Maintenance & Service Guide

HP Omni Pro 110 All-in-One PC

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HP Omni Pro 110 All-in-One PC

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About This Book

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

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

NOTE: Text set off in this manner provides important supplemental information.

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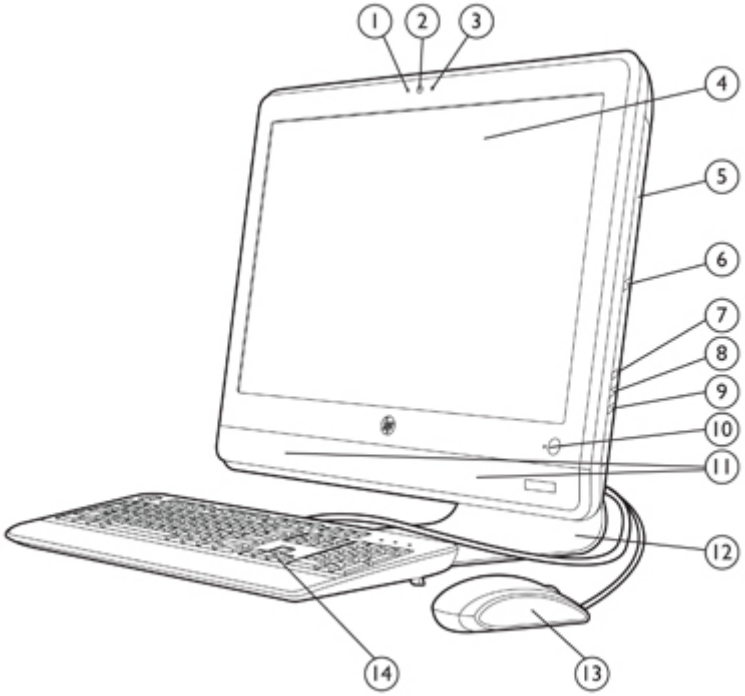
1 Product Features

The HP Compaq 6000 Pro All-In One Business PC offers the following features:

- Processors: Intel® Pentium™ Dual Core, Core™ 2 Duo, and Celeron Core 2 Duo processors up to 65w
- Chipset: Intel G41
- Display panel: 20” 16:9 1600x900 TN CCFL non glare
- Memory: DDR3-1333; 2 SODIMMs, 4 GB maximum
- Optical drive: 1 SlimTray DVDRW
- Graphics: UMA graphics only, GMA X4500
- Power supply: 150W
- Connectivity: Gigabit; b/g/n (1x1 with 1 internal antenna)
- Keyboard: wired
- Mouse: wired
- Webcam: VGA low light, single mic
- Audio: AMD (Realtek ALC269)
- Preinstalled operating systems:
  - Windows 7 Professional Edition 32 with optional XP Mode (Americas)
  - Windows 7 Professional Edition 64 with optional XP Mode (Americas)
  - Windows 7 Starter Edition 32 (Latin America only)
  - Windows 7 Home Basic 64 (Latin America only)
  - FreeDOS (Latin America only)
  - Red Flag Linux (Latin America only)
- Card reader: 6-in-1 using ALCOR Micro AU6433
- SATA drives: 2 total: 1x 3.5" HDD + 1x slim slot ODD @ 3Gb/s
- Side I/O: Card reader, 2x USB-2, Mic-In and Headphone
- Rear I/O: Power-In, RJ45, Audio-Out, 4x USB-2

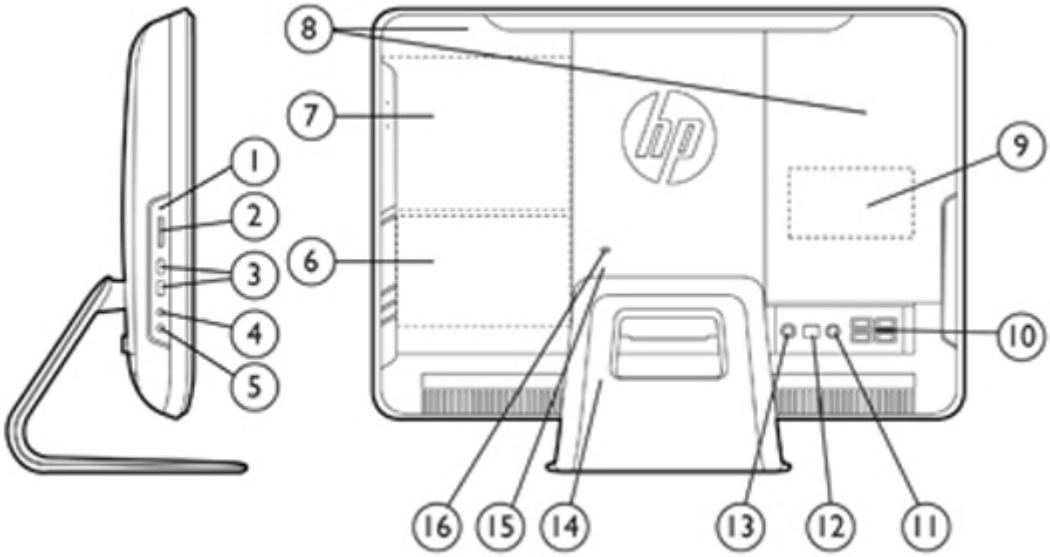
- Expansion slot: 1x half-size – for WLAN only
- Ethernet LAN: Realtek RL8111E 10/100/1000

Front Components



Component		Component	
(1)	Webcam LED indicator (optional)	**(8)**	Brightness decrease button
(2)	Webcam (optional)	**(9)**	Drive activity LED
(3)	Integrated microphone (optional along w/ webcam)	**(10)**	Power button and LED
(4)	20-inch diagonal 16:9 widescreen 1600 x 900 LCD display	**(11)**	High-performance stereo speakers
(5)	Optical drive	**(12)**	Adjustable tilt stand
(6)	Optical drive eject button	**(13)**	HP optical mouse
(7)	Brightness increase button	**(14)**	HP low-profile keyboard with numeric keypad

Rear and Side Components



Component		Component	
(1)	Media Card Reader LED	**(9)**	Memory access
(2)	HP 6-in-1 Media Card Reader	**(10)**	(4) USB 2.0 ports
(3)	(2) USB 2.0 ports	**(11)**	Stereo audio line out
(4)	Microphone jack	**(12)**	RJ-45 Gigabit Ethernet port
(5)	Headphone jack	**(13)**	Power connector with LED indicator
(6)	Hard drive access (must remove panel)	**(14)**	Adjustable tilt stand
(7)	Optical drive access (must remove panel)	**(15)**	Access cover panel
(8)	Removable access panels (must remove panel)	**(16)**	Lock slot

2 Installing and Customizing the Software

If your computer was not shipped with a Microsoft operating system, some portions of this documentation do not apply. Additional information is available in online help after you install the operating system.

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

NOTE: Be sure there is a 10.2-cm (4-inch) clearance at the back of the unit and above the monitor to permit the required airflow.

Installing the Operating System

The first time you turn on the computer, the operating system is installed automatically. This process takes about 5 to 10 minutes, depending on which operating system is being installed. Carefully read and follow the instructions on the screen to complete the installation.

⚠ **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 may damage the software that runs the computer or prevent its proper installation.

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

If your computer was not shipped with a Microsoft operating system, some portions of this documentation do not apply. Additional information is available in online help after you install the operating system.

Downloading Microsoft Windows Updates

1. To set up your Internet connection, click **Start** > **Internet Explorer** and follow the instructions on the screen.
2. Once an Internet connection has been established, click the **Start** button.
3. Select the **All Programs** menu.

4. Click on the **Windows Update** link.

   In Windows 7, the **Windows Update** screen appears. Click **view available updates** and make sure all critical updates are selected. Click the **Install** button and follow the instructions on the screen.

   It is recommended that you install all of the critical updates and service packs.

5. After the updates have been installed, Windows will prompt you to reboot the machine. Be sure to save any files or documents that you may have open before rebooting. Then select **Yes** to reboot the machine.

Installing or Upgrading Device Drivers (Windows systems)

When installing optional hardware devices after the operating system installation is complete, you must also install the drivers for each of the devices.

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

Obtain the latest support software, including support software for the operating system from http://www.hp.com/support. Select your country and language, select **Download drivers and software (and firmware)**, enter the model number of the computer, and press Enter.

Protecting the Software

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

3 Computer Setup (F10) Utility

Computer Setup (F10) Utilities

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

- Change factory default settings.
- Set the system date and time.
- Set, view, change, or verify the system configuration, including settings for graphics, audio, storage, communications, and input devices.
- View settings for processor and memory.
- Modify the boot order of bootable devices such as hard drives, optical drives, or USB flash media devices.
- Run hard drive self-tests.
- Establish a supervisor password that controls access to Computer Setup (F10) Utility and the settings described in this section.

Using Computer Setup (F10) Utilities

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

1. Turn on or restart the computer.
2. Press either Esc or F10 while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.

   Pressing Esc displays a menu that allows you to access different options available at startup.

   NOTE: If you do not press Esc or F10 at the appropriate time, you must restart the computer and again press Esc or F10 when the monitor light turns green to access the utility.

3. If you pressed Esc, press F10 to enter Computer Setup.
4. The Computer Setup Utility screen is divided into menu headings and actions.

   Five menu headings appear on the Computer Setup Utility screen:

   - Main
   - Advanced

- Power
- Boot
- Exit

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

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

Computer Setup—Main

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

Table 3-1 Computer Setup—Main

Option	Description
System Time	Allows you to set system time.
System Date	Allows you to set system date.
System IDs	(view only) Product Name Serial Number UUID SKU Number Family Name Asset Tag Feature Byte Build ID
Language	Allows you to select language.
Floppy Diskette A	Specifies the capacity and physical size, if installed.

Table 3-1 Computer Setup—Main (continued)

1st Drive **2nd Drive**	For each, allows you to set: • Port Configuration - enable/disable (default is enabled) Capacity (Size - HDD only; view only) Transfer mode (view only) • Smart Support - run HDD self-test for selected channel: ◦ SMART Status Check ◦ SMART Short Self-Test ◦ SMART Extended Self-Test
System Information	(view only) • Installed Memory • Memory Bank 1 • Memory Bank 2 • BIOS Revision • Core Version

Computer Setup—Advanced

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

WARNING! Setting items on this menu to incorrect values may cause your system to malfunction.

Table 3-2 Computer Setup—Advanced

Option	Description
CPU Type	(view only)
CPU Speed	(view only)
Cache RAM	(view only)
Supervisor Password	Allows you to establish, disable, or change the supervisor password.
User Password	Allows you to establish, disable, or change the user password. **NOTE:** Only displays if a Supervisor password is set.
Onboard LAN	Allows you to disable/enable onboard LAN controller. Default is enabled.
Onboard WLAN	Allows you to disable/enable onboard WLAN controller. Default is enabled.
Onboard LAN Boot ROM	Allows you to disable/enable the boot ROM of the onboard LAN chip. Default is enabled.
Onboard 1394	Allows you to enable/disable all 1394 ports. Default is enabled.
Primary Video Adapter	Allows you to select the boot display device when more than 2 video options are offered by the system: • Integrated (Onboard) • PCI-E
SATA Controller	Allows you to disable/enable the SATA controller. Default is enabled.
SATA Controller Mode	If SATA Controller is enabled, allows you to set the mode to: • IDE • AHCI (default)
Onboard Audio	Allows you to set the onboard audio to: • Auto (default) • Disabled • Enabled
USB Ports	Allows you to individually disable/enable USB ports. Default is enabled.
Change Supervisor Password	Allows you to change the supervisor password. Press Enter to change the password. Press Enter again to disable the password.

Computer Setup—Power

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

Table 3-3 Computer Setup—Power

Option	Description
After AC Power Failure	Allows you to select system restart behavior after power loss: • Stay Off (default) • Power On • Auto
XD(Execute Disable)	Disables/enables XD bit. Default is enabled.
Virtualization Technology	Allows you to enable/disable the virtualization features of the processor. Changing this setting requires turning the computer off and then back on. Default is disabled.
WOL in S5	Allows you to enable/disable limited (normal shutdown) WOL from S5 support. Default is disabled.

Computer Setup—Boot

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

Table 3-4 Computer Setup—Boot

Option	Description
Boot-time Diagnostic Screen	Disables/enables POST diagnostic messages display. Default is disabled.
ESC: Boot Menu	Enables/disables the ability to press the Esc key to access the boot menu during boot.
F9: Diagnostics	Enables/disables the ability to press the F9 key to access the Diagnostics menu during boot.
F10: Setup	Enables/disables the ability to press the F10 key to access the Setup menu during boot.
F11: Recovery	Enables/disables the ability to press the F11 key to access the recovery menu during boot.
F12: Boot from LAN	Enables/disables the ability to press the F12 key to boot from LAN.
Boot Device Priority **1st Boot Device** **2nd Boot Device** **3rd Boot Device** **4th Boot Device**	Allows you to specify which device groups will boot first, second, third, and fourth or to disable any of the four: • Floppy Group • CD-ROM Group • Hard Drive Group • Network Boot Group **NOTE:** MS-DOS drive lettering assignments may not apply after a non-MS-DOS operating system has started.
Floppy Group Boot Priority	Specifies boot device priority within removable devices. Press Enter to select the device, up or down arrow to move the selected device, Enter to select the device, Esc to abort.
CD-ROM Group Boot Priority	Specifies boot device priority within CD/DVD drives.

Table 3-4 Computer Setup—Boot (continued)

Hard Drive Group Boot Priority	Specifies boot device priority within hard drives.
Network Group Boot Priority	Specifies boot device priority within bootable network devices.

Computer Setup—Exit

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

Table 3-5 Computer Setup—Exit

Option	Description
Exit Saving Changes	Press Enter to exit saving changes.
Exit Discarding Changes	Press Enter to exit discarding changes.
Load Setup Defaults	Press Enter to load setup defaults.
Discard Changes	Press Enter to discard changes.
Save Changes	Press Enter to save changes.

