**Advanced Features**

**User's Guide**

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**LegacySelect Technology Control**

LegacySelect technology control offers legacy-full, legacy-reduced, or legacy-free solutions based on common platforms, hard drive images, and help desk procedures. Control is provided to the administrator through system setup, Dell OpenManage™ IT Assistant, or Dell custom-factory integration.

LegacySelect allows administrators to electronically activate or deactivate connectors and media devices that include serial and USB connectors, a parallel connector, a floppy drive, PCI slots, and a PS/2 mouse. Connectors and media devices that are deactivated make resources available. You must restart the computer to effect the changes.

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**Manageability**

**DASH**

DASH (Desktop and mobile Architecture for System Hardware) is a Desktop Management Task Force (DMTF) management initiative that standardizes the manageability interfaces for mobile and desktop hardware. The focus of the DASH architecture is to enable the remote management of desktop and mobile computing resources in a standard manner that is independent of operating state. Your computer supports early versions of the DASH initiative including the following management profiles:

- Base Desktop Mobile
- Power State Management
- Boot Control
- CPU
- System Memory
- Fan
- Power Supply
- Sensor
- Physical Asset
- Software Inventory

**NOTE:** If you have chosen to use "None" (no manageability) or ASF, you will be unable to take advantage of DASH features and profiles.

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**Active Management Technology**

Intel Active Management Technology (iAMT) provides secure systems management capabilities that reduce IT costs and allow better discovery, healing, and protection of networked computing assets. With iAMT, computers can be managed regardless of whether the computer is on, off, or the operating system is hung.

**NOTE:** iAMT can be configured using Dell Client Manager (DCM) 2.1.1 or later. For complete information on how to configure iAMT, see the Dell Client Manager 2.1.1 (or later) documentation on www.dell.com/openmanage. For more information about Dell's iAMT implementation, see the Client Systems Management Administrator's Guide available on the Dell Support website at support.dell.com.

Key benefits of iAMT are:

- Reduced desk-side visits
- Automation of more management functionality through enablement of systems management console software
- Improved security
iAMT Features

Basic Functionality

- Ability to discover, track, and inventory assets in the presence or absence of the operating systems. The computer must have the power cable connected and must be connected to the network.
- Ability to power on and power off the computer remotely, whatever the state of the operating system.

Advanced Functionality

- Ability to do remote issues remediation (1-to-1) via text-based console redirection (Serial-over-LAN) and IDE redirection.
- Hardened security via agent presence (enables detection of removed agents) and network access control (Circuit breaker) and software version control.

Your computer aids in troubleshooting iAMT by providing the following iAMT related error messages:

<table>
<thead>
<tr>
<th>Error Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERVICE_MODE jumper: The service mode jumper is installed</td>
<td>Do not populate the SERVICE_MODE jumper. AMT will not function properly. Only manufacturing uses this jumper.</td>
</tr>
<tr>
<td>MEMORY: Unsupported memory configuration. Populate DIMM1.</td>
<td>Unable to launch ME. AMT functionality is broken when DIMM1 is not populated.</td>
</tr>
</tbody>
</table>

Out of Band Management

The term "out of band" refers to the ability to manage the computer in the absence of an operating system or with the operating system in an unusable state, or with the computer powered off. The only requirement for managing such a computer is for AMT capability to be enabled and a network cable plugged into the integrated network adapter.

- NOTE: Power is supplied to the DIMMs even when the computer is turned off.

Accessing iAMT setup

Intel’s Management Engine BIOS Extension (MEBx) interface controls the iAMT features and setup options for your computer. MEBx is used to:

- Turn on or off iAMT
- Set iAMT modes
- Set iAMT configuration modes

To view the MEBx setup screen, press <Ctrl><p> during the boot process of your computer when you turn it on. Your default MEBx password is **admin**.

- NOTE: To make configuration setting changes, the default MEBx password must be changed.

Turning Off iAMT

iAMT is enabled in the Management Engine (ME) firmware by default. However, you may choose to turn off the iAMT feature.

To turn off iAMT:

1. Press <Ctrl-P> to enter the MEBx setup and enter your password.
2. Select **Intel® ME Configuration** → **Intel ME Features Control** → **Manageability Feature Selection**
3. Select **None**.
4. Select **Return to Previous Menu** twice.

Changes are applied and the computer reboots.

USB Provisioning

iAMT can be provisioned using a USB key and Dell Client Manager. The USB key must:

- Be formatted using the FAT16 file system with no system files.
To provision AMT using a USB key, plug the USB key into a USB port prior to boot. During POST, the BIOS displays a message stating that the computer is being provisioned.

### Alert Standard Format

ASF is a DMTF management standard that specifies “pre-operating system” or “operating system-absent” alerting techniques. The standard is designed to generate an alert on potential security and fault conditions when the operating system is in a sleep mode or the computer is turned off. ASF is designed to supersede previous operating-system-absent alerting technologies.

Your computer supports the following ASF version 1.03 and 2.0 alerts and remote capabilities:

<table>
<thead>
<tr>
<th>Alert</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chassis: Chassis Intrusion - Physical Security Violation/Chassis Intrusion - Physical Security Violation Event Cleared</td>
<td>The computer chassis with the chassis intrusion feature (optional on some computers) installed and enabled has been opened or the chassis intrusion alert has been cleared.</td>
</tr>
<tr>
<td>CPU: Emergency Shutdown Event</td>
<td>The processor temperature is too hot and the power supply has shut down.</td>
</tr>
<tr>
<td>Cooling Device: Generic Critical Fan Failure/Generic Critical Fan Failure Cleared</td>
<td>The fan speed (rpm) is out of limits or the fan speed (rpm) problem has been resolved.</td>
</tr>
<tr>
<td>Temperature: Generic Critical Temperature Problem/Generic Critical Temperature Problem Cleared</td>
<td>The computer temperature is out of limits or the computer temperature problem has been resolved.</td>
</tr>
<tr>
<td>Battery Low</td>
<td>The computer battery has reached a voltage of 2.2 V or lower.</td>
</tr>
</tbody>
</table>

ASF allows Remote Management and Control Protocol (RMCP) messages to be exchanged between a remote management console and a client computer that is in a “pre-operating system” or “operating system-absent” state. RMCP messages can be sent to instruct a client computer to start up, shut down, or restart.

For more information about Dell’s ASF implementation, see the ASF User’s Guide and the ASF Administrator’s Guide, which are available on the Dell Support website at support.dell.com.

### Dell OpenManage™ Applications

**NOTE:** Either Dell OpenManage™ applications and Dell™ Client Manager (DCM) are available for your computer to help meet your system management needs. See Dell Client Manager (DCM) for information about DCM.

You can manage your computer via IT Assistant and Dell OpenManage Client Instrumentation (OMCI).

IT Assistant configures, manages, and monitors computers and other devices on a corporate network. IT Assistant manages assets, configurations, events (alerts), and security for computers equipped with industry-standard management software. It supports instrumentation that conforms to SNMP and CIM industry standards.

For information on IT Assistant, see the Dell OpenManage IT Assistant User’s Guide available on the Dell Support website at support.dell.com.

Dell OpenManage Client Instrumentation is software that enables remote management programs such as IT Assistant to do the following:

- Access information about your computer, such as how many processors it has and what operating system it is running.
- Monitor the status of your computer, such as listening for thermal alerts from temperature probes or hard drive failure alerts from storage devices.

A computer that has Dell OpenManage Client Instrumentation set up on a network that uses IT Assistant is a managed computer. For information about Dell OpenManage Client Instrumentation, see the Dell OpenManage Client Instrumentation User’s Guide available on the Dell Support website at support.dell.com.

### Dell Client Manager (DCM)

**NOTE:** Either Dell™ Client Manager (DCM) or Dell OpenManage™ applications are available for your computer to help meet your system management needs. See Dell OpenManage™ Applications for information about Dell OpenManage products.

Dell Client Manager (DCM) Console

The Dell Client Manager (DCM) console allows you to configure, manage, and monitor Dell computers on a corporate network via a simple GUI interface. Through the DCM console you can manage assets, configurations, events (alerts), status, and security for computers equipped with industry-standard management software. For information about standards supported by DCM, see www.altiris.com.

For information about the DCM console, see www.altiris.com or the Dell Support website at support.dell.com.

The DCM console also allows you to:

- Access information about your computer, such as how many processors it has and what operating system it is running.
Monitor the status of your computer, such as listening for thermal alerts from temperature probes or hard drive failure alerts from storage devices.

Change the state of your computer by updating its BIOS, configuring BIOS settings, or shutting it down remotely.

With Dell Client Manager installed on a console and its client software installed on client computers, you have a managed computer. For information about DCM, see the Dell Support website at support.dell.com.

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**Physical Security**

**Chassis Intrusion Detection**

*NOTE:* When the administrator password is enabled, you must know the administrator password before you can reset the Chassis Intrusion setting.

This (optional on some computers) feature, if installed and enabled, detects that the chassis was opened and alerts the user. To change the Chassis Intrusion setting:

1. Enter system setup (see *Entering System Setup*).
2. Press the down-arrow keys to move to the System Security option.
3. Press <Enter> to access the System Security option's pop-up menu.
4. Press the down-arrow key to move to the Chassis Intrusion setting.
5. Press <Enter> to select an option setting.
6. Press <Enter> again after you update the option setting.
7. Exit and save system setup.

**Option Settings**

- **On** — If the computer cover is opened, the setting changes to Detected, and the following alert message displays during the boot routine at the next computer start-up:
  
  Alert! Cover was previously removed.

  To reset the Detected setting, enter system setup (see *Entering System Setup*). In the Chassis Intrusion option, press the left- or right-arrow key to select Reset, and then choose On, On-Silent, or Off.

- **On-Silent** (default setting) — If the computer cover is opened, the setting changes to Detected. No alert message appears during the boot sequence at the next computer start-up.

- **Off** — No intrusion monitoring occurs and no messages appear.

**Padlock Ring and Security Cable Slot**

Use one of the following methods to secure your computer:

- Use a padlock alone or a padlock and looped security cable with the padlock ring.
  
  A padlock alone prevents the computer from being opened.

  A security cable looped around a stationary object is used in conjunction with a padlock to prevent unauthorized movement of the computer.

- Attach a commercially available antitheft device to the security cable slot on the top of the computer.
Antitheft devices usually include a segment of metal-stranded cable with an attached locking device and key. The documentation that comes with the device contains instructions for installing it.

**Trusted Platform Module (TPM)**

- **NOTE:** Computers shipping into China are not equipped with TPM.
- **NOTE:** The TPM feature supports encryption only if the operating system supports TPM. For more information, see the TPM software documentation and the help files that came with the software.

TPM is a hardware-based security feature that can be used to create and manage computer-generated encryption keys. When combined with security software, the TPM enhances existing network and computer security by enabling features such as file protection capabilities and protected e-mail. The TPM feature is enabled through a system setup option.

**Enabling the TPM Feature**

1. Enable the TPM software:
   a. Restart the computer and press <F2> during the Power On Self Test to enter the system setup program.
   d. Press <Esc> to exit the setup program.
   e. If prompted, click Save/Exit.

2. Activate the TPM setup program:
   a. Restart the computer and press <F2> during the Power On Self Test to enter the system setup program.
   b. Select Security → TPM Activation and press <Enter>.
   c. Under TPM Activation, select Activate and press <Enter>.

   **NOTE:** You only need to activate TPM once.

   d. Once the process is complete, the computer either restarts automatically or prompts you to restart your computer.

**Security Management Software**

The security management software is designed to utilize four different features to help you secure your computer:

- Log-in management
- Pre-boot authentication (using a fingerprint reader, smart card, or password)
- Encryption
- Private information management

For information about how to use the software and the different security features, see the Getting Started Guide for the software:

Click Start → All Programs → Wave Systems Corp → Getting Started Guide

**Computer Tracking Software**

Computer tracking software may enable you to locate your computer if it is lost or stolen. The software is optional and may be purchased when you order your Dell™ computer, or you can contact your Dell sales representative for information about this security feature.

- **NOTE:** Computer tracking software may not be available in certain countries.
- **NOTE:** If you have computer tracking software and your computer is lost or stolen, you must contact the company that provides the tracking service to report the missing computer.
About Smart Cards and Fingerprint Readers

**NOTE:** The smart card feature or fingerprint reader may not be available on your computer.

Smart cards are portable credit-card shaped devices with internal integrated circuits. The top surface of the smart card usually contains an embedded processor under the gold contact pad. The combination of the small size and integrated circuits make smart cards valuable tools for security, data storage, and special programs. Using smart cards can improve computer security by combining something a user has (the smart card) with something only the user should know (a PIN) to provide more secure user-authentication than passwords alone.

The fingerprint reader is a device that you can use to help keep your Dell™ computer secure. The reader is a strip sensor located on a peripheral device for your computer. When you slide your finger over the reader, it uses your unique fingerprint to authenticate your user identity.

**Password Protection**

**WARNING:** Although passwords provide security for the data on your computer, they are not foolproof. If your data requires more security, it is your responsibility to obtain and use additional forms of protection, such as data encryption programs.

**System Password**

**WARNING:** If you leave your computer running and unattended without having a system password assigned, or if you leave your computer unlocked so that someone can disable the password by changing a jumper setting, anyone can access the data stored on your hard drive.

**Option Settings**

You cannot change or enter a new system password if either of the following two options is displayed:

- **Set** — A system password is assigned.
- **Disabled** — The system password is disabled by a jumper setting on the system board.

You can only assign a system password when the following option is displayed:

- **Not Set** — No system password is assigned and the password jumper on the system board is in the enabled position (the default setting).

**Assigning a System Password**

To escape from the field without assigning a system password, press <Tab> or the <Shift><Tab> key combination to move to another field, or press <Esc> at any time before you complete step 5.

1. Enter system setup (see Entering System Setup) and verify that Password Status is set to Unlocked.
2. Highlight System Password, and then press the left- or right-arrow key.
   
   The option heading changes to Enter Password, followed by an empty 32-character field in square brackets.
3. Type your new system password.
   
   You can use up to 32 characters. To erase a character when entering your password, press <Backspace> or the left-arrow key. The password is not case sensitive.
   
   Certain key combinations are not valid. If you enter one of these combinations, the speaker emits a beep.
   
   As you press each character key (or the spacebar for a blank space), a placeholder appears in the field.
4. Press <Enter>.
   
   If the new system password is less than 32 characters, the whole field fills with placeholders. Then the option heading changes to Verify Password, followed by another empty 32-character field in square brackets.
5. To confirm your password, type it a second time and press <Enter>.
   
   The password setting changes to Set.
6. Exit system setup.

Password protection takes effect when you restart the computer.
Typing Your System Password

When you start or restart your computer, the following prompt appears on the screen.

If Password Status is set to Locked:

Type the password and press <Enter>.

If you have assigned an administrator password, the computer accepts your administrator password as an alternate system password.

If you type a wrong or incomplete system password, the following message appears on the screen:

** Incorrect password. **

If you again type an incorrect or incomplete system password, the same message appears on the screen. The third and subsequent times you type an incorrect or incomplete system password, the computer displays the following message:

** Incorrect password. **

Number of unsuccessful password attempts: 3
System halted! Must power down.

Even after your computer is turned off and on, the previous message is displayed each time you type an incorrect or incomplete system password.

NOTE: You can use Password Status in conjunction with System Password and Admin Password to further protect your computer from unauthorized changes.

Deleting or Changing an Existing System Password

1. Enter system setup (see Entering System Setup).
2. Highlight System Password and press <Enter>.
3. When prompted, type the system password.
4. Press <Enter> twice to clear the existing system password. The setting changes to Not Set.
   
   If Not Set is displayed, the system password is deleted. If Not Set is not displayed, press <Alt><b> to restart the computer, and then repeat steps 3 and 4.
5. To assign a new password, follow the procedure in Assigning a System Password.
6. Exit system setup.

Administrator Password

Option Settings

You cannot change or enter a new administrator password if either of the following two options is displayed:

- **Set** — An administrator password is assigned.
- **Disabled** — The administrator password is disabled by a jumper setting on the system board.

You can only assign an administrator password when the following option is displayed:

- **Not Set** — No administrator password is assigned and the password jumper on the system board is in the enabled position (the default setting).

Assigning an Administrator Password

The administrator password can be the same as the system password.

NOTE: If the two passwords are different, the administrator password can be used as an alternate system password. However, the system password cannot be used in place of the administrator password.

1. Enter system setup (see Entering System Setup) and verify that Admin Password is set to Not Set.
2. Highlight Admin Password and press the left- or right-arrow key.
   
   The computer prompts you to type and verify the password. If a character is not permitted, the computer emits a beep.
3. Type and then verify the password.

After you verify the password, the **Admin Password** setting changes to **Set**. The next time you enter system setup, the computer prompts you for the administrator password.

4. Exit system setup.

A change to **Admin Password** becomes effective immediately (no need to restart the computer).

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### Operating Your Computer With an Administrator Password Enabled

When you enter system setup, the **Admin Password** option is highlighted, prompting you to type the password.

If you do not type the correct password, the computer lets you view, but not modify, system setup options.

> **NOTE:** You can use **Password Status** in conjunction with **Admin Password** to protect the system password from unauthorized changes.

### Deleting or Changing an Existing Administrator Password

To change an existing administrator password, you must know the administrator password.

1. Enter system setup (see [Entering System Setup](#)).
2. Type the administrator password at the prompt.
3. Highlight **Admin Password** and press the left- or right-arrow key to delete the existing administrator password.

   The setting changes to **Not Set**.

   To assign a new administrator password, perform the steps in [Assigning an Administrator Password](#).

4. Exit system setup.

### Disabling a Forgotten Password and Setting a New Password

To reset system and/or administrator passwords, see [Clearing Forgotten Passwords](#).

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### System Setup

#### Overview

Use system setup as follows:

- To change the system configuration information after you add, change, or remove any hardware in your computer
- To set or change a user-selectable option such as the user password
- To read the current amount of memory or set the type of hard drive installed

Before you use system setup, it is recommended that you write down the system setup screen information for future reference.

#### Entering System Setup

1. Turn on (or restart) your computer.
2. When the blue DELL™ logo appears, press <F2> immediately.

   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop. Then shut down your computer (see [Turning Off Your Computer](#)) and try again.

#### System Setup Screens

The system setup screen displays current or changeable configuration information for your computer. Information on the screen is divided into three areas: the
System Setup Options

**Options List** — This field appears on the left side of the system setup window. The field is a scrollable list containing features that define the configuration of your computer, including installed hardware, power conservation, and security features.

Scroll up and down the list by using the up and down arrow keys. As an option is highlighted, the **Option Field** displays more information about that option and the option’s current and available settings.

**Option Field** — This field contains information about each option. In this field you can view your current settings and make changes to your settings.

Use the right- and left-arrow keys to highlight an option. Press <Enter> to make that selection active.

**Key Functions** — This field appears below the **Option Field** and lists keys and their functions within the active system setup field.

### System Info
- **Lists the computer name, BIOS Version, Service Tag, Express Service Code, (if applicable), and the Asset Tag.** None of these fields can be modified.

### Processor Info
- Identifies the CPU type, bus speed, clock speed, and L2 cache size. States whether the processor is hyperthreading and multiple-core capable and whether it supports 64-bit technology. None of these fields can be modified.

### Memory Info
- Lists the type, size, speed, channel mode (dual or single), and memory slot information of installed memory. For each populated memory slot, system setup lists the DIMM size, rank, type, and organization. Empty memory slots are denoted as "Empty." None of these fields can be modified.

### PCI Info
- Identifies any installed PCI or PCI Express cards. None of these fields can be modified.

### Date/Time
- Displays current date and time settings.

### Boot Sequence
- The computer attempts to boot from the sequence of devices specified in this list. This option allows you to control/modify the boot sequence (see **Boot Sequence**).

### Drives
- **Diskette Drive**
  - (Internal default)
  - This option enables or disables the floppy drive. The options are **Off**, **Internal**, **USB**, and **Read Only**.
  - **NOTE:** If **USB** is selected, ensure that USB Controller setup option under Onboard Devices is set to **On**.

- **SATA 0 through SATA n**
  - Identifies and enables/disables the drives attached to the SATA connectors on the system board and lists the capacities for the hard drives.
  - **NOTE:** These options appear as **SATA 0** through **SATA 3** for the mini tower, **SATA 0** through **SATA 2** for the desktop, **SATA 0 and SATA1** for the small form factor and ultra small form factor computers.

- **External SATA**
  - Identifies and enables/disables the drives attached to the eSATA connector on the system board and lists the capacities for the hard drives.
  - **NOTE:** This option is not available on the ultra small form factor computer.

- **SATA Operation**
  - **(RAID Autodetect/AHCI default for mini-tower and desktop)**
  - **(AHCI default for small form factor and ultra small form factor)**
  - Options for Mini Tower and Desktop:
    1. RAID Autodetect/AHCI (RAID if signed drives, otherwise AHCI)
    2. RAID Autodetect/ATA (RAID if signed drives, otherwise ATA)
    3. RAID On (SATA is configured for RAID on every boot)
    - **NOTE:** When in Autodetect mode, the computer configures the drive as RAID if a RAID signature is detected on the drive. Otherwise the drive will be configured as AHCI or ATA.
  - Options for Small Form Factor and Ultra Small Form Factor:
### SMART Reporting
This setting determines whether integrated drive errors are reported or not during computer start-up.

### Onboard Devices

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AHCI</strong></td>
<td>Enables or disables the integrated NIC controller. When the <strong>On/Off</strong> setting is active, if a boot routine is not available from the network server, the computer attempts to boot from the next device in the boot sequence list.</td>
</tr>
<tr>
<td><strong>ATA</strong></td>
<td>Enables or disables the onboard audio controller.</td>
</tr>
<tr>
<td><strong>USB Controller</strong></td>
<td>Enables or disables the internal USB controller. <strong>No Boot</strong> enables the controller but disables the ability to boot from a USB device.</td>
</tr>
<tr>
<td><strong>Rear Quad/Triad USB</strong></td>
<td>Enables or disables the upper USB ports on the back of the computer.</td>
</tr>
<tr>
<td><strong>Rear Dual USB</strong></td>
<td>Enables or disables the lower USB ports on the back of the computer.</td>
</tr>
<tr>
<td><strong>Front USB</strong></td>
<td>Enables or disables the front USB ports.</td>
</tr>
<tr>
<td><strong>PCI Slots</strong></td>
<td>Enables or disables all PCI and PCI Express slots.</td>
</tr>
<tr>
<td><strong>LPT Port Mode</strong></td>
<td>Determines the mode of operation of the internal parallel port. <strong>Off</strong> disables the port. <strong>AT</strong> configures the port for AT compatibility. <strong>PS/2</strong> configures the port for PS/2 compatibility. <strong>EPP</strong> configures the port for the EPP bidirectional protocol. <strong>ECP</strong> configures the port for the ECP bidirectional protocol.</td>
</tr>
<tr>
<td><strong>LPT Port Address</strong></td>
<td>Determines the address that the built-in parallel port uses.</td>
</tr>
<tr>
<td><strong>Serial Port #1</strong></td>
<td>Determines how the serial port operates. <strong>Auto</strong>, the default setting, automatically configures a connector to a particular designation (COM1 or COM3).</td>
</tr>
<tr>
<td><strong>Serial Port #2</strong></td>
<td>Determines how the serial port operates. <strong>Auto</strong>, the default setting, automatically configures a connector to a particular designation (COM2 or COM4).</td>
</tr>
</tbody>
</table>

### Video

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Video</strong></td>
<td>This setting specifies which video controller is primary, <strong>Auto</strong> or <strong>Onboard/Card</strong>. When Auto is selected, the add-in video controller will be used.</td>
</tr>
</tbody>
</table>

**NOTE:** A PCI Express graphics card will override the integrated video controller.

### Performance

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HyperThreading</strong></td>
<td>The hyperthreading option is displayed if the installed processor supports hyperthreading. Determines whether the physical processor appears as one or two logical processors. The performance of some applications improves with additional logical processors. <strong>On</strong> enables hyperthreading.</td>
</tr>
<tr>
<td><strong>Multiple CPU Core</strong></td>
<td>Determines whether the processor will have one or two cores enabled. <strong>On</strong> enables the second core.</td>
</tr>
<tr>
<td><strong>Virtualization</strong></td>
<td>Specifies whether a virtual machine monitor (VMM) can utilize the additional hardware capabilities provided by Intel Virtualization technology.</td>
</tr>
<tr>
<td><strong>VT for Direct I/O</strong></td>
<td>Specifies whether a Virtual Machine Monitor (VMM) can use the additional hardware capabilities provided by Intel Virtualization Technology for Direct I/O. Default is <strong>Off</strong>.</td>
</tr>
<tr>
<td>Feature</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Trusted Execution</td>
<td>Specifies whether a Measured Virtual Machine Monitor (MVMM) can use additional hardware capabilities provided by Intel Trusted Execution Technology. Default is Off.</td>
</tr>
<tr>
<td>Virtual Appliance</td>
<td>Specifies whether a Virtual Appliance can use the additional hardware capabilities provided by Intel Embedded Information Technology. Default is Off.</td>
</tr>
<tr>
<td>VA Config Lock</td>
<td>Specifies whether the Virtual Appliance ACPI Configuration Interface is locked or unlocked. This option has no effect when Virtual Appliance is disabled. Default is Unlocked.</td>
</tr>
<tr>
<td>SpeedStep</td>
<td>Enables Intel® SpeedStep® for all supported processors in the computer. This setting changes the processor power consumption and frequency.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE:</strong> This option may not be available on your computer.</td>
</tr>
<tr>
<td>Limit CPUID Value</td>
<td>Limits the max value the processor standard CPUID function will support. Some operating systems won’t complete installation when the max CPUID function supported is greater than 3.</td>
</tr>
</tbody>
</table>
| HDD Acoustic Mode              | i Quiet — The hard drive operates at its most quiet setting.  
   i Performance — The hard drive operates at its maximum speed.  
   i Bypass — Your computer does not test or change the current acoustics mode setting.  
   i Suggested — The hard drive operates at the level suggested by the drive manufacturer.                                            |
|                               | **NOTE:** Switching to performance mode may cause the drive to be noisier, but its performance is not affected. Changing the acoustics setting does not alter your hard drive image.                     |
| Security                       |                                                                                                                                                                                                            |
| Unlock Setup                   | When an administrator password is being used, allows the user access to modify system setup settings. Enter the administrator password at the prompt to unlock system setup. If the correct password is not entered here, the user can view but not modify system setup fields. |
| Admin Password                 | Displays the current status of your system setup program’s password security feature and allows you to verify and assign a new admin password.                                                                 |
| System Password                | Displays the current status of the computer’s system password security feature and allows a new system password to be assigned and verified.                                                             |
| SATA 0-n Password              | Displays the current status of the hard drive’s password security feature and allows a new hard drive password to be assigned and verified.                                                                      |
| Password Changes               | Determines the interaction between the System password and the Admin password. Locked prevents a user without a valid Admin password from being able to modify the System password. Unlocked allows a user with a valid System password to modify the system password. |
| Chassis Intrusion              | When enabled and the switch installed, this option alerts the user, during the next computer start-up, that the computer cover has been opened. The settings are On, On-Silent (default setting), and Off.       |
| Intrusion Detected             | Acknowledges and clears a chassis intrusion alert.                                                                                                                                                           |
| TPM Security                   | Enables or disables the Trusted Platform Module security device.                                                                                                                                              |
| TPM Activation                 | Activates or deactivates the Trusted Platform Module security device. The Clear option clears any data stored by a user that has previously activated and used TPM.                                         |
|                               | **NOTE:** In order to activate Trusted Platform Module, the TPM Security option must be set to On.                                                                                                             |
| Execute Disable                | Enables or disables Execute Disable memory protection technology.                                                                                                                                              |
| Computrace                     | Enables or disables the BIOS interface of the optional Computrace service from Absolute Software. This optional monitoring service must be purchased separately.  
   Activate permanently enables the BIOS-Computrace interface. Disable permanently disables the BIOS-Computrace interface. Deactivate temporarily deactivates the BIOS-Computrace interface. |
|                               | **NOTE:** By activating service, you consent to transmission of data from your computer to the Computrace server.                                                                                               |
Option Settings

This feature allows you to change the boot sequence for devices.

Boot Sequence

This feature allows you to change the boot sequence for devices.

Option Settings

- **USB Device** — The computer attempts to boot from the USB device. If no operating system is present, the computer generates an error message.
- **Onboard or USB Floppy Drive** — The computer attempts to boot from the floppy drive. If the floppy disk in the drive is not bootable, or if no floppy disk is in the drive, the computer generates an error message.
Onboard SATA Hard Drive — The computer attempts to boot from the primary serial ATA hard drive. If no operating system is on the drive, the computer generates an error message.

Onboard or USB CD-ROM Drive — The computer attempts to boot from the CD drive. If no CD is in the drive, or if the CD has no operating system, the computer generates an error message.

Onboard Network Controller — The computer attempts to boot from the network controller. If no operating system is present, the computer generates an error message.

Changing Boot Sequence for the Current Boot

You can use this feature, for example, to tell the computer to boot from the CD drive so that you can run the Dell Diagnostics on the Drivers and Utilities media, but you want the computer to boot from the hard drive when the diagnostic tests are complete. You can also use this feature to restart your computer to a USB device such as a floppy drive, memory key, or CD drive.

1. If you are booting to a USB device, connect the USB device to a USB connector.
2. Turn on (or restart) your computer.
3. When F2 = Setup, F12 = Boot Menu appears in the upper-right corner of the screen, press <F12>.
   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft Windows desktop. Then shut down your computer (see Turning Off Your Computer) and try again.
   The Boot Device Menu appears, listing all available boot devices. Each device has a number next to it.
4. At the bottom of the menu, enter the number of the device that is to be used for the current boot only.
   For example, if you are booting to a USB memory key, highlight USB Device and press <Enter>.
   **NOTE:** To boot to a USB device, the device must be bootable. To make sure your device is bootable, check the device documentation.

Changing Boot Sequence for Future Boots

1. Enter system setup (see Entering System Setup).
2. Use the arrow keys to highlight the Boot Sequence menu option and press <Enter> to access the pop-up menu.
   **NOTE:** Write down your current boot sequence in case you want to restore it.
3. Press the up- and down-arrow keys to move through the list of devices.
4. Press the spacebar to enable or disable a device. (Enabled devices have a checkmark.)
5. Press <Shift><Up Arrow> or <Shift><Down Arrow> to move a selected device up or down the list.

Booting to a USB Device

**NOTE:** To boot to a USB device, the device must be bootable. To ensure that your device is bootable, check the device documentation.

Memory Key

1. Insert the memory key into a USB port and restart the computer.
2. When F12 = Boot Menu appears in the upper-right corner of the screen, press <F12>.
   The BIOS detects the device and adds the USB device option to the boot menu.
3. From the boot menu, select the number that appears next to the USB device.
   The computer boots to the USB device.
**Floppy Drive**

1. In system setup, set the **Diskette Drive** option to **USB**.

2. Save and exit system setup.

3. Connect the USB floppy drive, insert a bootable floppy, and re-boot the computer.

**Jumper Settings**

<table>
<thead>
<tr>
<th>Jumper</th>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSWD</td>
<td>Password features are enabled (default setting).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Password features are disabled.</td>
</tr>
<tr>
<td>RTCRST</td>
<td>The real-time clock has not been reset.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The real-time clock is being reset (jumpered temporarily).</td>
</tr>
</tbody>
</table>
Clearing Forgotten Passwords

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide.*

⚠️ **NOTICE:** This process erases both the system and administrator passwords.

1. Follow the procedures in *Before You Begin.*

2. Remove the computer cover.

3. Locate the 2-pin password jumper (PSWD) on the system board, and remove the jumper to clear the password. See *Jumper Settings.*

4. Replace the computer cover (see *Replacing the Computer Cover.*)

5. Connect your computer and monitor to electrical outlets, and turn them on.

6. After the Microsoft® Windows® desktop appears on your computer, shut down your computer (see *Turning Off Your Computer.*)

7. Turn off the monitor and disconnect it from the electrical outlet.

8. Disconnect the computer power cable from the electrical outlet, and press the power button to ground the system board.

9. Open the computer cover.

10. Locate the 2-pin password jumper on the system board and attach the jumper to reenable the password feature.

11. Replace the computer cover (see *Replacing the Computer Cover.*)

12. Connect your computer and devices to electrical outlets, and turn them on.

⚠️ **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

13. Assign a new system and/or administrator password.

Clearing CMOS Settings

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide.*

1. Follow the procedures in *Before You Begin.*

2. Remove the computer cover.

3. Reset the current CMOS settings:
   a. Locate the password (PSWD) and CMOS (RTC_RST) jumpers on the system board (see *Jumper Settings.*)
   b. Remove the password jumper plug from its pins.
   c. Place the password jumper plug on the RTC_RST pins and wait approximately 5 seconds.
   d. Remove the jumper plug from the RTC_RST pins and place it back on the password pins.

4. Replace the computer cover (see *Replacing the Computer Cover.*)

⚠️ **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

5. Connect your computer and devices to electrical outlets, and turn them on.
Hyperthreading and Multi-Core Technology

Hyperthreading is an Intel technology that can enhance overall computer performance by allowing one physical processor to function as two logical processors that are capable of performing certain tasks simultaneously. Multi-core processors contain two or more physical computational units inside a single CPU package, thereby increasing computing efficiency and multi-tasking ability. Intel has implemented this technology in its Dual-Core and Quad-Core processors. These processors have two and four computational units respectively. It is recommended that you use the Microsoft Windows XP Service Pack 1 (SP1) or higher or Windows Vista operating systems which are optimized to take advantage of these technologies.

While many programs can benefit from hyperthreading and multi-core technology, some programs may have not been optimized for them and may require an update from the software manufacturer. Contact the software manufacturer for updates and information about using hyperthreading or multi-core technology with your software. To determine if your computer is using hyperthreading technology, check the system setup option for hyperthreading under the Performance tab (see System Setup).

Power Management for Windows XP and Windows Vista

Options in Windows XP

The Microsoft Windows XP power management features can reduce the amount of electricity your computer uses when it is on and you are not using it. You can reduce power to just the monitor or the hard drive, or you can use standby mode or hibernate mode to reduce power to the entire computer. When the computer exits from a power conservation mode, it returns to the operating state it was in prior to entering the mode.

NOTE: Windows XP Professional includes security and networking features not available in Windows XP Home Edition. When a Windows XP Professional computer is connected to a network, different options related to security and networking appear in certain windows.

NOTE: The procedures to activate the standby and hibernate modes may vary according to your operating system.

Standby Mode

Standby mode conserves power by turning off the display and the hard drive after a designated period of time, known as a time-out. When the computer exits from standby mode, it returns to the operating state it was in prior to entering standby mode.

NOTE: If your computer loses power while in standby mode, it may lose data.

To set standby mode to automatically activate after a defined period of inactivity:

1. Click Start ® Control Panel ® Pick a category ® Performance and Maintenance.
2. Under or pick a Control Panel icon, click Power Options.

To immediately activate standby mode without a period of inactivity, click Start ® Turn Off Computer ® Stand by.

To exit from standby mode, press a key on the keyboard or move the mouse.

Hibernate Mode

Hibernate mode conserves power by copying system data to a reserved area on the hard drive, and then completely turning off the computer. When the computer exits from hibernate mode, the desktop is restored to the state it was in prior to entering hibernate mode.

To activate hibernate mode:

1. Click Start ® Control Panel ® Pick a category ® Performance and Maintenance.
2. Under or pick a Control Panel icon, click Power Options.
3. Define your hibernate settings on the Power Schemes tab, Advanced tab, and Hibernate tab.

To exit from hibernate mode, press the power button. The computer may take a short time to exit from hibernate mode. Because the keyboard and mouse do not function in hibernate mode, pressing a key on the keyboard or moving the mouse does not bring the computer out of hibernation.

Because hibernate mode requires a special file on your hard drive with enough disk space to store the contents of the computer memory, Dell creates an appropriately sized hibernate mode file before shipping the computer to you. If the computer’s hard drive becomes corrupted, Windows XP recreates the hibernate file automatically.

Power Options Properties

Define your standby mode settings, hibernate mode settings, and other power settings in the Power Options Properties window. To access the Power Options Properties window:
1. Click Start ® Control Panel ® Pick a category ® Performance and Maintenance.

2. Under or pick a Control Panel icon, click Power Options.

3. Define your power settings on the Power Schemes tab, Advanced tab, and Hibernate tab as described in the following sections.

**Power Schemes Tab**

Each standard power setting is called a scheme. If you want to select one of the standard Windows schemes installed on your computer, choose a scheme from the Power schemes drop-down menu. The settings for each scheme appear in the fields below the scheme name. Each scheme has different settings for starting standby mode, hibernate mode, turning off the monitor, and turning off the hard drive.

**NOTICE:** If you set the hard drive to time-out before the monitor does, your computer may appear to be locked up. To recover, press any key on the keyboard or click the mouse. To avoid this problem, always set the monitor to time-out before the hard drive.

The Power schemes drop-down menu displays the following schemes:

- **Always On** (default) — If you want to use your computer with no power conservation.
- **Home/Office Desk** — If you want your home or office computer to run with little power conservation.
- **Portable/Laptop** — If your computer is a portable computer that you use for traveling.
- **Presentation** — If you want your computer to run without interruption (using no power conservation).
- **Minimal Power Management** — If you want your computer to run with minimal power conservation.
- **Max Battery** — If your computer is a portable computer and you run your computer from batteries for extended periods of time.

If you want to change the default settings for a scheme, click the drop-down menu in the Turn off monitor, Turn off hard disks, System stand by, or System hibernates field, and then select a time-out from the displayed list. Changing the time-out for a scheme field permanently changes the default settings for that scheme, unless you click Save As and enter a new name for the changed scheme.

**Advanced Tab**

The Advanced tab allows you to:

- Place the power options icon in the Windows task bar for quick access.
- Set the computer to prompt you for your Windows password before the computer exits from standby mode or hibernate mode.
- Program the power button to activate standby mode, activate hibernate mode, or turn off the computer.

To program these functions, click an option from the corresponding drop-down menu and click OK.

**Hibernate Tab**

The Hibernate tab allows you to enable hibernate mode. If you want to use the hibernate settings as defined on the Power Schemes tab, click the Enable hibernate support check box on the Hibernate tab.

For more information on power management options:

1. Click Start ® Help and Support ® Performance and maintenance.

2. In the Performance and maintenance window, click Conserving power on your computer.

**Options in Windows Vista**

The Microsoft Vista power management features can reduce the amount of electricity your computer uses when it is on and you are not using it. You can reduce power to just the monitor or the hard drive, or you can use sleep mode or hibernate mode to reduce power to the entire computer. When the computer exits from a power conservation mode, it returns to the operating state it was in prior to entering the mode.

**Sleep Mode**

Sleep mode conserves power by turning off the display and the hard drive after a predetermined period of inactivity (a time-out). When the computer exits sleep mode, it returns to the same operating state it was in before entering sleep mode.

To enter sleep mode in Windows Vista, click Start , click the arrow in the lower-right corner of the Start menu, and then click Sleep.

To exit sleep mode, press a key on the keyboard or move the mouse.
Hibernate Mode

Hibernate mode conserves power by copying system data to a reserved area on the hard drive and then completely turning off the computer. When the computer exits hibernate mode, it returns to the same operating state it was in before entering hibernate mode.

To manually enter hibernate mode in Windows Vista, click Start, click the arrow in the lower-right corner of the Start menu, and then click Hibernate.

Configuring Power Management Settings

You can use the Windows Power Options Properties to configure the power management settings on your computer.

To access Power Options Properties, click Start ® Control Panel ® System and Maintenance ® Power Options.

About RAID Configurations

This section provides an overview of the RAID configuration that you may have selected when you purchased your computer. A number of RAID configurations are available in the computer industry for different types of uses. Your Dell computer supports RAID level 0 and RAID level 1. A RAID level 0 configuration is recommended for high-performance programs, while RAID level 1 is recommended for users that desire a high level of data integrity.

NOTE: RAID levels do not represent a hierarchy. A RAID level 1 configuration is not inherently better or worse than a RAID level 0 configuration.

The Intel® RAID controller on your computer can only create a RAID level configuration using two physical drives. The drives should be the same size to ensure that the larger drive does not contain unallocated (and therefore unusable) space.

NOTE: If you purchased your Dell computer with RAID, your computer has been configured with two hard drives that are the same size.

Verifying That RAID Is Working

Your computer displays information pertaining to your RAID configuration at start-up, before loading the operating system. If RAID is not configured, the message none defined appears under RAID Volumes, followed by a list of the physical drives installed in your computer. If a RAID volume is identified, you can then check the Status field to determine the current state of your RAID configuration. The Status field contains information about the following conditions:

- Normal — Your RAID configuration is functioning properly.
- Degraded — One of your hard drives has failed. The computer is still bootable; however, RAID is not functioning and data is not being copied to the other drive.
- Rebuild — Following a degraded condition, the computer has detected the replacement/connection of a secondary hard drive and will automatically restore the RAID configuration the next time the operating system loads.

