

NetVista™



# User Guide

## Type 2289 and 6824



NetVista™



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**Note**

Before using this information and the product it supports, be sure to read the "Safety Information" on page v and Appendix E, "Notices" on page 43.

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## Safety Information

### DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- Connect all power cords to a properly wired and grounded electrical outlet.
- Connect to properly wired outlets any equipment that will be attached to this product.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.

To connect:	To disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

### DANGER

Le courant électrique provenant de l'alimentation, du téléphone et des câbles de transmission peut présenter un danger.

Pour éviter tout risque de choc électrique :

- Ne manipulez aucun câble et n'effectuez aucune opération d'installation, d'entretien ou de reconfiguration de ce produit au cours d'un orage.
- Branchez tous les cordons d'alimentation sur un socle de prise de courant correctement câblé et mis à la terre.
- Branchez sur des socles de prise de courant correctement câblés tout équipement connecté à ce produit.
- Lorsque cela est possible, n'utilisez qu'une seule main pour connecter ou déconnecter les câbles d'interface;
- Ne mettez jamais un équipement sous tension en cas d'incendie ou d'inondation, ou en présence de dommages matériels.
- Avant de retirer les carters de l'unité, mettez celle-ci hors tension et déconnectez ses cordons d'alimentation, ainsi que les câbles qui la relient aux

réseaux, aux systèmes de télécommunication et aux modems (sauf instruction contraire mentionnée dans les procédures d'installation et de configuration).

- Lorsque vous installez, que vous déplacez, ou que vous manipulez le présent produit ou des périphériques qui lui sont raccordés, reportez-vous aux instructions ci-dessous pour connecter et déconnecter les différents cordons.

Connexion:	Déconnexion:
1. Mettez les unités hors tension.	1. Mettez les unités hors tension.
2. Commencez par brancher tous les cordons sur les unités.	2. Débranchez les cordons d'alimentation des prises.
3. Branchez les câbles d'interface sur des connecteurs.	3. Débranchez les câbles d'interface des connecteurs.
4. Branchez les cordons d'alimentation sur des prises.	4. Débranchez tous les câbles des unités.
5. Mettez les unités sous tension.	

---

## Lithium battery notice

### CAUTION:

Danger of explosion if battery is incorrectly replaced.

When replacing the battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

#### *Do not:*

- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

### ATTENTION

Danger d'explosion en cas de remplacement incorrect de la batterie.

Remplacer uniquement par une batterie IBM de type ou d'un type équivalent recommandé par le fabricant. La batterie contient du lithium et peut exploser en cas de mauvaise utilisation, de mauvaise manipulation ou de mise au rebut inappropriée.

#### *Ne pas :*

- Lancer ou plonger dans l'eau
- Chauffer à plus de 100°C (212°F)
- Réparer ou désassembler

Mettre au rebut les batteries usagées conformément aux règlements locaux.

---

## Modem safety information

To reduce the risk of fire, electrical shock, or injury when using telephone equipment, always follow basic safety precautions, such as:

- Never install telephone wiring during a lightning storm.



- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.
- Do not use the telephone to report a gas leak in the vicinity of the leak.

### Consignes de sécurité relatives au modem

Lors de l'utilisation de votre matériel téléphonique, il est important de respecter les consignes ci-après afin de réduire les risques d'incendie, d'électrocution et d'autres blessures :

- N'installez jamais de cordons téléphoniques durant un orage.
- Les prises téléphoniques ne doivent pas être installées dans des endroits humides, excepté si le modèle a été conçu à cet effet.
- Ne touchez jamais un cordon téléphonique ou un terminal non isolé avant que la ligne ait été déconnectée du réseau téléphonique.
- Soyez toujours prudent lorsque vous procédez à l'installation ou à la modification de lignes téléphoniques.
- Si vous devez téléphoner pendant un orage, pour éviter tout risque de choc électrique, utilisez toujours un téléphone sans fil.
- En cas de fuite de gaz, n'utilisez jamais un téléphone situé à proximité de la fuite.

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## Laser compliance statement

Some IBM Personal Computer models are equipped from the factory with a CD-ROM drive or a DVD-ROM drive. CD-ROM drives and DVD-ROM drives are also sold separately as options. CD-ROM drives and DVD-ROM drives are laser products. These drives are certified in the U.S. to conform to the requirements of the Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J for Class 1 laser products. Elsewhere, these drives are certified to conform to the requirements of the International Electrotechnical Commission (IEC) 825 and CENELEC EN 60 825 for Class 1 laser products.

When a CD-ROM drive or a DVD-ROM drive is installed, note the following handling instructions.

### CAUTION:

**Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

Removing the covers of the CD-ROM drive or DVD-ROM drive could result in exposure to hazardous laser radiation. There are no serviceable parts inside the CD-ROM drive or DVD-ROM drive. **Do not remove the drive covers.**

Some CD-ROM drives and DVD-ROM drives contain an embedded Class 3A or Class 3B laser diode. Note the following statement.

**DANGER**

**Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.**

**DANGER:**

Certains modèles d'ordinateurs personnels sont équipés d'origine d'une unité de CD-ROM ou de DVD-ROM. Mais ces unités sont également vendues séparément en tant qu'options. L'unité de CD-ROM/DVD-ROM est un appareil à laser. Aux États-Unis, l'unité de CD-ROM/DVD-ROM est certifiée conforme aux normes indiquées dans le sous-chapitre J du DHHS 21 CFR relatif aux produits à laser de classe 1. Dans les autres pays, elle est certifiée être un produit à laser de classe 1 conforme aux normes CEI 825 et CENELEC EN 60 825.

Lorsqu'une unité de CD-ROM/DVD-ROM est installée, tenez compte des remarques suivantes:

**ATTENTION: Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites.**

L'ouverture de l'unité de CD-ROM/DVD-ROM peut entraîner un risque d'exposition au rayon laser. Pour toute intervention, faites appel à du personnel qualifié.

Certaines unités de CD-ROM/DVD-ROM peuvent contenir une diode à laser de classe 3A ou 3B. Tenez compte de la consigne qui suit:

**DANGER**

**Rayonnement laser lorsque le carter est ouvert. Évitez toute exposition directe des yeux au rayon laser. Évitez de regarder fixement le faisceau ou de l'observer à l'aide d'instruments optiques.**

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## Overview

Thank you for selecting an IBM® computer. Your computer incorporates many of the latest advances in computer technology and can be upgraded as your needs change.

Instructions for installing options are included in this publication. When adding an option, use these instructions along with the instructions that come with the option.

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## Information resources

The *Quick Reference* that comes with your computer provides information for installing your computer and starting the operating system. It also includes basic troubleshooting information, software recovery procedures, help and service information, and warranty information.

Access IBM provides a link to more information about your computer. Click **Start** → **Access IBM**.

If you have Internet access, the most up-to-date manuals for your computer are available from the World Wide Web. To access this information, point your browser to:

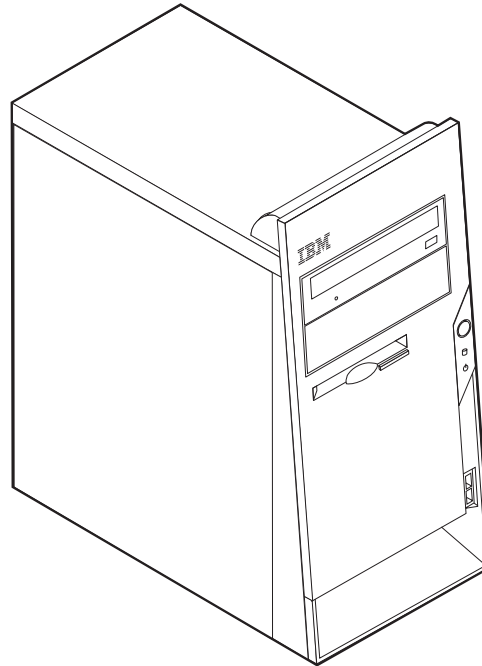
<http://www.ibm.com/pc/support>

Type your machine type and model number in the **Quick Path** field, and click **Go**.



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## Chapter 1. Installing options



This chapter provides an introduction to the features and options that are available for your computer. You can expand the capabilities of your computer by adding memory, adapters or drives. When installing an option, use these instructions along with the instructions that come with the option.

### **Important**

Before you install or remove any option, read “Safety Information” on page v. These precautions and guidelines will help you work safely.

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## Features

This section provides an overview of the computer features and preinstalled software.

### **Microprocessor**

Intel® Pentium® 4 processor with either 256 KB or 512 KB of internal L2 cache memory and Intel NetBurst™ micro-architecture

### **Memory**

- Support for two dual inline memory modules (DIMMs)
  - 2.5 V, 184-pin, 266MHz double data rate synchronous dynamic random access memory (DDR SDRAM)
  - 128 MB, 256 MB, 512 MB, or 1.0 GB (when available) DIMMs in any combination (See “Installing memory” on page 12 for additional information.)
- 512 KB flash memory for system programs

**Internal drives**

- 3.5-inch, 1.44 MB diskette drive
- Internal hard disk drive
- EIDE CD-ROM or DVD-ROM drive (some models)

**Video subsystem**

- Dynamic video memory technology
- Accelerated graphics port (AGP) video adapter slot on the system board (some models)

**Audio subsystem**

Integrated SoundMax 3 audio subsystem

**Connectivity**

- 10/100 Mbps integrated Intel Ethernet controller that supports the Wake on LAN<sup>®</sup> feature
- 56K V.90 data/fax PCI modem (some models)

**System management features**

- Remote Program Load (RPL) and Dynamic Host Configuration Protocol (DHCP)
- Wake on LAN
- Wake on Ring (in the IBM Setup Utility program, this feature is called Serial Port Ring Detect for an external modem and Modem Ring Detect for an internal modem)
- Remote Administration
- Automatic power-on startup
- System Management (SM) BIOS and SM software
- Ability to store POST hardware test results

**Input/output features**

- 25-pin, Extended Capabilities Port (ECP)/Extended Parallel Port (EPP)
- Two 9-pin serial connectors
- Six 4-pin, USB connectors (supports up to USB 2.0)
- PS/2<sup>®</sup> mouse connector
- PS/2 keyboard connector
- Ethernet connector
- Monitor connector
- Three audio connectors (line in, line out, and microphone)

**Expansion**

- Four drive bays
- Three 32-bit peripheral component interconnect (PCI) adapter slots
- One accelerated graphics port (AGP) expansion slot (some models)

**Power**

- 180 W power supply with manual voltage selection switch
- Automatic 50/60 Hz input frequency switching
- Advanced Power Management support

- Advanced Configuration and Power Interface (ACPI) support

#### **Security features**

- User and administrator passwords
- Support for the addition of a rope clip and lockable cable
- Support for the addition of an integrated cable lock (see Access IBM)
- Support for a padlock on the chassis
- Startup sequence control
- Startup without diskette drive, keyboard, or mouse
- Unattended start mode
- Diskette and hard disk I/O control
- Serial and parallel port I/O control
- Security profile by device

#### **IBM preinstalled software**

Your computer might come with preinstalled software. If it does, an operating system, device drivers to support built-in features, and other support programs are included.

