

service reference guide

hp business desktop dx5150 series
1st edition

This document provides information on the removal and replacement of all parts as well as information on troubleshooting, Desktop Management, setup utilities, PATA and SATA drives, safety, routine care, connector pin assignments, POST error messages, and diagnostic indicator lights.

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HP Business Desktop dx5150 Series
1st Edition

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Installing the Operating System

 **CAUTION:** Do not add optional hardware or third-party devices to your computer until the operating system is successfully installed. Doing so may cause errors and may prevent the operating system from installing properly.

 **CAUTION:** Once the automatic installation has begun, DO NOT TURN OFF THE COMPUTER UNTIL THE PROCESS IS COMPLETE. Turning off the computer during the installation process might damage the software that runs the computer or prevent its proper installation.

The first time the computer is turned on, the operating system is automatically installed. This takes approximately 10 minutes, depending on the system hardware configuration. At the beginning of the installation process, you are prompted to select the appropriate language for the operating system. Read and follow the instructions that appear on the screen to complete the installation. During this process, do not turn off your computer unless you are directed to do so.

 If the computer shipped with more than one operating system language on the hard drive, the installation process could take up to 60 minutes.

1.1 Installing or Upgrading Device Drivers


To install hardware devices such as a printer, a display adapter, or network adapter after the operating system installation is completed, the operating system needs access to the appropriate software drivers for the devices.

If prompted for the I386 directory, replace the path specification with **C:\i386**, or click **Browse** in the dialog box to locate the i386 folder. This action points the operating system to the appropriate drivers.

Obtain the latest support software, including support software for the operating system from www.hp.com. Click **support & drivers**, select **Download drivers and software**, enter the model number of the computer, and press **Enter**.

You can also obtain the latest support software on CD. The following Web site provides information about purchasing a support software CD subscription:

<http://h18000.www1.hp.com/support/files/desktops/us/purchase.html>

 If the computer has an optical CDRW drive, install the appropriate application to allow you to write to the drive. To install the application, double-click the Setup Software icon on the desktop or the application launcher and select the **Easy CD Creator** and **Direct CD** options when prompted.

1.2 Transferring Files and Settings

Use the Microsoft Windows XP Files and Settings Transfer Wizard to move files and settings from an old computer to a new one. Click **Start > All Programs > Accessories > System Tools > Files and Settings Transfer Wizard**.

1.3 Backing Up and Restoring Files

1.3.1 Creating a Backup File—Windows XP Professional

1. Click **Start > All Programs > Accessories > System Tools > Backup**.
2. Use the Backup or Restore Wizard to create a backup file or tape.



You can save a backup file to a hard disk, a floppy disk, CD, USB flash media device, tape drive, or to any other removable or nonremovable media.

1.3.2 Restoring from the Backup File—Windows XP Professional

1. Click **Start > All Programs > Accessories > System Tools > Backup**.
2. Use the Backup or Restore Wizard to restore files from a backup file.



A backup file can be saved on a hard disk, a floppy disk, CD, USB flash media device, tape drive, or any other removable or nonremovable media.

1.4 Converting to NTFS

Windows XP Professional

To convert a FAT or FAT32 volume to NTFS,

1. Click **Start > All Programs > Accessories > Command Prompt**.
2. Type **convert *drive_letter*: /fs:ntfs** (where *drive_letter* is the volume to be converted) and press **Enter**.

1.5 HP Software

The Microsoft Windows XP Professional operating system is preinstalled on the computer and will be configured automatically the first time the computer is turned on. The following HP software may also be installed at that time on selected models:

- Computer Setup Utilities
- HP Support Software including device drivers
- Configuration Record
- Online *Safety & Comfort Guide*
- Power Management with energy saver features
- Security Management tools
- Software Support Management tools

Certain drivers and utilities are available only in selected languages. You can obtain the latest version of these files, in English and selected other languages, in one of three ways:

- Support Software CD
- HP Web site at www.hp.com
- *Restore Plus!* CD, which is supplied with many HP models



Additional HP software may be required in certain situations.

Setup Utilities and Diagnostics Features

Setup Utilities (F10) and diagnostic features provide information needed about the computer system when contacting Customer Support. You can also use these tools to:

- Change factory default settings and to set or change the system configuration, which may be necessary when you add or remove hardware.
- Determine if all of the devices installed on the computer are recognized by the system and are functioning properly.
- Determine information about the operating environment of the computer.
- Solve system configuration errors detected but not automatically fixed during the Power-On Self-Test (POST).
- Establish and manage passwords and other security features.
- Establish and manage energy-saving timeouts.



All features identified in this chapter may not be available on all HP products.

2.1 Power-On Self-Test (POST)

POST is a series of diagnostic tests that runs automatically when the system is turned on. POST checks the following items to ensure that the computer system is functioning properly:

- Keyboard
- Memory modules
- Diskette drives
- All mass storage devices
- Processors
- Controllers



If the Power-On Password is set, a text box password prompt appears on the screen while POST is running. You must enter the password before continuing. Refer to Chapter 3, [Section 3.1, “Initial Configuration and Deployment.”](#) for information on setting, deleting, or bypassing the password.

If POST finds an error in the system, an audible and/or visual message occurs. For POST error messages and their solutions, refer to [Appendix C, “POST Error Messages.”](#)

2.2 Computer Setup (F10) Utilities

Use Computer Setup (F10) Utility to do the following:

- Change factory default settings.
- Set the system date and time.
- Set, view, change, or verify the system configuration, including settings for processor, graphics, memory, audio, storage, communications, and input devices.
- Modify the boot order of bootable devices such as hard drives, diskette drives, optical drives, or USB flash media devices.
- Enable or disable Quick Power-On Self Test, which is faster than a full boot but does not run all of the diagnostic tests run during a full boot.
- Enter the Asset Tag or property identification number assigned by the company to this computer.
- Establish a supervisor password that controls access to Computer Setup (F10) Utility and the settings described in this section.
- Secure integrated I/O functionality, including the serial, USB, or parallel ports, audio, or embedded NIC, so that they cannot be used until they are unsecured.
- Enable or disable Master Boot Record (MBR) Security.
- Enable or disable removable media boot ability.
- Enable or disable legacy diskette write ability (when supported by hardware).

2.2.1 Using Computer Setup (F10) Utilities

You can only access Computer Setup by turning the computer on or restarting the system. To access the Computer Setup Utilities menu, complete the following steps:

1. Turn on or restart the computer. If you are in Microsoft Windows, click **Start > Shut Down > Restart**.
2. As soon as the computer is turned on, press and hold the **F10** key until you enter Computer Setup.



If you do not press the **F10** key at the appropriate time, you must restart the computer and press and hold the **F10** key again to access the utility.

3. The Computer Setup Utility screen is divided into seven menu headings:
 - System Information
 - Standard CMOS Features
 - Advanced BIOS Features
 - Advanced Chipset Features
 - Integrated Peripherals
 - Power Management Setup
 - PnP/PCI Configurations

Six action choices are listed on the Computer Setup Utility screen:

- PC Health Status
- Load Optimized Defaults
- Set Supervisor Password
- Set User Password
- Save & Exit Setup
- Exit Without Saving

Use the arrow keys to select the appropriate heading, and then press **Enter**. Use the arrow (up and down) keys to select the option you want, and then press **Enter**. To return to the previous screen, press **Esc**.


4. To apply and save changes, press **F10** or select **Save & Exit Setup** on the Computer Setup Utility screen and press **Enter**.

If you have made changes that you do not want applied, select **Exit Without Saving** and press **Enter**.






CAUTION: Do NOT turn computer power OFF while the ROM is saving F10 Computer Setup changes because the CMOS could become corrupted. It is safe to turn off the computer only after exiting the F10 Setup screen.

2.2.2 Computer Setup Menu

Computer Setup			
Heading	Option	Description	
System Information	Displays	Product Name Processor Type Cache Size Memory Size System ROM Integrated MAC UUID System Serial # Asset Tracking Number Enter Asset Tag No.	
	Standard CMOS Features	Date (mm:dd:yy)	Allows you to set system date.
		Time (hh:mm:ss)	Allows you to set system time.
	Standard CMOS Features	IDE Channel 0 Master	For each, allows you to: <ul style="list-style-type: none"> • HDD Self-Test (SATA only) • SMART Status Check • HDD Short Self-Test • HDD Extended Self-Test • IDE Auto-Detection • Extended IDE Drive <ul style="list-style-type: none"> • None • Auto • Access Mode <ul style="list-style-type: none"> • CHS (PATA only) • LBA (PATA only) • Large • Auto
		IDE Channel 0 Slave	
		SATA IDE Channel 1 Master	
		SATA IDE Channel 2 Master	
		Drive A	
	Standard CMOS Features	Halt On	Allows you to set at: <ul style="list-style-type: none"> • All Errors • No Errors • All, but Keyboard • All, but Diskette • All, but Diskette/Keyboard
		POST Delay	Allows you to set a POST delay.
 Support for specific Computer Setup options may vary depending on the hardware configuration.			

Computer Setup (Continued)

Heading	Option	Description
Advanced BIOS Features	Removable Device Boot Seq.	Allows you to specify the order in which attached devices (such as an FDD, an LS120, or a Zip Drive) are checked for a bootable operating system image.
	Hard Disk Boot Seq.	Allows you to specify the order of attached hard drive devices (such as USB HDD storage, USB2 DriveKey, or USB flash media). The first drive in the order has priority in the boot sequence and is recognized as drive C (if any devices are attached).
	CD-ROM Boot Seq.	Allows you to specify the order in which attached CD-ROM drives (including USB ODD) are checked for a bootable operating system image.
	Network Boot Seq.	Allows you to specify the order in which network devices (including UP NIC cards) are checked for a bootable operating system image.
	MBR Security	Enables/disables the VIRUS warning feature for IDE Hard Disk boot sector protection. When this function is enabled and someone attempts to write data into this area, the BIOS responds with a warning message on screen and an alarm beep.
	Quick Power On Self Test	Enables/disables the system to skip certain tests while booting. Enabling this feature decreases the time required to boot the system.
	First Boot Device Second Boot Device Third Boot Device Fourth Boot Device	Allows you to specify which devices will boot first, second, third, and fourth.  MS-DOS drive lettering assignments may not apply after a non-MS-DOS operating system has started.
	Boot Up NumLock Status	Allows you to set the default NumLock status on or off.
	Security Option	Allows you to set to either Always or Setup.
	APIC Mode	Enables/disables the APIC support.
	MPS Version Control for OS	Allows you to set the MPS version for the OS.
	HDD S.M.A.R.T. Capability	Enables/disables SMART capability on the hard drive.
	ASF Support	Enables/disables ASF
BIOS Write Protection	Enables/disables BIOS write protection.	
Advanced Chipset Features	UMA Frame Buffer Size	Allows you to set the size of the UMA frame buffer.
 Support for specific Computer Setup options may vary depending on the hardware configuration.		


Computer Setup (Continued)		
Heading	Option	Description
Advanced Chipset Features (continued)	Video Display Devices	Allows you to set to: <ul style="list-style-type: none"> • Auto • CRT only • DFP only • CRT Force, DFP Auto
	Init Display First	Allows you to select the primary VGA source.
	Surroundview	Allows you to enable/disable Surroundview only if PCI-E GFX add-on card is ATI. Provides support for up to three independent monitors (available with the unified drivers).
	Auto Detect PCI Clk	Enables/disables PCI Clk auto detection.
	Spread Spectrum	Enables/disables spread spectrum.
Integrated Peripherals	South OnChip PCI Device	Allows you to enable/disable: <ul style="list-style-type: none"> • On Chip IDE Controller • Onboard AC97 Audio • Onboard Chip SATA <ul style="list-style-type: none"> • SATA Disabled • IDE Controller (non-RAID) • RAID Controller • Onboard LAN • Onboard LAN Boot ROM
	OnChip USB Controller	Enables/disables the USB controller.
	USB Legacy Support	Enables or disables the USB Legacy feature.
	Front Panel USB Port	Enables/disables the front panel USB port and the two USB ports located on the back of the computer under the NIC connector.
	Onboard FDC Controller	Enables/disables onboard FDC controller.
	Onboard Serial Port	Allows you to disable or select setting for the onboard serial port.
	Onboard Parallel Port	Allows you to disable or select setting for onboard parallel port.
	Parallel Port Mode	Allows you to select parallel port mode.
	ECP Mode Use DMA	If Parallel Port Mode is set to ECP or ECP+EPP, allows you to set the ECP Mode Use DMA to 1 or 3.
	Power Management Setup	ACPI Function
ACPI Suspend Type		Allows you to set type of ACPI suspend.
MODEM Use IRQ		Select IRQ for the device.
 Support for specific Computer Setup options may vary depending on the hardware configuration.		

Computer Setup (Continued)

Heading	Option	Description
Power Management Setup (continued)	After AC Power Loss	Allows you to select: <ul style="list-style-type: none"> • Last State • On • Off
	PowerOn by PCI Card	Enables/disables capability of powering on by PCI card.
	AMD Cool'n'Quiet	Allows you to set the AMD Cool'n'Quiet to auto or to disable it.
	RTC Alarm Resume	Enables/disables resumption of RTC alarm.
	Date (of Month)	If RTC Alarm Resume is enabled, allows you to select the day of the month for resumption of RTC alarm.
	Resume Time (hh:mm:ss)	If RTC Alarm Resume is enabled, allows you to select what time the RTC alarm will resume.
PnP/PCI Configurations	Reset Configuration Data	Enables/disables automatic reconfiguration. Default is Disabled. Select Enabled to reset Extended System Configuration Data (ESCD) when you exit Setup, if you have installed a new add-on and the system reconfiguration has caused such a serious conflict that the OS cannot boot.
	Resources Controlled By	Allows you to select whether resources are controlled automatically or manually. BIOS can automatically configure all the boot and Plug-and-Play-compatible devices. If you choose Auto, you cannot select IRQ DMA and memory base address fields, since BIOS automatically assigns them.
	IRQ Resources	When resources are controlled manually, allows you to assign each system interrupt a type, depending on the type of device using the interrupt. Legacy ISA for devices compliant with the original PC AT bus specification, PCI/ISA PnP for devices compliant with the Plug and Play standard whether designed for PCI or ISA bus architecture.
	• IRQ-3 assigned to	
	• IRQ-4 assigned to	
• IRQ-5 assigned to		
• IRQ-7 assigned to		
• IRQ-10 assigned to		
• IRQ-11 assigned to		
• IRQ-12 assigned to		
• IRQ-14 assigned to		
• IRQ-15 assigned to		
Assign IRQ for VGA	Enables/disables capability of assigning IRQ for VGA.	
Assign IRQ for USB	Enables/disables capability of assigning IRQ for USB.	



Support for specific Computer Setup options may vary depending on the hardware configuration.

Computer Setup (Continued)		
Heading	Option	Description
PC Health Status	System Information	Lists: <ul style="list-style-type: none"> • CPU Temperature • System Temperature • CPU Fan Speed • System Fan Speed • System Fan Fail Check (enable/disable) • Fan Control (auto/disable)
Load Optimized Defaults		Allows you to reset Computer Setup to factory defaults.
Set Supervisor Password		Allows you to establish a password to control access to Computer Setup. Allows you to boot computer and change Computer Setup.
Set User Password		Allows you to establish a password to control access to the computer. Allows you to boot the computer and view Computer Setup.
Save & Exit Setup		Allows you to save current settings and exit Computer Setup.
Exit Without Saving		Allows you to exit Computer Setup without saving changes.
 Support for specific Computer Setup options may vary depending on the hardware configuration.		

2.3 Recovering the Configuration Settings

Recovering the configuration settings established in the Computer Setup (F10) Utility requires that you first back up the settings before a recovery is needed.

The CMOS Save/Load utility ROMPAQ can be found at <http://www.hp.com> under the support and drivers for the HP Business Desktop dx5150. Download the ROMPAQ files into a folder on a removable storage device. It is recommended that you save any modified computer configuration settings to a diskette, a USB flash media device, or a diskette-like device (a storage device set to emulate a diskette drive), and save the diskette or device for possible future use.

2.3.1 Backing up the CMOS

1. Make sure the computer you want to back up is turned on. Connect the removable storage to the computer.
2. In Windows, click **Start > Run**, type **CMD**, and click **OK** to open a DOS command window.
3. Type **N:\folder\BIOS.exe SAVE:ABC001.DAT** (where *N* is the drive letter of the removable storage) to save the CMOS setting to the removable storage device.

2.3.2 Restoring the CMOS

1. Make sure the target computer is turned on. Connect the removable storage to the target computer.
2. In Windows, click **Start > Run**, type **CMD**, and click **OK**. to open a DOS command window.
3. Type **N:\folder\BIOS.exe LOAD:ABC001.DAT** (where *N* is the drive letter of the removable storage) to load the custom CMOS setting onto the target system.

2.4 Diagnostics for Windows

The Diagnostics for Windows (DFW) utility allows you to view information about the hardware and software configuration of the computer while running Microsoft Windows XP. It also allows you to perform hardware and software tests on the subsystems of the computer.

When you invoke Diagnostics for Windows, the current configuration of the computer is shown on the Overview screen. There is access from this screen to several categories of information about the computer and the Test tab. You can save to a file or print the information in every screen of the utility.



To test all subsystems, you must log in as the administrator. If you do not log in as the administrator, you will be unable to test some subsystems. The inability to test a subsystem is indicated by an error message under the subsystem name in the Test window or by shaded check boxes that you cannot select.

Use Diagnostics for Windows in the following instances to:

- Determine if all the devices installed on the computer are recognized by the system and functioning properly. Running tests is optional but recommended after installing or connecting a new device.
- Third party devices not supported by HP may not be detected. Save, print, or display the information generated by the utility.

2.4.1 Detecting Diagnostics for Windows

Some computers ship with the Diagnostics for Windows preloaded, but not preinstalled.

To determine whether Diagnostics for Windows is installed:

1. Access the location of the Diagnostics icons in Windows XP Home or Windows XP Professional by selecting **Start > Control Panel > Performance and Maintenance**.
2. If icons for Configuration Record and Diagnostics for Windows are present, the Diagnostics for Windows utility is installed. If the icons are not present, the utility is either not preloaded or not installed.

2.4.2 Installing Diagnostics for Windows

If Diagnostics for Windows is not preloaded, you can download the Diagnostics for Windows SoftPak from the following Web site:

<http://www.hp.com/support/files>

Once you download the software onto the hard drive, install the software as follows:

1. Close all Windows applications.
2. Install the Diagnostics for Windows utility:
 - In Windows XP, select **Start > Setup Software** icon. Select **Diagnostics for Windows**, click **Next**, then follow the instructions on the screen.
 - If the Setup Software icon is not on the Desktop or on the Start menu, run the Setup program from the **C:\CPQAPPS\DIAGS** directory or select **Start > Run** and type the following in the command line: **C:\CPQAPPS\DIAGS\SETUP**.
3. Click **Next** to install Diagnostics for Windows.
4. After the program has finished installing, you may be prompted to restart the computer, or the computer may automatically restart. If prompted, click **Finish** to restart the computer or **Cancel** to exit the program. You must restart the computer to complete the installation of Diagnostics for Windows.



If you want to upgrade an existing version of Diagnostics for Windows installed on the computer, visit <http://www.hp.com/support/files> and click on an applicable product. Locate the desired software and download the latest version. Execute the downloaded file and select **Repair** to update the installed version. This will cause the new version to overwrite the old version.

2.4.3 Using Categories in Diagnostics for Windows

To use categories:

1. Click **Start > HP Information Center > Diagnostics for Windows**. You can also select the **Diagnostics for Windows** icon, located in the Control Panel.

The screen displays the overview of the computer hardware and software.

 - In Windows 2000 Professional, select **Start > Settings > Control Panel**, then select **Diagnostics for Windows**.
 - In Windows XP Home and Windows XP Professional, select **Start > Control Panel > Performance and Maintenance**, then select **Diagnostics for Windows**.
2. For specific hardware and software information, select a category from the **Categories** pull-down menu or the appropriate icon on the toolbar.



As the cursor moves over the toolbar icons, Windows displays the corresponding category name.

3. To display more detailed information in a selected category, click **More** in the **Information Level** box in the lower left corner of the window or click **Level** at the top of the screen, and then select **More**.
4. Review, print, and/or save this information as desired.
 - To print the information, click **File > Print**. Select one of the following options: **Detailed Report (All Categories)**, **Summary Report (All Categories)**, or **Current Category**. Click **OK** to print the report you selected.
 - To save the information, click **File > Save As**. Select one of the following options: **Detailed Report (All Categories)**, **Summary Report (All Categories)**, or **Current Category**. Click **OK** to save the report you selected.
5. To exit Diagnostics for Windows, on the **File** menu, click **Exit**.

Menu Bar—File, Categories, Navigation, Level, Tab, Help

At the top of the Diagnostics for Windows screen is a menu bar consisting of six pull-down menus. Select a menu for the following system information:

- File—Save As, Print, Printer Setup, Exit.
- Categories.
 - System—System board, ROM, date, and time.
 - Asset Control—Asset tag, system serial number, and processor.
 - Input Devices—Keyboard, mouse, and joystick(s).
 - Communication—Ports.
 - Storage—Storage drives.
 - Graphics—Graphics.
 - Memory—System board and Windows memory.
 - Multimedia—Optical storage (CD, DVD, and so on) and audio.
 - Windows—Windows.
 - Architecture—PCI Device.
 - Resources—IRQ, I/O, and Memory Map.
 - Health—Status of system temperature and hard drives.
 - Miscellaneous—CMOS, DMI, BIOS, System, Product Name, and Serial Number.
- Navigation—Previous Category (**F5**), Next Category (**F6**).
- Level—Less (**F7**), More (**F8**) <information on the screen>.
- Tab.
 - Overview—Displays general information about the computer. This window is displayed when first starting the utility. The left side of the window shows hardware information, while the right side shows software information.
 - Test—Allows you to choose various parts of the system to test. You can also choose the type of test and testing mode.
 - Status—Displays the status of each test in progress. You can cancel testing by clicking the **Cancel Testing** button.
 - Log—Displays a log of tests for each device.
 - Error—Displays any errors that occurred during device testing. The window lists the device being tested, the type and number of errors, and the error code.
- Help—Contents, How to use Help, About.

2.4.4 Running Diagnostic Tests in Diagnostics for Windows

To run diagnostic tests:

1. Click **Start > HP Information Center > Diagnostics for Windows**.

Alternately, you can access Diagnostics for Windows using the Control Panel.

The screen displays the overview of the computer hardware and software. Five tabs are displayed below the row of icons: **Overview**, **Test**, **Status**, **Log**, and **Error**.

2. Click the **Test** tab, or click **Tab** at the top of the screen and select **Test**.
3. Select one of the following options:
 - Quick Test**—Runs a quick, general test on each device. Requires no user intervention if Unattended Mode is selected.
 - Complete Test**—Runs maximum testing of each device. The user can select Interactive Mode or Unattended Mode.
 - Custom Test**—Runs only the tests you select. To select specific devices or tests, find the device in the list, then select the check box beside each test. When selected, a red check mark is displayed in the box. Some tests selected may require user intervention.



To test all subsystems, you must log in as the administrator. If you do not log in as the administrator, you will be unable to test some subsystems. The inability to test a subsystem is indicated by an error message under the subsystem name in the Test window or by shaded boxes that you cannot check.

4. Select **Interactive Mode** or **Unattended Mode**. In Interactive Mode, the diagnostic software prompts you for any required input during tests. Some tests require interaction and display errors or halt testing if selected in conjunction with Unattended Mode.
 - Interactive Mode** provides maximum control over the testing process. You determine whether the test passed or failed. The software may prompt you to insert or remove devices.
 - Unattended Mode** does not display prompts. The software displays all discovered errors when testing is complete.
5. Click the **Begin Testing** button at the bottom of the window. Test Status is displayed, showing the progress and result of each test. For more details on the tests run, click the **Log** tab or click **Tab** at the top of the screen and select **Log**.
6. To view a test report, select one of three tabs:
 - Status**—Summarizes the tests run, passed, and failed during the current testing session.
 - Log**—Lists tests run on the system, the numbers of times each test has run, the number of errors found on each test, and the total run time of each test.
 - Error**—Lists all errors found on the computer with their error codes.
7. To save a test report:
 - Select the **Log** tab, then click **Save** to save a Log tab report.
 - Select the **Error** tab, then click **Save** to save an Error tab report.

8. To print a test report:
 - If the report is on the **Log** tab, on the **File** menu, click **Save As**, and then print the file from the selected folder.
 - If the report is on the **Error** tab, select the **Error** tab, and then click **Print**.
9. If errors are found, click the **Error** tab to display more detailed information and recommended actions.
10. Click **Print** or save the error information for future reference.
11. To exit Diagnostics for Windows, on the **File** menu, click **Exit**.

2.5 Configuration Record

The Configuration Record utility is a windows-based information-gathering tool that gathers critical hardware and software information from various computer subsystems. The information includes such things as the ROM, asset tag, processor, physical drives, PCI devices, memory, graphics, operating system version number, operating system parameters, and the operating system startup files to give a complete view of the computer. Configuration Record provides a means for automatically identifying and comparing configuration changes, and has the ability to maintain a configuration history. You can save the information as a history of multiple sessions.

This utility allows the resolution of problems without taking the computer offline and assists in maximizing the computer availability. The information obtained by the utility is useful in troubleshooting system problems and streamlines the service process by enabling quick and easy identification of system configurations.

The utility displays its findings in a *Now.log* file. If the original *Base.log* file is present in the *cpqdiags* directory, the *Base.log* file is displayed next to the *Now.log* file in a split window with the differences between the two highlighted in the color red.

2.5.1 Installing Configuration Record

The Configuration Record is part of Diagnostics for Windows and is automatically installed at the same time as Diagnostics for Windows.

2.5.2 Running Configuration Record

To run this program:

1. Click **Start > HP Information Center > Configuration Record**.

Alternately, you can access Diagnostics for Windows using the Control Panel.



The Configuration Record utility has two view options: **Show Changed Items Only** and **Show All**. The default view is **Show Changed Items Only**, therefore all the text is displayed in the color red since it shows only the differences. Switching to **Show All** displays the complete, comprehensive view of the system.

2. The default view is **Show Changed Items Only**. To view all the information gathered by Configuration Record, click **View** at the top of the window and select **Show All**, or click the **Show All Items** icon.
3. To save the information in the left or right window, select **File > Save Window File** and then select **Left Window File** or **Right Window File**.



Saving the configuration of the computer periodically allows you to keep a history of the configuration. This history may be useful to you in the future if the system encounters a problem that requires debugging.

4. To exit Configuration Record, on the **File** menu, click **Exit**.

2.6 Remote Diagnostics Enabling Agent

This utility provides a Web browser interface to Diagnostics for Windows. It enables remote control of the diagnostics and facilitates easy transfer of computer information from remote machines to a service provider.

The Remote Diagnostics Enabling Agent captures hardware configuration and provides the ability to perform tests remotely to diagnose computer problems. In addition, the Remote Diagnostics Enabling Agent identifies any computer hardware device problems signaled by the HP Management Agents. The Remote Diagnostics Enabling Agent automatically selects these hardware devices for testing.



The Remote Diagnostics Enabling Agent only works if Diagnostics for Windows is installed.

The Remote Diagnostics Enabling Agent is pre-loaded on some computers and is available through a SoftPaq at <http://www.hp.com> under **Support and Drivers**.

2.6.1 Installing/Upgrading Remote Diagnostics Enabling Agent

1. Visit <http://www.hp.com/support/files> and select the applicable product.
2. Locate the appropriate software and download the latest version.
3. Execute the downloaded file. If you are upgrading an existing version, select **Repair** for the new version to overwrite the old version.

2.6.2 Running the Remote Diagnostics Enabling Agent

1. Select the **Remote Diagnostics** icon located in the Control Panel.



The Remote Diagnostics Enabling Agent allows you to run Diagnostic Test or the Configuration Record in a browser window. You can run both of these utilities remotely or locally.

2. To exit Remote Diagnostics, on the **File** menu, click **Close**.

2.7 Protecting the Software

To protect software from loss or damage, you should keep a backup copy of all system software, applications, and related files stored on the hard drive. See the operating system or backup utility documentation for instructions about making backup copies of data files.

2.8 Restoring the Software

You can restore the Windows operating system and software to its original state using the *Restore CD*. See the *Restore CD* for complete instructions.

Desktop Management

HP Intelligent Manageability provides standards-based solutions for managing and controlling desktops, workstations, and notebook PCs in a networked environment.

The key capabilities and features of desktop management are:

- Initial configuration and deployment
- Remote system installation
- Software updating and management
- ROM flash
- Asset tracking and security
- Fault notification and recovery



Support for specific features described in this guide may vary by model or software version.

3.1 Initial Configuration and Deployment

HP computers come with a preinstalled system software image. After a brief software “unbundling” process, the computer is ready for use.

You can deploy a customized software image by:

- Installing additional software applications after unbundling the preinstalled software image.
- Using software deployment tools, such as Altiris Deployment Solutions™, to replace the preinstalled software with a customized software image.
- Using a disk cloning process to copy the contents from one hard drive to another.

The best deployment method depends upon your information technology environment and processes. The PC Deployment section of the Solutions and Services Web site (<http://h18000.www1.hp.com/solutions/pcsolutions>) provides information to help you select the best deployment method.

The *Restore Plus!* CD, ROM-based setup, and ACPI hardware provide further assistance with recovery of system software, configuration management and troubleshooting, and power management.

3.2 Remote System Installation

Remote System Installation allows you to start and set up your system using the software and configuration information located on a network server by initiating the Preboot Execution Environment (PXE). The Remote System Installation feature is usually used as a system setup and configuration tool, and can be used for the following tasks:

- Formatting a hard drive.
- Deploying a software image on one or more new PCs.
- Remotely updating the system BIOS in flash ROM. See [Section 3.4.1, “Remote ROM Flash.”](#)
- Configuring the system BIOS settings.

To initiate Remote System Installation, press **F12** when the F12 = Network Service Boot message appears in the lower-right corner of the HP logo screen. Follow the instructions on the screen to continue the process. The default boot order is a BIOS configuration setting that you can change to always attempt to PXE boot.

3.3 Software Updating and Management

HP provides several tools for managing and updating software on desktops and workstations—HP Client Manager Software, Altiris Client Management Solution; System Software Manager; HP Proactive Notification; and ActiveUpdate.

3.3.1 HP Client Manager Software

HP Client Manager Software (HP CMS) tightly integrates HP Intelligent Manageability technology within Altiris to provide superior hardware management capabilities for HP access devices that include:

- Detailed views of hardware inventory for asset management
- PC health check monitoring and diagnostics
- Proactive notification of changes in your hardware environment
- Web-accessible reporting of business critical details such as machines with thermal warnings, memory alerts, and more
- Remote updating of system software such as device drivers and ROM BIOS
- Remote changing of boot order
- System BIOS setting configuration

For more information on the HP Client Manager, visit http://h18000/www1.hp.com/im/client_mgr.html.

3.3.2 Altiris Client Management Solutions

HP and Altiris have partnered to provide comprehensive, tightly integrated systems management solutions to reduce the cost of owning HP client PCs. HP Client Manager Software is the foundation for additional Altiris Client Management Solutions that address:

- Inventory and Asset Management
 - ❑ SW license compliance
 - ❑ PC tracking and reporting
 - ❑ Lease contract, fixing asset tracking
- Deployment and Migration
 - ❑ Windows 2000/XP migration
 - ❑ System deployment
 - ❑ Personality migrations
- Help Desk and Problem Resolution
 - ❑ Managing help desk tickets
 - ❑ Remote troubleshooting
 - ❑ Remote problem resolution
 - ❑ Client disaster recovery
- Software and Operations Management
 - ❑ Ongoing desktop management
 - ❑ HP system SW deployment
 - ❑ Application self-healing

For more information and details on how to download a fully-functional 30-day evaluation version of the Altiris solutions, visit <http://h18000.www1.hp.com/im/prodinfo.html#deploy>.

