NT graphics: Graphic Device Interface (GDI) and OpenGL

.
NOTE: The Compaq PowerStorm 600 Graphics Controller does not support the DirectX/Direct3D APIs. Applications that require these APIs will not run.

■   Support for resolutions up to 1.3 Megapixels (1280 x 1024); includes both 4:3 and 16:9 screen formats

■   Hardware support for graphics features such as Gouraud shading, 2D and 3D vectors and triangles, texture processing, rectangle fills, anti-aliased vectors, clipping, alpha blending, fog, and stenciling

■ 16 MB of Synchronous Dynamic RAM (SDRAM) frame buffer memory

■ 64 MB of SDRAM texture memory

■ Video plane sets of 128 bits per pixel (up to 1024 x 768), 100 bits per pixel (at 1280 x 1024), and four video color lookup tables

■ 10-bit gamma correction

■ 32- or 24-bit double-buffering and 24-bit or 32-bit Z-buffering

■ Integrated VGA video support

■ Support for industry standard and multi-sync monitors

■ Hardware support for Display Data Channel (DDC)

■ Additional hardware acceleration:

❑ BitBlit (screen-to-screen copy)

❑ Get Block (screen-to-system copy)

❑ Put Block (system-to-screen copy)

❑ Put Bit Map (for drawing text)

❑ Masking

❑ Fast window clears

❑ Fast window mode double-buffering

❑ 10-bit Gamma correction

❑ Genlock support for multiple screens

❑ Hardware cursor

❑ Stereoscopic viewing support interlaced or frame sequential

❑ Model view matrix transformation of vertex and normal coordinates

❑ Texture matrix transformation of texture coordinates

❑ Full lighting calculations with up to eight light sources

❑ Up to six user clip planes

❑ Perspective transformation and viewport transformation

❑ View volume clipping

❑ Local Display List storage and processing

PowerStorm 600 Graphics Controller Hardware Requirements

The PowerStorm 600 graphics controller includes a PCI graphics rendering module and an AGP geometry accelerator module. The module set requires one PCI slot and one AGP slot.

PowerStorm 600 Graphics Controller Software Requirements

The PowerStorm 600 graphics controller uses the Intense 3D Wildcat 4000 video display driver. The video display driver installs as a standard Windows NT 4.0 driver and provides both GDI and OpenGL graphics compatibility.

Chapter **2**

Preparing for Removal/Installation

Your Compaq PowerStorm 600 Graphics Controller was factory-installed by Compaq Computer Corporation. The instructions in this chapter and Chapters 3 and 4 are provided for your reference.

Taking Electrostatic Discharge Precautions

Static electricity can damage the components inside a workstation or on a printed circuit card. To minimize the possibility of electrostatic discharge:

■ Turn off power to the workstation.

> ⚠ **CAUTION:** Disconnect the power cord from the system and wait 15-30 seconds for power to dissipate. Damage can occur to add-in components if power is not physically removed from the system during the installation procedures.

■ Touch the metal chassis of the workstation to drain off any static electricity before touching a card.

■ Wear a properly connected grounding wrist strap when handling a card or working in a workstation.

■ Work in an area with a relative humidity of at least 50 percent.

■ Do not remove the cards from their antistatic bags until you are ready to install them.

■ Handle cards as little as possible and by the edges only.

For more information regarding electrostatic discharge, see Appendix B in this guide.

Collecting Materials

Collect the following materials:

■ Compaq PowerStorm 600 Graphics Controller

NOTE: The PowerStorm 600 graphics controller includes a wide ribbon cable identified as the Vertex Bus cable that connects the geometry accelerator module and the graphics rendering module.

■ CD containing the video driver for the Powerstorm 600 graphics controller

■ Monitor with cable

■ Your workstation documentation

Reading the Instructions

Before installing or removing the PowerStorm 600 graphics controller, read Chapter 3, "Installing/Removing the Hardware," and Chapter 4, "Installing the Software" completely. You may want to review the *README.TXT* file on the video display driver CD as well.