Recovering the Configuration Settings

To reset all BIOS Setup options to their default values (including options for Ctrl+F10), you must enter F10 Setup mode and press F5.

This does not include updates to **system date**, **system time**, **supervisor password**, **user password**, and **CPU frequency multiplier**.

4 Serial ATA (SATA) Drive Guidelines and Features

NOTE: HP only supports the use of SATA hard drives on these models of computer. No Parallel ATA (PATA) drives are supported.

SATA Hard Drives

Serial ATA Hard Drive Characteristics	
Number of pins/conductors in data cable	7/7
Number of pins in power cable	15
Maximum data cable length	39.37 in (100 cm)
Data interface voltage differential	400-700 mV
Drive voltages	3.3 V, 5 V, 12 V
Jumpers for configuring drive	N/A
Data transfer rate	3.0 Gb/s

SATA Hard Drive Cables

SATA Data Cable

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

Current HP desktop products ship with SATA 3.0 Gb/s hard drives.

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

The SATA data cable is a thin, 7-pin cable designed to transmit data for only a single drive.

SMART ATA Drives

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

Hard Drive Capacities

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

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

Drive/Partition Capacity Limits

			Maximum Size	
File System	**Controller Type**	**Operating System**	**Partition**	**Drive**
FAT 32	ATA	Windows XP/Vista/Windows 7	32 GB	2 TB
NTFS	ATA	Windows XP/Vista/Windows 7	2 TB	2 TB

5 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.

Chassis Designation

An all-in one form factor is available.

All-in One

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.

Generating Static

The following table shows that:

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

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

*DIPs are Dual in-line packages, used for packaging integrated circuits.

DIPs are multi-packaged inside plastic tubes, trays, or Styrofoam.

NOTE: 700 volts can degrade a product.

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.

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 ± 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 ± 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

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.

Recommended Materials and Equipment

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

- Antistatic tape
- Antistatic smocks, aprons, or sleeve protectors
- Conductive bins and other assembly or soldering aids
- Conductive foam
- Conductive tabletop workstations with ground cord of one-megohm +/- 10% resistance
- Static-dissipative table or floor mats with hard tie to ground
- Field service kits
- Static awareness labels
- Wrist straps and footwear straps providing one-megohm +/- 10% resistance
- Material handling packages
- Conductive plastic bags
- Conductive plastic tubes
- Conductive tote boxes
- Opaque shielding bags
- Transparent metallized shielding bags
- Transparent shielding tubes

Operating Guidelines

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

- Keep the computer away from excessive moisture, direct sunlight, and extremes of heat and cold.
- Operate the computer on a sturdy, level surface. Leave a 10.2-cm (4-inch) clearance on all vented sides of the computer and above the monitor to permit the required airflow.
- Never restrict the airflow into the computer by blocking any vents or air intakes. Do not place the keyboard, with the keyboard feet down, directly against the front of the desktop unit as this also restricts airflow.
- Occasionally clean the air vents on all vented sides of the computer. Lint, dust, and other foreign matter can block the vents and limit the airflow. Be sure to unplug the computer before cleaning the air vents.
- Never operate the computer with the cover removed.
- Do not place computers so near each other that they are subject to each other's re-circulated or preheated air.
- Keep liquids away from the computer and keyboard.

- Never cover the ventilation slots on the monitor with any type of material.
- Install or enable power management functions of the operating system or other software, including sleep states.

Routine Care

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.

Cleaning the Computer Case

Follow all safety precautions in General Cleaning Safety Precautions on page 18 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.

Cleaning the Keyboard

Follow all safety precautions in General Cleaning Safety Precautions on page 18 before cleaning the keyboard.

To clean the tops of the keys or the keyboard body, follow the procedures described in Cleaning the Computer Case on page 18.

When cleaning debris from under the keys, review all rules in General Cleaning Safety Precautions on page 18 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.

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 Cleaning the Computer Case on page 18.

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 Cleaning the Computer Case on page 18.

Service Considerations

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

Tools and Software Requirements

To service the computer, you need the following:

- Torx T-15 screwdriver (HP screwdriver with bits, PN 161946-001)
- Flat-bladed screwdriver (may sometimes be used in place of the Torx screwdriver)
- Phillips #2 screwdriver
- Diagnostics software
- HP tamper-resistant T-15 wrench (Smart Cover FailSafe Key, PN 166527-001) or HP tamper-resistant bits (Smart Cover FailSafe Key, PN 166527-002)

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.

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

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.

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 Electrostatic Discharge Information on page 15
- 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.

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 140ºF (60ºC). Do not attempt to recharge the battery.

NOTE: 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, their authorized partners, or their agents.

6 Illustrated parts catalog

Computer major components

Item	Description	Spare part number
(1)	**Display panel, 20-inch, non-glare**	646794-001
(2)	**Front bezel kit**	704214-001
	Memory modules (PC3-10600, 1333-MHz; not illustrated)	
	2-GB	651609-001
	1-GB	651608-001
(3)	**Heat sink assembly (thermal module)** (includes replacement thermal material)	651607-001
(4)	**Fan**	651606-001
(5)	**Power button board**	651585-001
(6)	**System board**	648965-001
	Thermal pads (installed under system board; not illustrated)	
	DIMM thermal pad (20mm x 50mm x 2.5mm)	651595-001
	VRM thermal pad (15mm x 40mm x 4mm)	651596-001
(7)	**WLAN module (802.11b/g/n) (1x1 mini card)**	634906-001
(8)	**Inverter board**	651601-001
(9)	**Webcam module**	651586-001
(10)	**Speakers**	
	Right speaker	651597-001
	Left speaker	651598-001
(11)	**WLAN antenna cable**	651594-001
(12)	**Inverter cable**	651588-001
(13)	**Optical drive cable**	651590-001
(14)	**LVDS cable**	651589-001
(15)	**Webcam cable**	651591-001
(16)	**Hard drive cable**	651592-001
(17)	**Power button/LED cable**	651593-001
	Processor (includes replacement thermal material; not illustrated))	
	Intel Core2 Duo processors	
	• E8500 (3.16-GHz, 6-MB L2 cache, 1333-MHz FSB)	466170-001
	• E8400 (3.00-GHz, 6-MB L2 cache, 1333-MHz FSB)	509554-001
	• E7600 (3.06-GHz, 3-MB L2 cache, 1066-MHz FSB)	573954-001
	• E7500 (2.93-GHz, 3-MB L2 cache, 1066-MHz FSB)	586745-001
	Intel Pentium processors	
	• E6800 (3.33-GHz, 2-MB L2 cache, 1066-MHz FSB)	631758-001
	• E6700 (3.20-GHz, 2-MB L2 cache, 1066-MHz FSB)	617840-001

Item	Description	Spare part number
	• E5800 (3.20-GHz, 2-MB L2 cache, 800-MHz FSB)	646376-001
	• E5700 (3.00-GHz, 2-MB L2 cache, 800-MHz FSB)	631759-001
	• E5500 (2.80-GHz, 2-MB L2 cache, 800-MHz FSB)	613035-001
	Intel Celeron processor	
	• E3500 (2.70-GHz, 1-MB L2 cache, 800-MHz FSB)	633219-001
	AC adapter, 150W (external; not illustrated)	651587-001
	Hard drive (not illustrated)	
	1000-GB	621418-001
	750-GB	632938-001
	500-GB	621421-001
	320-GB	621420-001
	250-GB	621419-001
	Optical drive (does not include bezel; not illustrated)	597927-001
	Optical drive bezel	651599-001
	Mouse, USB, optical, Portia (not illustrated)	621416-001

Mass storage devices

Description	Spare part number
8X DVD±RW SuperMulti DL Drive with LightScribe	597927-001
Optical drive bracket (not illustrated)	651600-001
Optical drive bezel	651599-001
Hard drive	
1000-GB	621418-001
750-GB	632938-001
500-GB	621421-001
320-GB	621420-001
250-GB	621419-001

Sequential part number listing

Spare part number	Description
466170-001	Intel Core2 Duo E8500 processor (3.16-GHz, 6-MB L2 cache, 1333-MHz FSB)
509554-001	Intel Core2 Duo E8400 processor (3.00-GHz, 6-MB L2 cache, 1333-MHz FSB)

Spare part number	Description
573954-001	Intel Core2 Duo E7600 processor (3.06-GHz, 3-MB L2 cache, 1066-MHz FSB)
586745-001	Intel Core2 Duo E7500 processor (2.93-GHz, 3-MB L2 cache, 1066-MHz FSB)
597927-001	8X DVD±RW SuperMulti DL Drive with LightScribe
613035-001	Intel Core2 Duo E5500 processor (2.80-GHz, 2-MB L2 cache, 800-MHz FSB)
617840-001	Intel Core2 Duo E6700 processor (3.20-GHz, 2-MB L2 cache, 1066-MHz FSB)
621416-001	Mouse, USB, optical, Portia
621418-001	Hard drive, 1000 GB
621419-001	Hard drive, 250 GB
621420-001	Hard drive, 320 GB
621421-001	Hard drive, 500 GB
625256-001	Heat sink assembly, UMA graphic interface (thermal module) (includes replacement thermal material)
631758-001	Intel Pentium E6800 processor (3.33-GHz, 2-MB L2 cache, 1066-MHz FSB)
631759-001	Intel Pentium E5700 processor (3.00-GHz, 2-MB L2 cache, 800-MHz FSB)
632938-001	Hard drive, 750 GB
633219-001	Intel Core2 Duo E3500 processor (2.70-GHz, 1-MB L2 cache, 800-MHz FSB)
634906-001	WLAN module (802.11b/g/n) (1x1 mini card)
646376-001	Intel Pentium E5800 processor (3.20-GHz, 2-MB L2 cache, 800-MHz FSB)
646794-001	Display, 20-inch, non-glare
648965-001	System board
651585-001	Power button board
651586-001	Webcam module
651587-001	AC adapter, 150W (external)
651588-001	Inverter cable
651589-001	LVDS cable
651590-001	Webcam
651591-001	Webcam cable
651592-001	Power button/LED cable
651593-001	Power button/LED cable
651594-001	WLAN antenna cable
651595-001	Thermal pad, DIMM (20mm x 50mm x 2.5mm)
651596-001	Thermal pad, VRM (15mm x 40mm x 4mm)
651597-001	Speaker, right
651598-001	Speaker, left
651599-001	Optical drive bezel

Spare part number	Description
651600-001	Optical drive bracket
651601-001	Inverter board
651606-001	Fan
651607-001	Heat sink assembly (thermal module) (includes replacement thermal material)
651608-001	1-GB memory module (PC3-10600, 1333-MHz)
651609-001	2-GB memory module (PC3-10600, 1333-MHz)
704214-001	Front bezel kit

7 Removal and Replacement Procedures All-in One (AIO) Chassis

The following sections provide information about disassembling various components of the HP Pro All-in-One.

Preparing to Disassemble the Computer

To avoid injury and equipment damage, always complete the following steps in order, when opening the HP Pro All-in-One.

1. Remove all media (CD, DVD, etc.) from the computer.
2. Shut down the computer.
3. After the system has completely shut down, disconnect the power adapter from the back of the HP Pro All-in-One.
4. Disconnect all other attached cables from the back of the computer.
5. Place the computer face down on a soft flat surface. HP recommends that you set down a blanket, towel, or other soft cloth to protect the touch screen surface from scratches or other damage.

⚠ **WARNING!** Beware of sharp edges inside the chassis.

Small Rear Cover

The small rear cover is located above the stand. You must remove it to remove the stand.

To remove the small rear cover:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Position the computer with the rear facing you.
3. Pry the cover loose using the slot in the top of the cover **(1)**, and then lift it off the computer **(2)**.

Figure 7-1 Removing the small rear cover

To replace the cover, reverse the removal procedures.

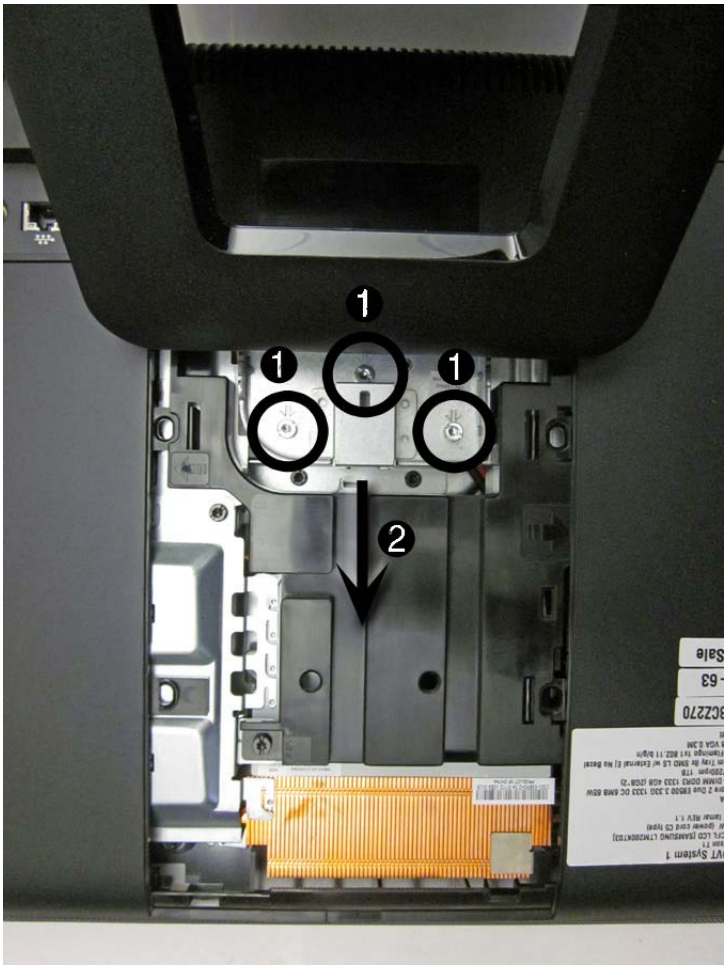
Stand

The stand is secured with three screws.