#### **Operating systems preinstalled (varies by model type)**

**Note:** Not all countries or regions will have these operating systems.

- Microsoft® Windows® XP Professional
- Microsoft Windows XP Home
- Microsoft Windows 2000 Professional

#### **Operating systems (tested for compatibility)<sup>1</sup>**

- Microsoft Windows NT® Workstation Version 4.0
- Microsoft Windows 98 Second Edition

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1. The operating systems listed here are being tested for compatibility at the time this publication goes to press. Additional operating systems might be identified by IBM as compatible with your computer following the publication of this booklet. Corrections and additions to this list are subject to change. To determine if an operating system has been tested for compatibility, check the Web site of the operating system vendor.

## Specifications

This section lists the physical specifications for your computer.

<p><b>Dimensions</b></p> <p>Height: 340 mm (13.4 in.) Width: 180 mm (7.1 in.) Depth: 358 mm (14.1 in.)</p> <p><b>Weight</b></p> <p>Minimum configuration as shipped: 7.6 kg (16.8 lb) Maximum configuration: 8.6 kg (19 lb)</p> <p><b>Environment</b></p> <p>Air temperature: System on: 10° to 35°C (50° to 95° F) System off: 10° to 43°C (50° to 110° F) Maximum altitude: 2134 m (7000 ft) <b>Note:</b> The maximum altitude, 2134 m (7000 ft), is the maximum altitude at which the specified air temperatures apply. At higher altitudes, the maximum air temperatures are lower than those specified.</p> <p>Humidity: System on: 8% to 80% System off: 8% to 80%</p> <p><b>Electrical input</b></p> <p>Input voltage: Low range: Minimum: 90 V ac Maximum: 135 V ac Input frequency range: 47–63 Hz Voltage switch setting: 115 V ac High range: Minimum: 180 V ac Maximum: 265 V ac Input frequency range: 47–63 Hz Voltage switch setting: 230 V ac Input kilovolt-amperes (kVA) (approximate): Minimum configuration as shipped: 0.08 kVA Maximum configuration: 0.22 kVA</p> <p><b>Note:</b> Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use.</p>	<p><b>Heat output</b> (approximate) in British thermal units (Btu) per hour: Minimum configuration: 257 Btu/hr (75 watts) Maximum configuration: 616 Btu/hr (180 watts)</p> <p><b>Airflow</b></p> <p>Approximately 0.48 cubic meters every minute (17 cubic feet every minute) maximum</p> <p><b>Acoustical noise-emission values</b></p> <p>Average sound-pressure levels: At operator position: Idle: 32 dBA Operating: 39 dBA At bystander position - 1 meter (3.3 ft): Idle: 31 dBA Operating: 35 dBA Declared (upper limit) sound-power levels: Idle: 4.5 bels Operating: 5.0 bels</p> <p><b>Note:</b> These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.</p> <p><b>Note:</b> The computer is classified as a Class A or Class B digital device. See the <i>Quick Reference</i> for further information about this classification.</p>
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## Available options

The following are some available options:

- External options
  - Parallel port devices, such as printers and external drives
  - Serial port devices, such as external modems and digital cameras
  - Audio devices, such as external speakers for the sound system
  - USB devices, such as printers, joysticks, and scanners
  - Security device, such as a rope clip
  - Monitors
- Internal options
  - System memory, called dual inline memory modules (DIMMs)
  - Peripheral component interconnect (PCI) adapters
  - Internal drives, such as:
    - CD-ROM drive or DVD-ROM drive
    - Hard disk
    - Diskette drives and other removable media drives

For the latest information about available options, see the following World Wide Web pages:

- <http://www.ibm.com/pc/us/options/>
- <http://www.ibm.com/pc/support/>

You can also obtain information by calling the following telephone numbers:

- Within the United States, call 1-800-IBM-2YOU (1-800-426-2968), your IBM reseller, or IBM marketing representative.
- Within Canada, call 1-800-565-3344 or 1-800-IBM-4YOU.
- Outside the United States and Canada, contact your IBM reseller or IBM marketing representative.

---

## Tools required

To install some options in your computer, you might need a flat-blade or Phillips screwdriver. Additional tools might be needed for certain options. See the instructions that come with the option.

---

## Handling static-sensitive devices

Static electricity, although harmless to you, can seriously damage computer components and options.

When you add an option, do *not* open the static-protective package containing the option until you are instructed to do so.

When you handle options and other computer components, take these precautions to avoid static electricity damage:

- Limit your movement. Movement can cause static electricity to build up around you.
- Always handle components carefully. Handle adapters and memory modules by the edges. Never touch any exposed circuitry.
- Prevent others from touching components.

- When you install a new option, touch the static-protective package containing the option to a metal expansion-slot cover or other unpainted metal surface on the computer for at least two seconds. This reduces static electricity in the package and your body.
- When possible, remove the option and install it directly in the computer without setting the option down. When this is not possible, place the static-protective package that the option came in on a smooth, level surface and place the option on it.
- Do not place the option on the computer cover or other metal surface.

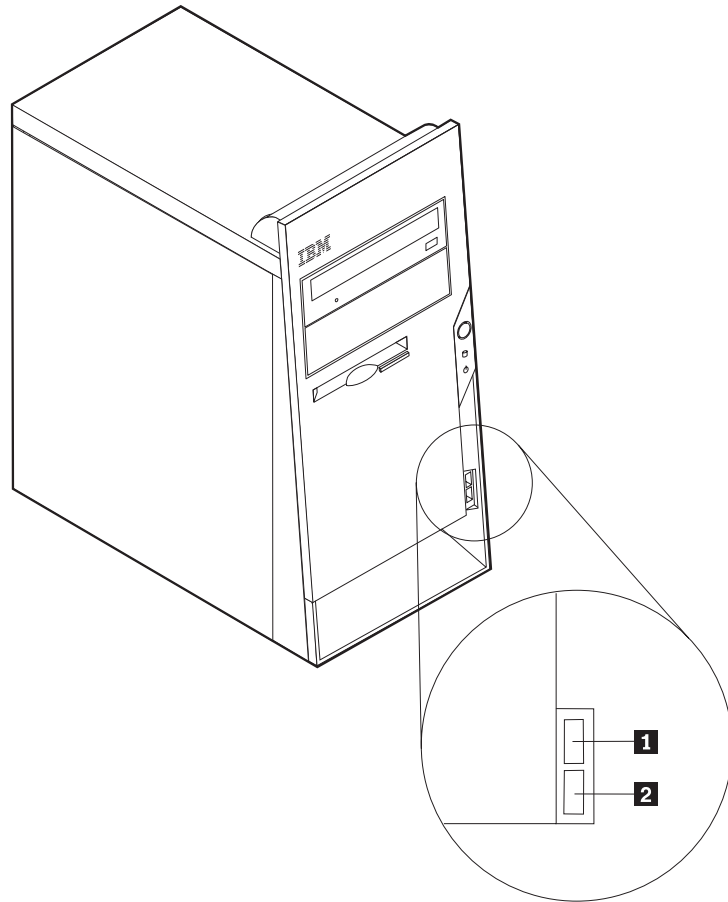
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## Installing external options

This section shows the various external connectors on your computer to which you can attach external options, such as external speakers, a printer, or a scanner. For some external options, you must install additional software in addition to making the physical connection. When adding an external option, use the information in this section to identify the required connector, and then use the instructions that come with the option to help you make the connection and install any software or device drivers that are required for the option.

## Locating the connectors on the front of your computer

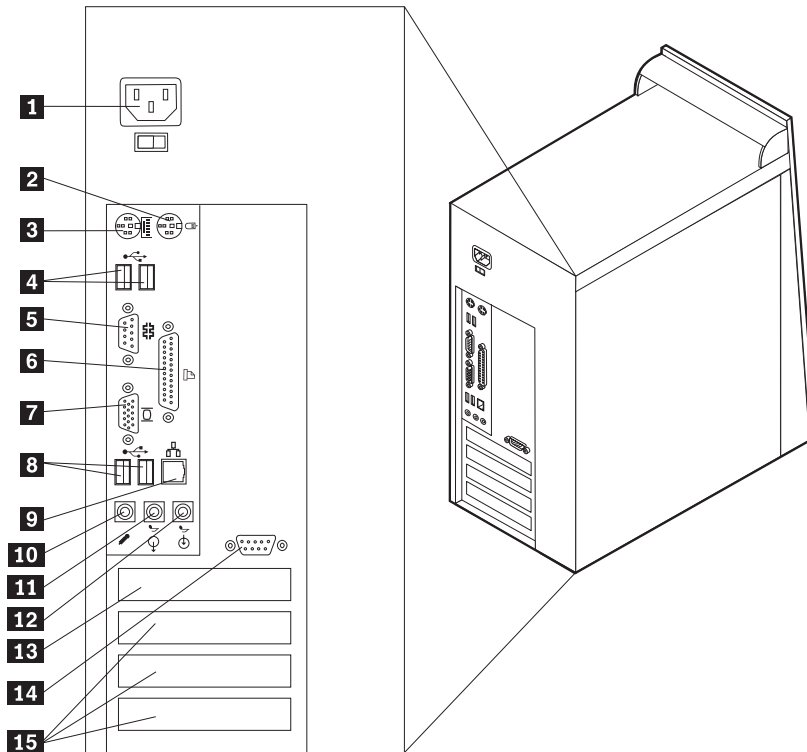
The following illustration shows the locations of the USB connectors on the front of the computer.