On selected desktop and notebook models, an Altiris management agent is included as part of the factory-loaded image. This agent enables communication with the Altiris Development Solution, which you can use to complete new hardware deployment or personality migration to a new operating system using easy-to-follow wizards. Altiris solutions provide easy-to-use software distribution capabilities. When used in conjunction with System Software Manager, or HP Client Manager Software, administrators can also update ROM BIOS and device driver software from a central console.

For more information, visit <http://www.hp.com/go/easydeploy>.

3.3.3 System Software Manager

System Software Manager (SSM) lets you update system-level software on multiple systems simultaneously. When executed on a PC client system, SSM detects both hardware and software versions, then updates the appropriate software from a central repository, also known as a file store. Driver versions supported by SSM are denoted with a special icon on the driver download Web site and on the Support Software CD. To download the utility or to obtain more information on SSM, visit <http://h18000.www1.hp.com/im/ssmwp.html>.

3.3.4 Proactive Change Notification (PCN)

The Proactive Change Notification program uses the Subscriber's Choice Web site to proactively and automatically send you:

- Proactive Change Notification (PCN) emails informing you of hardware and software changes to most commercial computers and servers, up to 60 days in advance.
- E-mail containing Customer Bulletins, Customer Advisories, Customer Notes, Security Bulletins, and Driver alerts for most commercial computers and servers.

You create your own profile to ensure that you only receive the information relevant to your IT environment. To learn more about the Proactive Change Notification program and create your custom profile, visit <http://www.hp.com/go/pcn>.

3.3.5 Subscriber's Choice

Subscriber's Choice is a client-based service from HP. Based on your profile, HP will supply you with personalized product tips, feature articles, and/or driver and support alerts/notifications. Subscriber's Choice Driver and Support Alerts/Notifications will deliver e-mails notifying you that the information you subscribed to in your profile is available for review and retrieval. To learn more about Subscriber's Choice and create a custom profile, visit <http://www.hp.com/go/pcn>.

3.4 ROM Flash

The computer comes with a reprogrammable flash ROM (read only memory). By establishing a setup password in Computer Setup (F10) Utility, you can protect the ROM from unintentional updates or overwrites. This protection is important to ensure the operating integrity of the computer. Should you need or want to upgrade your ROM, you may:

- Order an upgraded *ROMPaq*[™] diskette from HP.
- Download the latest ROMPaq images from <http://www.hp.com/support/files>.



CAUTION: For maximum ROM protection, establish a setup password. The setup password prevents unauthorized ROM upgrades. System Software Manager allows the system administrator to set the setup password on one or more PCs simultaneously. For more information, visit <http://www.hp.com/go/ssm>.

3.4.1 Remote ROM Flash

Remote ROM Flash allows the system administrator to safely upgrade the ROM on remote HP computers directly from the centralized network management console. Enabling the system administrator to perform this task remotely on multiple computers and personal computers results in a consistent deployment of and greater control over HP PC ROM images over the network.



The computer must be powered on, or turned on through Remote Wakeup, to take advantage of Remote ROM Flash.

For more information on Remote ROM Flash, refer to the HP Client Manager Software or System Software Manager at <http://h18000.www1.hp.com/im/prodinfo.html>.

3.4.2 HPQ Flash

Use the HPQFlash utility to locally update or restore the system ROM in individual PCs through a Windows environment. For more information on HPQFlash, refer to the HP Client Manager Software or System Software Manager at <http://www.hp.com/support/files>.

3.4.3 FailSafe Boot Block ROM

The FailSafe Boot Block ROM allows for system recovery in the unlikely event of a ROM flash failure, for example, if a power failure occurs during a ROM upgrade. The Boot Block is a flash-protected section of the ROM that checks for a valid system ROM flash when power to the system is turned on.

- If the system ROM is valid, the system starts normally.
- If the system ROM fails the validation check, the FailSafe Boot Block ROM provides enough support to start the system from a ROMPaq diskette, which programs the system ROM with a valid image.



Some models also support recovery from a ROMPaq CD.

When the bootblock detects an invalid system ROM, the System Power LED blinks RED eight times, one every second, followed by a two-second pause. You will also hear eight simultaneous beeps. A Boot Block recovery mode message is displayed on the screen (some models).



The beeps continue through five cycles of eight simultaneous beeps and stop; however, the LED continues blinking until the issue is resolved.

To recover the system after it enters Boot Block recovery mode, complete the following steps:

1. If there is a diskette or a CD in the computer, remove the media and turn off the power.
2. Insert a ROMPaq diskette, bootable drive key, or CD.
3. Turn on power to the system.
4. If no ROMPaq diskette is found, you must insert one and restart the computer.


3.4.4 Replicating Your Setup

To replicate or copy one setup configuration to other computers of the same model, HP has provided a Windows-based software utility, System Software Manager, that you can download from <http://www.hp.com/go/ssm>, plus a DOS-based software, CMOS Save/Load utility, that can be downloaded from <http://www.hp.com/support/files>. After logging on to the HP Support Web site, enter the name of your computer when prompted.

Creating a Bootable Device

Supported USB Flash Media Device


Supported devices, such as an HP Drive Key, have a pre-installed image to simplify the process of making them bootable. If the USB flash media device being used does not have this image, use the procedure later in this section (see “[Unsupported USB Flash Media Device](#)” on page 7).

 **CAUTION:** You cannot boot all computers from a USB flash media device. If the default boot order in the Computer Setup (F10) Utility lists the USB device before the hard drive, you can boot the computer from a USB flash media device. Otherwise, you must use a bootable diskette.


To create a bootable USB flash media device, you must have a:

- Supported USB flash media device.
 - Bootable DOS diskette with the FDISK and SYS programs. If SYS is not available, you can use FORMAT, but you will lose all existing files on the USB flash media device.
 - PC that is bootable from a USB flash media device.
1. Turn off the computer.
 2. Insert the USB flash media device into one of the computer's USB ports and remove all other USB storage devices except USB diskette drives.
 3. Insert a bootable DOS diskette with FDISK.COM and either SYS.COM or FORMAT.COM into a diskette drive and turn on the computer to boot to the DOS diskette.
 4. Run FDISK from the A:\ prompt by typing **FDISK** and pressing **Enter**. If prompted, click **Yes (Y)** to enable large disk support.
 5. Enter Choice [**5**] to display the drives in the system. The USB flash media device is the drive that closely matches the size of one of the drives listed. It is usually the last drive in the list. Note the letter of the drive.

USB flash media device drive: _____


 **CAUTION:** If a drive does not match the USB flash media device, do not proceed. Data loss may occur. Check all USB ports for additional storage devices. If any are found, remove them, reboot the computer, and proceed from step 4. If none are found, either the system does not support the USB flash media device or the USB flash media device is defective. DO NOT proceed in attempting to make the USB flash media device bootable.

6. Exit FDISK by pressing the **Esc** key to return to the A:\ prompt.
 7. If your bootable DOS diskette contains SYS.COM, go to step 8. Otherwise, go to step 9.
 8. At the A:\ prompt, enter **SYS x:** where x represents the drive letter noted above.
-

 **CAUTION:** Make sure that you have entered the correct drive letter for the USB flash media device.

After transferring the system files, SYS will return to the A:\ prompt. Go to step 13.

9. Copy any files you want to keep from your USB flash media device to a temporary directory on another drive (for example, the system's internal hard drive).
 10. At the A:\ prompt, enter **FORMAT /S X:** where X represents the drive letter noted before.
-

 **CAUTION:** Make sure that you have entered the correct drive letter for the USB flash media device.

FORMAT will display one or more warnings and ask you each time whether you want to proceed. Enter **Y** each time. FORMAT will format the USB flash media device, add the system files, and ask for a Volume Label.

11. Press **Enter** for no label or enter one if desired.

12. Copy any files you saved in step 9 back to your USB flash media device.
13. Remove the diskette and reboot the computer. The computer will boot to the USB flash media device as drive C.



The default boot order varies from computer to computer, and you can change it in the Computer Setup (F10) Utility.

If you have used a DOS version from Windows 9x, you may see a brief Windows logo screen. If you do not want this screen, add a zero-length file named LOGO.SYS to the root directory of the USB flash media device.

Unsupported USB Flash Media Device



CAUTION: You cannot boot all computers from a USB flash media device. If the default boot order in the Computer Setup (F10) Utility lists the USB device before the hard drive, you can boot the computer from a USB flash media device. Otherwise, you must use a bootable diskette.

To create a bootable USB flash media device, you must have a:

- Supported USB flash media device.
 - Bootable DOS diskette with the FDISK and SYS programs. If SYS is not available, you can use FORMAT, but you will lose all existing files on the USB flash media device.
 - PC that is bootable from a USB flash media device.
1. If there are any PCI cards in the system that have SCSI, ATA RAID or SATA drives attached, turn off the computer and unplug the power cord.



CAUTION: You must unplug the power cord.

2. Open the computer and remove the PCI cards.
3. Insert the USB flash media device into one of the computer's USB ports and remove all other USB storage devices except USB diskette drives. Close the computer cover.
4. Plug in the power cord and turn on the computer.
5. As soon as the computer is turned on, press and hold the **F10** key until you enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.



If you do not press the **F10** key at the appropriate time, you must restart the computer and press and hold the **F10** key again to access the utility.

If you are using a PS/2 keyboard, you may see a Keyboard Error message—disregard it.

6. Go to **Integrated Peripherals > South OnChip IDE Device** to disable the PATA controller, and go to **Integrated Peripherals > South OnChip PCI Device** to disable the SATA controller. Exit setup, confirming the changes.
7. Insert a bootable DOS diskette with FDISK.COM and either SYS.COM or FORMAT.COM into a diskette drive and turn on the computer to boot to the DOS diskette.
8. Run FDISK and delete any existing partitions on the USB flash media device. Create a new partition and mark it active. Exit FDISK by pressing the **Esc** key.

9. If the system did not automatically restart when exiting FDISK, press **Ctrl+Alt+Del** to reboot to the DOS diskette.
10. At the A:\ prompt, type **FORMAT C: /S** and press **Enter**. Format will format the USB flash media device, add the system files, and ask for a Volume Label.
11. Press **Enter** for no label or enter one if desired.
12. Turn off the computer and unplug the power cord. Open the computer and re-install any PCI cards that were previously removed. Close the computer cover.
13. Plug in the power cord, remove the diskette, and turn on the computer.
14. As soon as the computer is turned on, press and hold the **F10** key until you enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.
15. Go to **Integrated Peripherals > South OnChip IDE Device** and **Integrated Peripherals > South OnChip PCI Device** and re-enable the PATA and SATA controllers that were disabled in step 6.
16. Save the changes and exit. The computer will boot to the USB flash media device as drive C.



The default boot order varies from computer to computer, and you can change it in the Computer Setup (F10) Utility. Refer to the *Computer Setup Guide* on the *Documentation CD* for instructions.

If you have used a DOS version from Windows 9x, you may see a brief Windows logo screen. If you do not want this screen, add a zero-length file named LOGO.SYS to the root directory of the USB flash media device.

3.4.5 Dual-State Power Button

With Advanced Configuration and Power Interface (ACPI) enabled for Windows XP, the power button can function either as an on/off switch or as a suspend button. The suspend feature does not completely turn off power, but instead causes the computer to enter a low-power standby. This allows you to quickly power down without closing applications and to quickly return to the same operational state without any data loss.

To change the power button's configuration, complete the following steps:

1. Left click on the **Start Button**, then select **Control Panel > Performance and Maintenance > Power Options**.
2. In the **Power Options Properties**, select the **Advanced** tab.
3. In the **Power Button** section, select **Standby**.

After configuring the power button to function as a suspend button, press the power button to put the system in a very low power state (standby). Press the button again to quickly bring the system out of suspend to full power status. To completely turn off all power to the system, press and hold the power button for four seconds.



CAUTION: Do not use the power button to turn off the computer unless the system is not responding; turning off the power without operating system interaction could cause damage to or loss of data on the hard drive.

3.4.6 World Wide Web Site

When making the transition to new or revised operating systems, it is important to implement the support software designed for that operating system. If you plan to run a version of Microsoft Windows that is different from the version included with your computer, you must install corresponding device drivers and utilities to ensure that all features are supported and functioning properly.

HP has made the task of locating, accessing, evaluating, and installing the latest support software easier. You can download the software from <http://www.hp.com/support>. The Web site contains the latest device drivers, utilities, and flashable ROM images needed to run the latest Microsoft Windows operating system on your HP computer.

3.4.7 Building Blocks and Partners

HP management solutions integrate with other systems management applications, and are based on industry standards, such as:

- Web-Based Enterprise Management (WBEM)
- Windows Management Interface (WMI)
- Wake on LAN Technology
- ACPI
- SMBIOS
- Pre-boot Execution (PXE) support

3.5 Asset Tracking and Security

Asset tracking features incorporated into the computer provide key asset tracking data that you can manage using HP Insight Manager, HP Client Manager or other system management applications. Seamless, automatic integration between asset tracking features and these products enables you to choose the management tool that is best suited to your environment and to leverage your investment in existing tools.

HP also offers several solutions for controlling access to valuable components and information. ProtectTools Imbeds Security, if installed, prevents unauthorized access to the internal components of the personal computer. By disabling parallel, serial, or USB ports, or by disabling removable media boot capability, you can protect valuable data assets. You can automatically forward Memory Change and Smart Cover Sensor alerts to system management applications to deliver proactive notification of tampering with a computer's internal components.







ProtectTools is available on some systems.

Use the following utilities to manage security settings on your HP computer:

- Locally, using the Computer Setup Utilities. See the *Computer Setup (F10) Utility Guide* on the *Documentation CD* included with the computer for additional information and instructions on using the Computer Setup Utilities.
- Remotely, using HP Client Manager or System Software Manager. This software enables the secure, consistent deployment and control of security settings from a simple command-line utility.

The following table and sections refer to managing security features of your computer locally through the Computer Setup Utilities (F10).

Security Features Overview	
Option	Description
Supervisor Password	<p>Allows you to set and enable Supervisor (administrator) password.</p> <p> If the Supervisor password is set, it is required to change Computer Setup options, flash the ROM, and make changes to certain plug and play settings under Windows.</p> <p>See the <i>Troubleshooting Guide</i> on the <i>Documentation CD</i> for more information.</p>
User Password	<p>Allows you to set and enable a User password.</p> <p> If the User password is set, it is required to access the computer when power is turned on.</p> <p>See the <i>Troubleshooting Guide</i> on the <i>Documentation CD</i> for more information.</p>
Device Security	Enables/disables serial ports, parallel port, front USB ports, system audio, and network controllers (some models).
Network Service Boot	Enables/disables the computer's ability to boot from an operating system installed on a network server. (Feature available on NIC models only; the network controller must reside on the PCI bus or be embedded on the system board.)
System IDs	<p>Allows you to set:</p> <ul style="list-style-type: none"> • Asset tag (18-byte identifier) and ownership Tag (80-byte identifier displayed during POST). • Chassis serial number or Universal Unique Identifier (UUID) number. The UUID can only be updated if the current chassis serial number is invalid. (These ID numbers are normally set in the factory and are used to uniquely identify the system.) <p>Keyboard locale setting (for example, English or German) for System ID entry.</p>
Master Boot Record Security	<p>Allows you to enable or disable Master Boot Record (MBR) Security.</p> <p>When enabled, the BIOS rejects all requests to write to the MBR on the current bootable disk. Each time the computer is powered on or rebooted, the BIOS compares the MBR of the current bootable disk to the previously-saved MBR. If changes are detected, you are given the option of saving the MBR on the current bootable disk, restoring the previously-saved MBR, or disabling MBR Security. You must know the setup password, if one is set.</p> <p> Disable MBR Security before intentionally changing the formatting or partitioning of the current bootable disk. Several disk utilities (such as FDISK and FORMAT) attempt to update the MBR.</p> <p>If MBR Security is enabled and disk accesses are being serviced by the BIOS, write requests to the MBR are rejected, causing the utilities to report errors.</p> <p>If MBR Security is enabled and disk accesses are being serviced by the operating system, any MBR change will be detected by the BIOS during the next reboot, and an MBR Security warning message will be displayed.</p>
<p> For more information about Computer Setup, see the <i>Computer Setup (F10) Utility Guide</i> on the <i>Documentation CD</i>.</p> <p>Support for security features may vary depending on the specific computer configuration.</p>	

3.5.1 Password Security

The user password prevents unauthorized use of the computer by requiring entry of a password to access applications or data each time the computer is turned on or restarted. The setup password specifically prevents unauthorized access to Computer Setup, and can also be used as an override to the user password. That is, when prompted for the user password, entering the supervisor password instead will allow access to the computer.

A network-wide setup password can be established to enable the system administrator to log in to all network systems to perform maintenance without having to know the user password, even if one has been established.



System Software Manager and HP Client Manager Software allow remote management of Setup Passwords and other BIOS settings in a networked environment. For more information, visit <http://www.hp.com/go/EasyDeploy>.

3.5.2 Establishing a Supervisor Password with Computer Setup

If the system is equipped with an embedded security device, refer to *HP ProtectTools Embedded Security Guide*, on the *Documentation CD*. Establishing a Supervisor password through Computer Setup prevents reconfiguration of the computer (use of the Computer Setup F10 utility) until the password is entered.

1. Turn on or restart the computer. If you are in Windows, click **Start > Shut Down > Restart**.
2. As soon as the computer is turned on, press and hold the **F10** key until you enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.



If you do not press the **F10** key at the appropriate time, you must restart the computer and press and hold the **F10** key again to access the utility.

If you are using a PS/2 keyboard, you may see a Keyboard Error message—disregard it.

3. Select **Set Security Password** and follow the instructions on the screen.
4. Before exiting, on the **File** menu, select **Save Changes and Exit**.

3.5.3 Establishing a User Password with Computer Setup

Establishing a user password through Computer Setup prevents access to the computer when power is turned on unless the password is entered. When a user password is set, Computer Setup presents Password Options under the Security menu. Password options include Password Prompt on Warm Boot. When Password Prompt on Warm Boot is enabled, you must also enter the password each time the computer is rebooted.

1. Turn on or restart the computer. If you are in Windows, click **Start > Shut Down > Restart**.
2. As soon as the computer is turned on, press and hold the **F10** key until you enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.



If you do not press the **F10** key at the appropriate time, you must restart the computer and press and hold the **F10** key again to access the utility.

If you are using a PS/2 keyboard, you may see a Keyboard Error message—disregard it.

3. Select **Security**, then **Power-On Password** and follow the instructions on the screen.
4. Before exiting, on the **File** menu, select **Save Changes and Exit**.

Entering a User Password

To enter a power-on password, complete the following steps:

1. Turn on or restart the computer. If you are in Windows, click **Start > Shut Down > Restart**.
2. When the key icon appears on the monitor, type your current password, then press **Enter**.



Type carefully; for security reasons, the characters you type do not appear on the screen.

If you enter the password incorrectly, the message “Invalid Password, Press any key to continue!” appears. Try again. After three unsuccessful tries, you must turn off the computer, then turn it on again before you can continue.

Entering a Supervisor Password

If the system is equipped with an embedded security device, refer to the *HP ProtectTools Embedded Security Guide*, on the *Documentation CD*.

If a Supervisor password has been established on the computer, you will be prompted to enter it each time you run Computer Setup.

1. Turn on or restart the computer. If you are in Windows, click **Start > Shut Down > Restart**.
2. As soon as the computer is turned on, press and hold the **F10** key until you enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.



If you do not press the **F10** key at the appropriate time, you must restart the computer and press and hold the **F10** key again to access the utility.

If you are using a PS/2 keyboard, you may see a Keyboard Error message—disregard it.

3. When the **Enter Password** box appears on the monitor, type the supervisor password, then press **Enter**.



Type carefully; for security reasons, the characters you type do not appear on the screen.

If you enter the password incorrectly, the message “Invalid Password, Press any key to continue!” appears. Try again. After three unsuccessful tries, you must turn off the computer, then turn it on again before you can continue.

Changing a User or Supervisor Password

If the system is equipped with an embedded security device, refer to the *HP ProtectTools Embedded Security Guide*, on the *Documentation CD*.

1. Turn on or restart the computer. If you are in Windows, click **Start > Shut Down > Restart the Computer**.
2. When the **Enter Password** box appears, type the current User password, if a password is required.
3. Press **Enter**.
4. Press and hold the **F10** key until you enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.



If you do not press the **F10** key at the appropriate time, you must restart the computer and press and hold the **F10** key again to access the utility.

If you are using a PS/2 keyboard, you may see a Keyboard Error message—disregard it.

5. When the **Enter Password** box appears to access Computer Setup, type the current Supervisor password, if required.
6. Press **Enter**.
7. Select either **Set Supervisor Password** or **Set User Password**.
8. When the **Enter Password** box appears on the screen, type the new password and press **Enter**.
9. Before exiting, on the **File** menu, select **Save Changes and Exit**.



To delete a password instead of changing it, when the **Enter Password** box appears on the screen, press **Enter** instead of entering the new password. This deletes the current password.

Clearing Passwords

If you forget the password, you cannot access the computer. Refer to the *Troubleshooting Guide* on the *Documentation CD* for instructions on clearing passwords.

If the system is equipped with an embedded security device, refer to the *HP ProtectTools Embedded Security Guide*, on the *Documentation CD*.

3.5.4 Master Boot Record Security

The Master Boot Record (MBR) contains information needed to successfully boot from a disk and to access the data stored on the disk. Master Boot Record Security may prevent unintentional or malicious changes to the MBR, such as those caused by some computer viruses or by the incorrect use of certain disk utilities. It also allows you to recover the “last known good” MBR, should the computer detect changes to the MBR when the system is restarted.

To enable MBR Security, complete the following steps:

1. Turn on or restart the computer. If you are in Windows, click **Start > Shut Down > Restart**.
2. As soon as the computer is turned on, press and hold the **F10** key until you enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.



If you do not press the **F10** key at the appropriate time, you must restart the computer and press and hold the **F10** key again to access the utility.

If you are using a PS/2 keyboard, you may see a Keyboard Error message—disregard it.

3. Select **Advanced BIOS Features > MBR Security** and press **Enter**.
4. In the MBR Security box, press the up or down arrows to select **Enabled** or **Disabled**.
5. To accept the changes, press **Enter**. To abort the changes, press the **Esc** key.

When MBR Security is enabled, the BIOS prevents any changes being made to the MBR of the current bootable disk while in MS-DOS or Windows Safe Mode.



Most operating systems control access to the MBR of the current bootable disk; the BIOS cannot prevent changes that may occur while the operating system is running.

Each time the computer is turned on or restarted, the BIOS compares the MBR of the current bootable disk to the previously saved MBR. If changes are detected and if the current bootable disk is the same disk from which the MBR was previously saved, the following message is displayed:

1999—Master Boot Record has changed.

1. Press any key to enter Setup to configure MBR Security.
2. Upon entering Computer Setup, you must disable the MBR Security feature.

You must know the supervisor password, if one exists.

If changes are detected and if the current bootable disk is **not** the same disk from which the MBR was previously saved, the following message is displayed:

2000—Master Boot Record Hard Drive has changed.

1. Press any key to enter Setup to configure MBR Security.
2. Upon entering Computer Setup, you must disable the MBR Security feature.

You must know the supervisor password, if one exists.

In the unlikely event that the previously saved MBR has been corrupted, the following message is displayed:

1998—Master Boot Record has been lost.

1. Press any key to enter Setup to configure MBR Security.
2. Upon entering Computer Setup, you must disable the MBR Security feature.

You must know the supervisor password, if one exists.

3.5.5 Before You Partition or Format the Current Bootable Disk

Ensure that MBR Security is disabled before you change partitioning or formatting of the current bootable disk. Some disk utilities, such as FDISK and FORMAT, attempt to update the MBR. If MBR Security is enabled when you change partitioning or formatting of the disk, you may receive error messages from the disk utility or a warning from MBR Security the next time the computer is turned on or restarted.

To disable MBR Security, complete the following steps:

1. Turn on or restart the computer. If you are in Windows, click **Start > Shut Down > Restart**.
2. As soon as the computer is turned on, press and hold the **F10** key until you enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.



If you do not press the **F10** key at the appropriate time, you must restart the computer and press and hold the **F10** key again to access the utility.

If you are using a PS/2 keyboard, you may see a Keyboard Error message—disregard it.

3. Select **Advanced BIOS Features > MBR Security** and press **Enter**.
4. In the MBR Security Pop-up box, use the down arrow key to select **Disabled**.
5. Press **Enter**.
6. Before exiting, on the **File** menu, click **Save and Exit Setup**.

3.5.6 Cable Lock Provision

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

For illustrated instructions, see the Removal and Replacement Chapter for the specific chassis.

3.6 Fault Notification and Recovery

Fault Notification and Recovery features combine innovative hardware and software technology to prevent the loss of critical data and minimize unplanned downtime.

When a fault occurs, the computer displays a Local Alert message containing a description of the fault and any recommended actions. You can then view current system health by using the HP Client Manager Software. If the computer is connected to a network managed by HP Insight Manager, HP Client Manager Software, or other system management applications, the computer also sends a fault notice to the network management application.

3.6.1 Surge-Tolerant Power Supply

An integrated surge-tolerant power supply provides greater reliability when the computer is hit with an unpredictable power surge. This power supply is rated to withstand a power surge of up to 2000 volts without incurring any system downtime or data loss.

3.6.2 Thermal Sensor

The thermal sensor is a hardware and software feature that tracks the internal temperature of the computer. This feature displays a warning message when the normal range is exceeded, which gives you time to take action before internal components are damaged or data is lost.

Serial and Parallel ATA Drive Guidelines and Features



Serial ATA = SATA
Parallel ATA = PATA



CAUTION: HP only supports a PATA hard drive in SATA systems when the PATA hard drive is used in a MultiBay device.

4.1 SATA Hard Drive Information

Characteristic	SATA
Number of pins/conductors in data cable	7/7
Number of pins in power cable	15
Maximum data cable length	39.37 in (100 cm)
Data interface voltage differential	400 - 700 mV
Drive voltages	3.3 V, 5V, 12 V
Jumpers for configuring drive	N/A
Data transfer rate	1.5 Gb/s

SATA connectors on the system board are color coded to make identification easier.

SATA Identification	Color
Primary channel, device 0	Blue
Secondary channel, device 0	White

4.1.1 SATA Data Cable

The SATA data cable is a thin, 7-pin cable designed to transmit data for only a single drive. As shown in the table, each cable has three grounds, and four transmit/receive pins.

SATA data cables are susceptible to damage if overflexed. Never crease a SATA data cable and never bend it tighter than a 30 mm (1.18 in) radius.

Pin Number	Usage	Device Plug	Host Plug
P1	Ground	Ground	Ground
P2*	A+	Transmit data	Receive data
P3*	A-	Transmit data	Receive data
P4	Ground	Ground	Ground
P5**	B-	Receive data	Transmit data
P6**	B+	Receive data	Transmit data
P7	Ground	Ground	Ground

*P2 and P3 differential signal pair

**P5 and P6 differential signal pair

4.1.2 SATA Power Cable

Pin	Usage	Notes	Pin	Usage	Notes
P1	V3.3	3.3 V power	P9	V5	5 V power
P2	V3.3	3.3 V power	P10	Ground	
P3	V3.3	3.3 V power	P11	Reserved	
P4	Ground		P12	Ground	
P5	Ground		P13	V 12	12 V power
P6	Ground		P14	V12	12 V power
P7	V5	5 V power	P15	V12	12 V power
P8	V5	5 V power			

4.2 PATA Hard Drive Information

Characteristic	PATA
Number of pins/conductors in data cable	40/80
Number of pins in power cable	4
Maximum data cable length	18 in (45.7 cm)
Data interface voltage	5 V
Drive voltages	5 V, 12 V
Jumpers for configuring drive	Required
Data transfer rate	up to 1.0 Gb/s

4.2.1 PATA Data Cable

Pin	Signal	Pin	Signal	Pin	Signal
1	Reset	15	DD1	29	DMAK
2	Ground	16	DD14	30	Ground
3	DD7	17	DD0	31	INTRQ
4	DD8	18	DD15	32	IOCS16
5	DD6	19	Ground	33	DA1
6	DD9	20	(Key)	34	PDIAG (cable detect)
7	DD5	21	DMARQ	35	DA0
8	DD10	22	Ground	36	DA2
9	DD4	23	DIOW	37	CS1FX
10	DD11	24	Ground	38	CS3FX
11	DD3	25	DIOR	39	DASP
12	DD12	26	Ground	40	Ground
13	DD2	27	IORDY		
14	DD13	28	CSEL		

4.2.2 PATA Power Cable

Pin	Usage
1	+12 V
2	Ground
3	Ground
4	+5 V

4.2.3 PATA Cable Layout

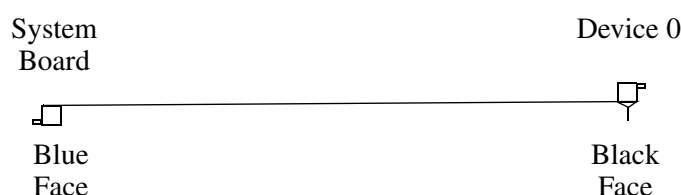
The faces of industry-standard cable connectors are color-coded for easy recognition:

- System board connector = blue face
- Device 0 connector = black face
- Device 1 connector = gray face

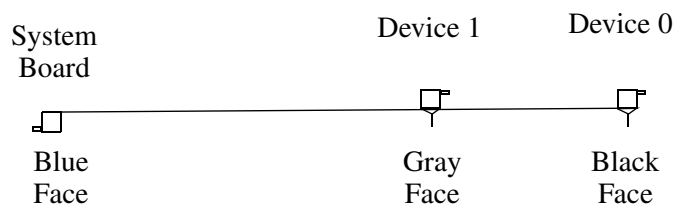


The color code of an industry-standard cable is applicable only if the drive's jumper is in the cable-select position.

Single-Drive Cable



Two-Drive Cable



On a two-drive cable, the Drive/Device 0 connector is always the farthest one from the system board connector and the Drive/Device 1 connector is always the closest to the system board connector.



Some cables may be labeled “Drive 0” instead of “Device 0” and “Drive 1” instead of “Device 1”.

4.3 PATA Drive Installation Guidelines



CAUTION: HP only supports a PATA hard drive in SATA systems when the PATA hard drive is used in a MultiBay device.

This computer system board has one Parallel ATA (PATA) channel.

The channel can have up to two devices attached to it. All drives are connected to a channel using an industry-standard 80-conductor cable.



The industry standard 1.44 MB diskette drive has its own separate channel and is not included as a part of the maximum four drives.

The drive attached to a channel must have a drive designation. If a drive is attached to the Device 0 cable position and its cable-select jumper is present, the drive is designated as Device 0. Similarly, if a drive is attached to the Device 1 cable position and its cable-select jumper is present, the drive is designated as Device 1.

For optimal performance of a computer system, all drives need to be attached to the PATA channel(s) in a specified sequence. This sequence is determined by the device class of the drives and by specific attach sequence rules.

4.3.1 PATA Device Classes

To determine the best drive attach sequence, ATA/ATAPI drives are segregated into four different classes based upon the bandwidth demands they place on an ATA channel. The most demanding devices are in Class 1 and the least demanding are in Class 4.

Class 1 Hard Drives	Class 2 High Speed Optical Drives	Class 3 Optical Storage Drives	Class 4 Magnetic Storage Drives
Only MultiBay hard drive is supported	DVD DVD-CD R/W	R/W CD-ROM CD-ROM	Zip

General Attach Guidelines

- The lower the device class number, the faster the device and the more bandwidth required.
- A drive installed in the Device 0 position receives the greatest possible bandwidth.