To remove the stand:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Position the computer with the rear facing you.
3. Remove the small rear cover (see Small Rear Cover on page 28).
4. Remove the three Torx screws **(1)** that secure the stand to the computer.
5. Slide the stand toward the top of the computer **(2)**, and then lift it off the computer.

Figure 7-2 Removing the stand



To replace the stand, reverse the removal procedures.

Left Rear Cover

The left rear cover is located on the left, rear of the computer. You must remove it to access the optical drive and the hard drive.

To remove the left rear cover:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Position the computer with the rear facing you.
3. Remove the small rear cover (see Small Rear Cover on page 28).
4. Remove the stand (see Stand on page 29).
5. Slide the cover toward the left and off the computer.

Figure 7-3 Removing the left rear cover

To replace the left rear cover, reverse the removal procedures.

Optical Drive

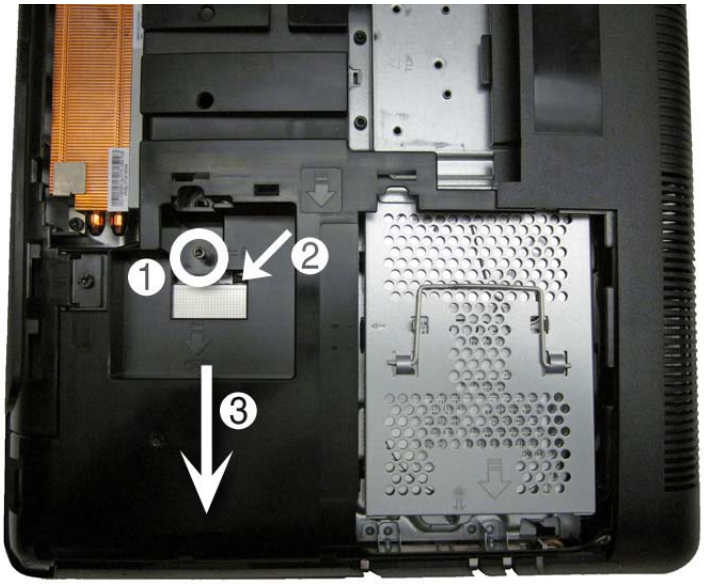
Description	Spare part number
8X DVD±RW SuperMulti DL Drive with LightScribe	597927-001
Optical drive bracket	651600-001
Optical drive bezel	651599-001

The optical drive is located under the left rear cover. It is secured with one screw.

To remove the optical drive:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Position the computer with the rear facing you.
3. Remove the small rear cover (see Small Rear Cover on page 28).
4. Remove the stand (see Stand on page 29).
5. Remove the left rear cover (see Left Rear Cover on page 30).
6. Remove the screw **(1)** that secures the drive to the computer.
7. Insert a flat blade screwdriver into the slot and push **(2)** to disengage the drive, and then slide the drive out of the computer **(3)**.

Figure 7-4 Removing the optical drive



If you need to remove the optical drive bracket from the rear of the optical drive:

Figure 7-5 Optical drive bracket

1. Remove the two screws that secure the bracket to the drive.
2. Remove the bracket from the drive.

To install an optical drive, reverse the removal procedures.

Hard Drive

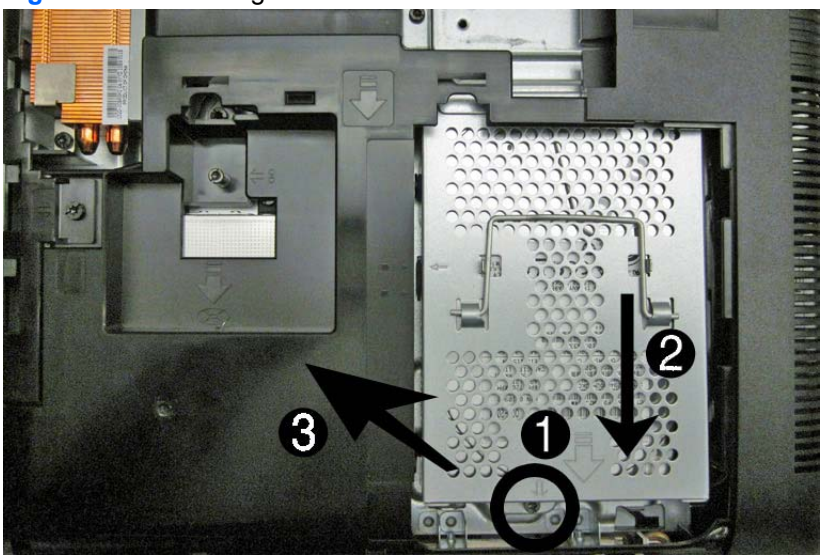
Description	Spare part number
1000-GB	621418-001
750-GB	632938-001
500-GB	621421-001
320-GB	621420-001
250-GB	621419-001

The hard drive is located under the left rear cover next to the optical drive. The hard drive is secured with one captive screw and is housed in a removable cage.

To remove the hard drive:

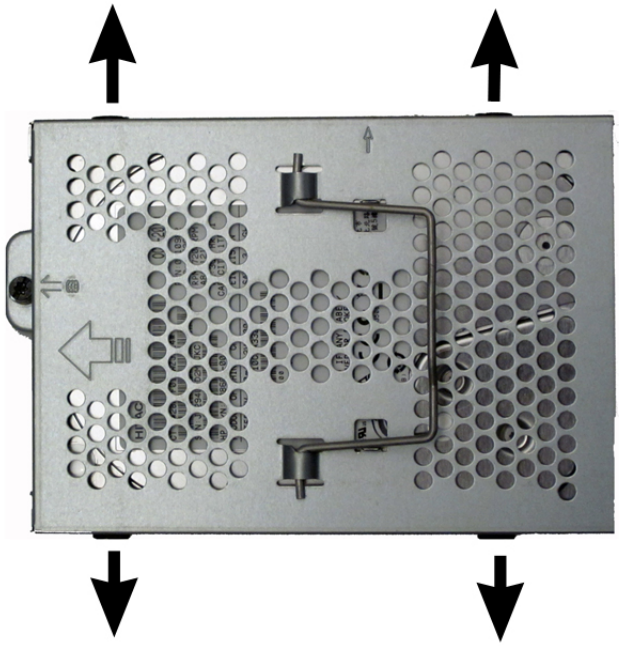
1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Position the computer with the rear facing you.
3. Remove the small rear cover (see Small Rear Cover on page 28).
4. Remove the stand (see Stand on page 29).
5. Remove the left rear cover (see Left Rear Cover on page 30).
6. Loosen the captive screw **(1)** that secures the drive to the computer.
7. Using the drive cage handle **(2)**, slide the cage toward the side of the computer to disengage it from the connector, and then lift the drive out of the computer **(3)**.

Figure 7-6 Removing the hard drive



8. To remove the hard drive from the hard drive cage, remove the four Phillips screws that secure the drive to the cage, and then slide the drive out of the cage.

Figure 7-7 Removing the hard drive from the hard drive cage



To replace the hard drive, reverse the removal procedures.

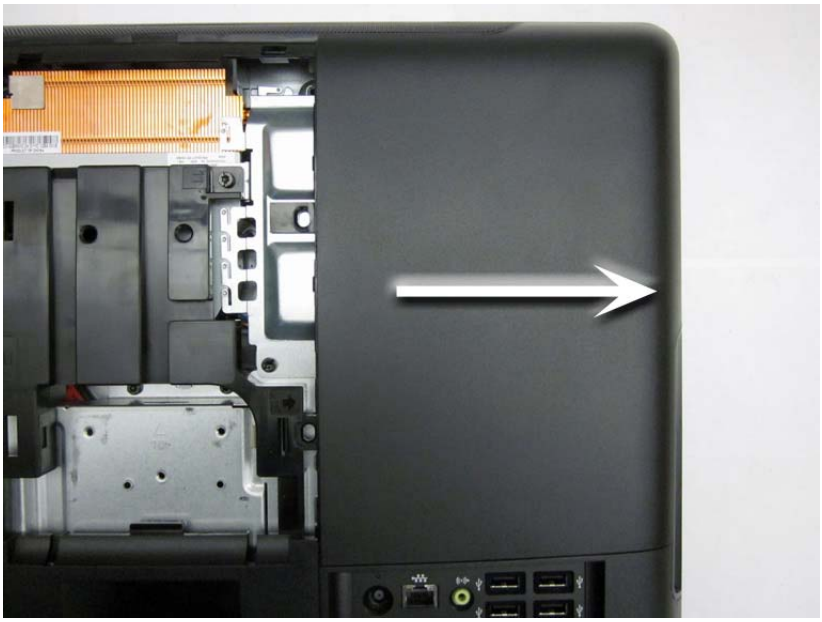
Right Rear Cover

The right rear cover is located on the right, rear of the computer. You must remove it to access memory and system board components.

To remove the right rear cover:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Position the computer with the rear facing you.
3. Remove the small rear cover (see Small Rear Cover on page 28).
4. Remove the stand (see Stand on page 29).
5. Slide the cover toward the right and off the computer.

Figure 7-8 Removing the right rear cover



To replace the right rear cover, reverse the removal procedures.

Memory

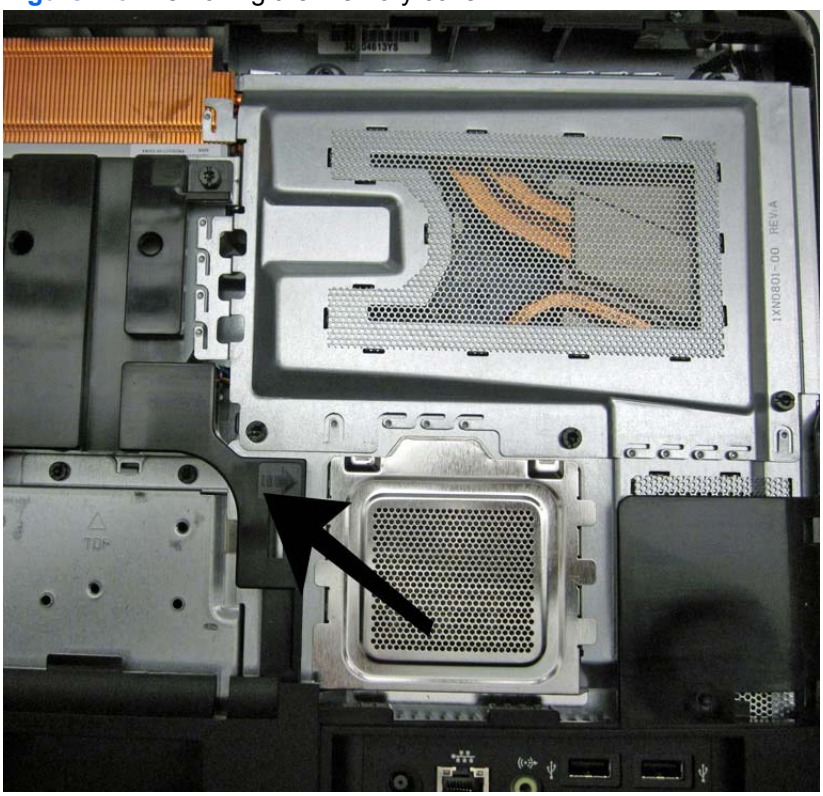
Description	Spare part number
2 GB (PC3-10600, 1333-MHz)	651609-001
1 GB (PC3-10600, 1333-MHz)	651608-001

Memory modules are located on the right side of the computer under the memory cover. The computer has two stacked memory slots.

To remove a memory module:

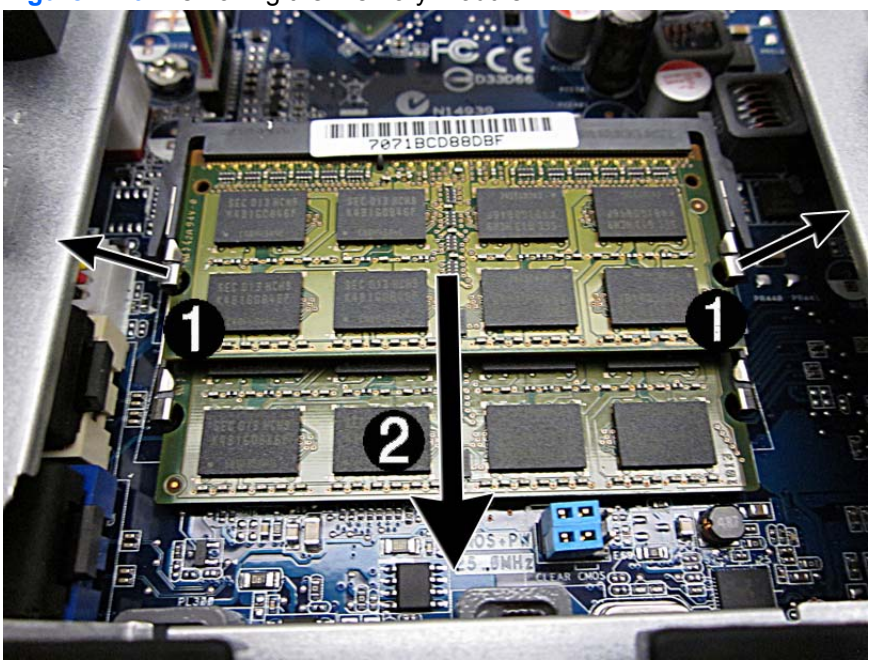
1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Position the computer with the rear facing you.
3. Remove the small rear cover (see Small Rear Cover on page 28).
4. Remove the stand (see Stand on page 29).
5. Remove the right rear cover (see Right Rear Cover on page 35).
6. Lift the memory cover off the computer.

Figure 7-9 Removing the memory cover



7. Open both latches of the memory module socket **(1)**, and remove the memory module from the socket **(2)**.

Figure 7-10 Removing the memory module



NOTE: If you are removing both cards, you must remove the upper one before removing the lower one.

To install a memory module, reverse the removal procedures.

