

service reference guide

HP Compaq Business Desktop dx2000 uT Series
Personal Computers
2st 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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Service Reference Guide

HP Business Desktop dx2000 uT Series
Personal Computers

First Edition (March 2004)

Second Edition (May 2004)

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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
- *Compaq Restore CD*, which is supplied with many Compaq 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 and SCSI mass storage devices
- Processors
- Controllers



If the Power-On Password is set, a key icon 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 LS-120 drives.
- Configure the boot priority of IDE (ATA) and SCSI hard drive controllers.
- 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 power-on password prompting during system restarts (warm boots) as well as during power-on.
- Establish a setup 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.
- Enable or disable removable media write ability (when supported by hardware).
- 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. Select your language from the list and press the **Enter** key.
4. A choice of four headings appears in the Computer Setup Utilities menu: File, Storage, Security, and Advanced.



5. 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**.
6. To apply and save changes, select **File > Save Changes and Exit**.
 - If you have made changes that you do not want applied, select **Ignore Changes and Exit**.
 - To reset to factory settings, select **Set Defaults and Exit**. This option will restore the original factory system 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, processor type and speed, cache size (L1/L2), installed memory size, Chipset type, BIOS version, BIOS release date, and CPU ID.
Standard CMOS Setup	System time (hh/mm/ss)	Sets the system time (24 hour format).
	System date (mm/dd/yy)	Sets the system date.
	Floppy drive A	Calculates the size and capacity of the floppy drive.
	Primary IDE Master	Auto detects which hard drive is the primary master drive.
	Primary IDE Slave	Auto detects which hard drive is the primary slave drive.
	Secondary IDE Master	Auto detects which hard drive is the secondary master drive.
Advanced CMOS Setup	Secondary IDE Slave	Auto detects which hard drive is the secondary slave drive.
	Add-On ROM Display Mode	<ul style="list-style-type: none"> Force BIOS: Add-On ROM displayed (default) Keep Current: Add-On ROM not displayed
	POST Delay Time (seconds)	<p>Sets the amount of time before the Setup Utility prompt (F10=Setup) appears when the computer boots.</p> <ul style="list-style-type: none"> None: POST delay time disable (default) 5: POST delay of 5 seconds 15: POST delay of 15 seconds 25: POST delay of 25 seconds 35: POST delay of 35 seconds
	System Keyboard	<p>Detects if a keyboard is present when the computer boots</p> <p>Absent: keyboard not detected (default)</p> <p>Present: keyboard detected</p>
	APIC ACPI SCI IRQ	<p>Enables or disables the internal I/O APIC and Multiprocessor Tables. (Disabling the APIC ACPI SCI IRQ may require you to reinstall the operating system.)</p> <ul style="list-style-type: none"> Enable: IRQ 20-23 (default) Disable: IRQ 09-11
	Hyper-Threading Technology	<p>Enables or disables the Intel Hyper-Threading Technology. (This item is only selectable with the Intel HTT CPU plug-in.)</p> <ul style="list-style-type: none"> Enable: Intel HTT function enable (BIOS auto detect). Disable: Intel HTT function disable (BIOS auto detect).
Boot Device Priority	Specifies the boot order for all devices.	

Heading	Option	Description	
 Support for Computer Setup options may vary depending on your specific hardware configuration.			
Advanced CMOS Setup (Continued)	Internal Graphic Mode Select	Selects the size of memory for internal graphics adapter. <ul style="list-style-type: none"> • 1MB: Share 1MB • 4MB: Share 4MB • 8MB: Share 8MB (default) • 16MB: Share 16MB • 32MB: Share 32MB 	
	Power Management Setup	ACPI Standby State	Sets the ACPI standby state when system goes into ACPI standby mode. <ul style="list-style-type: none"> • S1/PSOS: power on suspend • S3/STR: Suspend to RAM (default)
		Restore on AC/ Power Loss	Sets the system status after AC power loss. <ul style="list-style-type: none"> • Power Off: System always powers off (Default) • Power On: System always powers on • Last State: System returns to the last state before AC power loss
		Resume on Ring	Sets the Resume On Ring from soft off. <ul style="list-style-type: none"> • Disable: Ring Resume disable (default) • Enable: Ring Resume enable
	Resume on PME	Sets the Resume On PME from soft on. <ul style="list-style-type: none"> • Disable: PME Resume disable • Enable: PME Resume enable (default) 	
Peripheral Setup	OnBoard LAN	Enables or disables the OnBoard LAN. <ul style="list-style-type: none"> • Disable: OnBoard LAN disabled • Enable: OnBoard LAN enabled (default) 	
	OnBoard LAN Chip Boot ROM	Enables or disables the OnBoard LAN Chip Boot ROM. <ul style="list-style-type: none"> • Disable: OnBoard LAN Chip Boot ROM disabled • Enable: OnBoard LAN Chip Boot ROM enabled (default) 	
	Init. Graphics Adapter Priority	Sets the initial priority of the graphics adapter. <ul style="list-style-type: none"> • VGA/PCI • PCI/Int-VGA (default) 	
	USB Function	Enables or disables the USB controller. <ul style="list-style-type: none"> • Disable: USB controller disabled • Enable: USB controller enabled (default) 	
 Support for Computer Setup options may vary depending on your specific hardware configuration.			

Heading	Option	Description
Peripheral Setup (Continued)	USB 1.1 Device Legacy Support	Sets the USB 1.1 Device Legacy Support under DOS mode. <ul style="list-style-type: none"> • Disable: USB 1.1 Device Legacy Support disabled • No Mice: A mouse is not supported • All Devices: All devices are supported (default)
	OnBoard Serial Port	Sets the OnBoard Serial Port settings <ul style="list-style-type: none"> • Auto (default) • Disable • 3F8/IRQ4 • 2F8/IRQ3 • 3E8/IRQ2 • 2E8/IRQ1
	OnBoard Parallel Port	Sets the OnBoard Parallel Port settings. <ul style="list-style-type: none"> • SPP (Bi-Dir) • SPP and EPP-1.9 • ECP • ECP and EPP-1.9 (Default)
Hardware Monitor	CPU Warning Temperature	Warns when CPU temperature is greater than 85°C/185°F.
	CPU Shutdown Temperature	System will shutdown when CPU temperature is greater than 90°C/194°F.
	System Warning Temperature	Warns when system temperature is greater than 60°C/140°F.
	System Shutdown Temperature	System will shutdown when system temperature is greater than 65°C/149°F.
	CPU Temperature	Detects current CPU temperature.

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

Heading	Option	Description
Hardware Monitor (Continued)	System Temperature	Detects current system temperature.
	CPU FAN Speed	Detects CPU fan speed.
	Chassis FAN Speed	Detects current chassis fan speed.
	CPU VID	Detects current CPU voltage.
	Vccp	Detects current Vccp voltage.
	+1.5V	Detects current ATX power +1.5V.
	+2.5V	Detects current ATX power +2.5V.
	+3.3V	Detects current ATX power +3.3V.
	+5.0V	Detects current ATX power +5.0V.
	+12.0V	Detects current ATX power +12.0V.
	HVcc	Detects current HVcc voltage.
Password Option	Change Supervisor Password	Allows you to set and change the supervisor password.
	Password Status	Shows password status
	Password Check	Allows you to set the password check when the supervisor password is set up. <ul style="list-style-type: none"> • Setup: Password prompt appears when BIOS is executed. • Always: Password verification is checked every time the computer boots (default).
Load Default Settings	None	Loads the optimal default values for all the setup options.
Save Settings and Exit	None	Saves changes and exits setup.
Exit Without Savings	None	Allows you to exit setup without saving any changes.
 Support for Computer Setup options may vary depending on your specific hardware configuration.		

2.3 Protecting the Software

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

2.4 Restoring the Software

The Windows operating system and software can be restored to its original state by using the *Restore CD*. See the *Restore CD* for complete instructions on using this feature.