4.4 ATA SMART Drives

The Self Monitoring Analysis and Recording Technology (SMART) ATA drives for the HP Personal Computers have built-in drive failure prediction that warns the user or network administrator of an impending failure or crash of the hard drive. The SMART drive tracks fault prediction and failure indication parameters such as reallocated sector count, spin retry count, and calibration retry count. If the drive determines that a failure is imminent, it generates a fault alert.

4.5 Drive Capacities

The combination of the file system and the operating system used in the computer determines the maximum usable size of a drive partition. A drive partition is the largest segment of a drive that the operating system can properly access. Therefore, a single hard drive can be subdivided into a number of unique drive partitions in order to make use of all of its space.

Because of the differences in the way that drive sizes are calculated, the size reported by the operating system may differ from that marked on the hard drive or listed in the computer specification. Drive size calculations by drive manufacturers are bytes to the base 10 while calculations by Microsoft are bytes to the base 2.

Drive/Partition Capacity Limits				
File System	Controller Type	Operating System	Maximum Size	
			Partition	Drive
FAT 32	ATA	Windows 2000/ XP	32 GB	128 PB
NTFS	ATA	Windows NT/2000/XP	2 TB	128 PB

4.6 SATA BIOS

Windows 2000 and XP	Windows 9x, NT, and Linux
Enhanced Mode (default BIOS Setting) —Separate IDE controller	Compatibility Mode (non-default BIOS Setting) —Combined IDE controller
<ul style="list-style-type: none"> • PATA Controller in Legacy Mode <ul style="list-style-type: none"> - Device 0 is accessible as Device 0 of PATA controller's Primary Channel - Device 1 is accessible as Device 1 of PATA controller's Primary Channel • SATA Controller in Native Mode <ul style="list-style-type: none"> - SATA 0 is accessible as Device 0 of SATA controller's Primary Channel - SATA 1 is accessible as Device 0 of SATA controller's Secondary Channel - SATA 2 is accessible as Device 1 of SATA controller's Primary Channel - SATA 3 is accessible as Device 1 of SATA controller's Secondary Channel 	<ul style="list-style-type: none"> • PATA Controller in Legacy Mode <ul style="list-style-type: none"> - Device 0 is accessible as Device 0 of the combined controller's Secondary Channel - Device 1 is accessible as Device 1 of the combined controller's Secondary Channel • SATA Controller in Legacy Mode <ul style="list-style-type: none"> - SATA 0 is accessible as Device 0 of the combined controller's Primary Channel - SATA 1 is inaccessible - SATA 2 is accessible as device 1 of the combined controller's Primary Channel - SATA 3 is inaccessible

4.6.1 Legacy Mode

Use Legacy mode to access devices attached to the embedded IDE controller. The channel requires two fixed I/O address ranges and an IRQ for each.

- Command block: 1F0h - 1F7h
- Control block: 3F6h
- IRQ: 14

4.6.2 Native Mode

Use Native mode to access devices attached to add-in cards. Native mode is not supported by many legacy operating systems. PCI Plug-n-Play BIOS assigns addresses and the IRQ is shared with multiple controllers. The PCI Configuration Space contains Base Address Registers for the Command and Control Block.

- Offset 10h—Primary Command base address
- Offset 14h—Primary Control base address
- Offset 18h—Secondary Command base address
- Offset 1Ch—Secondary Control base address

4.7 Mixed Devices Boot and Drive Letter Ordering

SATA Emulation	Hard Drive Order	HDD Boot and Drive Letter Ordering
Separate IDE Controller (default). Used with Windows 2000 and XP.	A. Integrated SATA B. Integrated IDE	A1. SATA 0 A2. SATA 2 A3. SATA 1 A4. SATA 3 B1. IDE Device 0 B2. IDE Device 1
Separate IDE Controller. Used with Windows 2000 and XP.	A. Integrated IDE B. Integrated SATA	A1. IDE Device 0 A2. IDE Device 1 B1. SATA 0 B2. SATA 2 B3. SATA 1 B4. SATA 3
Combined with IDE Controller. Used with Windows 9x, NT, and Linux.	A. Integrated SATA B. Integrated IDE	A1. SATA 0 A2. SATA 2 B1. IDE Device 0 B2. IDE Device 1
Combined with IDE Controller. Used with Windows 9x, NT, and Linux.	A. Integrated IDE B. Integrated SATA	A1. IDE Device 0 A2. IDE Device 1 B1. SATA 0 B2. SATA 2

Identifying the Chassis, Routine Care, and Disassembly Preparation

This chapter provides general service information. To properly service the computer, you must adhere to the procedures and precautions described in this chapter.



CAUTION: When the computer is plugged into an AC power source, voltage is always 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.



Not all models are available in all chassis styles.

5.1 Chassis Designations

5.1.1 Microtower (MT)



5.1.2 Small Form Factor (SFF)



5.2 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 appear to be affected at all and can work perfectly throughout a normal cycle. The device may function normally for a while, but it has been degraded 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.

5.2.1 Generating Static

The following table shows that:

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

Event	Relative Humidity		
	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

*These components are multi-packaged inside plastic tubes, trays, or Styrofoam.



700 volts can degrade a product.

5.2.2 Preventing Electrostatic Damage to Equipment

Many electronic components are sensitive to ESD. Circuitry design and structure determine the degree of sensitivity. The following 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.

5.2.3 Personal Grounding Methods and Equipment

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

- **Wrist straps** are flexible straps with a maximum of one-megohm \pm 10% resistance in the ground cords. To provide proper ground, you must wear a strap 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 maximum of one-megohm \pm 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

5.2.4 Grounding the Work Area

To prevent static damage at the work area, use the following precautions:

- Cover the work surface 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 work areas.
- 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 conductive field service tools, such as cutters, screwdrivers, and vacuums.

5.2.5 Recommended Materials and Equipment

Materials and equipment 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 \pm 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 \pm 10% resistance
- Material handling packages
- Conductive plastic bags
- Conductive plastic tubes

- Conductive tote boxes
- Opaque shielding bags
- Transparent metallized shielding bags
- Transparent shielding tubes

5.3 Operating Guidelines

To prevent overheating and to help prolong the life of the computer:

- Keep the computer away from excessive moisture, direct sunlight, and extremes of heat and cold.
- Operate the computer on a sturdy, level surface. Leave a 10.2-cm (4-inch) clearance on all vented sides of the computer and above the monitor to permit the required airflow.
- Never restrict the airflow into the computer by blocking any vents or air intakes. Do not place the keyboard, with the keyboard feet down, directly against the front of the desktop unit as this also restricts airflow.
- Occasionally clean the air vents on all vented sides of the computer. Lint, dust, and other foreign matter can block the vents and limit the airflow.
- Never operate the computer with the cover or side panel removed.
- Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air.
- If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.
- The computer is designed to operate continuously (24x7), provided that the operating guidelines listed above are met.
- Install or enable power management functions of the operating system or other software, including sleep states.

5.4 Routine Care

5.4.1 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 unplug the computer when cleaning with liquids or damp cloths.
4. Always unplug 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.

5.4.2 Cleaning the Computer Case

Follow all safety precautions in [Section 5.4.1, “General Cleaning Safety Precautions,”](#) 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.

5.4.3 Cleaning the Keyboard

Follow all safety precautions in [Section 5.4.1, “General Cleaning Safety Precautions,”](#) before cleaning the keyboard.

To clean the tops of the keys or the keyboard body, follow the procedures described in [Section 5.4.2, “Cleaning the Computer Case.”](#)

When cleaning debris from under the keys, review all rules in [Section 5.4.1, “General Cleaning Safety Precautions,”](#) before following these procedures:



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

- You may remove visible debris underneath or between the keys by vacuuming or shaking.
 - You may use canned, pressurized air to clean debris from under the keys. Use caution, 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.

- Clean under a key 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.

5.4.4 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 5.4.2, “Cleaning the Computer Case.”](#)

5.4.5 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 [Section 5.4, "Routine Care."](#)

5.5 Service Considerations

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

5.5.1 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 always on when the computer is either in the "On," "Standby," or "Suspend" modes. The cooling fan is off when the computer is in "Standby," "Suspend," or "OFF" modes.

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

5.5.2 Tools and Software Requirements

To service the computer, you need the following:

- Torx T-15 screwdriver (Compaq screwdriver with bits, PN 161946-001)
- Torx T-15 screwdriver with small diameter shank (for certain front bezel removal)
- Flat-bladed screwdriver (may sometimes use in place of the Torx screwdriver)
- Phillips #2 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)

5.5.3 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, the screw can damage the unit. HP strongly recommends that you keep all screws removed during disassembly with the part that was removed, then returned to their proper locations.



Metric screws have a black finish.

U.S. screws have a silver finish and are used only for the hard drive.



As you remove each subassembly from the computer, place the subassembly away from the work area to prevent damage.

5.5.4 Cables and Connectors

Most cables used in the unit are flat, flexible cables. You just handle these cables 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 you place cables in their proper location during the reassembly process. Improper cable placement can damage the computer.

5.5.5 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 you must mail a drive, 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 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, discharge yourself of static electricity. While handling a drive, avoid touching the connector. For more information about preventing electrostatic damage, refer to [Section 5.2, “Electrostatic Discharge Information.”](#)
- 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.

5.5.6 Lithium Coin Cell Battery

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

See the appropriate removal and replacement chapter for the chassis you are working on in this guide for replacement procedures.



WARNING: This computer contains a lithium battery. There is a risk of fire and chemical burns 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 60°C (140°F).



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

Removal and Replacement Procedures— Microtower (MT) Chassis

Adherence to the procedures and precautions described in this chapter is essential for proper service. After completing all necessary removal and replacement procedures, run the Diagnostics utility to verify that all components operate properly.



Not all features listed in this guide are available on all computers.

6.1 Preparation for Disassembly

See [Chapter 5, “Identifying the Chassis, Routine Care, and Disassembly Preparation,”](#) for initial procedures.

1. Remove/disengage any security devices that prohibit opening the computer ([Section 6.2.1, “Installing a Cable Lock,”](#) and [Section 6.2.2, “Installing a Padlock”](#)).
2. Close any open software applications.
3. Exit the operating system.
4. Remove any diskette, compact disc, or MultiBay device 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: Regardless of the power-on state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. In some systems, the cooling fan is on even when the computer is in the “Standby” or “Suspend” mode. Always disconnect the power cord before servicing a unit.

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.

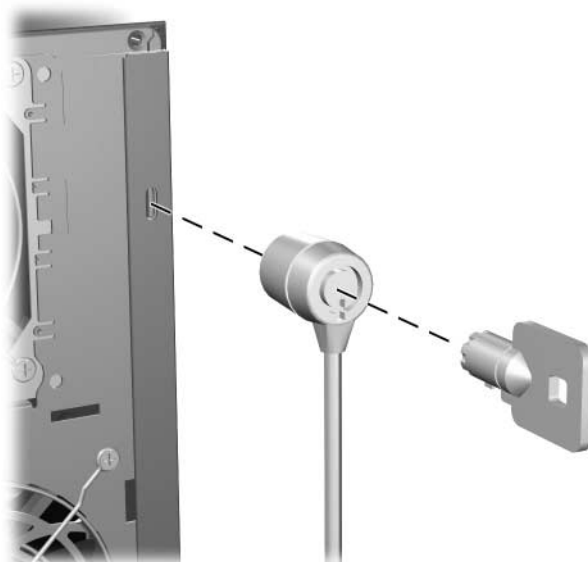


CAUTION: The screws used in the computer are of different thread sizes and lengths; using the wrong screw in an application may damage the unit.

6.2 External Security Devices

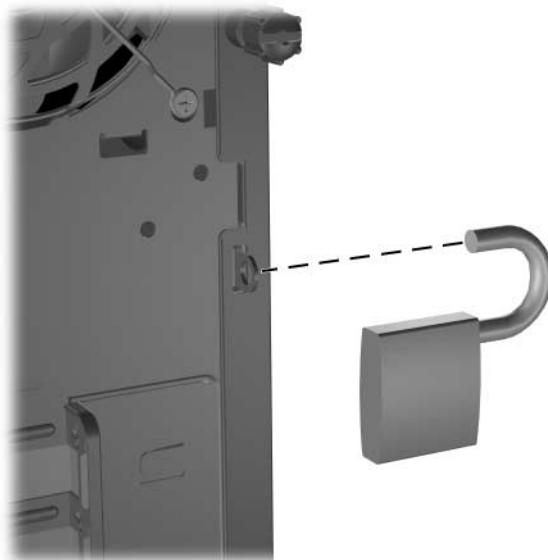
6.2.1 Installing a Cable Lock

The cable lock may be used to secure the computer access panel to the chassis and, at the same time, secure the computer to a fixed object.




6.2.2 Installing a Padlock

A padlock may be used by itself to secure the access panel to the computer chassis. A padlock may also be used with a security cable to secure the computer to a fixed object.




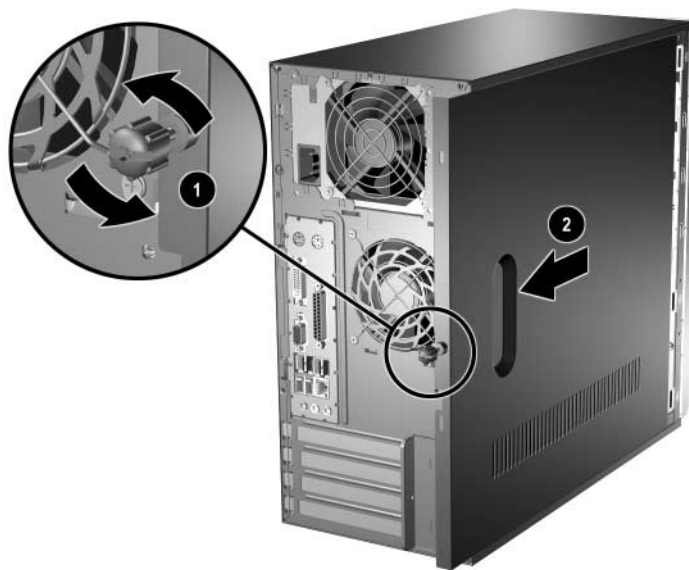
6.3 Access Panel

1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).

 **CAUTION:** Before removing the computer access panel, ensure that the computer is turned off and that the power cord is disconnected from the electrical outlet.

2. Loosen the captive thumbscrew **1** that secures the access panel to the computer chassis.
3. Slide the access panel **2** back about 2.5 cm (1 inch), then lift it off the unit.

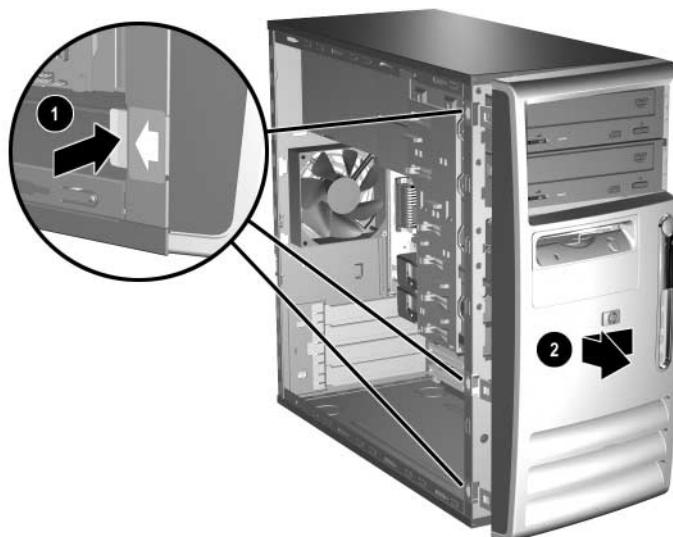
 You may want to lay the computer on its side to install internal parts. Make sure the side with the access panel and pull grip is facing up.



To install the access panel, reverse the removal procedure.

6.4 Front Bezel

1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the access panel (Section 6.3, “Access Panel”).
3. To remove the front bezel, press in on the two bottom tabs on the side of the bezel ❶ so that they release from the chassis. Then press in on the upper tab on the side of the bezel so that it releases from the chassis. The bezel will rotate out slightly ❷.



To reinstall the front bezel,

1. Position the chassis in the upright position.
2. Insert the two hooks on the right side of the bezel ❶ into the rectangular holes on the chassis then rotate the bezel into place ❷ so that the three tabs on the left side of the bezel and the single tab on the upper right corner of the bezel snap into the slots on the chassis.

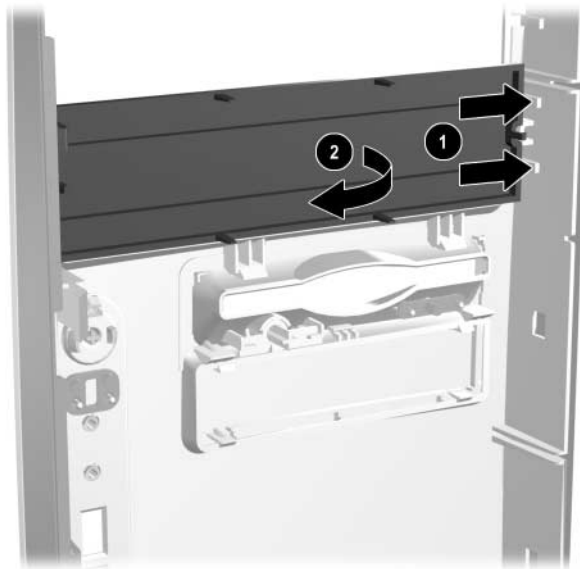


6.5 Front Drive Bezels

1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the access panel (Section 6.3, “Access Panel”).
3. Remove the front bezel (Section 6.4, “Front Bezel”).

6.5.1 5.25" Drive Bezel Blank

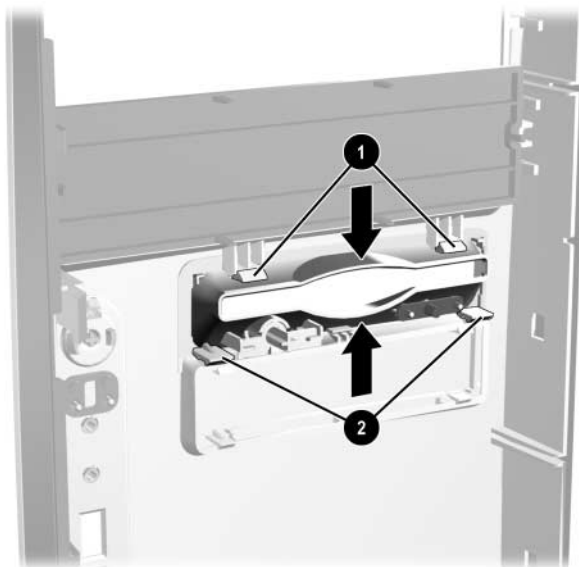
Press the two retaining tabs on the inside of the large bezel ❶ towards the outside of the bezel to release the bezel blank. At the same time, pull the bezel blank in ❷ to remove it from the front bezel.



To install a bezel blank, reverse the removal procedure.

6.5.2 Diskette Drive Bezel

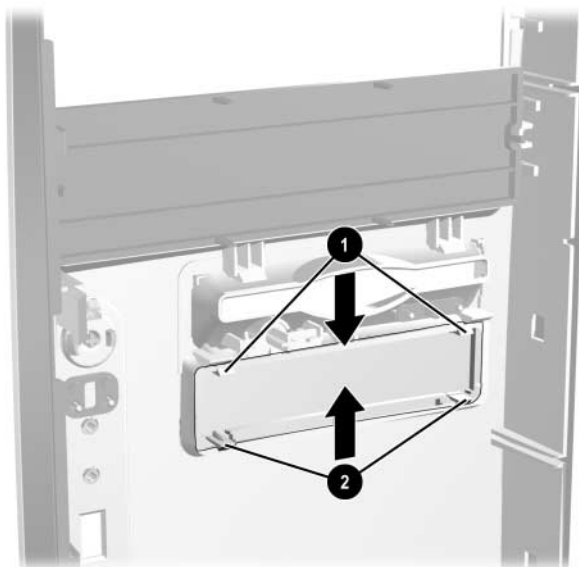
Press the two upper ❶ or the two lower ❷ tabs for the diskette drive bezel towards the center of the drive bezel and push the bezel out to remove it from the front bezel.



To install a bezel or a bezel blank, reverse the removal procedure.

6.5.3 3.5" Drive Bezel Blank

Press the two upper ❶ or the two lower ❷ tabs for the 3.5" drive bezel towards the center of the 3.5" drive bezel and push the bezel blank out to remove it from the front bezel.



To install a bezel blank, reverse the removal procedure.

6.6 Cable Management

Always follow good cable management practices when working inside the computer.

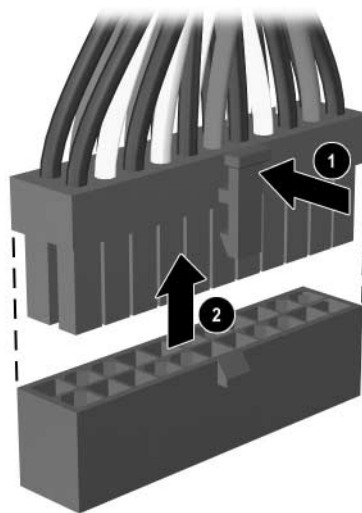
- Keep cables away from major heat sources like the heatsink.
- Do not jam cables on top of expansion cards or memory modules. Printed circuit cards like these are not designed to take excessive pressure on them.
- Keep cables clear of sliding or moveable parts to prevent their being cut or crimped when the parts are moved.
- When folding a flat ribbon cable, never fold to a sharp crease. Sharp creases may damage the wires.
- Some flat ribbon cables come prefolded. Never change the folds on these cables.
- Do not bend any cable sharply. A sharp bend can break the internal wires.
- Never bend a SATA data cable tighter than a 30 mm (1.18 in) radius.
- Never crease a SATA data cable.
- Do not rely on components like the drive cage, power supply, or computer cover to push cables down into the chassis. Always position the cables to lay properly by themselves.

When removing the power supply power cables from the P1 or P3 connectors on the system board, always follow these steps:

1. Squeeze on the top of the retaining latch attached to the cable end of the connector ❶.
2. Grasp the cable end of the connector and pull it straight up ❷.



CAUTION: Always pull the connector - NEVER pull on the cable. Pulling on the cable could damage the cable and result in a failed power supply.



6.6.1 Cable Connections

Cable	To	Cable Designator
Power Supply	System board	P1
Power Supply	System board	P5
Power Supply	1st SATA Hard drive	P7
Power Supply	2nd SATA Hard drive	P6
Power Supply	1st Optical drive	P2
Power Supply	2nd Optical drive	P3
Power Supply	Diskette drive	P4
Power Supply	5.25" Zip drive	P3
Cable	To	PCA Designator
Diskette drive	System board	FDD1 (Black)
1st SATA Hard drive	System board	SATA 1 (Blue)
2nd SATA Hard drive	System board	SATA 2 (White)
ODD Data	System board	IDE1 (Blue)
ODD Audio (if required)	System board	CD_IN1 (Black)
2nd ODD Audio (if required)	System board	AUX_IN1 (Yellow)
Heatsink fan	System board	CPU_FAN
Secondary system fan	System board	CHASSIS_FAN
Front LED power on button	System board	F_P1
Front I/O USB	System board	JUSB1 (Yellow)
Front I/O Audio	System board	AUD1 (Black)
Speaker	System board	SPKR
Serial port connector	System board	COM1
TCIP Security module	System board	JTPM1

6.7 Memory Modules

CAUTION: The memory module sockets have gold metal contacts. When upgrading the 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.

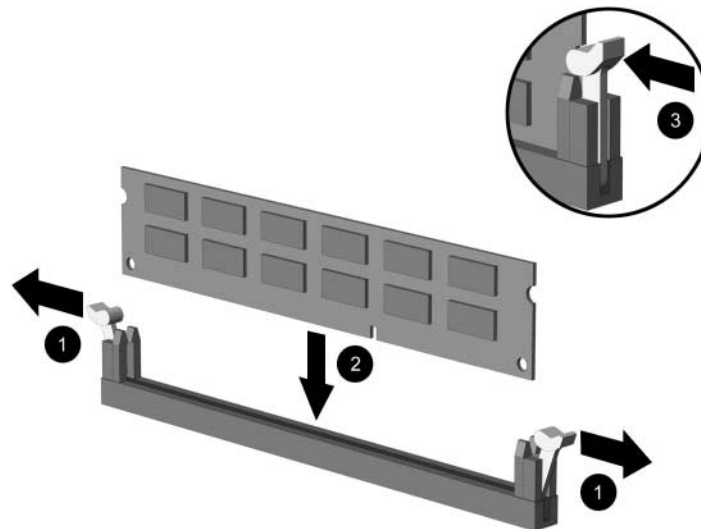
Static electricity can damage the electronic components of the computer or optional cards. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object. Refer to Chapter 5 for more information.


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 6.1, “Preparation for Disassembly”).
2. Remove the access panel and rotate the computer so the system board is parallel to the table to make it easier to work on (Section 6.3, “Access Panel”). If you have locked the Smart Cover Lock, use Computer Setup to unlock the lock.

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

3. Open both latches of the memory module socket ❶, and insert the memory module into the socket ❷. Begin by installing a module into the socket nearest the preinstalled module, and install the modules following the numerical order of the sockets.



 You can install a memory module in only one way. Match the notch on the module with the tab on the memory socket.

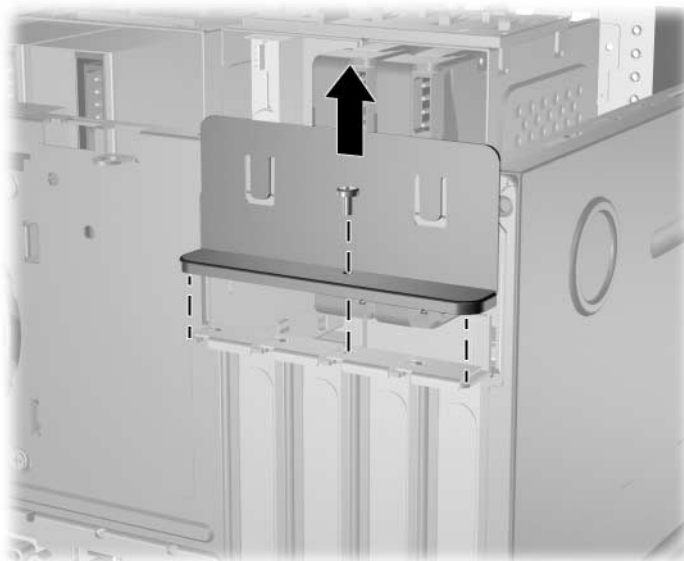
4. Push the module down into the socket, ensuring that the module is fully inserted and properly seated. Make sure the latches are in the closed position ❸.
5. Repeat steps 3 and 4 for any additional modules that you want to install.

To reassemble the computer, reverse the removal procedure.

6.8 Expansion Cards

6.8.1 Expansion Slot Cover

1. Prepare the computer for disassembly ([Section 6.1, “Preparation for Disassembly”](#)).
2. Remove the access panel and rotate the computer so the system board is parallel to the table to make it easier to work on ([Section 6.3, “Access Panel”](#)).
3. On the rear of the computer, remove the retaining screw and slide the slot cover lock up to access the expansion slot covers.



For instructions on PCI expansion cards see [Section 6.8.2, “PCI Expansion Card.”](#)

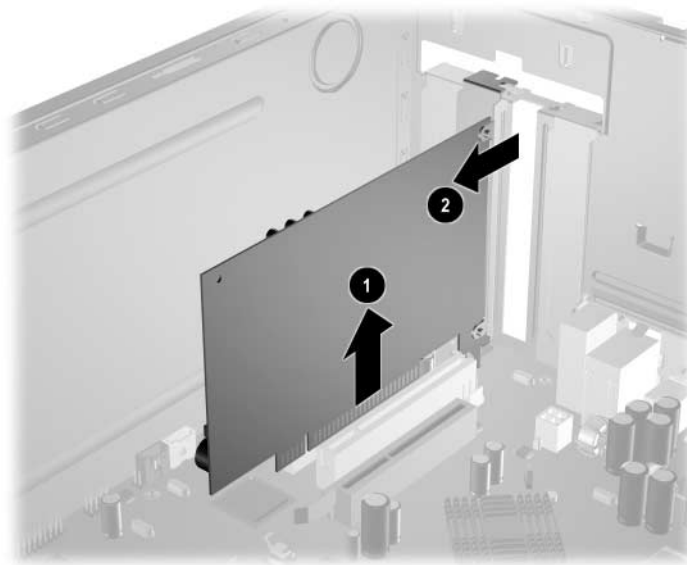
6.8.2 PCI Expansion Card

For preliminary steps, see [Section 6.8.1, “Expansion Slot Cover.”](#)

1. Lay the computer on its side with the open side facing up.
If replacing a PCI expansion card go to step 2.
If installing a PCI expansion card for the first time in a computer, skip to step 5.
2. When removing an expansion card from a standard expansion socket, hold the card at each end, and carefully rock it back and forth until the connectors pull free from the socket.
3. Pull the expansion card straight up from the socket ❶ then away from the inside of the chassis ❷ to maneuver the card out of the computer.



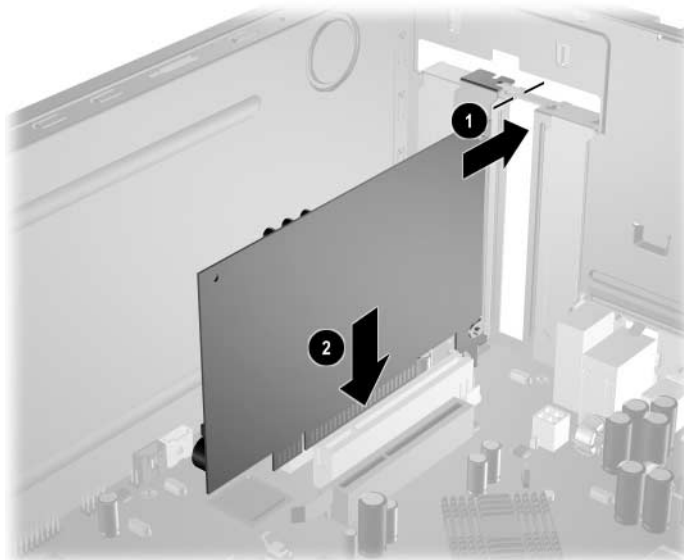
CAUTION: Make sure not to scrape the card against the other components.



CAUTION: After removing an expansion card, you must replace it with a new card or cover the open slot (for example, with a metal slot cover or a piece of cardboard taped in place) for proper cooling of internal components during operation.

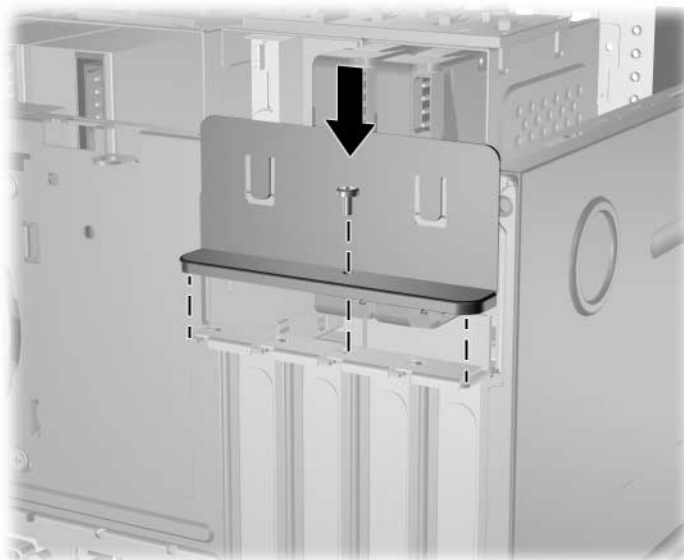
4. Store the old card in the anti-static packaging that contained the new card.
5. If you are installing a PCI expansion card for the first time in this computer, you will need to remove the correct expansion slot cover at this time.