**1** and **2** USB connectors

## Locating the connectors on the rear of your computer

The following illustration shows the locations of the connectors on the back of the computer.



- 1** Power connector
- 2** Mouse connector
- 3** Keyboard connector
- 4** USB connectors
- 5** Serial connector
- 6** Parallel connector
- 7** Monitor connector

- 8** USB connectors

- 9** Ethernet connector
- 10** Microphone connector
- 11** Audio line out connector
- 12** Audio line in connector
- 13** AGP slot (some models)
- 14** Serial connector
- 15** PCI slots (In some models, other devices, such as a modem, might be installed here.)

**Note:** Some connectors on the rear of the computer are color-coded to help you to determine where to connect the cables on your computer.

Connector	Description
Mouse connector	Used to attach a mouse, trackball, or other pointing device that uses a standard mouse connector.
Keyboard connector	Used to attach a keyboard that uses a standard keyboard connector.
Serial connectors	Used to attach an external modem, serial printer, or other devices that use a 9-pin serial connector.
Parallel connector	Used to attach a parallel printer, parallel scanner, or other devices that use a 25-pin parallel connector.
USB connectors	Used to attach a device that requires a Universal Serial Bus (USB) connection, such as a USB scanner or USB printer. If you have more than four USB devices, you can purchase a USB hub, which you can use to connect additional USB devices.
Ethernet connector	Used to attach an Ethernet cable for a local area network (LAN). <b>Note:</b> To operate the computer within FCC Class B limits, use a Category 5 Ethernet cable.
Audio line out connector	Used to send audio signals from the computer to external devices, such as powered stereo speakers (speakers with built-in amplifiers), headphones, multimedia keyboards, or the audio line in connector on a stereo system or other external recording device.
Audio line in connector	Used to receive audio signals from an external audio device, such as a stereo system. When you attach an external audio device, a cable is connected between the audio line out connector of the device and the audio line in connector of the computer.
Microphone connector	Used to attach a microphone to your computer when you want to record voice or other sounds on the hard disk if you use speech-recognition software.

## Obtaining device drivers

You can obtain device drivers for operating systems that are not preinstalled at <http://www.ibm.com/pc/support/> on the World Wide Web. Installation instructions are provided in README files with the device-driver files.

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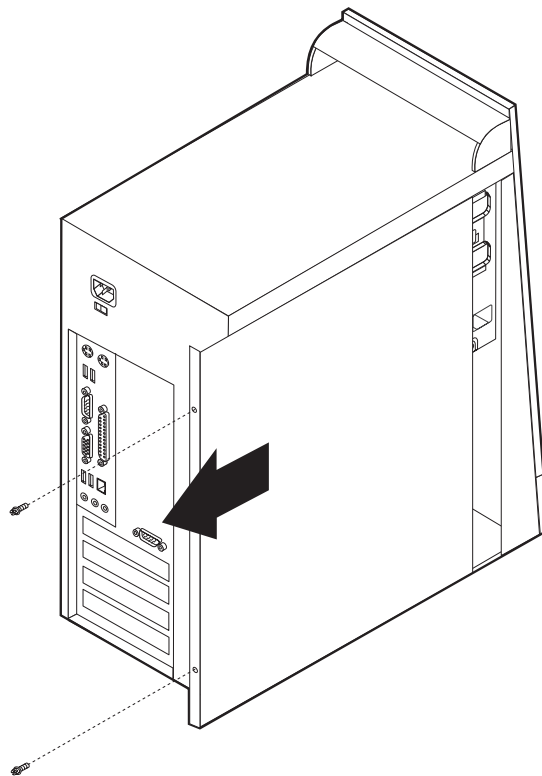
## Removing the cover

**Important**

Read “Safety Information” on page v and “Handling static-sensitive devices” on page 5 before removing the cover.

To remove the cover:

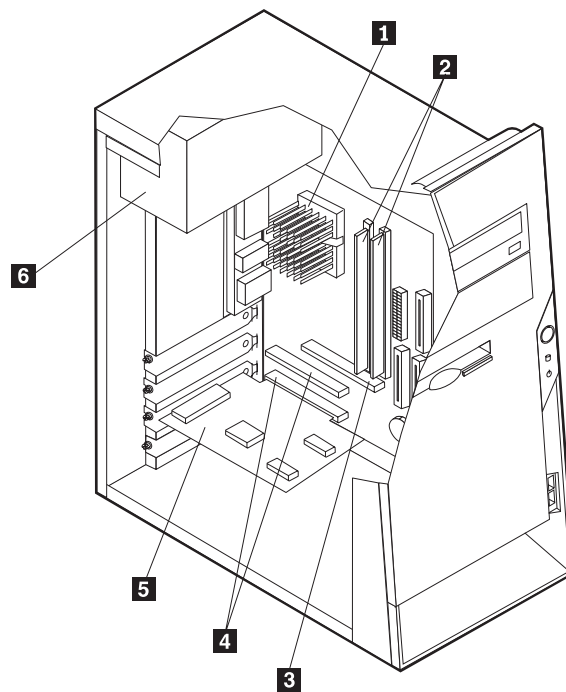
1. Shut down your operating system, remove any media (diskettes, CDs, or tapes) from the drives, and turn off all attached devices and the computer.
2. Unplug all power cords from electrical outlets.
3. Disconnect all cables attached to the computer. This includes power cords, input/output (I/O) cables, and any other cables that are connected to the computer.
4. Remove the two screws at the rear of the left side cover and slide the cover to the rear to remove.



---

## Locating components

The following illustration will help you locate the various components in your computer.



**1** Microprocessor and heat sink

**2** DIMMs

**3** AGP slot (some models)

**4** PCI slots

**5** PCI adapter

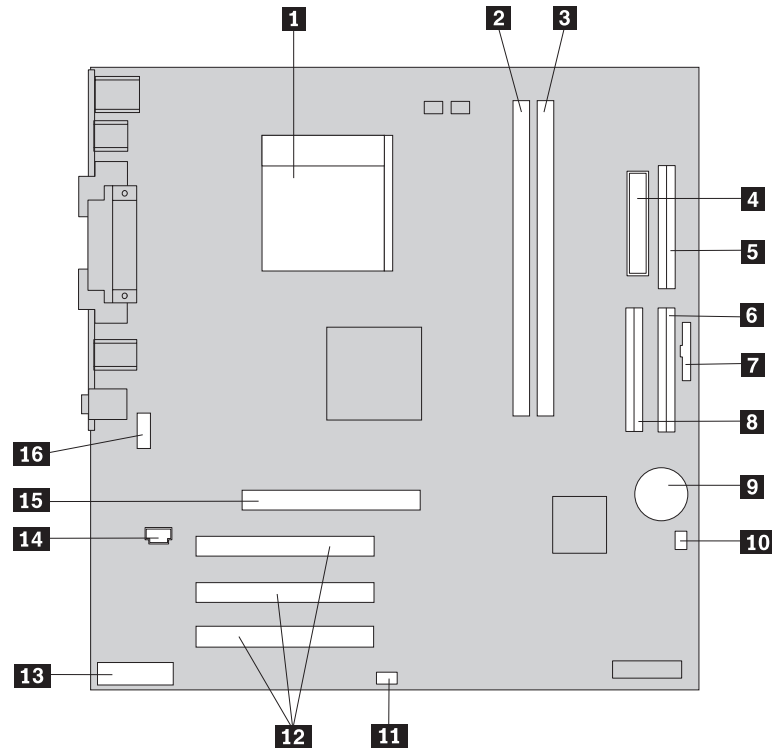
**6** Power supply

---

## Identifying parts on the system board

The system board (sometimes called the *planar* or *motherboard*) is the main circuit board in your computer. It provides basic computer functions and supports a variety of devices that are IBM-installed or that you can install later.

The following illustration shows the locations of parts on the system board.



- |                                   |                                       |
|-----------------------------------|---------------------------------------|
| <b>1</b> Microprocessor           | <b>9</b> Battery                      |
| <b>2</b> DIMM connector 1         | <b>10</b> Clear CMOS/Recovery jumper  |
| <b>3</b> DIMM connector 2         | <b>11</b> SCSI LED connector          |
| <b>4</b> Power connector          | <b>12</b> PCI slots                   |
| <b>5</b> Diskette drive connector | <b>13</b> Front panel audio connector |
| <b>6</b> Primary IDE connector    | <b>14</b> CD-ROM audio connector      |
| <b>7</b> Front panel connector    | <b>15</b> AGP slot (some models)      |
| <b>8</b> Secondary IDE connector  | <b>16</b> Serial connector            |

---

## Installing memory

Your computer has two connectors for installing dual inline memory modules (DIMMs) that provide up to a maximum of 2.0 GB of system memory.

