

service reference guide

HP Compaq dx2200 MT
Business PC
1st Edition

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

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Contents

1 Installing the Operating System

1.1 Microsoft Windows XP	1-1
1.1.1 Installing or Upgrading Device Drivers	1-1
1.2 Converting to NTFS	1-2
1.2.1 Windows XP Home and XP Professional	1-2
1.3 HP Software	1-2

2 Setup Utilities and Diagnostics Features

2.1 Power-On Self-Test (POST)	2-1
2.2 Computer Setup Utilities	2-2
2.2.1 Using Computer Setup (F10) Utilities	2-2
2.2.2 Computer Setup Menu	2-4
2.3 Recovering the Configuration Settings	2-11
2.3.1 Backing up the CMOS	2-11
2.3.2 Restoring the CMOS	2-11

3 Desktop Management

3.1 Initial Configuration and Deployment	3-1
3.2 ROM Flash	3-1
3.2.1 FailSafe Boot Block ROM	3-1
3.2.2 Dual-State Power Button	3-2
3.2.3 Power Management	3-2
3.2.4 World Wide Web Site	3-3
3.3 Security	3-3
3.3.1 Password Security	3-3
3.3.2 Establishing a Supervisor Password Using Computer Setup	3-3
3.3.3 Establishing a User Password Using Computer Setup	3-3
3.3.4 Surge-Tolerant Power Supply	3-5

4 Serial and Parallel ATA Drive Guidelines and Features

4.1 SATA Hard Drives	4-1
4.2 SATA Hard Drive Cables	4-2
4.2.1 SATA Data Cable	4-2
4.2.2 SATA Power Cable	4-2
4.3 PATA Device Information	4-3
4.4 PATA Cables	4-3
4.4.1 PATA Data Cable	4-3
4.4.2 PATA Power Cable	4-3
4.5 PATA Drive Installation Guidelines	4-3

4.5.1 PATA Device Classes	4-4
4.6 SATA SMART Drives	4-4
4.7 Drive Capacities	4-4
4.8 SATA BIOS.....	4-5
4.8.1 Legacy Mode	4-5
4.8.2 Native Mode.....	4-6

5 Identifying the Chassis, Routine Care, and Disassembly Preparation

5.1 Chassis Designations.....	5-1
5.1.1 Microtower (MT)	5-1
5.2 Electrostatic Discharge Information	5-2
5.2.1 Generating Static	5-2
5.2.2 Preventing Electrostatic Damage to Equipment.....	5-2
5.2.3 Personal Grounding Methods and Equipment	5-3
5.2.4 Grounding the Work Area	5-3
5.2.5 Recommended Materials and Equipment.....	5-3
5.3 Routine Care	5-4
5.3.1 General Cleaning Safety Precautions.....	5-4
5.3.2 Cleaning the Computer Case	5-4
5.3.3 Cleaning the Keyboard.....	5-5
5.3.4 Cleaning the Monitor	5-5
5.3.5 Cleaning the Mouse	5-5
5.4 Service Considerations	5-6
5.4.1 Power Supply Fan	5-6
5.4.2 Tools and Software Requirements	5-6
5.4.3 Screws	5-6
5.4.4 Cables and Connectors	5-7
5.4.5 Hard Drives	5-7
5.4.6 Lithium Coin Cell Battery	5-7

6 Removal and Replacement Procedures— Microtower (MT) Chassis

6.1 Preparation for Disassembly	6-1
6.2 Access Panel	6-2
6.3 Front Bezel	6-3
6.4 Front Drive Bezels.....	6-4
6.4.1 5.25" Drive Bezel Blank.....	6-4
6.4.2 Removing a 3.5" Drive Bezel Blank	6-5
6.5 Memory	6-6
6.5.1 Installing Memory Modules.....	6-6
6.6 Expansion Cards	6-8
6.6.1 Expansion Slot Cover Lock	6-8
6.6.2 PCI/PCIe Expansion Card	6-8
6.7 Cable Management	6-10
6.7.1 Cable Connections	6-11
6.8 Drives.....	6-12
6.8.1 Drive Positions	6-12
6.8.2 5.25" Drive	6-13
6.8.3 3.5" Drive.....	6-14

6.8.4 Removing a 3.5" Hard Drive	6-16
6.9 Front I/O Panel Housing Assembly	6-17
6.9.1 Power Switch Assembly	6-18
6.10Speaker	6-19
6.11System Fan	6-20
6.12Heatsink	6-21
6.13Processor	6-22
6.14System Board	6-24
6.15Battery	6-25
6.15.1Type 1 Battery Holder	6-26
6.15.2Type 2 Battery Holder	6-27
6.15.3Type 3 Battery Holder	6-28
6.16Power Supply	6-29

A Connector Pin Assignments

B Power Cord Set Requirements

C POST Error Messages

D Memory

E Troubleshooting Without Diagnostics

Index

Installing the Operating System

Depending on the model, Microsoft Windows XP Home or Windows XP Professional is preinstalled on the computer and will be configured automatically the first time the computer is turned on.



CAUTION: Do not add optional hardware 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.

1.1 Microsoft Windows XP

The first time the computer is turned on, Microsoft Windows is automatically installed. This takes approximately 10 minutes, depending on the system hardware configuration. 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.

1.1.1 Installing or Upgrading Device Drivers

To install optional hardware devices after the OS installation is completed, you must install the device drivers for the device you are installing.

The I386 directory and its subdirectories provide the HP- or Compaq-specific integration of the operating system for the computer model and include device drivers supported by the operating system.

When prompted for the I386 directory on the operating system CD, replace the path specification with C:\I386 or use the *Browse* button of the dialog box to browse the computer for the I386 folder. This action points to the appropriate drivers.

The latest support software is also available from the Web site at <http://www.hp.com/support>.

1.2 Converting to NTFS

1.2.1 Windows XP Home and XP Professional

The Windows XP Home and XP Professional operating systems handle only NTFS-formatted drives. When installed, XP will, if necessary, automatically convert a FAT32 drive to NTFS.

1.3 HP Software

The Microsoft Windows XP Home or Windows XP Professional operating system is preinstalled on the computer and will be configured automatically the first time the computer is turned on. All other software is user-installed.

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 these ways:

- 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. These tools can also be used 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 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 IDE (ATA) mass storage devices
- Processors
- Controllers



If the Supervisor Password is set, a prompt appears on the screen while POST is running. You will need to 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 Utilities

Use Computer Setup Utilities (F10) to:

- Modify or restore 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 devices.
- Configure the boot priority of IDE (ATA) hard drives.
- The system is preset to always Quick Boot.
- Enable or disable Network Server Mode, which allows the computer to boot the operating system when the power-on password is enabled with or without a keyboard or mouse attached. When attached to the system, the keyboard and mouse remain locked until the power-on password is entered.
- Enable supervisor password prompting during system restarts (warm boots) as well as during power-on.
- Establish a supervisor password that controls access to Computer Setup (F10) Utility and the settings described in this section.
- Secure the 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 removable media boot ability.
- Solve system configuration errors detected but not automatically fixed during the Power-On Self-Test (POST).
- Execute self-tests on a specified IDE (ATA) hard drive (when supported by the drive).

2.2.1 Using Computer Setup (F10) Utilities

Computer Setup can be accessed only by turning on the computer 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 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 turn the computer off, then on again, and press 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. A choice of headings appears in the Computer Setup Utilities menu: System Information, Standard CMOS Features, Advanced BIOS Features, Advanced Chipset Features, Integrated Peripherals, Power Management Setup, PnP/PCI Configurations, PC Health Status, Load Optimized Defaults, Set Supervisor Password, Set User Password, Save and Exit Setup, and Exit Without Saving.

4. Use the arrow (left and right) keys to select the appropriate heading. Use the arrow (up and down) keys to select the option you want, then press **Enter**. To return to the Computer Setup Utilities menu, press **Esc**.
5. To apply and save changes, select **Save and Exit Setup**.
 - ☐ If you have made changes that you do not want applied, select **Exit Without Saving**.
 - ☐ To reset to factory settings, select **Load Optimized Defaults**. This option will restore the original factory system defaults. You must still select **Save and Exit Setup** after resetting the defaults.




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

2.2.2 Computer Setup Menu

Heading	Option	Description
System Information	None	Lists product name, SKU number, processor type, processor speed, CPU ID, cache size, memory size, system ROM, integrated MAC, UUID, system serial number, asset tracking number, asset tag number, and CPU clock ratio.
Standard CMOS Features	Date (mm/dd/yy)	Allows you to set system date.
	Time (hh:mm:ss)	Allows you to set system time.
	PATA Controller	Disables/enables PATA controller.
	PATA Ch 0 Master	<ul style="list-style-type: none"> • For each, if PATA HDD is used, allows you to: <ul style="list-style-type: none"> • run SMART HDD self-test for selected channel <ul style="list-style-type: none"> • SMART Status Check <ul style="list-style-type: none"> –Target Disk –SMART –Smart Status Check • HDD Short Self-Test <ul style="list-style-type: none"> – Target Disk – Estimated Test Time – Start Test • HDD Extended Self-Test <ul style="list-style-type: none"> – Target Disk – Estimated Test Time – Start Test • set device details on selected channel to: <ul style="list-style-type: none"> –None –Auto –Manual • set access mode on selected channel to: <ul style="list-style-type: none"> –CHS (Cylinder-Head-Sector) –LBA (Logical Block Addressing) –Large –Auto • view <ul style="list-style-type: none"> –Firmware version –Capacity –Cylinder –Head –Precomp –Landing Zone –Sector
	PATA Ch 0 Slave	


Heading	Option	Description
Standard CMOS Features (continued)	SATA Controller	Disables/enables onboard SATA controller.
	SATA Ch 1 Master	For each, allows you to: <ul style="list-style-type: none"> run HDD self-test for selected channel: <ul style="list-style-type: none"> SMART Status Check <ul style="list-style-type: none"> Target Disk SMART SMART Status Check HDD Short Self-Test <ul style="list-style-type: none"> Target Disk Estimated Test Time Start Test HDD Extended Self-Test <ul style="list-style-type: none"> Target Disk Estimated Test Time Start Test set extended IDE drive on selected channel to: <ul style="list-style-type: none"> None Auto set access mode on selected channel to <ul style="list-style-type: none"> Large Auto view <ul style="list-style-type: none"> Firmware version Capacity Cylinder Head Precomp Landing Zone Sector
	SATA Ch 2 Master	
	Floppy Controller	Disables/enables the floppy disc controller.
	Drive A	Allows you to set Drive A to None or 1.44, 3.5 in. (Used to disable/enable Drive A in legacy operating systems.)
	Halt On	Allows you to set POST error behavior to: <ul style="list-style-type: none"> All Errors No Errors All but Keyboard All but Diskette All but Diskette/Keyboard

Heading	Option	Description
Standard CMOS Features (continued)	POST Delay	Allows you to set a POST delay to: <ul style="list-style-type: none"> • 0 seconds • 5 seconds • 10 seconds • 15 seconds • 30 seconds
	Device Boot Disabling	Allows you to restrict a device from booting the unit. You can disable as a bootable device: <ul style="list-style-type: none"> • None • USB • Internal ODD • Internal FDD • USB + ODD + FDD
Advanced BIOS Features	F9 Boot Menu	Disables/enables F9 Boot Menu
	Removable Device Boot Priority	Allows you to specify the order of attached removable devices (such as Legacy Floppy or USB FDD) The first drive in the order has priority in the boot sequence and is recognized as drive A.
	Hard Disk Boot Seq.	Allows you to specify the order of attached hard drive devices (such as USB HDD storage, USB2 Drive Key, 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).
	Optical Drive Boot Sequence	Allows you to specify the order in which attached optical drives (including USB ODD) are checked for a bootable operating system image.
	Network Boot Sequence	Allows you to specify the order in which network devices (including UP NIC cards) are checked for a bootable operating system image.
	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 or to disable any of the three: <ul style="list-style-type: none"> • Removable • Hard Disk • Optical Drive • Network • Disabled
		 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 to off or on.