Heat Sink (Thermal Module)

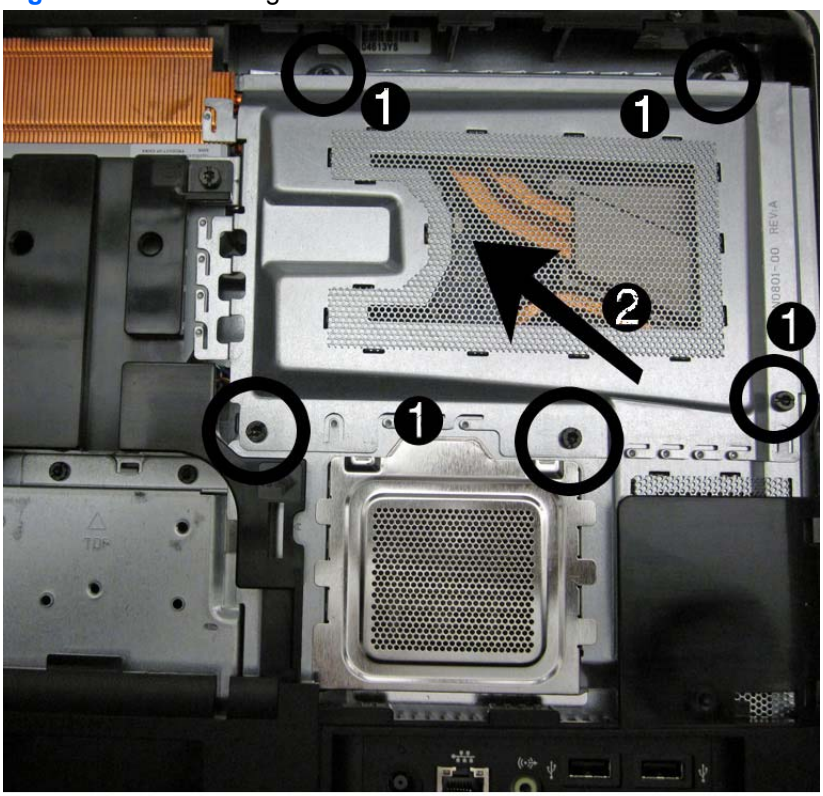
Description	Spare part number
Heat sink (thermal module)	651607-001

The heat sink is secured with five screws and four clips. You have to remove the heat sink cover to access the heat sink.

To remove the heat sink:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Position the computer with the rear facing you.
3. Remove the small rear cover (see Small Rear Cover on page 28).
4. Remove the stand (see Stand on page 29).
5. Remove the right rear cover (see Right Rear Cover on page 35).
6. Remove the heat sink cover by removing the five screws that secure it to the computer **(1)**, and then lifting the cover off the computer **(2)**.

Figure 7-11 Removing the heat sink cover



7. Remove the screw at the top of the heat sink **(1)**.

8. In the order indicated by the numbers stamped into the heat sink, remove the four screws **(2)** that secure the heat sink to the system board.

9. Remove the four clips **(3)** that secure the bottom part of the heat sink over the graphics processor.

NOTE: See the second image below for a closer view of the graphics heat sink levers and hooks.

Figure 7-12 Removing the heat sink

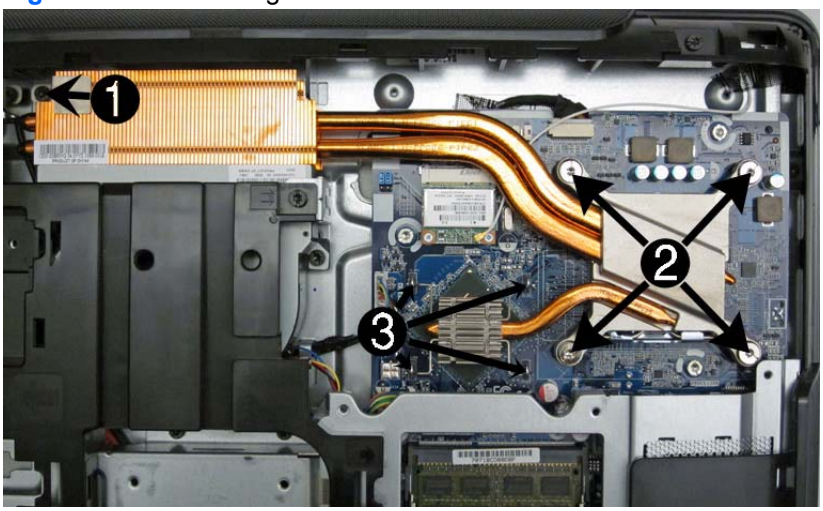
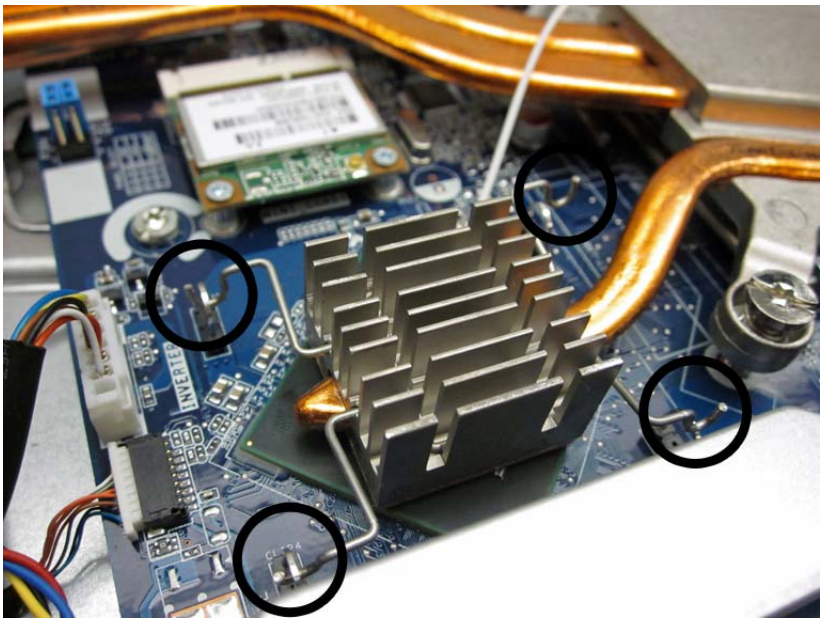


Figure 7-13 Graphics heat sink levers and hooks



10. Lift the heat sink off the system board.

To replace the heat sink, reverse the removal procedures.

Processor

Description	Spare part number
Intel Core2 Duo processors (include replacement thermal material)	
E8500, 6-MB cache, 3.16 GHz	466170-001
E8400, 6-MB cache, 3.00 GHz	509554-001
E7600, 3-MB cache, 3.06 GHz	573954-001
E7500, 3-MB cache, 2.93 GHz	586745-001
Intel Pentium processors (include replacement thermal material)	
E6800, 2-MB cache, 3.33 GHz	631758-001
E6700, 2-MB cache, 3.20 GHz	617840-001
E5800, 2-MB cache, 3.20 GHz	646376-001
E5700, 2-MB cache, 3.00 GHz	631759-001
E5500, 2-MB cache, 2.80 GHz	613035-001
Intel Celeron processor (include replacement thermal material)	
E3500, 1-MB cache, 2.70 GHz	633219-001

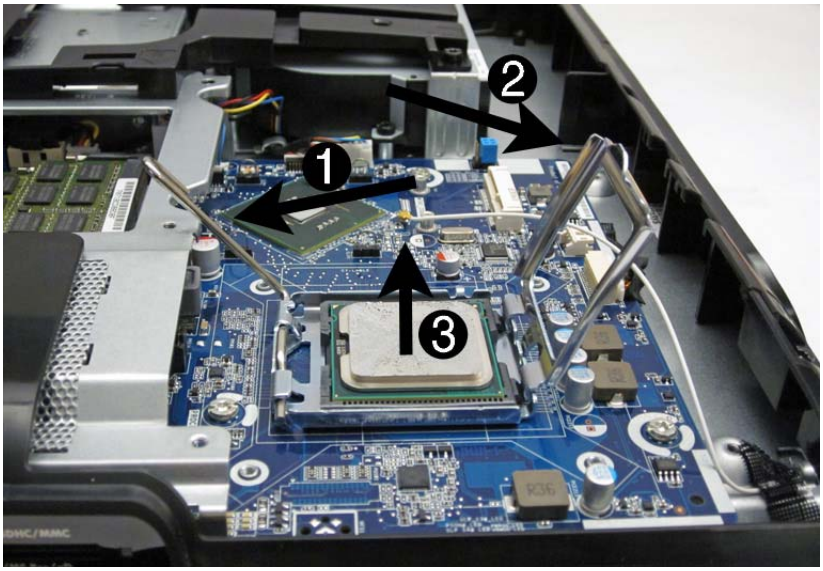
To remove the processor:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Position the computer with the rear facing you.
3. Remove the small rear cover (see Small Rear Cover on page 28).
4. Remove the stand (see Stand on page 29).
5. Remove the right rear cover (see Right Rear Cover on page 35).
6. Remove the heat sink (see Heat Sink (Thermal Module) on page 38).
7. Rotate the locking lever to its full open position **(1)**.
8. Lift the processor cover **(2)**.

9. Carefully lift the processor from the socket **(3)**.

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

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



To install a new processor:

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

   If reusing the existing heat sink, go to step 3.

   If using a new heat sink, go to step 5.
3. If reusing the existing heat sink, clean the bottom of the heat sink with the alcohol pad provided in the spares kit.
4. Apply the thermal material provided in the spares kit to the top of the processor and install the heat sink atop the processor.
5. If using a new heat sink, remove the protective covering from the bottom of the heat sink and place it in position atop the processor.

WLAN Module

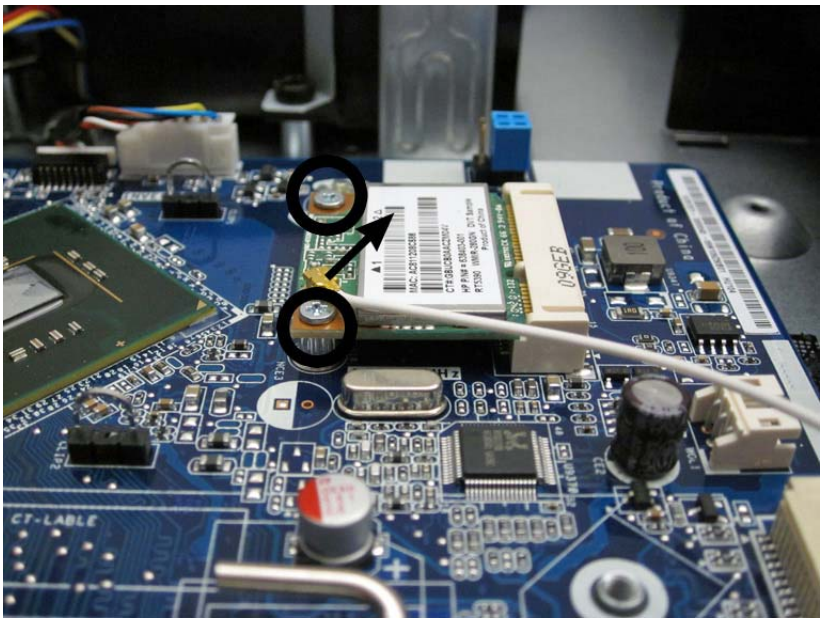
Description	Spare part number
WLAN module (802.11b/g/n) (1x1 mini card)	634906-001

The WLAN module is connected to the system board. The module is secured with two screws and has one connected antenna.

To remove the WLAN module:

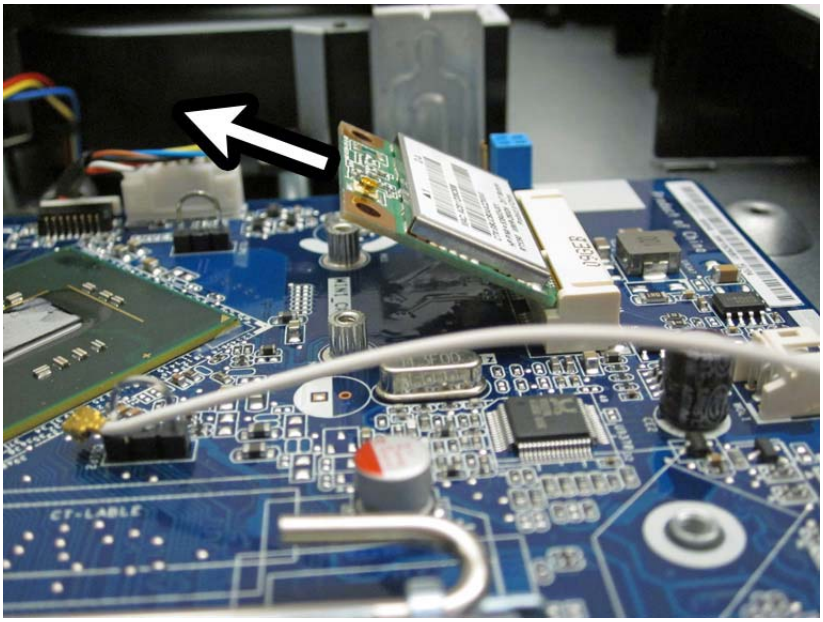
1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Position the computer with the rear facing you.
3. Remove the small rear cover (see Small Rear Cover on page 28).
4. Remove the stand (see Stand on page 29).
5. Remove the right rear cover (see Right Rear Cover on page 35).
6. Remove the heat sink (see Heat Sink (Thermal Module) on page 38).
7. Disconnect the antenna cable from the module, and then remove the screws that secure the module to the computer.

Figure 7-14 Removing the WLAN module screws and antenna



8. Lift the module to a 45-degree angle, and then remove it from the system board.

Figure 7-15 Removing the WLAN module



To install the WLAN module, reverse the removal procedures.

NOTE: WLAN modules are designed with a notch to prevent incorrect insertion.

Webcam Module

Description	Spare part number
Webcam module	651586-001

The webcam module is located at the top of the computer. It is located below an upper cover, is secured with two screws, and has one connector.

