



# Enhanced IDE Hard Disk Drive

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*User's Guide*



**Note:** Be sure to read the *Enhanced IDE Hard Disk Drive User's Guide Supplement* for warranty information and jumper setting information for your hard disk drive. Also, refer to Appendix C, "Notices" on page 2-6 for notice information.

## **Second Edition (March 2000)**

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Before installing this product, read the Safety Information.

مج، يجب قراءة دات السلامة

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 **Safety Information** (安全信息)。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

安裝本產品之前，請先閱讀「安全資訊」。

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## Product registration

Thank you for purchasing OPTIONS by IBM. Take a few moments to register your product and provide us with information that will help IBM to better serve you in the future. Your feedback is valuable to us in developing products and services that are important to you, as well as in developing better ways to communicate with you.

Register your option on the IBM Web site at:

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## About this book

This book contains instructions for installing, setting up, and using your IBM Enhanced IDE Hard Disk Drive. The manual is divided into the following parts:

**Part 1:** Product and software description, installation requirements, and handling, installation, and configuration instructions in the following languages:

- English
- German
- French
- Spanish
- Italian
- Brazilian Portuguese
- Japanese

**Part 2:** Service and notice information

**Note:** The illustrations in this publication might be slightly different from your hardware.



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## Part 1: Installation and user's guide

This section contains the product and software descriptions, and instructions on installing the hardware and software. If you have any problems with your hardware or software, go to “Problem solving” on page 1-19

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### Product description

The IBM® Enhanced IDE Hard Disk Drive (EIDE) is a 3.5-inch slimline (1-inch high) drive that can be installed only in computers that use AT attachment/integrated drive electronics (ATA/IDE) architecture.

Your hard disk drive can be configured in any of the following ways:

- Single drive
  - To be installed as the only hard disk drive in a computer
  - To replace a hard disk drive
- One of multiple drives
  - To operate with installed IDE (ATA) hard disk drives
  - To operate with installed (SCSI) hard disk drives

In addition to this user's guide, your option package contains:

- Enhanced IDE hard disk drive
- *DiskGo!* CD
- Four drive-mounting screws
- *Enhanced IDE Hard Disk Drive User's Guide Supplement*
- Safety information manual

Contact your place of purchase if parts are missing or damaged. Be sure to retain your proof of purchase. It might be required to receive warranty service.

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### Software description

**Important:** If you will be installing your new drive on a computer that does not have a CD-ROM drive, you can build a *DiskGo!* installation diskette on another system that has a CD-ROM drive using a blank formatted diskette and your *DiskGo!* CD. To create the installation diskette to use in a computer that does not have a CD-ROM drive:

1. Insert the *DiskGo!* CD into the CD-ROM drive on another computer.
2. Start the program as directed by the CD.
3. Follow the on-screen instructions to create an installation diskette using your *DiskGo!* CD and the blank formatted diskette.

The CD that comes with your option contains the DiskGo! and Disk Manager drive installation utility programs.

The DiskGo! utility program creates customized step-by-step drive installation instructions for computers using the Microsoft® Windows® 98, Windows 95, or Windows 3.1 operating systems on the existing drive. The instructions include directions on setting configuration jumpers, physically installing the drive, and using DiskGo! to partition and format the drive.

Disk Manager, a DOS-based installation utility program included on the *DiskGo!* CD, tests, partitions, formats, and prepares the drive for the installation of an operating system. Disk Manager can be started from the *DiskGo!* CD, eliminating the need for a System Diskette. You must attach the new drive to the computer before installing Disk Manager.

If you are using the Microsoft Windows 2000, Windows NT® Workstation, or IBM OS/2® operating system, you can use your operating system instead of DiskGo! or Disk Manager to partition and format an additional drive. However, be sure to read the *Enhanced IDE Hard Disk Drive User's Guide Supplement* before installing the drive.