Heading	Option	Description
Advanced BIOS Features (continued)	Security Option	Allows you to set the security option to Setup or Always so that the password is required every time the system boots or only when entering Computer Setup.
	APIC Mode	Disables/enables the APIC mode.
	MPS Version Control for OS	Allows you to set the MPS table version to: <ul style="list-style-type: none"> • 1.1 • 1.4
	BIOS Write Protection	Disables/enables BIOS upgrading.
	Execute Disable Bit	Disables/enables Execute Disable Bit (XD) functionality, which prevents malicious buffer overflow attacks.
	Enhanced Intel SpeedStep Technology	Enables/disables the primary display device:
Advanced Chipset Features	UMA Frame Buffer	Select the UMA (Unified Memory Architecture) frame buffer size: <ul style="list-style-type: none"> • 32MB • 64MB • Auto
	Init Display First (VGA Setting)	Allows you to select the primary display device: <ul style="list-style-type: none"> • PCI Slot • OnChip VGA • PCIEx
	SURROUNDVIEW	Disables/enables SURROUNDVIEW (available when an ATI PCIEx video card is installed).
	AutoDetect PCI Clk (VGA Setting)	Disable/enable PCI clock auto-detection.
Integrated Peripherals	Onboard HD Audio	Disables/enables onboard HD audio.
	OnChip USB Controller	Disables/enables USB controller.
	USB Legacy Support	Disables/enables USB legacy support function (USB keyboard, USB mouse, and USB Drive Key).
	Onboard LAN	Disables/enables onboard LAN controller.
	Onboard LAN Boot ROM	Disables/enables the boot ROM of the onboard LAN chip.

Heading	Option	Description
Integrated Peripherals (continued)	Onboard Serial Port	Allows you to select a setting for the onboard serial port: <ul style="list-style-type: none"> • Disabled • 3F8/IRQ4 • 2F8/IRQ3 • 3E8/IRQ4 • 2E8/IRQ3
	Onboard Parallel Port	Allows you to select a setting for the onboard parallel port: <ul style="list-style-type: none"> • Disabled • 378/IRQ7 • 278/IRQ5 • 3BC/IRQ7
	Parallel Port Mode	Allows you to select parallel port mode: <ul style="list-style-type: none"> • SPP • EPP • ECP • ECP+EPP • Normal
	ECP Mode Use DMA	If Parallel Port Mode is set to ECP or ECP+EPP, allows you to set the DMA channel for ECP Mode to 1 or 3.
Power Management Setup	After AC Power Loss	Allows you to select system power loss behavior: <ul style="list-style-type: none"> • On • Off • Last State
	ACPI Suspend Type	ACPI sleep mode is S3 (Suspend To RAM)
	External Modem S5 Wake-Up	Disables/enables wake-up modem from S5.
	RTC Alarm Resume	Disables/enables 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. (Set to 0 for every day.)
	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	Disables/enables automatic reconfiguration. The 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.

Heading	Option	Description
	Resources Controlled By	<p>Allows you to select whether resources are controlled automatically or manually:</p> <ul style="list-style-type: none"> • Auto (ESCD–Extended Storage Configuration Data) • Manual <p>BIOS can automatically configure all the bootable 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.</p>
	IRQ Resources <ul style="list-style-type: none"> • IRQ-3 assigned to • IRQ-4 assigned to • IRQ-5 assigned to • IRQ-7 assigned to • IRQ-9 assigned to • IRQ-10 assigned to • IRQ-11 assigned to • IRQ-12 assigned to • IRQ-14 assigned to • IRQ-15 assigned to 	<p>When resources are controlled manually, allows you to assign each system interrupt a type, depending on the type of device using the interrupt.</p> <p>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.</p>
	Maximum Payload Size	<p>Allows you to set TLP payload size for the PCI Express Devices to (in bytes):</p> <ul style="list-style-type: none"> • 128 • 256 • 512 • 1024 • 2048 • 4096
PC Health Status	System Fan Fail Check	Disables/enables system fan detection during POST.
	Smart Fan Function	Disables/enables smart fan functionality.
	Current CPU Temperature	(view only)

Heading	Option	Description
	Current System Temperature	(view only)
	Current CPU Fan Speed	(view only)
	Current System Fan Speed	(view only)
	Vcore	(view only)
	+12V	(view only)
	VCC5	(view only)
	+3.3V	(view only)
	VBAT (V)	(view only)
	3VSB (V)	(view only)
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.
Set User Password		Allows you to establish a password to control access to the computer. (Supervisor password must be set before you can set a User password.)
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 Computer Setup options may vary depending on your specific 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 firmware can be found at <http://www.hp.com> under the Software & Driver Downloads for your specific model. Download the firmware 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 to be backed up is turned on. Connect the removable storage to the computer.
2. Boot to DOS.
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. Boot to DOS.
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.

Desktop Management



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 to be used.

A customized software image may be deployed by installing additional software applications after unbundling the preinstalled software image.

The best deployment method depends on 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 ROM Flash

The computer’s BIOS is stored in a programmable flash ROM (read only memory). By establishing a supervisor password in the Computer Setup (F10) utility, you can protect the ROM from being unintentionally updated or overwritten. This is important to ensure the operating integrity of the computer. Should you need or want to upgrade the BIOS, you may download the latest BIOS images from the HP driver and support page: <http://www.hp.com/support>.



CAUTION: For maximum ROM protection, be sure to establish a supervisor password. The supervisor password prevents unauthorized ROM upgrades.

3.2.1 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 were to occur 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 bootable removable media that automatically invokes system BIOS upgrade utilities.

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

1. Remove all removable media and turn off the power.
2. Insert a diskette containing the desired BIOS image file in the root directory. The media must be formatted using the FAT32 file system.
3. Turn on power to the system.

The failsafe Boot Block BIOS will attempt to start the system from a bootable device. If no bootable device is found, an error message will appear.
4. Remove the removable media used to upgrade the BIOS.
5. Turn the power on to restart the computer.

3.2.2 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 the desired power button setting.

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 (suspend). 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.

3.2.3 Power Management

Power Management is a feature that saves energy by shutting down certain components of the computer when they are not in use, thus saving energy without having to shut down the computer.

With Advanced Configuration and Power Interface (ACPI) enabled for Windows XP, timeouts (the period of inactivity allowed before shutting down these components) can be enabled, customized, or disabled using the operating system.

1. In Windows XP, left click on the **Start Button**, then select **Control Panel > Power Options**.
2. In the **Power Options Properties**, select the **Power Schemes** tab.
3. Select the desired power scheme settings.

Use Display Properties to establish, modify, or disable Power Management settings for the monitor. To access Display Properties, right click on the **Windows Desktop**, then choose **Properties**.

3.2.4 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.

3.3 Security

3.3.1 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 supervisor 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 power-on password, even if one has been established.

3.3.2 Establishing a Supervisor Password Using Computer Setup

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 turn the computer off, then on again, and press the **F10** key again to access the utility.

3. Select **Set Supervisor Password** and follow the instructions on the screen.
4. Before exiting, click **Save and Exit Setup**.

3.3.3 Establishing a User Password Using 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, the password must also be entered 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 the **F10** key to enter Computer Setup.



If you do not press the **F10** key at the appropriate time, you must turn the computer off, then on again, and press 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 User Password** and follow the instructions on the screen.
4. Before exiting, click **Save and Exit Setup**.

Entering a User Password

To enter a user 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 prompt 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, inclining beeping tones are heard. Try again.

Entering a Supervisor Password

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 the **F10** key to enter Computer Setup.



If you do not press the **F10** key at the appropriate time, you must turn the computer off, then on again, and press 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 prompt appears on the monitor, type the supervisor password, then press the **Enter** key.



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

If you enter the password incorrectly, inclining beeping tones are heard. Try again.

Changing a User or Supervisor Password

1. Turn on or restart the computer. If you are in Windows, click **Start > Shut Down > Restart**.
2. To change the user password, go to step 3.

To change the supervisor password, as soon as the computer is turned on, press the **F10** key to enter Computer Setup.



If you do not press the **F10** key at the appropriate time, you must turn the computer off, then on again, and press 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 prompt appears, type your current password, then select the desired **Set...Password** item from the **F10** headings. Then, enter the new password twice. Follow the instructions on the screen.

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

4. Press the **Enter** key.

The new password takes effect the next time you turn on the computer.

Deleting a User or Supervisor Password

1. Turn on or restart the computer. If you are in Windows, click **Start > Shut Down > Restart**. To delete the supervisor password, run **Computer Setup**.
2. To delete the password, as soon as the computer is turned on, press the **F10** key to enter Computer Setup.



If you do not press the **F10** key at the appropriate time, you must turn the computer off, then on again, and press 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 prompt appears, type your current password
current password
4. Press the **Enter** key then, select either **Set User** or **Set Supervisor Password** in the **F10** menu as described in the previous sections.
5. When the prompt appears on the monitor press the **Enter** key twice. A message will appear advising you that the password has been disabled.

Clearing Passwords

If you forget your password, you cannot access the computer. To clear the password:

1. Turn off and unplug the computer.
2. Remove the access panel.
3. Move the CMOS jumper from pins 2-3 to pins 1-2 and keep it there for at least 5 seconds.
4. Reset the jumper to pins 1-2 and replace the access panel.
5. Restart the computer.

3.3.4 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.

Serial and Parallel ATA Drive Guidelines and Features



Serial ATA = SATA
Parallel ATA = PATA

HP does not support the use of a PATA (IDE) hard drive on this model of computer.

4.1 SATA Hard Drives

Serial ATA Hard Drive Characteristics	
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	5V, 12 V
Jumpers for configuring drive	N/A
Data transfer rate	1.5 Gb/s



When attaching the SATA cable to the system board always connect the primary hard drive to SATA 0.

4.2 SATA Hard Drive Cables

4.2.1 SATA Data Cable

Always use an HP approved SATA 3.0 Gb/s cable as it is fully backwards compatible with the SATA 1.5 Gb/s drives.

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.

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 3 grounds, and 4 transmit/receive pins.

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

4.2.2 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	Ground	
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			

4.3 PATA Device Information

This information applies to optical drives in a computer having one or two SATA drive controllers and a single PATA drive controller.

PATA hard drives are not supported on these models.

4.4 PATA Cables

4.4.1 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	DLOW	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		

4.4.2 PATA Power Cable

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

4.5 PATA Drive Installation Guidelines

The computer system boards for these products have one Parallel ATA (PATA) channel with a single connector. The channel can have up to two devices attached to it. All drives are connected to the 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 ATA drives.

Each 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.

4.5.1 PATA Device Classes

In order 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
Not 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.
- Drives installed in the Device 0 position receive the greatest possible bandwidth.

4.6 SATA 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.

4.7 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 may be properly accessed by the operating system. A single hard drive may therefore 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

4.8 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

4.8.1 Legacy Mode

The Legacy mode is used to access devices attached to an embedded ATA controller. Each channel of the controller requires two fixed I/O address ranges and an IRQ.

■ Primary Channel

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

■ Secondary Channel

- ❑ Command block: 170h - 177h
- ❑ Control block: 376h
- ❑ IRQ: 15

4.8.2 Native Mode

The native mode is used to access devices attached to additional ATA controllers and is not supported by many legacy operating systems. Addresses are assigned by PCI Plug-n-Play BIOS and the IRQ is shared with multiple controllers. Base Address Registers for the Command and Control Block are found in the PCI Configuration Space.

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

Identifying the Chassis, Routine Care, and Disassembly Preparation

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



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

5.1 Chassis Designations

5.1.1 Microtower (MT)



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 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



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, a strap must be worn snug against bare skin. The ground cord must be connected and fit snugly into the banana plug connector on the grounding mat or workstation.
- **Heel straps/Toe straps/Boot straps** can be used at standing workstations and are compatible with most types of shoes or boots. On conductive floors or dissipative floor mats, use them on both feet with a 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 field service tools, such as cutters, screwdrivers, and vacuums, that are conductive.