Review your workstation documentation for instructions on opening and closing the workstation, identifying the AGP slot, PCI expansion slots, and adding expansion cards.

Review the Microsoft Windows NT documentation and online Help for information on using the Display application and for instructions on installing drivers and software application programs.

Chapter **3**

Installing/Removing the Hardware

Your Compaq PowerStorm 600 Graphics Controller was factory-installed by Compaq Computer Corporation. The instructions in this chapter and Chapter 4 are provided for your reference.

Refer to your workstation reference guide for instructions on opening and closing the workstation, identifying the AGP and PCI slots, and adding expansion cards.

Before Installing or Removing the Hardware

To start the installation:

1. Confirm that power to the workstation and to the monitor is off. Disconnect the power cord from the system and allow the power to dissipate for 15-30 seconds before proceeding.

2. Open the workstation to gain access to the AGP and PCI expansion slots.

Installing the PowerStorm 600 Graphics Controller

To install the PCI graphics rendering module, refer to Figure 3-1 and follow these steps:

1. Align the module with the PCI slot, making sure the gold-fingered connectors on the edge of the module are aligned properly with the slot connector.

2. Push the module into the slot firmly and evenly until it is fully seated in the slot connector.

3. Visually inspect the connection. If it does not appear to be correct, remove and reinstall the module.

4. Use the screw you removed previously to secure the module to the workstation chassis.

To install the AGP geometry accelerator module, refer to Figure 3-1 and follow these steps:

1. Align the module with the AGP slot, making sure the gold-fingered connectors on the edge of the module are aligned properly with the slot connector.

2. Push the module into the slot firmly and evenly until it is fully seated in the slot connector.

3. Visually inspect the connection. If it does not appear to be correct, remove and reinstall the module.

4. Use the screw you removed previously to secure the module to the workstation chassis.

5. Connect the vertex data bus cable between the two modules, ensuring that the end of the cable with the ferrite band is plugged into the AGP module.

NOTE: The connector of the vertex data bus cable can be installed in only one orientation.

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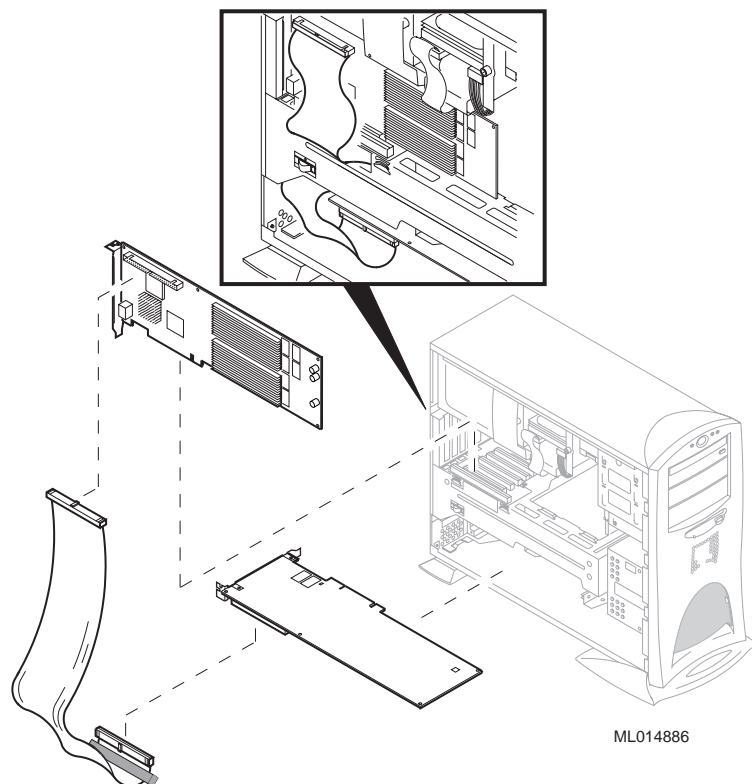
Figure 3-1. Installing the Graphics Controller Modules

Completing the Installation

To complete the installation:

 1. Close the workstation.

 2. Connect the monitor video cable to the blue video output port on the
    graphics rendering module of the PowerStorm 600 graphics controller.