The DiskGo! and Disk Manager utility programs contain applications that:

- Overcome system BIOS limitations in order to use the full capacity of larger and newer IDE drives
- Provide jumper settings for your old and new drives
- Partition and format your drive

In addition, the *DiskGo!* CD contains the following:

- **FileCopy**

FileCopy copies all files from one drive to another, simplifying the task of adding a new hard disk drive that will replace your startup drive and will contain your operating system. For more information on FileCopy, see “FileCopy” on page 1-22.

- **CD Update**

CD Update is a Windows utility program that modifies your application configuration to access a changed CD-ROM drive letter. For more information on CD Update, see “CD Update” on page 1-24.

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## Determining where to begin

**Note:** If you are familiar with IDE products and experienced in installing options, use the following instructions to quickly install your Enhanced IDE Hard Disk Drive. For detailed information about preparing your drive for installation, go to “Installation planning” on page 1-4.

If you are installing your new drive in a computer that does not have an existing drive, install your new drive in the computer using instructions in “Installing the drive” on page 1-8.

If you are using Windows 98 or Windows 95 on your existing drive, install DiskGo! using instructions in “Installing DiskGo! in Windows 98 or Windows 95.”

If you are using Windows 3.1 on your existing drive, install DiskGo! using instructions in “Installing DiskGo! in Windows 3.1.”

If you are using Windows NT or OS/2 on your existing drive, install your new drive in the computer using instructions in “Installing the drive” on page 1-8.

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## Installing DiskGo! in Windows 98 or Windows 95

If your current operating system is Windows 98 or Windows 95, install DiskGo! to receive customized instructions for installing your new drive.

To install DiskGo! in Windows 98 or Windows 95:

1. Turn on your computer.
2. Insert the *DiskGo!* CD into your CD-ROM drive. DiskGo! will start automatically.
3. Follow the on-screen instructions to install DiskGo! and to complete the drive installation process.

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## Installing DiskGo! in Windows 3.1

If your current operating system is Windows 3.1, install DiskGo! to receive customized instructions for installing your new drive.

To install DiskGo! in Windows 3.1:

1. Turn on your computer.
2. Insert the *DiskGo!* CD into your CD-ROM drive.
3. From the Program Manager, select **Run**.
4. Type `x:setup` (where *x* is the drive letter of your CD-ROM) and click **OK**.
5. Follow the on-screen instructions to install DiskGo! and to complete the drive installation process.

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## Installation planning

The following sections contain detailed information to help you plan your hard disk drive installation.

### Installation requirements

To install the EIDE hard disk drive you must have:

#### Documentation

The documentation that comes with your computer and operating system.

#### IDE bus adapter

Your computer must have an IDE port on the system board or on an IDE bus adapter. If the interface cable connectors in your computer have 40 pins, your computer uses the IDE architecture. If you are not sure about your IDE bus adapter, see the documentation that comes with your computer.

#### IDE cables and connectors

The IDE cables connect the IDE port on the system board, or on an IDE adapter, to your IDE storage devices. IDE storage devices include hard disk drives, CD-ROM drives, tape drives, and diskette drives greater than 100 MB.<sup>1</sup>

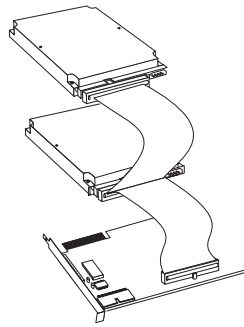
**Important:** Many newer hard disk drives can transfer data at rates of 66 or 100 MB per second (MBps). You must use the newer 80-wire IDE cables to enable your drive to transfer data at these rates. Like the older 40-wire IDE cables, the 80-wire IDE cables are no longer than 45.72 cm (18 in.) and have two to three cable connectors. If you use a 40-wire IDE cable with a drive that is capable of the faster data transfer rates, performance will be limited to a data transfer rate of 33 MBps.