When installing DIMMs, the following rules apply:

- Fill each system memory connector sequentially, starting at DIMM connector 1.
- Use 2.5 V, 184-pin, 266MHz double data rate synchronous dynamic random access memory (DDR SDRAM).
- Use 128 MB, 256 MB, 512 MB, or 1.0 GB (when available) DIMMs in any combination.
- DIMMs are 38.1 mm (1.5 inches) in height.

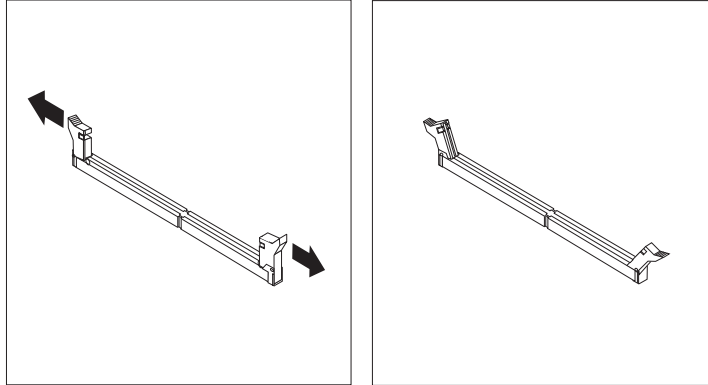
**Note:** Only DDR SDRAM DIMMs can be used.

To install a DIMM:

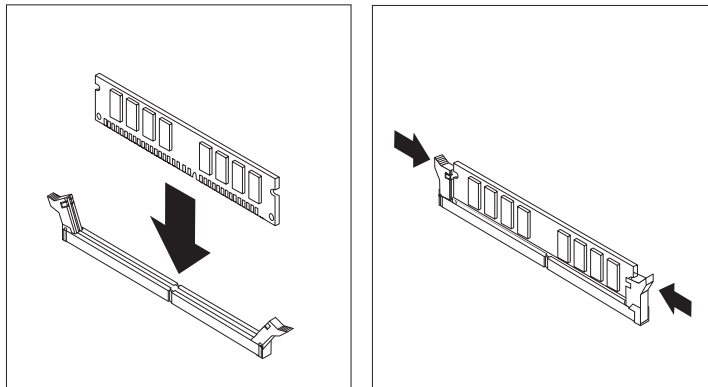
1. Remove the cover. See “Removing the cover” on page 10.



2. You might have to remove an adapter to gain access to the DIMM slots. See “Installing adapters” on page 14.
3. To locate the DIMM connectors. See “Identifying parts on the system board” on page 11.
4. Open the retaining clips.



5. Make sure the notches in the DIMM align with the tabs on the connector. Push or insert the DIMM straight down into the connector until the retaining clips close.



**What to do next:**

- Replace any adapters that were removed.
- To work with another option, go to the appropriate section.
- To complete the installation, go to “Replacing the cover and connecting the cables” on page 21.

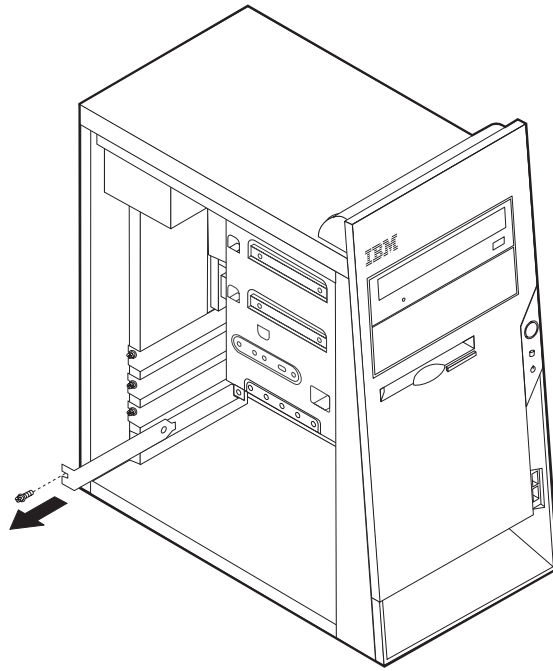
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## Installing adapters

This section provides information and instructions for installing and removing adapters. Your computer has three expansion slots for PCI adapters. You can install an adapter up to 228 mm (9 inches) long.

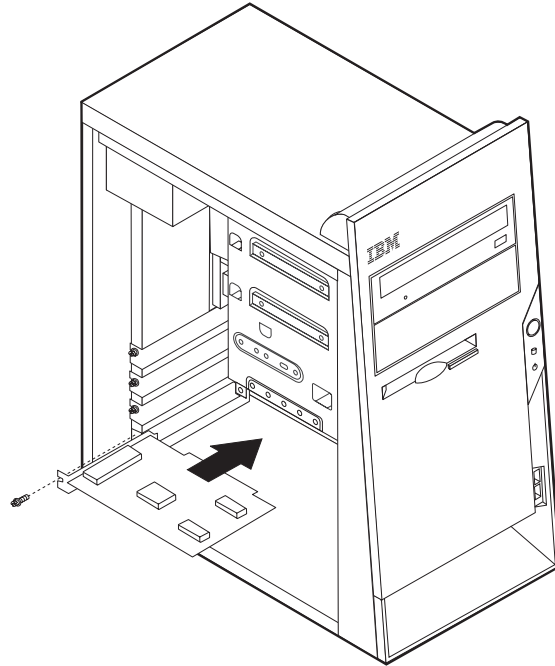
To install an adapter:

1. Remove the cover. See “Removing the cover” on page 10.
2. Remove the adapter slot cover for the appropriate expansion slot.



3. Remove the adapter from its static-protective package.

4. Install the adapter into the appropriate slot on the system board.
5. Secure the adapter with the screw as shown.



#### What to do next

- To work with another option, go to the appropriate section.
- To complete the installation, go to “Replacing the cover and connecting the cables” on page 21.

---

## Installing internal drives

This section provides information and instructions for installing and removing internal drives.

Internal drives are devices that your computer uses to read and store data. You can add drives to your computer to increase storage capacity and to enable your computer to read other types of media. Some of the different drives that are available for your computer are:

- Hard disk drives
- CD-ROM drives or DVD-ROM drives
- Removable media drives

Internal drives are installed in *bays*. In this book, the bays are referred to as bay 1, bay 2, and so on.

When you install an internal drive, it is important to note what type and size of drive that you can install in each bay. Also, it is important to correctly connect the internal drive cables to the installed drive.

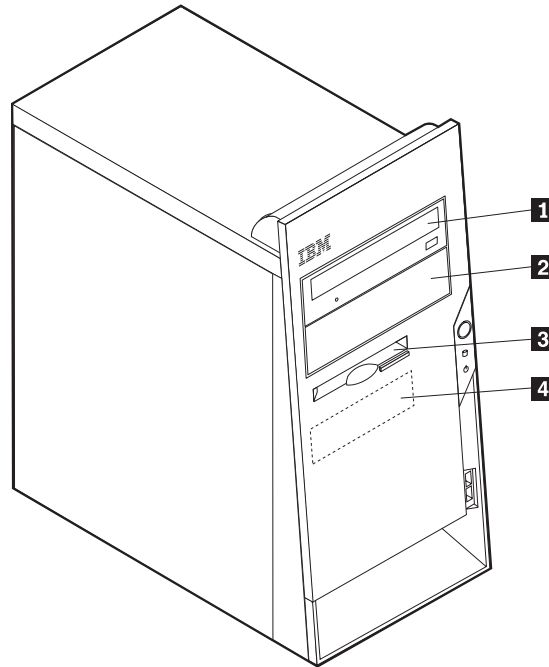
## Drive specifications

Your computer comes with the following IBM-installed drives:

- A CD-ROM drive or DVD-ROM drive in bay 1
- A 3.5-inch diskette disk drive in bay 3
- A 3.5-inch hard drive in bay 4

Any bay that does not have a drive installed has a static shield and bay panel installed.

The following illustration shows the locations of the drive bays.



The following table describes some of the drives you can install in each bay and their height requirements.

<b>1</b> Bay 1 - Maximum height: 43.0 mm (1.7 in.)	CD-ROM drive or DVD-ROM drive (preinstalled in some models) 5.25-inch hard disk drive
<b>2</b> Bay 2 - Maximum height: 43.0 mm (1.7 in.)	5.25-inch hard disk drive 3.5-inch hard disk drive (requires a mounting bracket) CD-ROM drive DVD-ROM drive
<b>3</b> Bay 3 - Maximum height: 25.8 mm (1.0 in.)	3.5-inch diskette drive (preinstalled)
<b>4</b> Bay 4 - Maximum height: 25.8 mm (1.0 in.)	3.5-inch hard disk drive

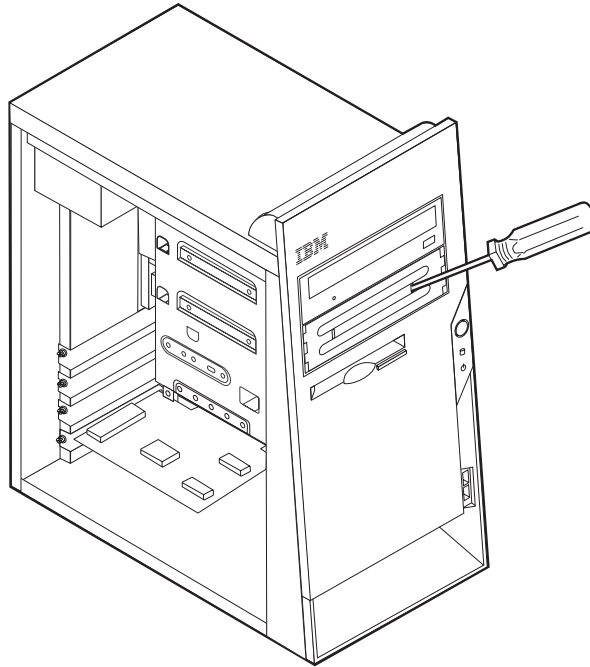
### Notes:

1. Drives that are greater than 43.0 mm (1.7 in.) high cannot be installed.
2. Install removable media (tape or CD) drives in the accessible bays (bay 1 or 2).