Desktop Management

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

The capabilities and features of the seven key components of desktop management are:

- Initial configuration and deployment
- ROM flash
- Security



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

The best deployment method depends 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 comes with a reprogrammable flash ROM (read only memory). By establishing a setup password in Computer Setup (F10) Utility, you can protect the ROM from being unintentionally updated or overwritten. This is important to ensure the operating integrity of the computer. Should you need or want to upgrade your ROM, you may:

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

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 ROMPaq diskette, which will program the system ROM with a valid image.

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

1. If there is a diskette in the diskette drive, remove the diskette and turn off the power.
2. Insert a ROMPaq diskette into the diskette drive.
3. Turn on power to the system.
4. If no ROMPaq diskette is found, you will be prompted to insert one and restart the computer.
5. If the system successfully starts from the diskette and successfully reprograms the ROM, then the three keyboard lights will turn on.
6. Remove the diskette and turn the power off.
7. Turn the power on again 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, saving energy without having to shut down the computer.

With Advanced Configuration and Power Interface (ACPI) enabled for Windows 2000 and 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 2000, left click on the **Start Button**, then select **Settings > Control Panel > Power Options**.

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

Establishing a setup 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.


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

3. Select **Security**, then select **Setup Password** and follow the instructions on the screen.
4. Before exiting, click **File > Save Changes and Exit**.

3.3.3 Establishing a Power-On Password Using Computer Setup

Establishing a power-on password through Computer Setup prevents access to the computer when power is turned on, unless the password is entered. When a power-on 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 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. Select **Security**, then **Power-On Password** and follow the instructions on the screen.
4. Before exiting, click **File > Save Changes and Exit**.

Entering a Power-On Password

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

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



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

If you enter the password incorrectly, a broken key icon appears. Try again. After three unsuccessful tries, you must turn off the computer, then turn it on again before you can continue.

Entering a Setup Password

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

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



If you do not press the **F10** key at the appropriate time, you must 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 key icon appears on the monitor, type the setup 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, a broken key icon appears. Try again. After three unsuccessful tries, you must turn off the computer, then turn it on again before you can continue.

Changing a Power-On or Setup Password

1. Turn on or restart the computer. If you are in Windows, click **Start > Shut Down > Restart**. To change the setup password, run **Computer Setup**.
2. To change the Power-On password, go to step 3.

To change the Setup password, 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. When the key icon appears, type your current password, a slash (/) or alternate delimiter character, your new password, another slash (/) or alternate delimiter character, and your new password again as shown:

current password/new password/new password



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.



Refer to the “National Keyboard Delimiter Characters” section in this chapter for information about the alternate delimiter characters.

The power-on password and setup password may also be changed using the Security options in Computer Setup.

Deleting a Power-On or Setup Password

1. Turn on or restart the computer. If you are in Windows, click **Start > Shut Down > Restart**. To delete the setup password, run **Computer Setup**.
2. To delete the Power-On password, go to step 3.

To delete the Setup password, 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. When the key icon appears, type your current password followed by a slash (/) or alternate delimiter character as shown:

current password/

4. Press the **Enter** key.
-



Refer to “National Keyboard Delimiter Characters” for information about the alternate delimiter characters. The power-on password and setup password may also be changed using the Security options in Computer Setup.

National Keyboard Delimiter Characters

Each keyboard is designed to meet country-specific requirements. The syntax and keys that you use for changing or deleting your password depend on the keyboard that came with your computer.

National Keyboard Delimiter Characters					
Arabic	/	Greek	-	Russian	/
Belgian	=	Hebrew	.	Slovakian	-
BHCSY*	-	Hungarian	-	Spanish	-
Brazilian	/	Italian	-	Swedish/Finnish	/
Chinese	/	Japanese	/	Swiss	-
Czech	-	Korean	/	Taiwanese	/
Danish	-	Latin American	-	Thai	/
French	!	Norwegian	-	Turkish	.
French Canadian	é	Polish	-	U.K. English	/
German	-	Portuguese	-	U.S. English	/

* For Bosnia-Herzegovina, Croatia, Slovenia, and Yugoslavia

Clearing Passwords

If you forget your password, you cannot access the computer. To clear the password, turn off and unplug the computer then, press the CMOS reset button, holding it down for 5 seconds. Close and 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.

Ultra ATA Drive Guidelines and Features

4.1 Ultra ATA Jumpers

Ultra ATA drives are configured by means of jumper settings. Factory-installed drives ship with the jumpers preset to the cable-select mode; therefore, no jumper setting changes are required on factory pre installed, replacement, or option drives. With cable-select, the drive is configured as either Master (Drive/Device 0) or Slave (Drive/Device 1) by its physical attachment to the cable.

If you purchase a third-party hard drive, refer to the documentation included with the drive kit to ensure proper cable installation and configuration.



All drives on a controller channel need to have their jumpers either in the cable-select mode or have the individual drive jumper installed on the appropriate Master (Drive/Device 0) or Slave (Drive/Device 1) position.

4.2 Ultra ATA Cables

When installing a second device on either the primary or secondary controller, you must use an industry standard 40-pin, 80-conductor Ultra ATA cable for optimal performance. These cables have a maximum length of 18 inches and a maximum distance of 6 inches between the two devices for a two-drive cable.

Drives operating at speeds faster than those of the Ultra ATA-33 devices require industry-standard 40-pin, 80-conductor cables to maintain the higher data transfer rates possible with the improved technology.

When using Ultra ATA-133, -100, -66, and slower -33 drives in the same system, each drive will operate at its appropriate data transfer rate.

4.2.1 Cable Layout

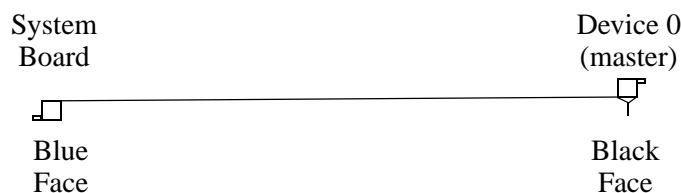
The faces of industry-standard cable connectors are color coded for easy recognition:

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

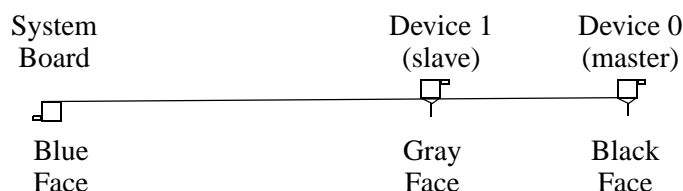


The color code of an industry-standard cable is valid only if the drive's jumper is in the cable-select position.

Single-Drive Cable



Two-Drive Cable



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



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

4.3 Drive Installation Guidelines

Most computer system boards have two ATA (IDE) controller channels with a dedicated connector for each controller. One controller is designated as the primary and the other as the secondary controller.

Each of the two controllers can have up to two devices attached to it. Each computer system may therefore have a maximum of four ATA/ATAPI drives. All drives are connected to these controllers using an industry-standard 40-pin, 80-conductor cable.



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

Any drive attached to a controller must have a drive designation. If only a single drive is connected to a controller and its jumper is in the cable-select position, it is designated as the Master Drive (Drive/Device 0) by its attachment to the Drive/Device 0 cable position. If two cable-selected drives are connected to a single controller, one will be designated by its attachment to the cable as the Master (Drive/Device 0) and the other as Slave (Drive/Device 1).

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

4.3.1 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 controller. The most demanding devices are in Class 1 and the least demanding are in Class 4.