RAID Level 0

NOTE: Because a RAID level 0 configuration provides no data redundancy, a failure of one drive results in the loss of all data. To protect your data when using a RAID level 0 configuration, perform regular backups.

RAID level 0 uses a storage technique known as data striping to provide a high data-access rate. Data striping is a method of writing consecutive segments, or stripes, of data sequentially across the physical drive(s) to create a large virtual drive. Data striping allows one of the drives to read data while the other drive is searching for and reading the next block.

Another advantage of a RAID level 0 configuration is that it utilizes the full storage capacities of the drives. For example, two 120-GB hard drives combine to provide 240 GB of hard drive space on which to store data.

NOTE: In a RAID level 0 configuration, the size of the configuration is equal to the size of the smallest drive multiplied by the number of drives in the configuration.
RAID Level 1 Configuration

RAID level 1 uses a data-redundancy storage technique known as mirroring to enhance data integrity. When data is written to the primary drive, the data is also duplicated, or mirrored, on the second drive in the configuration.

If a drive failure occurs, subsequent read and write operations are directed to the surviving drive. A replacement drive can then be rebuilt using the data from the surviving drive.

**NOTE:** In a RAID level 1 configuration, the size of the configuration is equal to the size of the smallest drive in the configuration.

Configuring Your Computer for RAID

You can use one of two methods to configure RAID hard drive volumes. One method uses the Intel RAID Option ROM utility and can be performed without an operating system present on the hard drive. The second method uses the Intel Matrix Storage Manager, or Intel Matrix Storage Console, and is performed after the operating system and the Intel Matrix Storage Console have been installed. Both methods require that you set your computer to RAID-enabled mode before you begin.

**Setting Your Computer to RAID-Enabled Mode**

1. Enter system setup (see System Setup).
2. Press the up- and down-arrow keys to highlight Drives, and press <Enter>.
3. Press the up- and down-arrow keys to highlight SATA Operation, and press <Enter>.
4. Press the left- and right-arrow keys to highlight RAID On, press <Enter>, and then press <Esc>.

**NOTE:** For more information about RAID options, see System Setup Options.

5. Press the left- and right-arrow keys to highlight Save/Exit, and press <Enter> to exit system setup and resume the boot process.

**Configuring Your Computer for RAID Using the Intel RAID Option ROM Utility**

**NOTE:** Although any size of drives may be used to create a RAID configuration when using the Intel RAID Option ROM utility, ideally the drives should be of equal size. In a RAID level 0 configuration, the size of the configuration will be the size of the smallest drive multiplied by the number of drives in the configuration (two). In a RAID level 1 configuration, the size of the configuration will be the smaller of the two drives used.

**NOTICE:** You lose any data on your hard drives when you create a RAID configuration using the following procedure. Back up data that you want to keep before continuing.

**NOTE:** Use the following procedure only if you are reinstalling your operating system. Do not use the following procedure to migrate an existing storage configuration to RAID level 0 configuration.

1. Set your computer to RAID-enabled mode (see Setting Your Computer to RAID-Enabled Mode).
2. Press <Ctrl><i> when you are prompted to enter the Intel RAID Option ROM utility.
3. Press the up- and down-arrow keys to highlight Create RAID Volume, and press <Enter>.
4. Enter a RAID volume name or accept the default, and press <Enter>.
5. Press the up- and down-arrow keys to select RAID0(Stripe), and press <Enter>.

   **NOTE:** Select the stripe size closest to the size of the average file that you want to store on the RAID volume. If you do not know the average file size, choose 128 KB as your stripe size.

6. Press the up- and down-arrow keys to change the stripe size and press <Enter>.

7. Select the desired capacity for the volume and press <Enter>. The default value is the maximum available size.

8. Press <Enter> to create the volume.

9. Press <y> to confirm that you want to create the RAID volume.

10. Confirm that the correct volume configuration is displayed on the main Intel RAID Option ROM utility screen.

11. Press the up- and down-arrow keys to select Exit and press <Enter>.

12. Install the operating system (see Restoring Your Operating System).

**Creating a RAID Level 1 Configuration**

1. Set your computer to RAID-enabled mode (see Setting Your Computer to RAID-Enabled Mode).

2. Press <Ctrl><i> when you are prompted to enter the Intel RAID Option ROM utility.

3. Use the up- and down-arrow keys to highlight Create RAID Volume and press <Enter>.

4. Enter a RAID volume name or accept the default and press <Enter>.

5. Use the up- and down-arrow keys to select RAID1(Mirror) and press <Enter>.

6. Select the desired capacity for the volume, and press <Enter>. The default value is the maximum available size.

7. Press <Enter> to create the volume.

8. Press <y> to confirm that you want to create the RAID volume.

9. Confirm that the correct volume configuration is displayed on the main Intel RAID Option ROM utility screen.

10. Use the up- and down-arrow keys to select Exit, and press <Enter>.

11. Install the operating system (see Restoring Your Operating System).

**Configuring Your Computer for RAID Using the Intel Matrix Storage Manager**

If you already have one hard drive with the operating system installed on it, and you want to add a second hard drive and reconfigure both drives into a RAID volume without losing the existing operating system and any data, you need to use the migrating option for a RAID level 0 configuration (see Migrating to a RAID Level 0 Configuration) or a RAID level 1 configuration (see Migrating to a RAID Level 1 Configuration). Create a RAID level 0 volume or RAID level 1 volume only when:

- You are adding a new drive to an existing single-drive computer (and the operating system is on the single drive), and you want to configure the drives into a RAID volume.

- You already have a two-hard drive computer configured into a volume, but you still have some space left on the volume that you want to designate as a second RAID volume.

**Creating a RAID Level 0 Configuration**

   **NOTE:** When you perform this operation, all data on the RAID drives will be lost.

1. Set your computer to RAID-enabled mode (see Setting Your Computer to RAID-Enabled Mode).

2. Click Start and point to Programs, Intel(R) Matrix Storage Manager, Intel Matrix Storage Console to launch the Intel Storage Utility.
3. On the Actions menu, select Create RAID Volume to launch the Create RAID Volume Wizard, and then click Next.

4. On the Select Volume Location screen, click the first hard drive you want to include in your RAID level 0 volume, and then click the right arrow.

5. Click a second hard drive. To add a third hard drive in your RAID level 0 volume, click the right arrow and click the third drive until three drives appear in the Selected window, and then click Next.

6. In the Specify Volume Size window, click the Volume Size desired, and then click Next.

7. Click Finish to create the volume, or click Back to make changes.

Creating a RAID Level 1 Configuration

**NOTE:** When you perform this operation, all data on the RAID drives is lost.

1. Set your computer to RAID-enabled mode (see Setting Your Computer to RAID-Enabled Mode).

2. Click the Start button and point to Programs® Intel(R) Matrix Storage Manager® Intel Matrix Storage Console to launch the Intel® Storage Utility.

**NOTE:** If you do not see an Actions menu option, you have not yet set your computer to RAID-enabled mode.

3. On the Actions menu, select Create RAID Volume to launch the Create RAID Volume Wizard.

4. Click Next at the first screen.

5. Confirm the volume name, select RAID 1 as the RAID level, and then click Next to continue.

6. On the Select Volume Location screen, click the first hard drive you want to use to create your RAID level 1 volume, and then click the right arrow. Click a second hard drive until two drives appear in the Selected window, and then click Next.

7. In the Specify Volume Size window, select the Volume Size desired and click Next.

8. Click Finish to create the volume, or click Back to make changes.


Recovering From a Single Hard Drive Failure (RAID 1) Using the Intel Matrix Storage Manager

**NOTE:** Perform the following steps only after you have replaced the failed hard drive (see the appropriate "Drives" section for your computer).

1. Turn on or restart your computer.

2. Press <Ctrl><i> when you are prompted to enter the Intel RAID Option ROM utility.

3. Under DEGRADED VOLUME DETECTED, confirm that the new (non-RAID) drive is listed and then press <Enter>.

4. Under Disk/Volume Information confirm that the volume status is Rebuild.

**NOTE:** Volumes with a status of Rebuild are rebuilt within the operating system.

5. Use the up- and down-arrow keys to select Exit, and then press <Enter>.

   Your computer boots to the operating system and begins rebuilding the RAID volume automatically. A dialog box appears and displays the progress of the rebuild.

**NOTE:** You can use your computer while the computer is rebuilding the RAID level 1 volume.

Migrating to a RAID Level 0 Configuration

**NOTE:** If you do not see an Actions menu option, you have not yet set your computer to RAID-enabled mode (see Setting Your Computer to RAID-Enabled Mode).
1. Set your computer to RAID-enabled mode (see Setting Your Computer to RAID-Enabled Mode).

2. Click the Start button and point to All Programs→Intel(R) Matrix Storage Manager→Intel Matrix Storage Console to launch the Intel Storage Utility.

   **NOTE:** If you do not see an Actions menu option, you have not yet set your computer to RAID-enabled mode.

3. On the Actions menu, select Create RAID Volume From Existing Hard Drive to launch the Migration Wizard.

4. Click Next on the Migration Wizard screen.

5. Enter a RAID volume name or accept the default.

6. From the drop-down box, select RAID 0 as the RAID level.

   **NOTE:** Select the stripe size closest to the size of the average file you want to store on the RAID volume. If you do not know the average file size, choose 128 KB as your stripe size.

7. Select the appropriate stripe size from the drop-down box, and then click Next.

   **NOTE:** Select the hard drive that you want to use as your source hard drive (it should be the hard drive containing the data or operating system files that you want to keep on the RAID volume).

8. On the Select Source Hard Drive screen, double-click the hard drive from which you want to migrate, and click Next.

9. On the Select Member Hard Drive screen, double-click the hard drive(s) to select the member drive(s) to span the stripe array, and click Next.

10. On the Specify Volume Size screen, select the volume size you want, and click Next.

   **NOTE:** In step 11, all data contained on the member drive removed.

11. Click Finish to start migrating, or click Back to make changes. You can use your computer normally during migration process.

**Migrating to a RAID Level 1 Configuration**

1. Set your computer to RAID-enabled mode (see Setting Your Computer to RAID-Enabled Mode).

2. Click the Start button and point to All Programs→Intel(R) Matrix Storage Manager→Intel Matrix Storage Console to launch the Intel Storage Utility.

   **NOTE:** If you do not see an Actions menu option, you have not yet set your computer to RAID-enabled mode.

3. On the Actions menu, click Create RAID Volume From Existing Hard Drive to launch the Migration Wizard.

4. Click Next on the first Migration Wizard screen.

5. Enter a RAID volume name or accept the default.

6. From the drop-down box, select RAID 1 as the RAID level.

   **NOTE:** Select the hard drive that you want to use as your source hard drive (it should be the hard drive containing the data or operating system files that you want to keep on the RAID volume).

7. On the Select Source Hard Drive screen, double-click the hard drive from which you want to migrate, and click Next.

8. On the Select Member Hard Drive screen, double-click the hard drive to select the member drive that you want to act as the mirror in the configuration, and click Next.

9. On the Specify Volume Size screen, select the volume size you want, and click Next.

   **NOTE:** In step 10, all data contained on the member drive is removed.

10. Click Finish to start migrating, or click Back to make changes. You can use your computer normally during migration process.
Replacing the Battery

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

**NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer’s electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

A coin-cell battery maintains computer configuration, date, and time information. The battery can last several years. The battery may need replacing if an incorrect time or date is displayed during the boot routine along with a message such as:

- Time-of-day not set - please run SETUP program

or

- Invalid configuration information - please run SETUP program

or

- Strike the F1 key to continue, F2 to run the setup utility

To determine whether you need to replace the battery, reenter the time and date in system setup and exit the program to save the information. Turn off your computer and disconnect it from the electrical outlet for a few hours; then reconnect the computer, turn it on, and enter system setup (see Entering System Setup). If the date and time are not correct in system setup, replace the battery.

You can operate your computer without a battery; however, without a battery, the configuration information is erased if the computer is turned off or unplugged from the electrical outlet. In this case, you must enter system setup (see Entering System Setup) and reset the configuration options.

**CAUTION:** A new battery can explode if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer’s instructions.

To remove the battery:

1. If you have not already done so, make a copy of your configuration information, found in system setup.

2. Follow the procedures in Before You Begin.

3. Remove the computer cover.

4. Locate the battery socket.

**NOTICE:** If you pry the battery out of its socket with a blunt object, be careful not to touch the system board with the object. Ensure that the object is inserted between the battery and the socket before you attempt to pry out the battery. Otherwise, you may damage the system board by prying off the socket or by breaking circuit traces on the system board.

**NOTICE:** To avoid damage to the battery connector, you must firmly support the connector while removing the battery.

5. Remove the system battery.
   a. Support the battery connector by pressing down firmly on the positive side of the connector.
   b. While supporting the battery connector, press the battery tab away from the positive side of the connector and pry the battery it up out of the securing tabs at the negative side of the connector.
6. Install the new system battery.
   a. Support the battery connector by pressing down firmly on the positive side of the connector.
   b. Hold the battery with the "+" facing up, and slide it under the securing tabs at the positive side of the connector.
   c. Press the battery straight down into the connector until it snaps into place.

7. Replace the computer cover (see Replacing the Computer Cover).

8. Enter system setup (see Entering System Setup) and restore the settings you recorded in step 1.

9. Properly dispose of the old battery as described in the Product Information Guide.
### Before You Begin

**User’s Guide**

- **Recommended Tools**
- **Before Working Inside Your Computer**

This chapter provides procedures for removing and installing the components in your computer. Unless otherwise noted, each procedure assumes that the following conditions exist:

- You have performed the steps in [Turning Off Your Computer](#) and [Before Working Inside Your Computer](#).
- You have read the safety information in your Dell™ Product Information Guide.
- A component can be replaced by performing the removal procedure in reverse order.

### Recommended Tools

The procedures in this document may require the following tools:

- Small flat-blade screwdriver
- Phillips screwdriver
- Flash BIOS update program floppy disk or CD

### Turning Off Your Computer

**NOTICE:** To avoid losing data, save and close all open files and exit all open programs before you turn off your computer.

1. Shut down the operating system:
   
   a. Save and close all open files and exit all open programs.
   
   b. In the Microsoft® Windows® XP operating system, click **Start** → **Shut Down** → **Shut down**.

   **In Microsoft Windows Vista®,** click the Windows Vista Start button™, in the lower-left corner of the desktop, click the arrow in the lower-right corner of the Start menu as shown below, and then click **Shut Down**.

   ![Power Button](image)

   The computer turns off after the operating system shutdown process is complete.

**NOTICE:** Ensure that the computer and all attached devices are turned off. If your computer and attached devices did not automatically turn off when you shut down your operating system, press and hold the power button for about 4 seconds to turn them off.

### Before Working Inside Your Computer

Use the following safety guidelines to help protect your computer from potential damage and to help ensure your own personal safety.

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

**CAUTION:** Handle components and cards with care. Do not touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a processor by its edges, not by its pins.

**NOTICE:** Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell is not covered by your warranty.

**NOTICE:** When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before you disconnect the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, ensure that both connectors are correctly oriented and aligned.

**NOTICE:** To avoid damaging the computer, perform the following steps before you begin working inside the computer.

1. **Turn off your computer.**

**NOTICE:** To disconnect a network cable, first unplug the cable from your computer and then unplug it from the network wall jack.
2. Disconnect any telephone or telecommunication lines from the computer.

3. Disconnect your computer and all attached devices from their electrical outlets, and then press the power button to ground the system board.

4. If applicable, remove the computer stand (for instructions, see the documentation that came with the stand) and the cable cover, if attached (see Cable Cover (Optional)).

⚠️ **CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

5. Remove the computer cover.
   - For a mini tower computer, see Removing the Computer Cover.
   - For a desktop computer, see Removing the Computer Cover.
   - For a small form factor computer, see Removing the Computer Cover.
   - For an ultra small form factor computer, see Removing the Computer Cover.

⚠️ **NOTICE:** Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate any static electricity that could harm internal components.
Cleaning Your Computer

User's Guide

Computer, Keyboard, and Monitor

Mouse

Floppy Drive

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

Computer, Keyboard, and Monitor

CAUTION: Before you clean your computer, disconnect the computer from the electrical outlet. Clean your computer with a soft cloth dampened with water. Do not use liquid or aerosol cleaners, which may contain flammable substances.

- Use a can of compressed air to remove dust from between the keys on the keyboard.

NOTICE: To prevent damage to the antiglare coating, do not wipe the display with soap or alcohol.

- To clean your monitor screen, lightly dampen a soft, clean cloth with water. You can also use a special screen-cleaning tissue or solution suitable for the monitor’s antistatic coating.
- Wipe the keyboard, computer, and monitor plastics with a soft cleaning cloth moistened with a solution of three parts water and one part dishwashing detergent.
  
  Do not soak the cloth or let water drip inside your computer or keyboard.

Mouse

NOTICE: Disconnect the mouse from the computer before cleaning the mouse.

If your screen cursor skips or moves abnormally, clean the mouse.

Cleaning a Non-Optical Mouse

1. Clean the outside casing of the mouse with a cloth moistened with a mild cleaning solution.

2. Turn the retainer ring on the underside of your mouse counterclockwise, and then remove the ball.

3. Wipe the ball with a clean, lint-free cloth.

4. Blow carefully into the ball cage or use a can of compressed air to dislodge dust and lint.

5. If the rollers inside the ball cage are dirty, clean the rollers with a cotton swab moistened lightly with isopropyl alcohol.

6. Recenter the rollers in their channels if they are misaligned. Ensure that fluff from the swab is not left on the rollers.

7. Replace the ball and retainer ring, and turn the retainer ring clockwise until it clicks into place.

Cleaning an Optical Mouse

Clean the outside casing of the mouse with a cloth moistened with a mild cleaning solution.

Floppy Drive

NOTICE: Do not attempt to clean drive heads with a swab. You might accidentally misalign the heads which prevents the drive from operating.
Clean your floppy drive using a commercially available cleaning kit. These kits contain pretreated floppy disks to remove contaminants that accumulate during normal operation.

**CDs and DVDs**

If you notice problems, such as skipping, with the playback quality of your CDs or DVDs, try cleaning the discs.

1. Hold the disc by its outer edge. You can also touch the inside edge of the center hole.

   NOTICE: To avoid damaging the surface, do not wipe in a circular motion around the disc.

2. With a soft, lint-free cloth, gently wipe the bottom of the disc (the unlabeled side) in a straight line from the center to the outer edge of the disc.

   For stubborn dirt, try using water or a diluted solution of water and mild soap. You can also purchase commercial products that clean discs and provide some protection from dust, fingerprints, and scratches. Cleaning products for CDs are also safe to use on DVDs.
About Your Desktop Computer

Front View

1 USB 2.0 connectors (2)
Use the front USB connectors for devices that you connect occasionally, such as joysticks or cameras, or for bootable USB devices (see System Setup for more information about booting to a USB device).

It is recommended that you use the back USB connectors for devices that typically remain connected, such as printers and keyboards.

2 LAN indicator light
This light indicates that a LAN (local area network) connection is established.

3 power button
Press this button to turn on the computer.

**NOTICE:** To avoid losing data, do not turn off the computer by pressing the power button. Instead, perform an operating system shutdown. See Turning Off Your Computer for more information.

**NOTICE:** If your operating system has ACPI enabled, when you press the power button the computer will perform an operating system shutdown.

4 Dell badge
This badge can be rotated to match the orientation of your computer. To rotate, place fingers around the outside of the badge, press firmly, and turn the badge. You can also rotate the badge using the slot provided near the bottom of the badge.

5 power light
The power light illuminates and blinks or remains solid to indicate different operating states:
- No light — The computer is turned off.
- Steady green — The computer is in a normal operating state.
- Blinking green — The computer is in a power-saving mode.
- Blinking or solid amber — See Power Problems.

To exit from a power-saving mode, press the power button or use the keyboard or the mouse if it is configured as a wake device in the Windows Device Manager. For more information about sleep modes and exiting from a power-saving mode, see Power Management for Windows XP and Windows Vista.

See Diagnostic Lights for a description of light codes that can help you troubleshoot problems with your computer.

6 diagnostic lights
Use the lights to help you troubleshoot a computer problem based on the diagnostic code. For more information, see Diagnostic Lights.

7 hard drive activity light
This light flickers when the hard drive is being accessed.
8 headphone connector
   Use the headphone connector to attach headphones and most kinds of speakers.

9 microphone connector
   Use the microphone connector to attach a microphone.

10 3.5-inch drive bay
   Can contain an optional floppy drive, second hard drive, or optional media card reader.

11 5.25-inch drive bay
   Can contain an optical drive. Insert a CD or DVD (if supported) into this drive.

Back View

1 card slots
   Access connectors for any installed PCI or PCI Express cards, PS/2 connector, eSATA connector, etc.

NOTE: The back view of the computer is different if a riser is installed.

2 back panel connectors
   Plug serial, USB, and other devices into the appropriate connectors (see Back Panel Connectors).

3 power connector
   Insert the power cable.

4 voltage selection switch
   Your computer is equipped with a manual voltage selection switch. To help avoid damaging a computer with a manual voltage selection switch, set the switch for the voltage that most closely matches the AC power available in your location.

NOTICE: In Japan, the voltage selection switch must be set to the 115-V position.
   Also, ensure that your monitor and attached devices are electrically rated to operate with the AC power available in your location.

5 padlock ring
   Insert a padlock to lock the computer cover.

6 cover-release latch
   Allows you to open the computer cover.

Back Panel Connectors

1 parallel connector
   Connect a parallel device, such as a printer, to the parallel connector. If you have a USB printer, plug it into a USB connector.

   NOTE: The integrated parallel connector is automatically disabled if the computer detects an installed card containing a parallel connector configured to the same address. For more information, see System Setup Options.

2 link integrity light
   Green — A good connection exists between a 10-Mbps network and the computer.
   Orange — A good connection exists between a 100-Mbps network and the computer.

   **Back View**

   ![Back View Diagram]

   **Back Panel Connectors**

   ![Back Panel Connectors Diagram]
Removing the Computer Cover

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

**CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

1. Follow the procedures in *Before You Begin*.
2. If you have installed a padlock through the padlock ring on the back panel, remove the padlock.
3. Locate the cover release latch shown in the illustration. Then, slide the release latch back as you lift the cover.
4. Grip the sides of the computer cover and pivot the cover up using the hinge tabs as leverage points.
5. Remove the cover from the hinge tabs and set it aside on a soft nonabrasive surface.

**CAUTION:** Graphics card heat sinks can become very hot during normal operation. Ensure that a graphics card heat sink has had sufficient time to cool before you touch it.
Inside Your Computer

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

⚠️ **CAUTION:** To avoid electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

⚠️ **NOTICE:** Be careful when opening the computer cover to ensure that you do not accidentally disconnect cables from the system board.

### Drive Bays
- Drive bays (media card reader or floppy drive, optical drive and hard drive)
- Power supply
- Optional chassis-intrusion switch
- System board
- Card slots
- Heat sink assembly
- Front I/O panel

### Chassis Intrusion Switch

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.
Removing the Chassis Intrusion Switch

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Disconnect the chassis intrusion switch cable from the system board by using two fingers to squeeze the release mechanism on one side of the connector as you pull to disconnect the cable connector.

4. Slide the chassis intrusion switch out of its slot in the metal bracket, and then push it down through the square hole in the bracket to remove the switch and its attached cable from the computer.

   **NOTE:** You may feel a slight resistance as you slide the switch out of the slot.

Replacing the Chassis Intrusion Switch

1. Gently insert the switch from underneath the metal bracket into the square hole in the bracket, and then slide the chassis intrusion switch into its slot until it snaps securely into place.

2. Reconnect the cable to the system board.

3. Replace the computer cover (see Replacing the Computer Cover).

Resetting the Chassis Intrusion Detector

1. Turn on (or restart) your computer.

2. When the blue DELL™ logo appears, press <F2> immediately.

   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop. Then shut down your computer and try again.

3. Select the Chassis Intrusion option and then press the left- or right-arrow key to select Reset. Change the setting to On, On-Silent, or Disabled.

   **NOTE:** The default setting is On-Silent.

4. Save your BIOS settings and exit system setup.

Removing the Heat Sink Assembly

**NOTE:** The chassis intrusion switch is standard on the ultra small form factor computer but is optional on mini tower, desktop, and small form factor computers; it may not be present on your computer.
1. Loosen the captive screw on each side of the heat sink assembly.

**CAUTION:** Despite having a plastic shield, the heat sink assembly may be very hot during normal operation. Be sure that it has had sufficient time to cool before you touch it.

2. Rotate the heat sink assembly upward, and remove the assembly from the computer.
Lay the heat sink down on its top.

### System Board Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>internal speaker (INT_SPKR)</td>
</tr>
<tr>
<td>2</td>
<td>processor connector (CPU)</td>
</tr>
<tr>
<td>3</td>
<td>processor power connector (12VPOWER)</td>
</tr>
<tr>
<td>4</td>
<td>memory module connectors (DIMM_1, DIMM_2, DIMM_3, DIMM_4)</td>
</tr>
<tr>
<td>5</td>
<td>password jumper (PSWD)</td>
</tr>
<tr>
<td>6</td>
<td>SATA connectors (SATA0, SATA1, SATA2)</td>
</tr>
<tr>
<td>7</td>
<td>riser connector (uses PCI-E port/SLOT1 and PCI port/SLOT2)</td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
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<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>intrusion switch connector (INTRUDER)</td>
</tr>
<tr>
<td>13</td>
<td>battery socket (BATTERY)</td>
</tr>
<tr>
<td>14</td>
<td>PCI Express x16 connector (SLOT1)</td>
</tr>
<tr>
<td>15</td>
<td>PCI connector (SLOT2)</td>
</tr>
<tr>
<td>16</td>
<td>PCI connector (SLOT3)</td>
</tr>
<tr>
<td></td>
<td>Description</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>7</td>
<td>front-panel connector (FRONTPANEL)</td>
</tr>
<tr>
<td>8</td>
<td>power connector (POWER)</td>
</tr>
<tr>
<td>9</td>
<td>external SATA connector (eSATA)</td>
</tr>
<tr>
<td>10</td>
<td>internal USB (INT_USB)</td>
</tr>
<tr>
<td>11</td>
<td>RTC reset jumper (RTCRST)</td>
</tr>
<tr>
<td>18</td>
<td>serial connector (SERIAL2)</td>
</tr>
<tr>
<td>19</td>
<td>system board speaker (BEEP)</td>
</tr>
<tr>
<td>20</td>
<td>aux power LED (aux_LED)</td>
</tr>
<tr>
<td>21</td>
<td>floppy connector (DSKT)</td>
</tr>
<tr>
<td>22</td>
<td>fan connector (FAN_CPU)</td>
</tr>
</tbody>
</table>

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If you purchased a Dell™ n Series computer, any references in this document to Microsoft® Windows® operating systems are not applicable.

If you purchased a Dell™ n Series computer, any references in this document to Microsoft® Windows® operating systems are not applicable.
Your Dell™ computer supports a PS/2 serial port adapter and provides the following connectors on the system board for PCI and PCI Express cards:

- Two connectors for low-profile PCI cards
- One connector for a low-profile PCI Express x16 card

**NOTE:** Your Dell computer includes only PCI and PCI Express card connectors. ISA cards are not supported.

### PCI Cards

#### Installing a PCI Card

If you are replacing a PCI card, remove the current driver for the card from the operating system. See the documentation that came with the card for information.

1. Follow the procedures in [Before You Begin](#).
2. Remove the computer cover (see [Removing the Computer Cover](#)).
3. Gently press the release tab on the card-retention latch all the way up.
4. If you are installing a card in an empty card connector on the system board, remove the filler bracket to create a card-slot opening at the back of the computer. Then continue with step 6.

5. If you are installing a card to replace one already installed in the computer, remove the installed card (see Removing a PCI Card).

6. Prepare the card for installation.

   **NOTE:** See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer.

   ![Diagram of card components]

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>release tab on card-retention latch</td>
</tr>
<tr>
<td>2</td>
<td>card</td>
</tr>
<tr>
<td>3</td>
<td>card-edge connector</td>
</tr>
<tr>
<td>4</td>
<td>card connector</td>
</tr>
</tbody>
</table>

   **CAUTION:** Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

7. If you are installing a PCI Express x16 card, hold the securing-tab release lever away from the card connector as you insert the new card into the connector slot.

   ![Diagram of PCI Express x16 card installation]

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PCI Express x16 card</td>
</tr>
<tr>
<td>2</td>
<td>release lever</td>
</tr>
<tr>
<td>3</td>
<td>securing slot (not all cards)</td>
</tr>
<tr>
<td>4</td>
<td>securing tab</td>
</tr>
<tr>
<td>5</td>
<td>PCI Express x16 card connector</td>
</tr>
</tbody>
</table>

8. Place the card in the connector and press down firmly. Using the following illustration as a guide, ensure that the card is fully seated in the slot.
9. Gently rotate the release tab downward to move the card-retention latch into place to secure the cards.

10. Connect any cables that should be attached to the card.

11. Replace the computer cover (see Replacing the Computer Cover), reconnect the computer and devices to electrical outlets, and then turn them on.

12. If you installed a sound card:
   a. Enter system setup, select Audio Controller, and change the setting to Off (see Entering System Setup).
   b. Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the microphone, speaker/headphone, or line-in connectors on the back or front panel.

13. If you installed a network adapter card and want to turn off the integrated network adapter:
   a. Enter system setup, select Network Controller, and change the setting to Off (see Entering System Setup).
   b. Connect the network cable to the connector on the network adapter card. Do not connect the network cable to the integrated network connector.

**NOTE:** If you are installing a PCI Express x16 card, ensure that the securing tab on the connector's release lever fits into the notch on the front end of the card.

9. Gently rotate the release tab downward to move the card-retention latch into place to secure the cards.

**NOTE:** Do not route card cables over or behind the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

10. Connect any cables that should be attached to the card.

11. Replace the computer cover (see Replacing the Computer Cover), reconnect the computer and devices to electrical outlets, and then turn them on.

**NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

12. If you installed a sound card:
   a. Enter system setup, select Audio Controller, and change the setting to Off (see Entering System Setup).
   b. Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the microphone, speaker/headphone, or line-in connectors on the back or front panel.

13. If you installed a network adapter card and want to turn off the integrated network adapter:
   a. Enter system setup, select Network Controller, and change the setting to Off (see Entering System Setup).
   b. Connect the network cable to the connector on the network adapter card. Do not connect the network cable to the integrated network connector.
14. Install any drivers required for the card as described in the card documentation.

Removing a PCI Card

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. Gently rotate upward the release tab on the card-retention latch.
4. If necessary, disconnect any cables connected to the card.
5. If you are replacing a PCI Express x16 card, remove the installed card by gently pulling the release lever away from the card until you release the securing tab from the dent in the card.
6. Grasp the card by its top corners, and ease it out of its connector.
7. If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

**NOTE:** Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintain the airflow that cools your computer.
8. Rotate the release tab downward to snap the card-retention latch into place.

**NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

9. Replace the computer cover (see Replacing the Computer Cover), reconnect the computer and devices to electrical outlets, and then turn them on.

10. Uninstall the card’s driver. See the documentation that came with the card for instructions.

11. If you removed a sound card:
   a. Enter system setup, select **Audio Controller**, and change the setting to **On** (see Entering System Setup).
   b. Connect external audio devices to the audio connectors on the computer back panel.

12. If you removed a network adapter card:
   a. Enter system setup, select **Network Controller**, and change the setting to **On** (see Entering System Setup).
   b. Connect the network cable to the integrated network connector on the back panel of the computer.

**Installing a PCI Card in the Riser-Card Cage**

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. If applicable, remove the card installed in the PCI3 connector on the system board.

4. Remove the riser-card cage:
   a. Check any cables connected to cards through the back panel openings. Disconnect any cables that will not reach the riser-card cage once they are removed from the computer.
   b. Gently pull on the handle and lift the riser-card cage up and away from the computer.

5. If you are installing a new card, remove the filler bracket to create an empty card-slot opening.

   If you are replacing a card that is already installed in the computer, remove the card. If necessary, disconnect any cables connected to the card. Grasp the card by its corners, and ease it out of its connector.

   **NOTE:** See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer.

6. Prepare the new card for installation.

   **CAUTION:** Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.
7. Press the release tab to raise the card-retention latch.

8. Insert the card firmly into the card connector on the riser-card cage.

9. Lower the card-retention latch and press it into place, securing the card(s) in the computer.

10. Replace the riser-card cage:
   a. Align the tabs in the side of the riser-card cage with the slots on the side of the computer, and slide the riser-card cage down into place.
   b. Ensure that the riser cards are fully seated in the connectors on the system board.


12. Connect any cables that should be attached to the card.

**NOTICE:** Do not route card cables over or behind the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

13. Replace the computer cover (see Replacing the Computer Cover), reconnect the computer and devices to electrical outlets, and then turn them on.

14. If you installed a sound card, perform the following steps:
   a. Enter system setup, select Audio Controller, and change the setting to Off (see Entering System Setup).
   b. Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the microphone, speaker/headphone,
or line-in connectors on the back panel.

15. If you installed a network adapter card and want to turn off the integrated network adapter:
   a. Enter system setup, select *Network Controller* and change the setting to *Off* (see *Entering System Setup*).
   b. Connect the network cable to the network adapter card’s connectors. Do not connect the network cable to the integrated network connector on the back panel of the computer.

   **NOTICE:** If you disable the integrated network adapter, you will not have AMT functionality.

16. Install any drivers required for the card as described in the card documentation.

**Removing a PCI Card From the Riser-Card Cage**

1. Follow the procedures in *Before You Begin*.

2. Remove the computer cover (see *Removing the Computer Cover*).

3. Remove the riser-card cage:
   a. Check any cables connected to cards through the back panel openings. Disconnect any cables that will not reach the riser-card cage once they are removed from the computer.
   b. Gently pull on the handle and lift the riser-card cage up and away from the computer.

4. Press in on the tab to raise the card-retention latch.

5. If necessary, disconnect any cables connected to the card.

6. Grasp the card by its top corners, and ease it out of its connector.

7. If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

   **NOTE:** Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintain the airflow that cools your computer.

8. Lower the card-retention latch and press it into place.

9. Replace the riser-card cage:
   a. Align the tabs in the side of the riser-card cage with the slots on the side of the computer, and slide the riser-card cage down into place.
   b. Ensure that the riser cards are fully seated in the connectors on the system board.
10. Replace the computer cover (see Replacing the Computer Cover), reconnect the computer and devices to electrical outlets, and then turn them on.

11. Uninstall the card's driver. See the documentation that came with the card for instructions.

12. If you removed a sound card:
   a. Enter system setup, select Audio Controller, and change the setting to On (see Entering System Setup).
   b. Connect external audio devices to the audio connectors on the computer back panel.

13. If you removed a network adapter card:
   a. Enter system setup, select Network Controller, and change the setting to On (see Entering System Setup).
   b. Connect the network cable to the integrated network connector on the back panel of the computer.

**PS/2 Serial Port Adapter**

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

⚠️ **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

**Installing a PS/2 Serial Port Adapter**

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.

4. Remove the filler bracket (if applicable).

   ☀️ **NOTE:** See the documentation that came with the adapter for information on configuring the adapter, making internal connections, or customizing it for your computer.

5. Align the PS/2 serial-port adapter bracket in the retention slot and press down firmly. Ensure that the adapter is fully seated in the slot.
6. Before you close the card retention mechanism, ensure that:
   - The tops of all cards and filler brackets are flush with the alignment bar.
   - The notch in the top of the card or filler bracket fits around the alignment guide.

7. Secure the card(s) by closing the card retention latch and snapping it into place.

   **NOTICE:** Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

8. Connect the adapter cable to the PS/2 serial port adapter connector (SERIAL2) on the system board (see *System Board Components*).

   **NOTE:** See the documentation for the PS/2 serial port adapter for information about the cable connections.

9. Replace the computer cover (see *Replacing the Computer Cover*).

**Removing a PS/2 Serial Port Adapter**

1. Follow the procedures in *Before You Begin*.

2. Remove the computer cover (see *Removing the Computer Cover*).
3. Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.

4. Disconnect the PS/2 serial-port cable from the system board (see System Board Components).

5. Ease the PS/2 serial-port adapter bracket out of its retention slot.

6. If you are removing the adapter permanently, install a filler bracket in the empty card-slot opening.

   **NOTE:** Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintain the airflow that cools your computer.

7. Before you close the card retention mechanism, ensure that:
   - The tops of all cards and filler brackets are flush with the alignment bar.
   - The notch in the top of the card or filler bracket fits around the alignment guide.

8. Secure any remaining card(s) by closing the card retention latch and snapping it into place.

9. Replace the computer cover (see Replacing the Computer Cover).

**Installing a PS/2 Serial Port Adapter in the Riser-Card Cage**

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Remove the riser-card cage:
   a. Check any cables connected to cards through the back panel openings. Disconnect any cables that will not reach the riser-card cage once they are removed from the computer.
   b. Rotate the riser-card cage handle up and gently pull on the handle to lift the riser-card cage up and away from the computer.
4. Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.

5. If you are installing a new PS/2 serial port adapter, remove the filler bracket to create an empty card-slot opening.

6. If you are replacing a PS/2 adapter that is already installed in the computer, remove the adapter.

7. If necessary, disconnect any cables connected to the adapter.

⚠️ **CAUTION:** To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards or adapters.

8. Align the PS/2 serial-port adapter bracket in the retention slot and press down firmly. Ensure that the adapter is fully seated in the slot.

9. Before you close the card retention mechanism, ensure that:
   - The tops of all cards and filler brackets are flush with the alignment bar.
   - The notch in the top of the card or filler bracket fits around the alignment guide.

10. Secure the card(s) by closing the card retention latch and snapping it into place.

⚠️ **NOTICE:** Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

11. Connect the adapter cable to the PS/2 serial port adapter connector (PS2/SERIAL2) on the system board (see System Board Components). 

12. Replace the riser-card cage:
   a. Align the tabs in the side of the riser-card cage with the slots on the side of the computer, and slide the riser-card cage down into place.
   b. Ensure that the riser-card connectors are fully seated in the connectors on the system board.
   c. Rotate the riser-card cage handle to the down position.

13. Connect any disconnected cables.

14. Replace the computer cover (see Replacing the Computer Cover).

15. Install any drivers required for the PS/2 serial port adapter.

**Removing a PS/2 Serial Port Adapter From the Riser-Card Cage**

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Remove the riser-card cage:
   a. Check any cables connected to cards through the back panel openings. Disconnect any cables that will not reach the riser-card cage once they are removed from the computer.
   b. Rotate the riser-card cage handle up and gently pull on the handle and lift the riser-card cage up and away from the computer.
4. Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.

5. Disconnect the PS/2 serial-port cable from the system board (see System Board Components).

6. Grasp the PS/2 serial-port adapter bracket by its top corners, and ease it out of its connector.

7. If you are removing the adapter permanently, install a filler bracket in the empty card-slot opening.

   **NOTE:** Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.

8. Before you close the card retention mechanism, ensure that:
   - The tops of all cards and filler brackets are flush with the alignment bar.
   - The notch in the top of the card or filler bracket fits around the alignment guide.

9. Secure the card(s) by closing the card retention latch and snapping it into place.

10. Replace the riser-card cage:
    a. Align the tabs in the side of the riser-card cage with the slots on the side of the computer, and slide the riser-card cage down into place.
    b. Ensure that the riser-card connectors are fully seated in the connectors on the system board.
    c. Rotate the riser-card cage handle to the down position.

11. Replace the computer cover (see Replacing the Computer Cover).

12. Uninstall the adapter's driver. See the documentation that came with the adapter for instructions.

**eSATA**

eSATA allows for full SATA data transfer rates (3 GB/sec) between a drive and the chipset, approximately six times the data throughput of USB.

eSATA on your computer also supports hot-plugging. Hot-plugging allows for device detection without powering down your computer prior to connecting the device to your computer. When a device is connected, the operating system automatically recognizes the change. However, the computer must be powered down before removal and/or replacement.

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

**NOTE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer’s electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

**Installing eSATA Without a Riser**

1. Remove the computer cover (see Removing the Computer Cover).

2. Remove the filler panel for the card slot you are using for the eSATA connector.
3. Mount the bracket into the desired card slot opening.

4. Plug the free end of the eSATA cable into the eSATA connector on the system board (see System Board Components).

5. Replace the computer cover (see Replacing the Computer Cover).

6. Boot your computer and enter system setup (see Entering System Setup). Use the esata option to enable the eSATA drive.

**Installing eSATA With a Riser**

1. Remove the computer cover (see Removing the Computer Cover).

2. Remove the riser from your computer.

3. Press the blue release tab to remove the filler panel for the card slot you are using for the eSATA connector.

4. Insert the bracket for the eSATA connector into that opening and press down on the release tab to hold the bracket in place.
5. Plug the free end of the eSATA cable into the eSATA connector on the system board.