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<sup>1</sup> When referring to hard-disk-drive capacity, MB means 1 000 000 bytes; total user-accessible capacity may vary depending on operating system.

You can attach up to two devices to an IDE cable, as shown. If your computer has two IDE ports (one IDE cable on each port), you can attach up to four devices (two devices on each cable).

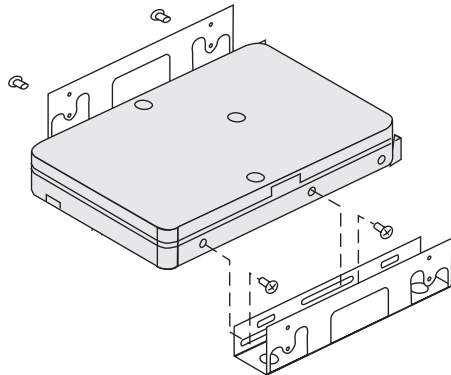
**Note:** Not all cables have connectors for two IDE devices.



### Mounting brackets and tools

- Most computers have 3.5-inch and 5.25-inch drive bays. The hard disk drive you are installing is designed for a 3.5-inch bay, but it can be adapted to a 5.25-inch bay. Common bay dimensions are:
  - 3.5-inch—10 cm x 15 cm x 2.5 cm (4 in. x 6 in. x 1 in.)
  - 5.25-inch—15 cm x 20 cm x 4 cm (6 in. x 8 in. x 1.6 in.)

To mount the hard disk drive in a 5.25-inch bay, attach a pair of 3.5-inch to 5.25-inch adapter brackets as shown. These brackets are available in the IBM 3.5 to 5.25-inch conversion kit (P/N 70G8165).



Special mounting hardware is needed for some installations. If you are not sure about what is needed for your computer, contact your reseller or refer to the documentation that comes with your computer.

- You will need a flat-blade and a Phillips-head screwdriver.

## Configuration planning

The DiskGo! and Disk Manager utility programs provide information on placing and configuring hard disk drives.

The DiskGo! on-screen instructions for the Windows 98, Windows 95, and Windows 3.1 operating systems provide customized directions on how to place and configure your drives.

If you are not using Windows 98, Windows 95, or Windows 3.1, you can obtain drive placement and configuration information from the Disk Manager utility program.

To run Disk Manager:

1. Go to a DOS prompt.
2. Insert the *DiskGo!* CD into your CD-ROM drive.
3. Type `x:dm` (where *x* is the drive letter of your CD-ROM), and then press Enter.
4. Follow the on-screen instructions.
5. In the Disk Manager main menu, select **View/Print Online Manual**, and then press Enter.
6. Select **Before Running Disk Manager**.
7. Select **Adding a Hard Drive - Considerations**.
8. Select **Notes on Adding a Drive** to view information on placing and configuring your drive.

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## Partitioning planning

The latest releases of Microsoft operating systems have an option for a 32-bit file allocation table called FAT32. FAT32 supports partitions as large as 2 TB<sup>2</sup> and cluster sizes of 4 KB<sup>3</sup> for partitions up to 8 GB.<sup>4</sup> If you have FAT32, you will be able to prepare your drive without concern for partition size limits or storage efficiency. To determine if you have FAT32 installed, select your existing drive under **My Computer**, and select **Properties**. If FAT32 is installed, the **General** tab will display FAT32 under the drive label.

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<sup>2</sup> When referring to hard-disk-drive capacity, TB (terabyte) means 1 000 000 000 000 bytes; total user-accessible capacity may vary depending on operating system.

<sup>3</sup> When referring to cluster sizes, KB means 1 024 bytes.

<sup>4</sup> When referring to hard-disk-drive-capacity, GB (gigabyte) means 1 000 000 000 bytes; total user-accessible capacity may vary depending on operating system.

The largest partition size that you can create under the DOS, Windows 95 (early upgrade versions), Windows 3.x, and OS/2 operating systems that use the 16-bit file allocation table (FAT16) file system is approximately 2.14 GB. Therefore, if your operating system uses the FAT16 file system, you must create more than one partition to use the full capacity of your drive.