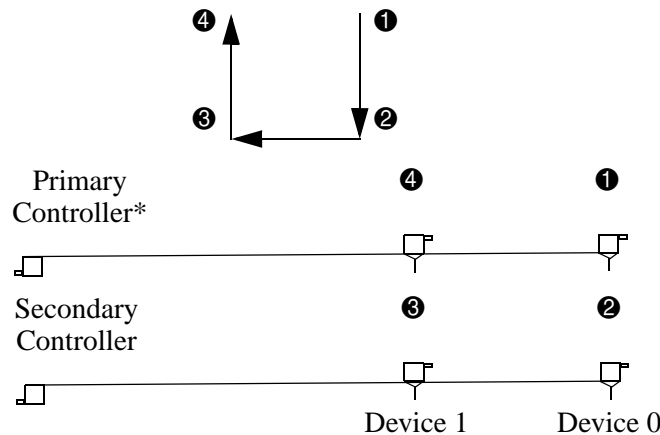
Class 1 Hard Drives	Class 2 High Speed Optical Drives	Class 3 Optical Storage Drives	Class 4 Magnetic Storage Drives
ATA-100	DVD	R/W CD-ROM	LS-120
ATA-66	DVD-CD R/W	CD-ROM	Tape
ATA-33			Zip

General Attach Guidelines

- The lower the device class number, the faster the device and the more bandwidth required.
- Drives installed in the Device 0 positions on both the primary and secondary controllers receive the greatest possible bandwidth.
- The bootable ATA hard drive should always be installed on the primary controller in the Device 0 position.

4.3.2 Attach Sequence Rules by Class Priority

Drives should be attached in the sequence shown for optimum performance starting at position ①.



*If there are three or more devices, two or more of which are hard drives, two hard drives should be attached to the primary controller first before following the General Attach Sequence Rule.

The attach sequence rule may also be stated in table format:

General Attach Sequence Rule*	
Sequence	Description
1	The lowest class drive - bootable hard drive recommended.
2	If only two drives, the last drive goes here; otherwise the lowest class of the remaining drives.
3	If only three drives, attach the final drive here. If a fourth drive exists, attach the lowest class drive here.
4	If there is a fourth drive, attach the final drive here - the drive with the highest class number of all devices.

*If there are three or more devices, two or more of which are hard drives, two hard drives should be attached to the primary controller first before following the General Attach Sequence Rule.

The rules allow for:

- Keeping the hard drive on a separate controller channel maximizes drive performance until a fourth device is added.
- Keeping the hard drives and removable media drives on separate controller channels maximizes compatibility.
- Keeping the hard drive and the writable optical drive on separate controller channels maximizes optical drive reliability.

4.3.3 Attach Sequence Worksheet

Use the worksheet below for obtaining optimum system performance when setting up a computer with multiple drives. Use the General Attach Sequence Rule to determine the best drive installation sequence.

Attach Sequence Worksheet				
Device Name	Device Class	Position Number	Controller Name	Device Number

Two examples of how to use the worksheet are:

- Three device installation
- Four device installation

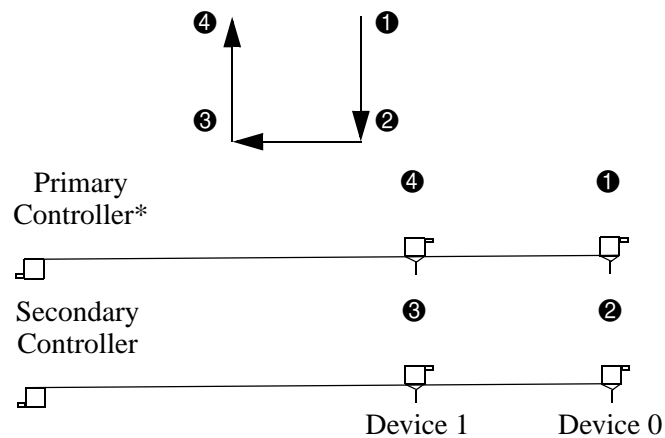
Example 1: Three Device Installation Sample

A system has three devices: Ultra ATA-100 hard drive, CD-ROM drive, and a DVD drive. Using the Device Class Table in Section 4.3.1, the devices may be identified as:

- Ultra ATA-100 hard drive = Class 1
- DVD drive = Class 2
- CD-ROM drive = Class 3

Attach Sequence Worksheet - Three Device Installation (Sample)

Device Name	Device Class	Position Number	Controller Name	Device Number
Ultra ATA-100 hard drive	1	①	Primary	0
DVD drive	2	②	Secondary	0
CD-ROM drive	3	③	Secondary	1



Example 2: Four Device Installation Sample

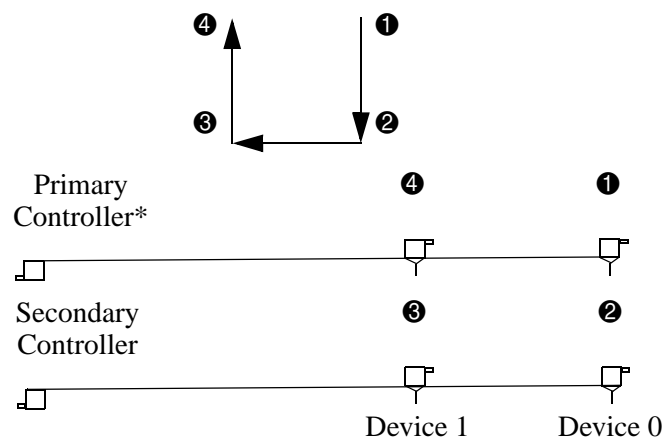
A system has four devices: Ultra ATA-100 hard drive, Ultra ATA-100 hard drive, DVD-CDR/W drive, and a ZIP-250 drive. Using the Device Class Table in Section 4.3.1, the devices may be reidentified as:

- Ultra ATA-100 hard drive = Class 1
- Ultra ATA-100 hard drive = Class 1
- DVD-CDR/W drive = Class 2
- ZIP-250 drive = Class 4

Attach Sequence Worksheet - Four Device Installation (Sample)

Device Name	Device Class	Position Number	Controller Name	Device Number
Ultra ATA-100 hard drive	1	①	Primary	0
DVD-CDR/W drive	2	②	Secondary	0
ZIP-250 drive	4	③	Secondary	1
Ultra ATA-100 hard drive*	1	④	Primary	1

*If there are three or more devices, two or more of which are hard drives, two hard drives should be attached to the primary controller first before following the General Attach Sequence Rule.



4.3.4 Additional Drive Application Notes

- When replacing a hard drive, the replacement should be of the same type (Ultra ATA -33, -66, or -100) as that being removed to retain the same level of performance.
- When Ultra ATA and SCSI hard drives are mixed in the same system, the Ultra ATA drive will become the boot drive unless the boot order is changed in Computer Setup (F10 Setup).

4.4 SMART

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

4.5 Drive Capacities

The combination of the file system and the operating system used in the computer determines the maximum usable size of a drive partition. A drive partition is the largest segment of a drive that 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.

The table that follows identifies the capabilities and restrictions imposed on the computer by the combinations of file and operating systems.

Microsoft to Drive Manufacturer Size Conversion Table*	
Drive Size as Identified by Microsoft Operating System	Drive Size as Identified by Drive Manufacturers
2 GB	2.1 GB
4 GB	4.3 GB
32 GB	34.4 GB
64 GB	68.7 GB
128 GB	137 GB
2 TB	2.199 TB

*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
FAT 32	SCSI	Windows 2000/ XP	32 GB	2 TB
NTFS	ATA	Windows NT/2000/XP	128 TB	128 PB
NTFS	SCSI	Windows NT/2000/XP	2TB	2TB

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 (μT)



This chassis may have either a carbonite or silver front bezel depending on the geographical location.

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 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 off **only** when the computer is turned off or the power cable has been disconnected.

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. screws have a silver finish.