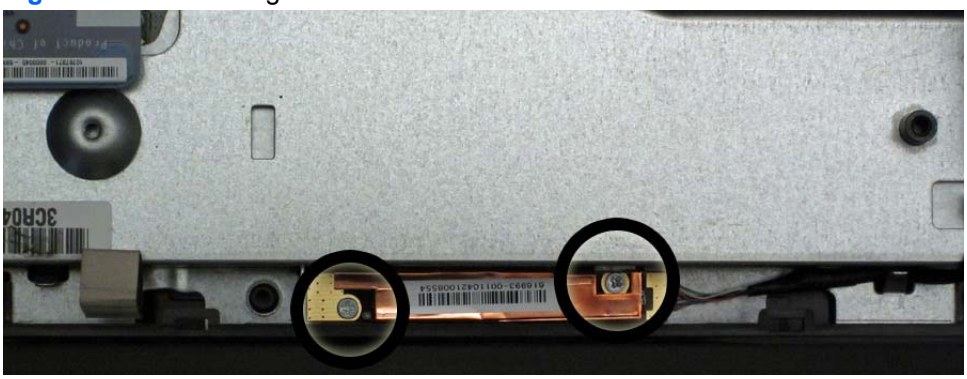
To remove the webcam module:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Position the computer with the top rear facing you.
3. Remove the small rear cover (see Small Rear Cover on page 28).
4. Remove the stand (see Stand on page 29).
5. Remove the right rear cover (see Right Rear Cover on page 35).
6. Remove the heat sink (see Heat Sink (Thermal Module) on page 38).
7. To remove the upper cover that allows access to the webcam, remove the two screws **(1)** that secure the cover to the computer, and then rotate the cover up and off the computer **(2)**.

Figure 7-16 Removing the upper cover

8. Remove the two screws that secure the webcam module to the computer.

Figure 7-17 Removing the webcam module screws



9. Disconnect the webcam cable from the module.

Figure 7-18 Disconnecting the webcam module cable

10. Remove the module from the computer.

To install a webcam module, reverse the removal procedures.

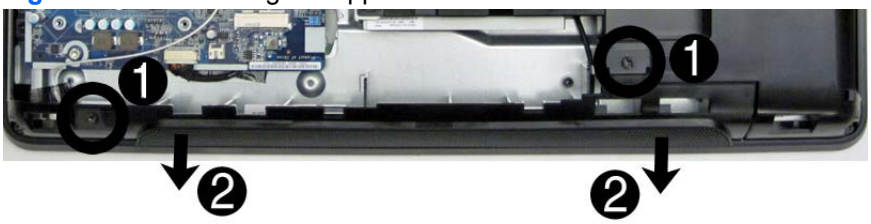
Rear Cover

The rear cover is secured with five screws. You must pry it off at the seams around the edges of the computer, starting at the bottom.

To remove the rear coverl:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Position the computer with the top rear facing you.
3. Remove the small rear cover (see Small Rear Cover on page 28).
4. Remove the stand (see Stand on page 29).
5. Remove the right rear cover (see Right Rear Cover on page 35).
6. Remove the heat sink (see Heat Sink (Thermal Module) on page 38).
7. Remove the upper cover (if not yet removed) by removing the two screws **(1)** that secure the cover to the computer, and then rotating the cover up and off the computer **(2)**.

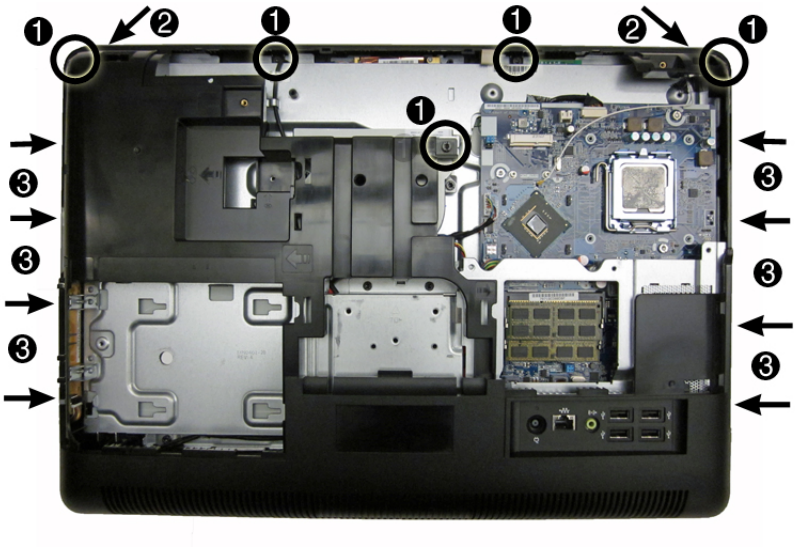
Figure 7-19 Removing the upper cover



8. Remove the five screws**(1)** that secure the rear cover to the computer.

9. Pry the cover off at the top covers **(2)**, and then work around the remainder of the computer prying the cover off **(3)**.

Figure 7-20 Removing the rear cover



10. Remove the rear cover from the computer.

To replace the rear cover, reverse the removal procedures.

Inverter Board

Description	Spare part number
Inverter board	651601-001

The inverter board is located on the left side of the computer under the rear cover. It is secured with two screws and has three connectors.

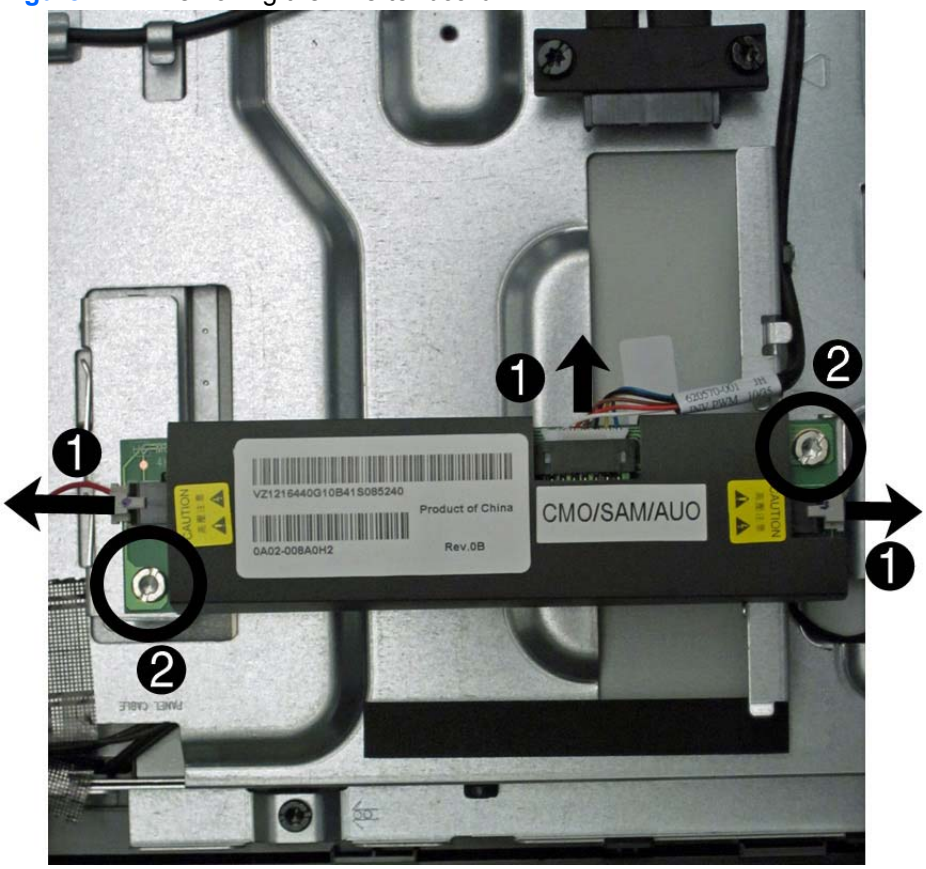
To remove the inverter board:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Remove the small rear cover (see Small Rear Cover on page 28).
3. Remove the stand (see Stand on page 29).
4. Remove the right rear cover (see Right Rear Cover on page 35).
5. Remove the heat sink (see Heat Sink (Thermal Module) on page 38).
6. Remove the rear cover (see Rear Cover on page 46).
7. Disconnect the three cables from the board **(1)**.

NOTE: Be careful not to damage the cables when disconnecting them from the board. Do not pull on the wires.

8. Remove the two screws **(2)** that secure the board to the computer.

Figure 7-21 Removing the inverter board



9. Remove the inverter board from the computer.

To install the inverter board, reverse the removal procedures.

Power Button Board

Description	Spare part number
Power button board	651585-001

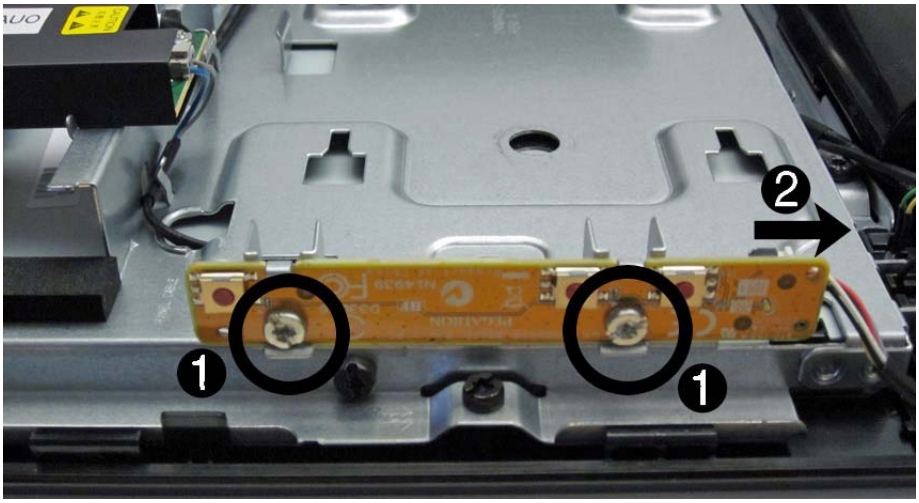
The power button board is mounted on the left side of the computer. It is secured with two screws and has one connector.

To remove the power button board:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Remove the small rear cover (see Small Rear Cover on page 28).
3. Remove the stand (see Stand on page 29).
4. Remove the right rear cover (see Right Rear Cover on page 35).
5. Remove the heat sink (see Heat Sink (Thermal Module) on page 38).
6. Remove the rear cover (see Rear Cover on page 46).
7. Remove the two screws **(1)** that secure the board to the computer.
8. Disconnect the cables from the board **(2)**.

NOTE: Be careful not to damage the cable when disconnecting it from the board. Do not pull on the wires.

Figure 7-22 Removing the power button board



9. Remove the board from the computer.

To install the power button board, reverse the removal procedures.

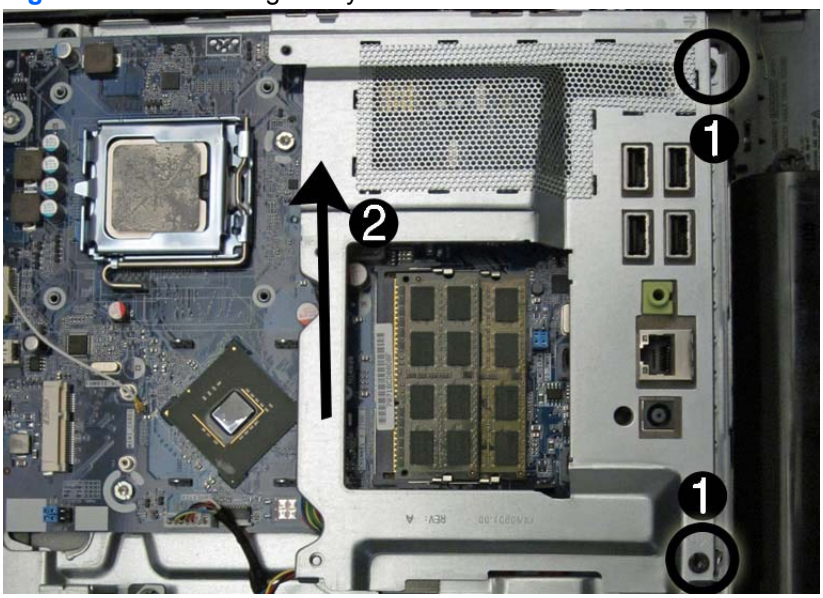
System Board Shield

The system board shield sits above the system board. It is secured with two screws.

To remove the system board shield:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Remove the small rear cover (see Small Rear Cover on page 28).
3. Remove the stand (see Stand on page 29).
4. Remove the right rear cover (see Right Rear Cover on page 35).
5. Remove the heat sink (see Heat Sink (Thermal Module) on page 38).
6. Remove the rear cover (see Rear Cover on page 46).
7. Remove the two screws **(1)** that secure the shield to the computer.
8. Rotate the shield from left to right to remove it from the computer **(2)**.

Figure 7-23 Removing the system board shield



To install the system board shield, reverse the removal procedures.

Fan

Description	Spare part number
Fan	651606-001

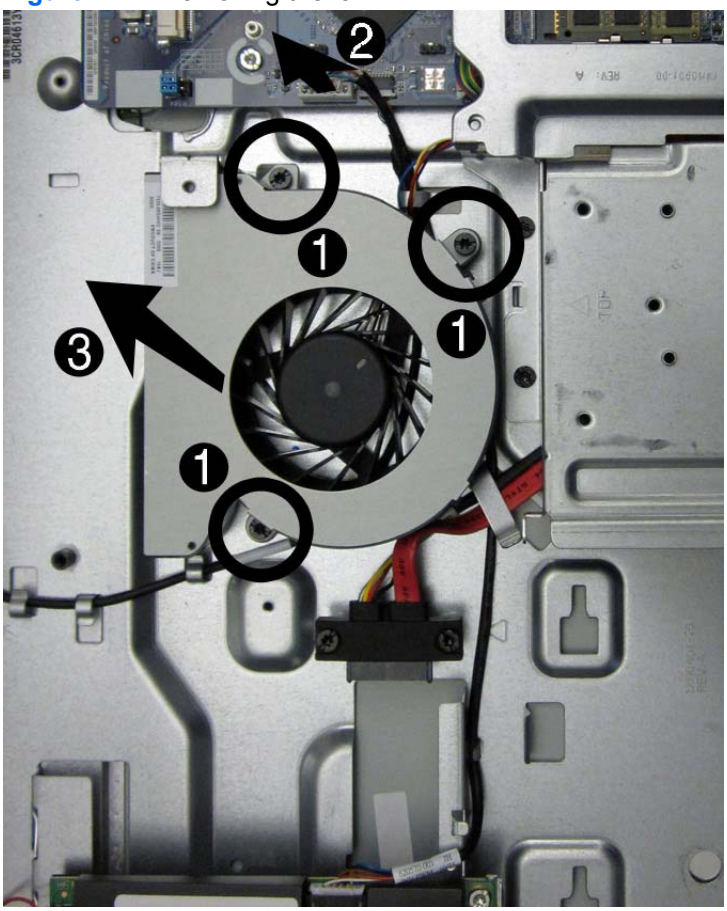
The fan is located near the top of the computer. It is secured with three screws.