5.2.5 Recommended Materials and Equipment

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

- Antistatic tape
- Antistatic smocks, aprons, or sleeve protectors
- Conductive bins and other assembly or soldering aids
- Conductive foam
- Conductive tabletop workstations with ground cord of one-megohm \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 +/- 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 Routine Care

5.3.1 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.

5.3.2 Cleaning the Computer Case

Follow all safety precautions in [Section 5.3.1, “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.

5.3.3 Cleaning the Keyboard

Follow all safety precautions in [Section 5.3.1, “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 5.3.2, “Cleaning the Computer Case.”](#)

When cleaning debris from under the keys, review all rules in [Section 5.3.1, “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.

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



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

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

5.3.4 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 5.3.2, “Cleaning the Computer Case.”](#)

5.3.5 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, clean the rotating encoder shafts, and wipe the ball with a clean, dry cloth before reassembly.
- To clean the mouse body, follow the procedures in [Section 5.3.2, “Cleaning the Computer Case.”](#)

5.4 Service Considerations

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

5.4.1 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 on when the computer is "ON" or in "Suspend to RAM" modes.

The cooling fan is off when the computer is in "Dormant", Suspend to Disk", or "Soft Off" modes.

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

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

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

5.4.3 Screws

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



Metric screws have a black finish.

U.S. (Unified Standard) screws have a silver finish and are only used on hard drives.



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

5.4.4 Cables and Connectors

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



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

5.4.5 Hard Drives

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

- If a drive must be mailed, place the drive in an HP approved hard drive shipping container or other suitable protective packaging and label the package “Fragile: Handle With Care.”
- Do not remove hard drives from the shipping package for storage. Keep hard drives in their protective packaging until they are actually mounted in the CPU.
- Avoid dropping drives from any height onto any surface.
- If you are inserting or removing a hard drive, turn off the computer. Do not remove a hard drive while the computer is on or in standby mode.
- Before handling a drive, ensure that you are discharged of static electricity. While handling a drive, avoid touching the connector. For more information about preventing electrostatic damage, refer to [Section 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.

5.4.6 Lithium Coin Cell Battery

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

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



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

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. Close any open software applications.
2. Exit the operating system.
3. Remove any diskette or compact disc from the computer.
4. 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. The power cord should always be disconnected before servicing a unit.

5. Disconnect the power cord from the electrical outlet and then from the computer.
6. 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.

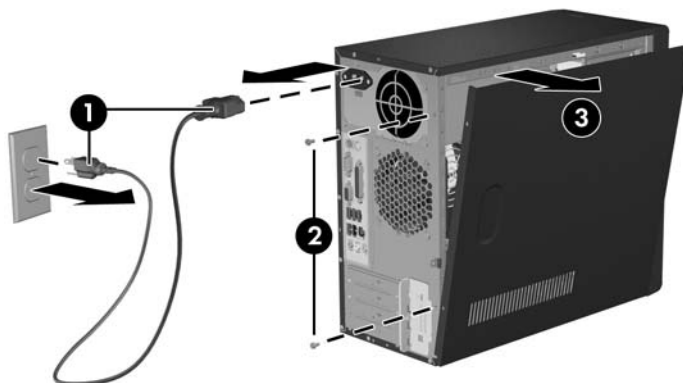
6.2 Access Panel

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.

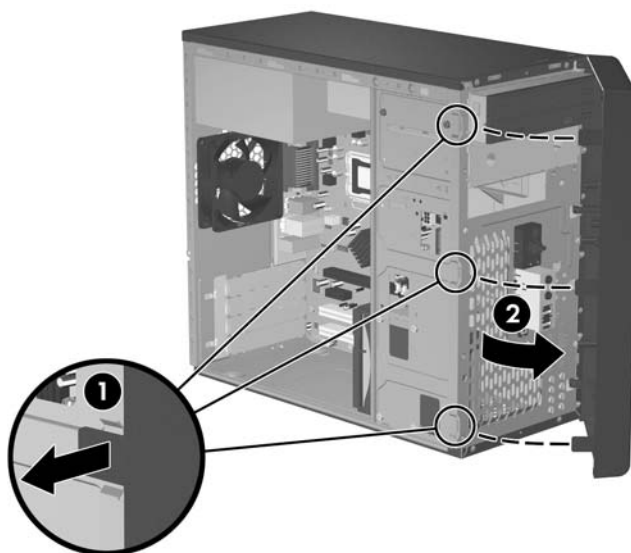
2. Disconnect the power cord from the computer and from the power source ❶.
3. Remove the two screws that secure the access panel to the computer chassis ❷.
4. Slide the access panel back about 6 mm (1/4 inch), then rotate the top of the panel away from the chassis (pivot on the bottom) and lift it off the unit ❸.



To replace the access panel, reverse the removal steps.

6.3 Front Bezel

1. Prepare the computer for disassembly ([Section 6.1, “Preparation for Disassembly”](#)).
2. Remove the access panel ([Section 6.2, “Access Panel”](#)).
3. Pull outward on all three tabs on the left side of the bezel ❶ then rotate the bezel off the chassis ❷, beginning with the left side then the right side.



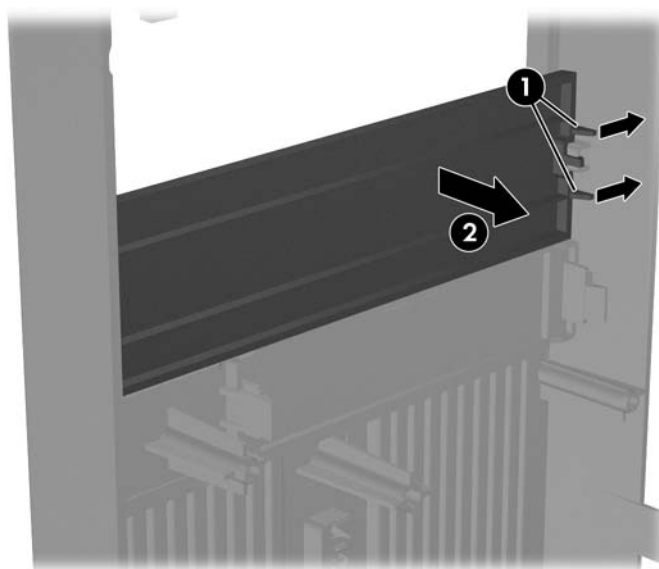
To reinstall the front bezel, reverse the removal procedure.

6.4 Front Drive Bezels

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

6.4.1 5.25" Drive Bezel Blank

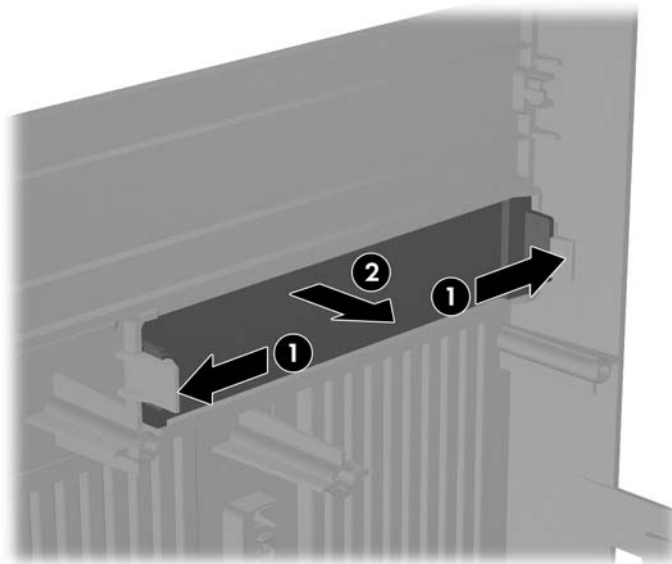
While facing the inside of the front bezel, press the two retaining tabs on the right towards the outer edge of the bezel ❶ and pull the bezel blank inwards to remove it ❷.



To install a bezel blank, slide the left side of the blank into the two retainer slots on the left side of the front bezel then snap the right side of the blank into place.

6.4.2 Removing a 3.5" Drive Bezel Blank

While facing the inside of the front bezel, press outward on the retaining tabs on each side of the bezel blank ❶ and pull the bezel blank inwards to remove it ❷.





To install a 3.5" bezel blank, press the blank inward from the inside of the front bezel so that it snaps into place.


6.5 Memory

For more information on the memory in this series of computers, refer to [Appendix D, “Memory.”](#)


6.5.1 Installing 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.

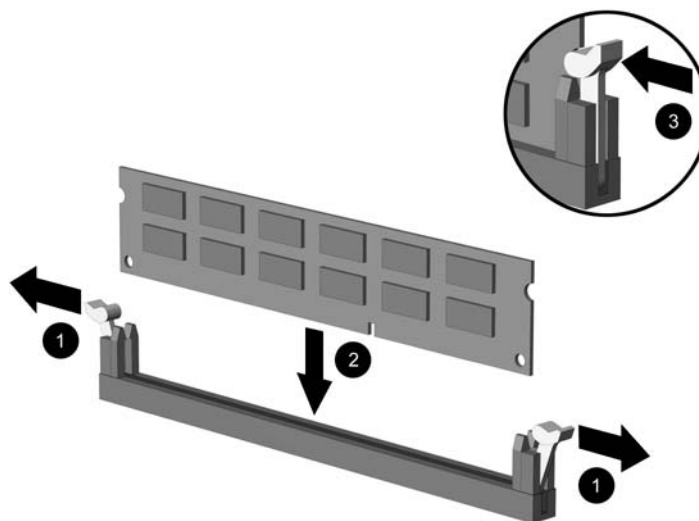
 **CAUTION:** Static electricity can damage the electronic components of the computer or optional cards. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object. Refer to Chapter 5 for more information.


 **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 6.1, “Preparation for Disassembly”](#)).
2. Remove the access panel ([Section 6.2, “Access Panel”](#)).

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

3. Lay the computer down on its side to make it easier to work on.
4. 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.



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

5. 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 ③.
6. Repeat steps 4 and 5 for any additional modules that you want to install.

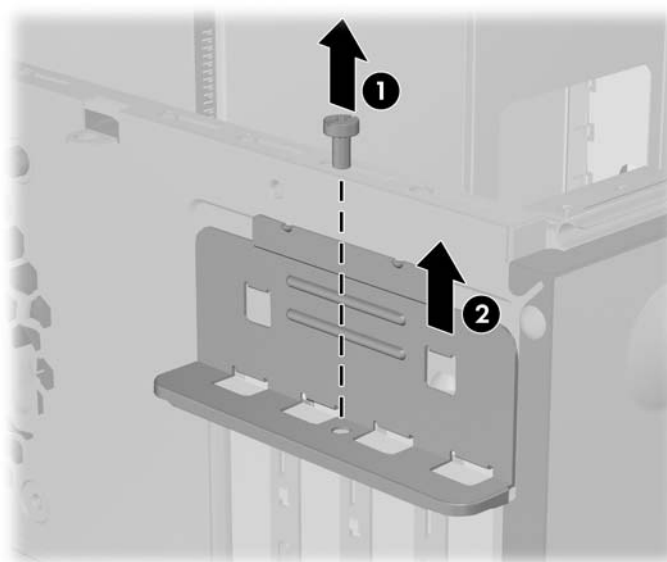
To reassemble the computer, reverse the removal procedure.

6.6 Expansion Cards

The computer has two PCI expansion slots that can accommodate expansion cards up to 17.46 cm (6.875 inches) in length, one PCIe x1 expansion slot, and one PCIe x16 expansion slot.

6.6.1 Expansion Slot Cover Lock

1. Prepare the computer for disassembly ([Section 6.1, “Preparation for Disassembly”](#)).
2. Remove the access panel ([Section 6.2, “Access Panel”](#)).
3. Lay the computer down on its side to make it easier to work on.
4. On the rear panel of the computer, remove the screw that secures the slot cover lock in place **1** then, slide the slot cover lock up and away from the slots to remove it from the computer **2**.