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

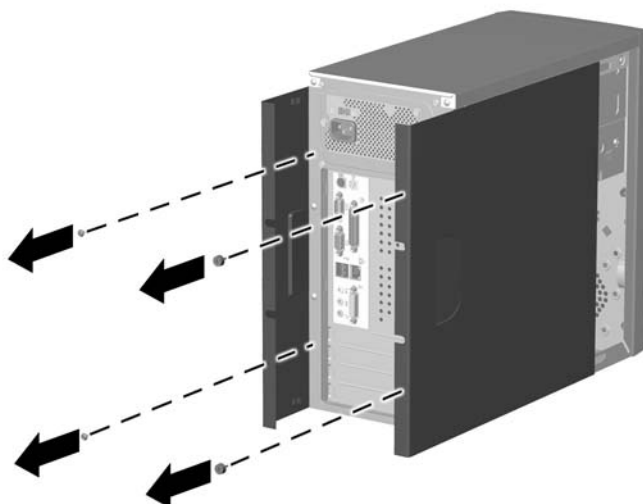
 **CAUTION:** Before removing the computer access panel, ensure that the computer is turned off and that the power cord is disconnected from the electrical outlet.

2. Remove the two screws that secure the access panel to the computer chassis. Some access panels use captive thumbscrews.


 Remove the right access panel to upgrade memory or an expansion card.

Remove the left access panel to upgrade a drive.

3. Slide the access panel back about 1 inch (2.5 cm), then lift it away from and off the unit.



To replace the access panel, reverse the removal steps.

 The two access panels are physically identical. One access panel has captive thumbscrews that may be removed by unscrewing them.

6.3 Front Bezel

1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the access panels (Section 6.2, “Access Panel”).
3. Grasp the bottom of the front panel below the lowest air vent and pull the panel out and up to release it from the chassis.



To install the front bezel, insert the top two latches into their respective holes in the chassis and push the bezel in until it is fully seated.



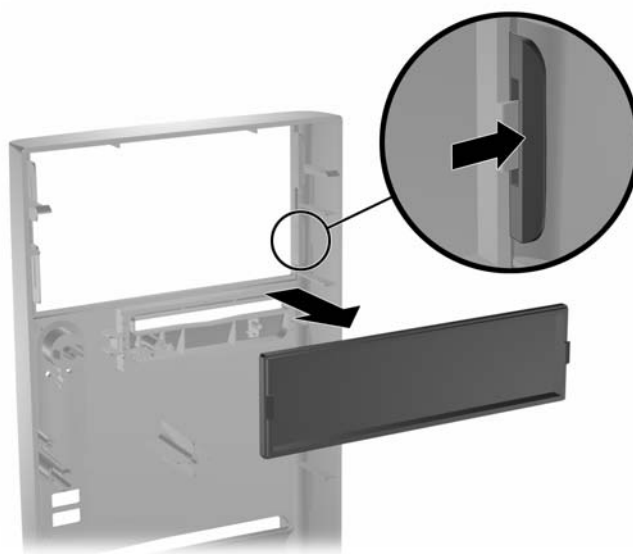
When replacing the front bezel, ensure that the top of the front bezel is flush with the top of the chassis before pressing it into place.

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

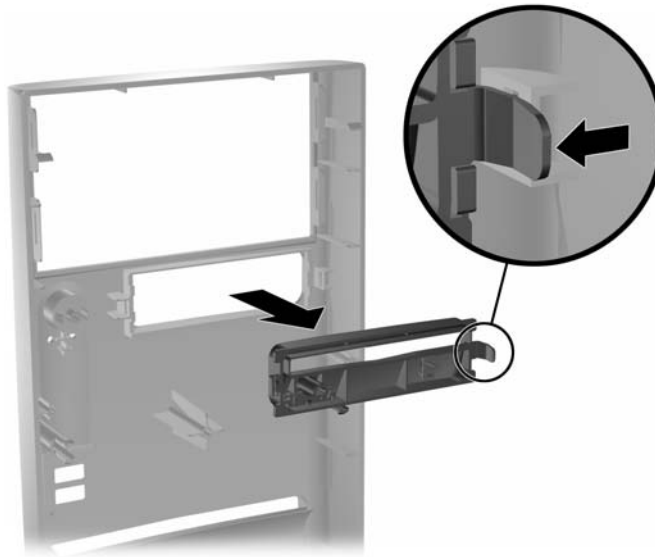
Press one of the retaining tabs on the inside of the large bezel towards the outer edge of the bezel to release the bezel blank. At the same time, pull the bezel blank inwards to remove it from the main bezel.



To install a bezel blank, reverse the removal procedure.

6.4.2 Diskette Drive Bezel

Pull the right retaining tab towards the center of the main bezel. At the same time, pull the bezel inwards to remove it from the main bezel.





To install a diskette drive bezel, reverse the removal procedure.


6.5 Memory

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

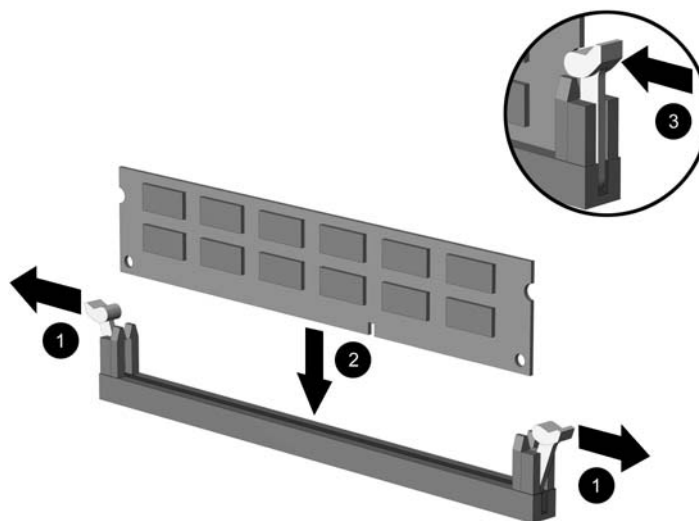
 If there is a hard drive in bay 5 it will be necessary to remove the lower drive cage before removing the memory modules ([Section 6.7.4, “Removing the Lower Drive Cage”](#)).

2. Remove the right 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 Card

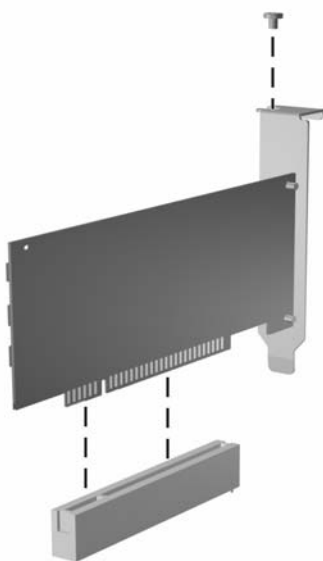
1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the right access panel (Section 6.2, “Access Panel”).
3. Lay the computer down on its side to make it easier to work on.

If installing an expansion card in an empty slot, skip to step 9.

4. To remove an expansion card, disconnect any cables attached to the expansion card.
5. Remove the screw at the top of the expansion slot.
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.

If not installing an additional expansion card, skip to step 11.

9. Remove the expansion slot cover.
10. Slide the expansion card into the expansion socket and press it firmly into place.



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. Install the screw at the top of the expansion slot to further secure the part in the chassis.
12. Replace the access panel.
13. Connect external cables to the installed card, if needed.

Reconfigure the computer, if necessary.