6. Replace the riser.

7. Replace the computer cover (see Replacing the Computer Cover).

8. Boot your computer and enter system setup (see Entering System Setup). Use the esata option to enable the eSATA drive.
Processor

**Removing the Processor**

1. Follow the procedures in *Before You Begin.*

2. Remove the computer cover (see *Removing the Computer Cover*).

3. Remove the heat sink assembly (see *Removing the Heat Sink Assembly*).

   **NOTICE:** Unless a new heat sink is required for the new processor, reuse the original heat sink assembly when you replace the processor.

4. Open the processor cover by sliding the release lever from under the center cover latch on the socket. Then pull the lever back to release the processor.

5. Gently remove the processor from the socket.

   Leave the release lever extended in the release position so that the socket is ready for the new processor.

**Installing the Processor**

1. Follow the procedures in *Before You Begin.*

2. Remove the computer cover (see *Removing the Computer Cover*).
3. Unpack the new processor, being careful not to touch the underside of the processor.

**NOTICE:** You must position the processor correctly in the socket to avoid permanent damage to the processor and the computer when you turn on the computer.

4. If the release lever on the socket is not fully extended, move it to that position.

5. Orient the front and rear alignment-notches on the processor with the front and rear alignment-notches on the socket.

6. Align the pin-1 corners of the processor and socket.

![Diagram of processor and socket with components labeled]

<table>
<thead>
<tr>
<th>1. processor cover</th>
<th>6. release lever</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. tab</td>
<td>7. front alignment-notch</td>
</tr>
<tr>
<td>3. processor</td>
<td>8. socket and processor pin-1 indicator</td>
</tr>
<tr>
<td>4. processor socket</td>
<td>9. rear alignment-notch</td>
</tr>
<tr>
<td>5. center cover latch</td>
<td></td>
</tr>
</tbody>
</table>

**NOTICE:** To avoid damage, ensure that the processor aligns properly with the socket, and do not use excessive force when you install the processor.

7. Set the processor lightly in the socket and ensure that the processor is positioned correctly.

8. When the processor is fully seated in the socket, close the processor cover.

   Ensure that the tab on the processor cover is positioned underneath the center cover latch on the socket.

9. Pivot the socket release lever back toward the socket, and snap it into place to secure the processor.

10. Clean the thermal grease from the bottom of the heat sink.

**NOTICE:** Ensure that you apply new thermal grease. New thermal grease is critical for ensuring adequate thermal bonding, which is a requirement for optimal processor operation.

11. Apply the new thermal grease to the top of the processor.

12. Install the heat sink assembly:
   a. Place the heat sink assembly back onto the heat-sink assembly bracket.
   b. Rotate the heat sink assembly down towards the computer base and tighten the two captive screws.

**NOTICE:** Ensure that the heat sink assembly is correctly seated and secure.
13. Replace the computer cover (see Replacing the Computer Cover).

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>heat sink assembly</td>
</tr>
<tr>
<td>2</td>
<td>heat-sink assembly bracket</td>
</tr>
<tr>
<td>3</td>
<td>captive screw housing (2)</td>
</tr>
</tbody>
</table>

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Drives

Your computer supports:

- One SATA (serial ATA) hard drive
- One 3.5-inch drive bay (to support a floppy drive, media card reader, or optional second SATA hard drive)
- One SATA optical drive
- One eSATA drive (with optional bracket)

**NOTE:** Due to the limited number of drive bays and controllers on this computer, you will not be able to connect all supported devices at once.

**NOTE:** If you will be operating your computer without an optical drive or a 3.5-inch device (floppy drive or media card reader) installed, the appropriate drive bay insert must be installed in place of the drive. Contact Dell if you need a drive bay insert.

### General Drive Installation Guidelines

SATA connectors on the system board are labeled SATA0, SATA1, and SATA2. Hard drives must be connected to the lower-numbered SATA connectors. Any other SATA device (like an optical drive) must be connected to the remaining SATA connectors numbered higher than the one that the hard drive(s) is connected to. For example, if you have two SATA hard drives and one SATA optical drive, connect the two hard drives to the SATA0 and SATA1 connectors, and connect the SATA optical drive to the SATA2 connector. (See System Board Components for the location of the SATA connectors on the system board.)

### Connecting Drive Cables

When you install a drive, you connect two cables—a DC power cable and a data interface cable—to the back of the drive.

### Data Interface Connectors
Power Cable Connectors

Connecting and Disconnecting Drive Cables
When removing a cable with a pull-tab, grasp the colored pull-tab and pull until the connector detaches.

When connecting and disconnecting a cable without a pull tab, hold the cable by the black connector at each end.

Drive Inserts
Your computer will come with a plastic insert with shoulder screws and a metal insert.

Removing Drive Inserts
If you are installing a new drive:

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. Lift the drive release latch.
4. Slide the metal bracket toward the back of the computer and lift up.
Replacing Drive Inserts

If you are removing a drive, and need to replace the inserts:

1. Place the plastic insert over the opening and press the insert tab down until the plastic insert snaps into place.

2. Slide the metal bracket toward the front of the computer and click into place.

3. Replace the computer cover (see Replacing the Computer Cover).

Optical Drive

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

⚠️ **CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

⚠️ **NOTE:** If you will be operating your computer without an optical drive or a 3.5-inch device (floppy drive or media card reader) installed, the appropriate drive bay insert must be installed in place of the drive. Contact Dell if you need a drive bay insert. See Removing Drive Inserts.

Removing an Optical Drive

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).
3. Pull up on the drive-release latch and slide the drive towards the back of the computer. Then, lift up to remove the drive from the computer.

4. Disconnect the power and data cables from the back of the drive.

5. If you are not replacing the optical drive at this time, install the optical drive insert by lowering it into the drive bay until it clicks into place. Contact Dell if you need a drive bay insert.

**Installing an Optical Drive**

1. Unpack the drive and prepare it for installation.
   
   Check the documentation that accompanied the drive to verify that the drive is configured for your computer.

2. Pull up on the drive-release latch and slide the drive towards the back of the computer. Then, lift up to remove the drive from the computer.

3. If you are installing a new drive:
   
   a. Remove the inserts (see \textit{Removing Drive Inserts}).
   
   b. Insert the three shoulder screws removed from the insert into the sides of the new drive and tighten them.
   
   c. Lift the drive release latch up and insert the new optical device.

4. If you are replacing an existing drive:
   
   a. Follow procedures in \textit{Removing an Optical Drive} to remove the existing drive.
   
   b. Remove the three shoulder screws from the existing drive.
   
   c. Insert the three shoulder screws into the sides of the new drive and tighten them.

5. Connect the power and data cables to the drive.

6. Align the shoulder screws with the screw guides, and slide the drive into the bay until it clicks into place.
7. Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.

8. Replace the computer cover (see Replacing the Computer Cover).

9. Update your configuration information by setting the appropriate Drive option (0 or 1) under Drives. See System Setup for more information.

10. Verify that your computer works correctly by running the Dell Diagnostics (see Dell Diagnostics).

## Floppy Drive

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

**CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

**NOTE:** If you will be operating your computer without an optical drive or a 3.5-inch device (floppy drive) installed, the appropriate drive bay insert must be installed in place of the drive. Contact Dell if you need a drive bay insert.

### Removing a Floppy Drive

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

   **NOTE:** Since the following steps do not require the complete removal of the optical drive, it is not necessary to disconnect the cables connecting the optical drive.

3. Remove the optical drive (if one exists) and carefully set it aside (see Removing an Optical Drive).

   **NOTICE:** Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

4. Pull up on the drive-release latch and slide the floppy drive the back of the computer. Then, lift up to remove the drive from the computer.
5. Disconnect the power and data cables from the back of the floppy drive.

6. If you are not replacing the floppy drive or media card reader at this time, install the floppy drive inserts (see Replacing Drive Inserts). Contact Dell if you need a drive bay insert.

Installing a Floppy Drive

1. If you are installing a new floppy drive
   a. Remove the drive inserts (see Removing Drive Inserts).
   b. Pull to remove the floppy drive insert that should be installed in the drive bay.
   c. Remove the four shoulder screws from the drive panel insert.

2. If you are replacing an existing floppy drive:
   Remove the four shoulder screws from the existing drive or media card reader.

3. Insert the four shoulder screws into the sides of the new floppy drive and tighten them.
4. Attach the power and data cables to the floppy drive.

5. Align the shoulder screws with the screw guides, and slide the drive into the bay until it clicks into place.

6. Replace the optical drive (see Optical Drive).

7. Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.

8. Replace the computer cover (see Replacing the Computer Cover).

9. Enter system setup and set the Diskette Drive option to enable your new floppy drive (see System Setup).

10. Verify that your computer works correctly by running the Dell Diagnostics (see Dell Diagnostics).

### Media Card Reader

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

**CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

**NOTE:** If you will be operating your computer without an optical drive or a 3.5-inch drive installed, the appropriate drive bay insert must be installed in place of the drive. Contact Dell if you need a drive bay insert.

#### Removing a Media Card Reader

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

   **NOTE:** Since the following steps do not require the complete removal of the optical drive, it is not necessary to disconnect the cables connecting the optical drive.

3. Remove the optical drive (if one exists) and carefully set it aside (see Removing an Optical Drive).

   **NOTICE:** Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

4. Pull up on the drive-release latch and slide the media card reader to the back of the computer. Then, lift up to remove the drive from the computer.
5. Disconnect the cable from the back of the media card reader and from the system board.

6. If you are not replacing the media card reader at this time, install the 3.5 inch drive insert (see Replacing Drive Inserts). Contact Dell if you need a drive bay insert.

**Installing a Media Card Reader**

1. If you are installing a new drive or media card reader:
   a. Remove the drive inserts (see Removing Drive Inserts).
   b. Remove the four shoulder screws from the drive panel insert.
   c. Pull to remove the 3.5 inch drive insert that should be installed in the drive bay.
2. If you are replacing an existing media card reader:
   Remove the four shoulder screws from the existing media card reader.

3. Insert the four shoulder screws into the sides of the new media card reader and tighten them.

4. Attach the cable to the media card reader and system board connector.

5. Align the shoulder screws with the screw guides, and slide the media card reader into the bay until it clicks into place.
6. Replace the optical drive (see Optical Drive).

7. Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.

8. Replace the computer cover (see Replacing the Computer Cover).

9. Verify that your computer works correctly by running the Dell Diagnostics (see Dell Diagnostics).

**Hard Drive**

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

⚠️ **CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

⚠️ **NOTICE:** To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

**Removing a Hard Drive**

1. If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.

2. Check the documentation for the drive to verify that it is configured for your computer.

3. Follow the procedures in Before You Begin.

4. Remove the computer cover (see Removing the Computer Cover).

⚠️ **NOTE:** Since the following steps do not require the complete removal of the optical drive and the floppy drive, it is not necessary to disconnect the cables connecting the two drives.

5. Remove the optical drive from the bay and carefully set it aside (see Optical Drive).

6. Remove the floppy drive from the 3.5-inch bay and carefully set it aside (see Floppy Drive).

7. Press in on the two plastic securing clips on each side of the drive and slide the drive towards the back of the computer.

⚠️ **NOTICE:** Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

8. Lift the drive out of the computer and disconnect the power and data cables from the drive.
Installing a Hard Drive

1. Check the documentation for the drive to verify that it is configured for your computer.

**NOTICE:** To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

2. Unpack the replacement hard drive, and prepare it for installation.

3. If your replacement hard drive does not have the plastic hard drive bracket attached, remove the bracket from the existing drive by unsnapping it from the drive.

4. Attach the bracket to the new drive by snapping it onto the drive.
5. Connect the power and data cables to the drive.

6. Locate the correct slot for the drive, and slide the drive into the bay until it clicks into place.

![Diagram of hard drive and slot verification number](image)

7. Replace the floppy drive and optical drive.

8. Check all connectors to be certain that they are properly cabled and firmly seated.

9. Replace the computer cover (see Replacing the Computer Cover).

10. If the drive you just installed is the primary drive, insert a bootable medium into your boot drive.

11. Turn on the computer.

12. Enter system setup, and update the SATA port option under the Drives option list (see Entering System Setup).

13. Exit system setup, and reboot the computer.

14. Partition and logically format your drive.

   - **NOTE:** For instructions, see the documentation that came with your operating system.

15. Test the hard drive by running the Dell Diagnostics (see Dell Diagnostics).

16. Install your operating system on the hard drive.

   - **NOTE:** For instructions, see the documentation that came with your operating system.

---

### Replacing a Second Hard Drive

For information on RAID configuration, see About RAID Configurations.

- **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

- **CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

- **NOTICE:** To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

- **NOTICE:** If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.

- **NOTE:** Installation of a second hard drive is restricted to certain configurations of the Desktop computer.

1. Check the documentation for the drive to verify that it is configured for your computer.

2. Follow the procedures in Before You Begin.
3. Remove the computer cover (see Removing the Computer Cover).

4. Remove the optical drive (if your configuration has one). See Removing an Optical Drive.

5. Disconnect cable from the existing hard drive.

6. Remove the existing hard drive from the computer (see Removing a Hard Drive).

7. Remove screws from the existing hard drive and install them on the new hard drive.

8. Carefully slide the new hard drive into the upper bay until it clicks into place.

9. Insert reconnect the cable to the drive.

10. Locate an unused SATA connector on the system board and attach a data cable from the second hard drive to the SATA connector.

   NOTICE: Always connect the data cable to the SATA1 connector when installing a second hard drive.

11. Replace the optical drive (if your configuration has one). See Installing an Optical Drive.

12. Replace the computer cover (see Replacing the Computer Cover).

13. Turn on the computer.

14. Enter system setup, and update the SATA port option under the Drives option list (see Entering System Setup).

15. Exit system setup, and reboot the computer.
16. Partition and logically format your drive.

[NOTE: For instructions, see the documentation that came with your operating system.]

17. Test the hard drive by running the Dell Diagnostics (see Dell Diagnostics).

18. Install your operating system on the hard drive.

[NOTE: For instructions, see the documentation that came with your operating system.]
I/O Panel

Removing the I/O Panel

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

⚠️ **CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

❄️ **NOTE:** Note the routing of all cables before disconnecting them, so that you can re-route them correctly when installing the new I/O panel.

1. Follow the procedures in **Before You Begin**.
2. Remove the computer cover (see **Removing the Computer Cover**).
3. Remove the heat sink assembly (see **Removing the Heat Sink Assembly**).
4. Move all other cables out of the way.
5. Remove the screw that secures the I/O panel to the desktop computer.

❄️ **NOTICE:** When sliding the I/O panel out of the computer, be extremely careful. Carelessness may result in damage to the cable connectors and the cable routing clips.

6. Gently rotate and slide the I/O panel away from the computer.
7. Remove the cable from the I/O panel by pulling on the pull tab.

---

**Replacing the I/O Panel**

To replace the I/O panel, follow the removal procedures in the reverse order.
NOTE: Use the guides on the I/O panel bracket to help position the I/O panel in place and use the notch on the I/O panel bracket to help seat the card.
Replacing the Power Supply

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

**NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer’s electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in *Before You Begin*.

2. Remove the computer cover (see *Removing the Computer Cover*).

3. Disconnect the DC power cables from the system board and the drives.

   Note the routing of the DC power cables underneath the tabs in the computer chassis as you remove them from the system board and drives. You must route these cables properly when you replace them to prevent them from being pinched or crimped.

4. Remove the two screws that attach the power supply to the back of the computer chassis.

5. Remove the optical drive and carefully set it aside (see *Optical Drive*).

6. Press the release button located on the floor of the computer chassis.

7. Slide the power supply toward the front of the computer approximately one inch.

8. Lift the power supply up and out of the computer.

9. Slide the replacement power supply into place.

10. Replace the screws that secure the power supply to the back of the computer chassis.
11. Reconnect the DC power cables.

12. Replace the optical drive (see Optical Drive).

13. Connect the AC power cable to the connector.

14. Replace the computer cover (see Replacing the Computer Cover).

**DC Power Connectors**

![DC Power Connectors Diagram]

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Signal name</th>
<th>18-AWG Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+3.3 VDC</td>
<td>Orange</td>
</tr>
<tr>
<td>2</td>
<td>+3.3 VDC</td>
<td>Orange</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>4</td>
<td>+5 VDC</td>
<td>Red</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>6</td>
<td>+5 VDC</td>
<td>Red</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>8</td>
<td>PS_PWRGOOD*</td>
<td>Gray</td>
</tr>
<tr>
<td>9</td>
<td>P5AUX</td>
<td>Purple</td>
</tr>
<tr>
<td>10</td>
<td>+12 VDC</td>
<td>White</td>
</tr>
<tr>
<td>11</td>
<td>+12 VDC</td>
<td>White</td>
</tr>
<tr>
<td>12</td>
<td>+3.3 VDC</td>
<td>Orange</td>
</tr>
<tr>
<td>13</td>
<td>+3.3 VDC/SE</td>
<td>Orange</td>
</tr>
<tr>
<td>14</td>
<td>+12 VDC*</td>
<td>Blue</td>
</tr>
<tr>
<td>15</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>16</td>
<td>PWR_PS_ON*</td>
<td>Green</td>
</tr>
<tr>
<td>17</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>18</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>19</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>20</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>Pin Number</td>
<td>Signal Name</td>
<td>18-AWG Wire</td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>1</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>3</td>
<td>+12 VDC</td>
<td>Yellow</td>
</tr>
<tr>
<td>4</td>
<td>+12 VDC</td>
<td>Yellow</td>
</tr>
</tbody>
</table>

*Use 22-AWG wire instead of 18-AWG wire.*
<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Signal name</th>
<th>18-AWG Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+3.3 VDC</td>
<td>Orange</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>3</td>
<td>+5 VDC</td>
<td>Red</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>5</td>
<td>+12 VDC</td>
<td>Yellow</td>
</tr>
</tbody>
</table>
Speakers

Installing a Speaker

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

**NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in Before You Begin.
2. Remove the cover of your computer (see Removing the Computer Cover).
3. Insert the speaker into the chassis of the computer.
4. Connect the cables to the system board.
5. Replace the computer cover.
6. Turn on power to the computer.

Removing a Speaker

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

**NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in Before You Begin.
2. Remove the cover of your computer (see Removing the Computer Cover).
3. Disconnect the cables from the system board.
4. Remove the speaker from the chassis of the computer.
5. Replace the computer cover.

6. Turn on power to the computer.
## Desktop Computer Specifications

### Microprocessor

<table>
<thead>
<tr>
<th>Microprocessor type</th>
<th>The following are supported:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intel® Core™2</td>
</tr>
<tr>
<td></td>
<td>Intel vPro™</td>
</tr>
<tr>
<td></td>
<td>Intel Celeron®</td>
</tr>
</tbody>
</table>

| Internal cache      | L1: up to 128 KB;           |
|                    | L2: up to 8 MB (depending on your processor) |

### Memory

<table>
<thead>
<tr>
<th>Type</th>
<th>667-MHz or 800-MHz DDR2 SDRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory connectors</td>
<td>4</td>
</tr>
<tr>
<td>Memory modules supported</td>
<td>512 MB, 1 GB, or 2 GB non-ECC</td>
</tr>
</tbody>
</table>

**Minimum memory**
- dual-channel: 1 GB
- single-channel: 512 MB

**NOTE:** 512 MB is the minimum shipping configuration.

| Maximum memory      | 64-bit operating system: 8 GB |
|                    | 32-bit operating system: 4 GB |

| BIOS address        | F0000h                        |

### Computer Information

<table>
<thead>
<tr>
<th>Chipset</th>
<th>Intel Q35 Express Chipset w/ICH9DD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data bus width</td>
<td>64 bits</td>
</tr>
<tr>
<td>Address bus width</td>
<td>32 bits</td>
</tr>
<tr>
<td>DMA channels</td>
<td>eight</td>
</tr>
<tr>
<td>Interrupt levels</td>
<td>24</td>
</tr>
<tr>
<td>BIOS chip (NVRAM)</td>
<td>32 Mb</td>
</tr>
</tbody>
</table>

**NIC**
- Integrated network interface with ASF 1.03 and 2.0 support as defined by DMTF
- Capable of 10/100/1000 communication
- AMT 3.0

### Video

<table>
<thead>
<tr>
<th>Type</th>
<th>Intel Graphics Media Accelerator 3100 (integrated on system board)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PCI Express x16 slot can support either a PCI Express graphics card or a DVI graphics card (for dual-monitor support)</td>
</tr>
</tbody>
</table>

### Audio

<table>
<thead>
<tr>
<th>Type</th>
<th>ADI 1984 High Definition Audio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stereo conversion</td>
<td>24-bit analog-to-digital; 24-bit digital-to-analog</td>
</tr>
</tbody>
</table>

### Controllers

| Drives              | three SATA controllers and one eSATA controller                     |
### Expansion Bus

<table>
<thead>
<tr>
<th>Bus type</th>
<th>PCI 2.3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PCI Express 1.0A</td>
</tr>
<tr>
<td></td>
<td>SATA 1.0A and 2.0</td>
</tr>
<tr>
<td></td>
<td>USB 2.0</td>
</tr>
</tbody>
</table>

**Bus speed**
- PCI: 133 MHz
- PCI Express x16: 8 GB/s bidirectional speed
- SATA: 1.5 Gbps and 3.0 Gbps
- USB: 480 Mbps

**Cards**
- Standard configuration supports low-profile cards only; with optional riser-card cage, computer supports half-length, full-height cards. Full-height cards are supported in the 6.875-inch riser card cage.

**PCI: without riser-card cage**
- Connectors: two
- Card size: low profile
- Connector size: 120 pins
- Connector data width: 32 bits

**PCI Express: without riser-card cage**
- Connectors: one x16
- Card size: low profile
- Power: 25 W (maximum)
- Connector size: 164 pins (x16)
- Connector data width (maximum): 16 PCI Express lanes (x16)

**PCI and PCI Express: with optional, full-height PCI Express riser-card cage, supporting both low-profile and full-height cards**
- Connectors: three PCI
- Card size: one low-profile card and two full-height cards
- Connector size: 120 pins
- Connector data width (maximum): 32 bits

### Drives

**Externally accessible**
- One eSATA drive (optional)

**Internally accessible**
- Two SATA (Serial ATA) hard drives
- One 3.5-inch floppy drive or media card reader
- One SATA optical drive

### Connectors

**External connectors:**
<table>
<thead>
<tr>
<th>Connector Type</th>
<th>描述</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial</td>
<td>9-pin connector; 16550C-compatible</td>
</tr>
<tr>
<td>Parallel</td>
<td>25-pin connector (bidirectional)</td>
</tr>
<tr>
<td>Video</td>
<td>15-pin VGA connector</td>
</tr>
<tr>
<td>Network adapter</td>
<td>RJ45 connector</td>
</tr>
<tr>
<td>Optional PS/2 with secondary serial port adapter</td>
<td>two 6-pin mini-DINs</td>
</tr>
<tr>
<td>USB</td>
<td>two front-panel and six back panel USB 2.0–compliant connectors</td>
</tr>
<tr>
<td>Audio</td>
<td>two connectors for line-in/ microphone and line-out; two front-panel connectors for headphones and microphone</td>
</tr>
</tbody>
</table>

**System board connectors:**

<table>
<thead>
<tr>
<th>Connector Type</th>
<th>描述</th>
</tr>
</thead>
<tbody>
<tr>
<td>SATA</td>
<td>three 7-pin connectors</td>
</tr>
<tr>
<td>eSATA</td>
<td>one 7-pin connector</td>
</tr>
<tr>
<td>Internal USB</td>
<td>10-pin header for optional media card reader (in 3.5-inch drive bay)</td>
</tr>
<tr>
<td>Floppy drive</td>
<td>34-pin connector</td>
</tr>
<tr>
<td>Serial</td>
<td>12-pin connector for optional secondary PS/2 serial port card</td>
</tr>
<tr>
<td>Fan</td>
<td>5-pin connector</td>
</tr>
<tr>
<td>PCI Express</td>
<td>one 120-pin (x16) connector</td>
</tr>
<tr>
<td>PCI 2.3</td>
<td>two 120-pin connectors</td>
</tr>
<tr>
<td>Front panel</td>
<td>40-pin connector</td>
</tr>
</tbody>
</table>

**Key Combinations**

- **<Ctrl>+<Alt>+<Del>** in Microsoft® Windows® XP, brings up the Windows Security window; in MS-DOS® mode, restarts (reboots) the computer
- **<F2>** or **<Ctrl>+<Alt>+<Enter>** starts embedded system setup (during system start-up only)
- **<F3>** automatically starts the computer from the network environment specified by the remote boot environment (PXE) rather than from one of the devices in the system setup Boot Sequence option (during system start-up only)
- **<F12>** or **<Ctrl>+<Alt>+<F8>** displays a boot device menu that allows the user to enter a device for a single boot (during system start-up only) as well as options to run hard drive and system diagnostics
- **<Ctrl>+<p>** displays the Management Engine BIOS Extension settings screen that allows you to modify the settings

**Controls and Lights**

- **Power control**
  - Power light: green light — blinking green indicates a sleep mode; solid green indicates a power-on state.
  - amber light — blinking amber indicates a problem with an installed device; solid amber indicates an internal power problem (See Power Problems.)
  - hard drive access light: green
  - Link light: solid green light indicates network connection
  - Link integrity light (on integrated network adapter): green light for 10-Mb operation; orange light for 100-Mb operation; yellow light for 1000-Mb (1-Gb) operation
  - Activity light (on integrated network adapter): yellow blinking light

**Diagnostic lights**

Four lights on the front panel (See Diagnostic Lights.)

**Standby power light**

AUX_PWR on the system board

**Power**

DC power supply:

**NOTE:** Power consumption from an AC power source can be zero when the computer is unplugged from that power source, but the internal battery does draw a minute amount of power from the power supply even when the computer is not drawing power from the AC power source.
<table>
<thead>
<tr>
<th><strong>Wattage</strong></th>
<th>280 W</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heat dissipation</strong></td>
<td>955 BTU/hr</td>
</tr>
<tr>
<td><strong>NOTE:</strong> Heat dissipation is calculated based upon the power supply rating.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Voltage</strong></th>
<th>manual selection power supplies — 90 to 135 V at 50/60 Hz; 180 to 265 V at 50/60 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Backup battery</strong></td>
<td>3-V CR2032 lithium coin cell</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Physical</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Height</strong></td>
<td>11.4 cm (4.5 inches)</td>
</tr>
<tr>
<td><strong>Width</strong></td>
<td>39.9 cm (15.7 inches)</td>
</tr>
<tr>
<td><strong>Depth</strong></td>
<td>35.3 cm (13.9 inches)</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>10.4 kg (23 lb)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Environmental</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Operating</strong></td>
<td>10° to 35°C (50° to 95°F)</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>-40° to 65°C (-40° to 149°F)</td>
</tr>
<tr>
<td><strong>Relative humidity</strong></td>
<td>20% to 80% (noncondensing)</td>
</tr>
<tr>
<td><strong>Maximum vibration:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Operating</strong></td>
<td>0.25 G at 3 to 200 Hz at 0.5 octave/min</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>0.5 G at 3 to 200 Hz at 1 octave/min</td>
</tr>
<tr>
<td><strong>Maximum shock:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Operating</strong></td>
<td>bottom half-sine pulse with a change in velocity of 50.8 cm/sec (20 inches/sec)</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>27-G faired square wave with a velocity change of 508 cm/sec (200 inches/sec)</td>
</tr>
<tr>
<td><strong>Altitude:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Operating</strong></td>
<td>-15.2 to 3048 m (-50 to 10,000 ft)</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>-15.2 to 10,668 m (-50 to 35,000 ft)</td>
</tr>
<tr>
<td><strong>Airborne contaminant level</strong></td>
<td>G2 or lower as defined by ISA-S71.04-1985</td>
</tr>
</tbody>
</table>
Installing your computer in an enclosure can restrict the airflow and impact your computer's performance, possibly causing it to overheat. Use the following guidelines when installing your computer in an enclosure.

**NOTICE:** The operating temperature specifications indicated in this guide reflect the maximum ambient operating temperature. The room's ambient temperature needs to be a consideration when installing your computer in an enclosure. For example, if the ambient room temperature is at 25°C (77°F), depending on your computer's specifications, you only have 5°C to 10°C (9°F to 18°F) temperature margin before you reach your computer's maximum operating temperature. For details about your computer's specifications:

- For a mini tower computer, see [Mini Tower Computer Specifications](#).
- For a desktop computer, see [Desktop Computer Specifications](#).
- For a small form factor computer, see [Small Form Factor Computer Specifications](#).
- For an ultra small form factor computer, see [Ultra Small Form Factor Computer Specifications](#).

- Leave a 10.2-centimeter (4-inch) minimum clearance on all vented sides of the computer to permit the airflow required for proper ventilation.
- If your enclosure has doors, they need to be of a type that allows at least 30% airflow through the enclosure (front and back).
- If your computer is installed in a corner on a desk or under a desk, leave at least 5.1 centimeters (2 inch) of clearance from the back of the computer to the wall to permit the airflow required for proper ventilation.
Do not install your computer in an enclosure that does not allow airflow. Restricting the airflow impacts your computer's performance, possibly causing it to overheat.
FCC Notices (U.S. Only)

User's Guide

FCC Class B

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause interference with radio and television reception. This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

- **NOTICE:** The FCC regulations provide that changes or modifications not expressly approved by Dell Inc. could void your authority to operate this equipment.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference with radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the system with respect to the receiver.
- Move the system away from the receiver.
- Plug the system into a different outlet so that the system and the receiver are on different branch circuits.

If necessary, consult a representative of Dell Inc. or an experienced radio/television technician for additional suggestions.

The following information is provided on the device or devices covered in this document in compliance with the FCC regulations:

- Product name: Dell™ OptiPlex™ 755
- Model numbers: DCTR, DCNE, DCSM, DCCY
- Company name:
  Dell Inc.
  Worldwide Regulatory Compliance & Environmental Affairs
  One Dell Way
  Round Rock, TX 78682 USA
  512-338-4400

- **NOTE:** For Further regulatory information, see your Product Information Guide.
## Finding Information

### User’s Guide

**NOTE:** Some features or media may be optional and may not ship with your computer. Some features or media may not be available in certain countries.

**NOTE:** Additional information may ship with your computer.

<table>
<thead>
<tr>
<th>What Are You Looking For?</th>
<th>Find It Here</th>
</tr>
</thead>
<tbody>
<tr>
<td>- A diagnostic program for my computer</td>
<td>Drivers and Utilities CD or DVD</td>
</tr>
<tr>
<td>- Drivers for my computer</td>
<td></td>
</tr>
<tr>
<td>- My computer documentation</td>
<td></td>
</tr>
<tr>
<td>- My device documentation</td>
<td></td>
</tr>
<tr>
<td>- Desktop System Software (DSS)</td>
<td></td>
</tr>
<tr>
<td><strong>NOTE:</strong> The Drivers and Utilities media may be optional and may not ship with your computer. Documentation and drivers are already installed on your computer. You can use the media to reinstall drivers (see Reinstalling Drivers and Utilities), to run the Dell Diagnostics (see Dell Diagnostics), or to access your documentation. Readme files may be included on your media to provide last-minute updates about technical changes to your computer or advanced technical-reference material for technicians or experienced users. <strong>NOTE:</strong> Drivers and documentation updates can be found at support.dell.com.</td>
<td></td>
</tr>
<tr>
<td>- How to set up my computer</td>
<td>Quick Reference Guide</td>
</tr>
<tr>
<td>- Basic troubleshooting information</td>
<td></td>
</tr>
<tr>
<td>- How to run the Dell Diagnostics</td>
<td><strong>NOTE:</strong> This document may be optional and may not ship with your computer.</td>
</tr>
<tr>
<td>- Tools and utilities</td>
<td></td>
</tr>
<tr>
<td><strong>NOTE:</strong> This document is available as a PDF at support.dell.com.</td>
<td></td>
</tr>
<tr>
<td>- Warranty information</td>
<td>Dell™ Product Information Guide</td>
</tr>
<tr>
<td>- Terms and Conditions (U.S. only)</td>
<td></td>
</tr>
<tr>
<td>- Safety instructions</td>
<td></td>
</tr>
<tr>
<td>- Regulatory information</td>
<td></td>
</tr>
<tr>
<td>- Ergonomics information</td>
<td></td>
</tr>
<tr>
<td>- End User License Agreement</td>
<td></td>
</tr>
<tr>
<td><strong>NOTE:</strong> This document may be optional and may not ship with your computer.</td>
<td></td>
</tr>
<tr>
<td>- How to remove and replace parts</td>
<td>Dell™ OptiPlex™ User’s Guide</td>
</tr>
<tr>
<td>- Specifications</td>
<td></td>
</tr>
<tr>
<td>- How to configure system settings</td>
<td>Microsoft Windows Help and Support Center</td>
</tr>
<tr>
<td>- How to troubleshoot and solve problems</td>
<td></td>
</tr>
</tbody>
</table>
1. Click **Start** or **Help and Support** → **Dell User and System Guides** → **System Guides**.
2. Click the User’s Guide for your computer.

### Service Tag and Microsoft® Windows® License

These labels are located on your computer.

- Use the Service Tag to identify your computer when you use support.dell.com or contact support.
- Enter the Express Service Code to direct your call when contacting support.

**NOTE:** As an increased security measure, the newly designed Microsoft Windows license label incorporates a missing portion or “hole” to discourage removal of the label.

### Dell Support Website — support.dell.com

**NOTE:** Select your region or business segment to view the appropriate support site.

To download Desktop System Software:

1. Go to support.dell.com, select your region or business segment, and enter your Service Tag.
2. Select **Drivers & Downloads** and click **Go**.
3. Click your operating system and search for the keyword **Desktop System Software**.

**NOTE:** The support.dell.com user interface may vary depending on your selections.

### How to use Windows XP

1. How to use Windows XP
2. How to work with programs and files
3. How to personalize my desktop

### Windows Help and Support

1. To access Windows Help and Support:
   - In Windows XP, click **Start** and click **Help and Support**.
   - In Windows Vista®, click the Windows Vista Start button and click **Help and Support**.
2. Type a word or phrase that describes your problem, and then click the arrow icon.
3. Click the topic that describes your problem.
4. Follow the instructions on the screen.

### Operating System Media
NOTE: The Operating System media may be optional and may not ship with your computer.

The operating system is already installed on your computer. To reinstall your operating system, use the Operating System media. See Reinstalling Windows XP or Windows Vista.

After you reinstall your operating system, use the Drivers and Utilities media to reinstall drivers for the devices that came with your computer.

Your operating system product key label is located on your computer.

NOTE: The color of your media varies based on the operating system you ordered.
Obtaining Assistance

⚠️ **CAUTION:** If you need to remove the computer covers, first disconnect the computer power and modem cables from all electrical outlets.

1. Complete the procedures in Troubleshooting.
2. Run the Dell Diagnostics (see Dell Diagnostics).
3. Make a copy of the Diagnostics Checklist (see Diagnostics Checklist) and fill it out.
4. Use Dell's extensive suite of online services available at Dell Support (support.dell.com) for help with installation and troubleshooting procedures.
5. If the preceding steps have not resolved the problem, contact Dell.

**NOTE:** Call the support service from a telephone near or at the computer so that the support staff can assist you with any necessary procedures.

**NOTE:** Dell's Express Service Code system may not be available in all countries.

When prompted by Dell's automated telephone system, enter your Express Service Code to route the call directly to the proper support personnel. If you do not have an Express Service Code, open the Dell Accessories folder, double-click the Express Service Code icon, and follow the directions.

For instructions on using the support service, see Support Service.

**NOTE:** Some of the following services are not always available in all locations outside the continental U.S. Call your local Dell representative for information on availability.

### Online Services

You can access Dell Support at support.dell.com. Select your region on the WELCOME TO DELL SUPPORT page, and fill in the requested details to access help tools and information.

You can contact Dell electronically using the following addresses:

- World Wide Web
  - www.dell.com/
  - www.dell.com/ap/ (Asian/Pacific countries only)
  - www.dell.com/jp (Japan only)
  - www.euro.dell.com (Europe only)
  - www.dell.com/la/ (Latin American and Caribbean countries)
  - www.dell.ca (Canada only)
- Anonymous file transfer protocol (FTP)
  - ftp.dell.com/
  - Log in as user: anonymous, and use your e-mail address as your password.
- Electronic Support Service
  - mobile_support@us.dell.com
  - support@us.dell.com
AutoTech Service
Dell’s automated support service—AutoTech—provides recorded answers to the questions most frequently asked by Dell customers about their portable and desktop computers.

When you call AutoTech, use your touch-tone telephone to select the subjects that correspond to your questions.

The AutoTech service is available 24 hours a day, 7 days a week. You can also access this service through the support service. For the telephone number to call for your region, see Contacting Dell.

Automated Order-Status Service
To check on the status of any Dell™ products that you have ordered, you can go to support.dell.com, or you can call the automated order-status service. A recording prompts you for the information needed to locate and report on your order. For the telephone number to call for your region, see Contacting Dell.

Support Service
Dell’s support service is available 24 hours a day, 7 days a week, to answer your questions about Dell hardware. Our support staff uses computer-based diagnostics to provide fast, accurate answers.

To contact Dell’s support service, see Getting Help and then call the number for your country as listed in Contacting Dell.

Problems With Your Order
If you have a problem with your order, such as missing parts, wrong parts, or incorrect billing, contact Dell for customer assistance. Have your invoice or packing slip handy when you call. For the telephone number to call for your region, see Contacting Dell.

Product Information
If you need information about additional products available from Dell, or if you would like to place an order, visit the Dell website at www.dell.com. For the telephone number to call for your region or to speak to a sales specialist, see Contacting Dell.

Returning Items for Warranty Repair or Credit
Prepare all items being returned, whether for repair or credit, as follows:

1. Call Dell to obtain a Return Material Authorization Number, and write it clearly and prominently on the outside of the box.
   For the telephone number to call for your region, see Contacting Dell.

2. Include a copy of the invoice and a letter describing the reason for the return.

3. Include a copy of the Diagnostics Checklist (see Diagnostics Checklist), indicating the tests that you have run and any error messages reported by the Dell Diagnostics (see Dell Diagnostics).

4. Include any accessories that belong with the item(s) being returned (power cables, software floppy disks, guides, and so on) if the return is for credit.

5. Pack the equipment to be returned in the original (or equivalent) packing materials.

You are responsible for paying shipping expenses. You are also responsible for insuring any product returned, and you assume the risk of loss during shipment to Dell. Collect On Delivery (C.O.D.) packages are not accepted.
Before You Call

**NOTE:** Have your Express Service Code ready when you call. The code helps Dell’s automated-support telephone system direct your call more efficiently. You may also be asked for your Service Tag (located on the back or bottom of your computer).

Remember to fill out the Diagnostics Checklist (see Diagnostics Checklist). If possible, turn on your computer before you call Dell for assistance and call from a telephone at or near the computer. You may be asked to type some commands at the keyboard, relay detailed information during operations, or try other troubleshooting steps possible only at the computer itself. Ensure that the computer documentation is available.

**CAUTION:** Before working inside your computer, follow the safety instructions in your Product Information Guide.

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Diagnostics Checklist

<table>
<thead>
<tr>
<th>Name:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address:</td>
<td>Phone number:</td>
</tr>
<tr>
<td>Service Tag (bar code on the back or bottom of the computer):</td>
<td>Express Service Code:</td>
</tr>
<tr>
<td>Return Material Authorization Number (if provided by Dell support technician):</td>
<td>Operating system and version:</td>
</tr>
<tr>
<td>Devices:</td>
<td>Expansion cards:</td>
</tr>
<tr>
<td>Are you connected to a network? Yes No</td>
<td>Network, version, and network adapter:</td>
</tr>
<tr>
<td>Programs and versions:</td>
<td>See your operating system documentation to determine the contents of the system’s start-up files. If the computer is connected to a printer, print each file. Otherwise, record the contents of each file before calling Dell.</td>
</tr>
<tr>
<td>Error message, beep code, or diagnostic code:</td>
<td>Description of problem and troubleshooting procedures you performed:</td>
</tr>
</tbody>
</table>

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Contacting Dell

**NOTE:** If you do not have an active Internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog.

For customers in the United States, call 800-WWW.DELL (800.999.3355).

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical support, or customer service issues:

1. Visit [support.dell.com](http://support.dell.com).
2. Verify your country or region in the Choose A Country/Region drop-down menu at the bottom of the page.
3. Click Contact Us on the left side of the page.
4. Select the appropriate service or support link based on your need.
5. Choose the method of contacting Dell that is convenient for you.
Terms in this Glossary are provided for informational purposes only and may or may not describe features included with your particular computer.

A

AC — alternating current — The form of electricity that powers your computer when you plug the AC adapter power cable into an electrical outlet.

ACPI — advanced configuration and power interface — A power management specification that enables Microsoft® Windows® operating systems to put a computer in standby or hibernate mode to conserve the amount of electrical power allocated to each device attached to the computer.

AGP — accelerated graphics port — A dedicated graphics port that allows system memory to be used for video-related tasks. AGP delivers a smooth, true-color video image because of the faster interface between the video circuitry and the computer memory.