6.6.2 PCI/PCIe Expansion Card

To remove an expansion card continue with step 1.

To install an expansion card in an existing empty slot go to step 9.

1. Prepare the computer for disassembly ([Section 6.1, “Preparation for Disassembly”](#)).
2. Remove the access panel ([Section 6.2, “Access Panel”](#)).
3. Lay the computer down on its side to make it easier to work on.
4. Remove the slot cover lock ([Section 6.6.1, “Expansion Slot Cover Lock”](#))

If you are installing an expansion card for the first time go to step 9.

If you are replacing an existing expansion card go to step 5.

5. Disconnect any cables attached to the expansion card.
6. Hold the card at each end and carefully rock it back and forth until the connectors pull free from the socket. Be sure not to scrape the card against other components.
7. Store the card in anti-static packaging.

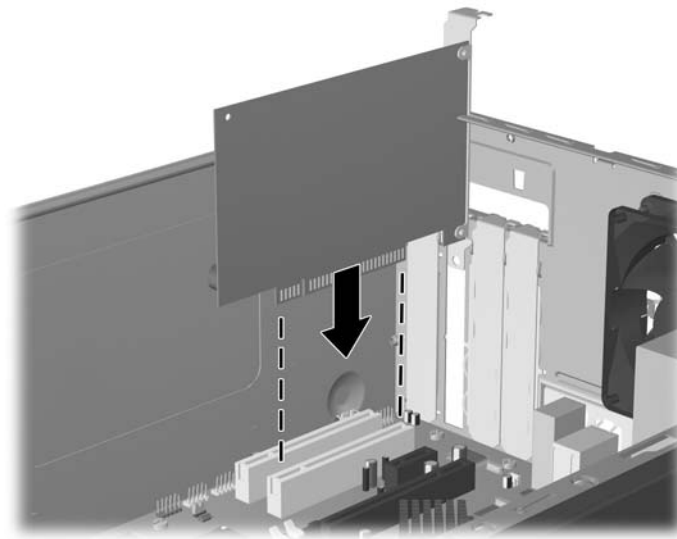
8. Install a new expansion card or an expansion slot cover to close the open slot.

To install a replacement expansion card go to step 10.

9. If you are installing an expansion card for the first time you must first remove the expansion slot cover. Use a flatblade screwdriver to pry out the metal shield on the rear panel that covers the expansion slot. Be sure you remove the appropriate shield for the expansion card you are installing.

Removable Shield	Expansion Card Type
Top shield	PCI e x16
Second shield	PCI e x1
Third shield	PCI
Bottom shield	PCI

10. With the card aligned so the mounting bracket will fit firmly against the computer backwall ❶, slide the expansion card into the expansion socket and press it firmly into place ❷.



When you install an expansion card, make sure you press firmly on the card so that the entire connector seats properly in the expansion card socket.

11. Reinstall the slot cover lock and its retaining screw.
 12. Replace the access panel.
 13. Connect external cables to the installed card, if needed.
- Reconfigure the computer, if necessary.


6.7 Cable Management

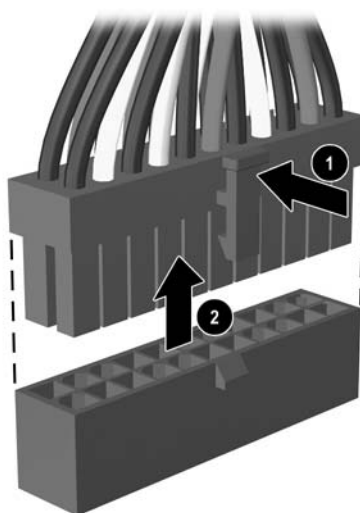
Always follow good cable management practices when working inside the computer.

- 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.
- 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 connector 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.



6.7.1 Cable Connections

Cable	To	Cable Designator
Power Supply	1st SATA Hard drive	P6
Power Supply	System board, 24-pin	P1
Power Supply	CPU power, 4-pin	P2
Power Supply	1st Optical drive	P3
Power Supply	2nd Optical drive	P4
Power Supply	2nd SATA Hard drive	P5
Power Supply	Diskette drive	P7
Cable	To	PCA Designator
Diskette drive	System board	FDD1 (Black)
1st SATA Hard drive	System board	SATA 0 (Orange)
2nd SATA Hard drive	System board	SATA 1 (Orange)
ODD Data	System board	IDE1 (Blue)
ODD Audio	System board	JCD1 (Black)
Heatsink fan	System board	CPU FAN 2 (Brown)
Secondary system fan	System board	SYSFAN1 (White)
Front power on button	System board	JFPF1 (Black)
Front I/O USB	System board	JUSB1 (Black)
Speaker	System board	AUDIO1 (White)
Front audio	System board	AUD1 (Black)

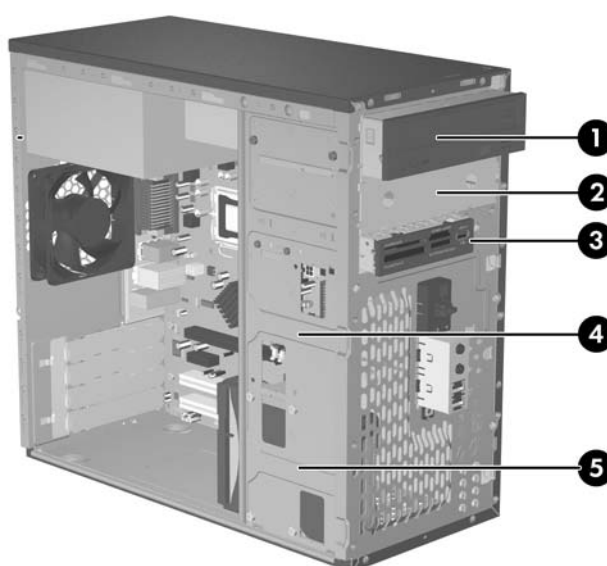
6.8 Drives

The computer supports up to four 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 Plus!* CD to load the Compaq factory-installed files.

6.8.1 Drive Positions



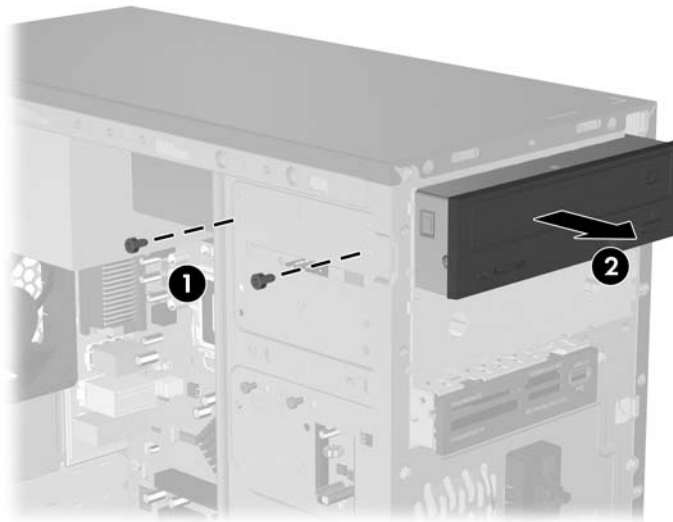
Drive Positions			
Item	Description	Item	Description
①	Optical* drive	④	Internal hard drive (secondary)
②	Optical* drive	⑤	Internal hard drive (primary)
③	External [#] 3.5"		

*An optical drive is a CD-ROM, CD-R/RW, DVD-ROM, DVD-R/RW, or CD-RW/DVD Combo drive.

[#]Optional media card reader illustrated.


6.8.2 5.25" Drive


1. Prepare the computer for disassembly ([Section 6.1, “Preparation for Disassembly”](#)).
2. Remove the access panel ([Section 6.2, “Access Panel”](#)).
3. Remove the front bezel ([Section 6.3, “Front Bezel”](#)).
4. Disconnect the power, data, and audio cables, as necessary, from the back of the drive.
5. Remove the two retainer screws that secure the drive in the drive cage **1**.
6. Slide the drive forward out of the drive cage, as shown in the illustration below **2**.



7. After the drive has been removed from the chassis, remove the two guide screws from the right side of the drive. These screws should be transferred to the new drive.

To install a drive, reverse the removal procedure.

 If you are installing a 5.25" drive for the first time into bay 2 you must first remove the metal shield that covers the bay by pressing in on the silver-colored tab on the left side of the chassis then pulling the shield out from the front of the chassis. It is not necessary to remove the drive from bay 1 when performing this operation.

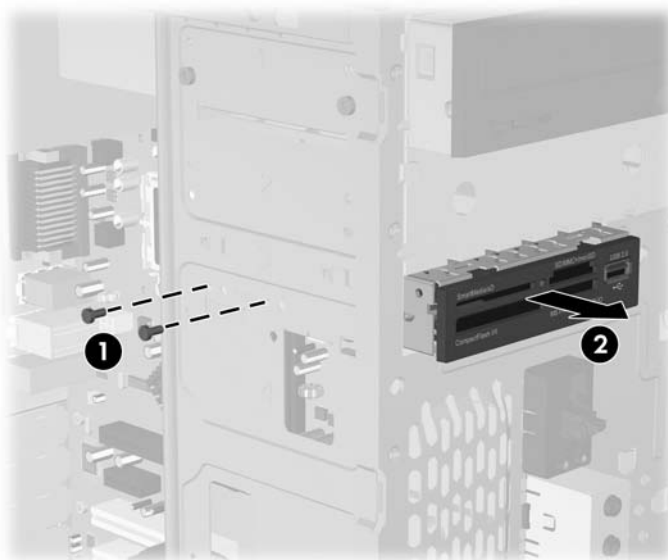
 There are a total of eight extra guide/retainer screws on the front of the chassis behind the bezel. Four have Unified Standard (U.S.) #6-32 standard threads and four have M3 metric threads. U.S. screws are used for hard drives and have a silver finish. Metric screws are used for all other drives and have a black finish. Be sure to install the appropriate guide screws into the drive.

6.8.3 3.5" Drive

If you are installing a device for the first time in the external 3.5" drive bay you will need to use a flat blade screwdriver to break out the metal shield.

The 3.5" external drive bay may be populated with a diskette drive or a media card reader. The removal procedure is the same for both devices.

1. Turn off the computer properly through the operating system and turn off any external devices.
2. Disconnect the power cord from the power outlet and the computer, and disconnect any external devices.
3. Remove the access panel. ([Section 6.2, "Access Panel"](#))
4. Remove the front bezel. ([Section 6.3, "Front Bezel"](#))
5. If the device is a media card reader, disconnect the internal USB cable from the system board. If the device is a diskette drive, disconnect the power and data cables from the back of the drive.
6. Remove the retainer screws that secure the drive to the bay ❶ then slide the drive forward and out of the bay ❷.



To install a drive, reverse the removal procedure. Be sure to install a guide screw on the front right side of a new drive. The guide screw helps secure the drive in place.

Refer to the table on the following page for proper retainer and guide screw locations.

Device	Retainer Screws	Guide Screws
Diskette Drive	2 (labeled "FDD" on chassis)	1 (front left side of drive)
Media Card Reader	2 (labeled "CR" on chassis)	none



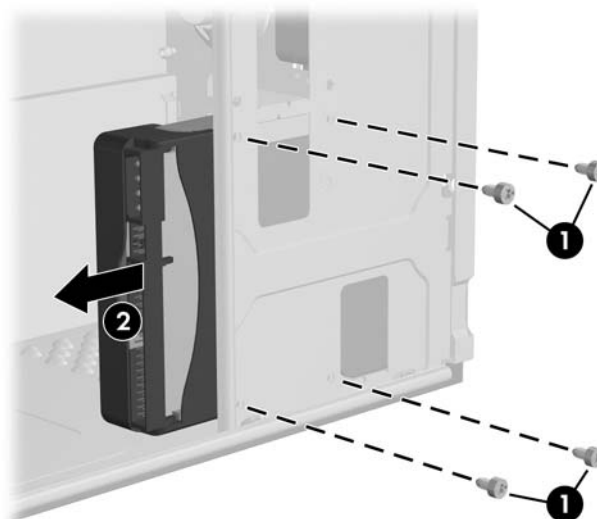
If you are installing a drive in the external 3.5" drive bay for the first time, use a flatblade screwdriver to pry out the metal shield covering the bay.