    If a workstation monitor has no built-in video cable, use a shielded video
    cable with a 15-pin (D-sub) video connector at one end for the video output
    port on the controller and the appropriate connectors at the other end for
    the video input port on the workstation monitor.

NOTE: Monitor input ports are usually D-sub or Bayonet Nut Connect (BNC) connectors. Shielded cables usually have a ferrite core (a box- or cylinder-shaped attachment) near each end to reduce interference with radio frequencies.

3. Turn on the workstation. The video display starts in VGA mode.

4. Install the video display driver for the PowerStorm 600 graphics controller as instructed in Chapter 4, "Installing the Software."

Removing the PowerStorm 600 Graphics Controller

To remove the PowerStorm 600 graphics controller, reverse the steps in the "Installing the PowerStorm 600 Graphics Controller" section.

CAUTION: Unplug the vertex cable from the module set before removing the PowerStorm 600 graphics controller.

Installing the Software

This chapter explains how to install the video drivers for your Compaq PowerStorm 600 Graphics Controller.

> **NOTE:** The PowerStorm 600 graphics controller requires Service Pack 4a from Microsoft to be installed on your workstation. This software was provided with your workstation. Please refer to your workstation documentation for more information.

Installing the Display Driver for the PowerStorm 600 Graphics Controller on Windows NT 4.0

Refer to the Microsoft Windows NT Workstation documentation and online Help for more information on installing drivers and software application programs, and configuring your workstation video display.

To install the driver for your PowerStorm 600 graphics controller:

1. Insert the CD containing the driver into the workstation CD-ROM drive.

> **CAUTION:** Make sure you have the correct driver to use with Windows NT Workstation 4.0. If you are unsure, refer to the *README.TXT* file on the driver CD for this information.

2. From the operating system *Start* menu, go to *Settings/Control Panel* and click on the *Control Panel* icon.

3. Click the *Display* icon in *Control Panel*. The *Display Properties* menu appears.

4. Click the *Settings* tab.

5. Click the *Display Type* button and bring up the *Display Type* panel.

6. Click the *Change* button and bring up the *Change Display* panel.

7. Click *Have Disk* and bring up the *Install From Disk* panel.

8. In the *Install From Disk* panel, enter the path for your driver. Click *OK*.

9. Verify that the *Intense 3D Wildcat 4000* driver is highlighted in the *Change Display* dialog, and click *OK*.

10. Click *Yes* when asked if you want to install a third-party driver.

    The driver files on the CD are copied to the primary hard drive of your workstation.

11. Insert the CD if you are prompted to do so and click *OK*.

    The installation will continue copying files. After the driver files are copied successfully, a message that the driver successfully installed displays.

12. Click *OK* again.

13. Click *Close* to exit the *Display Type* dialog.

14. Click *Close* to exit the *Display Properties* dialog.

15. When informed that the workstation must be restarted for the new settings to take effect, remove the CD from the CD-ROM drive and click *Yes* to restart the workstation.

    After the system restarts and you log in, a message displays. The message states that a new graphic driver has been installed, and that you should use the Display option in the Control Panel to select the preferred display resolution.

16. Click *OK*.

17. The *Display Properties/Settings* panel is brought up. Click *OK* to have the current settings applied.

18. If you want to change the display resolution or other display settings, see the following section, "Configuring the Video Display."

> ⚠ **CAUTION:** When you select *Display* in the Windows NT Control Panel, a message displays. Click *OK* to close the message. This message displays every time you select *Display* unless you clear the Show warning at startup check box.