If you use the DOS-based FDISK utility to partition your drive and you are using the maximum partition size of 2.14 GB, you must enter the partition size as 2047 MB.

If you are using OS/2, you can use the high performance file system (HPFS) developed for OS/2, instead of the FAT16 file system, to partition an additional drive. HPFS allocates files in 512-byte units, reducing lost disk space. HPFS also creates large partitions and accommodates large numbers of files more efficiently than FAT16 does. For more information on partitioning a drive for OS/2, see "Partitioning and formatting using OS/2" on page 1-16.

If you are using the Windows NT or Windows 2000 operating systems, you must use the NT File System (NTFS) to partition your new drive. For more information on partitioning a drive for Windows NT or Windows 2000, see "Partitioning and formatting using Windows NT or Windows 2000" on page 1-16.

### Selecting a drive partition size using FAT16

Base your partition size on how you use your computer.

- Select a larger partition size if you want the convenience of having many files in one partition or if you have large databases.
- Select a smaller partition size if you have a large number of small files such as text files.

FDISK assigns space on a hard disk drive in clusters. A cluster, or allocation unit, is the smallest unit of space on the drive that your operating system can address using FAT conventions. The operating system assigns one or more clusters to each file. Even a very small file uses one full cluster. The following table shows how the cluster size is incremented as the partition size increases.

Partition size	Cluster size (FAT16)
0 MB - 16MB	4 KB
16 MB - 128 MB	2 KB
128 MB - 256 MB	4 KB
256 MB - 512 MB	8 KB
512 MB - 1 GB	16 KB
1 GB - 2 GB	32 KB

These examples illustrate the effect of cluster size on hard disk space allocation.

- If you create a 2.14 GB partition, each disk cluster is 32 KB. A 1 KB file takes one cluster or 32 KB of disk space.

- If the partition size is 1.00 GB, the cluster size is 16 KB. A 1 KB file takes one cluster or 16 KB of disk space. A normal combination of application and data files can include thousands of small files.

Smaller partitions (cluster sizes) save hard disk capacity, particularly when the partition contains many small files. However, when a large file is placed in small partitions, the file must be spread over many clusters, causing it to be fragmented (scattered around the disk) which can result in slower performance. Therefore, small partitions are well suited for small files while large clusters are well suited to large files for optimal capacity and performance.

If you replace a hard disk drive with a much larger capacity drive, normally you will create a larger partition size on the new drive. When you copy files from a smaller partition to a larger partition, the same files require more space on the disk because of the increased cluster size.

For more information, see your operating system user's guide. Also, the *Disk Manager Online Manual* contains information about clusters and how to assign hard disk drive partitions. To open the *Disk Manager Online Manual*:

1. Go to a DOS prompt.
2. Insert the *DiskGo!* CD into your CD-ROM drive.
3. Type `x:dm\h` (where *x* is the drive letter of your CD-ROM) and press Enter.

## Creating Utility Diskettes for OS/2

If you use the OS/2 operating system on your existing drive to partition your new drive, create three OS/2 Utility Diskettes before starting your installation. The Utility Diskettes enable you to recover if you cannot restart (boot) your computer from a previously installed hard disk drive, and you do not have a backup diskette.

To create Utility Diskettes for OS/2:

1. Open **OS/2 System** on your Desktop.
2. Open **System Setup**.
3. Open **Create Utility Diskettes**.
4. Follow the on-screen instructions to create OS/2 Utility Diskettes.

You can also create the Utility Diskettes from the OS/2 CD-ROM by running `CDINST.CMD` from the file directory.

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## Installing the drive

**Attention:** If you are replacing an installed hard disk drive, be sure to make a backup copy of the data from the drive that you are replacing. Optionally, you can use the FileCopy utility program on the *DiskGo!* CD to copy data from your old drive to your new drive. For more information about FileCopy, see "FileCopy" on page 1-22.