There are a total of eight extra guide/retainer screws on the front of the chassis behind the bezel. Four have Unified Standard (U.S.) #6-32 standard threads and four have M3 metric threads. U.S. screws are used for hard drives and have a silver finish. Metric screws are used for all other drives and have a black finish. Be sure to install the appropriate guide screws into the drive.

6.8.4 Removing a 3.5" Hard Drive

1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the access panel (Section 6.2, “Access Panel”).
3. Remove the front bezel (Section 6.3, “Front Bezel”).
4. Disconnect the power, and data cables from the back of the drive.
5. Remove the four retaining screws that secure the drive in the drive cage ❶.
6. Slide the drive out of the rear of the drive bay ❷.



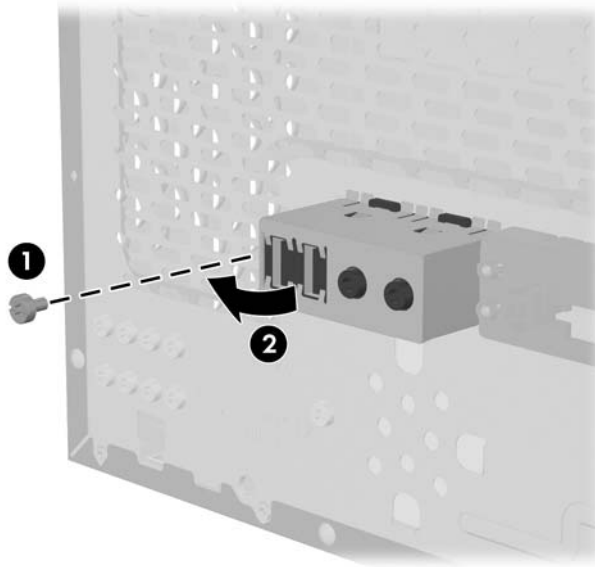
To replace the hard drive, reverse the removal procedure. No guide screws are required for drives installed in the hard drive bays (bays 4 and 5).



If you replaced the primary hard drive, the *Restore Plus!* CD may be used 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 CD. When the restore process has been completed, reinstall any personal files that were backed up before replacing the hard drive.

6.9 Front I/O Panel Housing Assembly

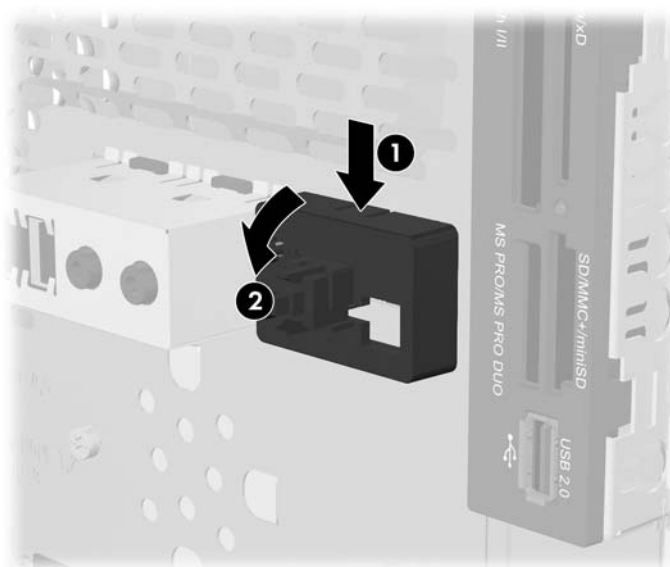
1. Prepare the computer for disassembly ([Section 6.1, “Preparation for Disassembly”](#)).
2. Remove the access panel and rotate the computer so the system board is parallel to the table to make it easier to work on ([Section 6.1, “Preparation for Disassembly”](#)).
3. Disconnect two attaching cables from the system board: the power switch/LED cable, and the front USB cable.
4. Free the two cables from the cable tie that is attached to the chassis.
5. Remove the screw ❶ that secures the housing to the chassis and then rotate the housing away from the chassis and pull the assembly out of the chassis ❷.



To install the housing assembly, reverse the removal procedures.

6.9.1 Power Switch Assembly

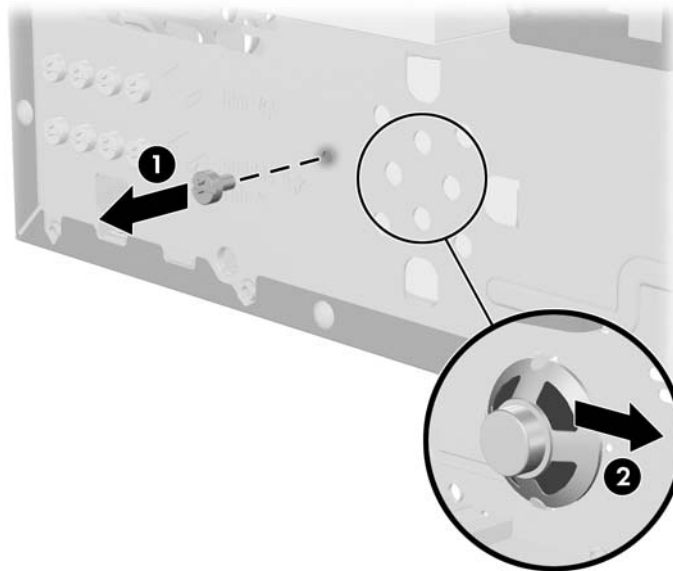
1. Prepare the computer for disassembly ([Section 6.1, “Preparation for Disassembly”](#)).
2. Remove the access panel and rotate the computer so the system board is parallel to the table to make it easier to work on ([Section 6.2, “Access Panel”](#)).
3. Disconnect the braided Power/LED cables from the system board.
4. Free the braided cables from the cable tie that is attached to the chassis.
5. Squeeze the top of the switch holder ❶, rotate the switch, and remove it from the chassis.



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

6.10 Speaker

1. Prepare the computer for disassembly ([Section 6.1, “Preparation for Disassembly”](#)).
2. Remove the access panel ([Section 6.2, “Access Panel”](#)).
3. Remove the front bezel ([Section 6.3, “Front Bezel”](#)).
4. Disconnect the speaker cable from the system board.
5. Free the cable from the cable tie that is attached to the chassis.
6. Remove the screw that secures the speaker to the inside of the chassis **1** then, remove the speaker **2** by sliding it out of the retaining clips

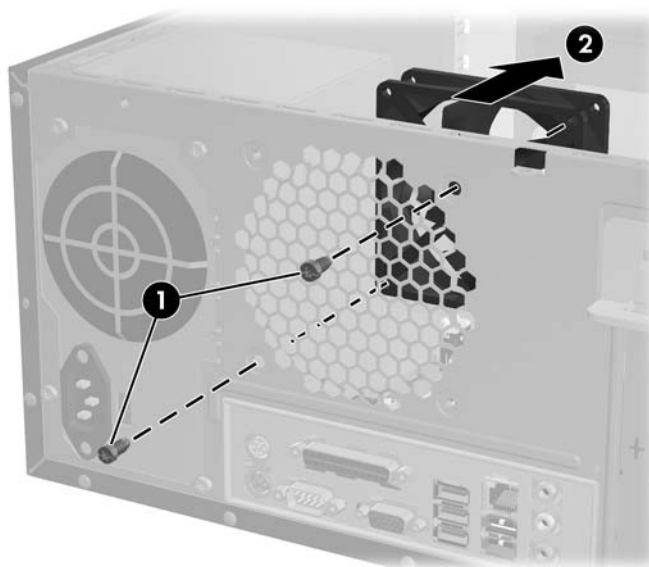


To install the speaker, reverse the removal procedure.

When installing the speaker, make sure the speaker wires point towards the speaker retaining screw.

6.11 System Fan

1. Prepare the computer for disassembly ([Section 6.1, “Preparation for Disassembly”](#)).
2. Remove the access panel ([Section 6.2, “Access Panel”](#)).
3. Disconnect the cable that connects the system fan to the system board.
4. Remove the screws that secure the fan to the chassis and remove the fan.



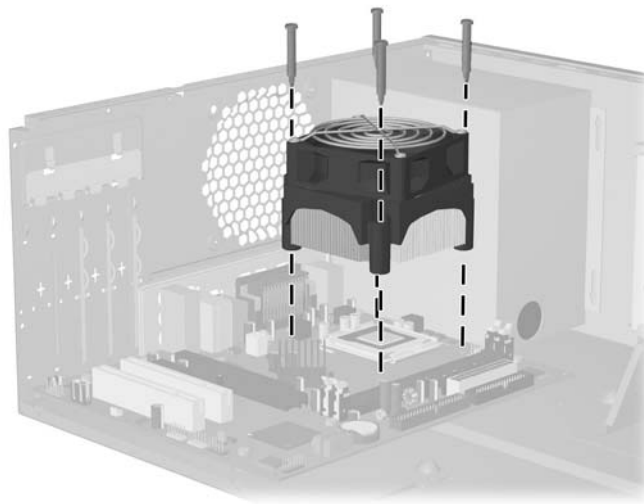
To install the fan, reverse the removal procedures.



When installing the fan, make sure the wires leading from the fan are located near the P2 4-pin power connector on the system board.

6.12 Heatsink

1. Prepare the computer for disassembly ([Section 6.1, “Preparation for Disassembly”](#)).
2. Remove the access panel ([Section 6.2, “Access Panel”](#)).
3. Lay the computer down on its side to make it easier to work on.
4. Disconnect the heatsink control cable from the system board.
5. Loosen the four captive screws that secure the heatsink to the system board.
6. Lift the heatsink from atop the processor and set it on its side to keep from contaminating the work area with thermal grease.



When reinstalling an existing heatsink, make sure that its bottom has been cleaned with an alcohol wipe and fresh thermal grease has been applied to the top of the processor. New heatsinks come from the factory with fresh thermal grease already applied.


Position the heatsink so that fan wiring is closest to the power supply. Check to ensure that the heatsink mounting lugs do not rest on any electrical components before tightening the retaining screws.




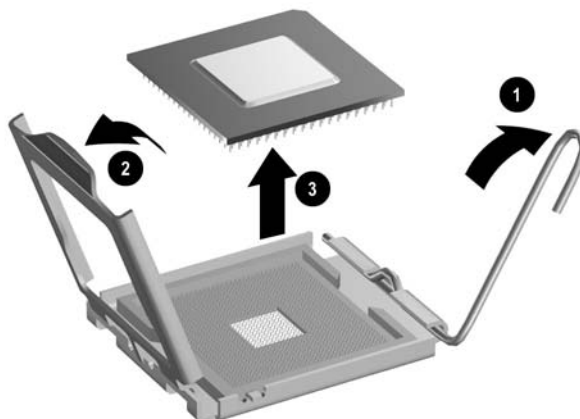
CAUTION: Heatsink retaining screws should be tightened in diagonally opposite pairs (as in an X) to evenly seat the heatsink to the processor. This is especially important as the pins on the socket are very fragile and any damage to them may require replacing the system board.

6.13 Processor

1. Prepare the computer for disassembly ([Section 6.1, “Preparation for Disassembly”](#)).
2. Remove the access panel cover ([Section 6.2, “Access Panel”](#)).
3. Disconnect the heatsink control cable from the system board and remove the heatsink. ([Section 6.12, “Heatsink”](#))
4. Rotate the processor locking lever to its full open position ❶.
5. Raise and rotate the microprocessor retainer to its full open position ❷.
6. Carefully lift the processor from the socket ❸.