AHCI — Advanced Host Controller Interface — An interface for a SATA hard drive Host Controller which allows the storage driver to enable technologies such as Native Command Queuing (NCQ) and hot plug.

ALS — ambient light sensor — A feature that helps to control display brightness.

antivirus software — A program designed to identify, quarantine, and/or delete viruses from your computer.

ASF — alert standards format — A standard to define a mechanism for reporting hardware and software alerts to a management console. ASF is designed to be platform- and operating system-independent.

B

battery life span — The length of time (years) during which a portable computer battery is able to be depleted and recharged.

battery operating time — The length of time (minutes or hours) that a portable computer battery powers the computer.

BIOS — basic input/output system — A program (or utility) that serves as an interface between the computer hardware and the operating system. Unless you understand what effect these settings have on the computer, do not change them. Also referred to as system setup.

bit — The smallest unit of data interpreted by your computer.

Bluetooth® wireless technology — A wireless technology standard for short-range (9 m [29 feet]) networking devices that allows for enabled devices to automatically recognize each other.

boot sequence — Specifies the order of the devices from which the computer attempts to boot.

bootable CD — A CD that you can use to start your computer. In case your hard drive is damaged or your computer has a virus, ensure that you always have a bootable CD or floppy disk available. Your Drivers and Utilities media (or ResourceCD) is a bootable CD or DVD.

bootable disk — A disk that you can use to start your computer. In case your hard drive is damaged or your computer has a virus, ensure that you always have a bootable CD, DVD, or floppy disk available.

bps — bits per second — The standard unit for measuring data transmission speed.

BTU — British thermal unit — A measurement of heat output.

bus — A communication pathway between the components in your computer.

bus speed — The speed, given in MHz, that indicates how fast a bus can transfer information.

byte — The basic data unit used by your computer. A byte is usually equal to 8 bits.

C

C — Celsius — A temperature measurement scale where 0° is the freezing point and 100° is the boiling point of water.

cache — A special high-speed storage mechanism which can be either a reserved section of main memory or an independent high-speed storage device. The cache enhances the efficiency of many processor operations.

L1 cache — Primary cache stored inside the processor.

L2 cache — Secondary cache which can either be external to the processor or incorporated into the processor architecture.

carnet — An international customs document that facilitates temporary imports into foreign countries. Also known as a merchandise passport.

CD-R — CD recordable — A recordable version of a CD. Data can be recorded only once onto a CD-R. Once recorded, the data cannot be erased or written over.
CD-RW — CD rewritable — A rewritable version of a CD. Data can be written to a CD-RW disc, and then erased and written over (rewritten).

CD-RW drive — A drive that can read CDs and write to CD-RW (rewritable CDs) and CD-R (recordable CDs) discs. You can write to CD-RW discs multiple times, but you can write to CD-R discs only once.

CD-RW/DVD drive — A drive, sometimes referred to as a combo drive, that can read CDs and DVDs and write to CD-RW (rewritable CDs) and CD-R (recordable CDs) discs. You can write to CD-RW discs multiple times, but you can write to CD-R discs only once.

clock speed — The speed, given in MHz, that indicates how fast computer components that are connected to the system bus operate.

COA — Certificate of Authenticity — The Windows alpha-numeric code located on a sticker on your computer. Also referred to as the Product Key or Product ID.

Control Panel — A Windows utility that allows you to modify operating system and hardware settings, such as display settings.

controller — A chip that controls the transfer of data between the processor and memory or between the processor and devices.

CRIMM — continuity rambus in-line memory module — A special module that has no memory chips and is used to fill unused RIMM slots.
cursor — The marker on a display or screen that shows where the next keyboard, touch pad, or mouse action will occur. It often is a blinking solid line, an underline character, or a small arrow.

D

DCM — Dell Client Manager. Dell's utility for remote management

DDR SDRAM — double-data-rate SDRAM — A type of SDRAM that doubles the data burst cycle, improving system performance.

DDR2 SDRAM — double-data-rate 2 SDRAM — A type of DDR SDRAM that uses a 4-bit prefetch and other architectural changes to boost memory speed to over 400 MHz.
device — Hardware such as a disk drive, printer, or keyboard that is installed in or connected to your computer.
device driver — See driver.

DIMM — dual in-line memory module — A circuit board with memory chips that connects to a memory module on the system board.

DIN connector — A round, six-pin connector that conforms to DIN (Deutsche Industrie-Norm) standards; it is typically used to connect PS/2 keyboard or mouse cable connectors.
disk striping — A technique for spreading data over multiple disk drives. Disk striping can speed up operations that retrieve data from disk storage. Computers that use disk striping generally allow the user to select the data unit size or stripe width.

DMA — direct memory access — A channel that allows certain types of data transfer between RAM and a device to bypass the processor.
docking device — See APR.

DMTF — Distributed Management Task Force — A consortium of hardware and software companies who develop management standards for distributed desktop, network, enterprise, and Internet environments.
domain — A group of computers, programs, and devices on a network that are administered as a unit with common rules and procedures for use by a specific group of users. A user logs on to the domain to gain access to the resources.

DRAM — dynamic random-access memory — Memory that stores information in integrated circuits containing capacitors.
driver — Software that allows the operating system to control a device such as a printer. Many devices do not work properly if the correct driver is not installed in the computer.

DSL — Digital Subscriber Line — A technology that provides a constant, high-speed Internet connection through an analog telephone line.
dual-core — An Intel® technology in which two physical computational units exist inside a single processor package, thereby increasing computing efficiency and multi-tasking ability.
dual display mode — A display setting that allows you to use a second monitor as an extension of your display. Also referred to as extended display mode.

DVD+R — DVD recordable — A recordable version of a DVD. Data can be recorded only once onto a DVD+R. Once recorded, the data cannot be erased or written over. DVD+R technology is different from DVD-R technology.

DVD-R — DVD recordable — A recordable version of a DVD. Data can be recorded only once onto a DVD-R. Once recorded, the data cannot be erased or written over. DVD-R technology is different from DVD+R technology.

DVD+RW — DVD rewritable — A rewritable version of a DVD. Data can be written to a DVD+RW disc, and then erased and written over (rewritten). DVD+RW technology is different from DVD-R technology.

DVD-RW — DVD rewritable — A rewritable version of a DVD. Data can be written to a DVD-RW disc, and then erased and written over (rewritten). DVD-RW technology is different from DVD+RW technology.

DVD+/−RW drive — drive that can read DVDs and most CD media and write to DVD+/−RW (rewritable DVDs) media.

DVI — digital video interface — A standard for digital transmission between a computer and a digital video display.
When you restart the computer, the memory information that was saved to the hard drive is automatically restored.

**E**

**ECC** — error checking and correction — A type of memory that includes special circuitry for testing the accuracy of data as it passes in and out of memory.

**ECP** — extended capabilities port — A parallel connector design that provides improved bidirectional data transmission. Similar to EPP, ECP uses direct memory access to transfer data and often improves performance.

**EIDE** — enhanced integrated device electronics — An improved version of the IDE interface for hard drives and CD drives.

**EMI** — electromagnetic interference — Electrical interference caused by electromagnetic radiation.

**ENERGY STAR®** — Environmental Protection Agency requirements that decrease the overall consumption of electricity.

**EPP** — enhanced parallel port — A parallel connector design that provides bidirectional data transmission.

**ESD** — electrostatic discharge — A rapid discharge of static electricity. ESD can damage integrated circuits found in computer and communications equipment.

**expansion card** — A circuit board that installs in an expansion slot on the system board in some computers, expanding the capabilities of the computer. Examples include video, modem, and sound cards.

**expansion slot** — A connector on the system board (in some computers) where you insert an expansion card, connecting it to the system bus.

**ExpressCard** — A removable I/O card adhering to the PCMCIA standard. Modems and network adapters are common types of ExpressCards. ExpressCards support both the PCI Express and USB 2.0 standard.

**Express Service Code** — A numeric code located on a sticker on your Dell™ computer. Use the Express Service Code when contacting Dell for assistance. Express Service Code service may not be available in some countries.

**extended display mode** — A display setting that allows you to use a second monitor as an extension of your display. Also referred to as dual display mode.

**extended PC Card** — A PC Card that extends beyond the edge of the PC Card slot when installed.

**F**

**Fahrenheit** — A temperature measurement scale where 32°F is the freezing point and 212°F is the boiling point of water.

**FBD** — fully-buffered DIMM — A DIMM with DDR2 DRAM chips and an Advanced Memory Buffer (AMB) that speeds communication between the DDR2 SDRAM chips and the system.

**FCC** — Federal Communications Commission — A U.S. agency responsible for enforcing communications-related regulations that state how much radiation computers and other electronic equipment can emit.

**fingerprint reader** — A strip sensor that uses your unique fingerprint to authenticate your user identity to help secure your computer.

**folder** — A term used to describe space on a disk or drive where files are organized and grouped. Files in a folder can be viewed and ordered in various ways, such as alphabetically, by date, and by size.

**format** — The process that prepares a drive or disk for file storage. When a drive or disk is formatted, the existing information on it is lost.

**FSB** — front side bus — The data path and physical interface between the processor and RAM.

**FTP** — file transfer protocol — A standard Internet protocol used to exchange files between computers connected to the Internet.

**G**

**G** — gravity — A measurement of weight and force.

**GB** — gigabyte — A measurement of data storage that equals 1024 MB (1,073,741,824 bytes). When used to refer to hard drive storage, the term is often rounded to 1,000,000,000 bytes.

**GHz** — gigahertz — A measurement of frequency that equals one thousand million Hz, or one thousand MHz. The speeds for computer processors, buses, and interfaces are often measured in GHz.

**graphics mode** — A video mode that can be defined as x horizontal pixels by y vertical pixels by z colors. Graphics modes can display an unlimited variety of shapes and fonts.

**GUI** — graphical user interface — Software that interacts with the user by means of menus, windows, and icons. Most programs that operate on the Windows operating systems are GUIs.

**H**

**hard drive** — A drive that reads and writes data on a hard disk. The terms hard drive and hard disk are often used interchangeably.

**heat sink** — A metal plate on some processors that helps dissipate heat.

**hibernate mode** — A power management mode that saves everything in memory to a reserved space on the hard drive and then turns off the computer. When you restart the computer, the memory information that was saved to the hard drive is automatically restored.
HTTP — hypertext transfer protocol — A protocol for exchanging files between computers connected to the Internet.

Hyperthreading — hyperthreading is an Intel technology that can enhance overall computer performance by allowing one physical processor to function as two logical processors, capable of performing certain tasks simultaneously.

Hz — hertz — A unit of frequency measurement that equals 1 cycle per second. Computers and electronic devices are often measured in kilohertz (kHz), megahertz (MHz), gigahertz (GHz), or terahertz (THz).

I

iAMT - Intel® Active Management Technology (Intel® AMT) Using built-in platform capabilities and popular third-party management and security applications, Intel AMT allows IT to better detect, repair, and protect their networked computing assets.

IC — integrated circuit — A semiconductor wafer, or chip, on which thousands or millions of tiny electronic components are fabricated for use in computer, audio, and video equipment.

IDE — integrated device electronics — An interface for mass storage devices in which the controller is integrated into the hard drive or CD drive.

IEEE 1394 — Institute of Electrical and Electronics Engineers, Inc. — A high-performance serial bus used to connect IEEE 1394-compatible devices, such as digital cameras and DVD players, to the computer.

infrared sensor — A port that allows you to transfer data between the computer and infrared-compatible devices without using a cable connection.

integrated — Usually refers to components that are physically located on the computer's system board. Also referred to as built-in.

I/O — input/output — An operation or device that enters and extracts data from your computer. Keyboards and printers are I/O devices.

I/O address — An address in RAM that is associated with a specific device (such as a serial connector, parallel connector, or expansion slot) and allows the processor to communicate with that device.

IrDA — Infrared Data Association — The organization that creates international standards for infrared communications.

IRQ — interrupt request — An electronic pathway assigned to a specific device so that the device can communicate with the processor. Each device connection must be assigned an IRQ. Although two devices can share the same IRQ assignment, you cannot operate both devices simultaneously.

ISP — Internet service provider — A company that allows you to access its host server to connect directly to the Internet, send and receive e-mail, and access websites. The ISP typically provides you with a software package, user name, and access phone numbers for a fee.

K

Kb — kilobit — A unit of data that equals 1024 bits. A measurement of the capacity of memory integrated circuits.

KB — kilobyte — A unit of data that equals 1024 bytes but is often referred to as 1000 bytes.

key combination — A command requiring you to press multiple keys at the same time.

kHz — kilohertz — A measurement of frequency that equals 1000 Hz.

L

LAN — local area network — A computer network covering a small area. A LAN usually is confined to a building or a few nearby buildings. A LAN can be connected to another LAN over any distance through telephone lines and radio waves to form a wide area network (WAN).

LCD — liquid crystal display — The technology used by portable computer and flat-panel displays.

LED — light-emitting diode — An electronic component that emits light to indicate the status of the computer.

local bus — A data bus that provides a fast throughput for devices to the processor.

LPT — line print terminal — The designation for a parallel connection to a printer or other parallel device.

M

Mb — megabit — A measurement of memory chip capacity that equals 1024 Kb.

Mbps — megabits per second — One million bits per second. This measurement is typically used for transmission speeds for networks and modems.

MB — megabyte — A measurement of data storage that equals 1,048,576 bytes. 1 MB equals 1024 KB. When used to refer to hard drive storage, the term is often rounded to 1,000,000 bytes.

MB/sec — megabytes per second — One million bytes per second. This measurement is typically used for data transfer ratings.

media bay — A bay that supports devices such as optical drives, a second battery, or a Dell Travellite™ module.
memory — A temporary data storage area inside your computer. Because the data in memory is not permanent, it is recommended that you frequently save your files while you are working on them, and always save your files before you shut down the computer. Your computer can contain several different forms of memory, such as RAM, ROM, and video memory. Frequently, the word memory is used as a synonym for RAM.

memory address — A specific location where data is temporarily stored in RAM.

memory mapping — The process by which the computer assigns memory addresses to physical locations at start-up. Devices and software can then identify information that the processor can access.

memory module — A small circuit board containing memory chips, which connects to the system board.

MHz — megahertz — A measure of frequency that equals 1 million cycles per second. The speeds for computer processors, buses, and interfaces are often measured in MHz.

Mini PCI — A standard for integrated peripheral devices with an emphasis on communications such as modems and NICs. A Mini PCI card is a small external card that is functionally equivalent to a standard PCI expansion card.

Mini-Card — A small card designed for integrated peripherals, such as communication NICs. The Mini-Card is functionally equivalent to a standard PCI expansion card.

mirroring — Duplication of data onto another computer at another location. Mirroring is performed for backup purposes or to be in close proximity to the user.

modem — A device that allows your computer to communicate with other computers over analog telephone lines. Three types of modems include: external, PC Card, and internal. You typically use your modem to connect to the Internet and exchange e-mail.

module bay — See media bay.

MP — megapixel — A measure of image resolution used for digital cameras.

ms — millisecond — A measure of time that equals one thousandth of a second. Access times of storage devices are often measured in ms.

N

network adapter — A chip that provides network capabilities. A computer may include a network adapter on its system board, or it may contain a PC Card with an adapter on it. A network adapter is also referred to as a NIC (network interface controller).

NIC — See network adapter.

notification area — The section of the Windows taskbar that contains icons for providing quick access to programs and computer functions, such as the clock, volume control, and print status. Also referred to as system tray.

ns — nanosecond — A measure of time that equals one billionth of a second.

NVRAM — nonvolatile random access memory — A type of memory that stores data when the computer is turned off or loses its external power source. NVRAM is used for maintaining computer configuration information such as date, time, and other system setup options that you can set.

O

optical drive — A drive that uses optical technology to read or write data from CDs, DVDs, or DVD+RWs. Example of optical drives include CD drives, DVD drives, CD-RW drives, and CD-RW/DVD combo drives.

P

parallel connector — An I/O port often used to connect a parallel printer to your computer. Also referred to as an LPT port.

partition — A physical storage area on a hard drive that is assigned to one or more logical storage areas known as logical drives. Each partition can contain multiple logical drives.

PC Card — A removable I/O card adhering to the PCMCIA standard. Modems and network adapters are common types of PC Cards.

PCI — peripheral component interconnect — PCI is a local bus that supports 32- and 64-bit data paths, providing a high-speed data path between the processor and devices such as video, drives, and networks.

PCI Express — A modification to the PCI interface that boosts the data transfer rate between the processor and the devices attached to it. PCI Express can transfer data at speeds from 250 MB/sec to 4 GB/sec. If the PCI Express chip set and the device are capable of different speeds, they will operate at the slower speed.

PCMCIA — Personal Computer Memory Card International Association — The organization that establishes standards for PC Cards.

PIO — programmed input/output — A method of transferring data between two devices through the processor as part of the data path.

pixel — A single point on a display screen. Pixels are arranged in rows and columns to create an image. A video resolution, such as 800 x 600, is expressed as the number of pixels across by the number of pixels up and down.

Plug-and-Play — The ability of the computer to automatically configure devices. Plug and Play provides automatic installation, configuration, and compatibility with existing hardware if the BIOS, operating system, and all devices are Plug and Play compliant.

POST — power-on self-test — Diagnostics programs, loaded automatically by the BIOS, that perform basic tests on the major computer components, such as memory, hard drives, and video. If no problems are detected during POST, the computer continues the start-up.
processor — A computer chip that interprets and executes program instructions. Sometimes the processor is referred to as the CPU (central processing unit).

PS/2 — personal system/2 — A type of connector for attaching a PS/2-compatible keyboard, mouse, or keypad.

PXE — pre-boot execution environment — A WIM (Wired for Management) standard that allows networked computers that do not have an operating system to be configured and started remotely.

### R

RAID — redundant array of independent disks — A method of providing data redundancy. Some common implementations of RAID include RAID 0, RAID 1, RAID 5, RAID 10, and RAID 50.

RAM — random-access memory — The primary temporary storage area for program instructions and data. Any information stored in RAM is lost when you shut down your computer.

readme file — A text file included with a software package or hardware product. Typically, readme files provide installation information and describe new product enhancements or corrections that have not yet been documented.

read-only — Data and/or files you can view but cannot edit or delete. A file can have read-only status if:

- It resides on a physically write-protected floppy disk, CD, or DVD.
- It is located on a network in a directory and the system administrator has assigned rights only to specific individuals.

refresh rate — The frequency, measured in Hz, at which your screen’s horizontal lines are recharged (sometimes also referred to as its vertical frequency). The higher the refresh rate, the less video flicker can be seen by the human eye.

resolution — The sharpness and clarity of an image produced by a printer or displayed on a monitor. The higher the resolution, the sharper the image.

RFI — radio frequency interference — Interference that is generated at typical radio frequencies, in the range of 10 kHz to 100,000 MHz. Radio frequencies are at the lower end of the electromagnetic frequency spectrum and are more likely to have interference than the higher frequency radiations, such as infrared and light.

ROM — read-only memory — Memory that stores data and programs that cannot be deleted or written to by the computer. ROM, unlike RAM, retains its contents after you shut down your computer. Some programs essential to the operation of your computer reside in ROM.

RPM — revolutions per minute — The number of rotations that occur per minute. Hard drive speed is often measured in rpm.

RTC — real-time clock — Battery-powered clock on the system board that keeps the date and time after you shut down the computer.

RTCRST — real-time clock reset — A jumper on the system board of some computers that can often be used for troubleshooting problems.

### S

SAS — serial attached SCSI — A faster, serial version of the SCSI interface (as opposed to the original SCSI parallel architecture).

SATA — serial ATA — A faster, serial version of the ATA (IDE) interface.

ScanDisk — A Microsoft utility that checks files, folders, and the hard disk’s surface for errors. ScanDisk often runs when you restart the computer after it has stopped responding.

SCSI — small computer system interface — A high-speed interface used to connect devices to a computer, such as hard drives, CD drives, printers, and scanners. The SCSI can connect many devices using a single controller. Each device is accessed by an individual identification number on the SCSI controller bus.

SDRAM — synchronous dynamic random-access memory — A type of DRAM that is synchronized with the optimal clock speed of the processor.

serial connector — An I/O port often used to connect devices such as a handheld digital device or digital camera to your computer.

Service Tag — A bar code label on your computer that identifies your computer when you access Dell Support at support.dell.com or when you call Dell for customer service or technical support.

setup program — A program that is used to install and configure hardware and software. The setup.exe or install.exe program comes with most Windows software packages. Setup program differs from system setup.

shortcut — An icon that provides quick access to frequently used programs, files, folders, and drives. When you place a shortcut on your Windows desktop and double-click the icon, you can open its corresponding folder or file without having to find it first. Shortcut icons do not change the location of files. If you delete a shortcut, the original file is not affected. Also, you can rename a shortcut icon.

SIM — Subscriber Identity Module — A SIM card contains a microchip that encrypts voice and data transmissions. SIM cards can be used in phones or portable computers.

smart card — A card that is embedded with a processor and a memory chip. Smart cards can be used to authenticate a user on computers equipped for smart cards.

S/PDIF — Sony/Philips Digital Interface — An audio transfer file format that allows the transfer of audio from one file to another without converting it to and from an analog format, which could degrade the quality of the file.

standby mode — A power management mode that shuts down all unnecessary computer operations to save energy.

StrikeZone™ — Reinforced area of the platform base that protects the hard drive by acting as a dampening device when a computer experiences resonating shock or is dropped (whether the computer is on or off).
surge protectors — Prevent voltage spikes, such as those that may occur during an electrical storm, from entering the computer through the electrical outlet. Surge protectors do not protect against lightning strikes or against brownouts, which occur when the voltage drops more than 20 percent below the normal AC-line voltage level.

Network connections cannot be protected by surge protectors. Always disconnect the network cable from the network connector during electrical storms.

SVGA — super-video graphics array — A video standard for video cards and controllers. Typical SVGA resolutions are 800 x 600 and 1024 x 768.

The number of colors and resolution that a program displays depends on the capabilities of the monitor, the video controller and its drivers, and the amount of video memory installed in the computer.

S-video TV-out — A connector used to attach a TV or digital audio device to the computer.

SXGA — super-extended graphics array — A video standard for video cards and controllers that supports resolutions up to 1280 x 1024.

SXGA+ — super-extended graphics array plus — A video standard for video cards and controllers that supports resolutions up to 1400 x 1050.

system board — The main circuit board in your computer. Also known as the system board.

system setup — A utility that serves as an interface between the computer hardware and the operating system. System setup allows you to configure user-selectable options in the BIOS, such as date and time or system password. Unless you understand what effect the settings have on the computer, do not change the settings for this program.

T

TAPI — telephony application programming interface — Enables Windows programs to operate with a wide variety of telephony devices, including voice, data, fax, and video.

text editor — A program used to create and edit files that contain only text; for example, Windows Notepad uses a text editor. Text editors do not usually provide word wrap or formatting functionality (the option to underline, change fonts, and so on).

TPM — trusted platform module — A hardware-based security feature that when combined with security software enhances network and computer security by enabling features such as file and e-mail protection.

travel module — A plastic device designed to fit inside the module bay of a portable computer to reduce the weight of the computer.

U

UMA — unified memory allocation — System memory dynamically allocated to video.

UPS — uninterruptible power supply — A backup power source used when the electrical power fails or drops to an unacceptable voltage level. A UPS keeps a computer running for a limited amount of time when there is no electrical power. UPS systems typically provide surge suppression and may also provide voltage regulation. Small UPS systems provide battery power for a few minutes to enable you to shut down your computer.

USB — universal serial bus — A hardware interface for a low-speed device such as a USB-compatible keyboard, mouse, joystick, scanner, set of speakers, printer, broadband devices (DSL and cable modems), imaging devices, or storage devices. Devices are plugged directly in to a 4-pin socket on your computer or in to a multi-port hub that plugs in to your computer. USB devices can be connected and disconnected while the computer is turned on, and they can also be daisy-chained together.

UTP — unshielded twisted pair — Describes a type of cable used in most telephone networks and some computer networks. Pairs of unshielded wires are twisted to protect against electromagnetic interference, rather than relying on a metal sheath around each pair of wires to protect against interference.

UXGA — ultra extended graphics array — A video standard for video cards and controllers that supports resolutions up to 1600 x 1200.

V

video controller — The circuitry on a video card or on the system board (in computers with an integrated video controller) that provides the video capabilities—in combination with the monitor—for your computer.

video memory — Memory that consists of memory chips dedicated to video functions. Video memory is usually faster than system memory. The amount of video memory installed primarily influences the number of colors that a program can display.

video mode — A mode that describes how text and graphics are displayed on a monitor. Graphics-based software, such as Windows operating systems, displays in video modes that can be defined as x horizontal pixels by y vertical pixels by z colors. Character-based software, such as text editors, displays in video modes that can be defined as x columns by y rows of characters.

video resolution — See resolution.

virus — A program that is designed to inconvenience you or to destroy data stored on your computer. A virus program moves from one computer to another through an infected disk, software downloaded from the Internet, or e-mail attachments. When an infected program starts, its embedded virus also starts.

A common type of virus is a boot virus, which is stored in the boot sectors of a floppy disk. If the floppy disk is left in the drive when the computer is shut down and then turned on, the computer is infected when it reads the boot sectors of the floppy disk expecting to find the operating system. If the computer is infected, the boot virus may replicate itself onto all the floppy disks that are read or written in that computer until the virus is eradicated.

V — volt — The measurement of electric potential or electromotive force. One volt appears across a resistance of 1 ohm when a current of 1 ampere flows through that resistance.
W

W — watt — The measurement of electrical power. One W is 1 ampere of current flowing at 1 volt.

WHr — watt-hour — A unit of measure commonly used to indicate the approximate capacity of a battery. For example, a 66-WHr battery can supply 66 W of power for 1 hour or 33 W for 2 hours.

wallpaper — The background pattern or picture on the Windows desktop. Change your wallpaper through the Windows Control Panel. You can also scan in your favorite picture and make it wallpaper.

WLAN — wireless local area network. A series of interconnected computers that communicate with each other over the air waves using access points or wireless routers to provide Internet access.

write-protected — Files or media that cannot be changed. Use write-protection when you want to protect data from being changed or destroyed. To write-protect a 3.5-inch floppy disk, slide its write-protect tab to the open position.

WWAN — wireless wide area network. A wireless high-speed data network using cellular technology and covering a much larger geographic area than WLAN.

WXGA — wide-aspect extended graphics array — A video standard for video cards and controllers that supports resolutions up to 1280 x 800.

X

XGA — extended graphics array — A video standard for video cards and controllers that supports resolutions up to 1024 x 768.

Z

ZIF — zero insertion force — A type of socket or connector that allows a computer chip to be installed or removed with no stress applied to either the chip or its socket.

Zip — A popular data compression format. Files that have been compressed with the Zip format are called Zip files and usually have a filename extension of .zip. A special kind of zipped file is a self-extracting file, which has a filename extension of .exe. You can unzip a self-extracting file by double-clicking it.

Zip drive — A high-capacity floppy drive developed by Iomega Corporation that uses 3.5-inch removable disks called Zip disks. Zip disks are slightly larger than regular floppy disks, about twice as thick, and hold up to 100 MB of data.

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You can increase your computer memory by installing memory modules on the system board.

Your computer supports DDR2 memory. For additional information on the type of memory supported by your computer, see the appropriate specifications for your system in this book.

**DDR2 Memory Overview**

- When installed in pairs, DDR2 memory modules should be of matched memory size and speed. If the DDR2 memory modules are not installed in matched pairs, the computer will continue to operate, but with a slight reduction in performance. See the label on the upper-right or upper-left corner of the module to determine the module's capacity.

![DDR2 Memory Modules](image)

**NOTE:** Always install DDR2 memory modules in the order indicated on the system board.

The recommended memory configurations are:

- A pair of matched memory modules installed in DIMM connectors 1 and 2
- A pair of matched memory modules installed in DIMM connectors 1 and 2 and another matched pair installed in DIMM connectors 3 and 4

**NOTICE:** Do not install ECC memory modules.

- If you install mixed pairs of PC2-5300 (DDR2 667-MHz) and PC2-6400 (DDR2 800-MHz) memory, the modules function at the speed of the slowest module installed.
- Be sure to install a single memory module in DIMM connector 1, the connector closest to the processor, before you install modules in any other connector.

![Memory Configurations](image)

**NOTICE:** Always install DDR2 memory modules in the order indicated on the system board.

**Addressing Memory Configurations**

If you are using a 32-bit operating system such as Microsoft® Windows® Vista®, your computer will support a maximum of 4 GB of memory. If you are using a
64-bit operating system, your computer will support a maximum of 8 GB (2-GB DIMMs in each of the four slots) of memory.

**Installing Memory**

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

.mipmap

**NOTICE:** To avoid electrostatic discharge and damage to internal components, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in [Before You Begin](#).

2. Remove the computer cover (see "Removing the Computer Cover" for your specific computer).

3. Press out the securing clip at each end of the memory module connector.

4. Align the notch on the bottom of the module with the crossbar in the connector.

5. Insert the module into the connector until the module snaps into position.

   *If you insert the module correctly, the securing clips snap into the cutouts at each end of the module.*

6. Replace the computer cover (see [Replacing the Computer Cover](#)).

**NOTICE:** To connect a network cable, first plug the cable into the network port or device and then plug it into the computer.

7. Connect your computer and devices to electrical outlets, and turn them on.
8. When the message appears stating that memory size has changed, press <F1> to continue.

9. Log on to your computer.

10. Right-click the My Computer icon on your Windows desktop and click Properties.

11. Click the General tab.

12. To verify that the memory is installed correctly, check the amount of memory (RAM) listed.

**Removing Memory**

![CAUTION:](image) Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

![NOTICE:](image) To avoid electrostatic discharge and damage to internal components, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see "Removing the Computer Cover" for your specific computer).

3. Press out the securing clip at each end of the memory module connector.

4. Grasp the module and pull up.
   
   If the module is difficult to remove, gently ease the module back and forth to remove it from the connector.

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Dell™ OptiPlex™ 755 User's Guide

Mini Tower Computer

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Notes, Notices, and Cautions

NOTE: A NOTE indicates important information that helps you make better use of your computer.

NOTICE: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

CAUTION: A CAUTION indicates a potential for property damage, personal injury, or death.

If you purchased a Dell™ n Series computer, any references in this document to Microsoft® Windows® operating systems are not applicable.

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Models: DCNE, DCSM, and DCCY

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Your Dell™ computer supports a PS/2 serial port adapter and provides the following connectors for PCI and PCI Express cards:

- Two PCI card slots
- One PCI Express x16 card slot
- One PCI Express x1 card slot

Installing a PCI or PCI Express Card

**NOTE:** Your Dell computer uses only PCI and PCI Express slots.

**NOTE:** The serial port adapter for your mini tower computer includes two PS/2 connectors.

If you are replacing a card, uninstall the driver for the existing card. See the documentation that came with the card for instructions.

1. Follow the procedures in [Before You Begin](#).
2. Remove the computer cover (see [Removing the Computer Cover](#)).
3. Gently push the release tab on the card retention latch from the inside to pivot the latch open. The latch will remain in the open position.
4. If you are installing a new card, remove the filler bracket to create a card-slot opening. Then continue with step 5.

5. If you are replacing a card that is already installed in the computer, remove the card. If necessary, disconnect any cables connected to the card.

6. If your card includes a card retention bar, remove the bar. Gently pull the securing tab, grasp the card by its top corners, and ease it out of its connector.

7. Prepare the new card for installation.

**NOTE:** See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer.

**CAUTION:** Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

8. If you are installing the card into the x16 card connector, position the card so that the securing slot is aligned with the securing tab, and gently pull the securing tab.

9. Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.
10. Before you lower the card retention mechanism, ensure that:
   - The tops of all cards and filler brackets are flush with the alignment bar.
   - The notch in the top of the card or filler bracket fits around the alignment guide.

11. Secure the card(s) by closing the card retention latch and snapping it into place.

   **NOTICE:** Do not route card cables over or behind the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

12. Connect any cables that should be attached to the card.

   See the documentation for the card for information about the card's cable connections.

13. Replace the computer cover (see *Replacing the Computer Cover*), reconnect the computer and devices to electrical outlets, and then turn them on.

   **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

14. If you installed a sound card:
   a. Enter system setup, select **Audio Controller**, and change the setting to **Off** (see *System Setup*).
   b. Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the microphone, speaker/headphone, or line-in connectors on the back panel of the computer.

15. If you installed an network adapter card and want to turn off the integrated network adapter:
   a. Enter system setup, select **Network Controller**, and change the setting to **Off** (see *System Setup*).
   b. Connect the network cable to the network adapter card's connectors. Do not connect the network cable to the integrated network connector on the back panel of the computer.

   **NOTICE:** If you disable the integrated network adapter, you will not have AMT functionality.

16. Install any drivers required for the card as described in the card documentation.

### Removing a PCI or PCI Express Card

1. Follow the procedures in *Before You Begin*.

2. Remove the computer cover (see *Replacing the Computer Cover*).

3. Gently push the release tab on the card retention latch from the inside to pivot the latch open. The latch will remain in the open position.
4. If necessary, disconnect any cables connected to the card.

5. If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

   **NOTE:** Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintain the airflow that cools your computer.

   **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

6. Replace the computer cover (see Replacing the Computer Cover), reconnect the computer and devices to electrical outlets, and then turn them on.

7. Uninstall the card’s driver. See the documentation that came with the card for instructions.

8. If you removed a sound card:
   a. Enter system setup, select **Audio Controller**, and change the setting to **On** (see System Setup).
   b. Connect external audio devices to the audio connectors on the back panel of the computer.

9. If you removed a network-adapter card connector:
   a. Enter system setup, select **Network Controller**, and change the setting to **On** (see System Setup).
   b. Connect the network cable to the integrated network connector on the back panel of the computer.

---

**PS/2 Serial Port Adapter**

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

**NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer’s electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

**Installing a PS/2 Serial Port Adapter**

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Gently push the release tab on the card retention latch from the inside to pivot the latch open. The latch will remain in the open position.
4. Remove the filler bracket (if applicable).

**NOTE:** See the documentation that came with the PS/2 serial port adapter for information on configuring the adapter, making internal connections, or customizing it for your computer.

5. Align the PS/2 serial-port adapter bracket in the retention slot and press down firmly. Ensure that the adapter is fully seated in the slot.

6. Close the card retention latch and gently press until it snaps into place.

**NOTICE:** Do not route cables over any installed cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

7. Connect the adapter cable to the serial port adapter connector (SERIAL2) on the system board (see System Board Components for connector locations).
1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Gently push the release tab on the card retention latch from the inside to pivot the latch open. The latch will remain in the open position.

4. Disconnect the PS/2 serial adapter cable from the system board (see System Board Components).

5. If necessary, disconnect any external cables connected to the adapter.

6. Ease the PS/2 serial-port adapter bracket out of its retention slot.

7. If you are removing the adapter permanently, install a filler bracket in the empty card-slot opening.

**NOTE:** Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer and maintain the airflow that cools your computer.
8. Before you close the card retention mechanism, ensure that:
   - The tops of all cards and filler brackets are flush with the alignment bar.
   - The notch in the top of the card or filler bracket fits around the alignment guide.

9. Secure the card(s) by closing the card retention latch and snapping it into place.

10. Replace the computer cover (see Replacing the Computer Cover).

**Installing eSATA**

eSATA allows for full SATA data transfer rates (3 GB/sec) between a drive and the chipset, approximately six times the data throughput of USB.

eSATA on your computer also supports hot-plugging. Hot-plugging allows for device detection without powering down your computer prior to connecting the device to your computer. When a device is connected, the operating system automatically recognizes the change. However, the computer must be powered down before removal and/or replacement.

⚠ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

**NOTE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Remove the computer cover (see Removing the Computer Cover).

2. Remove the filler panel for the card slot you are using for the eSATA connector.

3. Mount the bracket into the desired card slot opening.

4. Plug the free end of the eSATA cable into the eSATA connector on the system board.

5. Replace the computer cover (see Replacing the Computer Cover).

6. Boot your computer and enter system setup (see Entering System Setup). Use the esata option to enable the esata drive.

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Removing the Processor

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Loosen the captive screw (shown in the following figure) on each side of the heat sink assembly.

4. Rotate the heat sink assembly upward, and remove it from the computer. Lay the heat sink down on its top, with the thermal grease facing upward.

CAUTION: Despite having a plastic shield, the heat sink assembly may be very hot during normal operation. Be sure that it has had sufficient time to cool before you touch it.

5. Open the processor cover by sliding the release lever from under the center cover latch on the socket. Then, pull the lever back to release the processor.

NOTICE: When replacing the processor, do not touch any of the pins inside the socket or allow any objects to fall on the pins in the socket.
6. Gently remove the processor from the socket.
   Leave the release lever extended in the release position so that the socket is ready for the new processor.

### Installing the Processor

- **NOTICE:** Ground yourself by touching an unpainted metal surface on the back of the computer.
- **NOTICE:** When replacing the processor, do not touch any of the pins inside the socket or allow any objects to fall on the pins in the socket.

1. Follow the procedures in [Before You Begin](#).
2. Remove the computer cover (see [Removing the Computer Cover](#)).
3. Unpack the new processor, being careful not to touch the underside of the processor.
   - **NOTE:** You must position the processor correctly in the socket to avoid permanent damage to the processor and the computer when you turn on the computer.
4. If the release lever on the socket is not fully extended, move it to that position.
5. Orient the front and rear alignment-notches on the processor with the front and rear alignment-notches on the socket.
6. Align the pin-1 corners of the processor and socket.
7. Set the processor lightly in the socket and ensure that the processor is positioned correctly.

8. When the processor is fully seated in the socket, close the processor cover.
   Ensure that the tab on the processor cover is positioned underneath the center cover latch on the socket.

9. Pivot the socket release lever back toward the socket, and snap it into place to secure the processor.

10. Clean the thermal grease from the bottom of the heat sink.

   **NOTICE:** Ensure that you apply new thermal grease. New thermal grease is critical for ensuring adequate thermal bonding, which is a requirement for optimal processor operation.

11. Apply the new thermal grease to the top of the processor.

12. Install the heat sink assembly:
   a. Place the heat sink assembly back onto the heat-sink assembly bracket.
   b. Rotate the heat sink assembly down towards the computer base and tighten the two captive screws.

   **NOTICE:** Ensure that the heat sink assembly is correctly seated and secure.

13. Replace the computer cover (see [Replacing the Computer Cover](#)).
Drives

Your computer supports:

- Two SATA (Serial ATA) hard drives
- One 3.5-inch floppy drive or media card reader
- Two SATA optical drives
- One eSATA drive (with optional bracket)

General Drive Installation Guidelines

SATA connectors on the system board are labeled SATA0, SATA1, SATA2, and SATA3.

Hard drives must be connected to the lower numbered SATA connectors, while any other SATA devices (like an optical drive) must be connected to the remaining SATA connectors numbered higher than the one that the hard drive(s) is connected to. For example, if you have two SATA hard drives and one SATA optical drive, connect the two hard drives to the SATA0 and SATA1 connectors, and connect the SATA optical drive to the SATA2 connector. (See System Board Components for the location of SATA connectors on the system board.)

Connecting Drive Cables

When you install a drive, you connect two cables—a DC power cable and a data interface cable—to the back of the drive.

Data Interface Connectors
Power Cable Connectors

Connecting and Disconnecting Drive Cables
When removing a cable with a pull-tab, grasp the colored pull-tab and pull until the connector detaches.

When connecting and disconnecting a cable without a pull tab, hold the cable by the black connector at each end.

Hard Drive

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

**CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

**NOTICE:** To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

Removing a Hard Drive

1. If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.

2. Check the documentation for the drive to verify that it is configured for your computer.

3. Follow the procedures in Before You Begin.

4. Remove the computer cover (see Removing the Computer Cover).

5. Disconnect the power and data cables from the drive.
6. Press in on the blue release tabs on each side of the drive and slide the drive up and out of the computer.

![Diagram of hard drive installation](image)

**Installing a Hard Drive**

1. Unpack the replacement hard drive, and prepare it for installation.

2. Check the documentation for the drive to verify that it is configured for your computer.

3. If your replacement hard drive does not have the plastic hard drive bracket attached, remove the bracket from the existing drive by unsnapping it from the drive.

4. Snap the bracket onto the new drive.
5. Gently spread the sides of the drive bracket and slide the hard drive into the bracket, aligning the drive with the bracket pins, until the drive clicks into place.

6. Carefully slide the hard drive into the drive bay until it clicks into place.

7. Connect the power and data cables to the drive.

8. Ensure that the data cable is securely connected to the connector on the system board.

   **NOTICE:** Always connect the data cable to the SATA0 connector on the system board, or to the SATA1 connector if you already have a hard drive connected to the SATA0 connector and you are installing a second hard drive.

9. Check all connectors to be certain that they are properly cabled and firmly seated.

10. Replace the computer cover (see [Replacing the Computer Cover](#)).

11. Insert bootable media and enter system setup (see [System Setup](#)), and update the SATA port option under the Drives option list.

12. Exit system setup, and reboot the computer.

13. Partition and logically format your drive.

   See the documentation for your operating system for instructions.