6. When installing an expansion card, hold the card just above the expansion slot on the system board then move the card toward the rear of the chassis so that the bracket on the card is aligned with the open slot on the rear of the chassis ❶.
7. Press the card straight down into the expansion slot on the system board ❷.



Press firmly on the card so that the whole connector seats properly in the expansion card slot.

8. Slide the slot cover lock down toward the expansion card brackets and slot covers to secure them in place.



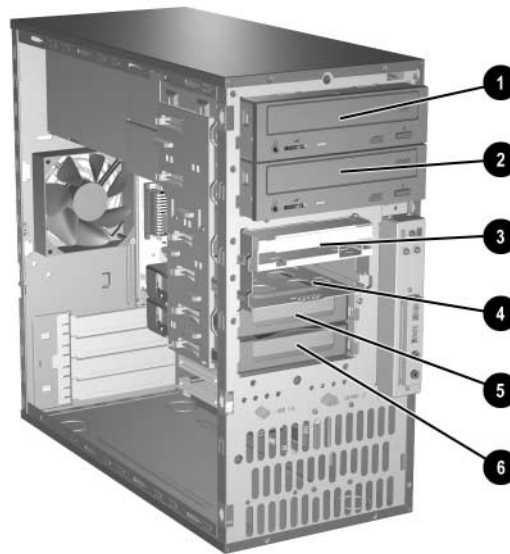
6.9 Drives

The computer supports up to six drives that may be installed in various configurations.

This Section describes the procedure for replacing or upgrading the storage drives. A Torx T-15 screwdriver is needed to remove and install the guide screws on a drive.

CAUTION: Make sure personal files on the hard drive are backed up to an external storage device before removing the hard drive. Failure to do so will result in data loss. After replacing the primary hard drive, you will need to run the *Restore CD* to load the factory-installed files.

6.9.1 Drive Positions



Drive Positions

Item	Description	Item	Description
❶	Optical drive*	❷	Bay for optional 3.5" drive
❸	Second optical drive	❹	Primary hard drive
❺	Diskette drive (optional)	❻	Optional hard drive

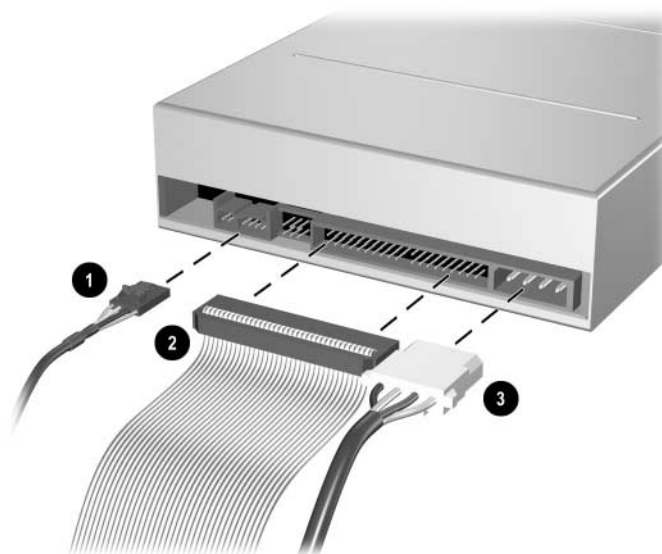
* CD-ROM, CD-R/RW, DVD-ROM, DVD-R/RW, or CD-RW/DVD Combo drive.

6.9.2 Removing a Drive

1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the access panel and rotate the computer so the system board is parallel to the table to make it easier to work on (Section 6.3, “Access Panel”).
3. Remove the front bezel (Section 6.4, “Front Bezel”).
4. Disconnect the audio, data, and power cables from the back of the drive, as shown in the following illustrations:

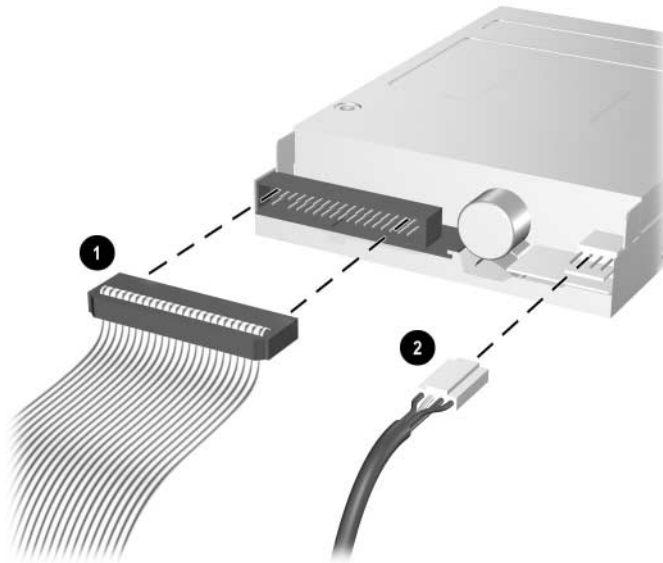
Disconnecting Optical Drive Cables

Audio cable is ❶, data cable is ❷, and power cable is ❸.



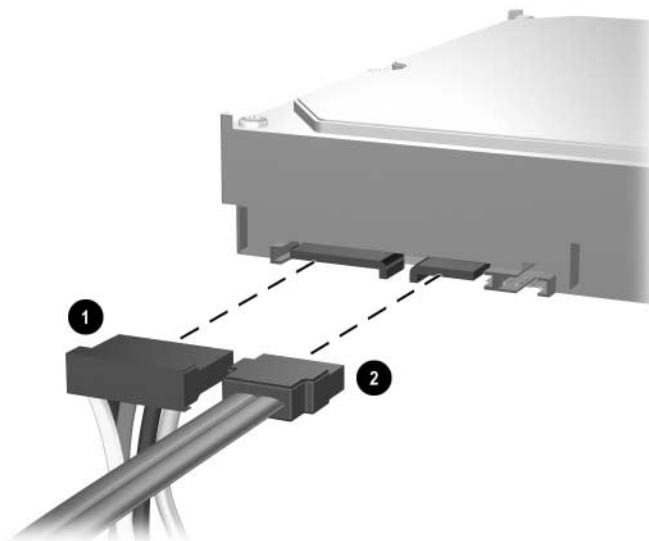
Disconnecting Diskette Drive Cables

Data cable is ❶ and power cable is ❷.



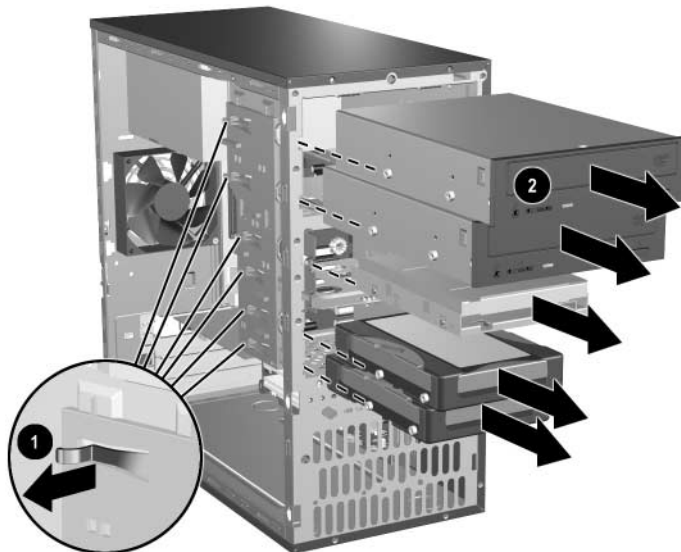
Disconnecting Hard Drive Cables

Power cable is ❶, data cable is ❷.



Releasing the Drives

5. A latch drive bracket with release tabs secures the drives in the drive bay. Lift the release tab on the latch drive bracket ❶ for the drive you want to remove, then slide the drive from its drive bay ❷.



6. Remove the four guide screws (two on each side) from the old drive. You will need these screws to install a new drive.

6.9.3 Installing a Drive



CAUTION: To prevent loss of work and damage to the computer or drive:

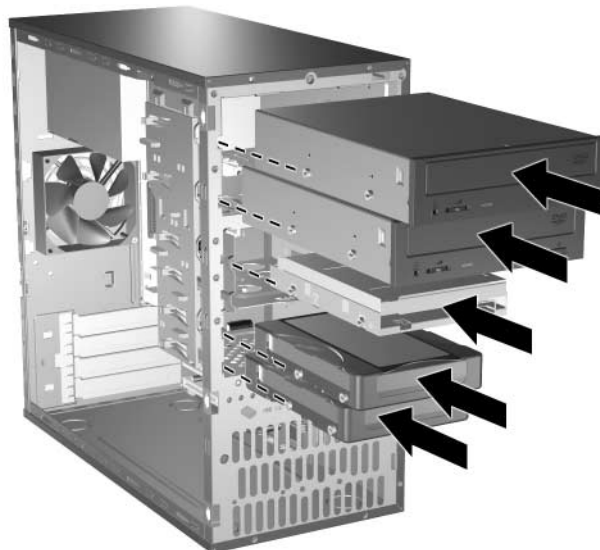
- If you are inserting or removing a hard drive, shut down the operating system properly, then turn off the computer. Do not remove a hard drive while the computer is on or in standby mode.
- Before handling a drive, ensure that you are discharged of static electricity. While handling a drive, avoid touching the connector. For more information about preventing electrostatic damage, refer to [Chapter 5, "Identifying the Chassis, Routine Care, and Disassembly Preparation,"](#) for more information
- Handle a drive carefully; do not drop it.
- 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.

1. Install four guide screws (two on each side) into the new drive. The screws help guide the drive into its proper position in the bay.
 - If this is a new installation, guide screws are provided on the front of the chassis under the front bezel.
 - If this is a replacement drive, use the screws taken from the old drive.



There are a total of eight extra guide screws on the front of the chassis. Four have U.S. threads and four have metric threads. Metric screws have a black finish. U.S. threaded screws have a silver finish and are only used for hard drives. Make sure to install the appropriate guide screws into the drive.

2. Align the guide screws with the guide slots, then slide the drive into the drive bay, making sure it is fully seated.



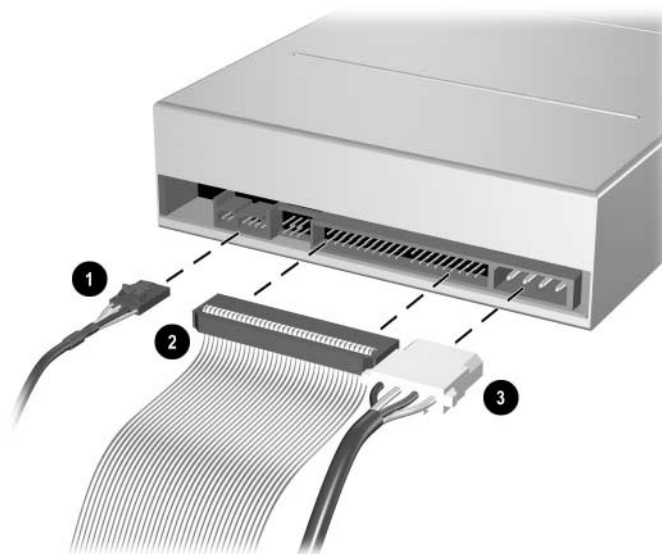
3. Reconnect all cables to the drive as shown in the following illustrations.



Refer to Chapter 4, [Section 4.3, "PATA Drive Installation Guidelines,"](#) for information on attaching the cabling to get optimum performance.

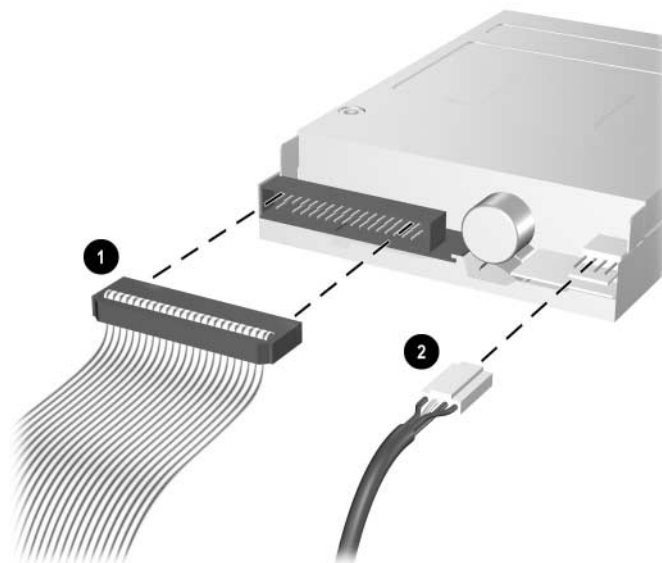
Connecting Optical Drive Cables

Audio cable is ❶, data cable is ❷, power cable is ❸.



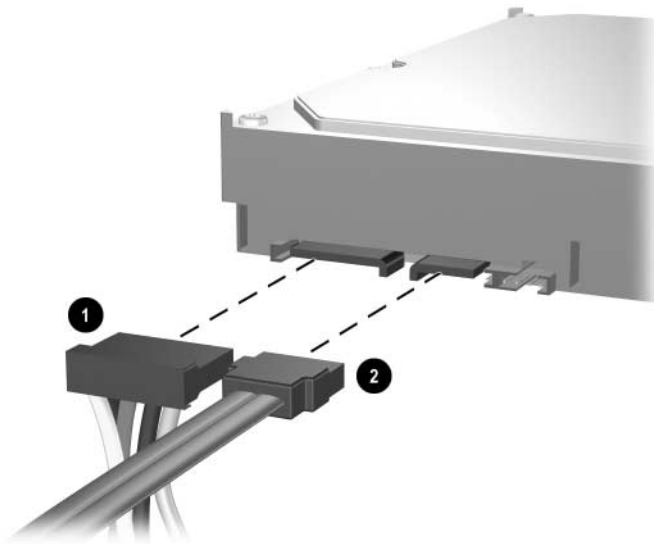
Connecting Diskette Drive Cables

Data cable is ❶, power cable is ❷.




Connecting Hard Drive Cables

Power cable is ❶, data cable is ❷.

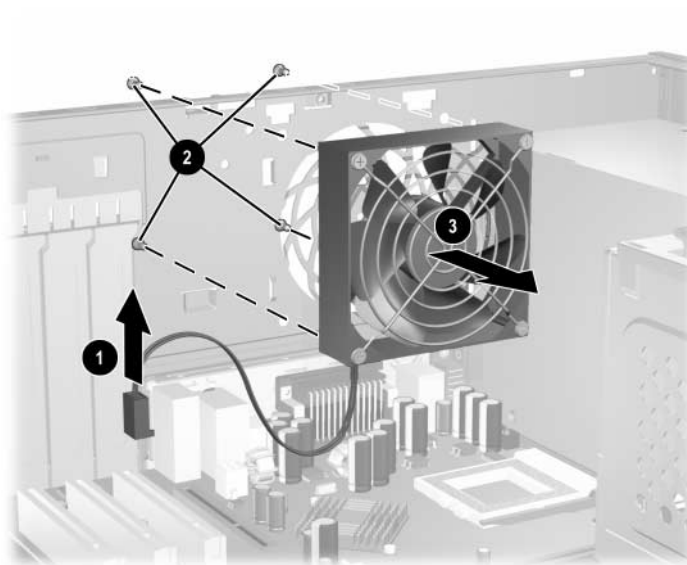


4. Install the front bezel ([Section 6.4, “Front Bezel”](#)).
5. Install the access panel ([Section 6.3, “Access Panel”](#)).
6. Turn on the computer.

 If you replaced the primary hard drive, you may use the restore CD to restore the operating system, software drivers, and/or any software applications that were preinstalled on the computer. Follow the instructions in the guide included with the restore CD. When the restore process has completed, reinstall any personal files that were backed up before replacing the hard drive.

6.10 Chassis Fan

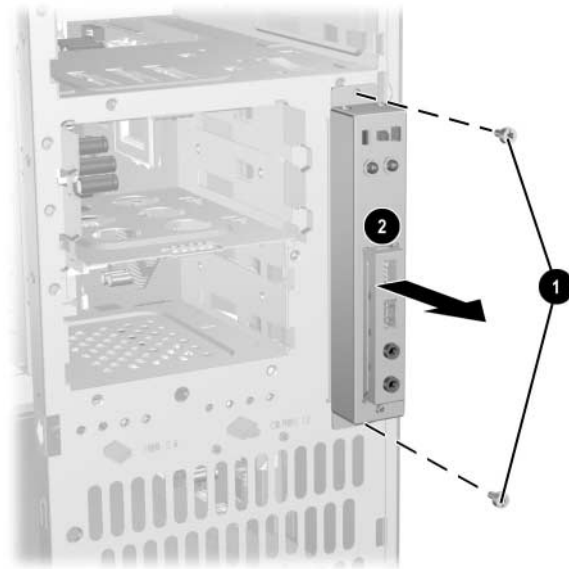
1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the access panel and rotate the computer so the system board is parallel to the table to make it easier to work on (Section 6.3, “Access Panel”).
3. Disconnect the power cable that connects the chassis fan to the system board ❶.
4. Remove the four screws from the rear of the chassis ❷ that secure the fan.
5. Remove the fan from the chassis ❸.



To install the chassis fan, reverse the removal procedure.

6.11 Front I/O Panel Housing Assembly

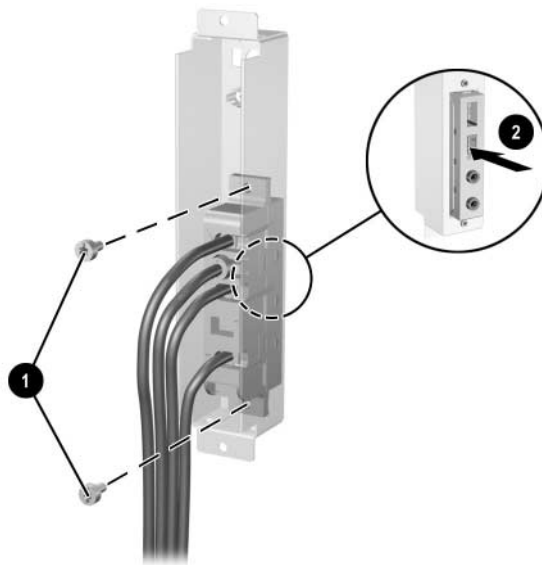
1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the access panel and rotate the computer so the system board is parallel to the table to make it easier to work on (Section 6.3, “Access Panel”).
3. Disconnect the following three attaching cables from the system board:
 - ❑ power switch/LED cable
 - ❑ front USB cable
 - ❑ front audio cable
4. Remove the two screws **1** that secure the housing to the chassis and then pull the housing **2** away from the chassis.



To install the housing assembly, reverse the removal procedures.

6.12 Front I/O Devices

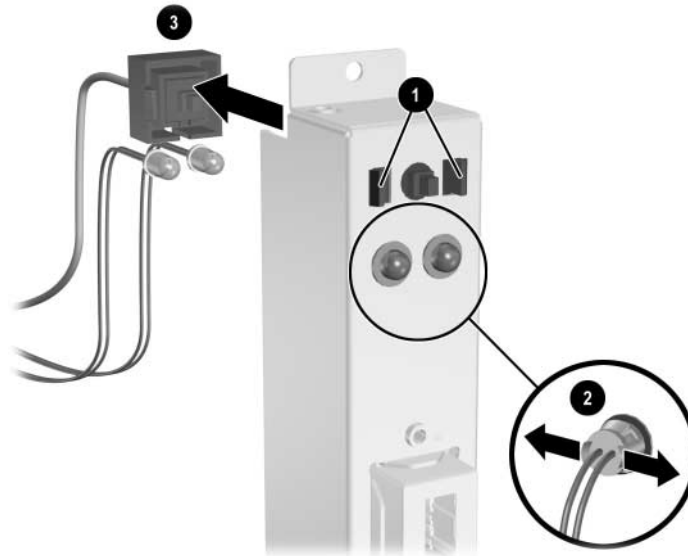
1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the access panel and rotate the computer so the system board is parallel to the table to make it easier to work on (Section 6.3, “Access Panel”).
3. Remove the front I/O panel assembly (Section 6.11, “Front I/O Panel Housing Assembly”).
4. Remove the two screws ❶ that hold the USB and audio port assembly in place.
5. Remove the I/O device assembly from the I/O panel ❷ by pushing it out of the housing.



To install the I/O devices, reverse the removal procedures and then reinstall the housing assembly.

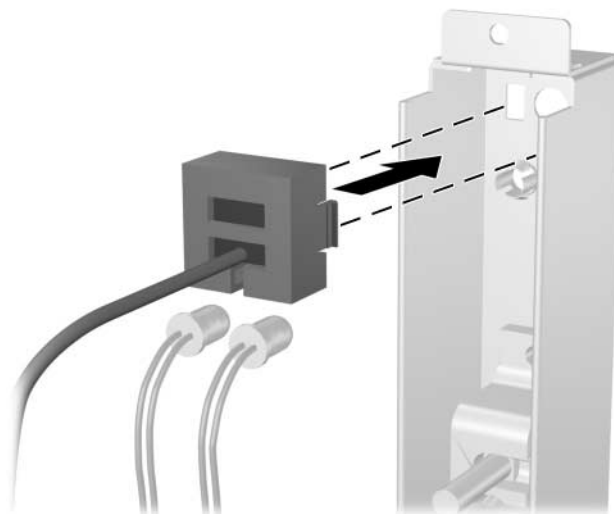
6.13 Power Switch Assembly

1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the access panel and rotate the computer so the system board is parallel to the table to make it easier to work on (Section 6.3, “Access Panel”).
3. Remove the front I/O panel assembly (Section 6.11, “Front I/O Panel Housing Assembly”).
4. Squeeze the switch holder retaining clips together ❶ and push the switch assembly out of the front I/O panel housing.
5. From the inside of the I/O panel assembly, spread the clips ❷ that secure the LEDs in place, and then push the LEDs out of the retainers from the front side.
6. If necessary, compress the retaining clips on the LED holders and push the holders out of the front of the I/O panel housing.
7. Remove the switch from the switch holder ❸.

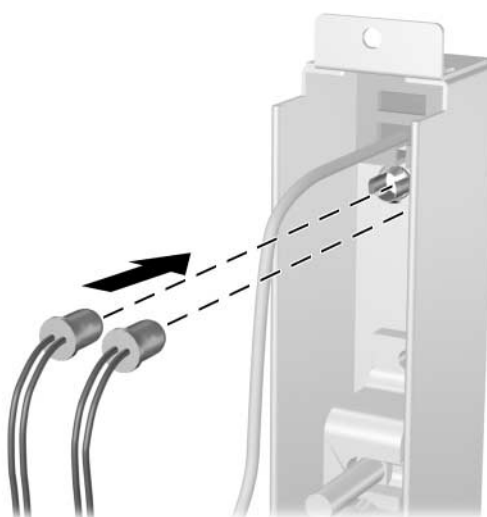


8. To install the power switch assembly install the switch into the switch holder.

- Place the switch holder with switch installed into the inside of the front I/O panel housing and position the legs of the retaining clip into the clip slots. Press firmly so that the clips will penetrate the slot openings and latch into place. If one clip will not easily engage, it may be necessary to use the end of a ball point pen (or another thin, stiff object) to compress the clip leg while inserting it into the clip slot.



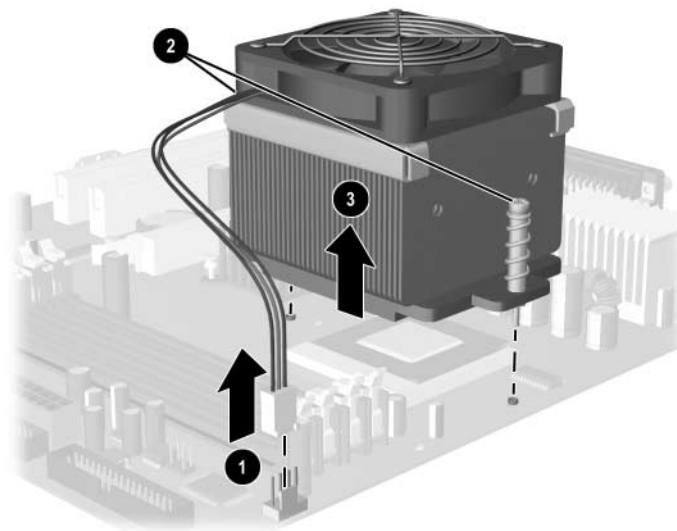
- Push the LEDs into their retainers. The power LED (having the blue and black leads) should be to the right when viewed from the front of the computer.



- Reconnect the housing assembly to the front of the chassis and reconnect the cables to the system board.

6.14 Heatsink

1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the access panel and rotate the computer so the system board is parallel to the table to make it easier to work on (Section 6.3, “Access Panel”).
3. Disconnect the heatsink fan cable ❶ from the system board.
4. Loosen the two screws ❷ that secure the heatsink to the processor.
5. Twist the heatsink to break the bond between it and the processor.
6. Lift the heatsink ❸ from the processor.



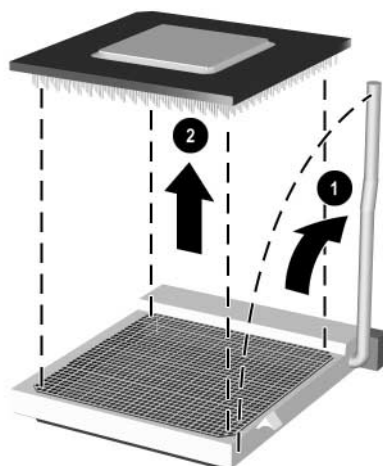
To install a heatsink, reverse the removal procedure.



CAUTION: Always refresh the thermal grease when reinstalling a heatsink.

6.15 Processor

1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the access panel and rotate the computer so the system board is parallel to the table to make it easier to work on (Section 6.3, “Access Panel”).
3. Remove the heatsink (Section 6.14, “Heatsink”).
4. Rotate the ZIF socket handle to its fully open position ❶.
5. Carefully lift the processor from the socket ❷.



To install a new processor:

1. Insert the processor into the socket.
2. Secure the locking lever.

If reusing the existing heatsink, go to step 3.

If using a new heatsink, go to step 5.

3. If reusing the existing heatsink clean bottom of the heatsink and apply the thermal grease found in the spares kit to the top of the processor.
4. Clean the bottom of the heatsink with the provided alcohol pad and place it atop the processor.

Go to step 6.

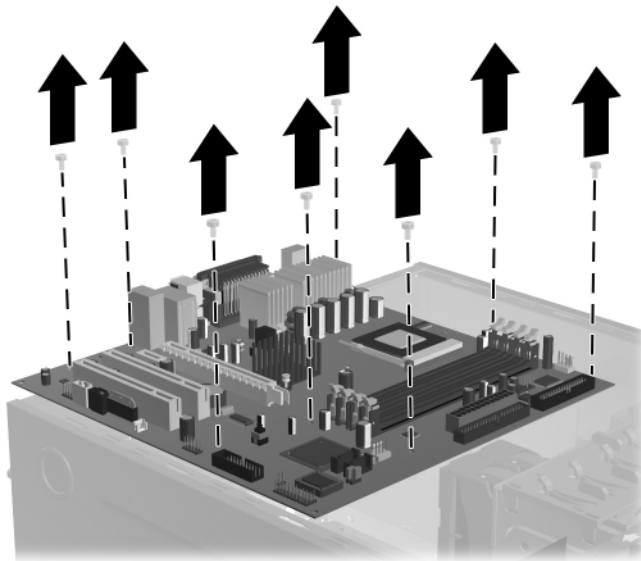
5. If using a new heatsink, remove the protective covering from the bottom of the heatsink and place it in position atop the processor.
6. Secure the heatsink to the system board and system board tray with the two captive screws and attach the heatsink control cable to the system board.



After installing a new processor onto the system board, always update the system ROM to ensure that the computer is using the latest version of the BIOS. You can find the latest system ROMPaq on the Web at: <http://h18000.www1.hp.com/support/files>.

6.16 System Board

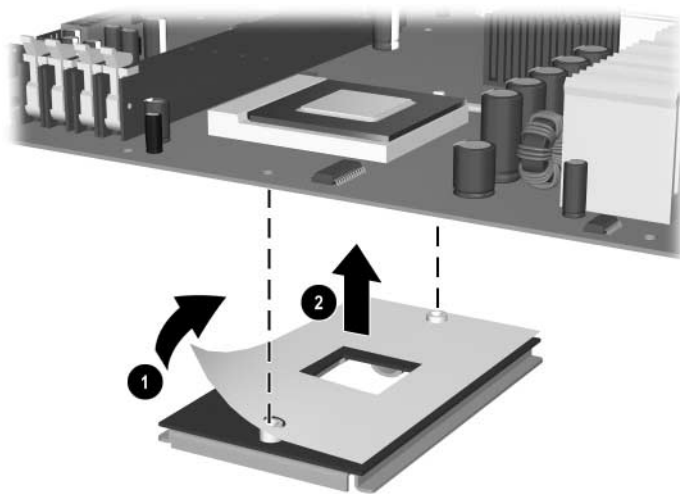
1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the access panel and rotate the computer so the system board is parallel to the table to make it easier to work on (Section 6.3, “Access Panel”).
3. Remove all PCI expansion cards (Section 6.8.2, “PCI Expansion Card”).
4. Remove the memory modules (Section 6.7, “Memory Modules”).
5. Remove the heatsink (Section 6.14, “Heatsink”).
6. Remove the processor (Section 6.15, “Processor”).
7. Disconnect all cables connected to the system board, noting their location for reinstallation.
8. Remove the eight screws that secure the system board to the chassis, then slide the board toward the front of the computer until the rear I/O connectors clear the chassis.



CAUTION: When installing a new system board, you must attach a new processor backing plate to the system board. The heatsink will not attach properly if this plate is not installed.

To install a processor backing plate:

1. Lay the new system board top down on a padded surface to protect the board from damage.
2. Remove the protective paper shield ❶ from the mounting surface of the backing plate.
3. Position the mounting plate studs over the back of the system board ❷ and press the plate firmly to the system board so the studs penetrate the mounting holes.



To complete the installation of the system board, reverse the removal procedures.

6.17 Battery

The battery that comes with your computer provides power to the real-time clock and has a lifetime of about three years. When replacing the battery, use a battery equivalent to the battery originally installed on the computer. The computer comes with a 3-volt lithium coin cell battery.



You can extend the lifetime of the lithium battery by plugging the computer into a live AC wall socket. The computer uses the lithium battery only when NOT connected to AC power.



WARNING: This computer contains an internal lithium manganese dioxide battery. There is a risk of fire and chemical burns if the battery is not handled properly. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose to temperatures higher than 140°F (60°C)
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
- Replace the battery only with the HP/Compaq spare designated for this product.



CAUTION: Before replacing the battery, it is important to back up the computer CMOS settings. When the battery is removed or replaced, the CMOS settings will be cleared. Refer to the *Troubleshooting Guide* for information on backing up the CMOS settings.



Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. In order to forward them to recycling or proper disposal, please use the public collection system or return them to HP/Compaq, their authorized partners, or their agents.



CAUTION: Static electricity can damage the electronic components of the computer or optional equipment. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

1. Prepare the computer for disassembly ([Section 6.1, “Preparation for Disassembly”](#)).
2. Remove the access panel and rotate the computer so the system board is parallel to the table to make it easier to work on ([Section 6.3, “Access Panel”](#)).

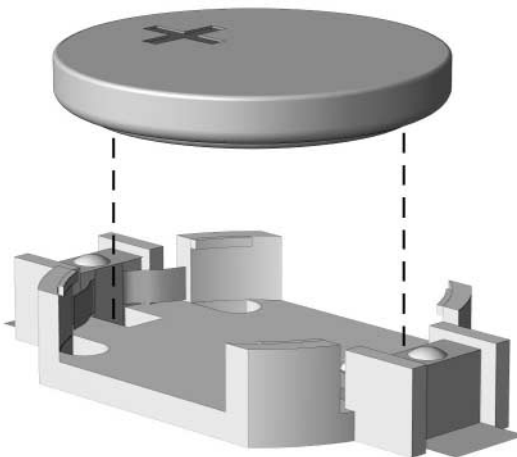


You may need to remove an expansion card to gain access to the battery.