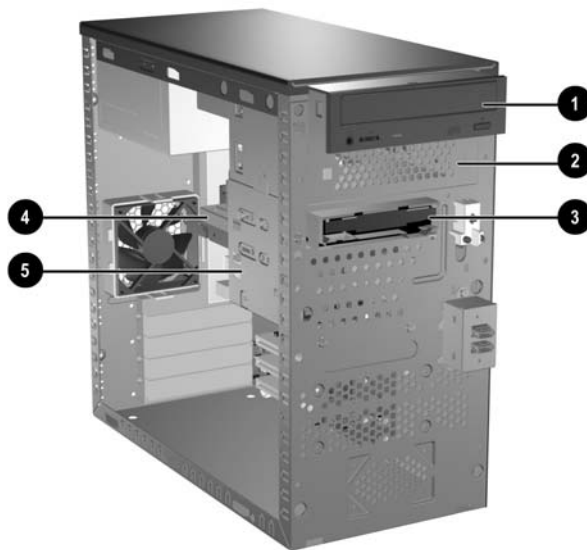
6.7 Drives

The computer supports up to five 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.

6.7.1 Drive Positions




Drive Positions

Item	Description	Item	Description
①	Optical drive	④	Hard drive
②	Optical drive	⑤	Hard drive
③	Diskette drive		

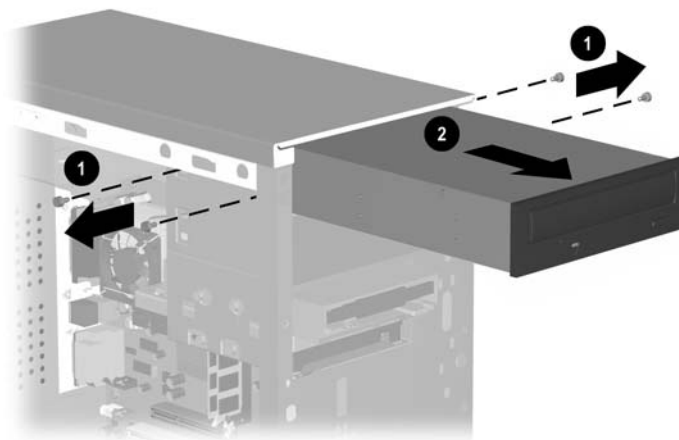
*An optical drive is a CD-ROM, CD-R/RW, DVD-ROM, DVD-R/RW, or CD-RW/DVD Combo drive.

6.7.2 Removing a 5.25" Drive


1. Prepare the computer for disassembly (Section 6.1, "Preparation for Disassembly").
2. Remove both the right and left access panels (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.


 In some cases it may be easier to slide the drive part way out of the drive bay before removing the cables.

5. Remove the four screws, two from each side, that secure the drive in the drive cage ❶.
6. Slide the drive out of the drive cage, as shown in the illustration below ❷.



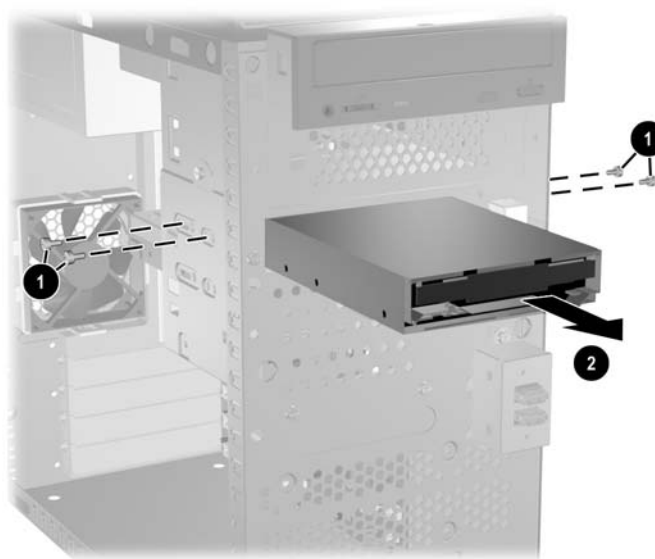
To install a drive, reverse the removal procedure.

 If you are installing a 5.25" drive for the first time into bay 2 you must first remove the drive from bay 1 and then knock or pry out the metal shield that covers the front of bay 2.

 **WARNING:** There may be sharp edges on the inside of the bay opening after the shield has been removed.

6.7.3 Removing a Diskette Drive

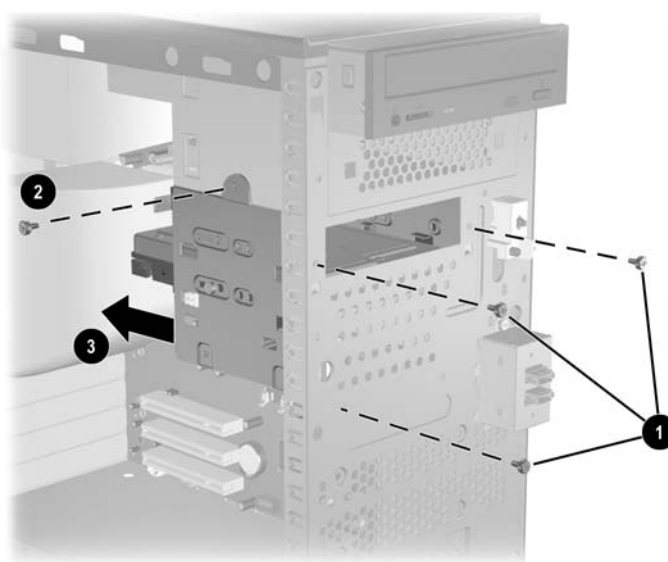
1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove both the right and left access panels (Section 6.2, “Access Panel”).
3. Remove the front bezel (Section 6.3, “Front Bezel”).
4. Disconnect the power, and data cables from the back of the drive.
5. Remove the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



To replace the diskette drive, reverse removal procedure.

6.7.4 Removing the Lower Drive Cage

1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove both the right and left access panels (Section 6.2, “Access Panel”).
3. Remove the front bezel (Section 6.3, “Front Bezel”).
4. Remove the diskette drive (Section 6.7.3, “Removing a Diskette Drive”).
5. Disconnect the power, and data cables from the back of all installed 3.5" drives.
6. Remove the four screws that secure the drive cage to the front of the chassis ❶ and then remove the single screw that attaches the lower drive cage to the fixed upper drive cage on the right side of the chassis ❷.
7. Slide the lower drive cage back about 1/2 inch to release it from the upper cage ❸.

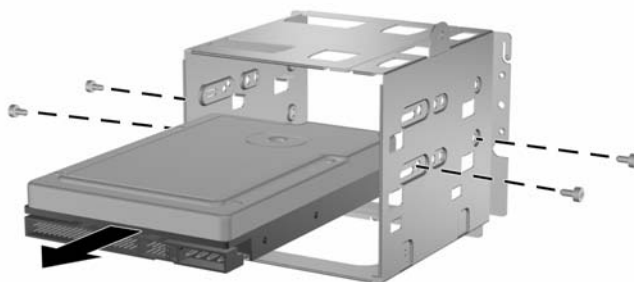


To install the lower drive cage, reverse the removal procedure.

CAUTION: When installing the retaining screws always use the short (5/32" long) screw in the side mounting position and the 4 longer screws on the front of the chassis.

6.7.5 Removing a 3.5" Hard Drive

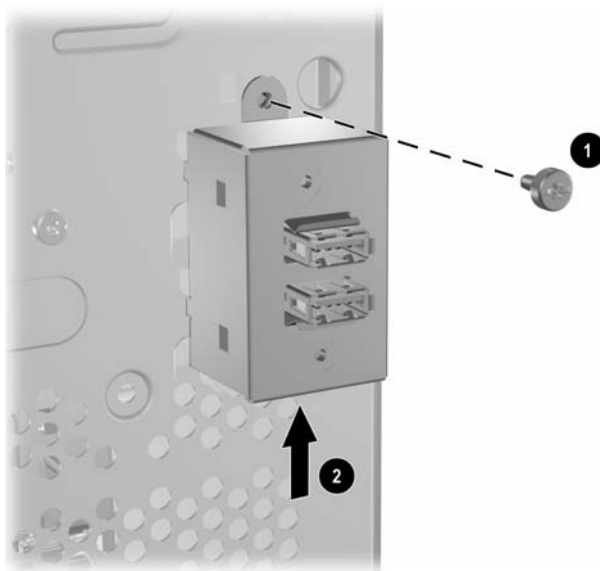
1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove both the right and left access panels (Section 6.2, “Access Panel”).
3. Remove the front bezel (Section 6.3, “Front Bezel”).
4. Remove the diskette drive (Section 6.7.3, “Removing a Diskette Drive”).
5. Disconnect the power, and data cables from the back of all installed 3.5" drives.
6. Remove the lower drive cage (Section 6.7.4, “Removing the Lower Drive Cage”).
7. Remove the four screws, two from each side, that secure the drive in the drive cage ❶.
8. Slide the drive out of the drive cage ❷.