14. Test the hard drive by running the Dell Diagnostics (see [Dell Diagnostics](#)).

15. If the drive you just installed is the primary drive, install your operating system on the hard drive. If the drive you just installed is the primary drive, insert a bootable medium into your boot drive. See the documentation that came with the drive for instructions on installing any software required for drive operation.
Adding a Second Hard Drive

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

⚠️ **CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

⚠️ **NOTICE:** To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

⚠️ **NOTICE:** If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.

1. Check the documentation for the drive to verify that it is configured for your computer.

2. Follow the procedures in *Before You Begin*.

3. Remove the computer cover (see *Removing the Computer Cover*).

4. Remove the plastic hard drive bracket from the inside of the hard drive bay by squeezing the release tabs and gently pulling the bracket up and out of the bay.

5. Gently spread the sides of the drive bracket and slide the hard drive into the bracket, aligning the drive with the bracket pins, until the drive clicks into place.

6. Carefully slide the new hard drive into the bay until it clicks into place.

7. Connect the power cable to the drive.

8. Locate an unused SATA connector on the system board and attach a data cable to this connector and to the second hard drive.
9. Replace the computer cover (see Replacing the Computer Cover).

10. Enter system setup (see System Setup), and update the SATA port option under the Drives option list.

11. Exit system setup, and reboot the computer.

12. Partition and logically format your drive.
   
   See the documentation for your operating system for instructions.

13. Test the hard drive by running the Dell Diagnostics (see Dell Diagnostics).

14. If the drive you just installed is the primary drive, install your operating system on the hard drive.

**Floppy Drive**

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

⚠️ **CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

**Removing the Floppy Drive**

1. Boot your computer and enter system setup (see Entering System Setup). Use the Diskette Drive option to disable the floppy drive.

2. Follow the procedures in Before You Begin.

3. Remove the computer cover (see Removing the Computer Cover).

4. Remove the drive panel by sliding the drive release latch downward to open the panel, and then remove it from the hinges.

5. Disconnect the power and data cables from the back of the floppy drive.
6. Grasp the sliding plate lever and slide it towards the bottom of the computer until the drive panel snaps open; while holding the lever in place, slide the drive out of the computer.

**Installing the Floppy Drive**

1. If you are replacing a floppy drive, remove the shoulder screws from the existing drive and attach the screws to the replacement drive.

2. If you are installing a new floppy drive, remove the drive-panel insert for the 3.5-inch drive bay, remove the shoulder screws from the inside of the drive-panel insert and attach the screws to the new drive.

3. Align the shoulder screws on the floppy drive with the shoulder screw slots, and gently slide it into the bay until it clicks into place.

4. Attach the power and data cables to the floppy drive and to the system board.
5. Replace the computer cover (see Replacing the Computer Cover).

6. Enter system setup (see Entering System Setup), and use the Diskette Drive option to enable your new floppy drive.

7. Verify that your computer works correctly by running the Dell Diagnostics (see Dell Diagnostics).

**Media Card Reader**

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

⚠️ **CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

**Removing the Media Card Reader**

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Remove the drive panel by sliding the drive release latch downward to open the panel, and then remove it from the hinges.

4. Disconnect the cable from the back of the media card reader.
5. Grasp the sliding plate lever and slide it towards the bottom of the computer until the drive panel snaps open; while holding the lever in place, slide the media card reader out of the computer.

**Installing the Media Card Reader**

1. If you are replacing a media card reader, remove the shoulder screws from the existing drive and attach the screws to the replacement media card reader.

   **NOTE:** If you are replacing an existing floppy drive with a media card reader, ensure you disable the floppy before installing the media card reader. Boot your computer and enter system setup (see *Entering System Setup*). Use the **Diskette Drive** option to disable the floppy drive. Follow instructions in *Removing the Floppy Drive*.

2. If you are installing a new media card reader, remove the drive-panel insert for the 3.5-inch drive bay, remove the shoulder screws from the inside of the drive-panel insert and attach the screws to the new drive.

3. Align the shoulder screws on the media card reader with the shoulder screw slots, and gently slide it into the bay until it clicks into place.

4. Attach the cable to the media card reader and to the system board.
5. Replace the computer cover (see Replacing the Computer Cover).

6. Verify that your computer works correctly by running the Dell Diagnostics (see Dell Diagnostics).

Optical Drive

⚠️ CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

⚠️ CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before replacing the cover.

Removing an Optical Drive

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Disconnect the power and data cables from the back of the drive.

4. Grasp the sliding plate lever and slide it towards the top of the computer until the drive panel snaps open; while holding the lever in place, slide the drive out of the computer.

Installing an Optical Drive

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. If you are replacing an optical drive, remove the shoulder screws from the existing drive and attach the screws to the replacement drive.

4. If you are installing a new optical drive, remove the drive-panel insert, remove the shoulder screws from the inside of the drive-panel insert, and attach the screws to the new drive.
5. Check the documentation that accompanied the drive to verify that the drive is configured for your computer.

6. Align the shoulder screws on the optical drive with the shoulder screw slots, and slide the drive into the bay until it clicks into place.

7. Connect the power and data cables to the drive and to the system board.

   Always connect the optical drive SATA cable to a system board SATA connector that is labeled with a number higher than those connected to any hard drives installed in the computer.

8. Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.

9. Replace the computer cover (see Replacing the Computer Cover).

10. Update your configuration information in system setup by setting the appropriate Drive option (SATA-1, SATA-2, or SATA-3) under Drives. See System.
11. Verify that your computer works correctly by running the Dell Diagnostics (see Dell Diagnostics).
I/O Panel

Removing the I/O Panel

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

**CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

**NOTE:** Note the routing of all cables as you remove them so that you can re-route them correctly when installing the new I/O panel.

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).

**NOTICE:** When sliding the I/O panel out of the computer, be extremely careful. Carelessness may result in damage to the cable connectors and the cable routing clips.

3. Remove the screw that secures the I/O panel. Press the release button to slide the card away from the front of the computer.

4. Disconnect all of the cables from the I/O panel, and remove the panel from the computer.

   ![Diagram of I/O panel components]

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I/O panel release button</td>
</tr>
<tr>
<td>2</td>
<td>securing screw</td>
</tr>
<tr>
<td>3</td>
<td>I/O panel</td>
</tr>
<tr>
<td>4</td>
<td>I/O cable connector</td>
</tr>
</tbody>
</table>

Replacing the I/O Panel

1. To replace the I/O panel, follow the removal procedure in the reverse order.

**NOTE:** Use the guides on the I/O panel bracket to help position the I/O panel in place, and use the notch on the I/O panel bracket to help seat the panel.
Power Supply

Replacing the Power Supply

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

**NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in *Before You Begin*.

2. Remove the computer cover (see *Removing the Computer Cover*).

3. Disconnect the DC power cables from the system board and the drives.

   Note the routing of the DC power cables underneath the tabs in the computer chassis as you remove them from the system board and drives. You must route these cables properly when you replace them to prevent them from being pinched or crimped.

4. Remove the four screws that attach the power supply to the back of the computer chassis.

5. Press the release button located on the floor of the computer chassis.

6. Slide the power supply toward the front of the computer by approximately 1 inch.

7. Lift the power supply up and out of the computer.

8. Slide the replacement power supply into place.

9. Replace the screws that secure the power supply to the back of the computer chassis.
10. Reconnect the DC power cables to the power supply.

11. Connect the AC power cable to the AC power connector.

12. Replace the computer cover (see Replacing the Computer Cover).

## DC Power Connectors

### DC Power Connector P1

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Signal name</th>
<th>18-AWG Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+3.3 VDC</td>
<td>Orange</td>
</tr>
<tr>
<td>2</td>
<td>+3.3 VDC</td>
<td>Orange</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>4</td>
<td>+5 VDC</td>
<td>Red</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>6</td>
<td>+5 VDC</td>
<td>Red</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>8</td>
<td>PS_PWRGOOD</td>
<td>Gray</td>
</tr>
<tr>
<td>9</td>
<td>PSAUX</td>
<td>Purple</td>
</tr>
<tr>
<td>10</td>
<td>V_12P0_DIG</td>
<td>White</td>
</tr>
<tr>
<td>11</td>
<td>V_12P0_DIG</td>
<td>White</td>
</tr>
<tr>
<td>12</td>
<td>+3.3 VDC</td>
<td>Orange</td>
</tr>
<tr>
<td>13</td>
<td>+3.3VDC/SE*</td>
<td>Orange</td>
</tr>
<tr>
<td>14</td>
<td>-12 VDC</td>
<td>Blue</td>
</tr>
<tr>
<td>15</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>16</td>
<td>PWR_PS_ON</td>
<td>Green</td>
</tr>
<tr>
<td>17</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>18</td>
<td>GND</td>
<td>Black</td>
</tr>
</tbody>
</table>
**DC Power Connector P2**

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Signal Name</th>
<th>18-AWG Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>3</td>
<td>+12 VDC</td>
<td>Yellow</td>
</tr>
<tr>
<td>4</td>
<td>+12 VDC</td>
<td>Yellow</td>
</tr>
</tbody>
</table>

*Optional wire. Use 22-AWG wire instead of 18-AWG wire.*

**DC Power Connectors P3, P5, P8, and P9**

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Signal Name</th>
<th>18-AWG Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+3.3 VDC</td>
<td>Orange</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>3</td>
<td>+5 VDC</td>
<td>Red</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>5</td>
<td>+12 VBDC</td>
<td>White</td>
</tr>
</tbody>
</table>

**DC Power Connector P7**

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Signal Name</th>
<th>22-AWG Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+5 VDC</td>
<td>Red</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>4</td>
<td>+12 VDC</td>
<td>Yellow</td>
</tr>
</tbody>
</table>

**DC Power Connector P10**
<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Signal name</th>
<th>18-AWG Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+12 VBDC</td>
<td>White</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>4</td>
<td>+5 VDC</td>
<td>Red</td>
</tr>
</tbody>
</table>
Installing a Speaker

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

⚠️ **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer’s electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in Before You Begin.
2. Remove the cover of your computer (see Removing the Computer Cover).
3. Insert the speaker into the chassis of the computer.
4. Connect the cables to the system board.
5. Replace the computer cover.
6. Turn on power to the computer.

Removing a Speaker

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

⚠️ **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer’s electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in Before You Begin.
2. Remove the cover of your computer (see Removing the Computer Cover).
3. Disconnect the cables from the system board.
4. Remove the speaker from the chassis of the computer.
5. Replace the computer cover.

6. Turn on power to the computer.
## Mini Tower Computer Specifications

### User’s Guide

<table>
<thead>
<tr>
<th>Microprocessor</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Microprocessor type</td>
<td>The following are supported:</td>
</tr>
<tr>
<td></td>
<td>Intel® Core™2</td>
</tr>
<tr>
<td></td>
<td>Intel vPro™</td>
</tr>
<tr>
<td></td>
<td>Intel Celeron®</td>
</tr>
<tr>
<td>Internal cache</td>
<td>L1: up to 128 KB;</td>
</tr>
<tr>
<td></td>
<td>L2: up to 8 MB (depending on your processor)</td>
</tr>
</tbody>
</table>

### Memory

<table>
<thead>
<tr>
<th>Type</th>
<th>667-MHz or 800-MHz DDR2 SDRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connectors</td>
<td>4</td>
</tr>
<tr>
<td>Memory modules supported</td>
<td>512-MB, 1-GB, or 2-GB non-ECC</td>
</tr>
<tr>
<td>Minimum memory</td>
<td>dual-channel: 1 GB</td>
</tr>
<tr>
<td></td>
<td>single-channel: 512 MB</td>
</tr>
<tr>
<td><strong>NOTE</strong>: 512 MB is the minimum shipping configuration.</td>
<td></td>
</tr>
<tr>
<td>Maximum memory</td>
<td>64-bit operating system: 8 GB</td>
</tr>
<tr>
<td></td>
<td>32-bit operating system: 4 GB</td>
</tr>
<tr>
<td>BIOS address</td>
<td>F0000h</td>
</tr>
</tbody>
</table>

### Computer Information

<table>
<thead>
<tr>
<th>Chipset</th>
<th>Intel Q35 Express Chipset w/ICH9DD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data bus width</td>
<td>64 bits</td>
</tr>
<tr>
<td>Address bus width</td>
<td>32 bits</td>
</tr>
<tr>
<td>DMA channels</td>
<td>eight</td>
</tr>
<tr>
<td>Interrupt levels</td>
<td>24</td>
</tr>
<tr>
<td>BIOS chip (NVRAM)</td>
<td>32 Mb</td>
</tr>
<tr>
<td>NIC</td>
<td>Integrated network interface with ASF 1.03 and 2.0 support as defined by DMTF</td>
</tr>
<tr>
<td></td>
<td>Capable of 10/100/1000 communication</td>
</tr>
<tr>
<td></td>
<td>iAMT 3.0</td>
</tr>
</tbody>
</table>

### Video

| Type | Intel Graphics Media Accelerator 3100 or DVI add-in card in PCI Express x16 slot or PCI Express x16 graphics card |

### Audio

| Type | ADI 1984 High Definition Audio |
| Stereo conversion | 24-bit analog-to-digital; 24-bit digital-to-analog |

### Controllers

| Drives | Four SATA controllers and one eSATA controller supporting one device each |
### Expansion Bus

**Bus type**  
- PCI 2.3  
- PCI Express 1.0A  
- SATA 1.0A and 2.0  
- USB 2.0

**Bus speed**  
- PCI: 133 MB/s  
- PCI Express x16: 8 GB/s bidirectional speed  
- PCI Express x1: 5 Gbps  
- SATA: 1.5 Gbps and 3.0 Gbps  
- USB: 480 Mbps

**Cards:**  
- Full-height cards supported

#### PCI:
- **connectors**: two  
- **connector size**: two 164 pin connectors  
- **connector data width** (maximum): 32 bits

#### PCI Express:
- **connectors**: one x1 and one x16  
- **Power**: 10 W (x1) and 75 W (x16) maximum  
- **Connector size**: 36 pins (x1) and 164 pins (x16)  
- **Connector data width (maximum)**: one PCI Express lane (x1) and 16 PCI Express lanes (x16)

### Drives

**Internally accessible**  
- Two SATA (Serial ATA) hard drives  
- One 3.5-inch floppy drive or media reader  
- Two SATA optical drives

**Externally accessible**  
- One eSATA drive (optional)

### Connectors

**External connectors:**  
- **Serial**: 9-pin connector; 16550C-compatible  
- **Parallel**: 25-pin connector (bidirectional)  
- **Video**: 15-pin VGA connector  
- **Network adapter**: RJ45 connector  
- **Optional PS/2 with secondary serial port adapter**: two 6-pin mini-DINs  
- **USB**: two front-panel and six back panel USB 2.0–compliant connectors  
- **Audio**: two connectors for line-in/ microphone and line-out; two front-panel connectors for headphones and microphone

**System board connectors:**  
- **SATA**: four 7-pin connectors  
- **eSATA**: one 7-pin connector  
- **Floppy drive**: 34-pin connector  
- **Serial**: 12-pin connector for optional second PS/2 serial port card  
- **Fan**: 5-pin connector  
- **PCI 2.2**: three 120-pin connectors  
- **PCI Express**: one 120-pin (x16) connector  
- **Front panel**: 40-pin connector

### Key Combinations

- **<Ctrl><Alt><Del>** In Microsoft® Windows® XP, brings up the **Windows Security** window. If in MS-DOS® mode, restarts (reboots) the computer.
- **<F2> or <Ctrl><Alt><Enter>** starts embedded system setup (during start-up only)
- **<F3>** automatically starts the computer from the network environment specified by the remote boot environment (PXE) rather than from one of the devices in the system setup **Boot Sequence** option
<F12> or <Ctrl><Alt><F8> displays a boot device menu that allows the user to enter a device for a single boot (during start-up only) as well as options to run hard drive and system diagnostics.

Ctrl+p displays the Management Engine BIOS Extension settings screen that allows you to modify the settings.

### Controls and Lights

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power control</td>
<td>push button</td>
</tr>
<tr>
<td>Power light</td>
<td>green light — blinking green indicates sleep mode; solid green indicates power-on state.  amber light — blinking amber indicates a problem with an installed device; solid amber indicates an internal power problem (See Power Problems.)</td>
</tr>
<tr>
<td>Hard drive access light</td>
<td>green</td>
</tr>
<tr>
<td>Link light (on front of chassis)</td>
<td>solid green light indicates network connection</td>
</tr>
<tr>
<td>Link integrity light (on integrated network adapter)</td>
<td>green light for 10-Mb operation; orange light for 100-Mb operation; yellow light for a 1000-Mb (1-Gb) operation</td>
</tr>
<tr>
<td>Activity light (on integrated network adapter)</td>
<td>yellow blinking light</td>
</tr>
<tr>
<td>Diagnostic lights</td>
<td>Four lights on the front panel (See Diagnostic Lights.)</td>
</tr>
<tr>
<td>Standby power light</td>
<td>AUX_PWR on the system board</td>
</tr>
</tbody>
</table>

### Power

<table>
<thead>
<tr>
<th>Component</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC power supply:</td>
<td></td>
</tr>
<tr>
<td>Wattage</td>
<td>305 W</td>
</tr>
<tr>
<td>Heat dissipation</td>
<td>1041 BTU/hr</td>
</tr>
<tr>
<td>Voltage</td>
<td>manual selection power supplies—90 to 135 V at 60 Hz; 180 to 265 V at 50 Hz</td>
</tr>
<tr>
<td>Backup battery</td>
<td>3-V CR2032 lithium coin cell</td>
</tr>
</tbody>
</table>

**NOTE:** Power consumption from an AC power source can be zero when the computer is unplugged from that power source. However, the computer draws a minute amount of power from the internal coin cell battery even when the computer is not drawing power from the AC power source.

**NOTE:** Heat dissipation is calculated based upon the power supply rating.

### Physical

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>41.4 cm (16.3 inches)</td>
</tr>
<tr>
<td>Width</td>
<td>18.5 cm (7.3 inches)</td>
</tr>
<tr>
<td>Depth</td>
<td>43.9 cm (17.3 inches)</td>
</tr>
<tr>
<td>Weight</td>
<td>12.34 kg (27.2 lb)</td>
</tr>
</tbody>
</table>

### Environmental

<table>
<thead>
<tr>
<th>Component</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature:</td>
<td>Operating: 10° to 35°C (50° to 95°F)</td>
</tr>
<tr>
<td></td>
<td>Storage: -40° to 65°C (-40° to 149°F)</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>20% to 80% (noncondensing)</td>
</tr>
<tr>
<td>Maximum vibration:</td>
<td>Operating: 0.25 G at 3 to 200 Hz at 0.5 octave/min</td>
</tr>
<tr>
<td></td>
<td>Storage: 0.5 G at 3 to 200 Hz at 1 octave/min</td>
</tr>
<tr>
<td>Maximum shock:</td>
<td>Operating: bottom half-sine pulse with a change in velocity of 50.8 cm/sec (20 inches/sec)</td>
</tr>
<tr>
<td></td>
<td>Storage: 27-G faired square wave with a velocity change of 508 cm/sec (200 inches/sec)</td>
</tr>
<tr>
<td>Altitude:</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Range</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Operating</td>
<td>15.2 to 3048 m (-50 to 10,000 ft)</td>
</tr>
<tr>
<td>Storage</td>
<td>15.2 to 10,668 m (-50 to 35,000 ft)</td>
</tr>
<tr>
<td>Airborne contaminant level</td>
<td>G2 or lower as defined by ISA-S71.04-1985</td>
</tr>
</tbody>
</table>
Transferring Information to a New Computer

You can use your operating system "wizards" to help you transfer files and other data from one computer to another—for example, from an old computer to a new computer. For instructions, see the following section that corresponds to the operating system that your computer is running.

Microsoft® Windows® XP

The Microsoft Windows XP operating system provides the Files and Settings Transfer Wizard to move data from a source computer to a new computer. You can transfer data, such as:

- E-mail messages
- Toolbar settings
- Window sizes
- Internet bookmarks

You can transfer the data to the new computer over a network or serial connection, or you can store it on removable media, such as a writable CD, for transfer to the new computer.

NOTE: You can transfer information from an old computer to a new computer by directly connecting a serial cable to the input/output (I/O) ports of the two computers. To transfer data over a serial connection, you must access the Network Connections utility from the Control Panel and perform additional configuration steps, such as setting up an advanced connection and designating the host computer and the guest computer.

For instructions on setting up a direct cable connection between two computers, see Microsoft Knowledge Base Article #305621, titled How to Set Up a Direct Cable Connection Between Two Computers in Windows XP. This information may not be available in certain countries.

For transferring information to a new computer, you must run the Files and Settings Transfer Wizard. You can use the optional Operating System media for this process or you can create a wizard disk with the Files and Settings Transfer Wizard.

Running the Files and Settings Transfer Wizard With the Operating System Media

NOTE: This procedure requires the Operating System media. This media is optional and may not be included with certain computers.

To prepare a new computer for the file transfer:

1. Open the Files and Settings Transfer Wizard: click Start → All Programs → Accessories → System Tools → Files and Settings Transfer Wizard.
2. When the Files and Settings Transfer Wizard welcome screen appears, click Next.
3. On the Which computer is this? screen, click New Computer → Next.
4. On the Do you have a Windows XP CD? screen, click I will use the wizard from the Windows XP CD → Next.
5. When the Now go to your old computer screen appears, go to your old or source computer. Do not click Next at this time.

To copy data from the old computer:

1. On the old computer, insert the Windows XP Operating System media.
2. On the Welcome to Microsoft Windows XP screen, click Perform additional tasks.
3. Under What do you want to do?, click Transfer files and settings → Next.
4. On the Which computer is this? screen, click Old Computer → Next.
5. On the Select a transfer method screen, click the transfer method you prefer.
6. On the What do you want to transfer? screen, select the items you want to transfer and click Next.
After the information has been copied, the Completing the Collection Phase screen appears.

7. Click Finish.

To transfer data to the new computer:

1. On the Now go to your old computer screen on the new computer, click Next.
2. On the Where are the files and settings? screen, select the method you chose for transferring your settings and files and click Next.
   The wizard reads the collected files and settings and applies them to your new computer.
   When all of the settings and files have been applied, the Finished screen appears.
3. Click Finished and restart the new computer.

Running the Files and Settings Transfer Wizard Without the Operating System Media

To run the Files and Settings Transfer Wizard without the Operating System media, you must create a wizard disk that will allow you to create a backup image file to removable media.

To create a wizard disk, use your new computer with Windows XP and perform the following steps:

1. Open the Files and Settings Transfer Wizard: click Start ® All Programs ® Accessories ® System Tools ® Files and Settings Transfer Wizard.
2. When the Files and Settings Transfer Wizard welcome screen appears, click Next.
3. On the Which computer is this? screen, click New Computer ® Next.
4. On the Do you have a Windows XP CD? screen, click I want to create a Wizard Disk in the following drive ® Next.
5. Insert the removable media, such as a writable CD, and click OK.
6. When the disk creation completes and the Now go to your old computer message appears, do not click Next.
7. Go to the old computer.

To copy data from the old computer:

1. On the old computer, insert the wizard disk.
2. Click Start ® Run.
3. In the Open field on the Run window, browse to the path for fastwiz (on the appropriate removable media) and click OK.
4. On the Files and Settings Transfer Wizard welcome screen, click Next.
5. On the Which computer is this? screen, click Old Computer ® Next.
6. On the Select a transfer method screen, click the transfer method you prefer.
7. On the What do you want to transfer? screen, select the items you want to transfer and click Next.
   After the information has been copied, the Completing the Collection Phase screen appears.
8. Click Finish.

To transfer data to the new computer:

1. On the Now go to your old computer screen on the new computer, click Next.
2. On the Where are the files and settings? screen, select the method you chose for transferring your settings and files and click Next. Follow the instructions on the screen.
   The wizard reads the collected files and settings and applies them to your new computer.
   When all of the settings and files have been applied, the Finished screen appears.
3. Click Finished and restart the new computer.
Microsoft Windows Vista®

1. Click the Windows Vista Start button, , and then click Transfer files and settings® Start Windows Easy Transfer.

2. In the User Account Control dialog box, click Continue.

3. Click Start a new transfer or Continue a transfer in progress.
   Follow the instructions provided on the screen by the Windows Easy Transfer wizard.

Setting Up a Home and Office Network

Connecting to a Network Adapter

To connect a network cable:

1. Connect the network cable to the network adapter connector on the back of your computer.
   Insert the cable until it clicks into place, and then gently pull it to ensure that it is secure.

2. Connect the other end of the network cable to a network device.

Network Setup

Windows XP

The Microsoft® Windows® XP operating system provides a Network Setup Wizard to guide you through the process of sharing files, printers, or an Internet connection between computers in a home or small office.

1. Click the Start button, point to All Programs ® Accessories ® Communications, and then click Network Setup Wizard.

2. On the Network Setup Wizard welcome screen, click Next.

3. Click Checklist for creating a network.

   NOTE: Selecting the connection method This computer connects directly to the Internet enables the integrated firewall provided with Windows XP Service Pack 1 (SP1) or later.

4. Complete the checklist and required preparations.
5. Return to the Network Setup Wizard and follow the instructions on the screen.

**Windows Vista**

To make changes to your network setup in Microsoft® Windows Vista®:

1. Click the Windows Vista Start button, and then click **Network and Sharing Center**.
2. Click **Set up a connection or network**.
3. Select the type of network connection you want to make and follow the instructions on the screen.
4. When finished, close the Network and Sharing Center.
Replacing the Computer Cover
User's Guide

Mini-Tower, Desktop, and Small Form Factor Computers
Ultra Small Form Factor Computers

1. Ensure that all cables are connected, and fold cables out of the way.
   Gently pull the power cables toward you so that they do not get caught underneath the drives.

2. Ensure that no tools or extra parts are left inside the computer.

3. To replace the cover:
   a. Align the bottom of the cover with the hinge tabs located along the bottom edge of the computer.
   b. Using the hinge tabs as leverage, rotate the cover downward to close it.
   c. Snap the cover into place by pulling back on the cover release latch and then releasing the latch when the cover is properly seated.
   d. Ensure that the cover is seated correctly before moving the computer.

4. Attach the computer stand (if applicable). For instructions, see the documentation that came with the stand.

5. Connect your computer and devices to electrical outlets, and turn them on.

After you remove and replace the cover, the chassis intrusion detector (optional on some computers), if installed and enabled, causes the following message to appear on the screen at the next computer start-up:
ALERT! Cover was previously removed.

6. Reset the chassis intrusion detector in System Setup by changing Chassis Intrusion to On or On-Silent.

NOTE: If an administrator password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

Ultra Small Form Factor Computers

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer’s electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in Before You Begin.

NOTICE: Before touching anything inside your computer, ground yourself by touching an unpainted metal surface. While you work, periodically touch an unpainted metal surface to dissipate any static electricity that could harm internal components.

2. If applicable, remove the cable cover (see Cable Cover (Optional)).

3. Replace the computer cover:
   a. Tilting the cover slightly, align it with the retaining strip at the back of the system.
   b. Slide the computer cover backward until it snaps into place.

CAUTION: Graphics card heat sinks can become very hot during normal operation. Ensure that a graphics card heat sink has had sufficient time to cool before you touch it.
Your Dell™ computer supports a PS/2 serial port adapter and provides the following connectors for PCI and PCI Express cards:

- One low-profile PCI card slot
- One low-profile PCI Express x16 card slot

**NOTE:** Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintain the airflow that cools your computer.

Your Dell computer uses only PCI and PCI Express slots. ISA cards are not supported.

**PCI Cards**

**Installing a PCI Card**

1. Follow the procedures in *Before You Begin*.
2. Remove the computer cover (see *Removing the Computer Cover*).
   
   **NOTE:** For PCI card locations, see *System Board Components*.
3. Gently lift the release tab on the card retention latch from the inside and pivot the latch open.

![Diagram of PCI card installation](image)
4. If you are installing a new card, remove the filler bracket to create a card-slot opening. Then continue with step 6.

5. If you are replacing a card that is already installed in the computer, remove the card. If necessary, disconnect any cables connected to the card. Then continue with step 6.

6. Prepare the card for installation.

**CAUTION:** Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

**NOTE:** See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer.

7. Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.

![](image)

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>card fully seated</td>
<td>card not fully seated</td>
<td>bracket within slot</td>
<td>bracket caught outside of slot</td>
</tr>
</tbody>
</table>

8. Before closing the card retention latch, ensure that:

- The tops of all cards and filler brackets are flush with the alignment guide
- The notch in the top of the card or filler bracket fits around the alignment guide

9. Secure the card(s) by closing the card retention latch and snapping it into place.

**NOTICE:** Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

10. Connect any cables that should be attached to the card.

11. Replace the computer cover (see Replacing the Computer Cover).

**NOTE:** See the documentation that came with the card regarding the card’s cable connections.

12. If you installed a sound card:

   a. Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **Off** (see System Setup).

   b. Connect external audio devices to the sound card’s connectors. Do not connect external audio devices to the line-in connector on the back panel of the computer (see Back Panel Connectors).

**NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

13. If you installed a network adapter card and want to turn off the integrated network adapter:

   a. Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **Off** (see System Setup).

   b. Connect the network cable to the network adapter card’s connectors. Do not connect the network cable to the integrated network connector on the back panel of the computer.

**NOTICE:** If you disable the integrated network adapter, you will not have AMT functionality.

14. Install any drivers required for the card as described in the card documentation.
Removing a PCI Card

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

   **NOTE:** For PCI card locations, see System Board Components.

3. Gently lift the release tab on the card retention latch from the inside and pivot the latch open.

4. If necessary, disconnect any cables connected to the card.

5. Grasp the card by its top corners, and ease it out of its connector.

   ![Image of PCI card removal](image)

| 1 | release tab |
| 2 | card retention latch |
| 3 | PCI card |
| 4 | card-edge connector |
| 5 | card connector |

6. If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

   **NOTE:** Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintain the airflow that cools your computer.

7. Before you close the card retention mechanism, ensure that:

   i. The tops of all cards and filler brackets are flush with the alignment bar.
   ii. The notch in the top of the card or filler bracket fits around the alignment guide.

   **NOTICE:** Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

8. Secure any remaining card(s) by closing the card retention latch and snapping it into place.

9. Replace the computer cover (see Replacing the Computer Cover).

10. Uninstall the card’s driver. See the documentation that came with the card for instructions.

11. If you removed a sound card:

    a. Enter system setup, select Integrated Audio from the Onboard Devices group, and change the setting to On (see System Setup).
    b. Connect external audio devices to the audio connectors on the back panel of the computer.

    **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

    **NOTE:** See the documentation for the card for information about the card’s cable connections.

12. If you removed a network adapter card connector:

    a. Enter system setup, select Integrated NIC from the Onboard Devices group, and change the setting to On (see System Setup).
Connect the network cable to the integrated network connector on the back panel of the computer.

**PCI Express and DVI Cards**

Your computer supports one low-profile PCI Express x16 card.

If you are replacing a PCI Express card with a different type of PCI Express card, remove the current driver for the card from the operating system. See the documentation that came with the card for information.

**Installing a PCI Express x16 Card or DVI Card**

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).
   
   **NOTE:** For PCI card locations, see System Board Components.

3. Gently lift the release tab on the card retention latch from the inside and pivot the latch open.

4. If you are installing a new PCI Express x16 card or DVI card, remove the filler bracket to create a card slot opening. Then continue with step 5.

5. If you are replacing a PCI Express x16 card or DVI card, remove the card (see Removing a PCI Express x16 Card or DVI Card). If necessary, disconnect any cables connected to the card. Then continue with step 6.

6. Prepare the card for installation.

   **CAUTION:** Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

   **NOTE:** See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer.

7. Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.

   ![Diagram of PCI Express x16 card installation](image)

   1. PCI Express x16 card 2. PCI Express x16 card connector

   ![Diagram of DVI card installation](image)

   1. PCI Express x16 DVI card 2. DVI card connector 3. PCI Express x16 card connector
8. Connect any cables that should be attached to the card.

9. Before you close the card retention mechanism, ensure that:
   - The tops of all cards and filler brackets are flush with the alignment bar.
   - The notch in the top of the card or filler bracket fits around the alignment guide.

10. Secure the card(s) by closing the card retention latch and snapping it into place.

11. Replace the computer cover (see Replacing the Computer Cover).

12. If you installed a sound card:
   a. Enter system setup, select Integrated Audio from the Onboard Devices group, and change the setting to Off (see System Setup).
   b. Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the line-in connector on the back panel of the computer (see Back Panel Connectors).

   **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

13. If you installed a network adapter card and want to turn off the integrated network adapter:
   a. Enter system setup, select Integrated NIC from the Onboard Devices group, and change the setting to Off (see System Setup).
   b. Connect the network cable to the network adapter card's connectors. Do not connect the network cable to the integrated network connector on the back panel of the computer.

14. Install any drivers required for the card as described in the card documentation.

**Removing a PCI Express x16 Card or DVI Card**

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Gently lift the release tab on the card retention latch from the inside and pivot the latch open.

4. If necessary, disconnect any cables connected to the card.

5. Press the lever with your thumb until you release the securing tab.
   - If you are removing a PCI Express x16 card, go to step 6.
   - If you are removing a DVI card, go to step 7.
6. While pressing the lever, pull the card up and out of the card connector.

7. While pressing the lever, pull the removal pull tab up and remove the card out of the card connector.

8. If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

   **NOTE:** Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintain the airflow that cools your computer.

9. Before you close the card retention mechanism, ensure that:
   - The tops of all cards and filler brackets are flush with the alignment bar.
   - The notch in the top of the card or filler bracket fits around the alignment guide.

10. Secure any remaining card(s) by closing the card retention latch and snapping it into place.

   **NOTICE:** Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

11. Replace the computer cover (see Replacing the Computer Cover).

12. Uninstall the card's driver. See the documentation that came with the card for instructions.

13. If you removed a sound card:
   a. Enter system setup, select Integrated Audio from the Onboard Devices group, and change the setting to On (see System Setup).
   b. Connect external audio devices to the audio connectors on the back panel of the computer.
To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

14. If you removed a network-adapter card connector:
   a. Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **On** (see **System Setup**).
   b. Connect the network cable to the integrated network connector on the back panel of the computer.

### PS/2 Serial Port Adapter

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the **Product Information Guide**.

⚠️ **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer’s electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

#### Installing a PS/2 Serial Port Adapter

1. Follow the procedures in **Before You Begin**.

2. Remove the computer cover (see **Removing the Computer Cover**).

3. Gently lift the release tab on the card retention latch from the inside and pivot the latch open.

4. Remove the filler bracket (if applicable).

   ⚠️ **NOTE:** See the documentation that came with the adapter for information on configuring the adapter, making internal connections, or customizing it for your computer.

5. Align the PS/2 serial-port adapter bracket in the retention slot and press down firmly. Ensure that the adapter is fully seated in the slot.

6. Before you close the card retention mechanism, ensure that:
   - The tops of all cards and filler brackets are flush with the alignment bar.
   - The notch in the top of the card or filler bracket fits around the alignment guide.

7. Secure the card(s) by closing the card retention latch and snapping it into place.

   ⚠️ **NOTICE:** Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

8. Connect the adapter cable to the PS/2 serial port adapter connector (PS2/SERIAL2) on the system board (see **System Board Components**).
9. Replace the computer cover (see Replacing the Computer Cover).

Removing a PS/2 Serial Port Adapter

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.
4. Disconnect the PS/2 serial-port cable from the system board (see System Board Components).
5. Ease the PS/2 serial-port adapter bracket out of its retention slot.
6. If you are removing the adapter permanently, install a filler bracket in the empty card-slot opening.
   \[NOTE: \] Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintain the airflow that cools your computer.
7. Before you close the card retention mechanism, ensure that:
   1. The tops of all cards and filler brackets are flush with the alignment bar.
   2. The notch in the top of the card or filler bracket fits around the alignment guide.
8. Secure any remaining card(s) by closing the card retention latch and snapping it into place.
9. Replace the computer cover (see Replacing the Computer Cover).

eSATA

eSATA allows for full SATA data transfer rates (3 GB/sec) between a drive and the chip set, approximately six times the data throughput of USB.
eSATA on your computer also supports hot-plugging. Hot-plugging allows for device detection without powering down your computer prior to connecting the device to your computer. When a device is connected, the operating system automatically recognizes the change. However, the computer must be powered down before removal and/or replacement.

\[CAUTION: \] Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

\[NOTICE: \] To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Installing eSATA

1. Remove the computer cover (see Removing the Computer Cover).
2. Remove the filler panel for the card slot you are using for the eSATA connector.
3. Insert the bracket into the desired eSATA opening.
4. Plug the free end of the eSATA cable into the eSATA connector on the system board (see System Board Components).
5. Replace the computer cover (see Replacing the Computer Cover).

6. Boot your computer and enter system setup (see Entering System Setup). Use the esata option to enable the eSATA drive.
Removing the Processor

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. Loosen the captive screw on each side of the heat sink assembly.
4. Rotate the heat sink assembly upward, and remove the assembly from the computer.
   Lay the heat sink down on its top, with the thermal grease facing upward.

**CAUTION:** Despite having a plastic shield, the heat sink assembly may be very hot during normal operation. Be sure that it has had sufficient time to cool before you touch it.

**NOTICE:** Unless a new heat sink is required for the new processor, reuse the original heat sink assembly when you replace the processor.

5. Open the processor cover by sliding the release lever from under the center cover latch on the socket. Then, pull the lever back to release the processor.
6. Gently remove the processor from the socket.
   Leave the release lever extended in the release position so that the socket is ready for the new processor.

### Installing the Processor

**NOTICE:** Ground yourself by touching an unpainted metal surface on the back of the computer.

**NOTICE:** When replacing the processor, do not touch any of the pins inside the socket or allow any objects to fall on the pins in the socket.

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Unpack the new processor, being careful not to touch the underside of the processor.

**NOTICE:** You must position the processor correctly in the socket to avoid permanent damage to the processor and the computer when you turn on the computer.

4. If the release lever on the socket is not fully extended, move it to that position.

5. Orient the front and rear alignment-notches on the processor with the front and rear alignment-notches on the socket.

6. Align the pin-1 corners of the processor and socket.
1. Set the processor lightly in the socket and ensure that the processor is positioned correctly.
2. When the processor is fully seated in the socket, close the processor cover. Ensure that the tab on the processor cover is positioned underneath the center cover latch on the socket.
3. Pivot the socket release lever back toward the socket and snap it into place to secure the processor.
4. Clean the thermal grease from the bottom of the heat sink.
5. Apply the new thermal grease to the top of the processor.
6. Install the heat sink assembly:
   a. Place the heat sink assembly back onto the heat-sink assembly bracket.
   b. Rotate the heat sink assembly down towards the computer base and tighten the two captive screws.

**NOTICE:** To avoid damage, ensure that the processor aligns properly with the socket, and do not use excessive force when you install the processor.

**NOTICE:** Ensure that you apply new thermal grease. New thermal grease is critical for ensuring adequate thermal bonding, which is a requirement for optimal processor operation.

**NOTICE:** Ensure that the heat sink is correctly seated and secure.
13. Replace the computer cover (see Replacing the Computer Cover).

2 heat-sink assembly bracket
3 captive screw in housing (2)

Back to Contents Page
Drives

Your computer supports:
- One SATA (serial ATA) hard drive
- One slimline floppy drive or media card reader
- One SATA slimline optical drive
- One eSATA drive

General Installation Guidelines

SATA connectors on the system board are labeled SATA0 and SATA1. Hard drives must be connected to SATA0, while any other SATA devices (like an optical drive) must be connected to SATA1. For example, if you have a SATA hard drive and a SATA optical drive, connect the hard drive to the SATA0, and connect the SATA optical drive to the SATA1 connector. (See System Board Components for the location of the SATA connectors on the system board.)

Connecting Drive Cables

When you install a drive, you connect two cables (a DC power cable and a data interface cable) to the back of the drive.

Data Interface Connectors
Power Cable Connectors

Connecting and Disconnecting Drive Cables

When removing an cable with a pull-tab, grasp the colored pull-tab and pull until the connector detaches.

When connecting and disconnecting a SATA data cable, hold the cable by the black connector at each end.

Hard Drive

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

⚠️ **CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

⚠️ **NOTICE:** To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

Removing a Hard Drive

1. If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.

2. Check the documentation for the drive to verify that it is configured for your computer.

3. Follow the procedures in Before You Begin.

4. Remove the computer cover (see Removing the Computer Cover).

5. Lay the computer on its side so that the system board is on the bottom of the inside of the computer.

6. Press in on the two blue securing tabs on each side of the drive and slide the drive up and out of the computer.

⚠️ **NOTICE:** Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

7. Lift the drive out of the computer, careful not to pull the cables still attached to it.
8. Disconnect the power and data cable from the drive.

9. Disconnect the hard drive fan cable from the system board.

---

**Installing a Hard Drive**

1. Check the documentation for the drive to verify that it is configured for your computer.

   🔄 **NOTICE:** To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

2. Unpack the replacement hard drive, and prepare it for installation.

3. If your replacement hard drive does not have the plastic drive bracket attached, remove the bracket from the existing drive by unsnapping it from the drive.
4. Connect the hard drive fan cable to the system board.