3. Locate the battery and battery holder on the system board.
4. Depending on the type of battery holder on your system board, complete the following instructions to replace the battery:

6.17.1 Type 1 Battery Holder

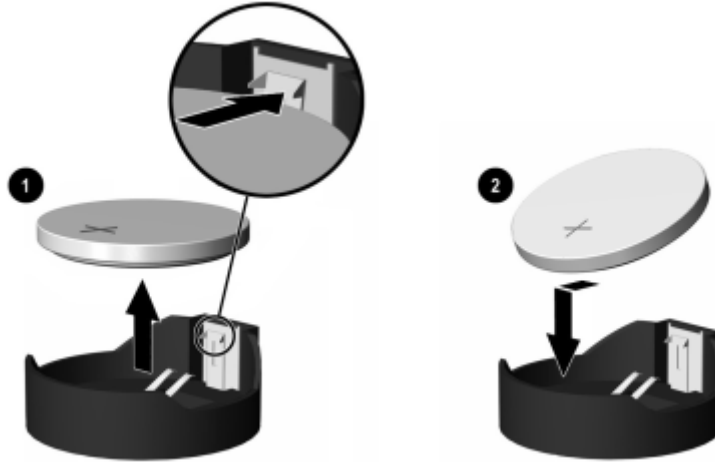
1. Lift the battery out of its holder.



2. Slide the replacement battery into position, positive side up. The battery holder automatically secures the battery in the proper position.
3. Replace the computer cover or access panel ([Section 6.3, “Access Panel”](#)).
4. Plug in and turn on power to the computer.
5. Using Computer Setup, reset the date and time, passwords, and any special system setups. For more information, refer to the *Computer Setup (F10) Utility Guide*.

6.17.2 Type 2 Battery Holder

1. To release the battery from its holder, squeeze the metal clamp that extends above one edge of the battery ❶. When the battery pops up, lift it out.
2. To insert the new battery, slide one edge of the replacement battery under the holder's lip ❷ with the positive side up. Push the other edge down until the clamp snaps over the other edge of the battery.

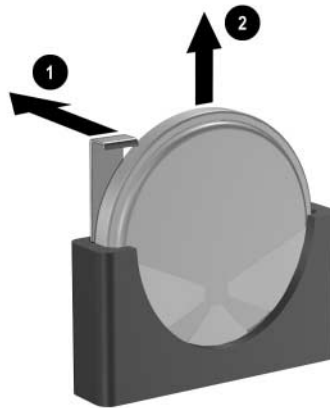


After replacing the battery, use the following steps to complete this procedure.

3. Replace the computer cover or access panel ([Section 6.3, “Access Panel”](#)).
4. Plug in and turn on power to the computer.
5. Using Computer Setup, reset the date and time, passwords, and any special system setups. For more information, refer to the *Computer Setup (F10) Utility Guide*.

6.17.3 Type 3 Battery Holder

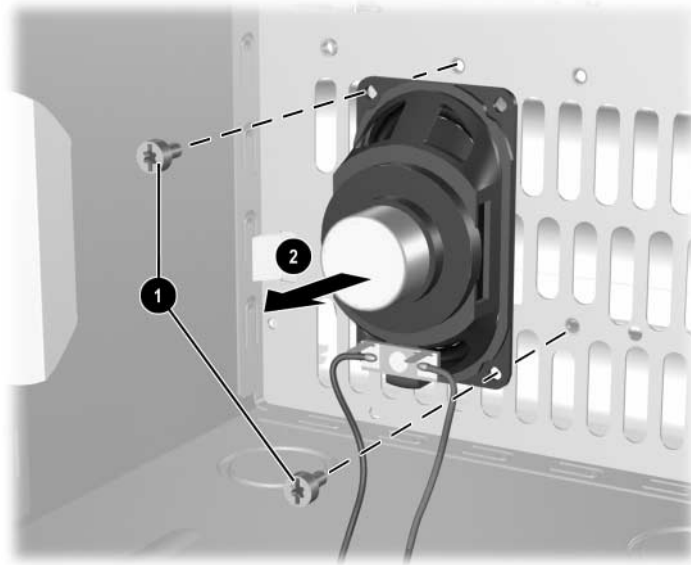
1. To release the battery from its holder, press back lever ❶ that extends above one edge of the battery.
2. When the battery pops up, lift it out ❷.



3. To insert the new battery, push it down into the holder with the positive side to the left as shown in the drawing above.
4. Replace the computer access panel ([Section 6.3, “Access Panel”](#)).
5. Plug in the computer and turn on power.
6. Using Computer Setup, reset the date and time, passwords, and any special system setups. For more information, refer to the *Computer Setup (F10) Utility Guide*.

6.18 Speaker

1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the access panel and rotate the computer so the system board is parallel to the table to make it easier to work on (Section 6.3, “Access Panel”).
3. Move/remove any components necessary to gain access to the speaker.
4. Disconnect the speaker wire from the system board connector.
5. Remove the two screws ❶, that secure the speaker to the chassis.
6. Remove the speaker ❷.



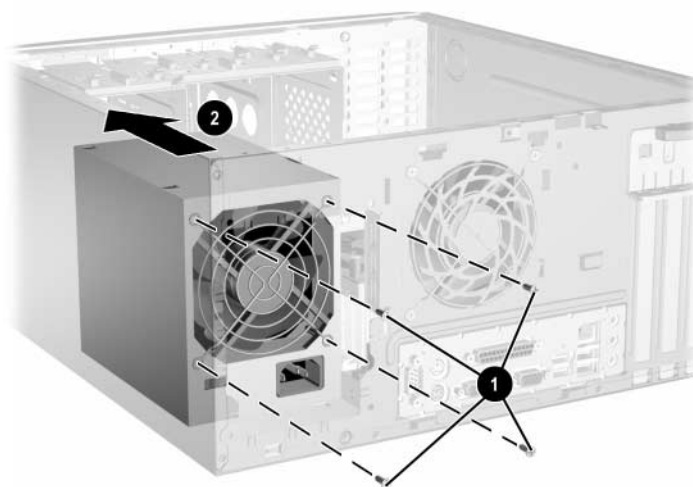
To install the speaker, reverse the removal procedures.

6.19 Power Supply



WARNING: Voltage is always present on the system board when the computer is plugged into an active AC outlet. To avoid possible personal injury and damage to the equipment, disconnect the power cord from the computer and/or the AC outlet before opening the computer.

1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the access panel and rotate the computer so the system board is parallel to the table to make it easier to work on (Section 6.3, “Access Panel”).
3. Disconnect all power cables from the mass storage devices and from the system board.
4. Remove the screws that connect the power supply to the chassis ❶.
5. Slide the power supply toward the front of the computer, then lift it out of the computer ❷.



To install the power supply, reverse the removal procedure.

Removal and Replacement Procedures— Small Form Factor (SFF) Chassis

Adherence to the procedures and precautions described in this chapter is essential for proper service. After completing all necessary removal and replacement procedures, run the Diagnostics utility to verify that all components operate properly.



Not all features listed in this guide are available on all computers.

7.1 Preparation for Disassembly

See [Chapter 5, “Identifying the Chassis, Routine Care, and Disassembly Preparation,”](#) for initial procedures.

1. Remove/disengage any security devices that prohibit opening the computer ([Section 7.2, “External Security Devices”](#)).
2. Close any open software applications.
3. Exit the operating system.
4. Remove any diskette, compact disc, or MultiBay device 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: Regardless of the power-on state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. In some systems the cooling fan is on even when the computer is in the “Standby” or “Suspend” modes. Always disconnect the power cord before servicing a unit.

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.

7.2 External Security Devices

7.2.1 Cable Lock

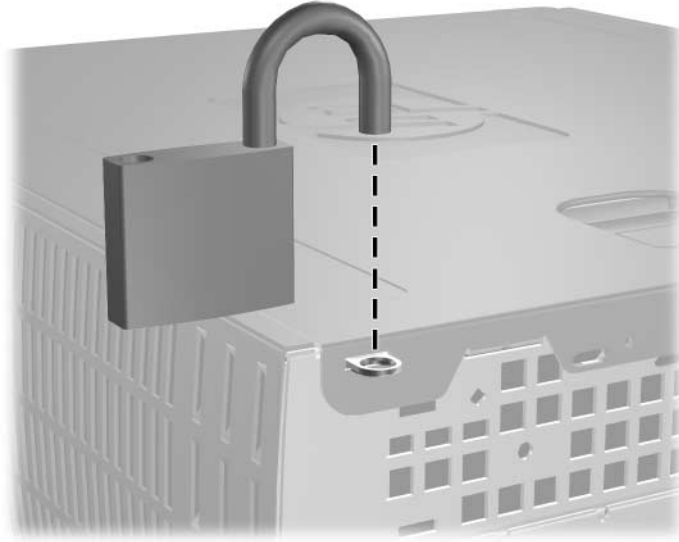
The cable lock may be used to secure the computer access panel to the chassis and, at the same time, secure the computer to a fixed object.

As shown, there are two acceptable methods for using the cable lock. While both methods work, for added security, HP recommends that you use the method shown on the left where the cable lock penetrates both the access panel and the chassis.




7.2.2 Padlock

A padlock may be used by itself to secure the access panel to the computer chassis. A padlock may also be used with a security cable to secure the computer to a fixed object.

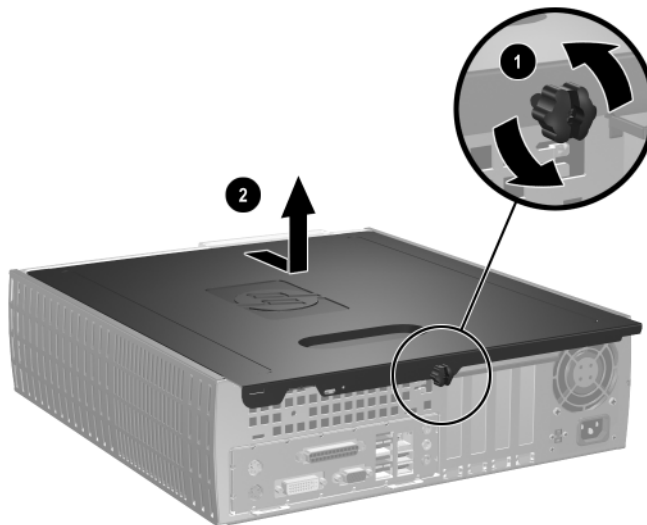


7.3 Computer Access Panel

1. Prepare the computer for disassembly (Section 7.1, “Preparation for Disassembly”).

 **CAUTION:** Before removing the computer access panel, ensure that the computer is turned off and that the power cord is disconnected from the electrical outlet.

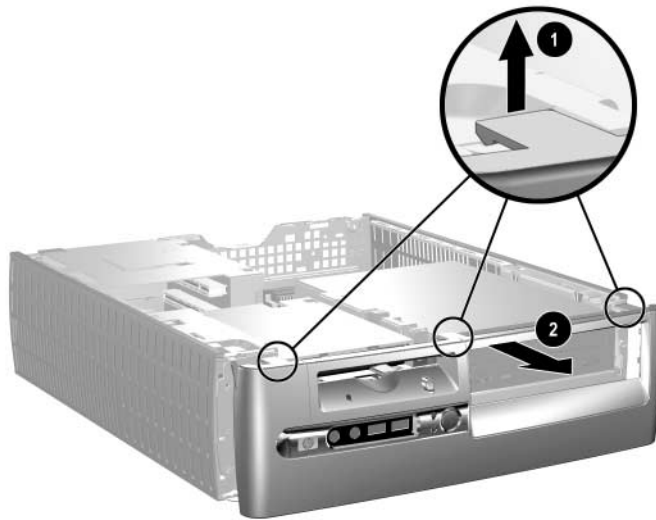
2. Pull up and hold open the latch on the top of the computer ❶.
3. Slide the computer access panel ❷ back about 1.3 cm (0.5 inch), then lift it off the unit.



When installing the access panel, press down on its center to ensure the latches are properly secured while sliding it into the locked position.

7.4 Front Bezel

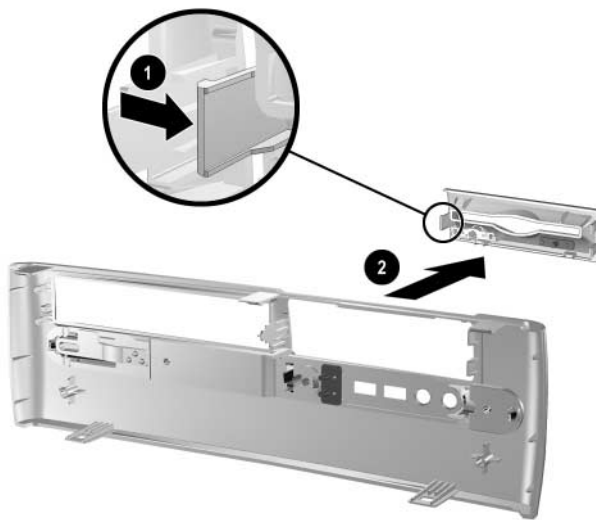
1. Prepare the computer for disassembly (Section 7.1, “Preparation for Disassembly”).
2. Remove the computer access panel (Section 7.3, “Computer Access Panel”).
3. Pull up on the three release tabs **1** on the top of the bezel, then pull the front bezel away from the chassis **2**.



To reinstall the front bezel, reverse the removal procedure

7.5 Front Drive Bezels

1. Prepare the computer for disassembly (Section 7.1, “Preparation for Disassembly”).
2. Remove the computer access panel (Section 7.3, “Computer Access Panel”).
3. Remove the front bezel (Section 7.4, “Front Bezel”).
4. Press the large retaining tab ❶ on the side of the bezel insert as shown then, push the bezel insert out of the front bezel ❷.



To install a bezel or a bezel blank, reverse the removal procedure.

7.6 Memory Modules

CAUTION: The memory module sockets have gold metal contacts. When upgrading the 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.

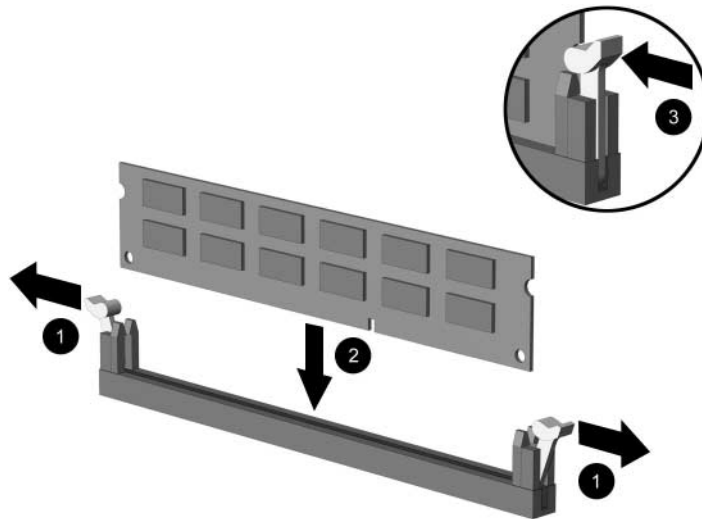
CAUTION: Static electricity can damage the electronic components of the computer or optional cards. Before beginning these procedures, ensure that you discharge yourself of static electricity by briefly touching a grounded metal object. Refer to [Chapter 5, “Identifying the Chassis, Routine Care, and Disassembly Preparation,”](#) 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 7.1, “Preparation for Disassembly”](#)).
2. Remove the computer access panel ([Section 7.3, “Computer Access Panel”](#)).

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

3. Remove the front bezel ([Section 7.4, “Front Bezel,”](#)).
4. Rotate the drive cage to its full upright position.
5. Open both latches of the memory module socket **1**, and insert the memory module into the socket **2**. Begin by installing a module into the socket nearest the preinstalled module, and install the modules following the numerical order of the sockets.



NOTE: A memory module can be installed in only one way. Match the notch on the module with the tab on the memory socket.

6. Push the module down into the socket, ensuring that the module is fully inserted and properly seated. Make sure the latches are in the closed position ❸.
7. Repeat steps 4 and 5 for any additional modules that you want to install.



The computer automatically recognizes the additional memory when the computer is turned on.

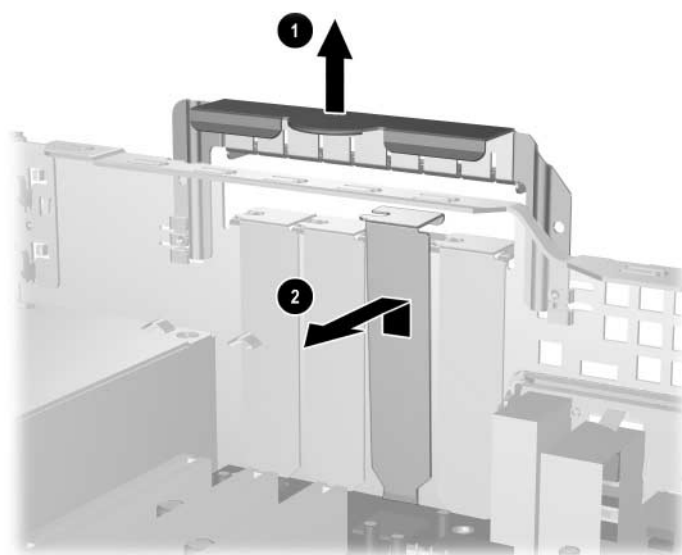
To reassemble the computer, reverse the removal procedure.



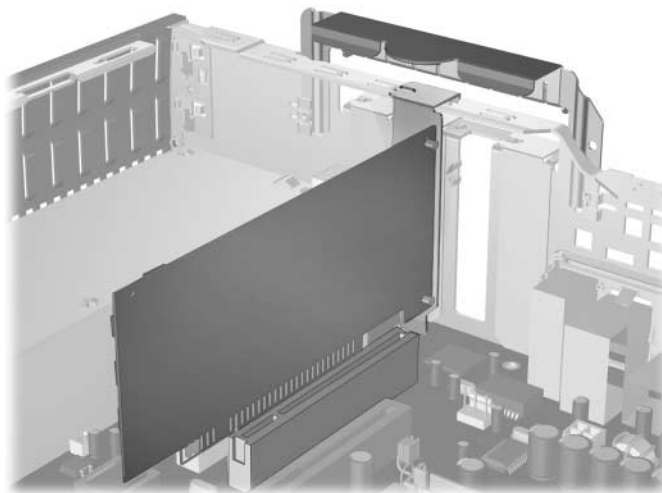
If you normally lock the Smart Cover Lock, use Computer Setup to relock the lock and enable the Smart Cover Sensor.

7.7 PCI Expansion Card

1. Prepare the computer for disassembly (Section 7.1, “Preparation for Disassembly”).
2. Remove the computer access panel (Section 7.3, “Computer Access Panel”).
3. Disconnect all cables attached to the expansion cards.
4. Release the expansion card latch ❶ that secures the PCI slot covers by pulling the latch up.
5. If you are installing a card for the first time continue with step 6.
If you are removing an existing card go to step 7.
6. Remove the slot cover by sliding it up and off ❷.



7. If you are removing an expansion card from a PCI expansion socket, hold the card at each end and carefully rock it back and forth until the connectors pull free from the socket. Lift the expansion card straight up then pull it in toward the center of the chassis to release it from the chassis frame. Make sure not to scrape the card against other components.

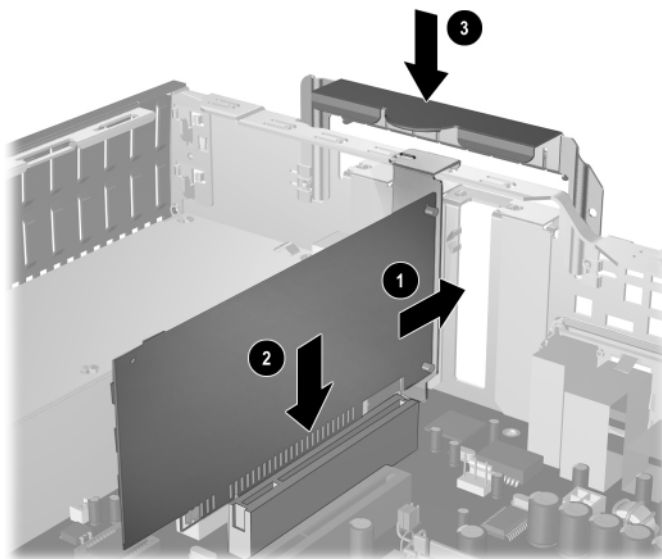



8. Place the card under the rear panel bracket **1**, then firmly push the expansion card into the connector **2**. Ensure that the card is firmly seated in the expansion card slot.




Be sure not to touch the rear panel bracket or other components in the chassis when installing an expansion card.

9. Push the expansion slot latch down **3** to secure the card.




 If you are *not* replacing the old expansion card with a new card, install an expansion slot cover to close the open slot. Insert the metal slot covering the open slot, then push the expansion slot latch down to secure the slot cover in place

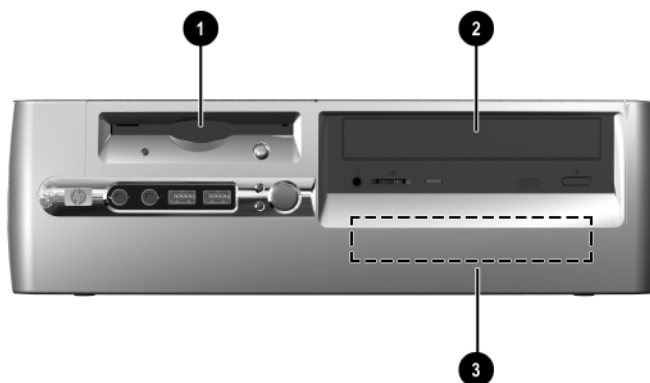
 **CAUTION:** After removing an expansion card, you must replace it with a new card or cover the open slot with a metal slot cover or a piece of tape for proper cooling of internal components. Failure to do so may cause the system to overheat.

7.8 Drives

The computer supports up to three drives. This section describes the procedure for replacing or upgrading the storage drives. You need a Torx T-15 screwdriver to remove and install the guide screws on a drive.

 **CAUTION:** Make sure personal files on the hard drive are backed up to an external storage device before removing the hard drive. Failure to do so will result in data loss. After replacing the primary hard drive, you need to run the *Restore Plus!* CD to load the factory-installed files.

7.8.1 Drive Positions



Drive Positions

Item	Description	Item	Description
❶	One standard 3.5-inch, one-third height bay (1.44-MB diskette drive shown)*	❸	Internal 3.5-inch, one-third height bay for hard drive
❷	5.25-inch drive bay for optional drives.		

*If a 1.44-MB diskette drive is installed, it is configured with a diskette drive bezel as shown in the illustration. If the computer contains an empty 3.5-inch drive bay, then a bezel blank is installed instead. If you do not have a drive in this slot, you may later choose to install a 3.5-inch device (such as a diskette drive, hard drive, or Zip drive). However, to install a 3.5-inch device other than a diskette drive or hard drive, you must order the 3.5-inch device bezel to provide proper air flow within the chassis.

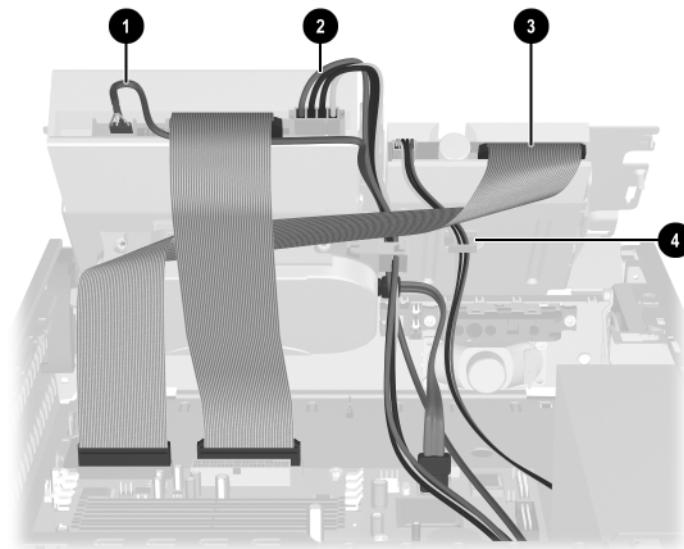
To verify the type and size of the storage device installed in the computer, run Computer Setup.

7.8.2 Cable Management

CAUTION: You must keep the drive data and power cables clear of the power supply and the power supply fan to avoid damage or restrict air flow.

Follow these guidelines when routing the cables in the computer:

1. Route the optical drive audio cable ❶ (if needed) along the back of the optical drive and then down, alongside of the drive cage to the floor of the chassis. Route this cable behind the hard drive data cable.
2. Route the optical drive power cable ❷ down, alongside of the drive cage to the floor of the chassis. Keep the cable clear of the power supply fan.
3. Fold the diskette drive flat-ribbon data cable ❸ near the connector on the drive. Route the cable up high on the drive cage (near the cable connectors), then folding again to lay beneath the optical drive data cable.
4. The cable clip ❹ is stamped from the back of the drive cage and secures the diskette drive power cable.




Always follow good cable management practices when working inside the computer.

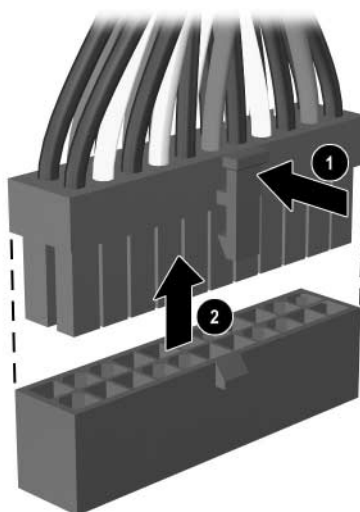
- Keep cables away from major heat sources like the heatsink.
- Do not jam cables on top of expansion cards or memory modules. Printed circuit cards like these are not designed to take excessive pressure.
- Keep cables clear of sliding or moveable parts to prevent their being cut or crimped when the parts are moved.
- When folding a flat ribbon cable, never fold to a sharp crease. Sharp creases may damage the wires.
- Some flat ribbon cables come prefolded. Never change the folds on these cables.
- Do not bend any cable sharply. A sharp bend can break the internal wires.

- Never bend a SATA data cable tighter than a 30 mm (1.18 in) radius.
- Never crease a SATA data cable.
- Do not rely on components like the drive cage, power supply, or computer cover to push cables down into the chassis. Always position the cables to lay properly by themselves.

When removing the power supply power cables from the P1 or P3 connectors on the system board, always follow these steps:

1. Squeeze on the top of the retaining latch attached to the cable end of the connector ❶.
2. Grasp the cable end of the connector and pull it straight up ❷.

 **CAUTION:** Always pull the connector - NEVER pull on the cable. Pulling on the cable could damage the cable and result in a failed power supply.



7.8.3 Cable Connections

Cable	To	Cable Designator
Power Supply	System board (ATX1)	P1
Power Supply	System board (JPW1)	P2
Power Supply	1st SATA Hard drive	P5
Power Supply	2nd SATA Hard drive	P3
Power Supply	Optical drive	P6
Power Supply	Diskette drive	P4
Power Supply	5.25" Zip drive	P6
Cable	To	PCA Designator
Diskette drive	System board	FDD1 (Black)
ODD Data	System board	IDE1 (Blue)
ODD Audio (if required)	System board	CD_IN1 (Black)
Heatsink fan	System board	CPU_FAN
Secondary system fan	System board	CHASSIS_FAN
Front LED power on button	System board	F_P1
Front I/O USB	System board	JUSB1 (Yellow)
Front I/O Audio	System board	AUD1 (Black)
Speaker	System board	SPKR
Serial port connector	System board	COM1
1st SATA Hard drive	System board	SATA 1 (Blue)
2nd SATA Hard drive	System board	SATA 2 (White)
TCIP Security module	System board	JTPM1

7.8.4 Optical Drive

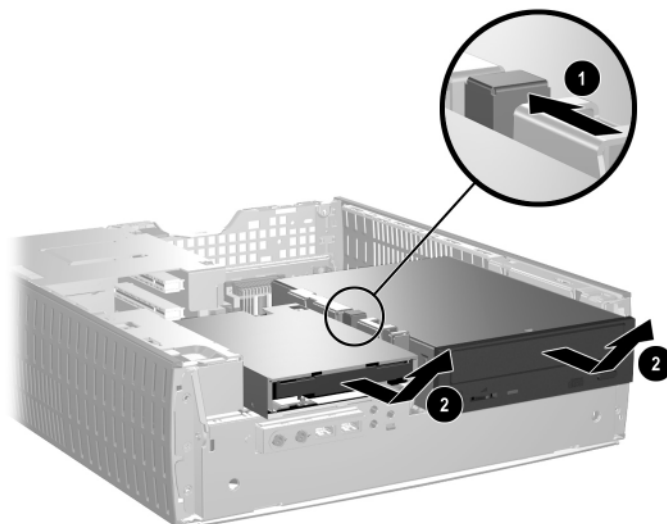


CAUTION: Remove all media from the drives before removing the drive from the computer.



An optical drive is a CD-ROM, CD-RW, DVD-ROM, or combination CD/DVD drive.

1. Prepare the computer for disassembly (Section 7.1, “Preparation for Disassembly”).
2. Remove the computer access panel (Section 7.3, “Computer Access Panel”).
3. Remove the front bezel (Section 7.4, “Front Bezel”).
4. Raise the Easy Access drive cage to the upright position.
5. Disconnect the audio, signal, and drive power cables from the drive. The other end of the cables should remain connected to the system board.
6. Make sure you properly route the drive cables (Section 7.8.2, “Cable Management”).
7. Return the Easy Access drive cage to the down position.
8. Push the drive release latch **1** toward the rear of the chassis and hold.
9. Slide the drive **2** toward the front of the drive cage, then lift the drive out of the computer.



To replace the drive:

1. Install two guide screws in the lower holes on each side of the drive.



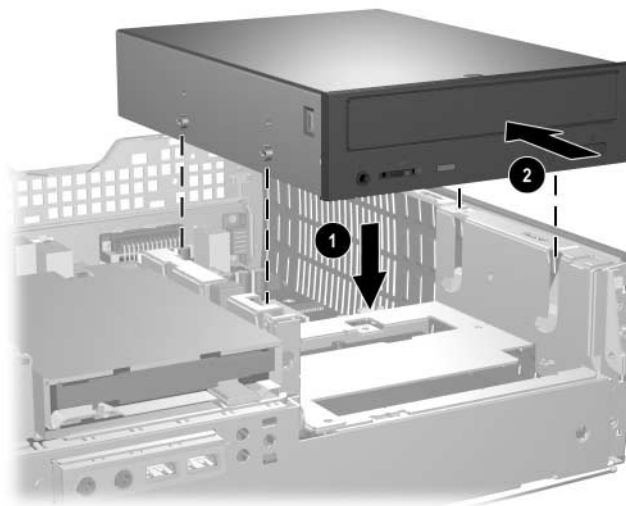
CAUTION: Use only 5-mm long screws as guide screws. Longer screws can damage the internal components of the drive.



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



2. Position the guide screws on the drive into the J-slots in the drive bay ❶. Then, slide the drive towards the rear of the computer ❷.