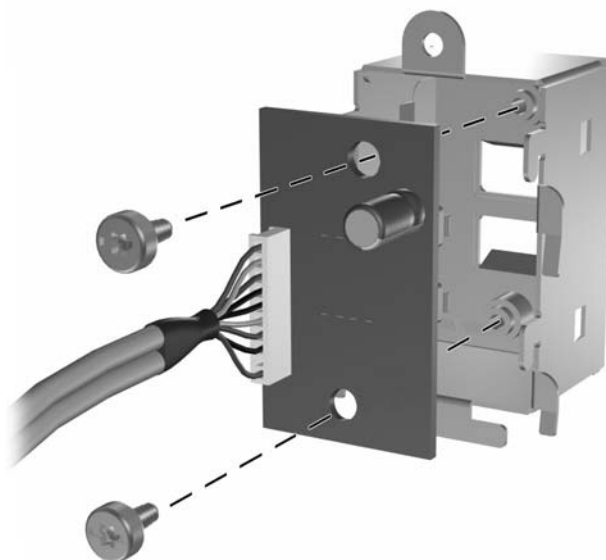
To replace the drive cage, reverse the removal procedure.

6.8 Front USB Device

1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the right access panel (Section 6.2, “Access Panel”).
3. Remove the front bezel (Section 6.3, “Front Bezel”).
4. Disconnect the front USB cable from the system board.
5. Remove the single screw that secures the front USB device to the chassis ❶, then slide the USB housing up to release it from the chassis ❷.



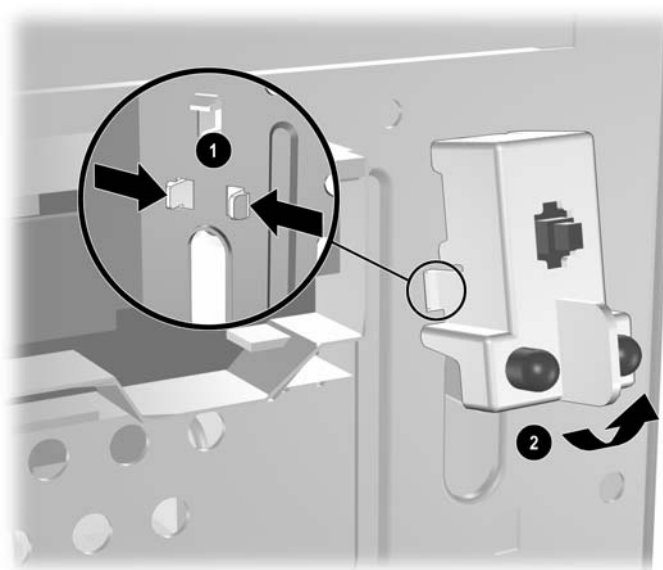
6. Remove the two screws that secure the USB printed circuit board from the inside of the USB housing and then remove the board.



To install the USB board and the USB housing to the chassis, reverse the removal procedures.

6.9 Power Switch Assembly

1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the right access panel (Section 6.2, “Access Panel”).
3. Remove the front bezel (Section 6.3, “Front Bezel”).
4. Remove the diskette drive (Section 6.7.3, “Removing a Diskette Drive”).
5. Disconnect the power, and data cables from the back of all installed 3.5" drives.
6. Remove the lower drive cage (Section 6.7.4, “Removing the Lower Drive Cage”).
7. Disconnect the power switch cable from the system board.
8. From the inside of the chassis, squeeze the two lower retaining clips together **1** while rotating the bottom of the power switch out of the chassis **2**.



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

6.10 Speaker

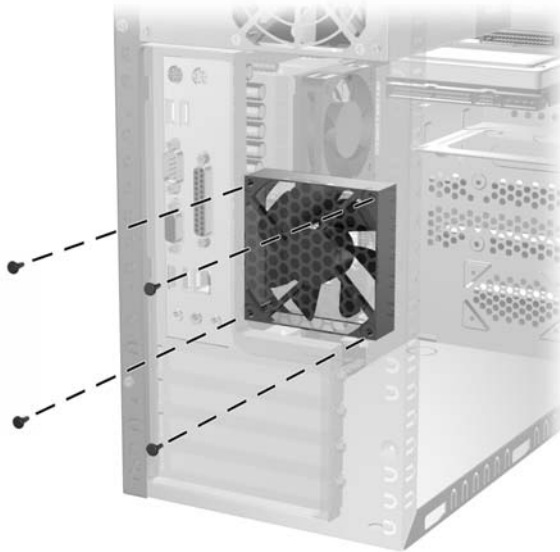
1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the right access panel (Section 6.2, “Access Panel”).
3. Remove the front bezel (Section 6.3, “Front Bezel”).
4. Disconnect the speaker cable from the system board ❶.
5. From the outside of the chassis pull out the stems of the four push pins to release the speakers then, remove the speaker ❷.



To install the speaker, reverse the removal procedure. To ensure proper alignment, install the push pins in an X pattern.

6.11 System Fan

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



To install the fan, reverse the removal procedures.

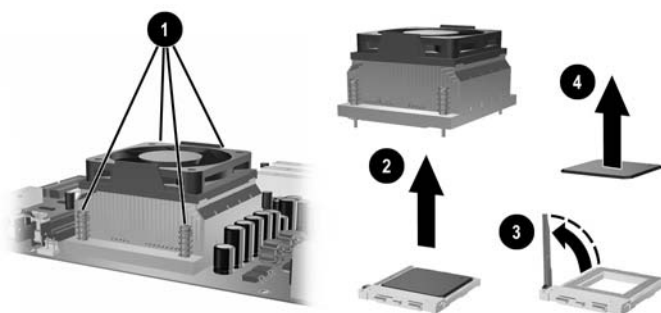
6.12 Processor and Heatsink

1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove the right access panels (Section 6.2, “Access Panel”).
3. Lay the computer down on its side to make it easier to work on.
4. Use a long, slender screwdriver to unscrew the four processor retaining screws ❶.



The spring-loaded retaining screws are captive to the heatsink.

5. Twist the heatsink to break the bond between it and the processor and lift the heatsink from the processor ❷.
6. Raise the handle on the ZIF socket to the full-open position ❸.
7. Grasp the processor by the edges and pull it straight up from the socket ❹.



To install the processor and heatsink, reverse the removal procedures.



CAUTION: When installing the heatsink, insert all four screw loosely and then tighten them in a X pattern to ensure the heatsink is properly seated.

6.13 System Board

1. Prepare the computer for disassembly (Section 6.1, “Preparation for Disassembly”).
2. Remove both the right and left access panels (Section 6.2, “Access Panel”).
3. Remove the front bezel (Section 6.3, “Front Bezel”).
4. Remove the diskette drive (Section 6.7.3, “Removing a Diskette Drive”).
5. Disconnect the power, and data cables from the back of all installed 3.5" drives.
6. Remove the lower drive cage (Section 6.7.4, “Removing the Lower Drive Cage”).