5. Connect the power and data cables to the drive.

6. Check all connectors to ensure that they are properly cabled and firmly seated.

7. Gently position the drive until it clicks into place.

8. Replace the computer cover (see Replacing the Computer Cover).

9. If the drive you just installed is the primary drive, insert bootable media into your boot drive.
10. Turn on the computer.

11. Enter system setup, and update the SATA port option under the Drives option list (see Entering System Setup).

12. Exit system setup, and reboot the computer.

13. Partition and logically format your drive.

   **NOTE:** For instructions, see the documentation that came with your operating system.

14. Test the hard drive by running the Dell Diagnostics (see Dell Diagnostics).

15. Install your operating system on the hard drive.

   **NOTE:** For instructions, see the documentation that came with your operating system.

### Replacing a Hard Drive Fan

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Remove the hard drive (see Removing a Hard Drive).

4. Turn the hard drive upside down, so that the hard drive fan is visible in the bottom of the drive bracket.

5. To remove the hard drive fan:
   a. Lift the release tab on the back panel of the fan.
   b. Rotate the fan in the opposite direction from that indicated by the arrow on the back panel of the fan.
   c. Lift to remove the fan and its back panel from the hard drive bracket.

6. To replace the hard drive fan:
   a. Turn the fan upside-down, so that its backing faces up and align the triangle on the fan's back panel with the corresponding triangle on the back of the hard drive bracket.
   b. Rotate the fan and its backing in the direction of the arrow on the fan's back panel.

7. Install the hard drive (see Installing a Hard Drive).

8. Replace the computer cover (see Replacing the Computer Cover).
Optical Drive

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

Removing an Optical Drive

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Lay the computer on its side so that the system board is on the bottom of the inside of the computer.

   NOTICE: Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

4. Pull up on the drive release latch and slide the drive towards the back of the computer. Then lift up to remove the drive from the computer.

![Diagram of drive release latch and optical drive]

5. Disconnect the power and data cable from the back of the drive.

   NOTE: The power and data cables for the slimline optical drive installed in your computer are configured in one of two ways as illustrated below.

![Diagram of power and data cables]

6. Remove the drive and replace the computer cover (see Replacing the Computer Cover).

Installing an Optical Drive

1. Unpack the drive and prepare it for installation.

2. Check the documentation that accompanied the drive to verify that the drive is configured for your computer.

3. Follow the procedures in Before You Begin.

4. Remove the computer cover (see Removing the Computer Cover).
5. Connect the power and data cable to the drive.

   **NOTE:** The power and data cables for the slimline optical drive installed in your computer are configured in one of two ways as illustrated below.

   ![Diagram of optical drive connections]

6. Gently position the drive until it clicks into place.

7. Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.

8. Replace the computer cover (see *Replacing the Computer Cover*).

9. See the documentation that came with the drive for instructions on installing any software required for drive operation.

10. Enter system setup and select the appropriate **Drive** option (see *System Setup*).

11. Verify that your computer works correctly by running the Dell Diagnostics (see *Dell Diagnostics*).

---

**Floppy Drive**

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

**CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

**Removing a Floppy Drive**

1. Follow the procedures in *Before You Begin*.

2. Remove the computer cover (see *Removing the Computer Cover*).

3. Lay the computer on its side so that the system board is on the bottom of the inside of the computer.

4. Remove the optical drive and carefully set it aside (see *Optical Drive*).

   **NOTICE:** Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.
5. If you are removing a floppy drive, pull up the cable release tab to unlock it.

6. Gently lift the data cable from the floppy data cable edge connector.

7. Disconnect the data cable from the system board.

8. Pull up on the drive release latch and slide the floppy drive or media card reader towards the back of the computer. Then lift up to remove the drive.

9. Replace the computer cover (see Replacing the Computer Cover).

### Installing a Floppy Drive

1. If you are:
   - Installing a new floppy drive, remove the drive panel insert
   - Replacing a drive, remove the floppy drive (see Removing a Floppy Drive).

2. Align the screws on the drive with the bracket slots in the computer, and gently position the drive until it clicks into place.

3. Insert the data cable into the cable release tab on the floppy drive and press down on the tab until it clicks to lock it in place.

4. Insert the data cable into the connector on the system board.
5. Replace the optical drive (see Optical Drive).

6. Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.

7. Replace the computer cover (see Replacing the Computer Cover).

8. Enter system setup and use the Diskette Drive option to enable your new floppy drive (see System Setup).

   See the documentation that came with the drive for instructions on installing any software required for drive operation.

9. Verify that your computer works correctly by running the Dell Diagnostics (see Dell Diagnostics).

---

### Media Card Reader

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

**CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

#### Removing a Media Card Reader

1. Follow the procedures in Before You Begin.

2. Lay the computer on its side so that the system board is on the bottom of the inside of the computer.

3. Remove the computer cover (see Removing the Computer Cover).

4. Remove the optical drive and carefully set it aside (see Optical Drive).

**NOTICE:** Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

5. Remove the cable from the media card reader connector.

6. Remove the hard drive (see Removing a Hard Drive).

7. Disconnect the cable.
Pull up on the drive release latch and slide the media card reader towards the back of the computer. Then lift up to remove the media card reader from the computer.

Replace the hard drive (see Installing a Hard Drive).

Replace the computer cover (see Replacing the Computer Cover).

Replacing a Media Card Reader

1. If you are replacing a media card reader, remove the installed media card reader (see Removing a Media Card Reader), and skip to step 3.

2. If you are installing a new media card reader, perform the following steps before continuing to step 3:
   a. Follow the procedures in Before You Begin.
   b. Remove the computer cover (see Removing the Computer Cover).
   c. Lay the computer on its side so that the system board is on the bottom of the inside of the computer.
   d. Remove the drive panel insert.

3. Align the screws on the media card reader with the bracket slots in the computer, and gently position the drive until it clicks into place.

4. Connect the cable into the connectors on the media card reader and system board.
5. Replace the optical drive (see Optical Drive).

6. Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.

7. Replace the computer cover (see Replacing the Computer Cover).

8. See the documentation that came with the drive for instructions on installing any software required for drive operation.

9. Verify that your computer works correctly by running the Dell Diagnostics (see Dell Diagnostics).
I/O Panel

Removing the I/O Panel

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

⚠️ **CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Remove the optical drive and floppy drive from the drive bays, if installed (see Drives).

4. Remove the hard drive (see Removing a Hard Drive).

5. Remove the processor heat sink (see Processor).

   📌 **NOTE:** You'll also have to remove the heat sink base.

6. Remove the system board.
   
   📌 Unscrew all retaining screws on the system board (see Small Form Factor System Board Screws).
   
   📌 Gently lift the system board out of the chassis.

7. Remove the front fan:
   
   Press the tab that secures the fan to the interior base of the computer and lift the fan from the computer; set the fan aside in the chassis.

8. Remove cables from the IO panel.

   Note the routing of the cables as you lay them aside, so that you can replace them correctly.

---

1. LED board
2. air temperature sensor
3. I/O cable connector
4. mounting screw
5. I/O panel
9. Remove cables from the system board.

10. From inside the computer cover, remove the mounting screw that secures the I/O panel to the computer.

11. Ease the I/O panel back and forth to release its circular tabs from the two holes in the chassis that secure it.

12. Remove the I/O panel from the computer.

**Replacing the I/O Panel**

To replace the I/O panel, follow the removal procedures in the reverse order.

⚠️ **NOTE:** Use the guides on the I/O panel bracket to help position the I/O panel in place and use the notch on the I/O panel bracket to help seat the card.
Replacing the Power Supply

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

**NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer’s electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. If installed, remove the optical drive (see Removing an Optical Drive).
4. If installed, remove the floppy drive or media card reader (see Floppy Drive).
5. Disconnect the DC power cables from the system board and the drives.

**NOTE:** Remember the routing of the DC power cables underneath the tabs in the computer frame as you remove them from the system board and drives. You must route these cables properly when you replace them to prevent their being pinched or crimped.

6. Remove the three screws that attach the power supply to the computer chassis.

7. Slide the power supply toward the front of the computer approximately 1 inch.

8. Lift the power supply up and out of the computer.

9. Slide the replacement power supply into place.

10. Replace the screws that secure the power supply to the back of the computer chassis.

11. Reconnect the DC power cables to the system board and drives (see System Board Components for connector locations).
12. Replace the floppy drive or media card reader (see Installing a Floppy Drive).

13. Replace the optical drive (see Installing an Optical Drive).

14. Replace the computer cover (see Replacing the Computer Cover).

15. Connect the AC power cable to the power supply AC power connector.

⚠️ NOTICE: To connect a network cable, plug the cable into the network wall jack and then plug it into the computer.

16. Connect your computer and devices to electrical outlets, and turn them on.

### DC Power Connectors

_wind_ The power supply installed in your computer is one of two options as illustrated below.

#### DC Power Connector P1

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Signal Name</th>
<th>18-AWG Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+3.3 VDC</td>
<td>Orange</td>
</tr>
<tr>
<td>2</td>
<td>+3.3 VDC</td>
<td>Orange</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>4</td>
<td>VCC (+5 V)</td>
<td>Red</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>6</td>
<td>VCC (+5 V)</td>
<td>Red</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>8</td>
<td>PS_PWRGOOD*</td>
<td>Gray</td>
</tr>
<tr>
<td>9</td>
<td>P5AUX</td>
<td>Purple</td>
</tr>
<tr>
<td>10</td>
<td>V.12P0_DIG</td>
<td>Yellow</td>
</tr>
<tr>
<td>11</td>
<td>V.12P0_DIG</td>
<td>Yellow</td>
</tr>
<tr>
<td>12</td>
<td>+3.3 V</td>
<td>Orange</td>
</tr>
<tr>
<td>13 (optional)</td>
<td>+3.3V</td>
<td>Orange</td>
</tr>
<tr>
<td>14</td>
<td>-12 V*</td>
<td>Blue</td>
</tr>
<tr>
<td>15</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>16</td>
<td>PWR_PS_ON</td>
<td>Green</td>
</tr>
<tr>
<td>17</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>Pin Number</td>
<td>Signal Name</td>
<td>18-AWG Wire</td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>18</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>19</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>20</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>21</td>
<td>VCC (+5V)</td>
<td>Red</td>
</tr>
<tr>
<td>22</td>
<td>VCC (+5V)</td>
<td>Red</td>
</tr>
<tr>
<td>23</td>
<td>VCC (+5V)</td>
<td>Red</td>
</tr>
<tr>
<td>24</td>
<td>GND</td>
<td>Black</td>
</tr>
</tbody>
</table>

*Use 22-AWG wire instead of 18-AWG wire.

### DC Power Connector P2

![Diagram]

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Signal Name</th>
<th>18-AWG Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>3</td>
<td>+12 VDC</td>
<td>Yellow</td>
</tr>
<tr>
<td>4</td>
<td>+12 VDC</td>
<td>Yellow</td>
</tr>
</tbody>
</table>

### DC Power Connectors P3

![Diagram]

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Signal Name</th>
<th>18-AWG Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+3.3 VDC</td>
<td>Orange</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>3</td>
<td>+5 VDC</td>
<td>Red</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>5</td>
<td>+12 VDC</td>
<td>Yellow</td>
</tr>
</tbody>
</table>

### DC Power Connector P5

![Diagram]

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Signal Name</th>
<th>18-AWG Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>2</td>
<td>+5 VDC</td>
<td>Red</td>
</tr>
<tr>
<td>3</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>4</td>
<td>+3.3 VDC</td>
<td>Orange</td>
</tr>
</tbody>
</table>

### DC Power Connector P6

![Diagram]
<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Signal Name</th>
<th>24-AWG Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>2</td>
<td>+5 VDC</td>
<td>Red</td>
</tr>
<tr>
<td>3</td>
<td>+5 VDC</td>
<td>Red</td>
</tr>
<tr>
<td>4</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>6</td>
<td>GND</td>
<td>Black</td>
</tr>
</tbody>
</table>
**Speakers**

**Installing a Speaker**

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide.*

⚠️ **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in *Before You Begin.*
2. Remove the cover of your computer (see *Removing the Computer Cover*).
3. Insert the speaker into the chassis of the computer.
4. Connect the cables to the system board.
5. Replace the computer cover.
6. Turn on power to the computer.

**Removing a Speaker**

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide.*

⚠️ **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in *Before You Begin.*
2. Remove the cover of your computer (see *Removing the Computer Cover*).
3. Disconnect the cables from the system board.
4. Remove the speaker from the chassis of the computer.
5. Replace the computer cover.

6. Turn on power to the computer.
## Small Form Factor Computer Specifications

### Microprocessor

<table>
<thead>
<tr>
<th>Microprocessor type</th>
<th>The following are supported:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intel® Core™2</td>
</tr>
<tr>
<td></td>
<td>Intel vPro™</td>
</tr>
<tr>
<td></td>
<td>Intel Celeron®</td>
</tr>
</tbody>
</table>

| Internal cache | L1: up to 128 KB; |
|               | L2: up to 8 MB (depending on your processor) |

### Memory

<table>
<thead>
<tr>
<th>Type</th>
<th>667-MHz or 800-MHz DDR2 SDRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory connectors</td>
<td>4</td>
</tr>
<tr>
<td>Memory modules supported</td>
<td>512 MB, 1 GB, or 2 GB non-ECC</td>
</tr>
<tr>
<td>Minimum memory</td>
<td>dual-channel: 1 GB; single-channel: 512 MB</td>
</tr>
<tr>
<td>Maximum memory</td>
<td>64-bit operating system: 8 GB</td>
</tr>
<tr>
<td></td>
<td>32-bit operating system: 4 GB</td>
</tr>
<tr>
<td>BIOS address</td>
<td>F0000h</td>
</tr>
</tbody>
</table>

### Computer Information

<table>
<thead>
<tr>
<th>Chipset</th>
<th>Intel Q35 Express Chipset w/ICH9DG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data bus width</td>
<td>64 bits</td>
</tr>
<tr>
<td>Address bus width</td>
<td>32 bits</td>
</tr>
<tr>
<td>DMA channels</td>
<td>eight</td>
</tr>
<tr>
<td>Interrupt levels</td>
<td>24</td>
</tr>
<tr>
<td>BIOS chip (NVRAM)</td>
<td>32 Mb</td>
</tr>
<tr>
<td>NIC</td>
<td>Integrated network interface with ASF 1.03 and 2.0 support as defined by DMTF</td>
</tr>
<tr>
<td></td>
<td>Capable of 10/100/1000 communication</td>
</tr>
<tr>
<td></td>
<td>iAMT 3.0</td>
</tr>
</tbody>
</table>

### Video

<table>
<thead>
<tr>
<th>Type</th>
<th>Intel Graphics Media Accelerator 3100 (integrated on system board)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PCI Express x16 slot can support either a PCI Express graphics card or a DVI graphics card (for dual-monitor support)</td>
</tr>
</tbody>
</table>

### Audio

<table>
<thead>
<tr>
<th>Type</th>
<th>ADI 1984 High Definition Audio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stereo conversion</td>
<td>24-bit analog-to-digital; 24-bit digital-to-analog</td>
</tr>
</tbody>
</table>

### Controllers

| Drives | two SATA controllers and one eSATA controller |
### Expansion Bus

<table>
<thead>
<tr>
<th>Bus type</th>
<th>PCI 2.3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PCI Express 1.0A</td>
</tr>
<tr>
<td></td>
<td>SATA 1.0A and 2.0</td>
</tr>
<tr>
<td></td>
<td>USB 2.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bus speed</th>
<th>PCI: 133 MBs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PCI Express x16: 8 GB/s bidirectional speed</td>
</tr>
<tr>
<td></td>
<td>SATA: 1.5 Gbps and 3.0 Gbps</td>
</tr>
<tr>
<td></td>
<td>USB: 480 Mbps</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cards:</th>
<th>low-profile cards supported</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PCI:</th>
<th>connector one</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>connector size 120 pins</td>
</tr>
<tr>
<td></td>
<td>connector data width (maximum) 32 bits</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PCI Express:</th>
<th>connector one x16</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>power 25 W (maximum)</td>
</tr>
<tr>
<td></td>
<td>connector size 164 pins (x16)</td>
</tr>
<tr>
<td></td>
<td>connector data width (maximum) 16 PCI Express lanes (x16)</td>
</tr>
</tbody>
</table>

### Drives

<table>
<thead>
<tr>
<th>Externally accessible</th>
<th>one bay for a slimline floppy drive; one bay for a slimline optical drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internally accessible</td>
<td>one bay for a 1-inch-high hard drive</td>
</tr>
</tbody>
</table>

### Connectors

<table>
<thead>
<tr>
<th>External connectors:</th>
<th>9-pin connector; 16550C-compatible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial</td>
<td>25-pin connector (bidirectional)</td>
</tr>
<tr>
<td>Optional PS/2 with secondary serial port adapter</td>
<td>two 6-pin mini-DINs</td>
</tr>
<tr>
<td>Video</td>
<td>15-pin VGA connector</td>
</tr>
<tr>
<td>Network adapter</td>
<td>RJ45 connector</td>
</tr>
<tr>
<td>USB</td>
<td>two front-panel and six back panel USB 2.0–compliant connectors</td>
</tr>
<tr>
<td>Audio</td>
<td>two connectors for line-in/ microphone and line-out; two front-panel connectors for headphones and microphone</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System board connectors:</th>
<th>10-pin header for optional media card reader (in 3.5-inch drive bay)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SATA</td>
<td>two 7-pin connectors</td>
</tr>
<tr>
<td>eSATA</td>
<td>one 7-pin connector</td>
</tr>
<tr>
<td>Floppy drive</td>
<td>34-pin connector</td>
</tr>
<tr>
<td>Serial</td>
<td>12-pin connector for optional secondary serial port card</td>
</tr>
<tr>
<td>Fan</td>
<td>two 5-pin connectors</td>
</tr>
<tr>
<td>PCI 2.3</td>
<td>one 120-pin connector</td>
</tr>
<tr>
<td>PCI Express</td>
<td>one 164-pin (x16) connector</td>
</tr>
<tr>
<td>Front panel</td>
<td>40-pin connector</td>
</tr>
</tbody>
</table>

### Key Combinations

<table>
<thead>
<tr>
<th>&lt;Ctrl&gt;+&lt;Alt&gt;+&lt;Del&gt;</th>
<th>If you are running Microsoft® Windows® XP, brings up the Windows Security window; in MS-DOS® mode, restarts (reboots) the computer</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;F2&gt; or &lt;Ctrl&gt;+&lt;Enter&gt;</td>
<td>starts embedded system setup (during system start-up only)</td>
</tr>
</tbody>
</table>
<F3> automatically starts the computer from the network environment specified by the remote boot environment (PXE) rather than from one of the devices in the system setup Boot Sequence option (during system startup only).

<F12> or <Ctrl><Alt><F8> displays a boot device menu that allows the user to enter a device for a single boot (during system startup only) as well as options to run hard drive and system diagnostics.

<Ctrl><p> displays the Management Engine BIOS Extension settings screen that allows you to modify the settings.

### Controls and Lights

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power control</td>
<td>push button</td>
</tr>
<tr>
<td>Power light</td>
<td>green light — blinking green indicates sleep mode; solid green indicates power-on state.</td>
</tr>
<tr>
<td></td>
<td>amber light — blinking amber indicates a problem with an installed device; solid amber indicates an internal power problem (See Power Problems.)</td>
</tr>
<tr>
<td>hard drive access light</td>
<td>green</td>
</tr>
<tr>
<td>Link light</td>
<td>solid green light indicates network connection</td>
</tr>
<tr>
<td>Link integrity light (on integrated network adapter)</td>
<td>green light for 10-Mb operation; orange light for 100-Mb operation; yellow light for a 1000-Mb (1-Gb) operation</td>
</tr>
<tr>
<td>Activity light (on integrated network adapter)</td>
<td>yellow blinking light</td>
</tr>
<tr>
<td>Diagnostic lights</td>
<td>Four lights on the front panel (See Dell Diagnostics.)</td>
</tr>
<tr>
<td>Standby power light</td>
<td>AUX_PWR on the system board</td>
</tr>
</tbody>
</table>

### Power

DC power supply:

**NOTE:** Power consumption from an AC power source can be zero when the computer is unplugged from that power source. However, the computer draws minimal power from the internal coin cell battery even when the computer is not drawing power from the AC power source.

- **Wattage**: 275 W
- **Heat dissipation**: 938 BTU/hr

**NOTE:** Heat dissipation is calculated based upon the power supply rating.

- **Voltage**: manual selection power supplies — 90 to 135 V at 50/60 Hz; 180 to 265 V at 50/60 Hz
- **Backup battery**: 3-V CR2032 lithium coin cell

### Physical

- **Height**: 9.26 cm (3.65 inches)
- **Width**: 31.37 cm (12.35 inches)
- **Depth**: 34.03 cm (13.40 inches)
- **Weight**: 7.4 kg (16.4 lb)

### Environmental

**Temperature:**
- **Operating**: 10° to 35°C (50° to 95°F)
- **Storage**: -40° to 65°C (-40° to 149°F)

**Relative humidity**: 20% to 80% (noncondensing)

**Maximum vibration:**
- **Operating**: 0.25 G at 3 to 200 Hz at 0.5 octave/min
- **Storage**: 0.5 G at 3 to 200 Hz at 1 octave/min

**Maximum shock:**
<table>
<thead>
<tr>
<th></th>
<th>Operating</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating</strong></td>
<td>bottom half-sine pulse with a change in velocity of 20 inches/sec (50.8 cm/sec)</td>
<td>27-G faired square wave with a velocity change of 200 inches/sec (508 cm/sec)</td>
</tr>
<tr>
<td><strong>Altitude:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>-15.2 to 3048 m (-50 to 10,000 ft)</td>
<td>-15.2 to 10,668 m (-50 to 35,000 ft)</td>
</tr>
<tr>
<td>Storage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airborne contaminant level</td>
<td>G2 or lower as defined by ISA-S71.04-1985</td>
<td></td>
</tr>
</tbody>
</table>
# Dell™ OptiPlex™ 755 User's Guide

## Small Form Factor Computer

## Notes, Notices, and Cautions

- **NOTE:** A NOTE indicates important information that helps you make better use of your computer.

- **NOTICE:** A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

- **CAUTION:** A CAUTION indicates a potential for property damage, personal injury, or death.

If you purchased a Dell n Series computer, any references in this document to Microsoft® Windows® operating systems are not applicable.

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Models: DCTR, DCNE, DCSM, and DCCY

March 2008 JN460 Rev. A02
About Your Small Form Factor Computer

Front View

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 1 | USB 2.0 connectors (2) Use the front USB connectors for devices that you connect occasionally, such as joysticks or cameras, or for bootable USB devices (see System Setup for more information about booting to a USB device).
It is recommended that you use the back USB connectors for devices that typically remain connected, such as printers and keyboards. |
| 2 | power button Press to turn on the computer. |
|   | NOTICE: To avoid losing data, do not turn off the computer by pressing the power button. Instead, perform an operating system shutdown. See Turning Off Your Computer for more information.|
|   | NOTICE: If your operating system has ACPI enabled, when you press the power button the computer will perform an operating system shutdown. |
| 3 | Dell badge Can be rotated to match the orientation of your computer. To rotate, place fingers around the outside of the badge, press firmly, and turn the badge. You can also rotate the badge using the slot provided near the bottom of the badge. |
| 4 | LAN indicator light Indicates that a LAN (local area network) connection is established. |
| 5 | diagnostic lights Use the lights to help you troubleshoot a computer problem based on the diagnostic code. For more information, see Diagnostic Lights. |
| 6 | hard drive activity light This light flickers when the hard drive is being accessed. |
| 7 | power light The power light illuminates and blinks or remains solid to indicate different operating states: |
|    |  - No light — The computer is turned off. |
|    |  - Steady green — The computer is in a normal operating state. |
|    |  - Blinking green — The computer is in a power-saving mode. |
|    |  - Blinking or solid amber — See Power Problems. |
|    | To exit from a power-saving mode, press the power button or use the keyboard or the mouse if it is configured as a wake device in the Windows Device Manager. For more information about sleep modes and exiting from a power-saving mode, see Power Management for Windows XP and Windows Vista. |
|    | See Dell Diagnostics for a description of light codes that can help you troubleshoot problems with your computer. |
Back View

| 1  | card slots | Access connectors for any installed PCI cards, PCI Express cards, PS/2, eSATA, and so on. |
| 2  | back panel connectors | Plug serial, USB, and other devices into the appropriate connectors (see Back Panel Connectors). |
| 3  | power connector | Insert the power cable. |
| 4  | voltage selection switch | Your computer is equipped with a manual voltage-selection switch. To help avoid damaging a computer with a manual voltage selection switch, set the switch for the voltage that most closely matches the AC power available in your location. |
|    |                  | **NOTICE:** In Japan, the voltage selection switch must be set to the 115-V position. Also, ensure that your monitor and attached devices are electrically rated to operate with the AC power available in your location. |
| 5  | padlock ring | Insert a padlock to lock the computer cover. |
| 6  | cover release latch | Allows you to open the computer cover. |

Back Panel Connectors

| 1  | parallel connector | Connect a parallel device, such as a printer, to the parallel connector. If you have a USB printer, plug it into a USB connector. |
| 2  | link integrity light | - Green — A good connection exists between a 10-Mbps network and the computer.  
- Orange — A good connection exists between a 100-Mbps network and the computer.  
- Yellow — A good connection exists between a 1-Gbps (or 1000-Mbps) network and the computer.  
- Off — The computer is not detecting a physical connection to the network. |

NOTE: The integrated parallel connector is automatically disabled if the computer detects an installed card containing a parallel connector configured to the same address. For more information, see System Setup Options.
Removing the Computer Cover

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

**CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

1. Follow the procedures in Before You Begin.
2. If you have installed a padlock through the padlock ring on the back panel, remove the padlock.
3. Locate the cover release latch shown in the illustration. Then, slide the release latch back as you lift the cover.
4. Grip the sides of the computer cover and pivot the cover up using the bottom hinges as leverage points.
5. Remove the cover from the hinge tabs and set it aside on a soft nonabrasive surface.

**CAUTION:** Graphics card heat sinks can become very hot during normal operation. Ensure that a graphics card heat sink has had sufficient time to cool before you touch it.
Inside Your Computer

⚠️ CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

⚠️ CAUTION: To avoid electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

⚠️ NOTICE: Be careful when opening the computer cover to ensure that you do not accidentally disconnect cables from the system board.

Chassis Intrusion Switch

⚠️ CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

⚠️ NOTE: The chassis intrusion switch is standard on the ultra small form factor computer but is optional on mini tower, desktop, and small form factor computers; it may not be present on your computer.
Removing the Chassis Intrusion Switch

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Remove the hard drive (see Removing a Hard Drive).

4. Disconnect the chassis intrusion switch cable from the system board by using two fingers to squeeze the release mechanism on one side of the connector as you pull to disconnect the cable connector.

5. Slide the chassis intrusion switch out of its slot in the metal bracket, and then push it down through the square hole in the bracket to remove the switch and its attached cable from the computer.

   **NOTE:** You may feel a slight resistance as you slide the switch out of the slot.

Replacing the Chassis Intrusion Switch

1. Gently insert the switch from underneath the metal bracket into the square hole in the bracket, and then slide the chassis intrusion switch into its slot until it snaps securely into place.

2. Reconnect the cable to the system board.

3. Replace the hard drive (see Installing a Hard Drive).

4. Replace the computer cover (see Replacing the Computer Cover).

5. If you are using a computer stand, attach it to the computer.

Resetting the Chassis Intrusion Detector

1. Turn on (or restart) your computer.

2. When the blue DELL™ logo appears, press <F2> immediately.

   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop. Then shut down your computer and try again.

3. Select the Chassis Intrusion option and then press the left- or right-arrow key to select Reset. Change the setting to On, On-Silent, or Disabled.

   **NOTE:** The default setting is On-Silent.

4. Save your BIOS settings and exit system setup.
# System Board Components

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>internal speaker connector (INT_SPKR)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>processor connector (CPU)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>processor power connector (12VPOWER)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>memory module connectors (DIMM_1, DIMM_2, DIMM_3, DIMM_4)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>password jumper (PSWD)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>SATA connectors (SATA0, SATA1)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>front-panel connector (FRONTPANEL)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>power connector (POWER)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>fan connector (FAN_HDD)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>eSATA connector (eSATA)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>internal USB connector (INT_USB)</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>RTC reset jumper (RTCSRST)</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>intrusion switch connector (INTRUDER)</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>battery socket (BATTERY)</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>PCI Express x16 connector (SLOT1)</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>PCI connector (SLOT2)</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>serial connector (SERIAL2)</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>system board speaker (BEEP)</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>aux power LED (aux_LED)</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>floppy drive connector (DSKT)</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>fan connector (FAN_CPU)</td>
<td></td>
</tr>
</tbody>
</table>
Replacing the System Board

Removing the System Board: Mini Tower, Desktop, Small Form Factor, and Ultra Small Form Factor Computers

1. Follow the procedures in Before You Begin.

2. Remove the computer cover.

**NOTICE:** Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate any static electricity that could harm internal components.

3. Remove any components that restrict access to the system board (optical drive[s], floppy drive, hard drive, I/O panel (as applicable).

4. Remove the processor and heat sink assembly:
   - Mini tower: see Processor
   - Desktop: see Processor
   - Small form factor: see Processor
   - Ultra small form factor: see Processor

5. Disconnect all cables from the system board.

6. Remove the screws from the system board.
   - Mini tower: see Mini Tower System Board Screws
   - Desktop: see Desktop System Board Screws
   - Small form factor: see Small Form Factor System Board Screws
   - Ultra small form factor: see Ultra Small Form Factor System Board Screws

7. Slide the system board assembly toward the front of the computer, and then lift the board up and away.

---

**Mini Tower System Board Screws**

1. mini tower system board
2. screws (9)
Desktop System Board Screws

1 desktop system board
2 screws (9)

Small Form Factor System Board Screws

1 small form factor system board
2 screws (7)

Ultra Small Form Factor System Board Screws
Place the system board assembly that you just removed next to the replacement system board to ensure it is identical.

### Replacing the System Board: Mini Tower, Desktop, Small Form Factor, and Ultra Small Form Factor Computers

1. Gently align the board into the chassis and slide it toward the back of the computer.
2. Replace the screws on the system board.
3. Replace any components and cables that you removed from the system board.
4. Reconnect all cables to their connectors at the back of the computer.
5. Replace the computer cover (see [Replacing the Computer Cover](#)).
If you purchased a Dell™ n Series computer, any references in this document to Microsoft® Windows® operating systems are not applicable.

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March 2008 P/N JN460 Rev. A02
## About Your Mini Tower Computer

### Front View

<table>
<thead>
<tr>
<th></th>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5.25-inch drive bay</td>
<td>Can contain an optical drive. Insert a CD or DVD (if supported) into this drive.</td>
</tr>
<tr>
<td>2</td>
<td>5.25-inch drive bay</td>
<td>Can contain an optical drive. Insert a CD or DVD (if supported) into this drive.</td>
</tr>
<tr>
<td>3</td>
<td>3.5-inch drive bay</td>
<td>Can contain an optional floppy drive or optional media card reader.</td>
</tr>
<tr>
<td>4</td>
<td>USB 2.0 connectors (2)</td>
<td>Use the front USB connectors for devices that you connect occasionally, such as joysticks or cameras, or for bootable USB devices (see your online User’s Guide for more information on booting to a USB device). It is recommended that you use the back USB connectors for devices that typically remain connected, such as printers and keyboards.</td>
</tr>
<tr>
<td>5</td>
<td>LAN indicator light</td>
<td>This light indicates that a LAN (local area network) connection is established.</td>
</tr>
<tr>
<td>6</td>
<td>Diagnostic lights</td>
<td>Use the lights to help you troubleshoot a computer problem based on the diagnostic code. For more information, see <a href="#">Diagnostic Lights</a>.</td>
</tr>
<tr>
<td>7</td>
<td>Power button</td>
<td>Press this button to turn on the computer.</td>
</tr>
</tbody>
</table>

**NOTICE:** To avoid losing data, do not turn off the computer by pressing the power button. Instead, perform an operating system shutdown. See [Before You Begin](#) for more information.

**NOTICE:** If your operating system has ACPI enabled, when you press the power button the computer will perform an operating system shutdown.
8 power light
The power light illuminates and blinks or remains solid to indicate different operating modes:
- No light — The computer is turned off.
- Steady green — The computer is in a normal operating state.
- Blinking green — The computer is in a power-saving mode.
- Blinking or solid amber — The computer is receiving electrical power, but an internal power problem may exist (see Power Problems).

To exit from a power-saving mode, press the power button or use the keyboard or the mouse if it is configured as a wake device in the Windows Device Manager. For more information about sleep modes and power-saving mode, see Advanced Features.

See Diagnostic Lights for a description of light codes that can help you troubleshoot problems with your computer.

9 hard drive activity light
This light flickers when the hard drive is being accessed.

10 headphone connector
Use the headphone connector to attach headphones and most kinds of speakers.

11 microphone connector
Use the microphone connector to attach a microphone.

---

**Back View**

1 cover-release latch
This latch allows you to open the computer cover.

2 padlock ring
Insert a padlock to lock the computer cover.

3 voltage selection switch
Your computer is equipped with a manual voltage-selection switch. To help avoid damaging a computer with a manual voltage-selection switch, set the switch for the voltage that most closely matches the AC power available in your location.

**NOTICE:** In Japan, the voltage selection switch must be set to the 115-V position.

Also, ensure that your monitor and attached devices are electrically rated to operate with the AC power available in your location.

4 power connector
Insert the power cable.

5 back panel connectors
Plug serial, USB, and other devices into the appropriate connectors. See Back Panel Connectors.

6 card slots (4)
Access connectors for any installed PCI or PCI Express cards, PS/2 connector, eSATA connector, etc.
### Back Panel Connectors

<table>
<thead>
<tr>
<th>Number</th>
<th>Connector Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>parallel connector</td>
<td>Connect a parallel device, such as a printer, to the parallel connector. If you have a USB printer, plug it into a USB connector. <strong>Note:</strong> The integrated parallel connector is automatically disabled if the computer detects an installed card containing a parallel connector configured to the same address. For more information, see System Setup Options.</td>
</tr>
</tbody>
</table>
| 2      | link integrity light            | - Green — A good connection exists between a 10-Mbps network and the computer.  
- Orange — A good connection exists between a 100-Mbps network and the computer.  
- Yellow — A good connection exists between a 1-Gbps (or 1000-Mbps) network and the computer.  
- Off — The computer is not detecting a physical connection to the network. |
| 3      | network adapter connector       | To attach your computer to a network or broadband device, connect one end of a network cable to either a network jack or your network or broadband device. Connect the other end of the network cable to the network adapter connector on the back panel of your computer. A click indicates that the network cable has been securely attached. **Note:** Do not plug a telephone cable into the network connector. For VPro to work, the network cable must be connected to the onboard NIC. It is recommended that you use Category 5 wiring and connectors for your network. If you must use Category 3 wiring, force the network speed to 10 Mbps to ensure reliable operation. |
| 4      | network activity light          | Flashes a yellow light when the computer is transmitting or receiving network data. A high volume of network traffic may make this light appear to be in a steady "on" state.                                                                                                                                                                           |
| 5      | line-out connector              | Use the green line-out connector to attach headphones and most speakers with integrated amplifiers.                                                                                                                                                                                                                                           |
| 6      | line-in/microphone connector    | Use the blue and pink line-in/microphone connector to attach a record/playback device such as a cassette player, CD player, or VCR; or a personal computer microphone for voice or musical input into a sound or telephony program.                                                                                                                                                        |
| 7      | USB 2.0 connectors (6)          | Use the back USB connectors for devices that typically remain connected, such as printers and keyboards.                                                                                                                                                                                                                                      |
| 8      | video connector                 | Plug the cable from your VGA-compatible monitor into the blue connector. **Note:** If you purchased an optional graphics card, this connector will be covered by a cap. Connect your monitor to the connector on the graphics card. Do not remove the cap. **Note:** If you are using a graphics card that supports dual monitors, use the y-cable that came with your computer. |
| 9      | serial connector                | Connect a serial device, such as a handheld device, to the serial port. The default designations are COM1 for serial connector 1 and COM2 for serial connector 2. For more information, see System Setup Options.                                                                                           |

---

### Removing the Computer Cover

1. **Parallel Connector:** Connect a parallel device, such as a printer, to the parallel connector. If you have a USB printer, plug it into a USB connector. **Note:** The integrated parallel connector is automatically disabled if the computer detects an installed card containing a parallel connector configured to the same address. For more information, see System Setup Options.

2. **Link Integrity Light:**
   - Green — A good connection exists between a 10-Mbps network and the computer.  
   - Orange — A good connection exists between a 100-Mbps network and the computer.  
   - Yellow — A good connection exists between a 1-Gbps (or 1000-Mbps) network and the computer.  
   - Off — The computer is not detecting a physical connection to the network.

3. **Network Adapter Connector:** To attach your computer to a network or broadband device, connect one end of a network cable to either a network jack or your network or broadband device. Connect the other end of the network cable to the network adapter connector on the back panel of your computer. A click indicates that the network cable has been securely attached. **Note:** Do not plug a telephone cable into the network connector. For VPro to work, the network cable must be connected to the onboard NIC. It is recommended that you use Category 5 wiring and connectors for your network. If you must use Category 3 wiring, force the network speed to 10 Mbps to ensure reliable operation.

4. **Network Activity Light:** Flashes a yellow light when the computer is transmitting or receiving network data. A high volume of network traffic may make this light appear to be in a steady “on” state.

5. **Line-Out Connector:** Use the green line-out connector to attach headphones and most speakers with integrated amplifiers.

6. **Line-In/Microphone Connector:** Use the blue and pink line-in/microphone connector to attach a record/playback device such as a cassette player, CD player, or VCR; or a personal computer microphone for voice or musical input into a sound or telephony program.

7. **USB 2.0 Connectors (6):** Use the back USB connectors for devices that typically remain connected, such as printers and keyboards.

8. **Video Connector:** Plug the cable from your VGA-compatible monitor into the blue connector. **Note:** If you purchased an optional graphics card, this connector will be covered by a cap. Connect your monitor to the connector on the graphics card. Do not remove the cap. **Note:** If you are using a graphics card that supports dual monitors, use the y-cable that came with your computer.

9. **Serial Connector:** Connect a serial device, such as a handheld device, to the serial port. The default designations are COM1 for serial connector 1 and COM2 for serial connector 2. For more information, see System Setup Options.
1. Follow the procedures in Before You Begin.

2. Lay the computer on its side as shown in the illustration.

3. Locate the cover release latch shown in the illustration. Then, slide the release latch back as you lift the cover.

4. Grip the sides of the computer cover and pivot the cover up using the hinge tabs as leverage points.

5. Remove the cover from the hinge tabs and set it aside on a soft nonabrasive surface.

**CAUTION:** Graphics card heat sinks can become very hot during normal operation. Ensure that a graphics card heat sink has had sufficient time to cool before you touch it.

---

**Inside Your Computer**

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

**CAUTION:** To avoid electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

**NOTICE:** Be careful when opening the computer cover to ensure that you do not accidentally disconnect cables from the system board.
Chassis Intrusion Switch

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

**NOTE:** The chassis intrusion switch is standard on the ultra small form factor computer but is optional on mini tower, desktop and small form factor computers; it may not be present on your computer.

### Removing the Chassis Intrusion Switch

1. Follow the procedures in *Before You Begin*.

2. Remove the computer cover (see *Removing the Computer Cover*).

3. Disconnect the chassis intrusion switch cable from the system board by using two fingers to squeeze the release mechanism on one side of the connector as you pull to disconnect the cable connector.

4. Slide the chassis intrusion switch out of its slot in the metal bracket, and then push it down through the square hole in the bracket to remove the switch and its attached cable from the computer.

**NOTE:** You may feel a slight resistance as you slide the switch out of the slot.
Replacing the Chassis Intrusion Switch

1. Gently insert the switch from underneath the metal bracket into the square hole in the bracket, and then slide the chassis intrusion switch into its slot until you feel it snap securely into place.

2. Reconnect the cable to the system board.

3. Replace the computer cover (seeReplacing the Computer Cover).

Resetting the Chassis Intrusion Detector

1. Turn on (or restart) your computer.

2. When the blue DELL™ logo appears, press <F2> immediately.

   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop. Then shut down your computer and try again.

3. Select the Chassis Intrusion option and then press the left- or right-arrow key to select Reset. Change the setting to On, On-Silent, or Disabled.