For more detailed installation information, refer to the *README.TXT* file delivered on the diskette containing the video display driver.

Configuring the Video Display

1. From the operating system *Start* menu, go to *Settings/Control Panel* and click on the *Control Panel* icon.

2. Open *Display* in the *Control Panel* to view the *Display Properties* dialog. Use the dialog tabs to configure the operation of the video display when it is controlled by the driver for the PowerStorm 600 graphics controller. For example, click the *Settings* tab to change the screen resolution.

For more detailed configuration information, refer to the *README.TXT* file delivered on the diskette containing the video display driver.

Verifying the Default Video Display Driver

After you configure the video display as desired, verify that the driver for the PowerStorm 600 graphics controller is the default video display driver that runs automatically when you start the workstation.

To verify the default video display driver:

1. From the operating system *Start* menu, go to *Settings/Control Panel/System*.
   On the *Startup/Shutdown* tab, verify that Windows NT Workstation Version 4.0 is selected in the Startup list. If it is not, select it from the list and click *Apply*.

> **IMPORTANT:** Do not select the VGA version of the operating system. The video display runs in VGA mode when the driver for the PowerStorm 600 graphics controller is not running.

2. Click *OK* to close the *System* dialog.

3. Click *Display* in the Control Panel.

4. Click the *Settings* tab.

5. Click the *Display Type* button.

6. Under *Adapter Type,* verify that the *Intense 3D Wildcat 4000 driver* is present. This indicates the driver is installed for the PowerStorm 600 graphics controller.

7. Click the *Cancel* button. No changes will occur.

8. Click the *Cancel* button to close the *Display Properties* menu.

Chapter 5

Technical Information

The following information is subject to change without notice.

Compaq PowerStorm 600 Graphics Controller Specifications

Table 5-1
PCI Graphics Rendering Module Hardware Specifications

Item	Specification
System	PCI Bus Standard
Card Size	12.25 inch x 3.875 inch; full-length PCI card
Power Requirements	25W maximum
	+12V@0.083 A maximum
	+5V@1.200 A maximum
	+3.3V@5.150 A maximum

Table 5-2
AGP Geometry Accelerator Module Hardware Specifications

Item	Specification
System	AGP Bus Standard
Card Size	12.25 inch x 3.875 inch; full-length AGP card
Power Requirements	24W maximum
	+12V@0.083 A maximum
	+5V@1.200 A maximum
	+3.3V@5.150 A maximum

Monitor Resolutions

The PowerStorm 600 graphics controller supports Compaq monitors and standard multi-sync monitors at the following resolutions and maximum refresh rates (Hz).

Resolution	Aspect Ratio	Bits per Pixel	Vertical Refresh Rates (Hz)
640 x 480	4 x 3	128	60, 73, 75, 85
800 x 600	4 x 3	128	60, 72, 75, 85
1024 x 768	4 x 3	128	60, 70, 75, 85
1152 x 864	4 x 3	128	60, 70, 75, 85
1280 x 960	5 x 4	100	60, 75, 85
1280 x 1024	5 x 4	100	60, 75, 85

VGA Video Display Support

The PowerStorm 600 graphics controller provides onboard VGA video display support. The maximum resolution supported in VGA mode is 800 x 600, 4 bits per pixel, at 60-Hz vertical refresh.

Texture Processing

Texture processing is provided by the onboard graphics and texture-processing engine. Full texture processing is supported, including trilinear interpolation of MIP-mapped images.

There are 64 MB of texture memory included onboard.

Z Buffering

The system supports hardware Z buffering at a depth of 32 bits with any resolution up to 1024 x 768. At 1280 x 1024, the Z buffer resolution is 24 bits.

DDC and DPMS Support

The PowerStorm 600 graphics controller provides hardware support for the Display Data Channel (DDC) standard for communication between a host workstation and its monitor. The controller supports the DDC 2B standard, which allows for bidirectional communication.