If you are using the Windows 98, Windows 95, or Windows 3.1 operating system, install DiskGo! prior to installing the drive in your computer. DiskGo! will create customized drive installation instructions that provide directions on how to install your drive. For instructions on installing DiskGo!, go to “Installing DiskGo! in Windows 98 or Windows 95” or “Installing DiskGo! in Windows 3.1” on page 1-3.

If you are using the OS/2 operating system on your existing drive, you must install your new drive in the computer before using OS/2 to partition and format your drive. Be sure to create OS/2 Utility Diskettes before installing your new drive. For more information, see “Creating Utility Diskettes for OS/2” on page 1-8.

If you are using the Windows NT operating system on your existing drive, you must install your new drive in the computer before using Windows NT to partition and format your new drive.

If you are installing your new drive in a computer that does not have a hard disk drive, you must install your new drive in the computer before you can use Disk Manager or an operating system to partition and format the drive.

The instructions in this section are general guidelines that apply to most computers. For specific information on installing a hard disk drive in your computer, see the documentation that comes with your computer.

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## **Step 1. Opening your computer**

Before opening your computer, complete the following steps:

1. Turn off the computer.
2. Unplug the cables from the power outlets for your computer and all attached devices.

It is now safe to open your computer. For specific information about opening your computer, see the documentation that comes with the computer.

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## **Step 2. Unpacking the drive**

Use the following procedure to unpack and handle the drive. To prevent damage and static-electricity discharge, limit handling to a minimum.

1. Do not open the antistatic bag until you are ready to install the drive. Static electricity can damage the drive and other computer components.
2. Touch the inner conductive surface of the antistatic bag containing the drive, and your hand, to an unpainted metal surface on the computer for two seconds. This drains static electricity from the bag and your body.
3. Before handling the drive, ground yourself by touching an unpainted surface on the computer. Ground yourself again after leaving and returning to your work area.

4. Always handle the drive by its edges. Do not touch any exposed printed circuitry, components or connector pins.
5. While installing the drive, avoid all unnecessary handling. Rough handling can damage the heads, rotating disks, and bearings inside the drive housing.
6. If you must put the drive down, place the antistatic bag on a flat padded surface, such as a magazine, and place the drive on the bag with the component side facing up.

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### Step 3. Setting the configuration jumpers

**Note:** Be sure to refer to the *Enhanced IDE Hard Disk Drive User's Guide Supplement* for information about setting configuration jumpers.

If you are installing the EIDE hard disk drive as the only drive on the IDE cable, you must place the jumpers in the master configuration.

If the EIDE hard disk drive will not be the only drive on the IDE cable, note these jumper configuration positions:

- Master
- Slave
- Cable select
- slave-present

Use the appropriate positions for your configuration:

#### Master

If you are installing the EIDE hard disk drive as the only drive on the IDE cable or you are replacing the master drive on the IDE cable, verify that the jumpers are in the master position.

#### Slave

If you are installing the EIDE hard disk drive as the slave drive, place the jumpers in the slave position. If the existing master drive is also an EIDE hard disk drive, verify that the jumpers for the existing drive are in the master position.

To verify the jumper positions on your drives, try the following procedures (listed in order of preference):

**Attention:** Installing the Disk Manager utility on the drive erases all user data on the drive.

1. Run the Disk Manager utility.

To find the current jumper settings for your drive using Disk Manager:

- a. Close the computer cover.
- b. Turn on the computer.