## Installing a drive

To install an internal drive, follow these steps:

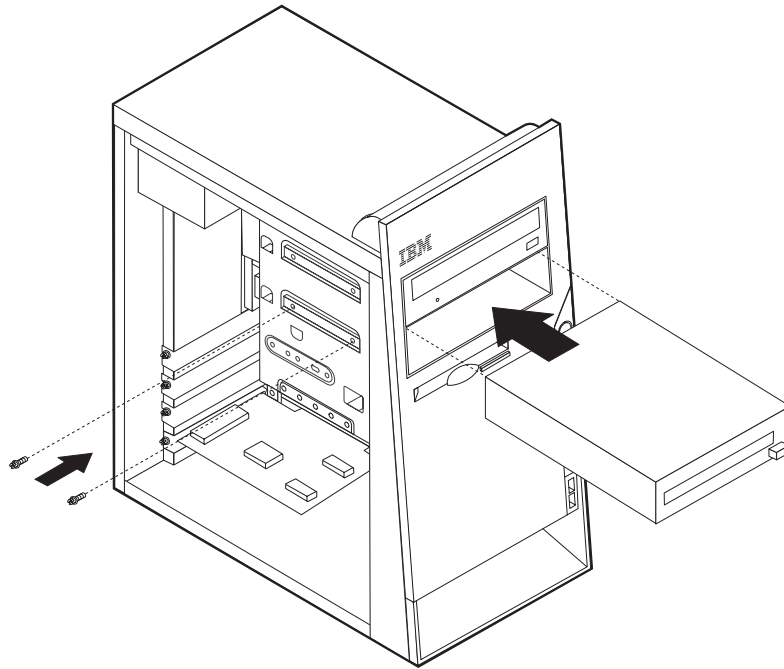
1. Remove the cover. See “Removing the cover” on page 10.
2. If your computer has a CD-ROM drive or DVD-ROM drive, you might need to remove the signal and power cables from the drive.
3. Remove the bay panel from the drive bay by inserting a flat-blade screwdriver at the end and gently prying it loose.
4. Remove the metal shield from the drive bay by inserting a flat-blade screwdriver into one of the slots and gently prying it loose.



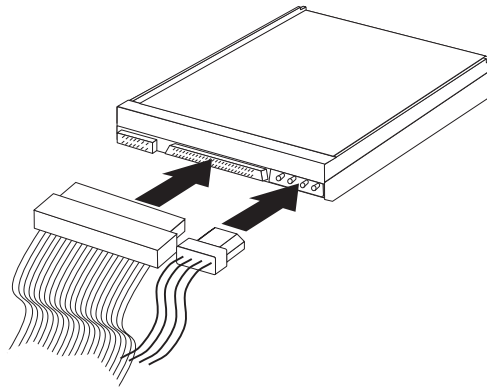
5. Make sure the drive that you are installing is set correctly as either a master or a slave device.
  - If it is the first CD-ROM drive or DVD-ROM drive, set it as a master device.
  - If it is an additional CD-ROM drive or DVD-ROM drive, set it as a slave device.
  - If it is an additional hard disk drive, set it as a slave device.

Refer to the documentation that comes with your drive for master/slave jumper information.

6. Install the drive into the bay. Align the screw holes and install two screws to secure the drive.



7. Each integrated drive electronics (IDE) drive requires two cables; a four-wire power cable that connects to the power supply and a signal cable that connects to the system board. For a CD-ROM drive, you might also have an audio cable.



The steps to connect an IDE drive are different depending on the type of drive you are connecting. Use one of the following procedures for your drive connection.

### **Connecting the first IDE CD-ROM drive or DVD-ROM drive**

1. Locate the three-connector signal cable that comes with your computer or with the new drive.
2. Locate the secondary IDE connector on the system board. See “Identifying parts on the system board” on page 11.
3. Connect one end of the signal cable to the drive and the other to the secondary IDE connector on the system board. To reduce electronic noise, use the connectors at the end of the cable only.
4. Your computer has extra power connectors for additional drives. Connect a power connector to the drive.

5. If you have a CD-ROM audio cable, connect it to the drive and to the system board. See “Identifying parts on the system board” on page 11.

### **Connecting an additional IDE CD-ROM drive or DVD-ROM drive**

1. Locate the secondary IDE connector on the system board and the three-connector signal cable. See “Identifying parts on the system board” on page 11.
2. Connect the extra connector in the signal cable to the new CD-ROM drive or DVD-ROM drive.
3. Your computer has extra power connectors for additional drives. Connect a power connector to the drive.

### **Connecting an additional IDE hard disk drive**

1. Locate the primary IDE connector on the system board. One end of the three-connector cable connects to the hard disk drive, and the other connects to the system board. See “Identifying parts on the system board” on page 11.
2. Connect the extra connector in the signal cable to the new hard disk drive.
3. Your computer has extra power connectors for additional drives. Connect a power connector to the drive.

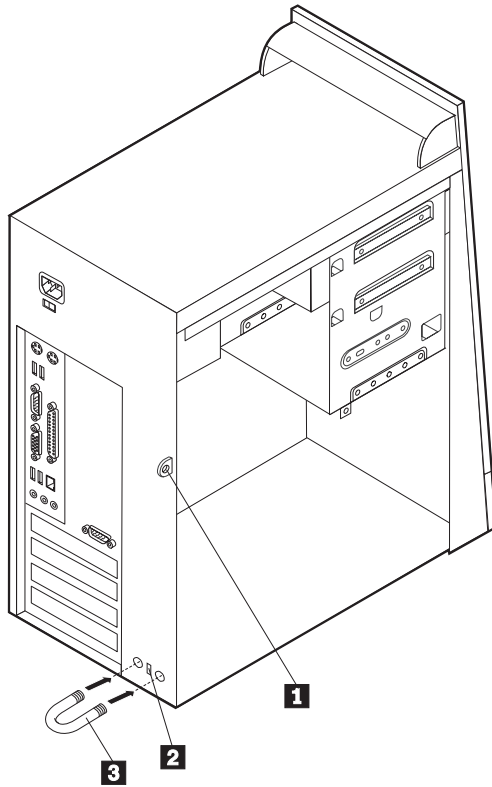
#### **What to do next**

- To work with another option, go to the appropriate section.
- To complete the installation, go to “Replacing the cover and connecting the cables” on page 21.

---

## **Physical security**

To help prevent hardware theft, you can install a rope clip and cable and an integrated cable lock. You can also install a padlock to secure the cover. Make sure the security cable does not interfere with other computer cables. (See Access IBM for more security information.) Refer to the following illustration to identify these security features.



- 1** Padlock loop
- 2** Integrated cable lock
- 3** Rope clip

#### What to do next

- To work with another option, go to the appropriate section.
- To complete the installation, go to “Replacing the cover and connecting the cables” on page 21.

## Changing the battery

Your computer has a special type of memory that maintains the date, time, and settings for built-in features, such as parallel-port assignments (configuration). A battery keeps this information active when you turn off the computer.

The battery normally requires no charging or maintenance throughout its life; however, no battery lasts forever. If the battery fails, the date, time, and configuration information (including passwords) are lost. An error message is displayed when you turn on the computer.

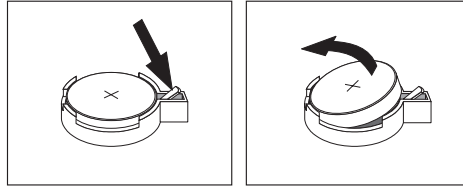
Refer to “Lithium battery notice” on page vi for information about replacing and disposing of the battery.

To change the battery:

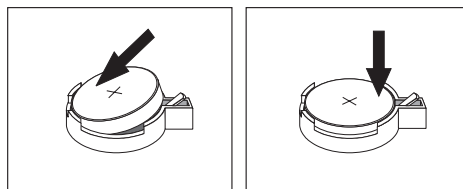
1. Turn off the computer and all attached devices.



2. Unplug the power cord and remove the cover. See “Removing the cover” on page 10.
3. Locate the battery. See “Identifying parts on the system board” on page 11.
4. If necessary, remove any adapters that impede access to the battery. See “Installing adapters” on page 14 for more information.
5. Remove the old battery.



6. Install the new battery.



7. Replace any adapters that were removed to gain access to the battery. See “Installing adapters” on page 14 for instructions for replacing adapters.
8. Replace the cover, and plug in the power cord. See “Replacing the cover and connecting the cables”.

**Note:** When the computer is turned on for the first time after battery replacement, an error message might be displayed. This is normal after replacing the battery.

9. Turn on the computer and all attached devices.
10. Use the IBM Setup Utility program to set the date and time and any passwords.

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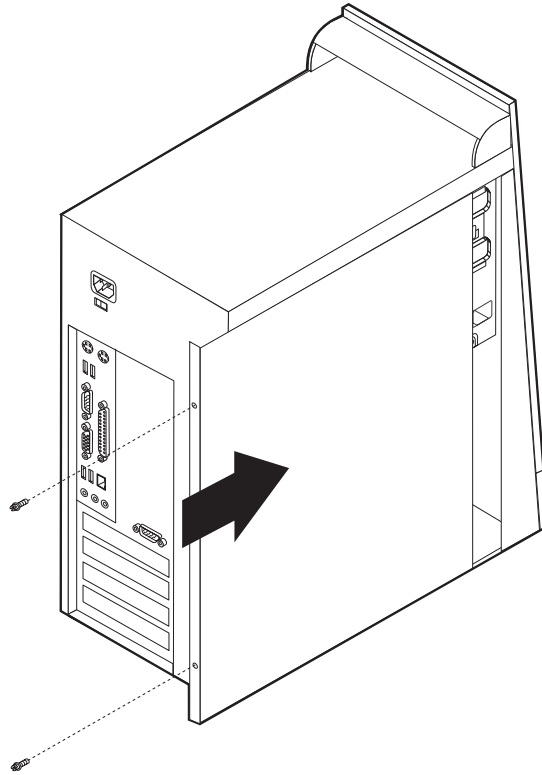
## Replacing the cover and connecting the cables

After working with options, you need to install any removed parts, replace the cover, and reconnect any cables, including telephone lines and power cords. Also, depending on the option that is installed, you might need to confirm the updated information in the IBM Setup Utility program.