   **NOTE:** The default setting is On-Silent.

4. Save your BIOS settings and exit system setup.

System Board Components
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>speaker connector (INT_SPKR)</td>
<td>12</td>
<td>RTC reset jumper (RTCRST)</td>
</tr>
<tr>
<td>2</td>
<td>fan (FAN_CPU)</td>
<td>13</td>
<td>intrusion switch connector (INTRUDER)</td>
</tr>
<tr>
<td>3</td>
<td>processor connector (CPU)</td>
<td>14</td>
<td>battery socket (BATTERY)</td>
</tr>
<tr>
<td>4</td>
<td>processor power connector (12VPOWER)</td>
<td>15</td>
<td>PCI Express x16 connector (SLOT1)</td>
</tr>
<tr>
<td>5</td>
<td>memory module connectors (DIMM_1, DIMM_2, DIMM_3, DIMM_4)</td>
<td>16</td>
<td>PCI Express x1 connector (SLOT4)</td>
</tr>
<tr>
<td>6</td>
<td>password jumper (PSWD)</td>
<td>17</td>
<td>PCI connector (SLOT2)</td>
</tr>
<tr>
<td>7</td>
<td>SATA drive connectors (SATA0, SATA1, SATA2, SATA3)</td>
<td>18</td>
<td>PCI connector (SLOT3)</td>
</tr>
<tr>
<td>8</td>
<td>front-panel connector (FRONTPANEL)</td>
<td>19</td>
<td>serial connector (SERIAL2)</td>
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<td>power connector (POWER)</td>
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<td>system board speaker (BEEP)</td>
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<tr>
<td>10</td>
<td>external SATA connector (eSATA)</td>
<td>21</td>
<td>aux power LED (aux_LED)</td>
</tr>
<tr>
<td>11</td>
<td>internal USB (INT_USB)</td>
<td>22</td>
<td>floppy connector (DSKT)</td>
</tr>
</tbody>
</table>

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Troubleshooting
User's Guide

Follow these tips when you troubleshoot your computer:

- If you added or removed a part before the problem started, review the installation procedures and ensure that the part is correctly installed.
- If a peripheral device does not work, ensure that the device is properly connected.
- If an error message appears on the screen, write down the exact message. This message may help support personnel diagnose and fix the problem(s).
- If an error message occurs in a program, see the program's documentation.

Battery Problems

**CAUTION:** There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

Replace the battery —

If you have repeatedly reset time and date information after turning on the computer, or if an incorrect time or date displays during start-up, replace the battery (see Replacing the Battery). If the battery still does not work properly, contact Dell (see Contacting Dell).

Card Problems

Fill out the Diagnostics Checklist as you complete these checks.

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

**CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before opening the cover.

**NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer.

Check the card seating and cable —

1. Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then remove the computer cover (see the appropriate "Removing the Computer Cover" section for your computer).
2. Ensure that each card is firmly seated in its connector. Reseat any loose cards.
3. Ensure that all cables are firmly connected to their corresponding connectors on the cards. If any cables appear loose, reconnect them.
   
   For instructions on which cables should be attached to specific connectors on a card, see the card's documentation.
4. Close the computer cover reconnect the computer and devices to electrical outlets, and then turn them on (see Replacing the Computer Cover).

Test the graphics card —

1. Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then remove the computer cover (see the appropriate "Removing the Computer Cover" section).
2. Remove all cards except the graphics card. See the appropriate "Cards" section for your computer.
   
   If your primary hard drive is connected to a drive controller card and not to one of the system board IDE connectors, leave the drive controller card installed in the computer.
Drive Problems

Ensure that Microsoft® Windows® Recognizes the drive —

Windows XP:
1. Click Start and click My Computer.

Windows Vista®:
1. Click the Windows Vista Start button and click Computer.

If the drive is not listed, perform a full scan with your antivirus software to check for and remove viruses. Viruses can sometimes prevent Windows from recognizing the drive.

Test the drive —

1. Insert another disc to eliminate the possibility that the original drive is defective.
2. Insert a bootable floppy disk and restart the computer.

Clean the drive or disk —

See Cleaning Your Computer.

Check the cable connections

Run the Hardware Troubleshooter —


Run the Dell Diagnostics —

See Dell Diagnostics.

Optical drive problems

⚠️ NOTE: High-speed optical drive vibration is normal and may cause noise, which does not indicate a defect in the drive or the media.

⚠️ NOTE: Because of different regions worldwide and different disc formats, not all DVD titles work in all DVD drives.

Adjust the Windows volume control —

1. Click the speaker icon in the lower-right corner of your screen.
2. Ensure that the volume is turned up by clicking the slide bar and dragging it up.
3. Ensure that the sound is not muted by clicking any boxes that are checked.

Check the speakers and subwoofer —
See Sound and Speaker Problems.

Problems writing to an optical drive

Close other programs —

The optical drive must receive a steady stream of data during the writing process. If the stream is interrupted, an error occurs. Try closing all programs before you write to the optical.

Turn off standby mode in Windows before writing to a disc —

See Power Management for Windows XP and Windows Vista or search for the keyword standby in Windows Help and Support for information on power management modes.

Hard drive problems

Run Check Disk —

Windows XP:

1. Click Start and click My Computer.
2. Right-click Local Disk C:
3. Click Properties → Tools → Check Now.
4. Click Scan for and attempt recovery of bad sectors and click Start.

Windows Vista:

1. Click Start and click Computer.
2. Right-click Local Disk C:
3. Click Properties → Tools → Check Now.
4. Follow the instructions on the screen.

E-Mail, Modem, and Internet Problems

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

NOTE: Connect the modem to an analog telephone jack only. The modem does not operate while it is connected to a digital telephone network.

NOTE: Do not plug a telephone cable into the network adapter connector (see the I/O connector information for your computer).

Check the Microsoft Outlook® Express security settings — If you cannot open your e-mail attachments:

1. In Outlook Express, click Tools → Options → Security.
2. Click Do not allow attachments to remove the checkmark, as needed.

Check the telephone line connection

Check the telephone jack
Connect the modem directly to the telephone wall jack
Use a different telephone line —

1. Verify that the telephone line is connected to the jack on the modem (the jack has either a green label or a connector-shaped icon next to it).
2. Ensure that you hear a click when you insert the telephone line connector into the modem.
3. Disconnect the telephone line from the modem and connect it to a telephone, then listen for a dial tone.
4. If you have other telephone devices sharing the line, such as an answering machine, fax machine, surge protector, or line splitter, bypass them and use the telephone to connect the modem directly to the telephone wall jack. If you are using a line that is 3 meters (10 feet) or more in length, try a shorter one.

Run the Modem diagnostic Tool —

Windows XP:

1. Click Start → All Programs → Modem Helper.
2. Follow the instructions on the screen to identify and resolve modem problems. Modem Helper is not available on certain computers.

Windows Vista:

1. Click **Start** → **All Programs** → **Modem Diagnostics Tool**.
2. Follow the instructions on the screen to identify and resolve modem problems. Modem diagnostics are not available on all computers.

**Verify that the modem is communicating with Windows** —

Windows XP:

1. Click **Start** → **Control Panel** → **Printers and Other Hardware** → **Phone and Modem Options** → **Modems**.
2. Click the COM port for your modem → **Properties** → **Diagnostics** → **Query Modem** to verify that the modem is communicating with Windows.

   If all commands receive responses, the modem is operating properly.

Windows Vista:

1. Click **Start** → **Control Panel** → **Hardware and Sound** → **Phone and Modem Options** → **Modems**.
2. Click the COM port for your modem → **Properties** → **Diagnostics** → **Query Modem** to verify that the modem is communicating with Windows.

   If all commands receive responses, the modem is operating properly.

**Ensure that you are connected to the Internet** — Ensure that you have subscribed to an Internet provider. With the Outlook Express e-mail program open, click **File**. If **Work Offline** has a checkmark next to it, click the checkmark to remove it and connect to the Internet. For help, contact your Internet service provider.

**Error Messages**

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

If the error message is not listed, see the documentation for the operating system or the program that was running when the message appeared.

**A filename cannot contain any of the following characters: \/: * ? " < > | —** Do not use these characters in filenames.

**A required .DLL file was not found** — The program that you are trying to open is missing an essential file. To remove and then reinstall the program:

Windows XP:

1. Click **Start** → **Control Panel** → **Add or Remove Programs** → **Programs and Features**.
2. Select the program you want to remove.
3. Click **Uninstall**.
4. See the program documentation for installation instructions.

Windows Vista:

1. Click **Start** → **Control Panel** → **Programs** → **Programs and Features**.
2. Select the program you want to remove.
3. Click **Uninstall**.
4. See the program documentation for installation instructions.

**drive letter \ is not accessible. The device is not ready** — The drive cannot read the disk. Insert a disk into the drive and try again.

**Insert bootable media** — Insert a bootable floppy disk, CD, or DVD.

**Non-system disk error** — Remove the floppy disk from the floppy drive and restart your computer.

**Not enough memory or resources. Close some programs and try again** — Close all windows and open the program that you want to use. In some cases, you may have to restart your computer to restore computer resources. If so, run the program that you want to use first.

**Operating system not found** — Contact Dell (see Contacting Dell).
Keyboard Problems

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

Check the keyboard cable —

- Ensure that the keyboard cable is firmly connected to the computer.
- Shut down the computer (see Before Working Inside Your Computer), reconnect the keyboard cable as shown on the setup diagram for your computer, and then restart the computer.
- Ensure that the cable is not damaged or frayed and check cable connectors for bent or broken pins. Straighten any bent pins.
- Remove any keyboard extension cables and connect the keyboard directly to the computer.

Test the keyboard — Connect a properly working keyboard to the computer, then try using the keyboard.

Run the Hardware Troubleshooter —


Lockups and Software Problems

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

The computer does not start up

Check the diagnostic lights —

See Diagnostic Lights.

Ensure that the power cable is firmly connected to the computer and to the electrical outlet

The computer stops responding

**NOTICE:** You may lose data if you are unable to perform an operating system shutdown.

Turn the computer off — If you are unable to get a response by pressing a key on your keyboard or moving your mouse, press and hold the power button for at least 8 to 10 seconds (until the computer turns off), and then restart your computer.

A program stops responding

End the program —

1. Press <Ctrl><Shift><Esc> simultaneously to access the Task Manager.
2. Click the Applications tab.
3. Click to select the program that is no longer responding.
4. Click End Task.

A program crashes repeatedly

**NOTE:** Most software includes installation instructions in its documentation or on a floppy disk, CD, or DVD.

Check the software documentation —

If necessary, uninstall and then reinstall the program.
A program is designed for an earlier Windows operating system

Run the Program Compatibility Wizard —

Windows XP:
The Program Compatibility Wizard configures a program so that it runs in an environment similar to non-XP operating system environments.

1. Click Start ® All Programs ® Accessories ® Program Compatibility Wizard ® Next.
2. Follow the instructions on the screen.

Windows Vista:
The Program Compatibility Wizard configures a program so that it runs in an environment similar to non-Windows Vista operating system environments.

1. Click Start ® Control Panel ® Programs ® Use an older program with this version of Windows.
2. In the welcome screen, click Next.
3. Follow the instructions on the screen.

A solid blue screen appears

Turn the computer off —

If you are unable to get a response by pressing a key on your keyboard or moving your mouse, press and hold the power button for at least 8 to 10 seconds (until the computer turns off), and then restart your computer.

Other software problems

Check the software documentation or contact the software manufacturer for troubleshooting information —

1. Ensure that the program is compatible with the operating system installed on your computer.
2. Ensure that your computer meets the minimum hardware requirements needed to run the software. See the software documentation for information.
3. Verify that the device drivers do not conflict with the program.
4. If necessary, uninstall and then reinstall the program.

Back up your files immediately

Use a virus-scanning program to check the hard drive, floppy disks, CDs, or DVDs

Save and close any open files or programs and shut down your computer through the Start menu

Memory Problems

⚠️ CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

If you receive an insufficient memory message —

1. Save and close any open files and exit any open programs you are not using to see if that resolves the problem.
2. See the software documentation for minimum memory requirements. If necessary, install additional memory (see Installing Memory).
3. Reseat the memory modules (see Memory) to ensure that your computer is successfully communicating with the memory.
4. Run the Dell Diagnostics (see Dell Diagnostics).

If you experience other memory problems —

1. Reseat the memory modules (see Memory) to ensure that your computer is successfully communicating with the memory.
2. Ensure that you are following the memory installation guidelines (see Installing Memory).
3. Ensure that the memory you are using is supported by your computer. For more information about the type of memory supported by your computer, see the specifications for your computer.
4. Run the Dell Diagnostics (see Dell Diagnostics).
Mouse Problems

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

**Check the mouse cable —**

1. Ensure that the cable is not damaged or frayed and check cable connectors for bent or broken pins. Straighten any bent pins.
2. Remove any mouse extension cables, and connect the mouse directly to the computer.
3. Verify that the mouse cable is connected as shown on the setup diagram for your computer.

**Restart the computer —**

1. Simultaneously press <Ctrl>+<Esc> to display the Start menu.
2. Press <u>, press the up- and down-arrow keys to highlight **Shut down** or **Turn Off**, and then press <Enter>.
3. After the computer turns off, reconnect the mouse cable as shown on the setup diagram.
4. Turn on the computer.

**Test the mouse —** Connect a properly working mouse to the computer, then try using the mouse.

**Check the mouse settings —**

*Windows XP*

1. Click **Start** → Control Panel → Mouse.
2. Adjust the settings as needed.

*Windows Vista:*

1. Click **Start** → Control Panel → Hardware and Sound → Mouse.
2. Adjust the settings as needed.

**Reinstall the mouse driver —** See Drivers.


Network Problems

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

**Check the network cable connector —** Ensure that the network cable is firmly inserted into the network connector on the back of the computer and the network jack.

**Check the network lights on the back of the computer —** If the link integrity light is off (see System Lights), no network communication is occurring. Replace the network cable.

**Restart the computer and log on to the network again**

**Check your network settings —** Contact your network administrator or the person who set up your network to verify that your network settings are correct and that the network is functioning.


Power Problems

**Troubleshooting Power Problems**
If the power light is green and the computer is not responding — See Diagnostic Lights. If the power light is blinking green — The computer is in standby mode. Press a key on the keyboard, move the mouse, or press the power button to resume normal operation. If the power light is off — The computer is either turned off or is not receiving power.

- Reseat the power cable in the power connector on the back of the computer and the electrical outlet.
- Bypass power strips, power extension cables, and other power protection devices to verify that the computer turns on properly.
- Ensure that the main power cable and front panel cable are securely connected to the system board (see the "System Board Components" section for your computer).
- Perform the power supply self-test, if applicable (see Power Supply Self-Test). If the power light is blinking amber — The computer is receiving electrical power, but an internal power problem may exist.

- Ensure that the voltage selection switch is set to match the AC power at your location (if applicable).
- Ensure that all components and cables are properly installed and securely connected to the system board (see the "System Board Components" section for your computer).
- Perform the power supply self-test, if applicable (see Power Supply Self-Test). If the power light is steady amber — A device may be malfunctioning or incorrectly installed.

- Ensure that the processor power cable is securely connected to the system board power connector (POWER2) (see the "System Board Components" section for your computer).
- Remove and then reinstall all memory modules (see Memory).
- Remove and then reinstall any expansion cards, including graphics cards (see the "Cards" section for your computer).
- Perform the power supply self-test, if applicable (see Power Supply Self-Test). Eliminate interference — Some possible causes of interference are:

- Power, keyboard, and mouse extension cables
- Too many devices connected to the same power strip
- Multiple power strips connected to the same electrical outlet

Power Supply Self-Test

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

If your mini tower, desktop, or small form factor computer has been certified for ENERGY STAR® 4.0, then your power supply is equipped with a self-test feature to help with troubleshooting power problems. The self-test feature can be performed with the power supply connected to computer devices or in isolation. The test button and LED are accessible externally on the back of the power supply (where the AC plug is located).

**NOTE:** The power supply self-test feature is available only with ENERGY STAR 4.0 power supplies.

![Power Supply Self-Test diagram](image)

<table>
<thead>
<tr>
<th></th>
<th>test button</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>test LED</td>
</tr>
</tbody>
</table>

To perform the power supply self-test:

1. Turn your computer off and disconnect the computer from the electrical outlet.
2. Disconnect the DC power supply connectors from the system board and all internal devices. The procedure for disconnecting the power supply cables depends on the form factor of your computer:

   - For the mini tower, see Power Supply.
3. Connect your computer to a working electrical outlet.

4. Press and hold the power supply test button.
   - If the test LED illuminates, the power supply is functioning properly. Connect the DC power supply connector to the system board, and then perform the test again. Continue to connect devices (one at a time) and perform the self-test until the test LED fails to illuminate and a faulty device is identified. Replace the defective device/part or contact Dell (see Contacting Dell).
   - If the test LED does not illuminate, the power supply is defective. Replace the power supply or contact Dell (see Contacting Dell).

Printer Problems

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

ℹ️ **NOTE:** If you need technical assistance for your printer, contact the printer’s manufacturer.

Check the printer documentation — See the printer documentation for setup and troubleshooting information.

Ensure that the printer is turned on

Check the printer cable connections —

- See the printer documentation for cable connection information.
- Ensure that the printer cables are securely connected to the printer and the computer.

Test the electrical outlet — Ensure that the electrical outlet is working by testing it with another device, such as a lamp.

Verify that the printer is recognized by Windows —

*Windows XP:*

1. Click Start ® Control Panel ® Printers and Other Hardware ® View installed printers or fax printers.
2. If the printer is listed, right-click the printer icon.
3. Click Properties ® Ports. For a parallel printer, ensure that the Print to the following port(s): setting is LPT1 (Printer Port). For a USB printer, ensure that the Print to the following port(s): setting is USB.

*Windows Vista:*

1. Click Start ® Control Panel ® Hardware and Sound ® Printer.
2. If the printer is listed, right-click the printer icon.
3. Click Properties and click Ports.
4. Adjust the settings, as needed.

Reinstall the printer driver —

See the printer documentation for information on reinstalling the printer driver. —

Scanner Problems

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

ℹ️ **NOTE:** If you need technical assistance for your scanner, contact the scanner's manufacturer.

Check the scanner documentation — See the scanner documentation for setup and troubleshooting information.

Unlock the scanner — Ensure that your scanner is unlocked (if the scanner has a locking tab or button).

Restart the computer and try the scanner again

Check the cable connections —

- See the scanner documentation for information on cable connections.
Ensure that the scanner cables are securely connected to the scanner and the computer.

**Verify that the scanner is recognized by Microsoft Windows —**

**Windows XP:**
1. Click Start ® Control Panel ® Printers and Other Hardware ® Scanners and Cameras.
2. If your scanner is listed, Windows recognizes the scanner.

**Windows Vista:**
1. Click Start ® Control Panel ® Hardware and Sound ® Scanners and Cameras.
2. If the scanner is listed, Windows recognizes the scanner.

**Reinstall the scanner driver —** See the scanner documentation for instructions.

**Sound and Speaker Problems**

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

**No sound from speakers**

⚠️ **NOTE:** The volume control in MP3 and other media players may override the Windows volume setting. Always check to ensure that the volume on the media player(s) has not been turned down or off.

- **Check the speaker cable connections** — Ensure that the speakers are connected as shown on the setup diagram supplied with the speakers. If you purchased a sound card, ensure that the speakers are connected to the card.

- **Ensure that the subwoofer and the speakers are turned on** — See the setup diagram supplied with the speakers. If your speakers have volume controls, adjust the volume, bass, or treble to eliminate distortion.

- **Adjust the Windows volume control** — Click or double-click the speaker icon in the lower-right corner of your screen. Ensure that the volume is turned up and that the sound is not muted.

- **Disconnect headphones from the headphone connector** — Sound from the speakers is automatically disabled when headphones are connected to the computer's front-panel headphone connector.

- **Test the electrical outlet** — Ensure that the electrical outlet is working by testing it with another device, such as a lamp.

- **Eliminate possible interference** — Turn off nearby fans, fluorescent lights, or halogen lamps to check for interference.

- **Run the speaker diagnostics**

- **Reinstall the sound driver** — See Drivers.


**No sound from headphones**

- **Check the headphone cable connection** — Ensure that the headphone cable is securely inserted into the headphone connector (see the front and back views for the appropriate computer).

- **Adjust the Windows volume control** — Click or double-click the speaker icon in the lower-right corner of your screen. Ensure that the volume is turned up and that the sound is not muted.
Video and Monitor Problems

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

NOTICE: If your computer came with a PCI graphics card installed, removal of the card is not necessary when installing additional graphics cards; however, the card is required for troubleshooting purposes. If you remove the card, store it in a safe and secure location. For information about your graphics card, go to support.dell.com.

The screen is blank

NOTE: For troubleshooting procedures, see the monitor’s documentation.

The screen is difficult to read

Check the monitor cable connection —

- Ensure that the monitor cable is connected to the correct graphics card (for dual graphics card configurations).
- If you are using the optional DVI-to-VGA adapter, ensure that the adapter is correctly attached to the graphics card and monitor.
- Ensure that the monitor cable is connected as shown on the setup diagram for your computer.
- Remove any video extension cables and connect the monitor directly to the computer.
- Swap the computer and monitor power cables to determine if the monitor's power cable is defective.
- Check the connectors for bent or broken pins (it is normal for monitor cable connectors to have missing pins).

Check the monitor power light —

- If the power light is lit or blinking, the monitor has power.
- If the power light is off, firmly press the button to ensure that the monitor is turned on.
- If the power light is blinking, press a key on the keyboard or move the mouse to resume normal operation.

Test the electrical outlet — Ensure that the electrical outlet is working by testing it with another device, such as a lamp.

Check the diagnostic lights —

See Diagnostic Lights.

Check the monitor settings — See the monitor documentation for instructions on adjusting the contrast and brightness, demagnetizing (degaussing) the monitor, and running the monitor self-test.

Move the subwoofer away from the monitor — If your speaker system includes a subwoofer, ensure that the subwoofer is positioned at least 60 centimeters (2 feet) away from the monitor.

Move the monitor away from external power sources — Fans, fluorescent lights, halogen lamps, and other electrical devices can cause the screen image to appear shaky. Turn off nearby devices to check for interference.

Rotate the monitor to eliminate sunlight glare and possible interference

Adjust the Windows display settings —

Windows XP:

1. Click Start → Control Panel → Appearance and Themes.
2. Click the area you want to change or click the Display icon.
3. Try different settings for Color quality and Screen resolution.

Windows Vista:

1. Click Start → Control Panel → Hardware and Sound → Personalization → Display Settings.
2. Adjust Resolution and Colors settings, as needed.

3D image quality is poor
Check the graphics card power cable connection — Ensure that the power cable for the graphics card(s) is correctly attached to the card.

Check the monitor settings — See the monitor documentation for instructions on adjusting the contrast and brightness, demagnetizing (degaussing) the monitor, and running the monitor self-test.

Power Lights

⚠️ CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

The power button light located on the front of the computer illuminates and blinks or remains solid to indicate different states:

1. If the power light is green and the computer is not responding, see Diagnostic Lights.
2. If the power light is blinking green, the computer is in standby mode. Press a key on the keyboard, move the mouse, or press the power button to resume normal operation.
3. If the power light is off, the computer is either turned off or is not receiving power.
   - Reseat the power cable into both the power connector on the back of the computer and the electrical outlet.
   - If the computer is plugged into a power strip, ensure that the power strip is plugged into an electrical outlet and that the power strip is turned on.
   - Ensure that the electrical outlet is working by testing it with another device, such as a lamp.
   - Ensure that the main power cable and front panel cable are securely connected to the system board (see the “System Board Components” section for your computer).
4. If the power light is blinking amber, the computer is receiving electrical power, but an internal power problem might exist.
   - Ensure that the voltage selection switch is set to match the AC power at your location, if applicable.
   - Ensure that the processor power cable is securely connected to the system board (see the “System Board Components” section for your computer).
5. If the power light is steady amber, a device may be malfunctioning or incorrectly installed.
   - Remove and then reinstall the memory modules (see Memory).
   - Remove and then reinstall any cards (see the “Cards” section for your computer).
6. Eliminate interference. Some possible causes of interference are:
   - Power, keyboard, and mouse extension cables
   - Too many devices on a power strip
   - Multiple power strips connected to the same electrical outlet

System Lights

Your power button light and hard drive light may indicate a computer problem.

<table>
<thead>
<tr>
<th>Power Light</th>
<th>Problem Description</th>
<th>Suggested Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid green</td>
<td>Power is on, and the computer is operating normally. On the desktop computer, a solid green light indicates a network connection.</td>
<td>No corrective action is required.</td>
</tr>
<tr>
<td>Blinking green</td>
<td>The computer is in a power-saving mode.</td>
<td>Press the power button, move the mouse, or press a key on the keyboard to wake the computer.</td>
</tr>
<tr>
<td>Blinks green several times and then turns off</td>
<td>A configuration error exists.</td>
<td>Check the diagnostic lights to see if the specific problem is identified (see Diagnostic Lights).</td>
</tr>
<tr>
<td>Solid yellow</td>
<td>The Dell Diagnostics is running a test, or a device on the system board may be faulty or incorrectly installed.</td>
<td>If the Dell Diagnostics is running, allow the testing to complete. If the computer does not boot, contact Dell for technical assistance (see Contacting Dell).</td>
</tr>
<tr>
<td>Blinking yellow</td>
<td>A power supply or system board failure has occurred.</td>
<td>See Power Problems.</td>
</tr>
<tr>
<td>Solid green and a beep code during POST</td>
<td>A problem was detected while the BIOS was executing.</td>
<td>See Beep Codes for instructions on diagnosing the beep code. Also, check the diagnostic lights to see if the specific problem is identified (see Diagnostic Lights).</td>
</tr>
<tr>
<td>Solid green power light and no beep code and no video during POST</td>
<td>The monitor or the graphics card may be faulty or incorrectly installed.</td>
<td>Check the diagnostic lights to see if the specific problem is identified (see Diagnostic Lights).</td>
</tr>
</tbody>
</table>
NOTE: Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

To help troubleshoot a problem, your computer has four lights labeled 1, 2, 3, and 4 on the front panel. When the computer starts normally, the lights flash.

NOTE: After the computer completes POST, all four lights turn off before booting to the operating system.

### Diagnostic Lights

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

- If the computer malfunctions, the sequence of the lights help to identify the problem.

<table>
<thead>
<tr>
<th>Light Pattern</th>
<th>Problem Description</th>
<th>Suggested Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4</td>
<td>The computer is in a normal off condition or a possible pre-BIOS failure has occurred. The diagnostic lights are not lit after the computer successfully boots to the operating system.</td>
<td>If the problem persists, contact Dell (see Contacting Dell).</td>
</tr>
<tr>
<td>1 2 3</td>
<td>A possible processor failure has occurred.</td>
<td>Reset the processor (see Processor information for your computer).</td>
</tr>
<tr>
<td>1 2 4</td>
<td>Memory modules are detected, but a memory failure has occurred.</td>
<td>If available, install working memory of the same type into your computer (see Installing Memory).</td>
</tr>
<tr>
<td>1 2 4</td>
<td>A possible graphics card failure has occurred.</td>
<td>If available, install a working graphics card into your computer.</td>
</tr>
<tr>
<td>1 2 3 4</td>
<td>A possible floppy drive or hard drive failure has occurred.</td>
<td>If the problem persists, contact Dell (see Contacting Dell).</td>
</tr>
<tr>
<td>1 3 4</td>
<td>A possible USB failure has occurred.</td>
<td>Reinstall all USB devices and check all cable connections.</td>
</tr>
<tr>
<td>1 3 4 5</td>
<td>No memory modules are detected.</td>
<td>If two or more memory modules are installed, remove the modules (see Removing Memory), then reinstall one module (see Installing Memory) and restart the computer. If the computer starts normally, continue to install additional memory modules (one at a time) until you have identified a faulty module or reinstalled all modules without error.</td>
</tr>
<tr>
<td>1 2 3 4</td>
<td>Memory modules are detected, but a memory configuration or compatibility error has occurred.</td>
<td>Ensure that no special requirements for memory module/connector placement exist (see Memory). Ensure that the memory you are using is supported by your computer (see the &quot;Specifications&quot; section for your computer).</td>
</tr>
<tr>
<td>1 2 3</td>
<td>A possible expansion card failure has occurred.</td>
<td>Determine if a conflict exists by removing an expansion card (not a graphics card) and restarting the computer (see the &quot;Cards&quot; section for your computer). 2. If the problem persists, reinstall the card you removed, then remove a different card and restart the computer. 3. Repeat this process for each expansion card installed. If the computer starts normally, troubleshoot the last card removed from the computer for resource conflicts (see Troubleshooting Software and Hardware Problems in the Microsoft® Windows® XP and Microsoft® Windows Vista® Operating Systems). 4. If the problem persists, contact Dell (see Contacting Dell).</td>
</tr>
<tr>
<td>2 3 4</td>
<td>Another failure has occurred.</td>
<td>Ensure that all hard drive and optical drive cables are properly connected to the system board (see the &quot;System Board Components&quot; section for your computer). 2. If there is an error message on the screen identifying a problem with a device (such as the floppy drive or hard drive), check the device to make sure it is functioning properly. 3. If the operating system is attempting to boot from a device (such as the floppy drive or optical drive), check system setup (see System Setup) to ensure the boot sequence is correct for the devices installed on your computer. 4. If the problem persists, contact Dell (see Contacting Dell).</td>
</tr>
</tbody>
</table>
Beep Codes

Your computer might emit a series of beeps during start-up if the monitor cannot display errors or problems. This series of beeps, called a beep code, identifies a problem. For example, beep code 1-3-1 (one possible beep code) consists of one beep, a burst of three beeps, and then one beep. This beep code tells you that the computer encountered a memory problem.

Reseating the memory modules may correct the following beep code errors. If the problem persists, contact Dell (see Contacting Dell) for instructions on obtaining technical assistance.

<table>
<thead>
<tr>
<th>Code</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3-1 through 2-4-4</td>
<td>Memory not being properly identified or used</td>
</tr>
<tr>
<td>4-2-1</td>
<td>Memory failure above address 0FFFFh</td>
</tr>
</tbody>
</table>

If you experience any of the following beep code errors, see Contacting Dell for instructions on obtaining technical assistance.

<table>
<thead>
<tr>
<th>Code</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1-2</td>
<td>Microprocessor register failure</td>
</tr>
<tr>
<td>1-1-3</td>
<td>NVRAM read/write failure</td>
</tr>
<tr>
<td>1-1-4</td>
<td>ROM BIOS checksum failure</td>
</tr>
<tr>
<td>1-2-1</td>
<td>Programmable interval timer failure</td>
</tr>
<tr>
<td>1-2-2</td>
<td>DMA initialization failure</td>
</tr>
<tr>
<td>1-2-3</td>
<td>DMA page register read/write failure</td>
</tr>
<tr>
<td>1-3</td>
<td>Video Memory Test failure</td>
</tr>
<tr>
<td>1-3-1 through 2-4-4</td>
<td>Memory not being properly identified or used</td>
</tr>
<tr>
<td>3-1-1</td>
<td>Slave DMA register failure</td>
</tr>
<tr>
<td>3-1-2</td>
<td>Master DMA register failure</td>
</tr>
<tr>
<td>3-1-3</td>
<td>Master interrupt mask register failure</td>
</tr>
<tr>
<td>3-1-4</td>
<td>Slave interrupt mask register failure</td>
</tr>
<tr>
<td>3-2-2</td>
<td>Interrupt vector loading failure</td>
</tr>
<tr>
<td>3-2-4</td>
<td>Keyboard Controller Test failure</td>
</tr>
<tr>
<td>3-3-1</td>
<td>NVRAM power loss</td>
</tr>
<tr>
<td>3-3-2</td>
<td>Invalid NVRAM configuration</td>
</tr>
<tr>
<td>3-3-4</td>
<td>Video Memory Test failure</td>
</tr>
<tr>
<td>3-4-1</td>
<td>Screen initialization failure</td>
</tr>
<tr>
<td>3-4-2</td>
<td>Screen retrace failure</td>
</tr>
<tr>
<td>3-4-3</td>
<td>Search for video ROM failure</td>
</tr>
<tr>
<td>4-2-1</td>
<td>No timer tick</td>
</tr>
<tr>
<td>4-2-2</td>
<td>Shutdown failure</td>
</tr>
<tr>
<td>4-2-3</td>
<td>Gate A20 failure</td>
</tr>
<tr>
<td>4-2-4</td>
<td>Unexpected interrupt in protected mode</td>
</tr>
<tr>
<td>4-3-1</td>
<td>Memory failure above address 0FFFFh</td>
</tr>
<tr>
<td>4-3-3</td>
<td>Timer-chip counter 2 failure</td>
</tr>
<tr>
<td>4-3-4</td>
<td>Time-of-day clock stopped</td>
</tr>
<tr>
<td>4-4-1</td>
<td>Serial or parallel port test failure</td>
</tr>
<tr>
<td>4-4-2</td>
<td>Failure to decompress code to shadowed memory</td>
</tr>
<tr>
<td>4-4-3</td>
<td>Math-coprocessor test failure</td>
</tr>
<tr>
<td>4-4-4</td>
<td>Cache test failure</td>
</tr>
</tbody>
</table>

System Messages

**NOTE:** If the message you received is not listed in the table, see the documentation for either the operating system or the program that was running when the message appeared.

<table>
<thead>
<tr>
<th>Message</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>8042 Gate-A20 error</td>
<td>The keyboard controller failed its test.</td>
<td>If you receive this message after you make changes in the system setup program, enter the system setup program and restore the original value(s).</td>
</tr>
<tr>
<td>Address Line</td>
<td>An error in the address</td>
<td>Reseat the memory modules (see Memory).</td>
</tr>
</tbody>
</table>
When to Use the Dell Diagnostics

Dell Diagnostics

**CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

**When to Use the Dell Diagnostics**

If you experience a problem with your computer, perform the checks in this section and run the Dell Diagnostics before you contact Dell for technical assistance.

It is recommended that you print these procedures before you begin.

**NOTICE:** The Dell Diagnostics works only on Dell™ computers.

Enter system setup (see Entering System Setup), review your computer's configuration information, and ensure that the device you want to test displays in

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Description</th>
<th>Troubleshooting Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>C: Drive Error</td>
<td>The hard drive is not working or is not configured correctly.</td>
<td>Ensure that the hard drive is installed correctly in the computer (see the “Drives” section for your computer) and defined correctly in the system setup program (see System Setup).</td>
</tr>
<tr>
<td>C: Drive Failure</td>
<td>The hard drive is not working or is not configured correctly.</td>
<td>See Contacting Dell for instructions on obtaining technical assistance.</td>
</tr>
<tr>
<td>Cache Memory Error</td>
<td>The cache memory is not operating.</td>
<td>Ensure that the cache memory has been installed correctly in the computer (see the “Memory” section for your computer) and defined correctly in the system setup program (see System Setup).</td>
</tr>
<tr>
<td>CH-2 Timer Error</td>
<td>An error is occurring on the timer on the system board.</td>
<td>Enter the system setup program (see System Setup), verify the system configuration, and then restart the computer.</td>
</tr>
<tr>
<td>CMOS Battery State Low</td>
<td>The system configuration information in the system setup program is incorrect or the battery charge may be low.</td>
<td>See Contacting Dell for instructions on obtaining technical assistance.</td>
</tr>
<tr>
<td>CMOS Checksum Failure</td>
<td>CMOS System Options Not Set</td>
<td>Enter the system setup program (see System Setup), verify the system configuration, and then restart the computer.</td>
</tr>
<tr>
<td>CMOS Display Type Mismatch</td>
<td>CMOS Memory Size Mismatch</td>
<td>Enter the system setup program (see System Setup), verify the system configuration, and then restart the computer.</td>
</tr>
<tr>
<td>CMOS Time and Date Not Set</td>
<td>Drive A or B is present but has failed the BIOS POST.</td>
<td>Ensure that the drive is installed correctly in the computer (see the “Drives” section for your computer) and defined correctly in the system setup program (see System Setup).</td>
</tr>
<tr>
<td>DMA Error</td>
<td>DMA 1 Error</td>
<td>DMA 2 Error</td>
</tr>
<tr>
<td>FDD Controller Failure</td>
<td>The BIOS cannot communicate with the floppy drive or hard drive controller.</td>
<td>Ensure that the floppy drive or the hard drive is installed correctly in the computer (see the “Drives” section for your computer) and defined correctly in the system setup program (see System Setup). Check the interface cable at both ends.</td>
</tr>
<tr>
<td>HDD Controller Failure</td>
<td>An interrupt channel on the system board failed to POST.</td>
<td>The keyboard or system board may need to be replaced.</td>
</tr>
<tr>
<td>INTR1 Error</td>
<td>INTR2 Error</td>
<td>Invalid Boot Diskette</td>
</tr>
<tr>
<td>Keyboard Error</td>
<td>The BIOS has detected a stuck key.</td>
<td>Ensure that nothing is resting on the keyboard; if a key appears to be stuck, carefully pry it up. If the problem persists, you may need to replace the keyboard.</td>
</tr>
<tr>
<td>KB/Interface Error</td>
<td>An error occurred with the keyboard connector.</td>
<td>Ensure that nothing is resting on the keyboard; if a key appears to be stuck, carefully pry it up. If the problem persists, you may need to replace the keyboard.</td>
</tr>
<tr>
<td>No ROM Basic</td>
<td>The operating system cannot be located on drive A or drive C.</td>
<td>Enter the system setup program (see System Setup) and confirm that drive A or drive C is properly identified.</td>
</tr>
</tbody>
</table>
system setup and is active.

Start the Dell Diagnostics from either your hard drive or from the Drivers and Utilities media (an optional CD). See Starting the Dell Diagnostics From Your Hard Drive or Starting the Dell Diagnostics From the Drivers and Utilities CD (Optional) for more information.

Starting the Dell Diagnostics From Your Hard Drive

NOTE: If your computer does not display a screen image, contact Dell (see Contacting Dell).

1. Ensure that the computer is connected to an electrical outlet that is known to be working properly.
2. Turn on (or restart) your computer.
3. When the DELL logo appears, press <F12> immediately.

   NOTE: Keyboard failure may result when a key is held down for extended periods of time. To avoid possible keyboard failure, press and release <F12> in even intervals to open the Boot Device Menu.

   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft Windows desktop, and then shut down your computer and try again.

4. Use the up- and down-arrow keys to select Diagnostics from the boot menu and then press <Enter>.

   The computer runs the Pre-boot System Assessment (PSA), a series of initial tests of your system board, keyboard, display, memory, hard drive, and so on.

   - Answer any questions that appear.
   - If failures are detected, write down the error code(s) and see Contacting Dell.
   - If the Pre-boot System Assessment completes successfully, the following message appears: "Booting Dell Diagnostic Utility Partition. Press any key to continue."

   NOTE: If you see a message stating that no diagnostics utility partition has been found, run the Dell Diagnostics from your Drivers and Utilities media (see Starting the Dell Diagnostics From the Drivers and Utilities CD (Optional)).

5. Press any key to start the Dell Diagnostics from the diagnostics utility partition on your hard drive.
6. Press <Tab> to select Test System and then press <Enter>.

   NOTE: It is recommended that you select Test System to run a complete test on your computer. Selecting Test Memory initiates the extended memory test, which can take up to thirty minutes or more to complete. When the test completes, record the test results and then press any key to return to the previous menu.

7. At the Dell Diagnostics Main Menu, left-click with the mouse, or press <Tab> and then <Enter>, to select the test you want to run (see Dell Diagnostics Main Menu).

   NOTE: Write down any error codes and problem descriptions exactly as they appear and follow the instructions on the screen.

8. After all tests have completed, close the test window to return to the Dell Diagnostics Main Menu.
9. Close the Main Menu window to exit the Dell Diagnostics and restart the computer.

Starting the Dell Diagnostics From the Drivers and Utilities CD (Optional)

1. Insert the Drivers and Utilities CD (optional).
2. Shut down and restart the computer.

   When the DELL logo appears, press <F12> immediately.

   If you wait too long and the Windows logo appears, continue to wait until you see the Windows desktop. Then shut down your computer and try again.

   NOTE: The next steps change the boot sequence for one time only. On the next start-up, the computer boots according to the devices specified in system setup.

3. When the boot device list appears, highlight SATA CD-ROM Device and press <Enter>.
4. Select the SATA CD-ROM Device option from the CD boot menu.
5. Select the **Boot from CD-ROM** option from the menu that appears.

6. Type 1 to start the **Drivers and Utilities CD** menu.

7. Type 2 to start the **Dell Diagnostics**.

8. Select **Run the 32 Bit Dell Diagnostics** from the numbered list. If multiple versions are listed, select the version appropriate for your computer.

9. When the **Dell Diagnostics Main Menu** appears, select the test you want to run (see **Dell Diagnostics Main Menu**).

### Dell Diagnostics Main Menu

1. After the Dell Diagnostics loads and the **Main Menu** screen appears, click the button for the option you want.

<table>
<thead>
<tr>
<th>Option</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Express Test</td>
<td>Performs a quick test of devices. This test typically takes 10 to 20 minutes and requires no interaction on your part. Run <strong>Express Test</strong> first to increase the possibility of tracing the problem quickly.</td>
</tr>
<tr>
<td>Extended Test</td>
<td>Performs a thorough check of devices. This test typically takes an hour or more and requires you to answer questions periodically.</td>
</tr>
<tr>
<td>Custom Test</td>
<td>Tests a specific device. You can customize the tests you want to run.</td>
</tr>
<tr>
<td>Symptom Tree</td>
<td>Lists the most common symptoms encountered and allows you to select a test based on the symptom of the problem you are having.</td>
</tr>
</tbody>
</table>

2. If a problem is encountered during a test, a message appears with an error code and a description of the problem. Write down the error code and problem description and follow the instructions on the screen.