To remove the fan:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Remove the small rear cover (see Small Rear Cover on page 28).
3. Remove the stand (see Stand on page 29).
4. Remove the right rear cover (see Right Rear Cover on page 35).
5. Remove the heat sink (see Heat Sink (Thermal Module) on page 38).
6. Remove the rear cover (see Rear Cover on page 46).
7. Remove the system board shield (see System Board Shield on page 51).
8. Remove the three screws **(1)** that secure the fan to the computer.
9. Disconnect the fan cable **(2)** from the system board connector.

10. Lift the fan from the computer **(3)**.

Figure 7-24 Removing the fan



To install the fan, reverse the removal procedures.

Speakers

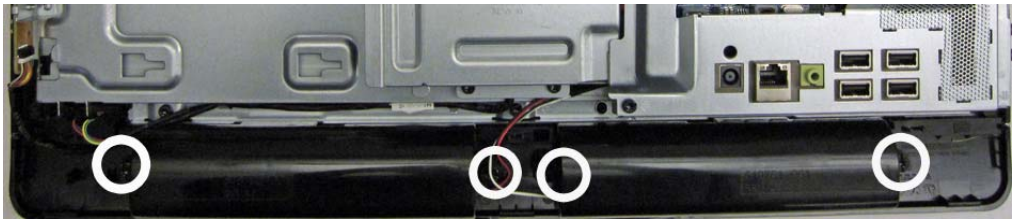
Description	Spare part number
Speaker, right	651597-001
Speaker, left	651598-001

The speakers are located at the bottom of the computer. Two separate speakers are each secured by two screws. The left speaker connects to the right speaker, and the right speaker connects to the system board.

To remove the speakers:

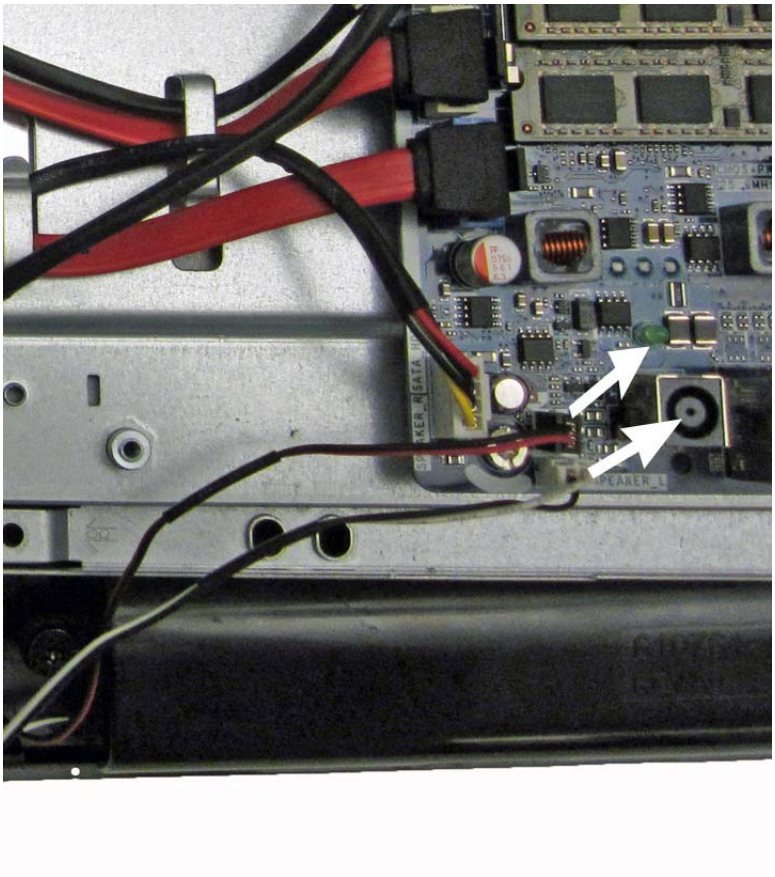
1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Remove the small rear cover (see Small Rear Cover on page 28).
3. Remove the stand (see Stand on page 29).
4. Remove the right rear cover (see Right Rear Cover on page 35).
5. Remove the heat sink (see Heat Sink (Thermal Module) on page 38).
6. Remove the rear cover (see Rear Cover on page 46).
7. Remove the system board shield (see System Board Shield on page 51).
8. Remove two screws that secure each speaker to the computer.

Figure 7-25 Removing the speakers



9. Disconnect the speaker cables from the system board connectors. The right speaker cable connector is black, the left speaker cable connector is white.

Figure 7-26 Removing the speakers



To install the speakers, reverse the removal procedures.

System Board

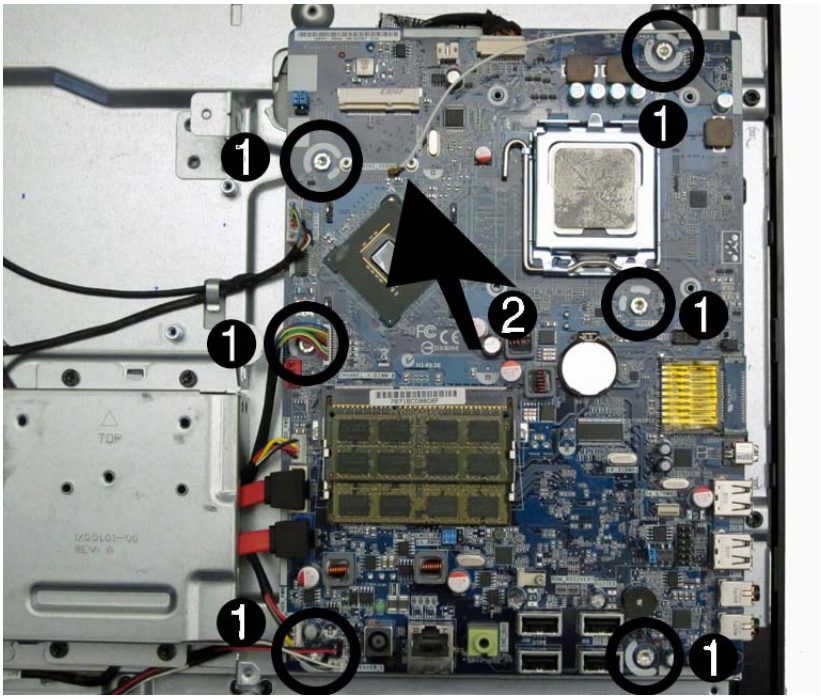
Description	Spare part number
System board	648965-001
Thermal pad, DIMM (20mm x 50mm x 2.5mm)	651595-001
Thermal pad, VRM (15mm x 40mm x 4mm)	651596-001

To remove the system board:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Remove the small rear cover (see Small Rear Cover on page 28).
3. Remove the stand (see Stand on page 29).
4. Remove the right rear cover (see Right Rear Cover on page 35).
5. Remove the heat sink (see Heat Sink (Thermal Module) on page 38).
6. Remove the rear cover (see Rear Cover on page 46).
7. Remove the system board shield (see System Board Shield on page 51).
8. Disconnect all cables from the system board, noting their location for reinstallation.
9. Remove the six screws **(1)** that secure the system board to the computer.
10. Disconnect any cables still connected to the system board, noting their location for re-connection.

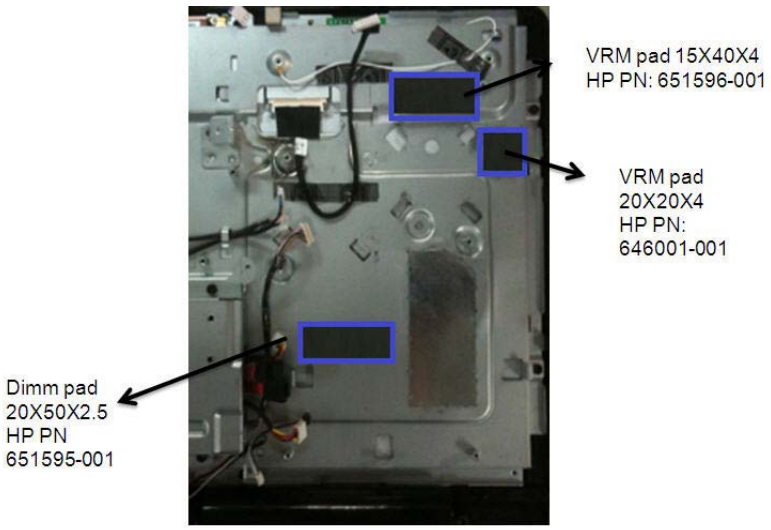
11. Lift the system board straight up and out of the computer **(2)**.

Figure 7-27 Removing the system board



To install the system board, reverse the removal procedures.

When replacing the system board, note that there are three thermal pads under the board. Use the following image to determine thermal pad locations and spare part numbers.



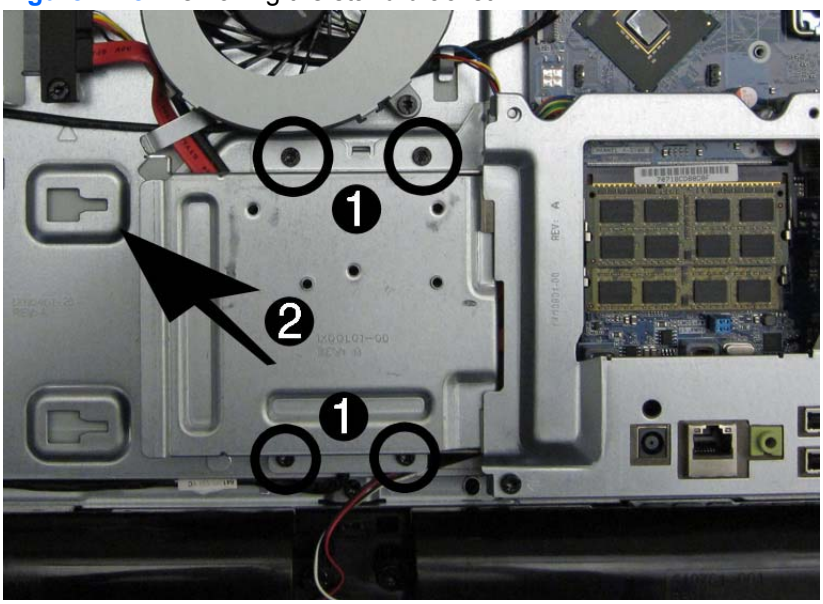
Stand Bracket

The stand bracket is secured with four screws. Removing it allows access to the fans, heat sink, processor, and optional TV tuner.

To remove the stand bracket:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Remove the small rear cover (see Small Rear Cover on page 28).
3. Remove the stand (see Stand on page 29).
4. Remove the right rear cover (see Right Rear Cover on page 35).
5. Remove the heat sink (see Heat Sink (Thermal Module) on page 38).
6. Remove the rear cover (see Rear Cover on page 46).
7. Remove the four screws **(1)** that secure the bracket to the computer.
8. Lift the bracket from the computer **(2)**.

Figure 7-28 Removing the stand bracket



To replace the stand bracket, reverse the removal procedures.

Drive Connectors

The drive connectors are located near the middle of the computer, below the fan. They are secured with two screws and each has two connectors. You must remove the shield to remove the drive connectors.

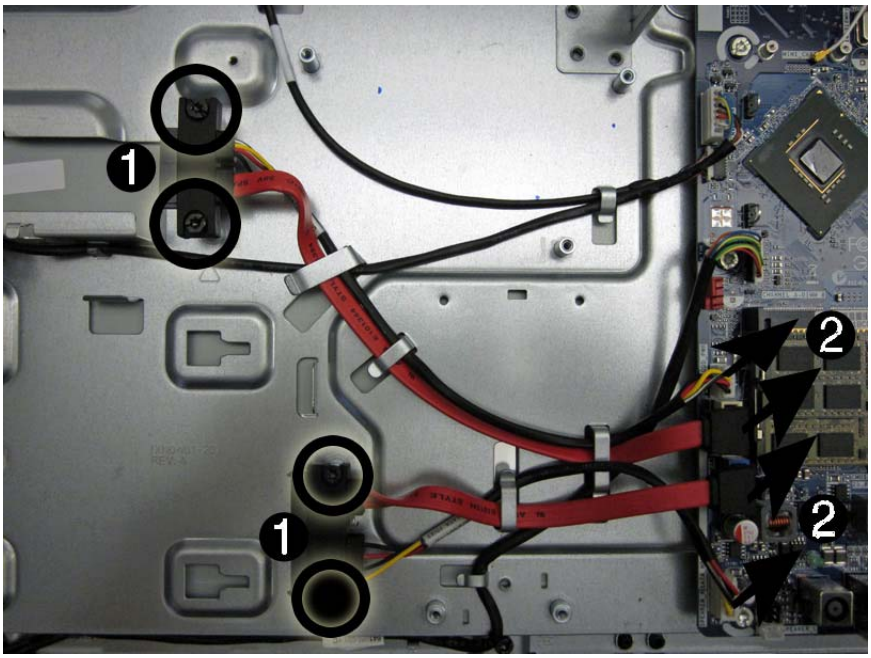
This section provides instructions for removing both drive connectors. You can remove either connector; you do not have to remove both.