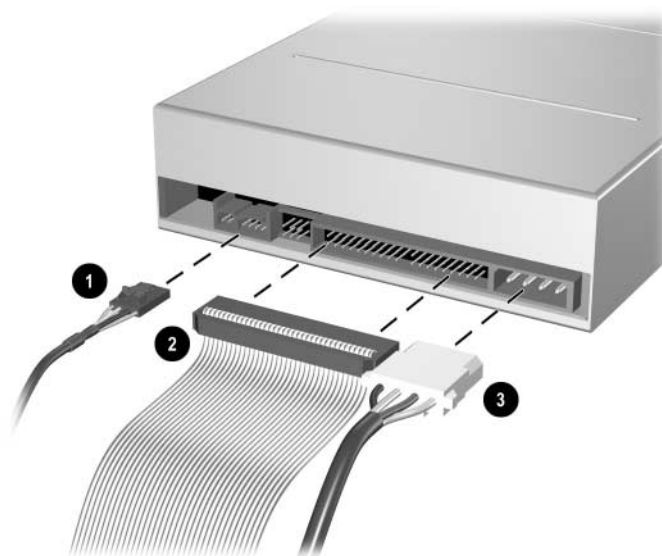


The drive release latch automatically locks in place when installing a drive.

3. Raise the Easy Access drive cage to the upright position and connect the flat ribbon cable and audio cable to the system board.
4. Connect the following cables to the rear of the optical drive:
 - Audio cable ❶
 - Flat ribbon data cable ❷
 - Power cable ❸



Windows XP does not require the use of an audio cable to transfer the sound to the system board.



5. Make sure you route the drive cables properly ([Section 7.8.2, “Cable Management”](#)).
6. Return the Easy Access drive cage to the down position. Make sure not to pinch the cables in the chassis when lowering the Easy Access drive cage.
7. Replace the front bezel and computer access panel.

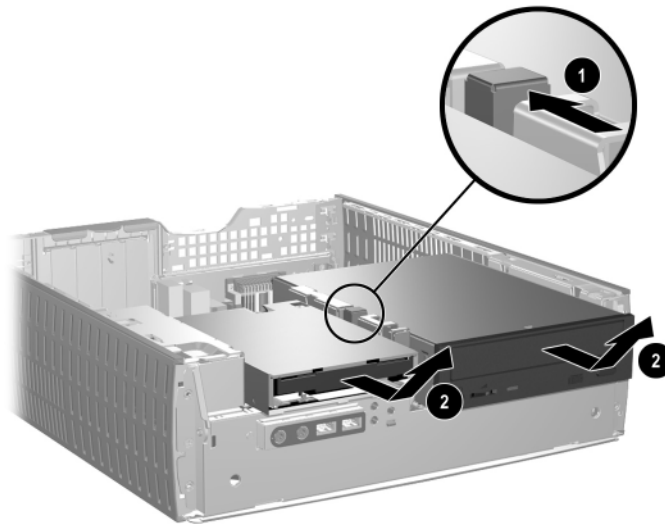
The system automatically recognizes the drive and reconfigures the computer.





CAUTION: When servicing the computer, make sure you place cables in their proper locations during the reassembly process. Improper cable placement can damage the computer.

7.8.5 External 3.5-inch Drive


1. Prepare the computer for disassembly (Section 7.1, “Preparation for Disassembly”).
2. Remove the computer access panel (Section 7.3, “Computer Access Panel”).
3. Remove the front bezel (Section 7.4, “Front Bezel”).
4. Raise the Easy Access drive cage to the upright position.
5. Disconnect the signal, and drive power cables from the drive. The other end of the cables should remain connected to the system board.
6. Return the Easy Access drive cage to the down position.
7. Push the drive release latch **1** toward the rear of the chassis and hold.
8. Slide the drive **2** toward the front of the drive cage, then lift the drive out of the computer.

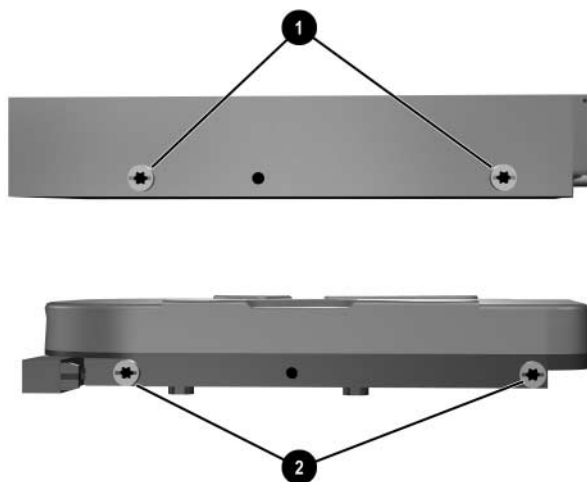


 When replacing the drive, transfer the four screws from the old drive to the new one. The screws take the place of drive rails.

 The guide screws on a 3.5-inch diskette drive **1** are placed closer together than on the hard drive **2**.

9. Insert the rear screws of the hard drive into the rear J-slots. Slide the drive toward the back of the drive cage until the front screws are aligned with the front J-slots. Then lower the front of the drive. Continue to slide the drive all the way back until it locks into place.
-

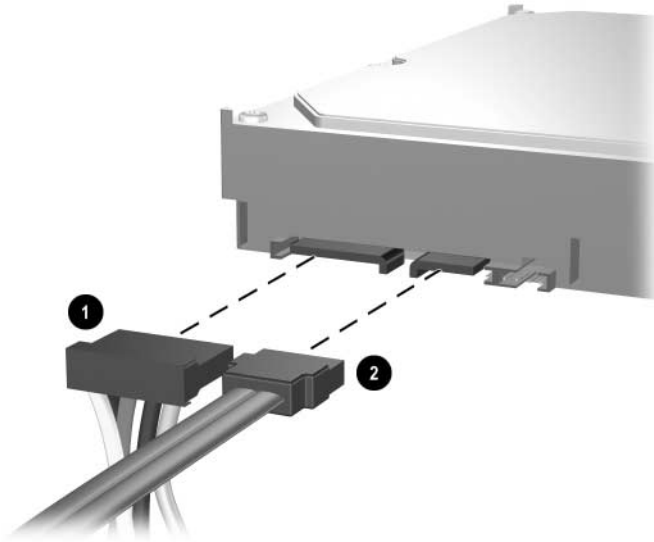
 If replacing a diskette drive, all guide screws (front and rear) will line up on the J-slots. Insert the guide screws into the J-slots, then slide the drive toward the back of the drive cage until it locks into place.



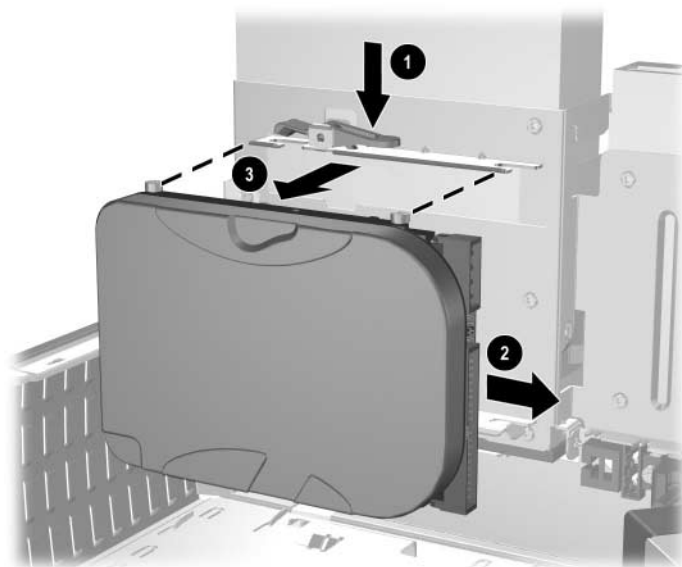
10. Connect the power and data cables.
11. Make sure the drive cables are routed properly ([Section 7.8.2, “Cable Management”](#)).
12. Rotate the drive cage to its original position.
13. Replace the front bezel and computer access panel.

7.8.6 Primary Hard Drive

1. Prepare the computer for disassembly (Section 7.1, “Preparation for Disassembly”).
2. Remove the computer access panel (Section 7.3, “Computer Access Panel”).
3. Remove the front bezel (Section 7.4, “Front Bezel”).
4. Raise the Easy Access drive cage to the upright position.
5. Disconnect the power cable ❶ and signal cable ❷ from the back of the drive.



6. Press and hold the drive release latch ❶.
7. Slide the drive to the right of the bay ❷, then pull the drive from the bay ❸.



To replace the hard drive, reverse the above procedure.



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. You will need a Torx T-15 screwdriver to remove and re-install the guide screws.

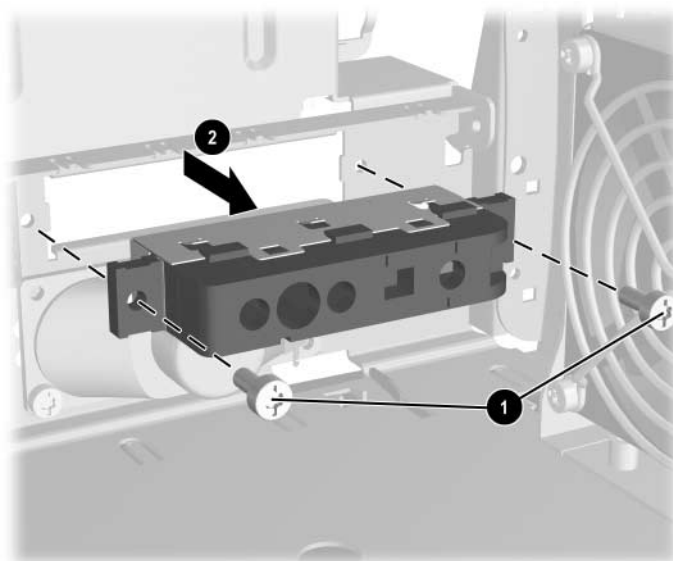
Make sure you route the drive cables properly ([Section 7.8.2, “Cable Management”](#)) before rotating the drive cage to its original position.

7.9 Front I/O Devices

1. Prepare the computer for disassembly (Section 7.1, “Preparation for Disassembly”).
2. Remove the front bezel (Section 7.4, “Front Bezel”).
3. Rotate the drive cage to its full open position.
4. Disconnect the two I/O device cables from the system board:
 - ❑ front USB cable pair
 - ❑ front audio cable
5. Remove the power supply from the chassis (Section 7.17, “Power Supply”).
6. From the inside of the chassis, remove the two screws that secure the I/O device to the chassis ❶, then pull the device into the chassis ❷ to free it from its mount.



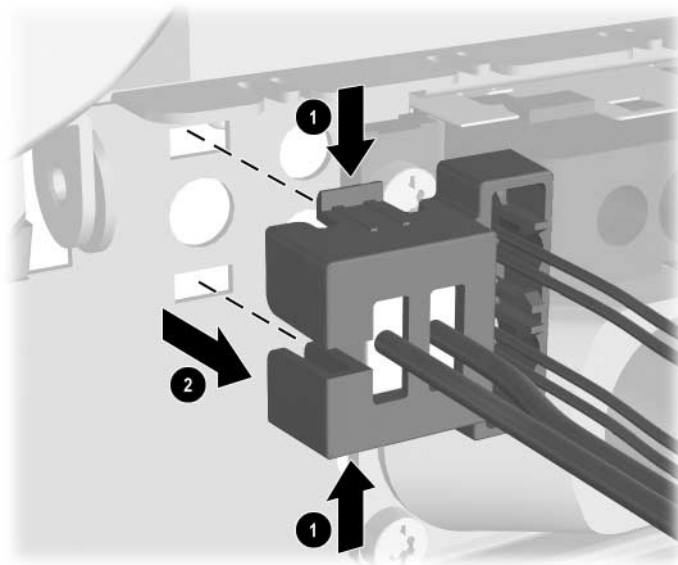
You may need a stubby Torx T15 screwdriver to remove the retaining screws.



To install the housing assembly, reverse the removal procedures.

7.10 Power Switch Assembly

1. Prepare the computer for disassembly (Section 7.1, “Preparation for Disassembly”).
2. Remove the front bezel (Section 7.4, “Front Bezel,”).
3. Rotate the drive cage to its full open position.
4. Disconnect the power switch/LED cable from the system board.
5. Squeeze the switch holder retaining clips together at the front of the chassis ❶ and push the switch assembly out of the chassis ❷.



To install the power switch assembly, reverse the removal procedure.

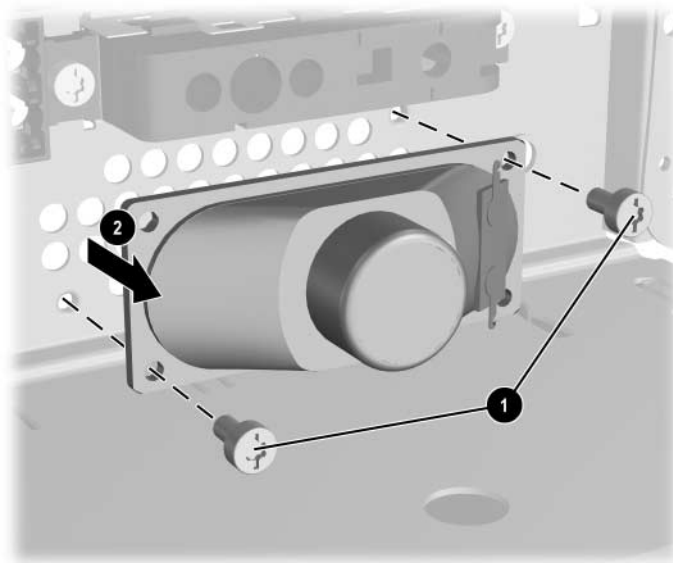
7.11 Speaker

1. Prepare the computer for disassembly (Section 7.1, “Preparation for Disassembly”).
2. Remove the computer access panel (Section 7.3, “Computer Access Panel”).
3. Remove the front bezel (Section 7.4, “Front Bezel”).
4. Rotate the drive cage to its upright position.
5. Disconnect the speaker wire from the system board.
6. Remove the two screws that secure the speaker to the chassis **1**.



You may need a stubby Torx T15 screwdriver to access the screws.

7. Remove the speaker **2**.



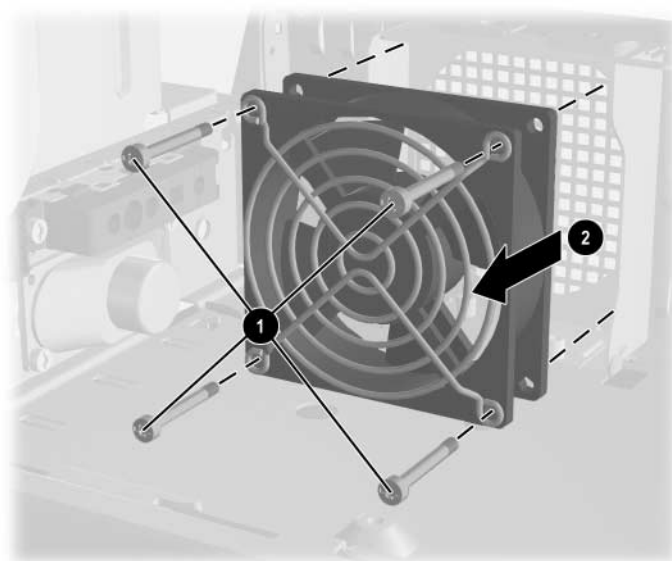
To install the speaker, reverse the removal procedures.

7.12 Chassis Fan

1. Prepare the computer for disassembly (Section 7.1, “Preparation for Disassembly”).
2. Remove the computer access panel (Section 7.3, “Computer Access Panel”).
3. Remove the front bezel (Section 7.4, “Front Bezel,”).
4. Rotate the drive cage to its full open position.
5. Disconnect the fan cable from the system board.
6. Remove the four screws that secure the fan grill and the fan to the chassis ❷, then pull the fan out of the chassis ❸.



You may need a stubby Torx T15 screwdriver to remove the retaining screws.



To install the chassis fan, reverse the removal procedure.

7.13 Battery

The battery that comes with this computer provides power to the real-time clock and has a lifetime of about three years. When replacing the battery, use a battery equivalent to the battery originally installed on the computer. The computer comes with a 3-volt lithium coin cell battery.



The lifetime of the lithium battery can be extended by plugging the computer into a live AC wall socket. The lithium battery is only used when the computer is NOT connected to AC power.



WARNING: This computer contains an internal lithium manganese dioxide battery. There is a risk of fire and chemical burns if the battery is not handled properly. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose to temperatures higher than 140°F (60°C)
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
- Replace the battery only with the HP/Compaq spare designated for this product.



CAUTION: Before replacing the battery, it is important to back up the computer CMOS settings. When the battery is removed or replaced, the CMOS settings will be cleared. Refer to the *Troubleshooting Guide* for information on backing up the CMOS settings.



Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. In order to forward them to recycling or proper disposal, please use the public collection system or return them to HP/Compaq, their authorized partners, or their agents.



CAUTION: Static electricity can damage the electronic components of the computer or optional equipment. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

1. Prepare the computer for disassembly ([Section 7.1, “Preparation for Disassembly”](#)).
2. Remove the computer access panel ([Section 7.3, “Computer Access Panel”](#)).

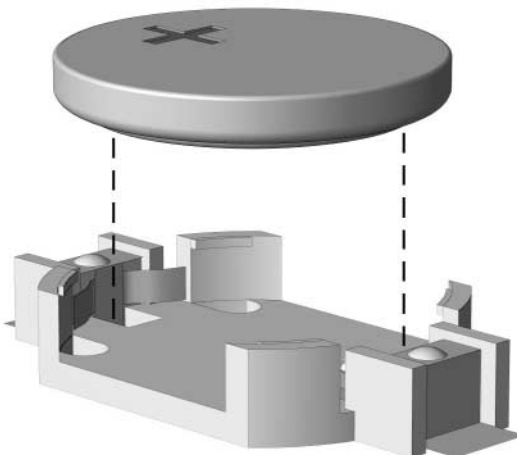


You may have to remove an expansion card to gain access to the battery.

3. Locate the battery and battery holder on the system board.
4. Carefully pull the cable bundle out of the way to access the battery.
5. Depending on the type of battery holder on your system board, complete the following instructions to replace the battery:

7.13.1 Type 1 Battery Holder

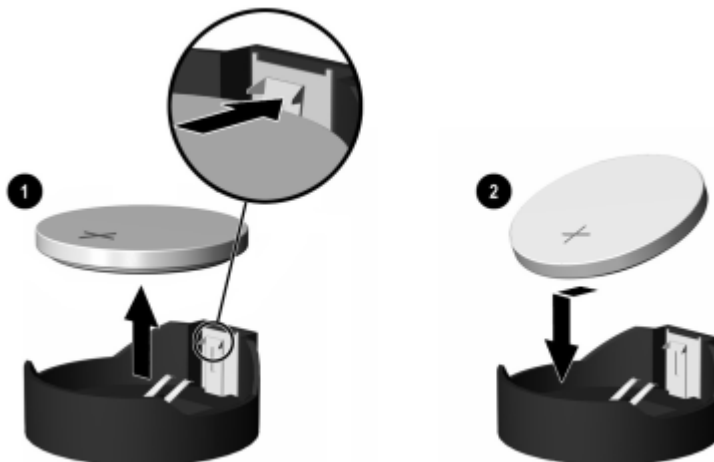
1. Lift the battery out of its holder.



2. Slide the replacement battery into position, positive side up.
3. The battery holder automatically secures the battery in the proper position.
4. Replace the computer cover or access panel.
5. Plug in and turn on power to the computer.
6. Using Computer Setup, reset the date and time, passwords, and any special system setups.
For more information, refer to the *Computer Setup (F10) Utility Guide*.

7.13.2 Type 2 Battery Holder

1. To release the battery from its holder, squeeze the metal clamp that extends above one edge of the battery ❶. When the battery pops up, lift it out.
2. To insert the new battery, slide one edge of the replacement battery under the holder's lip ❷ with the positive side up. Push the other edge down until the clamp snaps over the other edge of the battery.



After replacing the battery, use the following steps to complete this procedure.

3. Replace the computer cover or access panel.
4. Plug in and turn on power to the computer.
5. Using Computer Setup, reset the date and time, passwords, and any special system setups. For more information, refer to the *Computer Setup (F10) Utility Guide*.

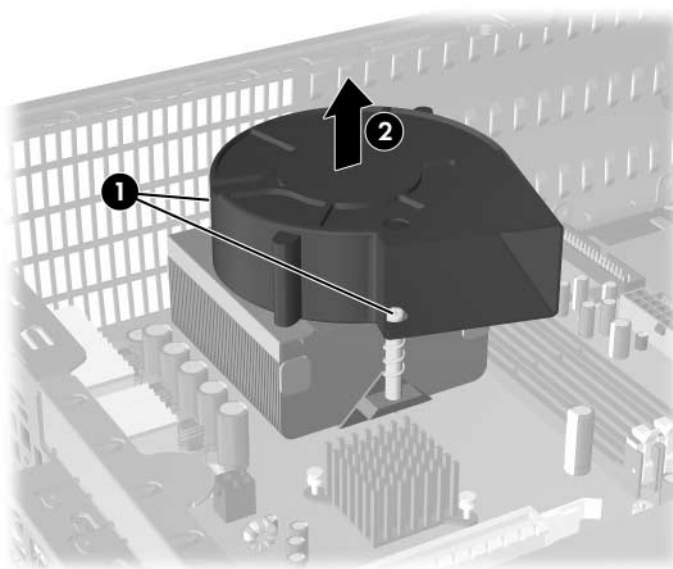
7.14 Heatsink Assembly

1. Prepare the computer for disassembly (Section 7.1, “Preparation for Disassembly”).
2. Remove the computer access panel (Section 7.3, “Computer Access Panel”).
3. Remove the front bezel (Section 7.4, “Front Bezel,”).
4. Rotate the drive cage to its full open position.
5. Disconnect the heatsink fan control cable from the system board.
6. Loosen the two captive screws ❶ that secure the heatsink to the system board.



You will need a straight shanked, flat blade, or Torx T15 screwdriver to loosen the heatsink retaining screws.

7. Twist the heatsink slightly to break the bond between it and the processor then, lift the heatsink from the processor ❷



8. Set the heatsink on its side to keep the thermal grease from getting on the work surface.



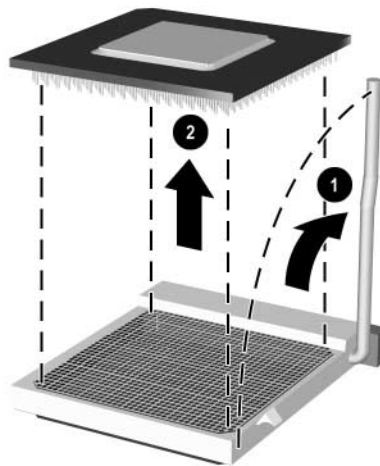
If reinstalling this heatsink, make sure that you clean its mounting surface and the mounting surface of the processor with an alcohol pad then, apply a fresh coating of thermal grease to the top of the processor.



CAUTION: Failure to apply a fresh coating of thermal grease could cause the computer to overheat.

7.15 Processor

1. Prepare the computer for disassembly (Section 7.1, “Preparation for Disassembly”).
2. Remove the computer access panel (Section 7.3, “Computer Access Panel”).
3. Remove the front bezel (Section 7.4, “Front Bezel”).
4. Remove the heatsink (Section 7.14, “Heatsink Assembly”).
5. Rotate the socket handle to its fully open position ❶.
6. Carefully lift the processor from the socket ❷.



To install a new processor:

1. Insert the processor into the socket.
2. Secure the locking lever.

If reusing the existing heatsink, go to step 3.

If using a new heatsink, go to step 5.

3. If reusing the existing heatsink clean bottom of the heatsink and apply the thermal grease provided in the spares kit to the top of the processor.
4. Clean the bottom of the heatsink with the provided alcohol pad and place it atop the processor.

Go to step 6.

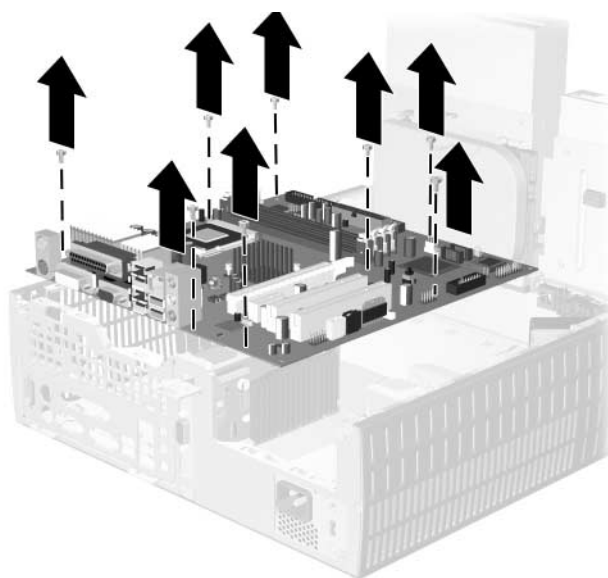
5. If using a new heatsink, remove the protective covering from the bottom of the heatsink and place it in position atop the processor.
6. Secure the heatsink to the system board and system board tray with the two captive screws and attach the heatsink control cable to the system board.



After installing a new processor onto the system board, always update the system ROM to ensure that the computer is using the latest version of the BIOS. You can find the latest system ROMPaq on the Web at: <http://h18000.www1.hp.com/support/files>.

7.16 System Board

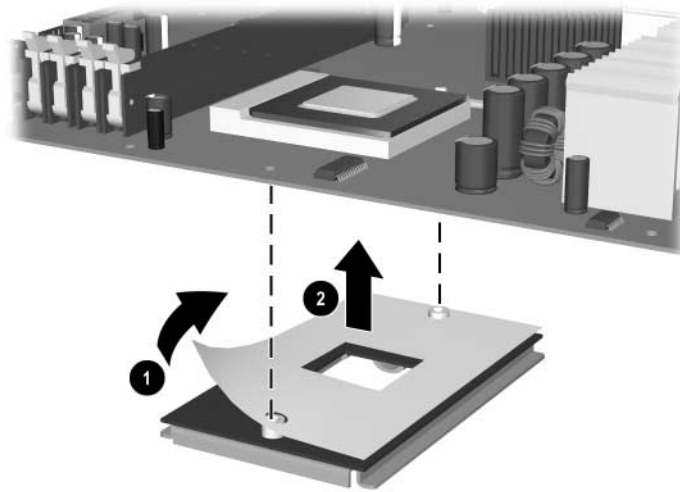
1. Prepare the computer for disassembly (Section 7.1, “Preparation for Disassembly”).
2. Remove the access panel and rotate the computer so the system board is parallel to the table to make it easier to work on (Section 7.3, “Computer Access Panel”).
3. Remove the front bezel (Section 7.4, “Front Bezel,”).
4. Rotate the drive cage to its full open position.
5. Remove all expansion cards (Section 7.7, “PCI Expansion Card”).
6. Remove the memory modules (Section 7.6, “Memory Modules”).
7. Remove the heatsink (Section 7.14, “Heatsink Assembly”).
8. Remove the processor (Section 7.15, “Processor”).
9. Disconnect all cables connected to the system board, noting their location for reinstallation.
10. Remove the eight screws that secure the system board to the chassis.
11. Slide the board towards the front of the computer for the rear I/O connectors to clear the chassis then, remove the system board from the chassis.



CAUTION: When installing a new system board, a new processor backing plate must be attached to the system board. The heatsink will not attach properly if this plate is not installed.

To install a processor backing plate:

1. Lay the new system board top down on a padded surface to protect the board from damage.
2. Remove the protective paper shield ❶ from the mounting surface of the backing plate.
3. Position the mounting plate studs over the back of the system board ❷ and press the plate firmly to the system board so the studs penetrate the mounting holes.

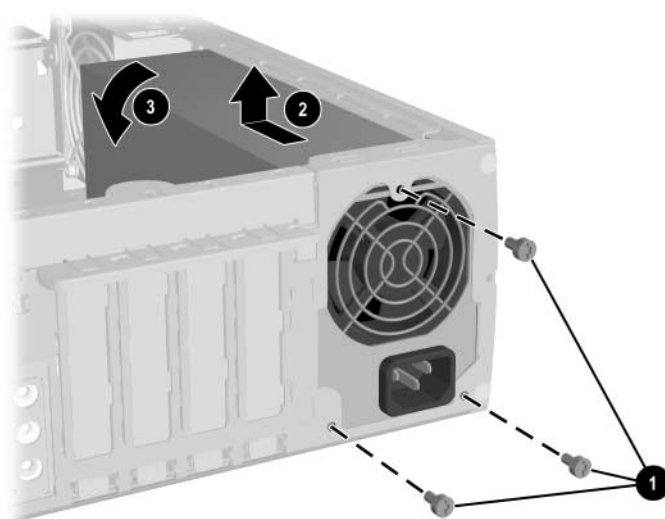


Complete the installation of the system board by reversing the removal procedures.

7.17 Power Supply

⚠ WARNING: Voltage is always present on the system board when the computer is plugged into an active AC outlet. To avoid possible personal injury and damage to the equipment, disconnect the power cord from the computer and/or the AC outlet before opening the computer.

1. Prepare the computer for disassembly (Section 7.1, “Preparation for Disassembly”).
2. Remove the computer access panel (Section 7.3, “Computer Access Panel”).
3. Remove the front bezel (Section 7.4, “Front Bezel,”).
4. Rotate the drive cage to its upright position.
5. Disconnect all power cables from the mass storage devices and from the system board.
6. Remove the TPM from the system board to prevent damaging it.
7. Remove the three screws that secure the power supply to the chassis ❶.
8. Slide the power supply forward about 3/8-inch, lift it to clear the guides on the floor of the chassis ❷ then, pivot the top of the power supply ❸ to clear the top chassis lip.




When installing the power supply, reverse the removal procedure, making sure that the clips on the bottom of the rear panel fit in the slots provided.


Connector Pin Assignments

This appendix contains the pin assignments for many computer and workstation connectors. Some of these connectors may not be used on the product being serviced.