To replace the cover and connect cables to your computer:

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your computer.
2. Clear any cables that might impede the replacement of the cover.

3. Position the cover on the chassis so that the guides on the top and bottom of the cover engage the chassis and push the cover to the closed position. Insert the screws that secure the cover.



4. Reconnect the external cables and power cords to the computer. See “Installing external options” on page 6.
5. To update the configuration, see Chapter 2, “Using the IBM Setup Utility program” on page 25.

**Important:**

When the power cord is first plugged in, the computer might appear to turn on for a few seconds and then turn off. This is a normal sequence to enable the computer to initialize.

---

## Erasing a lost or forgotten password (clearing CMOS)

This section applies to lost or forgotten passwords. For more information about lost or forgotten passwords, go to Access IBM.

To erase a forgotten password:

1. Turn off the computer and all attached devices.
2. Unplug the power cord.
3. Remove the cover. See “Removing the cover” on page 10.
4. Locate the Clear CMOS/Recovery jumper on the system board. See “Identifying parts on the system board” on page 11.
5. If necessary, see “Installing adapters” on page 14 to remove any adapters that impede access to the Clear CMOS/Recovery jumper.

6. Move the jumper from the standard position (pins 1 and 2) to the maintenance or configure position (pins 2 and 3).
7. Replace the cover and connect the power cord. See “Replacing the cover and connecting the cables” on page 21.
8. Restart the computer, leave it on for approximately 10 seconds, and then hold the power switch for approximately 5 seconds to turn the computer off.
9. Repeat steps 2 through 4 on page 22.
10. Move the jumper back to the standard (pins 1 and 2).
11. Replace the cover and connect the power cord. See “Replacing the cover and connecting the cables” on page 21.



---

## Chapter 2. Using the IBM Setup Utility program

The IBM Setup Utility program is stored in the electrically erasable programmable read-only memory (EEPROM) of your computer. The IBM Setup Utility program is used to view and change the configuration settings of your computer, regardless of which operating system you are using. However, the operating-system settings might override any similar settings in the IBM Setup Utility program.

---

### Starting the IBM Setup Utility program

To start the IBM Setup Utility program, do the following:

1. If your computer is already on when you start this procedure, shut down the operating system and turn off the computer.
2. Turn on your computer and look for the following prompt on the logo screen:  
(To interrupt normal startup, press Enter)

Press Enter when you see the prompt.

3. Press F1 to start the IBM Setup Utility.

**Note:** If a user password is set, you must type the password to continue. If an administrator password has been set, you cannot make any changes to configuration using the IBM Setup Utility program until you type your administrator password. See “Using passwords” for more information.

The IBM Setup Utility might start automatically when POST detects that hardware has been removed or new hardware has been installed in your computer.

---

### Viewing and changing settings

The IBM Setup Utility program menu lists items that identify system configuration topics.

When working with the IBM Setup Utility program menu, you must use the keyboard. The keys used to perform various tasks are displayed at the bottom of each screen.

---

### Exiting from the IBM Setup Utility program

When you finish viewing or changing settings, press Esc to return to the IBM Setup Utility program menu (you might have to press Esc several times). If you want to save the new settings, select **Save Settings** before you exit. Otherwise, your changes will not be saved.

---

### Using passwords

You can use passwords to provide security for your computer and data. There are two kinds of passwords: a user password and an administrator password. You do not have to set a password of either type to use your computer. However, if you decide to set either one, read the following sections.

## User password

The user password feature deters unauthorized persons from gaining access to your computer.

## Administrator password

Setting an administrator password deters unauthorized persons from changing configuration settings. If you are responsible for maintaining the settings of several computers, you might want to set an administrator password.

After you set an administrator password, a password prompt is displayed each time you try to access the IBM Setup Utility program. If you type the wrong password, you will see an error message. If you type the wrong password three times, you must turn the computer off and start again.

If both the user and administrator passwords are set, you can type either password. However, to change any configuration settings, you must use your administrator password.

## Setting, changing, and deleting a password

To set, change, or delete a password, do the following:

**Note:** A password can be any combination of up to seven characters (A- Z, a-z, and 0-9).

1. Start the IBM Setup Utility program (see "Starting the IBM Setup Utility program" on page 25).
2. From the IBM Setup Utility program menu, select **Security**.
3. Select **Set Passwords**. Read the information displayed on the right side of the screen.

---

## Using Security Profile by Device

Security Profile by Device is used to enable or disable user access to the following devices:

<b>IDE controller</b>	When this feature is set to <b>Disable</b> , all devices connected to the IDE controller (such as hard disk drives or the CD-ROM drive) are disabled and will not be displayed in the system configuration.
<b>Diskette Drive Access</b>	When this feature is set to <b>Disable</b> , the diskette drive cannot be accessed.
<b>Diskette Write Protect</b>	When this feature is set to <b>Enable</b> , all diskettes are treated as if they are write-protected.

To set Security Profile by Device, do the following:

1. Start the IBM Setup Utility program (see "Starting the IBM Setup Utility program" on page 25).
2. From the IBM Setup Utility program menu, select **Security**.
3. Select **Security Profile by Device**.
4. Select the desired devices and settings and press Enter.
5. Return to the IBM Setup Utility program menu and select **Exit** and then **Save Settings**.

---

## Selecting a startup device

If your computer does not start up (boot) from a device such as the CD-ROM, diskette, or hard disk as expected, use one of the following procedures to select a startup device.

### Selecting a temporary startup device

Use this procedure to startup from any boot device.

**Note:** Not all CDs, hard disks, and diskettes are startable (bootable).

1. Turn off your computer.
2. Turn on your computer and look for the following prompt on the logo screen:  
(To interrupt normal startup, press Enter)

Press Enter when you see the prompt.

3. When the Startup Interrupt Menu displays, press F12.
4. Select the desired startup device from the Startup Device menu and press Enter to begin.

**Note:** Selecting a startup device from the Startup Device menu does not permanently change the startup sequence.

### Changing the startup device sequence

To view or permanently change the configured startup device sequence, do the following:

1. Start the IBM Setup Utility program (see “Starting the IBM Setup Utility program” on page 25).
2. Select **Startup**.
3. Select **Startup Sequence**. See the information displayed on the right side of the screen.
4. Select the devices for the Primary Startup Sequence, the Automatic Startup Sequence, and the Error Startup Sequence.
5. Select **Exit** from the IBM Setup Utility menu and then **Save Settings**.

If you have changed these settings and want to return to the default settings, select **Load Default Settings** on the Exit menu.





---

## Appendix A. Updating System Programs

The following contains information about updating system programs (POST/BIOS) and how to recover from a POST/BIOS update failure.

---

### System programs

*System programs* are the basic layer of software that is built into your computer. They include the power-on self-test (POST), the basic input/output system (BIOS) code, and the IBM Setup Utility program. POST is a set of tests and procedures that is performed each time you turn on your computer. BIOS is a layer of software that translates instructions from other layers of software into electrical signals that the computer hardware can understand. You can use the IBM Setup Utility program to view and change the configuration and setup of your computer.

Your computer system board has a module called *electrically erasable programmable read-only memory* (EEPROM, also referred to as *flash memory*). You can easily update POST, BIOS, and the IBM Setup Utility program by starting your computer using a flash update diskette, or by running a special update program from your operating system.

IBM might make changes and enhancements to the system programs. When updates are released, they are available as downloadable files on the World Wide Web (see the *Quick Reference*). Instructions for using the system program updates are available in .txt file that is included in the update files. For most models, you can download either an update program to create a system-program-update (flash) diskette, or an update program that can be run from the operating system.

### Updating (flashing) BIOS from a diskette

1. Insert a system program update (flash) diskette into the diskette drive (drive A) in your computer. System program updates are available at <http://www.ibm.com/pc/support/> on the World Wide Web.
2. Turn on the computer. If it is on already, you must turn it off and back on again. The update begins.

### Updating (flashing) BIOS from your operating system

**Note:** Due to constant improvements being made to the IBM Web site, Web page content (including the links referenced in the following procedure) is subject to change.

1. From your browser, type <http://www.pc.ibm.com/support> in the address field and press Enter.
2. Click **NetVista and NetVista Thin Client**.
3. Click **NetVista Personal Computer**.
4. Click **Downloadable files**.
5. Under Select your product, choose your machine type and click Go.
6. In Downloadable file by category, click **BIOS**.
7. Under Downloadable files - BIOS by date, click your machine type.
8. Scroll down and look for the .txt file that has instructions for Flash BIOS update from the operating system. Click the .txt file.

9. Print these instructions. This is very important since they are not on the screen after the download begins.
10. From your browser, click **Back** to return to the list of files. Carefully follow the printed instructions to download, extract, and install the update.