The PowerStorm 600 graphics controller also provides hardware support for the Display Power Management Signaling (DPMS) standard. DPMS allows for a host workstation to transition its monitor to a power-saving mode.

Interfaces

The PowerStorm 600 graphics controller has a video output and a Stereo Sync Output Port, as described in the following sections.

Video Output Port

The video output port is a blue, female, 15-pin, D-Sub connector. The port provides connection to a workstation monitor. Use a cable less than 3 meters long.

**Table 5-3
Video Output Port**

Pin	Signal Name	Pin	Signal Name
1	Red Analog Video	9	+5V Supply
2	Green Analog Video	10	Ground
3	Blue Analog Video	11	Monitor ID (bit 0)
4	Monitor ID (bit 2)	12	Monitor ID (bit 1) *
5	Ground	13	Horizontal Sync
6	Ground	14	Vertical Sync
7	Ground	15	Monitor ID (bit 3) **
8	Ground		

* Bidirectional Data (SDA) for DDC

** Data Clock (SCL) for DDC

Stereo Sync Output Port

The stereo sync output port is a female, 5-pin, mini-DIN connector. The port provides connection to the emitter module of a pair of LCD shutter glasses.

Table 5-4
Stereo Sync Output Port

Pin	Signal Name
1	Ground
2	Ground
3	+12V
4	Stereo Sync
5	No Connect

Appendix **A**

Regulatory Compliance Notices

Federal Communications Commission Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures::

■ Reorient or relocate the receiving antenna.

■ Increase the separation between the equipment and receiver.

■ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

■ Consult the dealer or an experienced radio or television technician for help.

**Declaration of Conformity for Products Marked
with the FCC logo – United States Only**

This device complies with Part 15 of the FCC Rules. Operation is subject to
the following two conditions: (1) this device may not cause harmful
interference, and (2) this device must accept any interference received,
including interference that may cause undesired operation.

For questions regarding your product, contact:

Compaq Computer Corporation
P. O. Box 692000, Mail Stop 530113
Houston, Texas 77269-2000

or call 1-800- 652-6672 (1-800-OK COMPAQ). (For continuous quality
improvement, calls may be recorded or monitored.)

For questions regarding this FCC declaration, contact:

Compaq Computer Corporation
P. O. Box 692000, Mail Stop 510101
Houston, Texas 77269-2000

or call (281) 514-3333.

To identify this product, refer to the Part, Series, or Model number found on
the product.

Modifications

The FCC requires the user to be notified that any changes or modifications
made to this device that are not expressly approved by Compaq Computer
Corporation may void the user's authority to operate the equipment.

Cables

Connections to this device must be made with shielded cables with metallic
RFI/EMI connector hoods in order to maintain compliance with FCC Rules
and Regulations.

Canadian Notice

This Class B digital apparatus meets all requirements of the Canadian
Interference-Causing Equipment Regulations.

Avis Canadien

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union Notice

Products with the CE Marking comply with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Norms (in brackets are the equivalent international standards):

■ EN55022 (CISPR 22) - Electromagnetic Interference

■ EN50082-1 (IEC801-2, IEC801-3, IEC801-4) - Electromagnetic Immunity

■ EN60950 (IEC950) - Product Safety

Appendix **B**

Electrostatic Discharge

To prevent damaging the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage, observe the following precautions:

■ Avoid hand contact by transporting and storing products in static-safe containers.

■ Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.

■ Place parts on a grounded surface before removing them from their containers.

■ Avoid touching pins, leads, or circuitry.

■ Always be properly grounded when touching a static-sensitive component or assembly.

Grounding Methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

■ Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ± 10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.

■ Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.

■ Use conductive field service tools.

■ Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an Authorized Compaq Reseller install the part

NOTE: For more information on static electricity, or assistance with product installation, contact your Authorized Compaq Reseller.