Keyboard

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


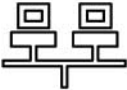
Mouse

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

Ethernet BNC

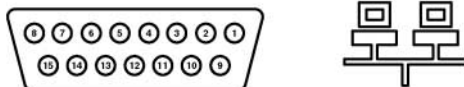
Connector and Icon	Pin	Signal
	1 (Center)	Data
	2 (Shield)	Ground

Ethernet RJ-45

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

Ethernet AUI

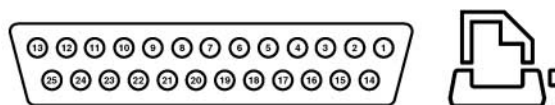
Connector and Icon



Pin	Signal	Pin	Signal
1	Ground	9	Positive AUI Differential Receive
2	Negative AUI Differential Collision	10	+12V
3	Positive AUI Differential Collision	11	Ground
4	Negative AUI Differential Transmit	12	Ground
5	Positive AUI Differential Transmit	13	Unused
6	Ground	14	Unused
7	Ground	15	Unused
8	Negative AUI Differential Receive	16	Unused


Parallel Interface

Connector and Icon




Pin	Signal	Pin	Signal	Pin	Signal
1	Strobe	7	Data Bit 5	13	Select
2	Data Bit 0	8	Data Bit 6	14	Auto Linefeed
3	Data Bit 1	9	Data Bit 7	15	Error
4	Data Bit 2	10	Acknowledge	16	Initialize Printer
5	Data Bit 3	11	Busy	17	Select IN
6	Data Bit 4	12	Paper End	18-25	Signal Ground

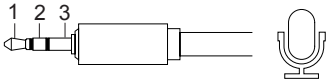
Serial Interface, Powered and Non-Powered

Connector and Icon	Pin	Signal
	1	Carrier Detect (12V if powered)
	2	Receive Data
	3	Transmit Data
	4	Data Terminal Ready
	5	Signal Ground
	6	Data Set Ready
	7	Request to Send
	8	Clear to Send
	9	Ring Indicator (5V if powered)

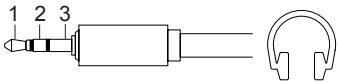
USB

Connector and Icon	Pin	Signal
	1	+5 VDC
	2	- Data
	3	+ Data
	4	Ground

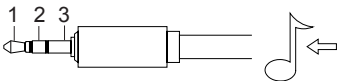
Microphone

Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio
	2 (Ring)	Power
	3 (Shield)	Ground

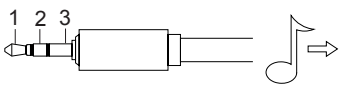
Headphone

Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_Left
	2 (Ring)	Audio_Right
	3 (Shield)	Ground

Line-In Audio

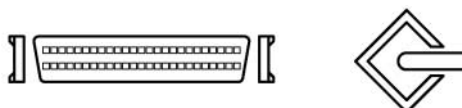
Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_In_Left
	2 (Ring)	Audio_In_Right
	3 (Shield)	Ground

Line-Out Audio

Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_Out_Left
	2 (Ring)	Audio_Out_Right
	3 (Shield)	Ground

SCSI Low Voltage Differential/Single Ended (LVD/SE)**Connector and Icon**

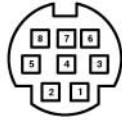
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1-16	Ground	40	-D0	49-50	Ground	60	-MSG
17-18	TERMPWR	41	-D1	51-52	TERMPW	61	-SEL
19	Reserved	42	-D1	53	Reserved	62	-C/D
20-34	Ground	43	-D3	54	Ground	63	-REQ
35	-D12	44	-D4	55	-ATN	64	-I/O
36	-D13	45	-D5	56	Ground	65	-D
37	-D14	46	-D6	57	-BSY	66	-D
38	-D15	47	-D7	58	-ACK	67	-D
39	-DP1	48	-DP0	59	-RST	68	-D

Ultra SCSI**Connector and Icon**

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1-11	Ground	29	DB3	37	Reserved	45	RST #
12	Reserved	30	DB4	38	TERMPWR	46	MSG #
13	Open	31	DB5	39	Reserved	47	SEL #
14	Reserved	32	DB6	40	Ground	48	C/D
15-25	Ground	33	DB7	41	ATN #	49	REQ #
26	DB0	34	DBP	42	Ground	50	Input/Output
27	DB1	35	Ground	43	BSY #		
28	DB2	36	Ground	44	ACK #		

External Infrared Transceiver

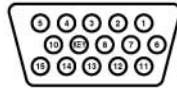
Connector and Icon



Pin	Signal	Pin	Signal	Pin	Signal
1	Transmit	4	5V	7	Not Used
2	Receive	5	Mode	8	Not Used
3	Ground	6	Not Used		

Monitor

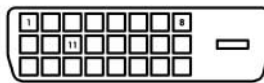
Connector and Icon



Pin	Signal	Pin	Signal	Pin	Signal
1	Red Analog	6	Ground	11	Not used
2	Green Analog	7	Ground	12	DDC Serial Data
3	Blue Analog	8	Ground	13	Horizontal Sync
4	Not used	9	+5V (fused)	14	Vertical Sync
5	Ground	10	Ground	15	DDC Serial Clock

DVI-D

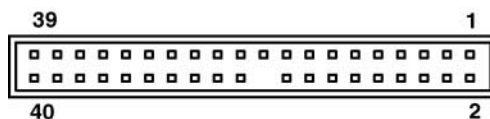
Connector and Icon



Pin	Signal	Pin	Signal	Pin	Signal
1	TMDS Data2-	9	TMDS Data1-	17	TMDS Data0-
2	TMDS Data2+	10	TMDS Data1+	18	TMDS Data0+
3	TMDS Data2/4 Shield	11	TMDS Data1/3Shield	19	TMDS Data0/5 Shield
4	TMDS Data4-	12	TMDS Data3-	20	TMDS Data5-
5	TMDS Data4+	13	TMDS Data3+	21	TMDS Data5+
6	DDC Clock	14	+5V Power	22	TMDS Data Clock
7	DDC Data	15	Grd for +5V	23	Shield
8	No Connect	16	Hot Plug Detect	24	TMDS Clock+
					TMDS Clock-

ATA/ATAPI (IDE) Standard Drive Cable

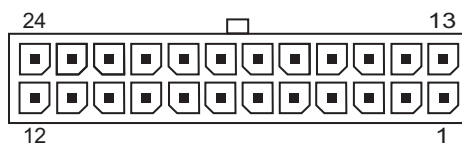
Connector



Pin	Signal	Pin	Signal	Pin	Signal
1	Reset	15	DD1	29	DMAK
2	Ground	16	DD14	30	Ground
3	DD7	17	DD0	31	INTRQ
4	DD8	18	DD15	32	IOCS16
5	DD6	19	Ground	33	DA1
6	DD9	20	(Key)	34	PDIAG (cable detect)
7	DD5	21	DMARQ	35	DA0
8	DD10	22	Ground	36	DA2
9	DD4	23	DIOW	37	CS1FX
10	DD11	24	Ground	38	CS3FX
11	DD3	25	DIOR	39	DASP
12	DD12	26	Ground	40	Ground
13	DD2	27	IORDY		
14	DD13	28	CSEL		

24-Pin Power

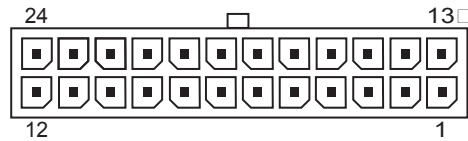
Connector



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	+3.3 V	7	GND	13	+3.34 V	19	GND
2	+3.3 V	8	POK	14	-12 V	20	open
3	GND	9	+5 V _{aux}	15	GND	21	+5 V
4	+5 V	10	+12 V	16	PSON	22	+5 V
5	GND	11	+12 V	17	GND	23	+5 V
6	+5 V	12	+3.34 V	18	GND	24	GND

24-Pin MicroFit Power

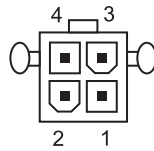
Connector



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	+5 V _{aux}	7	PWRGD	13	+12 V	19	GND
2	GND	8	+3.3 V	14	+5 V Sense	20	+3.3 Sense
3	+5 V	9	+3.3 V	15	GND	21	+3.3 V
4	+5 V	10	Tach	16	+5 V	22	+3.3 V
5	PS_ON	11	GND	17	+5 V	23	GND
6	GND	12	Fan-CMD	18	+3.3 V	24	-12 V

4-Pin Power (for CPU)

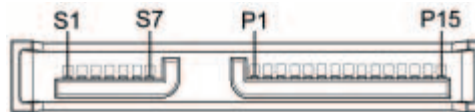
Connector and Icon



Pin	Signal
1	GND
2	GND
3	+12 V CPU
4	-12 V CPU

SATA Data and Power

Drive Connector



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
S1	Ground	S2	A+	S3	A-	S4	Ground
S5	B-	S6	B+	S7	Ground		
P1	V 3.3	P2	V 3.3	P3	V 3.3	P4	Ground
P5	Ground	P6	Ground	P7	V 5	P8	V 5
P9	V 5	P10	Ground	P11	Reserved	P12	Ground
P13	V 12	P14	V 12	P15	V 12		

*S = Data, P = Power

PCI Express**x1, x4, x8, and x16 PCI Express Connector****Pin A**

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	PRSNT1#	6	JTAG3	11	PERST#	16	PERp0	21	PERp1
2	+12V	7	JTAG4	12	GND	17	PERn0	22	PERn1
3	+12V	8	JTAG5	13	REFCLK+	18	GND	23	GND
4	GND	9	+3.3v	14	REFCLK-	19	RSVD	24	GND
5	JTAG2	10	+3.3v	15	GND	20	GND	25	PERp2
26	PERn(2)	31	GND	36	PERn4	41	GND	46	GND
27	GND	32	RSVD	37	GND	42	GND	47	PERp7
28	GND	33	RSVD	38	GND	43	PERp6	48	PERn7
29	PERp3	34	GND	39	PERp5	44	PERn6	49	GND
30	PERn3	35	PERp4	40	PERn5	45	GND	50	RSVD
51	GND	56	PERp9	61	PERn10	66	GND	71	GND
52	PERp8	57	PERn9	62	GND	67	GND	72	PERp13
53	PERn8	58	GND	63	GND	68	PERp12	73	PERn13
54	GND	59	GND	64	PERp11	69	PERn12	74	GND
55	GND	60	PERp10	65	PERn11	70	GND	75	GND
76	PERp14	81	PERn15						
77	PERn14	82	GND						
78	GND								
79	GND								
80	PERp15								

Pin B information is on the next page

Notes:

- x1 PCI Express uses pins 1-18
- x4 PCI Express uses pins 1-32
- x8 PCI Express uses pins 1-49
- x16 PCI Express uses pins 1-82

PCI Express

x1, x4, x8, and x16 PCI Express Connector



Pin B

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	+12V	6	SMDAT	11	WAKE#	16	GND	21	GND
2	+12V	7	GND	12	RSVD	17	PRSNT2#	22	GND
3	RSVD	8	+3.3v	13	GND	18	GND	23	PETp2
4	GND	9	JTAG1	14	PETp0	19	PETp1	24	PETn2
5	SMCLK	10	3.3vAux	15	PETn0	20	PETn1	25	GND
26	GND	31	PRSNT2#	36	GND	41	PETp6	46	PETn7
27	PETp3	32	GND	37	PETp5	42	PRTn6	47	GND
28	PETn3	33	PETp4	38	PETn5	43	GND	48	PRSNT2#
29	GND	34	PETn4	39	GND	44	GND	49	GND
30	RSVD	35	GND	40	GND	45	PETp7	50	PETp8
51	PETn8	56	GND	61	GND	66	PETp12	71	PETn13
52	GND	57	GND	62	PETp11	67	PETn12	72	GND
53	GND	58	PETp10	63	PETn11	68	GND	73	GND
54	PETp9	59	PETn10	64	GND	69	GND	74	PETp14
55	PETn9	60	GND	65	GND	70	PETp13	75	PETn14
76	GND	81	PRSNT2#						
77	GND	82	RSVD						
78	PETp15								
79	PETn15								
80	GND								

Notes:

- x1 PCI Express uses pins 1-18
- x4 PCI Express uses pins 1-32
- x8 PCI Express uses pins 1-49
- x16 PCI Express uses pins 1-82

Power Cord Set Requirements

The power supplies on some computers have external power switches. The voltage select switch feature on the computer permits it to operate from any line voltage between 100-120 or 220-240 volts AC. Power supplies on those computers that do not have external power switches are equipped with internal switches that sense the incoming voltage and automatically switch to the proper voltage.

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

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

General Requirements

The requirements listed below are applicable to all countries:

1. The power cord must be approved by an acceptable accredited agency responsible for evaluation in the country where the power cord set will be installed.
2. The power cord set must have a minimum current capacity of 10A (7A Japan only) and a nominal voltage rating of 125 or 250 volts AC, as required by each country's power system.
3. The diameter of the wire must be a minimum of 0.75 mm² or 18AWG, and the length of the cord must be between 1.8 m (6 feet) and 3.6 m (12 feet).

The power cord should be routed so that it is not likely to be walked on or pinched by items placed upon it or against it. Particular attention should be paid to the plug, electrical outlet, and the point where the cord exits from the product.



WARNING: Do not operate this product with a damaged power cord set. If the power cord set is damaged in any manner, replace it immediately.

Japanese Power Cord Requirements

For use in Japan, use only the power cord received with this product.



CAUTION: Do not use the power cord received with this product on any other products.

Country-Specific Requirements

Additional requirements specific to a country are shown in parentheses and explained below.

Country	Accrediting Agency	Country	Accrediting Agency
Australia (1)	EANSW	Italy (1)	IMQ
Austria (1)	OVE	Japan (3)	METI
Belgium (1)	CEBC	Norway (1)	NEMKO
Canada (2)	CSA	Sweden (1)	SEMKO
Denmark (1)	DEMKO	Switzerland (1)	SEV
Finland (1)	SETI	United Kingdom (1)	BSI
France (1)	UTE	United States (2)	UL
Germany (1)	VDE		

1. The flexible cord must be <HAR> Type HO5VV-F, 3-conductor, 0.75mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country where it will be used.
2. The flexible cord must be Type SVT or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15A, 125V) or NEMA 6-15P (15A 250V) configuration.
3. Appliance coupler, flexible cord, and wall plug must bear a "T" mark and registration number in accordance with the Japanese Dentori Law. Flexible cord must be Type VCT or VCTF, 3-conductor, 0.75 mm² conductor size. Wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7A, 125V) configuration.

POST Error Messages

This appendix lists the error codes, error messages, and the various indicator light and audible sequences that you may encounter during Power-On Self-Test (POST) or computer restart, the probable source of the problem, and steps you can take to resolve the error condition.

POST Message Disabled suppresses most system messages during POST, such as memory count and non-error text messages. If a POST error occurs, the screen will display the error message. To manually switch to the POST Messages Enabled mode during POST, press the **Tab** key. The default mode is POST Message Disabled.

The speed at which the computer loads the operating system and the extent to which it is tested are determined by the POST mode selection.

Quick Power-On Self Test is a fast startup process that does not run all of the system level tests, such as the memory test. Disabling this feature causes all of the ROM-based system tests to run and booting takes longer to complete.

POST Numeric Codes and Text Messages

This section covers those POST errors that have numeric codes associated with them. The section also includes some text messages that may be encountered during POST.



The computer will beep once after a POST text message is displayed on the screen.

Numeric Codes and Text Messages

Code/Message	Probable Cause	Recommended Action
BIOS ROM checksum error—System halted	The checksum of the BIOS code in the BIOS chip is incorrect, indicating that the BIOS code may have become corrupt.	Verify the correct ROM. Flash the ROM is needed. If an expansion card was recently added, remove it and see if the problem remains. Clear CMOS. If the message disappears, there may be a problem with the expansion card. Replace the system board.
CMOS battery failed	The CMOS battery is no longer functional.	Replace the RTC battery.
CMOS checksum error—Defaults loaded	Checksum of CMOS is incorrect, so the system loads the default equipment configuration. A checksum error may indicate that CMOS has become corrupt. A weak battery may have caused this error.	Check the battery and replace, if necessary.
CPU at nnnn	Displays the running speed of the CPU.	None.
Press ESC to skip memory test		The user may press ESC to skip the full memory test.
HARD DISK INSTALL FAILURE	Cannot find or initialize the hard drive controller or the drive.	Make sure the controller is installed correctly in the BIOS. If no hard drives are installed, be sure the Hard Drive selection in Setup is set to NONE.
Keyboard error or no keyboard present	Cannot initialize the keyboard.	Make sure the keyboard is attached correctly and no keys are pressed during POST. To purposely configure the system without a keyboard, set the error halt condition in Setup to HALT ON ALL, BUT KEYBOARD. The BIOS then ignores the missing keyboard during POST.
Memory Test:	This message displays during a full memory test, counting down the memory areas being tested.	None.

Numeric Codes and Text Messages *(Continued)*

Code/Message	Probable Cause	Recommended Action
Memory test fail	If POST detects an error during memory testing, additional information appears giving specifics about the type and location of the memory error.	Shut down the system, reseal the DIMMs, and reboot the system. If the problem persists, replace the DIMMs.
Override enabled—Defaults loaded	If the system cannot boot using the current CMOS configuration, the BIOS can override the current configuration with a set of BIOS defaults designed for the most stable, minimal-performance system.	None.
Error: Non-System disk or disk error. Replace and press any key when ready	The BIOS was unable to find a suitable boot device. This may mean an uninitialized or corrupt ATA flash.	Shut down the system, ensure that the power and data cables of all storage devices are plugged in properly, and reboot the system. Ensure all removable media have been removed.
Warning: CPU fan has failed.	CPU fan weak (RPM < 1000) or not turning.	Ensure that the CPU fan power cable is connected. If the problem persists, replace the fan.
Warning: System Fan has failed.	System fan weak (RPM < 1000) or not turning.	Ensure that the System fan power cable is connected. If the problem persists, replace the fan.
Memory is running at Single Channel Mode	When two same size memories are put in slot 1 and 3, this message will be displayed.	For optimal performance, shut down the system and move the second DIMM from the XMM3 to the XMM2 socket.

POST Diagnostic Front Panel LEDs and Audible Codes

This section covers the front panel LED codes as well as the audible codes that may occur before or during POST that do not necessarily have an error code or text message associated with them.



If you see flashing LEDs on a PS/2 keyboard, look for flashing LEDs on the front panel of the computer and refer to the following table to determine the front panel LED codes.

Recommended actions in the following table are listed in the order in which they should be performed.

Diagnostic Front Panel LEDs and Audible Codes			
Activity	Beeps	Possible Cause	Recommended Action
Green Power LED On.	None	Computer on.	None
Green Power LED flashes every two seconds. The Power LED will continue flashing until the problem is resolved.	None	Computer in Suspend to RAM mode (some models only) or normal Suspend mode.	None required. Press any key or move the mouse to wake the computer.
Red Power LED flashes two times, once every second, followed by a two-second pause. The Power LED will continue flashing until the problem is resolved. (Pertains to CPU fan only)	None	Processor thermal protection activated: A fan may be blocked or not turning. OR The heatsink/fan assembly is not properly attached to the processor.	<ol style="list-style-type: none"> 1. Ensure that the computer air vents are not blocked and the processor cooling fan is running. Leave a 4-inch (10.2-cm) clearance at the back of the system unit and above the monitor to permit the required airflow. 2. Open hood, press power button, and see if the processor fan spins. If the processor fan is not spinning, make sure the fan's cable is plugged onto the system board header. Ensure the fan is fully/properly seated or installed. 3. If fan is plugged in and seated properly, but is not spinning, then replace processor fan. 4. Reseat processor heatsink and verify that the fan assembly is properly attached.

Diagnostic Front Panel LEDs and Audible Codes *(Continued)*

Activity	Beeps	Possible Cause	Recommended Action
Red Power LED flashes three times, once every second, followed by a two-second pause. The Power LED will continue flashing until the problem is resolved.	None	Processor not installed (not an indicator of bad processor).	<ol style="list-style-type: none"> 1. Check to see that the processor is present. 2. Reseat the processor.
Red Power LED flashes four times, once every second, followed by a two-second pause. The Power LED will continue flashing until the problem is resolved.	None	Power failure (power supply overloaded).	<ol style="list-style-type: none"> 1. Open the hood and ensure the 4-wire power supply cable is seated into the connector on the system board. 2. Check if a device is causing the problem by removing ALL attached devices (such as hard, diskette, or optical drives, and expansion cards). Power on the system. If the system enters the POST, then power off and replace one device at a time and repeat this procedure until failure occurs. Replace the device that is causing the failure. Continue adding devices one at a time to ensure all devices are functioning properly. 3. Replace the power supply. 4. Replace the system board.
Red Power LED flashes five times, once every second, followed by a two-second pause, and the computer beeps five times. Beeps stop after five times but the Power LED will continue flashing until the problem is resolved.	5	Pre-video memory error.	<ol style="list-style-type: none"> 1. Reseat DIMMs. Power on the system. 2. Replace DIMMs one at a time to isolate the faulty module. 3. Replace third-party memory with HP memory. 4. Replace the system board.

Diagnostic Front Panel LEDs and Audible Codes <i>(Continued)</i>			
Activity	Beeps	Possible Cause	Recommended Action
Red Power LED flashes six times, once every second, followed by a two-second pause, and the computer beeps six times. Beeps stop after five times but the Power LED will continue flashing until the problem is resolved.	6	Pre-video graphics error.	For systems with a graphics card: <ol style="list-style-type: none"> 1. Reseat the graphics card. Power on the system. 2. Replace the graphics card. 3. Replace the system board. For systems with integrated graphics, replace the system board.
Red Power LED flashes seven times, once every second, followed by a two-second pause, and the computer beeps seven times. Beeps stop after five times but the Power LED will continue flashing until the problem is resolved.	7	System board failure (ROM detected failure prior to video).	Replace the system board.
Red Power LED flashes eight times, once every second, followed by a two-second pause, and the computer beeps eight times. Beeps stop after five times but the Power LED will continue flashing until the problem is resolved.	8	Invalid ROM based on bad checksum.	<ol style="list-style-type: none"> 1. Reflash the ROM using a ROMPaq diskette. See the "ROM Flash" section of the <i>Desktop Management Guide</i> on the <i>Documentation CD</i>. 2. Replace the system board.

Diagnostic Front Panel LEDs and Audible Codes *(Continued)*

Activity	Beeps	Possible Cause	Recommended Action
Red Power LED flashes nine times, once every second, followed by a two-second pause, and the computer beeps nine times. Beeps stop after five times but the Power LED will continue flashing until the problem is resolved.	9 or None, depending on the issue	System powers on but is unable to boot.	<ol style="list-style-type: none"> 1. Check that the voltage selector, located on the rear of the power supply (some models), is set to the appropriate voltage. Proper voltage setting depends on your region. 2. Replace the system board. 3. Replace the processor.
Red Power LED flashes ten times, once every second, followed by a two-second pause, and the computer beeps ten times. Beeps stop after five times but the Power LED will continue flashing until the problem is resolved.	10	Bad option card.	<ol style="list-style-type: none"> 1. Check each graphics card by removing the card (one at a time if multiple cards), then power on the system to see if fault goes away. 2. Once a bad card is identified, remove and replace the bad option card. 3. Replace the system board.

Diagnostic Front Panel LEDs and Audible Codes *(Continued)*

Activity	Beeps	Possible Cause	Recommended Action
System does not power on and LEDs are not flashing.	None	System unable to power on.	<p>Press and hold the power button for less than 4 seconds. If the hard drive LED turns green, then:</p> <ol style="list-style-type: none"> 1. Check that the voltage selector, located on the rear of the power supply, is set to the appropriate voltage. Proper voltage setting depends on your region. 2. Remove the expansion cards one at a time until the 5V_aux light on the system board turns on. 3. Replace the system board. <p>OR</p> <p>Press and hold the power button for less than 4 seconds. If the hard drive LED does not turn on green then:</p> <ol style="list-style-type: none"> 1. Check that the unit is plugged into a working AC outlet. 2. Open hood and check that the power button harness is properly connected to the system board. 3. Check that both power supply cables are properly connected to the system board. 4. Check to see if the 5V_aux light on the system board is turned on. If it is turned on, then replace the power button harness. 5. If the 5V_aux light on the system board is not turned on, then replace the power supply. 6. Replace the system board.


Troubleshooting Without Diagnostics

Preliminary Checklist

This section describes some simple, preliminary tests and guidelines for troubleshooting the computer without using the diagnostics.

- Are the computer and monitor connected to a working electrical outlet?
- Is the voltage select switch is set to the appropriate voltage for your region (115V or 230V)?
- Is the computer turned on?
- Is the green power light illuminated?
- Is the monitor turned on?
- Is the green monitor light illuminated?
- Turn up the monitor brightness and contrast controls if the monitor is dim.
- If the system has multiple video sources (embedded, PCI, or PCI Express adapters) installed (embedded video on some models only) and a single monitor, the monitor must be plugged into the monitor connector on the source selected as the primary VGA adapter. During boot, the other monitor connectors are disabled and if the monitor is connected into these ports, the monitor will not function. You can select which source will be the default VGA source in Computer (F10) Setup.
- Press and hold any key. If the system beeps, then the keyboard is operating correctly.
- Check all cables for loose or incorrect connections.
- Reconfigure the computer after installing a non-Plug and Play expansion board or other option, such as a diskette drive.
- Are all of the necessary device drivers installed?
- Have all printer drivers been installed for each application?
- Remove all diskettes from the diskette drives before you turn on the system.
- Are all switches set correctly?
- Is the NIC Remote Wakeup cable (featured on some models) connected between the NIC and the riser/system board?

Solving Minor Problems

Solving Minor Problems		
Problem	Cause	Possible Solution
Computer appears locked up and will not turn off when the power button is pressed.	Software control of the power switch is not functional.	<ol style="list-style-type: none"> 1. Press and hold the power button for at least four seconds until the computer turns off. 2. Disconnect electrical plug from outlet.
Computer will not respond to USB keyboard or mouse.	Computer is in standby mode.	Press the power button to resume from standby mode.
	System has locked up.	Restart computer.
 CAUTION: When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the computer will shut down and you will lose your unsaved data.		
Computer date and time display is incorrect.	RTC (real-time clock) battery may need to be replaced.	<ol style="list-style-type: none"> 1. Reset the date and time under Control Panel. 2. Replace the RTC battery.
Computer appears to pause periodically.	Network driver is loaded and no network connection is established.	Establish a network connection, or use Computer Setup or Microsoft Windows Device Manager to disable the network controller.
Cursor will not move using the arrow keys on the keypad.	The Num Lock key may be on.	Press the Num Lock key. The Num Lock key can be disabled (or enabled) in Computer Setup.
Devices connected to USB ports do not operate.	The Front Panel USB Port may be disabled in Computer Setup. This option controls the front USB port and the two USB ports on the back of the computer under the NIC connector.	Enable the Front Panel USB Port in Computer Setup. If the problem persists, contact an authorized service center.
Cannot remove computer cover or access panel.	Smart Cover Lock, featured on some computers, is locked.	<ol style="list-style-type: none"> 1. Unlock the Smart Cover Lock using Computer Setup. 2. Use the Smart Cover FailSafe Key in case of forgotten password, power loss, or computer malfunction.

Solving Minor Problems (Continued)		
Problem	Cause	Possible Solution
Poor performance is experienced.	Processor is hot.	<ol style="list-style-type: none"> 1. Ensure airflow to the computer is not blocked. 2. Ensure the fans are connected and working properly (some fans only operate when needed). 3. Ensure the processor heatsink is installed properly.
	Hard drive is full.	Transfer data from the hard drive to create more space on the hard drive.
	Low on memory.	Add more memory.
	Hard drive fragmented.	Defragment hard drive.
	Program previously accessed did not release reserved memory back to the system.	Restart the computer.
	Virus resident on the hard drive.	Run virus protection program.
	Too many applications running.	<ol style="list-style-type: none"> 1. Close unnecessary applications to free up memory. 2. Add more memory.
Computer powered off automatically and the Power LED flashes Red two times, once every second, followed by a two second pause.	Cause unknown.	Restart the computer.
	<p>Processor thermal protection activated: A fan may be blocked or not turning. OR The heatsink is not properly attached to the processor.</p>	<ol style="list-style-type: none"> 1. Ensure computer air vents are not blocked and the cooling fan is running. 2. Open hood, press power button, and see if the processor fan spins. If not spinning, make sure the fan's cable is plugged onto the system board header. Ensure the fan is fully/properly seated or installed. 3. Replace the processor fan. 4. Reseat processor heatsink and verify that the fan assembly is properly attached.

Solving Minor Problems *(Continued)*

Problem	Cause	Possible Solution
System does not power on and the LEDs on the front of the computer are not flashing.	System unable to power on.	<p>Press and hold the power button for less than 4 seconds. If the hard drive LED turns green, then:</p> <ol style="list-style-type: none"> 1. Check that the voltage selector is set to the appropriate voltage. 2. Remove the expansion cards one at a time until the 5V_aux light on the system board turns on. 3. Replace the system board. <p>OR</p> <p>Press and hold the power button for less than 4 seconds. If the hard drive LED does not turn on green then:</p> <ol style="list-style-type: none"> 1. Check that the unit is plugged into a working AC outlet. 2. Open hood and check that the power button harness is properly connected to the system board. 3. Check that both power supply cables are properly connected to the system board. 4. If the 5V_aux light on the system board is on, then replace the power button harness. 5. If the 5V_aux light on the system board is off, then replace the power supply. 6. Replace the system board.

Solving Power Supply Problems

Solving Power Supply Problems		
Problem	Cause	Solution
Power supply shuts down intermittently.	Voltage selector switch on rear of computer chassis not switched to correct line voltage.	Select the proper AC voltage.
	Power supply fault.	Replace the power supply.
Computer powered off automatically and the Power LED flashes Red two times, once every second, followed by a two second pause. (Pertains to CPU fan only)	Processor thermal protection activated: A fan may be blocked or not turning. OR The heatsink/fan assembly is not properly attached to the processor.	<ol style="list-style-type: none"> 1. Ensure that the computer air vents are not blocked and the cooling fan is running. 2. Open hood, press the power button, and see if the processor fan spins. If the processor fan is not spinning, make sure the fan's cable is plugged onto the system board header. Ensure the fan is fully/properly seated or installed. 3. Replace the processor fan. 4. Reseat processor heatsink and verify that the fan assembly is properly attached.
Power LED flashes Red four times, once every second followed by a two-second pause.	Power failure (power supply is overloaded).	<ol style="list-style-type: none"> 1. Check that the voltage selector, is set to the appropriate voltage. 2. Open the hood and ensure the 4- wire power supply cable is seated into the connector on the system board. 3. Check if a device is causing the problem by removing ALL attached devices). Power on the system. If the system enters the POST, then power off and replace one device at a time and repeat this procedure until failure occurs. Replace the device causing the failure. Continue adding devices one at a time to ensure all devices are functioning properly. 4. Replace the power supply. 5. Replace the system board.

Solving Diskette Problems

Solving Diskette Problems		
Problem	Cause	Solution
Diskette drive light stays on.	Diskette is damaged.	In Microsoft Windows XP, right-click Start , click Explore , and select a drive. Select File > Properties > Tools . Under Error-checking , click Check Now .
	Diskette is incorrectly inserted.	Remove diskette and reinsert.
	Drive cable is not properly connected.	Reconnect power cable. Ensure that all four pins are connected.
Drive not found.	Cable is loose.	Reseat diskette drive data and power cables.
	Removable drive is not seated properly.	Reseat the drive.
Diskette drive cannot write to a diskette.	Diskette is not formatted.	Format the diskette.
	Diskette is write-protected.	Use another diskette or remove the write protection.
	Writing to the wrong drive.	Check the drive letter in the path statement.
	Not enough space is left on the diskette.	Use another diskette.
	Diskette write control is enabled.	Use Computer Setup to check the storage security feature disabled settings.
	Diskette is damaged.	Replace the damaged disk.
Cannot format diskette.	Invalid media reported.	When formatting a disk in MS-DOS, you may need to specify diskette capacity. For example, to format a 1.44-MB diskette, type the following command at the MS-DOS prompt: FORMAT A: /F:1440
	Disk may be write protected.	Open the locking device on the diskette.
A problem has occurred with a disk transaction.	The directory structure is bad, or there is a problem with a file.	In Windows XP, right-click Start , click Explore , and select a drive. Select File > Properties > Tools . Under Error-checking , click Check Now .

Solving Diskette Problems (Continued)		
Problem	Cause	Solution
Diskette drive cannot read a diskette.	Diskette is not formatted.	Format the diskette.
	You are using the wrong diskette type for the drive type.	Check the type of drive that you are using and use the correct diskette type.
	You are reading the wrong drive.	Check the drive letter in the path statement.
	Diskette is damaged.	Replace the diskette with a new one.
"Invalid system disk" message is displayed.	A diskette that does not contain the system files needed to start the computer has been inserted in the drive.	When drive activity stops, remove the diskette and press the Spacebar . The computer should start up.
	Diskette error has occurred.	Restart the computer by pressing the power button.
Cannot Boot to Diskette.	Diskette is not bootable.	Replace with a bootable diskette.
	Diskette boot has been disabled in Computer Setup.	Run Computer Setup and enable diskette boot in Storage > Boot Order .
	Removable media boot has been disabled in Computer Setup.	Run Computer Setup and enable Removable Media Boot in Storage > Storage Options .
	Network server mode is enabled in Computer Setup.	Enter Computer Setup and move the network interface card to the last position in Advanced BIOS Features > Removable Device Priority .