 **CAUTION:** Do NOT handle the pins in the processor socket. These pins are very fragile and handling them could cause irreparable damage. Once pins are damaged it may be necessary to replace the system board.

 **CAUTION:** The heatsink must be installed within 24 hours of installing the processor to prevent damage to the processor's solder connections.



To install a new processor:

1. Place the processor in its socket and close the retainer.
2. Secure the locking lever.

If reusing the existing heatsink, go to step 3.

If using a new heatsink, go to step 6.

3. If reusing the existing heatsink, clean the bottom of the heatsink with the alcohol pad provided in the spares kit.
4. Apply the thermal grease provided in the spares kit to the top of the processor and install the heatsink atop the processor.

5. Go to step 7.
6. If using a new heatsink, remove the protective covering from the bottom of the heatsink and place it in position atop the processor.
7. Secure the heatsink to the system board and system board tray with the 4 captive screws and attach the heatsink control cable to the system board.



CAUTION: Heatsink retaining screws should be tightened in diagonally opposite pairs (as in an X) to evenly seat the heatsink on the processor. This is especially important as the pins on the socket are very fragile and any damage to them may require replacing the system board.



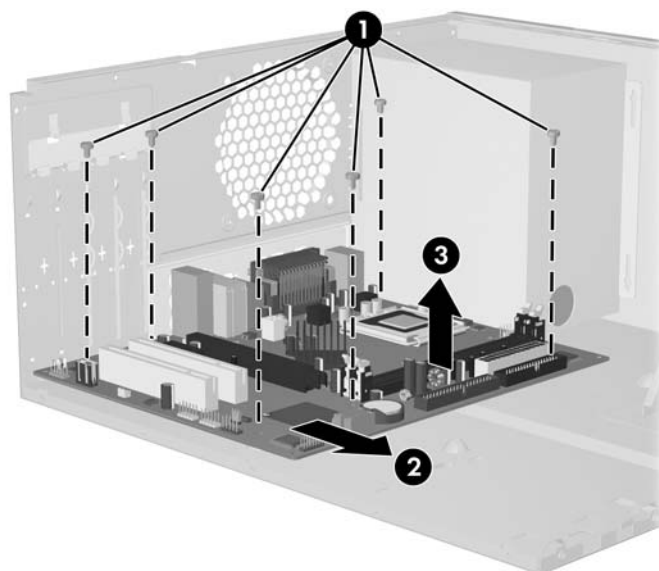
After installing a new processor onto the system board, always update the system ROM to ensure that the latest version of the BIOS is being used on the computer. The latest system ROM BIOS can be found on the Web at: <http://h18000.www1.hp.com/support/files>.

6.14 System Board

1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the access panel (Section 6.2, “Access Panel”).
3. Remove the front bezel (Section 6.3, “Front Bezel”).
4. Disconnect the power, and data cables from the back of all installed drives.
5. Disconnect all cables from the system board.
6. Remove the heatsink from the system board (Section 6.12, “Heatsink”).
7. Remove the 6 screws that secure the system board to the chassis ❶.
8. Slide the system board towards the front of the chassis ❷ then remove it ❸.



The system board in the computer may look slightly different from the one shown here.



To install the system board, reverse the removal procedure.



After installing a new system board, always update the system ROM to ensure that the latest version of the BIOS is being used on the computer. The latest system ROM BIOS can be found on the Web at: <http://h18000.www1.hp.com/support/files>.

6.15 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.



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 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 right access panel ([Section 6.2, “Access Panel”](#)).

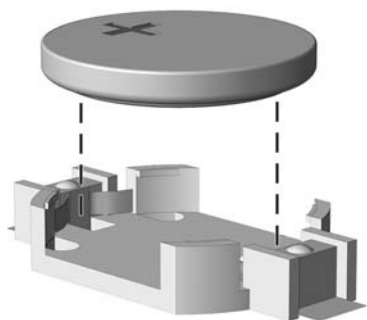


It may be necessary to remove an expansion card to gain access to the battery.

3. Locate the battery and battery holder on the system board.

6.15.1 Type 1 Battery Holder

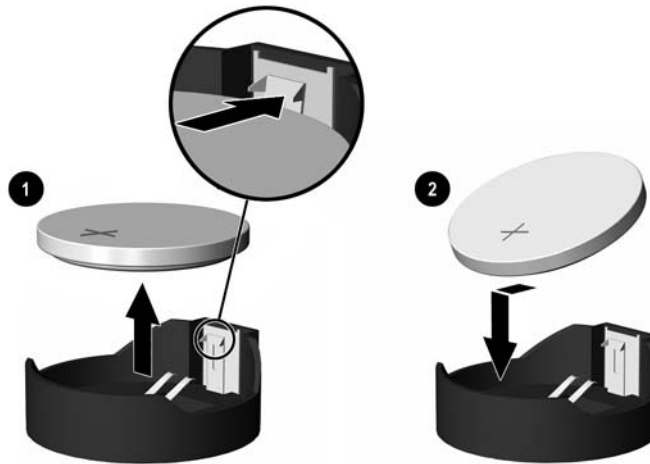
1. Lift the battery out of its holder.



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 access panel.
5. Plug in the computer and turn on power to the computer.
6. Reset the date and time, your passwords, and any special system setups, using Computer Setup. Refer to the *Computer Setup (F10) Utility Guide*.

6.15.2 Type 2 Battery Holder

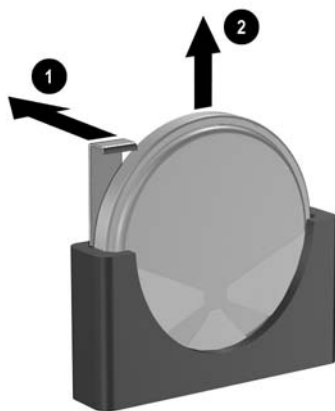
1. To release the battery from its holder, squeeze the metal clamp that extends above one edge of the battery. When the battery pops up, lift it out ❶.
2. To insert the new battery, slide one edge of the replacement battery under the holder's lip with the positive side up ❷. Push the other edge down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



3. Replace the computer access panel.
4. Plug in the computer and turn on power to the computer.
5. Reset the date and time, your passwords, and any special system setups, using Computer Setup. Refer to the *Computer Setup (F10) Utility Guide*.

6.15.3 Type 3 Battery Holder

1. Pull back on the clip ❶ that holds the battery in place, then remove the battery ❷.
2. Insert the new battery and position the clip back in place.



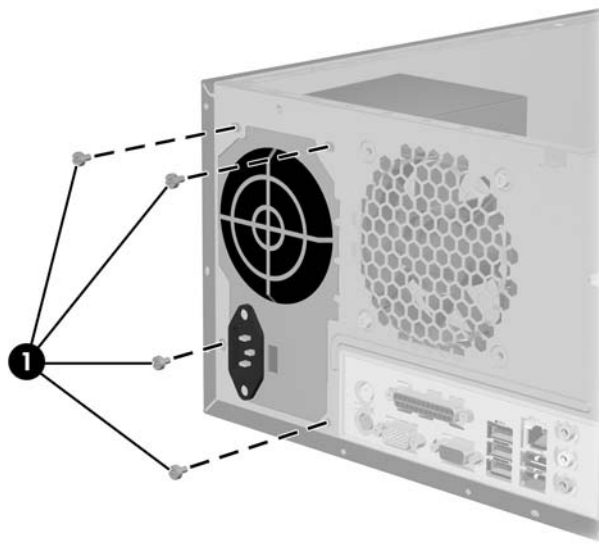
3. Replace the computer access panel.
4. Plug in the computer and turn on power to the computer.
5. Reset the date and time, your passwords, and any special system setups, using Computer Setup. Refer to the *Computer Setup (F10) Utility Guide*.

6.16 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 the power cord should be disconnected 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 ([Section 6.2, “Access Panel”](#)).
3. Disconnect all power cables from the mass storage devices and from the system board.
4. Remove the 4 screws ❶ that secure the power supply to the chassis.
5. Slide the power supply toward the front of the computer ❷, then lift it out of the computer.


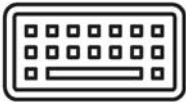


To install the power supply, reverse the removal procedure.


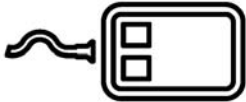
Connector Pin Assignments

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.


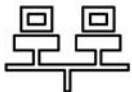
Enhanced Keyboard

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

Mouse

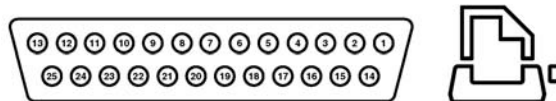
Connector and Icon	Pin	Signal
 	1	Data
	2	Unused
	3	Ground
	4	+5 VDC
	5	Clock
	6	Unused

Ethernet 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

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)

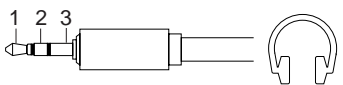
USB

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

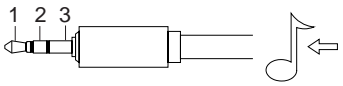
Microphone

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

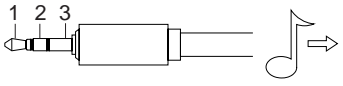
Headphone

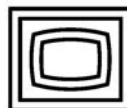
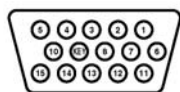
Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_Left
	2 (Ring)	Audio_Right
	3 (Shield)	Ground

Line-In Audio

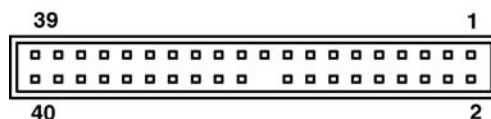
Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_In_Left
	2 (Ring)	Audio_In_Right
	3 (Shield)	Ground

Line-Out Audio

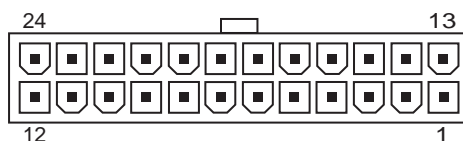
Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_Out_Left
	2 (Ring)	Audio_Out_Right
	3 (Shield)	Ground

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 DC (fused)	14	Vertical Sync
5	Ground	10	Ground	15	DDC Serial Clock

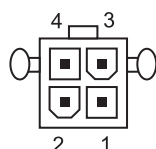
ATA/ATAPI (IDE) Standard Drive Cable**Connector**

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	Aux GND	13	+3.3 V	19	GND
2	+3.3 V	8	PWROK	14	-12 V	20	NI
3	GND	9	+5 Vaux	15	GND	21	+5 V
4	+5 V	10	+12 V	16	PSON	22	+5 V
5	GND	11	+12 V	17	GND	23	+5V
6	+5 V	12	+3.3 V	18	GND/(R/S)	24	GND

*Open for d300 series computers; -5V for all others

4-Pin Power (for CPU)**Connector and Icon****Pin****Signal**

1	GND
2	GND
3	+12 V
4	+12 V

Power Cord Set Requirements

The voltage select switch feature on the computer permits it to operate from any line voltage between 100-120 or 220-240 volts AC.

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

Power cord sets for use in other countries must meet the requirements of the country where you use the computer. For more information on power cord set requirements, contact your authorized HP dealer, reseller, or service provider.

General Requirements

The requirements listed below are applicable to all countries:

1. The length of the power cord set must be at least 1.8 m (6.00 feet) and a maximum of 3.0 m (9.75 feet.)
2. All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country where the power cord set will be used.
3. The power cord set must have a minimum current capacity of 10A and a nominal voltage rating of 125 or 250 volts AC, as required by each country's power system.
4. The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector, for mating with appliance inlet on the Switch Box.

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, 1.0 mm² 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 SJT 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, 1.0 mm² conductor size. Wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7A, 125V) configuration.

POST Error Messages

An error message results if the Power-On Self-Test (POST) encounters a problem. This test runs when the system is turned on, checking assemblies within the computer and reporting any errors found.

Not all computers use all of the codes listed.