---

## Recovering from a POST/BIOS update failure

If power to your computer is interrupted while POST/BIOS is being updated (flash update), your computer might not restart correctly. If this happens, perform the following procedure to recover:

1. Turn off the computer and any attached devices, such as printers, monitors, and external drives.
2. Unplug all power cords from electrical outlets, and remove the cover. See "Removing the cover" on page 10.
3. Locate the Clear CMOS/Recovery jumper on the system board. See "Identifying parts on the system board" on page 11.
4. If necessary, refer to Installing adapters to remove any adapters that impede access to the Clear CMOS/Recovery jumper.
5. Move the jumper from the standard position (pins 1 and 2) to pins 2 and 3.
6. Replace the cover. See "Replacing the cover and connecting the cables" on page 21.
7. Reconnect the power cords for the computer and monitor to electrical outlets.
8. Insert the POST/BIOS update (flash) diskette into drive A, and turn on the computer and the monitor.
9. After the update session is completed, there will be no video and the series of beeps will end. Remove the diskette from the diskette drive, and turn off the computer and monitor.
10. Unplug the power cords from electrical outlets.
11. Remove the cover. See "Replacing the cover and connecting the cables" on page 21.
12. Remove any adapters that impede access to the BIOS Configuration jumper.
13. Replace the Clear CMOS/Recovery jumper to its original position.
14. Replace any adapters that were removed.
15. Replace the cover and reconnect any cables that were disconnected.
16. Turn on the computer to restart the operating system.

---

## Appendix B. Manual modem commands

The following section lists commands for manually programming your modem.

Commands are accepted by the modem while it is in Command Mode. Your modem is automatically in Command Mode until you dial a number and establish a connection. Commands may be sent to your modem from a PC running communication software or any other terminal devices.

All commands sent to the modem must begin with **AT** and end with **ENTER**. All commands may be typed in either upper or lower case, but not mixed. To make the command line more readable, spaces may be inserted between commands. If you omit a parameter from a command that requires one, it is just like specifying a parameter of **0**.

Example:

**ATH [ENTER]**

---

### Basic AT commands

In the following listings, all default settings are printed in **bold text**.

Command		Function
A		Manually answer incoming call.
A/		Repeat last command executed. <b>Do not</b> precede A/ with AT or follow with ENTER.
D_		<b>0 - 9, A-D, # and *</b>
	L	last number redial
	P	pulse dialing
		<b>Note: Pulse dialling is not supported for Australia, New Zealand, Norway, and South Africa.</b>
	T	<b>touch-tone dialing</b>
	W	wait for second dial tone
	,	pause
	@	wait for five seconds of silence
	!	flash
	;	return to Command Mode after dialing
DS=n		Dial one of the four telephone numbers (n=0-3) stored in the modem non-volatile memory.
E_	E0	Commands are not echoed
	E1	<b>Commands are echoed</b>
+++		Escape Characters - Switch from Data Mode to Command Mode (T.I.E.S. Command)
H_	H0	Force modem on-hook (hang up)
	H1	Force modem off-hook (make busy) <b>Note: H1 command is not supported for Italy</b>
I_	I0	Display product-identification code

Command		Function
	I1	Factory ROM checksum test
	I2	Internal memory test
	I3	Firmware ID
	I4	Reserved ID
L_	L0	Low speaker volume
	L1	<b>Low speaker volume</b>
	L2	Medium speaker volume
	L3	High speaker volume
M_	M0	Internal speaker off
	M1	<b>Internal speaker on until carrier detected</b>
	M2	Internal speaker always on
	M3	Internal speaker on until carrier detected and off while dialing
N_		Included for compatibility only, provides no effect
O_	O0	Return to Data Mode
	O1	Return to Data Mode and initiate an equalizer retrain
P		<b>Set Pulse dial as default</b>
Q_	Q0	Modem sends responses
	Q1	Modem does not send responses
Sr?		Read and display value in register r.
Sr=n		Set register r to value n (n = 0-255).
T		<b>Set Tone Dial as default</b>
V_	V0	<b>Numeric responses</b>
	V1	<b>Word responses</b>
W_	W0	<b>Report DTE speed only</b>
	W1	Report line speed, error correction protocol, and DTE speed.
	W2	Report DCE speed only
X_	X0	Hayes Smartmodem 300 compatible responses/blind dialing.
	X1	Same as X0 plus all CONNECT responses/blind dialing
	X2	Same as X1 plus dial tone detection
	X3	Same as X1 plus busy detection/blind dialing
	X4	All responses and dial tone and busy <b>signal detection</b>
Z_	Z0	Reset and retrieve active profile 0
	Z1	Reset and retrieve active profile 1

## Extended AT commands

Command		Function
&C_	&C0	Force Carrier Detect Signal High (ON)
	&C1	<b>Turn on CD when remote carrier is present</b>
&D_	&D0	<b>Modem ignores the DTR signal</b>
	&D1	Modem returns to Command Mode after DTR toggle

Command		Function
	&D2	<b>Modem hangs up, returns to the Command Mode after DTR toggle</b>
	&D3	Resets modem after DTR toggle
&F_	&F	Recall factory default configuration
&G_	&G0	<b>Guard tone disabled</b>
	&G1	Guard tone disabled
	&G2	1800 Hz guard tone
&K_	&K0	Disable flow control
	&K3	<b>Enable RTS/CTS hardware flow control</b>
	&K4	Enable XON/XOFF software flow control
	&K5	Enable transparent XON/XOFF flow control
	&K6	Enable both RTS/CTS and XON/XOFF flow control
&M_	&M0	Asynchronous operation
&P_	&P0	<b>US setting for off-hook-to-on-hook ratio</b>
	&P1	UK and Hong Kong off-hook-to-on-hook ratio
	&P2	Same as &P0 setting but at 20 pulses per minute
	&P3	Same as &P1 setting but at 20 pulses per minute
&R_	&R0	Reserved
	&R1	<b>CTS operates per flow control requirements</b>
&S_	&S0	<b>Force DSR Signal High (ON)</b>
	&S1	DSR off in command mode, on in on-line mode
&T_	&T0	Ends test in progress
	&T1	Perform Local Analog Loopback Test
	&T3	Perform Local Digital Loopback Test
	&T4	<b>Grant Remote Digital Loopback Test request by remote modem</b>
	&T5	Deny Remote Digital Loopback Test request
	&T6	Perform a Remote Digital Loopback Test
	&T7	Perform a Remote Digital Loopback Test and Self-Test
	&T8	Perform Local Analog Loopback Test and Self-Test
&V	&V0	Displays Active and Stored Profiles
	&V1	Display Last Connection Statistics
&W_	&W0	Stores the active profile as Profile 0
	&W1	Stores the active profile as Profile 1
%E_	%E0	<b>Disable auto-retrain</b>
	%E1	Enable auto-retrain
+MS?		Displays the current Select Modulation settings
+MS=?		Displays a list of supported Select Modulation options

Command	Function
+MS=a,b,c,e,f	Select modulation where: <b>a</b> =0, 1, 2, 3, 9, 10, 11, 12, 56, 64, 69; <b>b</b> =0-1; <b>c</b> =300-56000; <b>d</b> =300- 56000; <b>e</b> =0-1; and <b>f</b> =0-1. <b>A, b, c, d, e, f</b> default= <b>12, 1, 300, 56000, 0, 0</b> . Parameter " <b>a</b> " specifies the modulation protocol desired where: 0=V.21, 1=V.22, 2=V.22bis, 3=V.23, 9=V.32, 10=V.32bis, 11=V.34, 12=V.90,K56Flex,V.34.....,56=K 56Flex, V.90,V.34....., 64=Bell 103, and 69=Bell 212. Parameter " <b>b</b> " specifies automode operations where: 0=automode disabled, 1= automode enabled with V.8/V.32 Annex A. Parameter " <b>c</b> " specifies the minimum connection data rate (300- 56000). Parameter " <b>d</b> " specifies the maximum connection rate (300-56000); Parameter " <b>e</b> " specifies the codec type (0= Law, and 1=A-Law). Parameter " <b>f</b> " specifies "robbed bit" signaling detection (0=detection disabled 1=detection enabled)

## MNP/V.42/V.42bis/V.44 commands

Command	Function
%C_	%C0 Disable MNP Class 5 and V.42bis data compression
	%C1 Enable MNP Class 5 data compression only
	%C2 Enable V.42bis data compression only
	%C3 <b>Enable MNP Class 5 and V.42bis data compression</b>
&Q_	&Q0 Direct data link only (same as \N1)
	&Q5 <b>V.42 data link with fallback options</b>
	&Q6 Normal data link only (same as \N0)
+DS44=0, 0	Disable V.44
+DS44=3, 0	Enable V.44
+DS44?	Current values
+DS44=?	List of support values

## Fax Class 1 commands

+FAE=n	Data/Fax Auto Answer
+FCLASS=n	Service Class
+FRH=n	Receive data with HDLC framing
+FRM=n	Receive data
+FRS=n	Receive silence
+FTH=n	Transmit data with HDLC framing
+FTM=n	Transmit data
+FTS=n	Stop transmission and wait

## Fax Class 2 commands

+FCLASS=n	Services class.
+FAA=n	Adaptive answer.
+FAXERR	Fax error value.
+FBOR	Phase C data bit order.

+FBUF?	Buffer size (read only).
+FCFR	Indicate confirmation to receive.
+FCLASS=	Service class.
+FCON	Facsimile connection response.
+FCIG	Set the polled station identification.
+FCIG:	Report the polled station identification.
+FCR	Capability to receive.
+FCR=	Capability to receive.
+FCSI:	Report the called station ID.
+FDCC=	DCE capabilities parameters.
+FDCS:	Report current session.
+FDCS=	Current session results.
+FDIS:	Report remote capabilities.
+FDIS=	Current sessions parameters.
+FDR	Begin or continue phase C receive data.
+FDT=	Data transmission.
+FDTC:	Report the polled station capabilities.
+FET:	Post page message response.
+FET=N	Transmit page punctuation.
+FHNG	Call termination with status.
+FK	Session termination.
+FLID=	Local ID string.
+FLPL	Document for polling.
+FMDL?	Identify model.
+FMFR?	Identify manufacturer.
+FPHCTO	Phase C time out.
+FPOLL	Indicates polling request.
+FPTS:	Page transfer status.
+FPTS=	Page transfer status.
+FREV?	Identify revision.
+FSPT	Enable polling.
+FTSI:	Report the transmit station ID.