   If you cannot resolve the error condition, contact Dell (see **Contacting Dell**).

   **NOTE:** The Service Tag for your computer is located at the top of each test screen. If you contact Dell, technical support will ask for your Service Tag. Your computer’s Service Tag is listed in the **System Info** option in system setup. See **System Setup** for more information.

3. If you run a test from the **Custom Test** or **Symptom Tree** option, click the applicable tab described in the following table for more information.

<table>
<thead>
<tr>
<th>Tab</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Results</td>
<td>Displays the results of the test and any error conditions encountered.</td>
</tr>
<tr>
<td>Errors</td>
<td>Displays error conditions encountered, error codes, and the problem description.</td>
</tr>
<tr>
<td>Help</td>
<td>Describes the test and may indicate requirements for running the test.</td>
</tr>
<tr>
<td>Configuration</td>
<td>Displays your hardware configuration for the selected device. The Dell Diagnostics obtains configuration information for all devices from system setup, memory, and various internal tests, and it displays the information in the device list in the left pane of the screen. The device list may not display the names of all the components installed on your computer or all devices attached to your computer.</td>
</tr>
<tr>
<td>Parameters</td>
<td>Allows you to customize the test by changing the test settings.</td>
</tr>
</tbody>
</table>

4. When the tests are completed, if you are running the **Drivers and Utilities CD**, remove the CD.

5. Close the test screen to return to the **Main Menu** screen. To exit the **Dell Diagnostics** and restart the computer, close the **Main Menu** screen.

### Drivers

**What Is a Driver?**

A driver is a program that controls a device such as a printer, mouse, or keyboard. All devices require a driver program.

A driver acts like a translator between the device and any other programs that use the device. Each device has its own set of specialized commands that only its driver recognizes.

Dell ships your computer to you with required drivers already installed—no further installation or configuration is needed.

**NOTICE:** The Drivers and Utilities media may contain drivers for operating systems that are not on your computer. Ensure that you are installing software appropriate for your operating system.
Many drivers, such as the keyboard driver, come with your Microsoft Windows operating system. You may need to install drivers if you:

- Upgrade your operating system.
- Reinstall your operating system.
- Connect or install a new device.

**Identifying Drivers**

If you experience a problem with any device, identify whether the driver is the source of your problem and, if necessary, update the driver.

**Microsoft® Windows® XP**

1. Click **Start** → **Control Panel**.
2. Under **Pick a Category**, click **Performance and Maintenance**, and click **System**.
3. In the **System Properties** window, click the **Hardware** tab, and click **Device Manager**.

**Microsoft Windows Vista®**

1. Click the Windows Vista start button , and right-click **Computer**.
2. Click **Properties** → **Device Manager**.
   
   **NOTE:** The User Account Control window may appear. If you are an administrator on the computer, click **Continue**; otherwise, contact your administrator to continue.

Scroll down the list to see if any device has an exclamation point (a yellow circle with a [!]) on the device icon.

If an exclamation point is next to the device name, you may need to reinstall the driver or install a new driver (see **Reinstalling Drivers and Utilities**).

**Reinstalling Drivers and Utilities**

**NOTICE:** The Dell Support website at support.dell.com and your Drivers and Utilities media provide approved drivers for Dell™ computers. If you install drivers obtained from other sources, your computer might not work correctly.

**Using Windows Device Driver Rollback**

If a problem occurs on your computer after you install or update a driver, use Windows Device Driver Rollback to replace the driver with the previously installed version.

**Windows XP:**

1. Click **Start** → **My Computer** → **Properties** → **Hardware** → **Device Manager**.
2. Right-click the device for which the new driver was installed and click **Properties**.
3. Click the **Drivers** tab → **Roll Back Driver**.

**Windows Vista:**

1. Click the Windows Vista start button , and right-click **Computer**.
2. Click **Properties** → **Device Manager**.

   **NOTE:** The User Account Control window may appear. If you are an administrator on the computer, click **Continue**; otherwise, contact your administrator to enter the Device Manager.

3. Right-click the device for which the new driver was installed and click **Properties**.
4. Click the **Drivers** tab → **Roll Back Driver**.

If Device Driver Rollback does not resolve the problem, then use System Restore (see [Restoring Your Operating System](#)) to return your computer to the operating state that existed before you installed the new driver.

---

**Manually Reinstalling Drivers**

After extracting the driver files to your hard drive as described in the previous section:

**Windows XP:**

1. Click **Start** → **My Computer** → **Properties** → **Hardware** → **Device Manager**.

2. Double-click the type of device for which you are installing the driver (for example, **Audio** or **Video**).

3. Double-click the name of the device for which you are installing the driver.

4. Click the **Driver** tab → **Update Driver**.

5. Click **Install from a list or specific location (Advanced)** → **Next**.

6. Click **Browse** and browse to the location to which you previously copied the driver files.

7. When the name of the appropriate driver appears, click **Next**.

8. Click **Finish** and restart your computer.

**Windows Vista:**

1. Click the Windows Vista start button, and right-click **Computer**.

2. Click **Properties** → **Device Manager**.

   **NOTE:** The User Account Control window may appear. If you are an administrator on the computer, click **Continue**; otherwise, contact your administrator to enter the Device Manager.

3. Double-click the type of device for which you are installing the driver (for example, **Audio** or **Video**).

4. Double-click the name of the device for which you are installing the driver.

5. Click the **Driver** tab → **Update Driver** → **Browse my computer for driver software**.

6. Click **Browse** and browse to the location to which you previously copied the driver files.

7. When the name of the appropriate driver appears, click the name of the driver → **OK** → **Next**.

8. Click **Finish** and restart your computer.

---

**Troubleshooting Software and Hardware Problems in the Microsoft® Windows® XP and Microsoft Windows Vista® Operating Systems**

If a device is either not detected during the operating system setup or is detected but incorrectly configured, you can use the Hardware Troubleshooter to resolve the incompatibility.

To start the Hardware Troubleshooter:

**Windows XP:**

1. Click **Start** → **Help and Support**.

2. Type hardware troubleshooter in the search field and press <Enter> to start the search.

3. In the **Fix a Problem** section, click Hardware Troubleshooter.

4. In the **Hardware Troubleshooter** list, select the option that best describes the problem and click **Next** to follow the remaining troubleshooting steps.
Windows Vista:

1. Click the Windows Vista start button , and click Help and Support.
2. Type hardware troubleshooter in the search field and press <Enter> to start the search.
3. In the search results, select the option that best describes the problem and follow the remaining troubleshooting steps.

Restoring Your Operating System

You can restore your operating system in the following ways:

- System Restore returns your computer to an earlier operating state without affecting data files. Use System Restore as the first solution for restoring your operating system and preserving data files.
- Dell PC Restore by Symantec (available in Windows XP) and Dell Factory Image Restore (available in Windows Vista) returns your hard drive to the operating state it was in when you purchased the computer. Both permanently delete all data on the hard drive and remove any programs installed after you received the computer. Use Dell PC Restore or Dell Factory Image Restore only if System Restore did not resolve your operating system problem.
- If you received an Operating System disc with your computer, you can use it to restore your operating system. However, using the Operating System disc also deletes all data on the hard drive. Use the disc only if System Restore did not resolve your operating system problem.

Using Microsoft Windows System Restore

The Windows operating systems provide a System Restore option which allows you to return your computer to an earlier operating state (without affecting data files) if changes to the hardware, software, or other system settings have left the computer in an undesirable operating state. Any changes that System Restore makes to your computer are completely reversible.

Starting System Restore

Windows XP:

1. Click Start ® All Programs ® Accessories ® System Tools ® System Restore.
2. Click either Restore my computer to an earlier time or Create a restore point.
3. Click Next and follow the remaining on-screen prompts.

Windows Vista:

1. Click Start  .
2. In the Start Search box, type System Restore and press <Enter>.

   NOTE: The User Account Control window may appear. If you are an administrator on the computer, click Continue; otherwise, contact your administrator to continue the desired action.

3. Click Next and follow the remaining prompts on the screen.

In the event that System Restore did not resolve the issue, you may undo the last system restore.

Undoing the Last System Restore

NOTE: Before you undo the last system restore, save and close all open files and exit any open programs. Do not alter, open, or delete any files or programs until the system restoration is complete.

Windows XP:
1. Click Start® All Programs® Accessories® System Tools® System Restore.

2. Click Undo my last restoration and click Next.

Windows Vista:

1. Click Start .

2. In the Start Search box, type System Restore and press <Enter>.

3. Click Undo my last restoration and click Next.

Enabling System Restore

⚠️ **NOTE:** Windows Vista does not disable System Restore; regardless of low disk space. Therefore, the steps below apply only to Windows XP.

If you reinstall Windows XP with less than 200 MB of free hard-disk space available, System Restore is automatically disabled.

To see if System Restore is enabled:

1. Click Start® Control Panel® Performance and Maintenance® System.

2. Click the System Restore tab and ensure that Turn off System Restore is unchecked.

Using Dell™ PC Restore and Dell Factory Image Restore

⚠️ **NOTE:** Using Dell PC Restore or Dell Factory Image Restore permanently deletes all data on the hard drive and removes any programs or drivers installed after you received your computer. If possible, back up the data before using these options. Use PC Restore or Dell Factory Image Restore only if System Restore did not resolve your operating system problem.

⚠️ **NOTE:** Dell PC Restore by Symantec and Dell Factory Image Restore may not be available in certain countries or on certain computers.

Use Dell PC Restore (Windows XP) or Dell Factory Image Restore (Windows Vista) only as the last method to restore your operating system. These options restore your hard drive to the operating state it was in when you purchased the computer. Any programs or files added since you received your computer—including data files—are permanently deleted from the hard drive. Data files include documents, spreadsheets, e-mail messages, digital photos, music files, and so on. If possible, back up all data before using PC Restore or Factory Image Restore.

Windows XP: Dell PC Restore

Using PC Restore:

1. Turn on the computer.

   During the boot process, a blue bar with www.dell.com appears at the top of the screen.

2. Immediately upon seeing the blue bar, press <Ctrl><F11>.

   If you do not press <Ctrl><F11> in time, let the computer finish starting, and then restart the computer again.

⚠️ **NOTICE:** If you do not want to proceed with PC Restore, click Reboot.

3. Click Restore and click Confirm.

   The restore process takes approximately 6 to 10 minutes to complete.

4. When prompted, click Finish to reboot the computer.

⚠️ **NOTE:** Do not manually shut down the computer. Click Finish and let the computer completely reboot.

5. When prompted, click Yes.

   The computer restarts. Because the computer is restored to its original operating state, the screens that appear, such as the End User License Agreement, are the same ones that appeared the first time the computer was turned on.
Removing PC Restore:

**NOTICE:** Removing Dell PC Restore from the hard drive permanently deletes the PC Restore utility from your computer. After you have removed Dell PC Restore, you will not be able to use it to restore your computer operating system.

Dell PC Restore enables you to restore your hard drive to the operating state it was in when you purchased your computer. It is recommended that you do not remove PC Restore from your computer, even to gain additional hard drive space. If you remove PC Restore from the hard drive, you cannot ever recall it, and you will never be able to use PC Restore to return your computer operating system to its original state.

1. Log on to the computer as a local administrator.
2. In Microsoft Windows Explorer, go to `c:\dell\utilities\DSR`.
3. Double-click the filename `DSRIRRemv2.exe`.
   - **NOTE:** If you do not log on as a local administrator, a message appears stating that you must log on as administrator. Click `Quit`, and then log on as a local administrator.
   - **NOTE:** If the partition for PC Restore does not exist on your computer hard drive, a message appears stating that the partition was not found. Click `Quit`; there is no partition to delete.
4. Click `OK` to remove the PC Restore partition on the hard drive.
5. Click `Yes` when a confirmation message appears.
   - The PC Restore partition is deleted and the newly available disk space is added to the free space allocation on the hard drive.
6. Right-click Local Disk (C) in Windows Explorer, click Properties, and verify that the additional disk space is available as indicated by the increased value for Free Space.
7. Click Finish to close the PC Restore Removal window and restart the computer.

Windows Vista: Dell Factory Image Restore

1. Turn on the computer. When the Dell logo appears, press <F8> several times to access the Vista Advanced Boot Options window.
2. Select Repair Your Computer.
   - The System Recovery Options window appears.
3. Select a keyboard layout and click Next.
4. To access the recovery options, log on as a local user. To access the command prompt, type administrator in the User name field, then click OK.
5. Click Dell Factory Image Restore.
   - **NOTE:** Depending upon your configuration, you may need to select Dell Factory Tools, then Dell Factory Image Restore.
   - The Dell Factory Image Restore welcome screen appears.
6. Click Next.
   - The Confirm Data Deletion screen appears.
     - **NOTICE:** If you do not want to proceed with Factory Image Restore, click Cancel.
7. Click the checkbox to confirm that you want to continue reformatting the hard drive and restoring the system software to the factory condition, then click Next.
   - The restore process begins and may take five or more minutes to complete. A message appears when the operating system and factory-installed applications have been restored to factory condition.
8. Click Finish to reboot the computer.

Using the Operating System Media

Before you Begin

If you are considering reinstalling the Windows operating system to correct a problem with a newly installed driver, first try using Windows Device Driver Rollback. See Using Windows Device Driver Rollback. If Device Driver Rollback does not resolve the problem, then use System Restore to return your operating system to the operating state it was in before you installed the new device driver. See Using Microsoft Windows System Restore.

Notice: Before performing the installation, back up all data files on your primary hard drive. For conventional hard drive configurations, the primary hard drive is the first drive detected by the computer.

To reinstall Windows, you need the following items:
- Dell™ Operating System media
- Dell Drivers and Utilities media

Note: The Dell Drivers and Utilities media contains drivers that were installed during the assembly of the computer. Use the Dell Drivers and Utilities media to load any required drivers. Depending on the region from which you ordered your computer, or whether you requested the media, the Dell Drivers and Utilities media and Operating System media may not ship with your computer.

Reinstalling Windows XP or Windows Vista

The reinstallation process can take 1 to 2 hours to complete. After you reinstall the operating system, you must also reinstall the device drivers, virus protection program, and other software.

Notice: The Operating System media provides options for reinstalling Windows XP. The options can overwrite files and possibly affect programs that are installed on your hard drive. Therefore, do not reinstall Windows XP unless a Dell technical support representative instructs you to do so.

1. Save and close any open files and exit any open programs.

2. Insert the Operating System disc.

3. Click Exit if the Install Windows message appears.

4. Restart the computer.

When the DELL logo appears, press <F12> immediately.

Note: If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop; then, shut down your computer and try again.

Note: The next steps change the boot sequence for one time only. On the next start-up, the computer boots according to the devices specified in the system setup program.

5. When the boot device list appears, highlight CD/DVD/CD-RW Drive and press <Enter>.

6. Press any key to Boot from CD-ROM.

7. Follow the instructions on the screen to complete the installation.

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### Front View

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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USB connectors (2)</td>
<td>Use the front USB connectors for devices that you connect occasionally, such as joysticks or cameras, or for bootable USB devices (see System Setup for more information about booting to a USB device). It is recommended that you use the back USB connectors for devices that typically remain connected, such as printers and keyboards.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>headphone connector</td>
<td>Use the headphone connector to attach headphones and most kinds of speakers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>microphone connector</td>
<td>Use the microphone connector to attach a microphone.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 4 | power light | The power light illuminates and blinks or remains solid to indicate different states:  
|   |   | - No light — The computer is turned off.  
|   |   | - Steady green — The computer is in a normal operating state.  
|   |   | - Blinking green — The computer is in a power-saving mode.  
|   |   | - Blinking or solid yellow — See Power Problems.  
|   |   | To exit from a power-saving mode, press the power button or use the keyboard or the mouse if it is configured as a wake device in the Windows Device Manager. For more information about sleep modes and exiting from a power-saving mode, see Power Management for Windows XP and Windows Vista.  
|   | See System Lights for a description of light codes that can help you troubleshoot problems with your computer. |
| 5 | power button | Press this button to turn on the computer.  
|   | NOTICE: To avoid losing data, do not turn off the computer by pressing the power button. Instead, perform an operating system shutdown. See Turning Off Your Computer for more information. |
| 6 | vents | The vents help prevent your computer from overheating. To ensure proper ventilation, do not block these cooling vents. |
| 7 | module bay | Install a D-module optical drive, second hard drive, or floppy drive in the module bay. |
The hard drive access light is on when the computer reads data from or writes data to the hard drive. The light might also be on when devices such as your CD player are operating.

The vents help prevent your computer from overheating. To ensure proper ventilation, do not block these cooling vents.

The vents located on each side of the computer help prevent your computer from overheating. To ensure proper ventilation, do not block these cooling vents.

For mounting optional stand.

See Diagnostic Lights for a description of light codes that can help you troubleshoot problems with your computer.

Rotate this knob in a clockwise direction to remove the cover.

See Padlock Ring and Security Cable Slot for information about using the security cable slot.

See Back Panel Connectors for a description of the connectors for your computer.

Insert the AC power adapter plug.

The vents help prevent your computer from overheating. To ensure proper ventilation, do not block these cooling vents.

Connect a parallel device, such as a printer, to the parallel connector. If you have a USB printer, plug it into a USB connector.

To attach your computer to a network or broadband device, connect one end of a network cable to either a network jack or your network or broadband device. Connect the other end of the network cable to the network adapter connector on the back panel of your computer. A click indicates that the network cable has been securely attached.
Connecting a VGA Monitor

If you have a VGA monitor, plug the adapter cable into the white DVI video connector on the back panel of your computer, and connect the monitor cable to the VGA connector on the adapter.

Connecting Two Monitors

Use the cable adapter to connect a VGA monitor and a DVI monitor to the DVI-I connector on the back panel.

When you connect two monitors, the video driver will detect this connection and activate the multimonitor functionality.

Removing the Computer Cover

3 network adapter

NOTE: Do not plug a telephone cable into the network connector.

It is recommended that you use Category 5 wiring and connectors for your network. If you must use Category 3 wiring, force the network speed to 10 Mbps to ensure reliable operation.

4 network activity light

The amber light flashes when the computer is transmitting or receiving network data. A high volume of network traffic may make this light appear to be in a steady "on" state.

5 line-out connector

Use the green line-out connector to attach an amplified speaker set.

6 line-in connector

Use the blue line-in connector to attach a record/playback device such as a cassette player, CD player, or VCR.

7 USB connectors (5)

Use the back USB connectors for devices that typically remain connected, such as printers and keyboards.

8 serial connector

Connect a serial device, such as a handheld device, to the serial connector.

9 video connector

If you have a DVI-compatible monitor, plug the cable from your monitor into the white DVI video connector on the back panel. If you have a VGA monitor, see Connecting a VGA Monitor.

10 power connector

Insert the AC power adapter plug.

11 diagnostic lights

See Diagnostic Lights for a description of light codes that can help you troubleshoot problems with your computer.
1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

   NOTICE: Before touching anything inside your computer, ground yourself by touching an unpainted metal surface. While you work, periodically touch an unpainted metal surface to dissipate any static electricity that could harm internal components.

3. If applicable, remove the cable cover, (see Cable Cover (Optional)).

4. Remove the computer cover:
   a. Rotate the cover release knob in a clockwise direction, as shown in the illustration.
   b. Slide the computer cover forward by 1 cm (½ inch), or until it stops, and then raise the cover.

   CAUTION: Graphics card heat sinks can become very hot during normal operation. Ensure that a graphics card heat sink has had sufficient time to cool before you touch it.

Inside Your Computer

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

CAUTION: To avoid electrical shock, always unplug your computer from the AC power adapter before removing the cover.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer’s electronic components. You can do so by touching an unpainted metal surface on the computer chassis.
Chassis Intrusion Switch

⚠️ CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

NOTE: The chassis intrusion switch is standard on the ultra small form factor computer but is optional on mini tower, desktop and small form factor computers; it may not be present on your computer.

Removing the Chassis Intrusion Switch

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Disconnect the chassis intrusion switch cable from the system board by using two fingers to squeeze the release mechanism on one side of the connector as you pull to disconnect the cable connector.

4. Slide the chassis intrusion switch out of its slot in the metal bracket, and then push it down through the square hole in the bracket to remove the switch and its attached cable from the computer.

   NOTE: You may feel a slight resistance as you slide the switch out of the slot.

Replacing the Chassis Intrusion Switch

1. Gently insert the switch from underneath the metal bracket into the square hole in the bracket, and then slide the chassis intrusion switch into its slot until you feel it snap securely into place.
2. Reconnect the cable to the system board.

3. Replace the computer cover (see Replacing the Computer Cover).

4. If you are using a computer stand, attach it to the computer.

**Resetting the Chassis Intrusion Detector**

1. Turn on (or restart) your computer.

2. When the blue DELL™ logo appears, press <F2> immediately.
   
   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop. Then shut down your computer and try again.

3. Select the Chassis Intrusion option and then press the left- or right-arrow key to select Reset. Change the setting to On, On-Silent, or Disabled.

   **NOTE:** The default setting is On-Silent.

4. Save your BIOS settings and exit system setup.

---

**System Board Components**

![Diagram of the system board components](image)

<table>
<thead>
<tr>
<th>Component Description</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 fan connector (FAN_FRONT)</td>
<td>8</td>
</tr>
<tr>
<td>2 internal speaker connector (INT_SPKR)</td>
<td>9</td>
</tr>
<tr>
<td>3 system board speaker (BEEP)</td>
<td>10</td>
</tr>
<tr>
<td>4 channel B memory connector (DIMM_2)</td>
<td>11</td>
</tr>
<tr>
<td>5 channel A memory connector (DIMM_1)</td>
<td>12</td>
</tr>
<tr>
<td>6 SATA data cable connector (SATA0)</td>
<td>13</td>
</tr>
<tr>
<td>7 battery (BATT)</td>
<td>14</td>
</tr>
<tr>
<td>8 password jumper (PSWD)</td>
<td></td>
</tr>
<tr>
<td>9 hard drive fan connector (FAN_HDD)</td>
<td></td>
</tr>
<tr>
<td>10 clear CMOS jumper (RTCRST)</td>
<td></td>
</tr>
<tr>
<td>11 hard drive power connector (SATA_PWR)</td>
<td></td>
</tr>
<tr>
<td>12 fan connector (FAN_REAR)</td>
<td></td>
</tr>
<tr>
<td>13 intrusion switch connector (INTRUDER)</td>
<td></td>
</tr>
<tr>
<td>14 processor (CPU)</td>
<td></td>
</tr>
</tbody>
</table>

**Cable Cover (Optional)**
**Attaching the Cable Cover**

1. Ensure that all external device cables are threaded through the hole in the cable cover.

2. Connect all device cables to the connectors on the back of the computer.

3. Hold the bottom of the cable cover so as to align the tabs with the slots on the computer’s back panel.

4. Insert the tabs into the slots and slide the cover to align the ends of the cover with the ends of the chassis (see the illustration) until the cable cover is securely positioned.

5. Install a security device in the security cable slot (optional).

![Diagram of cable cover](image)

**Removing the Cable Cover**

1. If a security device is installed in the security cable slot, remove the device.

2. Slide the release button, grasp the cable cover, and slide the cover sideways as shown until it stops, and then lift the cable cover up and away.

![Diagram of cable cover removal](image)

**Connecting the AC Power Adapter**

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

1. Connect the AC power adapter to the power connector on the back of the computer. Ensure that the latch clicks into place for a secure connection.

2. Connect one end of the AC power cable to the power adapter.

⚠️ **CAUTION:** If your power adapter cable has a green grounding wire, *do not permit* contact between the green ground wire and power leads because electrical shock, fire, or damage to your computer can occur.
3. If your AC power cable has a green ground wire for connection to an electrical outlet, connect the metal ground connector to the grounding source (often a screw) on the outlet (see the following illustration):
   a. Loosen the grounding source.
   b. Slide the metal ground connector behind the grounding source, and then tighten the grounding source.

4. Connect the AC power cable to the power outlet.

The AC power adapter has a status light that is off when the adapter is not plugged into the power outlet, and it is green or amber for the following different states:

- **Green light** — solid green indicates that the power adapter is connected to an AC power outlet and to the computer.
- **Amber light** — solid amber indicates that the power adapter is connected to an AC power outlet but not to the computer. The computer will not operate in this condition. Connect the AC power adapter to the computer and/or reset the power adapter by disconnecting and reconnecting the plug to the power outlet.

---

### Dell Badge

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

The Dell badge on the front of your computer can be rotated. To rotate the badge:

1. Remove the computer cover (see *Removing the Computer Cover*).
2. Pull on the lever to release the tab from the slot.
3. Rotate the badge to the desired position, ensuring that the tab is secured in the slot.
1. Release lever with tab in slot
2. Slots (2)
Module Bay

⚠️ **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide.*

You can install a Dell™ removable device such as a floppy drive, optical drive, or second hard drive in the module bay. You can also install an airbay (filler blank) in the bay if you do not plan to install a drive.

Your Dell computer ships with either an optical drive or an airbay (filler blank) installed in the module bay. The airbay is held in the module bay with a security screw only. You can secure an optical drive in the module bay using two methods:

- Locking switch (accessed by removing the computer cover)
- Security screw (packaged separately)

See [Securing a Device in the Module Bay](#) for more information about securing a device in your computer.

⚠️ **NOTICE:** To prevent damage to devices, place them in a safe, dry place when they are not installed in the computer. Avoid pressing down on them or placing heavy objects on top of them.

**Installing a Device When Your Computer Is Turned Off**

To install a device in the module bay:

1. Remove any installed device from the bay. If the module bay contains an airbay, remove the security screw and pull the airbay out of the module bay and skip to **step 5**.

2. If the module bay contains a device that is locked with the locking switch, remove the cover (see [Removing the Computer Cover](#)) and lift the module locking switch to the unlocked position. If a security screw is also used, remove the screw.
3. Press the device latch release so that the latch release pops out.

4. Pull the device by the latch release to remove the device from the module bay.

5. Slide the new device into the module bay.

6. If desired, you may lock the new device in the module bay by moving the module locking switch to the locked position (you must remove the computer cover to use the locking switch).

7. If you removed the cover to lock the device in the module bay, replace the computer cover (see Replacing the Computer Cover).

Removing and Installing a Device When Your Computer Is Running Microsoft® Windows®
1. To remove a device installed in the module bay, double-click the Safely Remove Hardware icon on the taskbar.

2. In the list of devices that appears on your screen, click the device you want to eject.

   **NOTE:** You cannot remove a device if your computer is turned on and the device is locked in the module bay. You must shut down the computer and follow the steps in Installing a Device When Your Computer Is Turned Off to remove a locked device.

   **NOTICE:** Do not place any heavy objects on top of the computer. Doing so may bend the chassis and cause difficulty in removing a module device.

3. When a computer message indicates that you can remove the device, remove the device from the module bay.

4. Slide the new device into the module bay.

## Securing a Device in the Module Bay

1. To secure a device in the module bay, your computer is equipped with a module locking switch. To use this switch:
   a. Remove the computer cover (see Removing the Computer Cover).
   b. Gently press the module locking switch down until it locks into place.

   ![Securing Device Diagram](image)

   c. Replace the computer cover (see Replacing the Computer Cover).

   The module cannot be removed from the computer until you lift the module locking switch into its unlocked position.

2. You may also secure a device in the module bay by using a security screw (packaged separately), accessed from the bottom of the computer.

   ![Security Screw Diagram](image)
Processor

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

NOTICE: When replacing the processor, do not touch any of the pins inside the socket or allow any objects to fall on the pins in the socket.

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Remove the fan shroud by lifting the fan shroud up and away from the computer.

4. Remove the heat sink:
   a. Press the release lever on the retention base until the heat sink is released.

CAUTION: The heat sink can get extremely hot. Ensure that the heat sink has had sufficient time to cool before you touch it.
b. Gently lift the heat sink from the processor.

c. Lay the heat sink down on its top, with the thermal grease facing upward.

**NOTICE:** Unless a new heat sink is required for the new processor, reuse the original heat sink assembly when you replace the processor.

5. Pull the release lever straight up until the processor is released, and then remove the processor from the socket.

6. Unpack the new processor, being careful not to touch the underside of the processor.

7. If the release lever on the socket is not fully extended, move it to that position.

8. Orient the front and rear alignment notches on the processor with the front and rear alignment notches on the socket.

9. Align the pin-1 corners of the processor and socket.

**NOTICE:** To avoid damage, ensure that the processor aligns properly with the socket, and do not use excessive force when you install the processor.

10. Set the processor lightly in the socket and ensure that the processor is positioned correctly.

11. When the processor is fully seated in the socket, pivot the release lever back toward the socket until it snaps into place to secure the processor.
If you are installing a processor replacement kit from Dell, return the processor to Dell in the same package in which your replacement kit was sent.

**NOTICE:** Ground yourself by touching an unpainted metal surface on the back of the computer.

12. Clean the thermal grease from the bottom of the heat sink.

**NOTICE:** Ensure that you apply new thermal grease. New thermal grease is critical for ensuring adequate thermal bonding, which is a requirement for optimal processor operation.

13. Apply the new thermal grease to the top of the processor.

14. Place one end of the heat sink under the tab on the retention base on the side opposite the release lever.

15. Lower the heat sink onto the processor at a 45-degree angle so that one end of the heat sink fits securely under the tab opposite the release tab on the retention base.

16. Re-assemble the shroud.

17. Replace the computer cover (see Replacing the Computer Cover).

18. Replace the cable cover, if used (see Cable Cover (Optional)).
Drives

Your computer supports:

- One SATA (serial ATA) hard drive
- One optional Dell D-module optical drive, second hard drive, or floppy drive in the module bay (See Module Bay for information on installing and removing devices in the module bay.)

General Installation Guidelines

NOTE: For information on installing D-module drives, see the documentation that came with your optional device.

Connecting Drive Cables

When you install a drive, you connect two cables—a DC power cable and a data interface cable—to the back of the drive.

Data Interface Connectors

<table>
<thead>
<tr>
<th>SATA Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 data interface cable connector</td>
</tr>
<tr>
<td>2 data interface connector</td>
</tr>
</tbody>
</table>

Power Cable Connectors

<table>
<thead>
<tr>
<th>Power Cable Connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 power cable</td>
</tr>
<tr>
<td>2 power input connector</td>
</tr>
</tbody>
</table>
Connecting and Disconnecting Drive Cables

When connecting and disconnecting a SATA data cable, hold the cable by the black connector at each end. When removing a cable with a pull-tab, grasp the colored pull-tab and pull until the connector detaches.

![Diagram of drive cables](image)

Hard Drive

⚠️ CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the Product Information Guide.

⚠️ CAUTION: To guard against electrical shock, always unplug your computer from the power supply before removing the hard drive.

⚠️ NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

⚠️ NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

Installing a Hard Drive

1. If you are installing a new drive, rather than replacing an already installed drive, attach the plastic drive rails—located inside the cover—to the new drive and skip to step 9.

2. If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.

3. Check the documentation for the drive to verify that the drive is configured for your computer.

4. Follow the procedures in Before You Begin.

5. Remove the computer cover (see Removing the Computer Cover).

6. Remove the installed hard drive:
   a. With one hand, squeeze the drive rails so as to push the two rails toward each other.
   b. Slide the drive slightly forward, and rotate the hard drive up and away from the hard drive bracket.
7. Disconnect the data and power cables from the drive connectors.

8. Remove the four screws that secure the drive rails to the existing hard drive, and attach the drive rails to the replacement hard drive.

9. Attach the data and power cables to the hard drive connectors, ensuring that the connectors are properly oriented before connecting them.

10. Slide the hard drive into the hard drive bracket.
11. Replace the computer cover (see Replacing the Computer Cover).

12. Replace the cable cover, if used.

See the documentation that came with the drive for instructions on installing any software required for drive operation.

13. Reboot the computer.

14. Partition and logically format your drive before you proceed to the next step.

For instructions, see the documentation that came with your operating system.

15. Test the hard drive by running the Dell Diagnostics (see Dell Diagnostics).

16. Install your operating system on the hard drive.

For instructions, see the documentation that came with your operating system.

### Replacing a Hard Drive Fan

1. Follow the instructions in Before You Begin.

2. Remove the hard drive (see Hard Drive).

3. Remove the hard drive fan:
   a. Remove the screw that secures the fan release tab to the hard drive bracket.
   b. Press down on the fan release tab, and then slide the fan towards the front of the computer so that its side tabs are free of the corresponding slots in the hard drive bracket.
   c. Lift to remove the fan from the hard drive bracket.
   d. Unplug the fan.
4. Replace the hard drive fan:
   a. Plug the fan into the computer.
   b. Align the four side tabs and release tab on the fan with the five corresponding slots on the hard drive bracket.
   c. Slide the release tab beneath the metal housing covering its slot, and then slide the fan towards the back of the computer.
   d. Replace the screw to secure the fan release tab to the hard drive bracket.
Speakers

Installing a Speaker

⚠️ CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

⚠️ NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer’s electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in Before You Begin.

2. Remove the cover of your computer (see Removing the Computer Cover).

3. Insert the speaker into the chassis of the computer.

4. Connect the cables to the system board.

5. Replace the computer cover.

6. Turn on power to the computer.

Removing a Speaker

⚠️ CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the Product Information Guide.

⚠️ NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer’s electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in Before You Begin.

2. Remove the cover of your computer (see Removing the Computer Cover).

3. Disconnect the cables from the system board.

4. Remove the speaker from the chassis of the computer.
5. Replace the computer cover.

6. Turn on power to the computer.
# Ultra Small Form Factor Computer Specifications

<table>
<thead>
<tr>
<th>Microprocessor</th>
<th>The following are supported:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microprocessor type</td>
<td>Intel® Core™2</td>
</tr>
<tr>
<td></td>
<td>Intel vPro™</td>
</tr>
<tr>
<td></td>
<td>Intel Celeron®</td>
</tr>
<tr>
<td>Internal cache</td>
<td>L1: up to 64 KB;</td>
</tr>
<tr>
<td></td>
<td>L2: up to 4 MB (depending on your processor)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Memory</th>
<th>667-MHz or 800-MHz DDR2 SDRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>2</td>
</tr>
<tr>
<td>Memory connectors</td>
<td>2</td>
</tr>
<tr>
<td>Memory modules supported</td>
<td>512 MB, 1 GB, or 2 GB non-ECC</td>
</tr>
<tr>
<td>Minimum memory</td>
<td>dual-channel: 1 GB;</td>
</tr>
<tr>
<td></td>
<td>single-channel: 512 MB</td>
</tr>
<tr>
<td>Maximum memory</td>
<td>4 GB</td>
</tr>
<tr>
<td>BIOS address</td>
<td>F0000h</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Computer Information</th>
<th>Intel Q35 Express Chipset w/ICH9DO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chipset</td>
<td>64 bits</td>
</tr>
<tr>
<td>Data bus width</td>
<td>32 bits</td>
</tr>
<tr>
<td>Address bus width</td>
<td>eight</td>
</tr>
<tr>
<td>DMA channels</td>
<td>24</td>
</tr>
<tr>
<td>Interrupt levels</td>
<td>32 Mb</td>
</tr>
<tr>
<td>NIC</td>
<td>Integrated network interface with ASF 1.03 and 2.0 support as defined by DMTF</td>
</tr>
<tr>
<td></td>
<td>Capable of 10/100/1000 communication</td>
</tr>
<tr>
<td></td>
<td>iAMT 3.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Video</th>
<th>Intel Graphics Media Accelerator 3100 with integrated DVI-I with dual-monitor support</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Audio</th>
<th>ADI 1984 High Definition Audio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stereo conversion</td>
<td>24-bit analog-to-digital; 24-bit digital-to-analog</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Controllers</th>
<th>one serial ATA controller supporting one device</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Expansion Bus</th>
<th></th>
</tr>
</thead>
</table>
**Bus type**  
SATA 1.0a and 2.0; USB 2.0

**Bus speed**  
SATA: 1.5 and 3.0 Gbps; USB: 480 Mbps

**Drives**  
Internal/External  
one D-module bay for an optical drive, second hard drive, or floppy drive  
one bay for a 3.5-inch hard drive

**Connectors**  
**External connectors:**  
Serial  
9-pin connector; 16550C-compatible  
Parallel  
25-pin connector (bidirectional)  
Video  
28-pin DVI connector  
Network adapter  
RJ45 connector  
USB  
two front-panel and five back panel USB 2.0–compliant connectors  
Audio  
two back panel connectors for line-in and line-out; two front-panel connectors for headphones and microphone

**System board connectors:**  
SATA  
7-pin connector  
Fan  
one 3-pin and two 5-pin connectors

**Key Combinations**  
<Ctrl><Alt><Del>  
in Microsoft® Windows® XP, brings up the Windows Security window; in MS-DOS® mode, restarts (reboots) the computer  
<F2> or <Ctrl><Alt><Enter>  
starts embedded system setup (during system start-up only)  
<F3>  
automatically starts the computer from the network environment specified by the remote boot environment (PXE) rather than from one of the devices in the system setup Boot Sequence option (during start-up only)  
<F12> or <Ctrl><Alt><F8>  
displays a boot device menu that allows the user to enter a device for a single boot (during system start-up only) as well as options to run hard drive and system diagnostics  
<Ctrl><p>  
displays the Management Engine BIOS Extension settings screen that allows you to modify the settings

**Controls and Lights**  
**Power control**  
push button  
**Power light**  
green light — Blinking green indicates a sleep mode; solid green indicates the power-on state.  
amber light — Blinking amber indicates a problem with an installed device; solid amber indicates an internal power problem (See Power Problems.)  
**Power supply status light**  
green light — Solid green indicates the power adapter is connected to an AC outlet and the computer.  
amber light — Solid amber indicates the power adapter is connected to an AC outlet but not the computer.  
**hard drive access light**  
green  
**Link integrity light (on integrated network adapter)**  
green light for 10-Mb operation; orange light for 100-Mb operation; yellow light for a 1000-Mb (1-Gb) operation  
**Activity light (on integrated network adapter)**  
yellow blinking light  
**Diagnostic lights**  
Four lights on the back panel (See Diagnostic Lights.)  
**Standby power light**  
AUX_PWR on the system board
## Power

**DC external power supply:**

<table>
<thead>
<tr>
<th>NOTE:</th>
<th>Power consumption from an AC power source can be zero when the computer is unplugged from that power source. However, the computer draws a minute amount of power from the internal coin cell battery even when the computer is not drawing power from the AC power source.</th>
</tr>
</thead>
</table>

### Wattage
- 220 W

### Heat dissipation
- 751 BTU/hr

**NOTE:** Heat dissipation is calculated based upon the power supply rating.

### Voltage
- Auto-sensing power supplies — 90 to 135 V at 50/60 Hz; 180 to 265 V at 50/60 Hz

### Backup battery
- 3-V CR2032 lithium coin cell

## Physical

### Without cable cover:
- **Height:** 26.4 cm (10.375 inches)
- **Width:** 8.9 cm (3.5 inches)
- **Depth:** 25.3 cm (9.95 inches)
- **Weight:** 4.5 kg (10 lb)

### With standard cable cover:
- **Height:** 26.4 cm (10.375 inches)
- **Width:** 8.9 cm (3.5 inches)
- **Depth:** 33 cm (13 inches)
- **Weight:** 4.9 kg (10.8 lb)

### With extended cable cover:
- **Height:** 12.34 kg (27.2 lb)
- **Weight:** 4.9 kg (10.8 lb)

## Environmental

### Temperature:
- **Operating:** 10° to 30°C (50° to 86°F)
- **Storage:** -40° to 65°C (-40° to 149°F)

### Relative humidity
- 20% to 80% (noncondensing)

### Maximum vibration:
- **Operating:** 0.25 G at 3 to 200 Hz at 0.5 octave/min
- **Storage:** 0.5 G at 3 to 200 Hz at 1 octave/min

### Maximum shock:
- **Operating:** Bottom half-sine pulse with a change in velocity of 50.8 cm/sec (20 inches/sec)
- **Storage:** 27-G faired square wave with a velocity change of 508 cm/sec (200 inches/sec)

### Altitude:
- **Operating:** -15.2 to 3048 m (-50 to 10,000 ft)
- **Storage:** -15.2 to 10,668 m (-50 to 35,000 ft)

### Airborne contaminant level
- G2 or lower as defined by ISA-S71.04-1985
If you purchased a Dell™ n Series computer, any references in this document to Microsoft® Windows® operating systems are not applicable.
Dell Inc. ("Dell") manufactures its hardware products from parts and components that are new or equivalent to new in accordance with industry-standard practices. For information about the Dell warranty for your computer, see the Product Information Guide or separate paper warranty document that shipped with your computer.