Recommended Actions are to be taken in incremental steps. Perform one step at a time and continue only if the action does not cure the problem.

POST Error Messages

Screen Message	Probable Cause	Recommended Action
Gate 20 Error	BIOS cannot access memory over 1MB.	Reseat memory modules. Replace memory modules.
Parity Error	Fatal memory parity error. System halts after displaying this message.	Reseat memory modules. Replace memory modules.
Boot Failure...	BIOS could not boot from the device. This message is usually followed by information about the specific device.	Reseat the device data and power cables. Replace the device data cable. Replace the device. Replace the system board.
Invalid Boot Diskette	Diskette in drive A: not bootable.	Replace the diskette.
Drive Not Ready	BIOS could not configure drive A: during POST.	Reseat the device data and power cables. Replace the device data cable. Replace the device. Replace the system board.
Drive A: Error	BIOS could not configure drive A: during POST.	Reseat the device data and power cables. Replace the device data cable. Replace the device. Replace the system board.
Insert BOOT Diskette In A:	BIOS could not find a bootable diskette in drive A:.	Replace the diskette.

POST Error Messages

Screen Message	Probable Cause	Recommended Action
Primary Master/Slave Hard Disk Error	Primary Master/Slave hard drive could not be initialized by the BIOS.	Reseat the device data and power cables. Replace the device data cable. Replace the device. Replace the system board.
Secondary Master/ Slave Hard Disk Error	Secondary Master/Slave hard drive could not be initialized by the BIOS.	Reseat the device data and power cables. Replace the device data cable. Replace the device. Replace the system board.
Primary Master/Slave Drive — ATAPI Incompatible	Device configured as a Primary/ Master/Slave failed an ATAPI compatibility test.	Replace the device. Replace the system board.
Secondary Master/ Slave Drive — ATAPI Incompatible	Device configured as a Secondary/ Master/ Slave failed an ATAPI compatibility test.	Replace the device. Replace the system board.
S.M.A.R.T. Capable but Command Failed. S.M.A.R.T. Command Failed	BIOS unable to send a S.M.A.R.T. message to the device.	Backup the data on the hard drive. Replace the hard drive.
S.M.A.R.T. Status Bad, Backup and replace. S.M.A.R.T. Capable and Status Bad.	S.M.A.R.T. capable hard drive detects an imminent failure.	Backup the data on the hard drive, then replace the hard drive.
DMA-1 Error DMA-2 Error	Error when initializing secondary DMA controller.	Reconnect the cables on the peripheral device. Replace the data cable. Replace the device. Replace the system board.
DMA Controller Error	POST error while trying to initialize the DMA controller.	Reconnect the cables on the peripheral device. Replace the data cable. Replace the device. Replace the system board.
Checking NVRAM...Update Failed	BIOS could not write to the NVRAM block.	Change system board jumper on JP2 to pins 2-3 (Unlock), then flash the system BIOS. Reset the jumper to pins 1-2 (Lock). Replace the system board.

POST Error Messages

Screen Message	Probable Cause	Recommended Action
Microcode Error	BIOS could not find or load the CPU microcode update to the CPU.	Ensure the system board BIOS supports the processor. Change system board jumper on JP2 to pins 2-3 (Unlock), then flash the system BIOS. Reset the jumper to pins 1-2 (Lock).
NVRAM Checksum Bad, NVRAM Cleared	Error detected while validating NVRAM data.	Restart the computer, use the F10 Key to access Computer Setup. Select Load Default Settings > Save and Exit .
NVRAM Ignored	NVRAM data used to store plug and play data was not used for system configuration in POST.	Restart the computer, use the F10 Key to access Computer Setup. Select Load Default Settings > Save and Exit . Change system board jumper on JP2 to pins 2-3 (Unlock), then flash the system BIOS. Reset the jumper to pins 1-2 (Lock). Replace the system board.
NVRAM Bad	NVRAM data used to store plug and play data was not used for system configuration in POST.	Restart the computer, use the F10 Key to access Computer Setup. Select Load Default Settings > Save and Exit . Change system board jumper on JP2 to pins 2-3 (Unlock), then flash the system BIOS. Reset the jumper to pins 1-2 (Lock). Replace the system board.
Timer Error	Error found while programming the count register of channel 2 of the 8254 timer.	Replace the system board.
Interrupt Controller-1 Error	BIOS POST could not initialize the Master/Slave Interrupt controller.	Replace the system board.
CMOS Date/Time Not Set	CMOS Date and/or Time is invalid.	Set the date and time under Control Panel or in F10 Setup depending on the operating system. If problem persists, replace the RTC battery.
CMOS Battery Failed	CMOS battery failed.	Replace the RTC battery.
CMOS Battery Low	CMOS battery weak.	Replace the RTC battery.
CMOS Settings Wrong	Invalid CMOS settings.	Restart the computer, use the F10 Key to access Computer Setup. Select Load Default Settings > Save and Exit .
CMOS Checksum Bad	CMOS contents failed the Checksum check.	Restart the computer, use the F10 Key to access Computer Setup. Select Load Default Settings > Save and Exit .

POST Error Messages

Screen Message	Probable Cause	Recommended Action
CMOS Checksum Error. Defaults Loaded	CMOS corrupt or bad RTC battery.	Press F1 to save defaults. Replace RTC battery. Download the current ROM BIOS from the HP Web and reflash the ROM BIOS.
ROM BIOS Checksum Error - system halted	ROM BIOS may be corrupted.	Download the most current ROM BIOS from the Web and reflash the system ROM.
Keyboard/Interface Error	Keyboard controller failure.	Reconnect keyboard with computer turned off. Check connector for bent or missing pins. Ensure that none of the keys are depressed. Replace keyboard. Replace system board.
Keyboard Error or No Keyboard Present	Keyboard not present or system not responding when keyboard controller is initialized.	Reconnect keyboard with computer turned off. Check connector for bent or missing pins. Ensure that none of the keys are depressed. Replace keyboard. Replace system board.
Hard Disk Install Failure	Cannot find or initialize the hard drive.	Check Computer Setup (F10 Setup) for presence of hard drive. Check drive cable connections. Replace hard drive.
Memory Test Failure	If POST detects an error during memory testing, additional information appears about the type and location of the memory error.	Run Computer Setup (F10 Setup) or Windows utilities. Ensure memory modules are installed correctly. Verify proper memory module type. Remove and replace memory modules one at a time to isolate faulty module. Replace the faulty memory module. If error persists after replacing memory module, replace the system board.

POST Error Messages

Screen Message	Probable Cause	Recommended Action
Non-System Disk or Disk Error	BIOS unable to find a suitable boot device.	Verify that the device booting from is bootable. Replace as needed.
Warning: CPU Fan Has Failed. For Thermal Protection, System will be shut down. A 3 second long beep will be heard before the system will shut down.	CPU fan weak or not active.	<p>Ensure that the computer air vents are not blocked and the chassis cooling fan is running.</p> <p>Open hood, press power button, and see if the chassis fan spins. If the fan is not spinning, make sure the fan's cable is plugged onto the system board header. Ensure the fan is fully/properly installed.</p> <p>If fan is plugged in but is not spinning then, replace chassis fan.</p> <p>Replace the chassis fan.</p>
Warning: Processor Fan Has Failed. For Thermal Protection, System will be shut down. A 3 second long beep will be heard before the system will shut down.	Processor fan weak or not active.	<p>Ensure that the computer air vents are not blocked and the processor cooling fan is running.</p> <p>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.</p> <p>If fan is plugged in and seated properly, but is not spinning, then replace processor fan/heatsink assembly.</p> <p>Contact an authorized reseller or service provider.</p>

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.

POST 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.	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.
Power LED flashes every 4 seconds. This continues until the issue has been resolved.	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.	Ensure that the computer air vents are not blocked and the processor cooling fan is running. 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. If fan is plugged in but is not spinning, then replace processor fan. Reseat processor heatsink and verify that the fan assembly is properly attached. Contact an authorized reseller or service provider.
Power LED flashes five times, once every second, followed by a two second pause. LEDs continue until problem is solved.	None	Pre-video memory error.	Reseat DIMMs. Power on the system. Replace DIMMs one at a time to isolate the faulty module. Replace third-party memory with HP memory. Replace the system board.

POST Diagnostic Front Panel LEDs and Audible Codes (Continued)

Activity	Beeps	Possible Cause	Recommended Action
Power LED flashes six times, once every second, followed by a two second pause. LEDs continue until problem is solved.	None	Pre-video graphics error.	For systems with a graphics card: Reseat the graphics card. Power on the system. Replace the graphics card. Replace the system board. For systems with integrated graphics, replace the system board.
Power LED flashes eight times, once every second, followed by a two second pause. LEDs continue until problem is solved.	None	Invalid ROM based on bad checksum.	Reflash the ROM with the latest BIOS image. See the "ROM Flash" section of the <i>Desktop Management Guide</i> on the <i>Documentation and Diagnostics</i> CD. Replace the system board.
System does not power on and LEDs are not flashing.	None	System unable to power on.	Press and hold the power button for less than 4 seconds. If the hard drive LED turns green, then: 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. Remove the expansion cards one at a time until the LED light on the system board turns on. Replace the system board. OR Press and hold the power button for less than 4 seconds. If the hard drive LED does not turn on green then: Check that the unit is plugged into a working AC outlet. Open hood and check that the power button harness is properly connected to the system board. Check that both power supply cables are properly connected to the system board. Check to see if the LED light on the system board is turned on. If it is turned on, then replace the power button harness. If the LED light on the system board is not turned on, then replace the power supply. Replace the system board.

Memory

Computers equipped with Intel-based processors come with double data rate synchronous dynamic random access memory (DDR2-SDRAM) dual inline memory modules (DIMMs).

The memory sockets on the system board can be populated with up to two industry-standard DIMMs. These memory module slots are populated with at least one pre installed memory module. To achieve the maximum memory support, you can populate the system board with up to 2GB of memory configured in a high-performing dual channel mode.

For proper system operation, the computer supports DDR2-SDRAM DIMMs. The DIMMs must be industry-standard 240-pin, unbuffered PC2 5300 667 MHz- compliant, 1.9 volt DDR2-SDRAM DIMMs. The DDR2-SDRAM DIMMs must also:

- support CAS latency 4 (CL = 4) for PC2 5300 667 MHz
- contain the mandatory JEDEC SPD information

In addition, the computer supports:

- 256Mbit, 512Mbit, and 1 Gbit 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 maximum operational speed is determined by the slowest DIMM in the system.



The system will not start if you install unsupported DIMMs.

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 AGP adapters) installed (embedded video on select 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.
 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.		
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.
Poor performance is experienced.	Processor is hot.	<ol style="list-style-type: none"> 1. Ensure airflow to the computer is not blocked. Leave a 10.2-cm (4-inch) clearance on all vented sides of the computer and monitor to permit required airflow. 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.

Solving Minor Problems (Continued)

Problem	Cause	Possible Solution
Computer powered off automatically and the Power LED flashes every four seconds.	Processor thermal protection activated: A fan may be blocked or not turning. OR The heatsink is not properly attached to the processor.	<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.
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 3.3 V_{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 3.3 V_{aux} light on the system board is on, then replace the power button harness. 5. If the 3.3 V_{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 every four seconds.	Processor thermal protection activated: A fan may be blocked or not turning. OR The heatsink/fan assembly is not properly attached to the processor.	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.

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 button is not pushed in.	Push in drive button.
	Files on diskette are damaged.	Check the program diskettes.
	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.
	You attempted to hot plug a removable hard drive that has DriveLock security enabled. (This feature supported on select models only.)	Shut down the computer. Insert the drive into the MultiBay, if it is not already inserted. Turn on the computer.
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

Solving Diskette Problems (Continued)

Problem	Cause	Solution
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 .
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 .
	Diskette MBR validation is enabled.	Run Computer Setup and disable Diskette MBR Validation in Storage > Storage Options .

Solving Hard Drive Problems

Solving Hard Drive Problems

Problem	Cause	Solution
Hard drive error occurs.	Hard disk has bad sectors or has failed.	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 .