To remove the drive connectors:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Remove the small rear cover (see Small Rear Cover on page 28).
3. Remove the stand (see Stand on page 29).
4. Remove the right rear cover (see Right Rear Cover on page 35).
5. Remove the heat sink (see Heat Sink (Thermal Module) on page 38).
6. Remove the rear cover (see Rear Cover on page 46).
7. Remove the stand bracket (see Stand Bracket on page 58).
8. Determine which drive connector you need to remove. The optical drive connector is located above the hard drive connector.
9. Remove two screws **(1)** that secure the drive connector to the computer.
10. Disconnect the cables from the system board **(2)**.

NOTE: Be careful not to damage the cable when disconnecting it from the board. Do not pull on the cables.

Figure 7-29 Removing the drive connectors



11. Remove the cables from the clips built into the computer.
12. Remove the drive connector from the computer.

To install the hard drive connector, reverse the removal procedures.

Front Bezel

Description	Spare part number
Front bezel kit	704214-001

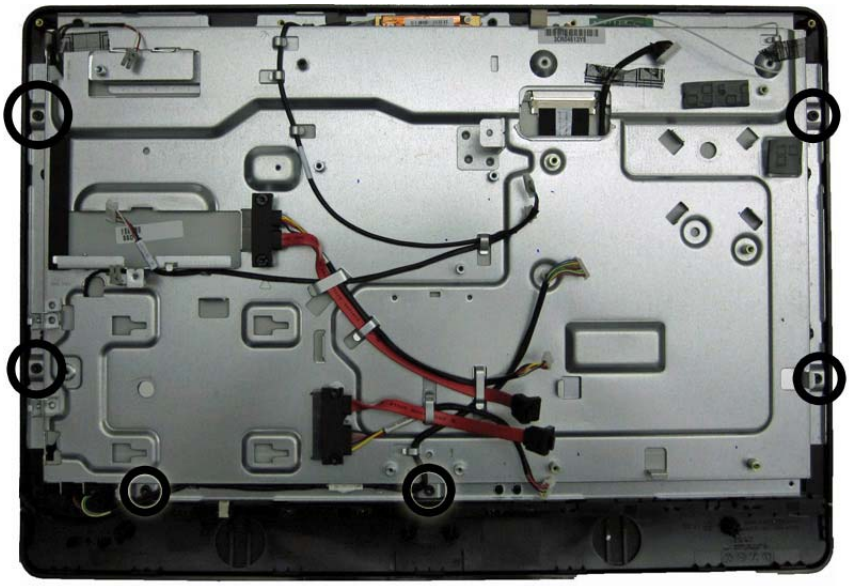
The front bezel is located on the front of the computer and secured with 6 screws and tabs on each side. You must remove the power button assembly from the bezel to remove the bezel from the computer.

To remove the front bezel:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Remove the small rear cover (see Small Rear Cover on page 28).
3. Remove the stand (see Stand on page 29).
4. Remove the right rear cover (see Right Rear Cover on page 35).
5. Remove the heat sink (see Heat Sink (Thermal Module) on page 38).
6. Remove the rear cover (see Rear Cover on page 46).
7. Remove the system board shield (see System Board Shield on page 51).
8. Remove the system board (see System Board on page 56).
9. Remove the stand bracket (see Stand Bracket on page 58).

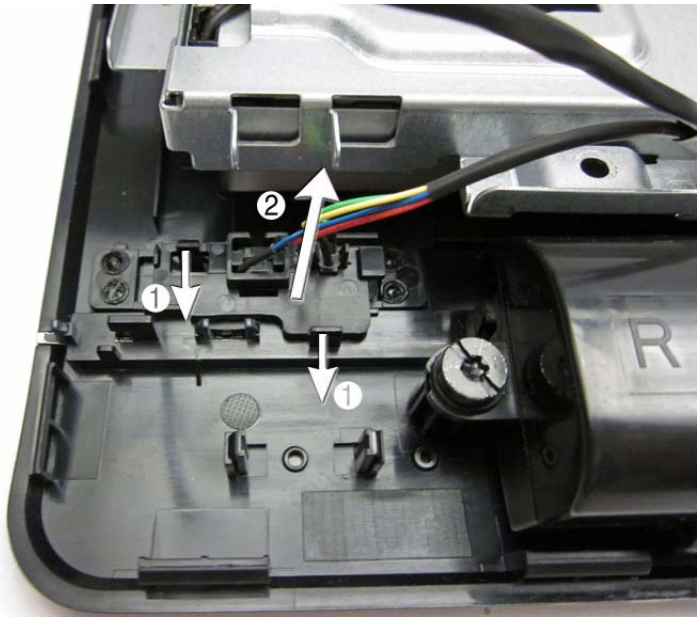
10. Remove the six screws that secure the bezel to the computer.

Figure 7-30 Removing the front bezel



11. Disconnect the power button assembly from the bezel by flexing the tabs **(1)** that secure it to the bezel and lifting it off the bezel **(2)**.

Figure 7-31 Removing the power button assembly from the bezel



12. Press the tabs that secure the bezel to the display assembly, and separate the bezel from the display assembly.

Figure 7-32 Removing the bezel from the display assembly

13. Lift the tabs to disengage the computer from the bezel
14. Remove the bezel from the computer.

To install a front bezel, reverse the removal procedures.

Display Panel

Description	Spare part number
Display, 20-inch, non-glare	646794-001

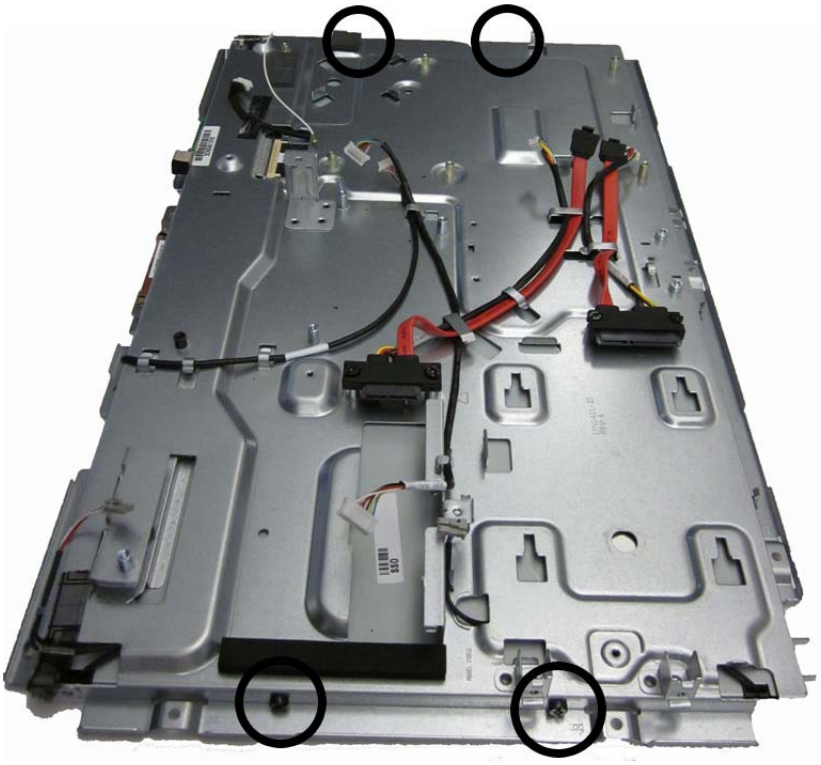
The display panel is secured with 4 screws.

To remove the display panel:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 27).
2. Remove the small rear cover (see Small Rear Cover on page 28).
3. Remove the stand (see Stand on page 29).
4. Remove the right rear cover (see Right Rear Cover on page 35).
5. Remove the heat sink (see Heat Sink (Thermal Module) on page 38).
6. Remove the rear cover (see Rear Cover on page 46).
7. Remove the system board shield (see System Board Shield on page 51).
8. Remove the system board (see System Board on page 56).
9. Remove the stand bracket (see Stand Bracket on page 58).
10. Remove the drive connectors (see Drive Connectors on page 59).
11. Remove the front bezel (see Front Bezel on page 60).

12. Remove the four screws that secure the display panel.

Figure 7-33 Removing the display panel



13. Lift the display panel from the remaining assembly.

To install a display panel, reverse the removal procedures.

A POST Error Messages

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

POST Message Disabled suppresses most system messages during POST, such as memory count and non-error text messages. If a POST error occurs, the screen will display the error message. To manually switch to the POST Messages Enabled mode during POST, press any key (except F10, F11, or F12). The default mode is POST Message Disabled.

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

Quick Boot is a fast startup process that does not run all of the system level tests, such as the memory test. Full Boot runs all of the ROM-based system tests and takes longer to complete.

Full Boot may also be enabled to run every 1 to 30 days on a regularly scheduled basis. To establish the schedule, reconfigure the computer to the Full Boot Every x Days mode, using Computer Setup.

POST Numeric Codes and Text Messages

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

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

Table A-1 Numeric Codes and Text Messages

Control panel message	Description	Recommended action
101-Option ROM Checksum Error	System ROM or expansion board option ROM checksum.	1. Verify the correct ROM. 2. Flash the ROM if needed. 3. If an expansion board was recently added, remove it to see if the problem remains. 4. Clear CMOS. 5. If the message disappears, there may be a problem with the expansion card. 6. Replace the system board.
103-System Board Failure	DMA or timers.	1. Clear CMOS. 2. Remove expansion boards. 3. Replace the system board.
110-Out of Memory Space for Option ROMs	Recently added PCI expansion card contains an option ROM too large to download during POST.	1. If a PCI expansion card was recently added, remove it to see if the problem remains. 2. In Computer Setup, set **Advanced** > **Device Options** > **NIC PXE Option ROM Download** to **DISABLE** to prevent PXE option ROM for the internal NIC from being downloaded during POST to free more memory for an expansion card's option ROM. Internal PXE option ROM is used for booting from the NIC to a PXE server.
162-System Options Not Set	Configuration incorrect. RTC (real-time clock) battery may need to be replaced.	Run Computer Setup and check the configuration in **Advanced** > **Device Options**. Reset the date and time under **Control Panel**. If the problem persists, replace the RTC battery. See the *Hardware Reference Guide* for instructions on installing a new battery, or contact an authorized dealer or reseller for RTC battery replacement.
163-Time & Date Not Set	Invalid time or date in configuration memory. RTC (real-time clock) battery may need to be replaced.	Reset the date and time under **Control Panel** (Computer Setup can also be used). If the problem persists, replace the RTC battery. See the *Hardware Reference Guide* for instructions on installing a new battery, or contact an authorized dealer or reseller for RTC battery replacement.

Table A-1 Numeric Codes and Text Messages (continued)

Control panel message	Description	Recommended action
164-MemorySize Error	Memory amount has changed since the last boot (memory added or removed).	Press the F1 key to save the memory changes.
164-MemorySize Error	Memory configuration incorrect.	1. Run Computer Setup or Windows utilities. 2. Make sure the memory module(s) are installed properly. 3. If third-party memory has been added, test using HP-only memory. 4. Verify proper memory module type.
201-Memory Error	RAM failure.	1. Ensure memory modules are correctly installed. 2. Verify proper memory module type. 3. Remove and replace the identified faulty memory module(s). 4. If the error persists after replacing memory modules, replace the system board.
213-Incompatible Memory Module in Memory Socket(s) X, X, ...	A memory module in memory socket identified in the error message is missing critical SPD information, or is incompatible with the chipset.	1. Verify proper memory module type. 2. Try another memory socket. 3. Replace DIMM with a module conforming to the SPD standard.
214-DIMM Configuration Warning	Populated DIMM Configuration is not optimized.	Rearrange the DIMMs so that each channel has the same amount of memory.
219-ECC Memory Module Detected ECC Modules not supported on this Platform	Recently added memory module(s) support ECC memory error correction.	1. If additional memory was recently added, remove it to see if the problem remains. 2. Check product documentation for memory support information.
301-Keyboard Error	Keyboard failure.	1. Reconnect keyboard with computer turned off. 2. Check connector for bent or missing pins. 3. Ensure that none of the keys are depressed. 4. Replace keyboard.
303-Keyboard Controller Error	I/O board keyboard controller.	1. Reconnect keyboard with computer turned off. 2. Replace the system board.

Table A-1 Numeric Codes and Text Messages (continued)

Control panel message	Description	Recommended action
304-Keyboard or System Unit Error	Keyboard failure.	1. Reconnect the keyboard with computer turned off. 2. Ensure that none of the keys are depressed. 3. Replace the keyboard. 4. Replace the system board.
510-Flash Screen Image Corrupted	Flash Screen image has errors.	Reflash the system ROM with the latest BIOS image.
511-CPU Fan not Detected	CPU fan is not connected or may have malfunctioned.	1. Reseat CPU fan. 2. Reseat fan cable. 3. Replace CPU fan.
512-Rear Chassis Fan not Detected	Rear chassis fan is not connected or may have malfunctioned.	1. Reseat rear chassis fan. 2. Reseat fan cable. 3. Replace rear chassis fan.
513-Front Chassis fan not detected	Front chassis fan is not connected or may have malfunctioned.	1. Reseat front chassis fan. 2. Reseat fan cable. 3. Replace front chassis fan.
912-Computer Cover Has Been Removed Since Last System Startup	Computer cover was removed since last system startup.	No action required.
917-Front Audio Not Connected	Front audio harness has been detached or unseated from motherboard.	Reconnect or replace front audio harness.
921-Device in PCI Express slot failed to initialize	There is an incompatibility/problem with this device and the system or PCI Express Link could not be retrained to an x1.	Try rebooting the system. If the error reoccurs, the device may not work with this system
1720-SMART Hard Drive Detects Imminent Failure	Hard drive is about to fail. (Some hard drives have a hard drive firmware patch that will fix an erroneous error message.)	1. Determine if hard drive is giving correct error message. Enter Computer Setup and run the Drive Protection System test under **Storage** > **DPS Self-test**. 2. Apply hard drive firmware patch if applicable. (Available at http://www.hp.com/support.) 3. Back up contents and replace hard drive.
1801-Microcode Patch Error	Processor is not supported by ROM BIOS.	1. Upgrade BIOS to proper version. 2. Change the processor.
1802-Processor Not Supported	Recently installed processor is not supported by the system.	Install a processor supported by your system.