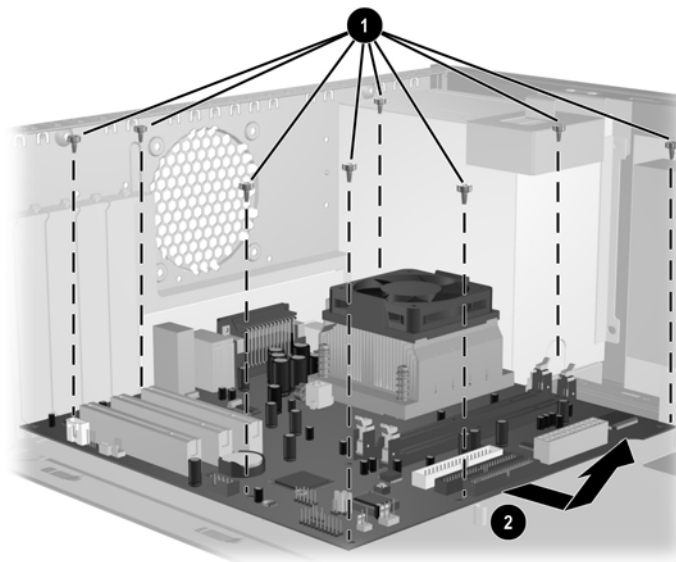


It is not necessary to remove the chassis fan from the chassis.

7. Disconnect all cables from the system board.
8. Remove the heatsink from the system board (Section 6.12, “Processor and Heatsink”).
9. Remove the 8 screws that secure the system board to the chassis ❶.
10. Slide the system board towards the front of the chassis ❷ to remove it.



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



To install the system board, reverse the removal procedure.

6.14 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.

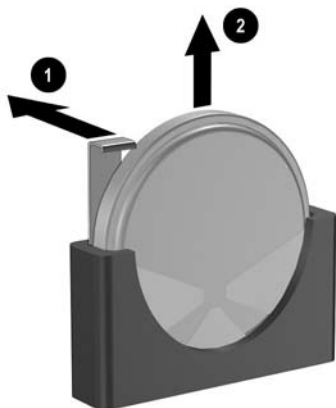
1. Prepare the computer for disassembly ([Section 6.1, “Preparation for Disassembly”](#)).
2. Remove the right access panel ([Section 6.2, “Access Panel”](#)).



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.

4. To release the battery from its holder, push away the metal clamp that extends above one edge of the battery ❶. When the battery pops up, lift it out ❷.
5. To insert the new battery, slide one edge of the replacement battery in with the positive side pointing to the metal retaining clamp as shown, until the clamp snaps over the other edge of the battery.



After the battery has been replaced, use the following steps to complete this procedure.

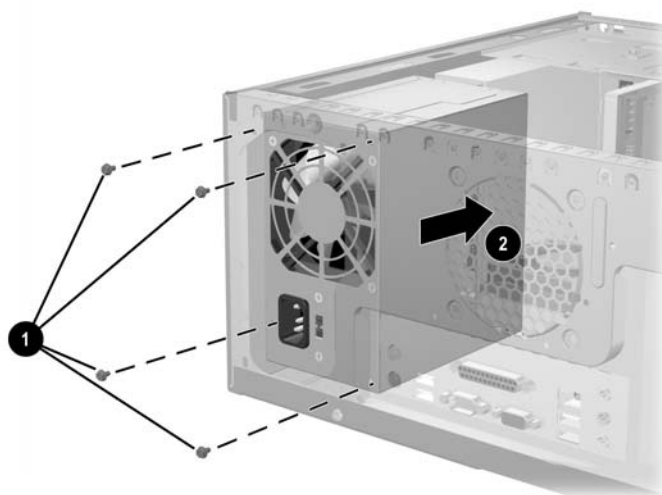
6. Replace the computer cover or access panel.
7. Plug in the computer and turn on power to the computer.

Reset the date and time, your passwords, and any special system setups, using Computer Setup.

6.15 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 right 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.




It is easier to install the power supply if the chassis is turned upside down. This will give you better control when supporting the power supply in the chassis to install the first retaining screw.


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

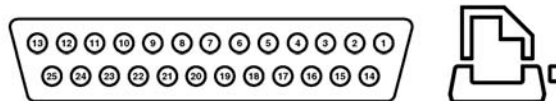
Connector and Icon	Pin	Signal
	1	Data
	2	Unused
	3	Ground
	4	+5 VDC
	5	Clock
	6	Unused

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

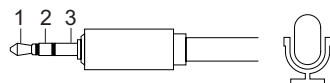
Connector and Icon



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

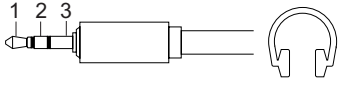
Microphone

Connector and Icon (1/8" miniphone)

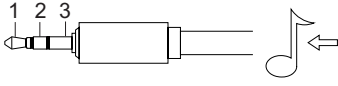


Pin	Signal
1 (Tip)	Audio
2 (Ring)	Power
3 (Shield)	Ground

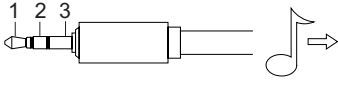
Headphone

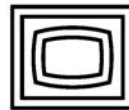
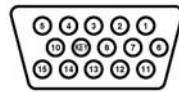
Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_Left
	2 (Ring)	Audio_Right
	3 (Shield)	Ground

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

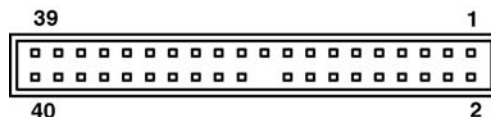
Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_Out_Left
	2 (Ring)	Audio_Out_Right
	3 (Shield)	Ground

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

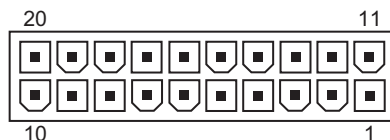
Connector



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		

20-Pin Power

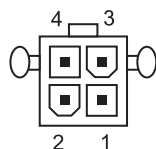
Connector



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

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

4-Pin Power (for CPU)



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 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 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 .

POST Error Messages

Screen Message	Probable Cause	Recommended Action
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.
Keyboard Error	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.
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.


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.
Cannot remove computer cover or access panel.	Smart Cover Lock, featured on some computers, is locked.	<ol style="list-style-type: none"> 1. Unlock the Smart Cover Lock using Computer Setup. 2. Use the Smart Cover FailSafe Key in case of forgotten password, power loss, or computer malfunction.
Poor performance is experienced.	Processor is hot.	<ol style="list-style-type: none"> 1. Ensure airflow to the computer is not blocked. 2. Ensure the fans are connected and working properly (some fans only operate when needed). 3. Ensure the processor heatsink is installed properly.
	Hard drive is full.	Transfer data from the hard drive to create more space on the hard drive.

Solving Minor Problems *(Continued)*

Problem	Cause	Possible Solution
Computer powered off automatically and the Power LED flashes Red two times, once every second, followed by a two second pause.	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 Red two times, once every second, followed by a two second pause.	Processor thermal protection activated: A fan may be blocked or not turning.	<ol style="list-style-type: none"> 1. Ensure that the computer air vents are not blocked and the cooling fan is running. 2. Open hood, press the power button, and see if the processor fan spins. If the processor fan is not spinning, make sure the fan's cable is plugged onto the system board header. Ensure the fan is fully/properly seated or installed. 3. Replace the processor fan. 4. Reseat processor heatsink and verify that the fan assembly is properly attached.
	OR The heatsink/fan assembly is not properly attached to the processor.	

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.
"Invalid system disk" message is displayed.	Diskette is damaged.	Replace the diskette with a new one.
	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.
Cannot Boot to Diskette.	Diskette error has occurred.	Restart the computer by pressing the power button.
	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.