Solving Hard Drive Problems


Solving Hard Drive Problems		
Problem	Cause	Solution
Hard drive error occurs.	Hard disk has bad sectors or has failed.	<ol style="list-style-type: none"> 1. In Windows XP, right-click Start, click Explore, and select a drive. Select File > Properties > Tools. Under Error-checking, click Check Now. 2. Use a utility to locate and block usage of bad sectors. If necessary, reformat the hard disk.
Disk transaction problem.	Either the directory structure is bad or there is a problem with a file.	In Windows XP, right-click Start , click Explore , and select a drive. Select File > Properties > Tools . Under Error-checking , click Check Now .
Drive not found (identified).	Loose cable.	Check cable connections.
	The system may not have automatically recognized a newly installed device.	<ol style="list-style-type: none"> 1. Run Computer Setup. 2. If the system still does not recognize the new device, check to see if the device is listed within Computer Setup. If it is listed, the probable cause is a driver problem. If it is not listed, the probable cause is a hardware problem. 3. If this is a newly installed drive, enter Computer Setup and disable the Quick Power On Self Test in Advanced BIOS Features.
	Drive's controller is disabled in Computer Setup.	Enter Computer Setup and enable all the IDE and SATA controllers in Integrated Peripherals > South OnChip IDE Device and Integrated Peripherals > South OnChip PCI Device .
	Drive responds slowly immediately after power-up.	Enter Computer Setup and disable the Quick Power On Self Test in Advanced BIOS Features .

Solving Hard Drive Problems (Continued)		
Problem	Cause	Solution
Nonsystem disk/NTLDR missing message.	System is trying to start from a non bootable diskette.	Remove the diskette from the diskette drive
	System is trying to start from a damaged hard drive.	<ol style="list-style-type: none"> 1. Insert a bootable diskette into the diskette drive and restart the computer. 2. Check the hard drive format using fdisk: If NTFS formatting, use a third party reader to evaluate the drive. If FAT32 formatting, the hard drive cannot be accessed. Replace the MBR image.
System files missing or not properly installed.	System files missing or not properly installed.	<ol style="list-style-type: none"> 1. Insert a bootable diskette into the diskette drive and restart the computer. 2. Check the hard drive format using Fdisk: If NTFS formatting, use a third party reader to evaluate the drive. If FAT32 formatting, the hard drive cannot be accessed. Replace the MBR image.
		<p>Enter Computer Setup and enable the hard drive in Integrated Peripherals > South OnChip IDE Device > OnChip IDE Channel 0 or 1.</p> <p>- or -</p> <p>Enter Computer Setup and enable the hard drive in Integrated Peripherals > South OnChip PCI Device > Onboard Chip SATA.</p>
Hard drive boot disabled in Computer Setup.	Hard drive boot disabled in Computer Setup.	<p>Enter Computer Setup and enable the hard drive in Integrated Peripherals > South OnChip IDE Device > OnChip IDE Channel 0 or 1.</p> <p>- or -</p> <p>Enter Computer Setup and enable the hard drive in Integrated Peripherals > South OnChip PCI Device > Onboard Chip SATA.</p>
Bootable hard drive is not attached as first in a multi-hard drive configuration.	Bootable hard drive is not attached as first in a multi-hard drive configuration.	If attempting to boot from a SATA hard drive, ensure it is attached to SATA 0.

Solving Hard Drive Problems *(Continued)*

Problem	Cause	Solution
Computer will not start.	Hard drive is damaged.	Observe the beeps and LED lights on the front of the computer. See Appendix C, "POST Error Messages."
Computer seems to be locked up.	Program in use has stopped responding to commands.	<ol style="list-style-type: none"> 1. Attempt the normal Windows "Shut Down" procedure. 2. Press the power button for four or more seconds to turn off the power. 3. Restart the computer using the power button.

Solving Display Problems


Solving Display Problems		
Problem	Cause	Solution
Blank screen (no video).	The cable connections are not correct.	Check the cable connections from the monitor to the computer and to the electrical outlet.
	Screen blanking utility installed or energy saver features enabled.	Press any key or click the mouse button and, if set, type your password.
	System ROM is bad; system is running in FailSafe Boot Block mode (indicated by eight beeps).	Reflash the ROM using a ROMPaq diskette.
	Fixed-sync monitor will not sync at the resolution chosen.	Ensure that the monitor can accept the same horizontal scan rate as the resolution chosen.
	Computer is in standby mode.	Press the power button to resume from standby mode.
<p> CAUTION: When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the computer will shut down and you will lose your unsaved data.</p>		
	Monitor cable plugged into the wrong connector.	If the computer system has both an integrated graphics connector and an add-in graphics card connector, plug the monitor cable into the graphics card connector on the back of the computer.
	Monitor settings in the computer are not compatible with the monitor.	<ol style="list-style-type: none"> 1. Restart the computer and press F8 during startup when you see "Press F8" in the bottom right corner of the screen. 2. Using the keyboard arrow keys, select Enable VGA Mode and press Enter. 3. In Windows Control Panel, double-click the Display icon and select the Settings tab. 4. Use the sliding control to reset the resolution.


Solving Display Problems (Continued)		
Problem	Cause	Solution
Blank screen and the power LED flashes Red five times, once every second, followed by a two-second pause, and the computer beeps five times. The beeps will repeat five times, but the Power LED will continue flashing until the problem is resolved.	Pre-video memory error.	<ol style="list-style-type: none"> 1. Reseat DIMMs. Power on the system. 2. Replace DIMMs one at a time to isolate the faulty module. 3. Replace third-party memory with HP memory. 4. Replace the system board.
Power LED flashes Red six times, once every second, followed by a two second pause, and the computer beeps six times. The beeps will repeat five times, but the Power LED will continue flashing until the problem is resolved.	Pre-video graphics error.	<p>For systems with a graphics card:</p> <ol style="list-style-type: none"> 1. Reseat the graphics card. 2. Replace the graphics card. 3. Replace the system board. <p>For systems with integrated graphics, replace the system board.</p>
Blank screen and the power LED flashes Red seven times, once every second, followed by a two-second pause, and the computer beeps seven times. The beeps will repeat five times, but the Power LED will continue flashing until the problem is resolved.	System board failure (ROM detected failure prior to video).	Replace the system board.
Monitor does not function properly when used with energy saver features.	Monitor without energy saver capabilities is being used with energy saver features enabled.	Disable monitor energy saver feature.
Dim characters.	The brightness and contrast controls are not set properly.	Adjust the monitor brightness and contrast controls.
	Cables are not properly connected.	Check that the graphics cable is securely connected to the graphics card and the monitor.
Blurry video or requested resolution cannot be set.	If the graphics controller was upgraded, the correct video drivers may not be loaded.	Install the video drivers included in the upgrade kit.

Solving Display Problems <i>(Continued)</i>		
Problem	Cause	Solution
Blurry video or requested resolution cannot be set (continued)	Monitor is not capable of displaying requested resolution.	Change requested resolution.
The picture is broken up, rolls, jitters, or flashes.	The monitor connections may be incomplete or the monitor may be incorrectly adjusted.	<ol style="list-style-type: none"> 1. Be sure the monitor cable is securely connected to the computer. 2. In a two-monitor system or if another monitor is in close proximity, be sure the monitors are not interfering with each other's electromagnetic field by moving them apart. 3. Fluorescent lights or fans may be too close to the monitor.
	Monitor needs to be degaussed.	Degauss the monitor.
Vibrating or rattling noise coming from inside a CRT monitor when powered on.	Monitor degaussing coil has been activated.	None. It is normal for the degaussing coil to be activated when the monitor is powered on.
Clicking noise coming from inside a CRT monitor.	Electronic relays have been activated inside the monitor.	None. It is normal for some monitors to make a clicking noise when turned on and off, when going in and out of standby mode, and when changing resolutions.
High pitched noise coming from inside a flat panel monitor.	Brightness and/or contrast settings are too high.	Lower brightness and/or contrast settings.
Fuzzy focus; streaking, ghosting, or shadowing effects; horizontal scrolling lines; faint vertical bars; or unable to center the picture on the screen. (flat panel monitors using an analog VGA input connection only)	Flat panel monitor's internal digital conversion circuits may be unable to correctly interpret the output synchronization of the graphics card.	<ol style="list-style-type: none"> 1. Select the monitor's Auto-Adjustment option in the monitor's on-screen display menu. 2. Manually synchronize the Clock and Clock Phase on-screen display functions. Download SoftPac SP20930 or SP22333, depending on the monitor, to assist with the synchronization.
Certain typed symbols do not appear correct.	The font you are using does not support that particular symbol.	Use the Character Map to locate the and select the appropriate symbol. Click Start > All Programs > Accessories > System Tools > Character Map . You can copy the symbol from the Character Map into a document.

Solving Audio Problems

Solving Audio Problems		
Problem	Cause	Solution
Sound cuts in and out.	Processor resources are being used by other open applications.	Shut down all open processor-intensive applications.
	Direct sound latency, common in many media player applications.	<p>In Windows XP:</p> <ol style="list-style-type: none"> 1. From the Control Panel, select Sounds and Audio Devices. 2. On the Audio tab, select a device from the Sound Playback list. 3. Click the Advanced button and select the Performance tab. 4. Set the Hardware acceleration slider to None and the Sample rate conversion quality slider to Good and retest the audio. <p>Set the Hardware acceleration slider to Full and the Sample rate conversion quality slider to Best and retest the audio.</p>
Sound does not come out of the speaker or headphones.	Software volume control is turned down.	Double-click the Speaker icon on the taskbar and use the volume slider to adjust the volume.
	Audio is hidden in Computer Setup.	Enable the audio in Computer Setup: Integrated Peripherals > South OnChip PCI Device .
	The external speakers are not turned on.	Turn on the external speakers.
	External speakers plugged into the wrong audio jack.	See the sound card documentation for proper speaker connection.
	Audio cable not connected.	Connect audio cable between CD or DVD-ROM drive and the system board.



Solving Audio Problems (Continued)		
Problem	Cause	Solution
Sound does not come out of the speaker or headphones. (Continued)	Digital CD audio is not enabled.	<p>Enable digital CD audio:</p> <ol style="list-style-type: none"> 1. From the Control Panel, select System. 2. On the Hardware tab, click the Device Manager button. 3. Right-click on the CD/DVD device and select Properties. 4. On the Properties tab, make sure "Enable digital CD audio for this CD-ROM device" is checked.
	Headphones or devices connected to the line-out connector mute the internal speaker.	Turn on and use headphones or external speakers, if connected, or disconnect headphones or external speakers.
	Volume is muted.	<ol style="list-style-type: none"> 1. From the Control Panel program, click Sound, Speech and Audio Devices, then click Sounds and Audio Devices. 2. Click the Mute check box to remove the check mark from the box.
	Computer is in standby mode.	Press the power button to resume from standby mode.
<p> CAUTION: When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the computer will shut down and you will lose your unsaved data.</p>		
Noise or no sound comes out of the speakers or headphones.	Computer may not be detecting the correct speaker/headphone type or output or analog-to-digital auto-sense is not engaged.	<ol style="list-style-type: none"> 1. The audio output jack supports both digital and analog output functions. When using digital speakers, switch the PC's output jack to digital mode. Go to the Volume Control Panel, select the Advanced button, and select the Enable Digital Audio check box. When using conventional analog speakers, ensure this check box is not selected. 2. If the headphones have a mono jack, use the multimedia device properties to switch the system to analog out.

Solving Audio Problems (Continued)		
Problem	Cause	Solution
<p> If you set digital as the Output Mode, the internal speaker and external analog speakers will no longer output audio until you switch back to an auto-sense or analog mode.</p> <p>If you set analog as the Output Mode, external digital speakers will not function until you change the output mode back to an auto-sense or digital mode.</p>		
Computer appears to be locked up while recording audio.	The hard disk may be full.	<ol style="list-style-type: none"> 1. Before recording, make sure there is enough free space on the hard disk. 2. Try recording the audio file in a compressed format.

Solving Printer Problems

Solving Printer Problems		
Problem	Cause	Solution
Printer will not print.	Printer is not turned on and online.	Turn the printer on and make sure it is online.
	The correct printer driver for the application are not installed.	<ol style="list-style-type: none"> 1. Install the correct printer driver for the application. 2. Try printing using the MS-DOS command: DIR C:\ > [printer port] where [printer port] is the address of the printer being used. If the printer works, reload the printer driver.
	If you are on a network, you may not have made the connection to the printer.	Make the proper network connections to the printer.
Printer will not turn on.	Printer may have failed.	Run printer self-test.
	The cables may not be connected properly.	Reconnect all cables.
	The correct printer driver is not installed.	Install the correct printer driver for the application.
Printer prints garbled information.	The cables may not be connected properly.	Reconnect all cables.
	Printer memory may be overloaded.	Reset the printer by turning it off for one minute, then turn it back on.
	Printer is offline.	<ol style="list-style-type: none"> 1. Check the paper tray and refill it if it is empty. 2. Select online.

Solving Keyboard and Mouse Problems

Solving Keyboard Problems		
Problem	Cause	Solution
Keyboard commands and typing are not recognized by the computer.	Keyboard connector is not properly connected.	<ol style="list-style-type: none"> 1. Turn off the computer. 2. Reconnect the keyboard to the back of the computer and restart the computer.
	Program in use has stopped responding to commands.	Shut down the computer using the mouse and then restart the computer.
	Keyboard needs repairs.	Replace the keyboard.
	Computer is in standby mode.	Press the power button to resume from standby mode.
<p> CAUTION: When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the computer will shut down and you will lose your unsaved data.</p>		
Cursor will not move using the arrow keys on the keypad.	The Num Lock key may be on.	Press the Num Lock key. The Num Lock light should not be on if you want to use the arrow keys. The Num Lock key can be disabled (or enabled) in Computer Setup.
Mouse does not respond to movement or is too slow.	Mouse connector is not properly plugged into the back of the computer.	<ol style="list-style-type: none"> 1. Shut down the computer using the keyboard. 2. Plug the mouse connector into the back of the computer (or the keyboard) and restart the computer.
	Program in use has stopped responding to commands.	Shut down the computer using the keyboard and then restart the computer.
	Mouse may need cleaning.	Remove the roller ball cover on the mouse and clean the internal components.
	Mouse needs repairs.	Replace the mouse.
	Computer is in standby mode.	Press the power button to resume from standby mode.
<p> CAUTION: When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the computer will shut down and you will lose your data.</p>		
Mouse will only move vertically or horizontally, or movement is jerky.	Mouse roller ball is dirty.	Remove roller ball cover from the bottom of the mouse and clean it.

Solving Hardware Installation Problems

You may need to reconfigure the computer when you add or remove hardware, such as an additional diskette drive. If you install a plug and play device, Windows XP automatically recognize the device and configure the computer. If you install a non–plug and play device, you must reconfigure the computer after completing installation of the new hardware. In Windows XP, use the **Add Hardware Wizard** and follow the instructions that appear on the screen.


Solving Hardware Installation Problems		
Problem	Cause	Solution
A new device is not recognized as part of the system.	Device is not seated or connected properly.	Ensure that the device is properly and securely connected and that pins in the connector are not bent down.
	Cable(s) of new external device are loose or power cables are unplugged.	Ensure that all cables are properly and securely connected and that pins in the cable or connector are not bent down.
	Power switch of new external device is not turned on.	Turn off the computer, turn on the external device, then turn on the computer to integrate the device with the computer system.
	When the system advised you of changes to the configuration, you did not accept them.	Reboot the computer and follow the instructions for accepting the changes.
	A plug and play board may not automatically configure when added if the default configuration conflicts with other devices.	Use Windows XP Device Manager to deselect the automatic settings for the board and choose a basic configuration that does not cause a resource conflict. You can also use Computer Setup to reconfigure or disable devices to resolve the resource conflict.
Computer will not start.	Wrong memory modules were used in the upgrade or memory modules were installed in the wrong location.	<ol style="list-style-type: none"> 1. Review the documentation that came with the system to determine if you are using the correct memory modules and to verify the proper installation. 2. Observe the beeps and LED lights on the front of the computer. See Appendix C, "POST Error Messages," to determine possible causes.

Solving Hardware Installation Problems *(Continued)*

Problem	Cause	Solution
Power LED flashes Red five times, once every second, followed by a two second pause, and the computer beeps five times. The beeps will repeat five times, but the Power LED will continue flashing until the problem is resolved.	Memory is installed incorrectly or is bad.	<ol style="list-style-type: none"> 1. Reseat DIMMs. 2. Replace DIMMs one at a time to isolate the faulty module. 3. Replace third-party memory with HP memory. 4. Replace the system board.
Power LED flashes Red six times, once every second, followed by a two second pause, and the computer beeps six times. The beeps will repeat five times, but the Power LED will continue flashing until the problem is resolved.	Video card is not seated properly or is bad, or system board is bad.	<p>For systems with a graphics card:</p> <ol style="list-style-type: none"> 1. Reseat the graphics card. Power on the system. 2. Replace the graphics card. 3. Replace the system board. <p>For systems with integrated graphics, replace the system board.</p>
Power LED flashes Red ten times, once every second, followed by a two-second pause, and the computer beeps ten times. The beeps will repeat five times, but the Power LED will continue flashing until the problem is resolved.	Bad option card.	<ol style="list-style-type: none"> 1. Check each option card by removing the cards one at time (if multiple cards), then power on the system to see if fault goes away. 2. Once bad card is identified, remove and replace bad option card. 3. Replace the system board.


Solving Network Problems

These guidelines do not discuss the process of debugging the network cabling.

Solving Network Problems		
Problem	Cause	Solution
Wake-on-LAN feature is not functioning.	Wake-on-LAN is not enabled.	Use the Network control application to enable Wake-on-LAN.
Network driver does not detect network controller.	Network controller is disabled.	Run Computer Setup and enable network controller.
	Incorrect network driver.	Check the network controller documentation for the correct driver or obtain the latest driver from the manufacturer's Web site.
<p>Network status link light does not turn on or it never flashes.</p> <p> The network status light should flash when there is network activity.</p>	No active network is detected.	Check cabling and network equipment for proper connection.
	Network controller is not set up properly.	Use the Network control application to verify that the device is working properly.
	Network driver is not properly loaded.	Reinstall network drivers.
	System cannot autosense the network.	Disable auto-sensing capabilities and force the system into the correct operating mode.
Diagnostics reports a failure.	The cable is not securely connected.	Ensure that both ends of the data cable are securely connected.
	The cable is attached to the incorrect connector.	Ensure that the cable is attached to the correct connector.
	There is a problem with the cable or a device at the other end of the cable.	Ensure that the cable and device at the other end are operating correctly.
	Network controller interrupt is shared with an expansion board.	Enter Computer Setup and change the resource settings for the board in PnP/PCI Configurations > IRQ Resources .
	The network controller is defective.	Replace the NIC.
Diagnostics passes, but the computer does not communicate with the network.	Network drivers are not loaded, or driver parameters do not match current configuration.	<ol style="list-style-type: none"> 1. Make sure the network drivers are loaded and that the driver parameters match the configuration of the network controller. 2. Make sure the correct network client and protocol is installed.

Solving Network Problems (Continued)		
Problem	Cause	Solution
Diagnostics passes, but the computer does not communicate with the network. (continued)	The network controller is not configured for this computer.	Select the Network icon in the Control Panel and configure the network controller.
Network controller stopped working when an expansion board was added to the computer.	Network controller interrupt is shared with an expansion board.	Enter Computer Setup and change the resource settings for the board in PnP/PCI Configurations > IRQ Resources .
	The network controller requires drivers.	Verify that the drivers were not accidentally deleted when the drivers for a new expansion board were installed.
	The expansion board installed is a network card (NIC) and conflicts with the embedded NIC.	Enter Computer Setup and change the resource settings for the board in PnP/PCI Configurations > IRQ Resources .
Network controller stops working without apparent cause.	The files containing the network drivers are corrupted.	Reinstall the network drivers, using the <i>Restore Plus!</i> CD.
	The cable is not securely connected.	Ensure that both ends of the cable are securely attached to the correct devices.
	The network controller is defective.	Replace the NIC.
New network card will not boot.	New network card may be defective or may not meet industry-standard specifications.	Install a working, industry-standard NIC, or change the boot sequence to boot from another source.
Cannot connect to network server when attempting Remote System Installation.	The network controller is not configured properly.	Verify Network Connectivity, that a DHCP Server is present, and that the Remote System Installation Server contains the NIC drivers for your NIC.
System setup utility reports unprogrammed EEPROM.	Unprogrammed EEPROM.	Flash the ROM.

Solving Memory Problems

 **CAUTION:** For those systems that support ECC memory, HP does not support mixing ECC and non-ECC memory. Otherwise, the system will not boot the operating system.

Solving Memory Problems		
Problem	Cause	Solution
System will not boot or does not function properly after installing additional memory modules.	Memory module is not the correct type or speed or the new memory module is not seated properly.	Replace module with the correct industry-standard device for the computer.
		On some models, ECC and non-ECC memory modules cannot be mixed.
Out of memory error.	Memory configuration may not be set up correctly.	Use the Device Manager to check memory configuration.
	You have run out of memory to run the application.	Check the application documentation to determine the memory requirements.
Memory count during POST is wrong.	The memory modules may not be installed correctly.	Check that the memory modules have been installed correctly and that proper modules are used.
	Integrated graphics may use system memory.	No action required.
Insufficient memory error during operation.	Too many Terminate and Stay Resident programs (TSRs) are installed.	Delete any TSRs that you do not need.
	You have run out of memory for the application.	Check the memory requirements for the application or add more memory to the computer.
Power LED flashes Red five times, once every second, followed by a two second pause, and the computer beeps five times. The beeps will repeat five times, but the Power LED will continue flashing until the problem is resolved.	Memory is installed incorrectly or is bad.	<ol style="list-style-type: none"> 1. Reseat DIMMs. 2. Replace DIMMs one at a time to isolate the faulty module. 3. Replace third-party memory with HP memory. 4. Replace the system board.

Solving Processor Problems

Solving Processor Problems		
Problem	Cause	Solution
Poor performance is experienced.	Processor is hot.	<ol style="list-style-type: none"> 1. Make sure the airflow to the computer is not blocked. Leave a 10.2-cm (4-inch) clearance at the back of the system unit and above the monitor to permit the required airflow. 2. Make sure the fans are connected and working properly (some fans only operate when needed). 3. Make sure the processor heatsink is installed properly.
Power LED flashes Red three times, once every second, followed by a two-second pause. The Power LED will continue flashing until the problem is resolved.	Processor is not seated properly or not installed. (This is not an indicator of a bad processor)	<ol style="list-style-type: none"> 1. Check to see that the processor is present. 2. Reseat the processor.

Solving CD-ROM and DVD Problems

Solving CD-ROM and DVD Problems		
Problem	Cause	Solution
System will not boot from CD-ROM or DVD drive.	Removable Media Boot is disabled in the Computer Setup utility.	Enter Computer Setup and enable CD-ROM or DVD drive boot in Integrated Peripherals > South OnChip IDE Device > OnChip IDE Channel 0 or 1 .
	Network Server Mode is enabled in Computer Setup.	Enter Computer Setup and move the network interface card to the last position in Advanced BIOS Features > Removable Device Priority .
	Non-bootable CD in drive.	Try a bootable CD in the drive.
	Boot order not correct.	Enter Computer Setup and change boot sequence in Advanced BIOS Features and Advanced BIOS Features > Removable Device Priority .
CD-ROM or DVD devices are not detected or driver is not loaded.	Drive is not connected properly or not properly configured.	<ol style="list-style-type: none"> 1. Reconnect power and data cables to the drive. 2. Install correct device driver.
	Movie will not play in the DVD drive.	See the documentation that came with the DVD drive.
	Decoder software is not installed.	Install decoder software.
	Damaged media.	Replace media.
Cannot eject compact disc (tray-load unit).	Movie rating locked out by parental lock.	Use DVD software to remove parental lock.
	Disc not properly seated in the drive.	<ol style="list-style-type: none"> 1. Turn off the computer and insert a thin metal rod into the emergency eject hole and push firmly. 2. Slowly pull the tray out from the drive until the tray is fully extended, then remove the disc.

Solving CD-ROM and DVD Problems *(Continued)*

Problem	Cause	Solution
CD-ROM, CD-RW, DVD-ROM, or DVD-R/RW drive cannot read a disc or takes too long to start.	Media has been inserted upside down.	Re-insert the media with the label facing up.
	The DVD-ROM drive takes longer to start because it has to determine the type of media played, such as audio or video.	Wait at least 30 seconds to let the DVD-ROM drive determine the type of media being played. If the disc still does not start, read the other solutions listed for this topic.
	CD or DVD disc is dirty.	Clean CD or DVD with a CD cleaning kit.
Recording audio CDs is difficult or impossible.	Wrong or poor quality media type.	Windows does not detect the CD-ROM or DVD-ROM drive.
		<ol style="list-style-type: none"> 1. Use Device Manager to remove or uninstall the device in question. 2. Restart the computer and let Windows detect the device.
Recording audio CDs is difficult or impossible.	Wrong or poor quality media type.	<ol style="list-style-type: none"> 1. Try using a slower recording speed. 2. Verify that you are using the correct media for the drive. 3. Try a different brand of media. Quality varies widely between manufacturers.

Solving Drive Key Problems

Solving Drive Key Problems

Problem	Cause	Solution
Drive key is not seen as a drive letter in Windows XP.	The drive letter after the last physical drive is not available.	Change the default drive letter for the Drive key in Windows XP.
The computer boots to DOS after making a bootable Drive key.	Drive key is bootable.	Install the Drive key after the operating system boots.

Solving Internet Access Problems

Solving Internet Access Problems		
Problem	Cause	Solution
Unable to connect to the Internet.	Internet Service Provider (ISP) account is not set up properly.	Verify Internet settings or contact the ISP for assistance.
	Modem is not set up properly.	Reconnect the modem. Verify the connections are correct using the quick setup documentation.
	Web browser is not set up properly.	Verify that the Web browser is installed and set up to work with your ISP.
	Cable/ DSL modem is not plugged in.	Plug in cable/DSL modem. You should see a "power" LED light on the front of the cable/DSL modem.
	Cable/DSL service is not available or has been interrupted due to bad weather.	Try connecting to the Internet at a later time or contact your ISP. (If the cable/DSL service is connected, the "cable" LED light on the front of the cable/DSL modem will be on.)
	The CAT5 UTP cable is disconnected.	Connect the CAT5 UTP cable between the cable modem and the computer's RJ-45 connector. (If the connection is good, the "PC" LED light on the front of the cable/DSL modem will be on.)
	IP address is not configured properly.	Contact the ISP for the correct IP address.
Cannot automatically launch Internet programs.	Cookies are corrupted.	In Windows XP <ol style="list-style-type: none"> 1. Select Start > Control Panel. 2. Double-click Internet Options. 3. On the General tab, click the Delete Cookies button.
	You must log on to the ISP before some programs will start.	Log on to the ISP and launch the desired program.

Solving Internet Access Problems *(Continued)*

Problem	Cause	Solution
Internet takes too long to download Web sites.	Modem is not set up properly.	<p>Verify that the correct modem speed and COM port are selected.</p> <p>For Windows XP:</p> <ol style="list-style-type: none"> 1. Select Start > Control Panel. 2. Double-click System. 3. Click the Hardware tab. 4. In the Device Manager area, click the Device Manager button. 5. Double-click Ports (COM & LPT). 6. Right-click the COM port your modem uses, then click Properties. 7. Under Device status, verify that the modem is working properly. 8. Under Device usage, verify the modem is enabled. 9. If there are further problems, click the Troubleshoot button and follow the on-screen instructions.

Solving Software Problems

Most software problems occur as a result of the following:

- The application was not installed or configured correctly.
- There is insufficient memory available to run the application.
- There is a conflict between applications.
- Make sure that all the needed device drivers have been installed.
- If you have installed an operating system other than the factory-installed operating system, check to be sure it is supported on the system.

Where available, run the Configuration Record utility to determine if any changes have been made to the software which may be causing a problem.

If you encounter software problems, see the applicable solutions listed in the following table.

Solving Software Problems		
Problem	Cause	Solution
Computer will not continue and no HP logo screen has appeared.	POST error has occurred.	Observe the beeps and LED lights on the front of the computer. See Appendix C, "POST Error Messages" to determine possible causes. See the Restore Kit or the Worldwide Limited Warranty for terms and conditions.
Computer will not continue after HP logo screen has appeared.	System files may be damaged.	Use recovery diskette to scan hard drive for errors.
"Illegal Operation has Occurred" error message is displayed.	Software being used is not Microsoft-certified for your version of Windows.	Verify that the software is certified by Microsoft for your version of Windows (see program packaging for this information).
	Configuration files are corrupt.	If possible, save all data, close all programs, and restart the computer.

AMD-Based Systems

Computers equipped with AMD-based processors come with Double Data Rate-Synchronous Dynamic Random Access Memory (DDR-SDRAM) Dual Inline Memory Modules (DIMMs).

DIMMs

The memory sockets on the system board can be populated with up to four industry-standard DIMMs. These memory sockets are populated with at least one preinstalled DIMM. To achieve the maximum memory support, you can populate the system board with up to 8GB (1-Gbit Technology) of memory configured in a high-performing dual channel mode.



The memory available may be limited by the operating system.

DDR-SDRAM DIMMs

For proper system operation, if the computer supports DDR-SDRAM DIMMs, the DIMMs must be:

- industry-standard 184-pin
- unbuffered PC3200 400 MHz-compliant
- 2.5 volt DDR-SDRAM DIMMs.

The DDR-SDRAM DIMMs must also:

- support CAS latency 3 (CL = 3)
- contain the mandatory JEDEC SPD information

In addition, the computer supports:

- 128Mbit, 256Mbit, 512Mbit, and 1Gbit non-ECC memory technologies
- single-sided and double-sided DIMMS
- DIMMs constructed with x8 and x16 DDR devices; DIMMs constructed with x4 SDRAM are not supported



The system will not start if you install unsupported DIMMs.

DIMM Sockets

The system will automatically operate in single channel mode or a higher-performing dual channel mode, depending on how the DIMMs are installed.

- In single channel mode, always populate the XMM1 socket first. If you add a second DIMM of a different memory size than the first, install it in XMM3. Otherwise, the system will not operate.

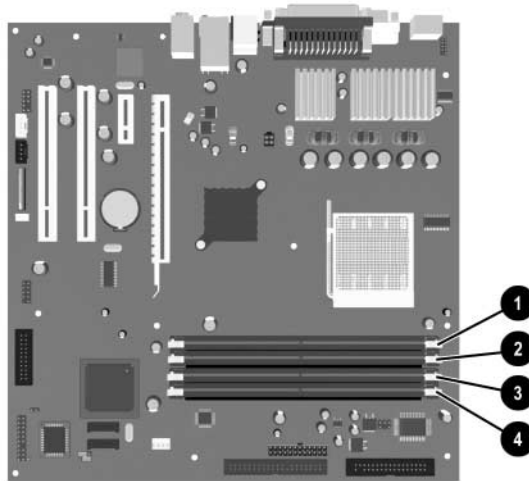


In single channel mode, the maximum operational speed is determined by the slowest DIMM in the system. If the system is populated with a DIMM that is 266 MHz and a second DIMM that is 333 MHz, the system will run at the slower of the two speeds.

- In dual channel mode, all DIMMs must be identically matched. If you are populating all four DIMM sockets, you must either use identical DIMMs in all sockets or use identical DIMM pairs in each pair of sockets, XMM1 and XMM2 black sockets and XMM3 and XMM4 blue sockets. Otherwise, the system will not operate.

There are four DIMM sockets on the system board, with two sockets per channel. The sockets are labeled XMM1, XMM2, XMM3, and XMM4. Sockets XMM1 and XMM3 operate in memory channel A. Sockets XMM2 and XMM4 operate in memory channel B.

The system board shown below may be different from the one in your computer.



Item	Description	Socket Color
❶	DIMM socket XMM1, Channel A	Black
❷	DIMM socket XMM2, Channel B	Black
❸	DIMM socket XMM3, Channel A	Blue
❹	DIMM socket XMM4, Channel B	Blue

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