Table A-1 Numeric Codes and Text Messages (continued)

Control panel message	Description	Recommended action
1805-Ambient Temperature Previously Over Limit	This system was placed in a low power state to prevent damage due to excessive environmental temperature.	Make sure the system meets the HP enclosure guidelines as listed in the QuickSpecs, including the following: 1. Clean the air vents on the front, back, or any other vented side of the computer. 2. Ensure that there is a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow. 3. Ensure that computers are not so near each other that they are subject to each other's re-circulated or preheated air. 4. If the computer is within an enclosure, ensure that there is proper intake and exhaust ventilation for the enclosure.
2200-PMM Allocation Error during MEBx Download	Memory error during POST execution of the Management Engine (ME) BIOS Extensions option ROM.	1. Reboot the computer. 2. Unplug the power cord, re-seat the memory modules, and reboot the computer. 3. If the memory configuration was recently changed, unplug the computer, restore the original memory configuration, and reboot the computer. 4. If the error persists, replace the system board.
2201-MEBx Module did not checksum correctly	Memory error during POST execution of the Management Engine (ME) BIOS Extensions option ROM.	1. Reboot the computer. 2. Unplug the power cord, re-seat the memory modules, and reboot the computer. 3. If the memory configuration was recently changed, unplug the power cord, restore the original memory configuration, and reboot the computer. 4. If the error persists, replace the system board.

Table A-1 Numeric Codes and Text Messages (continued)

Control panel message	Description	Recommended action
2202-PMM Deallocation Error during MEBx cleanup	Memory error during POST execution of the Management Engine (ME) BIOS Extensions option ROM.	1. Reboot the computer. 2. Unplug the power cord, re-seat the memory modules, and reboot the computer. 3. If the memory configuration was recently changed, unplug the power cord, restore the original memory configuration, and reboot the computer. 4. If the error persists, replace the system board.
2211-Memory not configured correctly for proper MEBx execution	SODIMM1 is not installed.	Make sure there is a memory module in the SODIMM1 socket and that it is properly seated.
2212-USB Key Provisioning failure writing to device	USB device used for USB key provisioning will not allow BIOS to update provision file properly.	1. Try a different USB key device for provisioning. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
2217-ME Firmware Version request failure	ME firmware is not properly responding to BIOS query for version information.	1. Reboot the computer. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
2218-ME Firmware Version should be updated	ME firmware must be updated to match current functionality contained in the system BIOS.	1. Update to the latest ME firmware version. 2. If the error persists and system BIOS has been recently updated, restore previous system BIOS version. 3. If the error still persists, replace the system board.
2219-USB Key Provisioning file has invalid header identifier	Provisioning file contained on the USB key has been corrupted or is not a valid version for the current ME firmware.	1. Recreate the provisioning file using third party management console software. 2. If the error persists and system BIOS has been recently updated, restore previous system BIOS version. Otherwise, update the ME firmware version. 3. If the error still persists, replace the system board.

Table A-1 Numeric Codes and Text Messages (continued)

Control panel message	Description	Recommended action
2220-USB Key Provisioning file has mismatch version	Provisioning file contained on the USB key is not a valid version for the current ME firmware.	1. Reboot the computer. 2. If the error persists and system BIOS has been recently updated, restore previous system BIOS version. Otherwise, update the ME firmware version. 3. If the error still persists, replace the system board.
2230-General error during MEBx execution	Error occurred during MEBx execution which fails into the “General” grouping. Status information displayed along with the error provides further clarity into the failure. MEBx handles transference of information between the system BIOS and ME firmware.	1. Reboot the computer. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
2231-ME error during MEBx execution	Error occurred during MEBx execution which fails into “ME” grouping.	1. Reboot the computer. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
2232-AMT error during MEBx execution	Error occurred during MEBx execution which fails into “AMT” grouping.	1. Reboot the computer. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
2233-HECI error during MEBx execution	Error occurred during MEBx execution which fails into “MEI or HECI” grouping.	1. Reboot the computer. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
Invalid Electronic Serial Number	Electronic serial number is missing.	Enter the correct serial number in Computer Setup.

Table A-1 Numeric Codes and Text Messages (continued)

Control panel message	Description	Recommended action
Network Server Mode Active and No Keyboard Attached	Keyboard failure while Network Server Mode enabled.	1. Reconnect keyboard with computer turned off. 2. Check connector for bent or missing pins. 3. Ensure that none of the keys are depressed. 4. Replace keyboard.
Parity Check 2	Parity RAM failure or a PCI/PCIe device is asserting a SERR#.	Run Computer Setup and Diagnostic utilities. To disable a PCI/PCIe device from asserting a SERR#, run the Computer Setup utility and select **Advanced** > **Bus Options** > **SERR# Generation** > **Disable**.

Interpreting POST Diagnostic Front Panel LEDs and Audible Codes

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

WARNING! When the computer is plugged into an AC power source, voltage is always applied to the system board. To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet and allow the internal system components to cool before touching.

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

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

Not all diagnostic lights and audible codes are available on all models.

Table A-2 Diagnostic Front Panel LEDs and Audible Codes

Activity	Beeps	Possible Cause	Recommended Action
Green Power LED On.	None	Computer on.	None
Green Power LED flashes every two seconds.	None	Computer in Suspend to RAM mode (some models only) or normal Suspend mode.	None required. Press any key or move the mouse to wake the computer.
Red Power LED flashes two times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	2	Thermal protection activated: Air flow is restricted, a fan may not be functioning, or the heatsink is not properly attached.	1. Clean the air vents on the front, back, or any other vented side of the computer. 2. Ensure that there is a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow. 3. Ensure that computers are not so near each other that they are subject to each other's re-circulated or preheated air. 4. If the computer is within an enclosure, ensure that there is proper intake and exhaust ventilation for the enclosure. 5. If a message appears on the screen indicating that a fan is not working, replace the fan. 6. Ensure that the heat sink is properly attached.
Red Power LED flashes three times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	3	Processor not installed (not an indicator of bad processor).	1. Check to see that the processor is present. 2. Reseat the processor.

Table A-2 Diagnostic Front Panel LEDs and Audible Codes (continued)

Activity	Beeps	Possible Cause	Recommended Action
Red Power LED flashes four times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	4	Power failure (power supply is overloaded).	1. Open the hood and ensure the 4 or 6-wire power supply cable is seated into the connector on the system board. 2. Check if a device is causing the problem by removing ALL attached devices (such as hard, diskette, or optical drives, and expansion cards). Power on the system. If the system enters the POST, then power off and replace one device at a time and repeat this procedure until failure occurs. Replace the device that is causing the failure. Continue adding devices one at a time to ensure all devices are functioning properly. 3. Replace the power supply. 4. Replace the system board.
Red Power LED flashes five times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	5	Pre-video memory error.	**CAUTION:** To avoid damage to the DIMMs or the system board, you must unplug the computer power cord before attempting to reseat, install, or remove a DIMM module. 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.
Red Power LED flashes six times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	6	Pre-video graphics error.	For systems with a graphics card: 1. Reseat the graphics card. 2. Replace the graphics card. 3. Replace the system board. For systems with integrated graphics, replace the system board.
Red Power LED flashes seven times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	7	System board failure (ROM detected failure prior to video).	Replace the system board.
Red Power LED flashes eight times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	8	Invalid ROM based on bad checksum.	1. Reflash the system ROM with the latest BIOS image. 2. Replace the system board.

Table A-2 Diagnostic Front Panel LEDs and Audible Codes (continued)

Activity	Beeps	Possible Cause	Recommended Action
Red Power LED flashes nine times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	9	System powers on but is unable to boot.	1. Unplug the AC power cord from the computer, wait 30 seconds, then plug the power cord back in to the computer. 2. Replace the system board. 3. Replace the processor.
Red Power LED flashes ten times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	10	Bad option card.	1. Check each option card by removing the card (one at a time if multiple cards), then power on the system to see if fault goes away. 2. Once a bad card is identified, remove and replace the bad option card. 3. Replace the system board.
Red Power LED flashes eleven times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	11	The current processor does not support a feature previously enabled on this system.	1. Install a Trusted Execution Technology (TXT) capable processor. 2. Disable TXT in the Computer Setup (F10) utility. 3. Reinstall the original processor.
System does not power on and LEDs are not flashing.	None	System unable to power on.	Press and hold the power button for less than 4 seconds. If the hard drive LED turns green, the power button is working correctly and the system board needs to be replaced. OR Press and hold the power button for less than 4 seconds. If the hard drive LED does not turn on green then: 1. Check that the unit is plugged into a working AC outlet. 2. Open hood and check that the power button harness is properly connected to the system board. 3. Check that both power supply cables are properly connected to the system board. 4. Check to see if the 5V_aux light on the system board is turned on. If it is turned on, then replace the power button harness. If the problem persists, replace the system board. 5. If the 5V_aux light on the system board is not turned on, remove the expansion cards one at a time until the 5V_aux light on the system board turns on. It the problem persists, replace the power supply.

Resetting the CMOS Jumper

1. Turn off the computer and any external devices, and disconnect the power cord from the power outlet. The power must be disconnected from the system to clear CMOS.
2. Disconnect all external equipment connected to the computer.

WARNING! To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet, and allow the internal system components to cool before touching.

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. See the *Hardware Reference Guide* for more information.

3. Disassemble the computer until you can gain access to the system board.

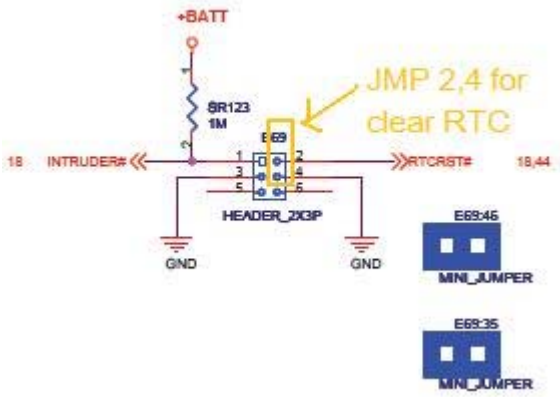
CAUTION: Resetting CMOS will restore the computer to factory defaults and will erase any customized information including passwords, asset numbers, and special settings.

4. Locate the header and jumper labeled **CMOS+PW**.

NOTE: Be sure you have disconnected the AC power cord from the wall outlet. The CMOS will not clear if the power cord is connected.

NOTE: For assistance locating the CMOS jumper and other system board components, see the *Illustrated Parts & Service Map* (IPSM). You can download the IPSM from http://www.hp.com/support.

5. Put the jumper on pins 2 and 4. This clears CMOS.



6. Put the jumper back on the original pins.
7. Replace the access panel.
8. Reconnect the external devices.
9. Plug in the computer and turn on power.

NOTE: Use Computer Setup to reset any special system setups along with the date and time.

For instructions on Computer Setup, see the *Computer Setup (F10) Utility Guide*.

B 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.

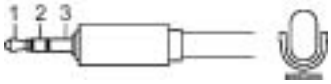
Ethernet BNC

Connector and Icon	Pin	Signal
	1	Data
	2	Ground

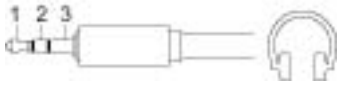
USB

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

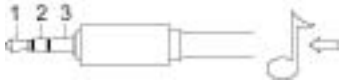
Microphone

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

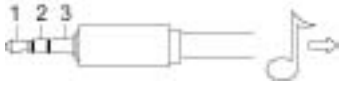
Headphone

Connector and Icon (1/8” miniphone)	Pin	Signal
	1 (Tip)	Audio_left
	2 (Ring)	Power_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

C Power Cord Set Requirements

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

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

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

General Requirements

The requirements listed below are applicable to all countries:

1. The power cord must be approved by an acceptable accredited agency responsible for evaluation in the country where the power cord set will be installed.
2. The power cord set must have a minimum current capacity of 10A (7A Japan only) and a nominal voltage rating of 125 or 250 volts AC, as required by each country's power system.
3. The diameter of the wire must be a minimum of 0.75 mm_2 or 18AWG, and the length of the cord must be between 1.8 m (6 feet) and 3.6 m (12 feet).

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

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

Japanese Power Cord Requirements

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

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

Country-Specific Requirements

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

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

1. The flexible cord must be Type HO5VV-F, 3-conductor, 0.75mm_2 conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country where it will be used.
2. The flexible cord must be Type SVT or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15A, 125V) or NEMA 6-15P (15A, 250V) configuration.
3. Appliance coupler, flexible cord, and wall plug must bear a “T” mark and registration number in accordance with the Japanese Dentori Law. Flexible cord must be Type VCT or VCTF, 3-conductor, 0.75 mm_2 conductor size. Wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7A, 125V) configuration.

D Specifications

All-in One Models

Table D-1 Specifications

Desktop Dimensions		
Height	16.0 in	47.0 cm
Width	20.0 in	50.8 cm
Depth	8.6 in	22.0 cm
Approximate Weight (including stand)	16.8 lb	7.6 kg
Temperature Range		
Operating	41° to 95°F	5° to 35°C
Nonoperating	-22° to 149°F	-30° to 66°C
Relative Humidity (noncondensing)		
Operating	15-80% at 79°F	15-80% at 26°C
Maximum Altitude (unpressurized)		
Operating	0 - 6,562 ft	0 - 2000 m
Nonoperating	0 - 15,000 ft	4,572 m
Power Supply		
Rated Voltage Range	100-240 V	100-240 V
Rated Line Frequency	50-60 Hz	50-60 Hz
	2.0 A	2.0 A
Max Operating Power	<150 W	<150 W
Idle Operating Power	Integrated graphics: 30 W	Integrated graphics: 30 W

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