Solving Hard Drive Problems *(Continued)*

Problem	Cause	Solution
Disk transaction problem.	Either the directory structure is bad or there is a problem with a file.	In Windows XP, right-click Start , click Explore , and select a drive. Select File > Properties > Tools . Under Error-checking , click Check Now .
Drive not found (identified).	Loose cable.	Check cable connections.
	The system may not have automatically recognized a newly installed device.	<ol style="list-style-type: none"> 1. Run Computer Setup. 2. If the system still does not recognize the new device, check to see if the device is listed within Computer Setup. If it is listed, the probable cause is a driver problem. If it is not listed, the probable cause is a hardware problem. 3. If this is a newly installed drive, enter Setup and try adding a POST delay under Advanced > Power-On.
	Drive jumper settings may be incorrect.	If the drive is a secondary drive that has just been installed on the same cable as the primary drive, verify that the jumpers for both drives are set correctly.
	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.
Nonsystem disk/NTLDR missing message. (continued)	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.


Solving Hard Drive Problems *(Continued)*

Problem	Cause	Solution
	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.
Second Ultra ATA hard drive does not perform optimally.	Using the wrong cable for the drive type.	Reinstall the second Ultra ATA hard drive using an 80-conductor cable (standard on select models.)
	Both slow and fast UATA devices are on the same data cable.	Connect slower UATA devices to a separate data cable connected to the secondary IDE (ATA) controller.
Computer will not start.	Hard drive is damaged.	Observe the beeps and LED lights on the front of the computer. See Appendix C, "POST Error Messages" .
Computer seems to be locked up.	Program in use has stopped responding to commands.	<ol style="list-style-type: none"> 1. Attempt the normal Windows "Shut Down" procedure. 2. Press the power button for four or more seconds to turn off the power. 3. Restart the computer using the power button.

Solving Display Problems

Solving Display Problems

Problem	Cause	Solution
Blank screen (no video).	The cable connections are not correct.	Check the cable connections from the monitor to the computer and to the electrical outlet.
	Screen blanking utility installed or energy saver features enabled.	Press any key or click the mouse button and, if set, type your password.
	System ROM is bad; system is running in FailSafe Boot Block mode (indicated by eight beeps).	Reflash the ROM using a ROMPaq diskette.
	Fixed-sync monitor will not sync at the resolution chosen.	Ensure that the monitor can accept the same horizontal scan rate as the resolution chosen.
	Computer is in standby mode.	Press the power button to resume from standby mode.

 **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, and the computer beeps six times.	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.


Solving Display Problems (Continued)

Problem	Cause	Solution
Clicking noise coming from inside a CRT monitor.	Electronic relays have been activated inside the monitor.	None. It is normal for some monitors to make a clicking noise when turned on and off, when going in and out of standby mode, and when changing resolutions.
High pitched noise coming from inside a flat panel monitor.	Brightness and/or contrast settings are too high.	Lower brightness and/or contrast settings.
Fuzzy focus; streaking, ghosting, or shadowing effects; horizontal scrolling lines; faint vertical bars; or unable to center the picture on the screen. (flat panel monitors using an analog VGA input connection only)	Flat panel monitor's internal digital conversion circuits may be unable to correctly interpret the output synchronization of the graphics card.	<ol style="list-style-type: none"> 1. Select the monitor's Auto-Adjustment option in the monitor's on-screen display menu. 2. Manually synchronize the Clock and Clock Phase on-screen display functions. Download SoftPaq SP20930 or SP22333, depending on the monitor, to assist with the synchronization.
Certain typed symbols do not appear correct.	The font you are using does not support that particular symbol.	Use the Character Map to locate the and select the appropriate symbol. Click Start > All Programs > Accessories > System Tools > Character Map . You can copy the symbol from the Character Map into a document.


Solving Audio Problems

Solving Audio Problems

Problem	Cause	Solution
Sound 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.	<ol style="list-style-type: none"> 1. Check the paper tray and refill it if it is empty. 2. Select online.

Solving Keyboard and Mouse Problems

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

Solving Hardware Installation Problems

You may need to reconfigure the computer when you add or remove hardware, such as an additional diskette drive. If you install a plug and play device, Windows XP automatically recognize the device and configure the computer. If you install a non–plug and play device, you must reconfigure the computer after completing installation of the new hardware. In Windows 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. The computer beeps at the same rate and at the same time as the LED flashes.	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>  The network status light should flash when there is network activity.	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
Diagnosics 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. Also, five simultaneous beeps will be heard.	Memory is installed incorrectly or is bad.	<ol style="list-style-type: none"> 1. Reseat DIMMs. 2. Replace DIMMs one at a time to isolate the faulty module. 3. Replace third-party memory with HP memory. 4. Replace the system board.

Solving Processor Problems

Solving Processor Problems		
Problem	Cause	Solution
Poor performance is experienced.	Processor is hot.	<ol style="list-style-type: none"> 1. Make sure the airflow to the computer is not blocked. 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 DiskOnKey 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.	<i>Windows XP</i> <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.

Memory

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

The memory sockets on the system board can be populated with up to four industry-standard DIMMs. These memory module slots are populated with at least one preinstalled memory module. To achieve the maximum memory support, you can populate the system board with up to 4GB of memory configured in a high-performing dual channel mode.

For proper system operation, if the computer supports DDR-SDRAM DIMMs, the DIMMs must be industry-standard 184-pin, unbuffered PC2700 333 MHz- or PC3200 400 MHz-compliant, 2.5 volt DDR-SDRAM DIMMs. The DDR-SDRAM DIMMs must also:

- support CAS latency 2.5 or 3 (CL = 2.5 or CL=3)
- contain the mandatory JEDEC SPD information

In addition, the computer supports:

- 128Mbit, 256Mbit, and 512Mbit 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 following processor bus frequencies are required for the system to run at the supported memory frequencies.

Memory Frequency	Required Processor Bus Frequency
266 MHz	400 MHz, 533 MHz, or 800 MHz
333 MHz	533 MHz or 800 MHz
400 MHz	800 MHz

If a memory frequency is paired with an unsupported processor bus frequency, the system will run at the highest supported memory speed. For example, if a 333 MHz DIMM is paired with a 400 MHz processor bus, the system will run at 266 MHz, the highest supported memory speed.



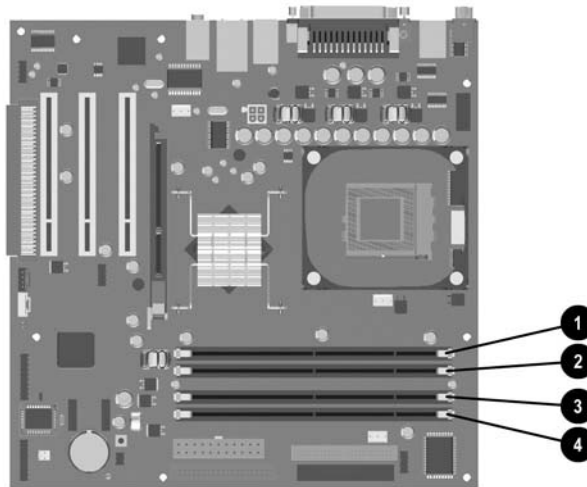
The system will not start if you install unsupported DIMMs.

DIMM Sockets

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



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



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

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

- In single channel mode, the maximum operational speed is determined by the slowest DIMM in the system. For example, if the system is populated with a DIMM that is 266 MHz and a second DIMM that is 333 MHz, the system will run at the slower of the two speeds.
- In dual channel mode, the DIMM pairs must be identically matched. DIMMs in the XMM1 and XMM3 black sockets must be identical; DIMMs in the XMM2 and XMM4 blue sockets must also be identical. Therefore, if you have one preinstalled DIMM in socket XMM1 and are adding a second DIMM, it is recommended that you install an identical DIMM into the XMM3 socket.

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