---

## Voice commands

#BDR	Select Baud Rate
#CID	Enable Caller ID detection and reporting format
#CLS	Select Data, Fax or Voice/Audio
#MDL?	Identify Model
#MFR?	Identify Manufacturer
#REV?	Identify Revision Level
#TL	Audio output transmit level

#VBQ?	Query Buffer Size
#VBS	Bits per sample (ADPCM or PCM)
#VBT	Beep Tone Timer
#VCI?	Identify Compression Method
#VLS	Voice line select
#VRA	Ringback goes away timer
#VRN	Ringback never came timer
#VRX	Voice Receive Mode
#VSDB	Silence deletion tuner
#VSK	Buffer skid setting
#VSP	Silence detection period
#VSR	Sampling rate selection
#VSS	Silence deletion tuner
#VTD	DTMF tone reporting capability
#VTM	Enable timing mark placement
#VTS	Generate tone signals
#VTX	Voice transmit mode



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## Appendix C. System address maps

The following charts represent how the hard disk stores different types of information. Address ranges and byte sizes are approximate.

---

### System memory map

The first 640 KB of system board RAM is mapped starting at address hex 00000000. A 256-byte area and a 1 KB area of this RAM are reserved for BIOS data. Memory can be mapped differently if POST detects an error.

Table 1. System memory map

Address range (decimal)	Address range (hex)	Size	Description
0 K – 512 KB	00000 – 7FFFF	512 KB	Conventional
512 K – 639 KB	80000 – 9FBFF	127 KB	Extended conventional
639 K – 640 KB	9FC00 – 9FFFF	1 KB	Extended BIOS data
640 K – 767 KB	A0000 – BFFFF	128 KB	Dynamic video memory display cache
768 K – 800 KB	C0000 – C7FFF	32 KB	Video ROM BIOS (shadowed)
800 K – 896 KB	C8000 – DFFFF	96 KB	PCI space, available to adapter ROMs
896 K – 1 MB	E0000 – FFFFF	128 KB	System ROM BIOS (main memory shadowed)
1 MB – 16 MB	1000000 – FFFFFFF	15 MB	PCI space
16 MB – 4096 MB	10000000 – FFDFFFFFF	4080 MB	PCI space (positive decode)
	FFFE0000 – FFFFFFFF	128 KB	System ROM BIOS

---

### I/O address map

The following table lists resource assignments for the I/O address map. Any addresses that are not shown are reserved.

Table 2. I/O address map

Address range (hex)	Size (bytes)	Description
0000 – 000F	16	DMA 1
0010 – 001F	16	General I/O locations, available to PCI bus
0020 – 0021	2	Interrupt controller 1
0022 – 003F	30	General I/O locations, available to PCI bus
0040 – 0043	4	Counter/timer 1
0044 – 00FF	28	General I/O locations, available to PCI bus
0060	1	Keyboard controller byte, reset IRQ
0061	1	System port B
0064	1	Keyboard controller, CMD/ATAT byte
0070, bit 7	1 bit	Enable NMI
0070, bits 6:0	6 bits	Real-time clock, address
0071	1	Real-time clock, data

Table 2. I/O address map (continued)

Address range (hex)	Size (bytes)	Description
0072	1 bit	Enable NMI
0072, bits 6:0	6 bits	RTC address
0073	1	RTC data
0080	1	POST checkpoint register during POST only
008F	1	Refresh page register
0080 – 008F	16	DMA page registers
0090 – 0091	15	General I/O locations, available to PCI bus
0092	1	PS/2 keyboard controller registers
0093 – 009F	15	General I/O locations
00A0 – 00A1	2	Interrupt controller 2
00A2 – 00BF	30	APM control
00C0 – 00DF	31	DMA 2
00E0 – 00EF	16	General I/O locations, available to PCI bus
00F0	1	Coprocessor error register
00F1 – 016F	127	General I/O locations, available to PCI bus
0170 – 0177	8	Secondary IDE channel
01F0 – 01F7	8	Primary IDE channel
0200 – 0207	8	MIDI/joystick port
0220 – 0227	8	Serial port 3 or 4
0228 – 0277	80	General I/O locations, available to PCI bus
0278 – 027F	8	LPT3
0280 – 02E7	102	Available
02E8 – 02EF	8	Serial port 3 or 4
02F8 – 02FF	8	COM2
0338 – 033F	8	Serial port 3 or 4
0340 – 036F	48	Available
0370 – 0371	2	IDE channel 1 command
0378 – 037F	8	LPT2
0380 – 03B3	52	Available
03B4 – 03B7	4	Video
03BA	1	Video
03BC – 03BE	16	LPT1
03C0 – 03CF	52	Video
03D4 – 03D7	16	Video
03DA	1	Video
03D0 – 03DF	11	Available
03E0 – 03E7	8	Available
03E8 – 03EF	8	COM3 or COM4
03F0 – 03F5	6	Diskette channel 1
03F6	1	Primary IDE channel command port

Table 2. I/O address map (continued)

Address range (hex)	Size (bytes)	Description
03F7 (Write)	1	Diskette channel 1 command
03F7, bit 7	1 bit	Diskette disk change channel
03F7, bits 6:0	7 bits	Primary IDE channel status port
03F8 – 03FF	8	COM1
0400 – 047F	128	Available
0480 – 048F	16	DMA channel high page registers
0490 – 0CF7	1912	Available
0CF8 – 0CFB	4	PCI configuration address register
0CFC – 0CFF	4	PCI configuration data register
LPTn + 400h	8	ECP port, LPTn base address + hex 400
OCF9	1	Turbo and reset control register
0D00 – FFFF	62207	Available

## DMA I/O address map

The following table lists resource assignments for the DMA address map. Any addresses that are not shown are reserved.

Table 3. DMA I/O address map

Address (hex)	Description	Bits	Byte pointer
0000	Channel 0, memory address register	00 – 15	Yes
0001	Channel 0, transfer count register	00 – 15	Yes
0002	Channel 1, memory address register	00 – 15	Yes
0003	Channel 1, transfer count register	00 – 15	Yes
0004	Channel 2, memory address register	00 – 15	Yes
0005	Channel 2, transfer count register	00 – 15	Yes
0006	Channel 3, memory address register	00 – 15	Yes
0007	Channel 3, transfer count register	00 – 15	Yes
0008	Channels 0–3, read status/write command register	00 – 07	
0009	Channels 0–3, write request register	00 – 02	
000A	Channels 0–3, write single mas register bits	00 – 02	
000B	Channels 0–3, mode register (write)	00 – 07	
000C	Channels 0–3, clear byte pointer (write)	N/A	
000D	Channels 0–3, master clear (write)/temp (read)	00 – 07	
000E	Channels 0-3, clear mask register (write)	00 – 03	
000F	Channels 0-3, write all mask register bits	00 – 03	
0081	Channel 2, page table address register	00 – 07	
0082	Channel 3, page table address register	00 – 07	
0083	Channel 1, page table address register	00 – 07	
0087	Channel 0, page table address register	00 – 07	
0089	Channel 6, page table address register	00 – 07	

Table 3. DMA I/O address map (continued)

Address (hex)	Description	Bits	Byte pointer
008A	Channel 7, page table address register	00 – 07	
008B	Channel 5, page table address register	00 – 07	
008F	Channel 4, page table address/refresh register	00 – 07	
00C0	Channel 4, memory address register	00 – 15	Yes
00C2	Channel 4, transfer count register	00 – 15	Yes
00C4	Channel 5, memory address register	00 – 15	Yes
00C6	Channel 5, transfer count register	00 – 15	Yes
00C8	Channel 6, memory address register	00 – 15	Yes
00CA	Channel 6, transfer count register	00 – 15	Yes
00CC	Channel 7, memory address register	00 – 15	Yes
00CE	Channel 7, transfer count register	00 – 15	Yes
00D0	Channels 4–7, read status/write command register	00 – 07	
00D2	Channels 4–7, write request register	00 – 02	
00D4	Channels 4–7, write single mask register bit	00 – 02	
00D6	Channels 4–7, mode register (write)	00 – 07	
00D8	Channels 4–7, clear byte pointer (write)	N/A	
00DA	Channels 4–7, master clear (write)/temp (read)	00 – 07	
00DC	Channels 4–7, clear mask register (write)	00 – 03	
00DE	Channels 4–7, write all mask register bits	00 – 03	
00DF	Channels 5–7, 8- or 16-bit mode select	00 – 07	

---

## Appendix D. Interrupt request and direct memory access channel assignments

The following tables list the IRQ and DMA channel assignments.

Table 4. IRQ channel assignments

IRQ	System resource
NMI	Critical system error
SMI	System-management interrupt for power management
0	Timer
1	Keyboard
2	Cascade interrupt from slave PIC
3	COM2 (some models only)
4	COM1
5	Available to user
6	Diskette controller
7	LPT1
8	Real-time clock
9	Video, ACPI
10	Available to user
11	Available to user
12	Mouse port
13	Math coprocessor
14	Primary IDE (if present)
15	Secondary IDE (if present)

**Note:** The default settings for COM 1 (IRQ 4), COM 2 (IRQ 3), and LPT 1 (IRQ 7) can be changed to another IRQ.

Table 5. DMA channel assignments

DMA channel	Data width	System resource
0	8 bits	Open
1	8 bits	Open
2	8 bits	Diskette drive
3	8 bits	Parallel port (for ECP or EPP)
4		Reserved (cascade channel)
5	16 bits	Open
6	16 bits	Open
7	16 bits	Open



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