Solving Hard Drive Problems (Continued)

Problem	Cause	Solution
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 Setup and try adding a POST delay under Advanced > Power-On.
	Drive's IDE (ATA) controller is disabled in Computer Setup.	Run Computer Setup and enable the Primary and Secondary IDE (ATA) controllers in Storage > Storage Options .
	Drive responds slowly immediately after power-up.	Run Computer Setup and increase the POST Delay in Advanced > Power-On Options .
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. If the hard drive is still inaccessible and MBR Security is enabled, try restoring the previously saved MBR image by entering Setup and selecting Security > Restore Master Boot Record.
	System files missing or not properly installed.	<ol style="list-style-type: none"> 1. Insert a bootable system diskette and restart. 2. Verify hard drive is partitioned and formatted. 3. Install system files for the appropriate operating system if necessary.
	Hard drive boot disabled in Computer Setup.	Run Computer Setup and enable the hard drive entry in the Storage > Boot Order list.

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 Power LED flashes).	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.
 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.		
	Monitor cable plugged into the wrong connector.	If the computer system has both an integrated graphics connector and an AGP card connector, plug the monitor cable into the AGP card connector.
	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
Power LED flashes Red six times, once every second, followed by a two second pause.	Pre-video graphics error.	For systems with a graphics card: <ol style="list-style-type: none"> 1. Reseat the graphics card. 2. Replace the graphics card. 3. Replace the system board. For systems with integrated graphics, 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.
	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.

Solving Display Problems (Continued)

Problem	Cause	Solution
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 SoftPaq SP20930 or SP22333, depending on the monitor, to assist with the synchronization. <p>NOTE: Use the monitor model number when searching for the SoftPaq.</p>
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 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.
	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.
	Digital CD audio is not enabled.	Enable digital CD audio: <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.



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.

Solving Audio Problems (Continued)

Problem	Cause	Solution
Noise or no sound comes out of the speakers or headphones.		<ol style="list-style-type: none"> 1. If using digital speakers that have a stereo jack and want the system to auto-switch to digital, use a stereo-to-mono adapter to properly engage the auto-sense feature or use the multimedia device properties to manually switch the audio signal from analog to digital. 2. If the headphones have a mono jack, use the multimedia device properties to switch the system to analog out.
<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>		
Sound cuts in and out.	Processor resources are being used by other open applications.	Shut down all open processor-intensive applications.
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 may have failed.	Run printer self-test.
Printer will not turn on.	The cables may not be connected properly.	Reconnect all cables.
Printer prints garbled information.	The correct printer driver is not installed.	Install the correct printer driver for the application.
	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.	The printer may be out of paper.	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.	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.

 **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.

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.	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 needs repairs.	Replace the mouse.
	Computer is in standby mode.	Press the power button to resume from standby mode.

 **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.

Mouse will only move vertically or horizontally, or movement is jerky.	Mouse roller ball and/or rotating encoder shafts are dirty.	Remove roller ball cover from the bottom of the mouse and clean both the roller ball and the rotating encoder shaft.
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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 2000, select the **Add New Hardware** icon in the **Control Panel** (for 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.	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 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.	Under the Computer Setup Advanced menu, change the resource settings for the board.
	The network controller is defective.	Replace the NIC or replace the system board if the NIC is embedded.
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.	Under the Computer Setup Advanced menu, change the resource settings for the board.
	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.	Under the Computer Setup Advanced menu, change the resource settings for the board.
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 or replace the system board if the NIC is embedded.
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.
		ECC memory modules are not supported.
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.
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.	Memory is installed incorrectly or is bad.	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. 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.

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.	The CD-ROM or DVD boot is not enabled through the Computer Setup utility.	Run the Computer Setup utility and enable booting to removable media and verify boot order settings.
	Non-bootable CD in drive.	Try a bootable CD in the drive.
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.	Movie may be regionalized for a different country.	See the documentation that came with the DVD drive.
	Decoder software is not installed.	Install decoder software.
Cannot eject compact disc (tray-load unit).	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.
CD-ROM, CD-RW, DVD-ROM, or DVD-R/RW drive cannot read a disc or takes too long to start.	CD has been inserted upside down.	Re-insert the CD 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.
	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.

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

Problem	Cause	Solution
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.

Solving Internet Access Problems *(Continued)*

Problem	Cause	Solution
Unable to connect to the Internet. (continued)	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 10/100 cable is disconnected.	Connect the CAT5 10/100 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.
	Cookies are corrupted.	<p><i>Windows XP</i></p> <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.
Cannot automatically launch Internet programs.	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><i>For Windows XP</i></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.

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.	None	Computer in Suspend to RAM mode (some models) or normal Suspend mode.	None required. Press any key or move the mouse to wake the computer.
Power LED flashes every four seconds.	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. 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. 5. Contact an authorized reseller or service provider.
Power LED flashes five times, once every second, followed by a two second pause.	None	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 (Continued)

Activity	Beeps	Possible Cause	Recommended Action
Power LED flashes six times, once every second, followed by a two second pause.	None	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.
Power LED flashes eight times, once every second, followed by a two second pause.	None	Invalid ROM based on bad checksum.	<ol style="list-style-type: none"> 1. Reflash the ROM using a ROMPaq diskette. 2. Replace the system board.
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 LED 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 LED light on the system board is turned on. If it is turned on, then replace the power button harness. 5. If the LED light on the system board is not turned on, then replace the power supply. 6. Replace the system board.

Index

4-pin power pin assignments A-4
24-pin power pin assignments A-4
5.25

drive bezel blank 6-4

A

access panel, removal and replacement 6-2
ATA/ATAPI (IDE) drive cable pin assignments A-4

B

battery
real-time clock E-2
removal and replacement 6-25 to 6-28
bezel blank, 5.25" drive 6-4
blank screen E-9

C

cable connections 6-11
cable management 6-10
cable pinouts
PATA data 4-3
PATA power 4-3
SATA data 4-2
SATA power 4-2
cable, proper handling 5-7
cautions
AC power 5-1
adding devices 1-1
batteries 5-7
cables 5-7
cooling fan 5-6
installation 1-1
keyboard cleaning 5-5
keyboard keys 5-5
changing operating systems, important information 3-3
changing password 3-4
chassis, illustrated 5-1
cleaning
computer 5-4
keyboard 5-5
monitor 5-5

mouse 5-5
cloning tools, software 3-1
CMOS Setup, Standard 2-4 to ??, 2-5 to 2-6
computer
cleaning 5-4
pauses E-2
Computer Setup
Standard CMOS Setup 2-4 to ??, 2-5 to 2-6
system information 2-4
utilities 2-2
configuring power button 3-2
connector pin assignments A-1 to A-4
country-specific power cord set requirements B-2
customizing software 3-1

D

date and time display E-2
deleting password 3-5
deployment tools, software 3-1
device drivers
installing/upgrading 1-1
obtaining 1-2
disassembly preparation 6-1
disk, cloning 3-1
drive
5.25" removal and replacement 6-13
capacities 4-5
hard drive removal and replacement 6-16
partition size 4-5
drive bezel 6-4
Drive Key, problems E-23
drive positions 6-12
dual-state power button 3-2

E

electrostatic discharge. *See* ESD
energy savings, settings for 3-2
entering
supervisor password 3-4
user password 3-4
error messages, POST C-1 to C-5
ESD (electrostatic discharge)
information 5-2

- materials and equipment 5-3
- preventing damage 5-2
- Ethernet
 - RJ-45 pin assignments A-1
- expansion card removal and replacement 6-8
- expansion slot cover lock removal and replacement 6-8

F

- FailSafe Boot Block ROM 3-1
- fan, power supply 5-6
- FAT 32 to NTFS conversion 1-2
- flashing LEDs C-5
- 4-pin power pin assignments A-4
- front bezel removal and replacement 6-3
- front drive bezel 6-4
- front I/O panel removal and replacement 6-17

G

- grounding methods 5-3

H

- hard drive
 - proper handling 5-7
 - removal and replacement 6-16
- headphone pin assignments A-3
- heatsink removal and replacement 6-21

I

- initial configuration 3-1
- Internet addresses, *See* Web sites

K

- keyboard
 - cleaning 5-5
 - pin assignments A-1

L

- LEDs
 - blinking PS/2 keyboard C-5
- line-in audio pin assignments A-3
- line-out audio pin assignments A-3

M

- memory, removal and replacement 6-6
- microphone pin assignments A-2
- monitor
 - blank screen E-9
 - blurry video E-10
 - checking connections E-1
 - cleaning 5-5
 - dim characters E-10
 - pin assignments A-3

- mouse
 - cleaning 5-5
 - pin assignments A-1

N

- NTFS conversion 1-2

O

- operating systems, important information about 3-3

P

- parallel interface pin assignments A-2

- password
 - changing 3-4
 - deleting 3-5
 - power-on 2-1
 - setup 3-3
 - supervisor 3-4
 - user 3-4

- password security 3-3

- PATA

- data cable pinouts 4-3
 - power cable pinouts 4-3

- POST (Power-On Self-Test) 2-1

- POST error messages C-1 to C-5

- power button
 - configuring 3-2
 - dual-state 3-2

- power cord set requirements
 - country specific B-2
 - general B-1

- Power Management 3-2

- power supply
 - fan information 5-6
 - removal and replacement 6-29
 - surge-tolerant 3-5

- power switch assembly removal and replacement 6-18

- power-on password 2-1

- Power-On Self-Test (POST) 2-1

- preinstalled software image 3-1

- preparation for disassembly 6-1

- problems
 - audio E-12
 - CD-ROM and DVD E-22
 - diskette E-5
 - display E-9
 - Drive Key E-23
 - hard drive E-6
 - installing hardware E-16

- Internet access E-23
- keyboard E-15
- memory E-20
- network E-18
- optical drives E-22
- power supply E-4
- printer E-14
- processor removal and replacement 6-22

R

- recovering system 3-1
- recovery, software 3-1
- removal and replacement
 - 5.25" drive 6-13
 - access pannel 6-2
 - battery ?? to 6-28
 - expansion card 6-8
 - expansion slot cover lock 6-8
 - front bezel 6-3
 - front I/O panel 6-17
 - hard drive 6-16
 - heatsink 6-21
 - memory 6-6
 - power supply 6-29
 - power switch assembly 6-18
 - processor 6-22
 - speaker 6-19
 - system board 6-24
 - system fan 6-20
- required tools and software 5-6

S

- safety precautions, cleaning 5-4
- SATA
 - data cable pinouts 4-2
 - power cable pinouts 4-2
- saving energy 3-2
- screws, correct size 5-6
- SDRAM (synchronous dynamic random access memory) D-1
- serial interface pin assignments A-2
- service considerations 5-6
- setting
 - supervisor password 3-3, 3-4
 - timeouts 3-2

- setup
 - initial 3-1
 - MS Windows 1-1
 - software 1-2
- software
 - Computer Setup Utilities 2-1
 - FailSafe Boot Block ROM 3-1
 - integration 3-1
 - Power Management 3-2
 - recovery 3-1
 - required 5-6
 - setup 1-2
- spare part number, tamper-resistant wrench 5-6
- speaker, removal and replacement 6-19
- static electricity 5-2
- supervisor password
 - changing 3-4
 - deleting 3-5
 - entering 3-4
 - setting 3-3
- surge-tolerant power supply 3-5
- system board removal and replacement 6-24
- system fan, removal and replacement 6-20
- system information, Computer Setup 2-4
- system recovery 3-1

T

- timeouts, setting 3-2
- tools, required 5-6
- 24-pin power pin assignments A-4

U

- USB pin assignments A-2
- user password
 - changing 3-4
 - deleting 3-5
 - entering 3-4

W

- Wake-on-LAN feature E-18
- warning, battery 5-7
- Web sites
 - HP 1-2
 - HP support 1-1, 3-3
 - PC Deployment 3-1
- wrench, tamper-resistant 5-6