- c. Go to a DOS prompt.
  - d. Insert the *DiskGo!* CD into your CD-ROM drive.
  - e. Type *x:dm* (where *x* is the drive letter of your CD-ROM) and press Enter.
  - f. Follow the instructions on the screen.
  - g. In the Disk Manager main menu, select **Easy Disk Installation** and press Enter.
  - h. If the displayed list of drives is correct, select **Yes**. Disk Manager will then display jumper settings for the drives in your computer.
  - i. If you can not verify that the displayed jumper settings are correct, return to the main menu, select **View/Print Online Manual**, and press Enter to view information on jumper settings.
  - j. Turn off your computer and unplug the power cord.
  - k. If the jumper settings are correct, open your computer and continue with “What to do next” on page 1-12.
2. Check the drive label.
  3. If no jumper information is available in the Disk Manager or on the drive label, check the drive manufacturer's Web site or call the drive manufacturer's help desk.

#### **Cable select**

Some systems use special ATA cables with two wires reversed in the device connectors to allow the drives to be ordered by the cable rather than by the jumper position. The cable select position is to be used only for systems equipped with these special cables. See the documentation that comes with your computer to determine if your ATA adapter requires you to place the jumpers in the cable select position.

If you place the jumpers in the cable select position, the IDE cable automatically assigns the master and slave settings based on the position of the drive on the cable. Any other devices on the IDE cable must also be set to cable select.

#### **Slave-present**

Your ATA drive has a slave-present position for the special case when you are installing the EIDE hard disk drive as master with an older and slower slave drive that does not comply with the ATA communication standard. However, almost all drives with a capacity above 500 MB comply with the ATA communication standard.

If you are installing the EIDE hard disk drive as the master, you have a slave device on the same ATA cable, and your configuration-setup program does not recognize the slave drive, turn off your computer and unplug the power cord. Open your computer. On the master drive, change your jumpers from the master position (the factory default) to the slave-present position. Then close your computer, reattach the power cord, and restart your computer.

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## What to do next

If you are installing the drive in a 5.25-inch bay, continue with “Step 4. Preparing the drive for a 5.25-inch bay.”

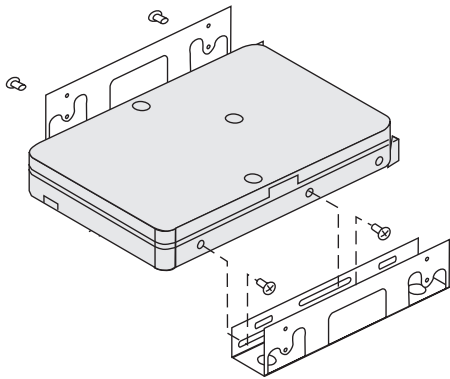
If you are installing the drive in a 3.5-inch bay, go to “Step 5. Mounting the drive in the bay.”

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## Step 4. Preparing the drive for a 5.25-inch bay

To attach the drive in a 5.25-inch bay:

1. Attach a pair of 3.5-inch to 5.25-inch expansion brackets, as shown in the illustration below. These brackets are available in the IBM 3.5 to 5.25-inch conversion kit (P/N 70G8165).



2. Some computers require that you attach special hard-disk-drive mounting hardware to ensure that the drive mounts securely into the bay. Contact your reseller or refer to the documentation that comes with your computer if you need specialized mounting hardware or more information.

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## Step 5. Mounting the drive in the bay

You can mount the drive horizontally or vertically. To mount the drive in the bay:

1. Slide the drive into the bay.
2. If you will be adding your new drive to a system with an existing drive, make sure the new drive is positioned so that it is adjacent to, and oriented in the same direction as, the existing hard drive so that you will not have to twist the interface cable in order to connect the drives.
3. Align the drive-bay screw holes with the threaded holes in the drive housing or expansion brackets.

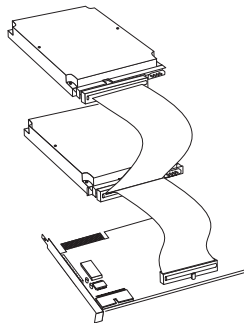
4. Hand thread the screws to lightly secure the drive in the bay. For some installations, you might have to use the screw holes on the bottom (circuit board side) of the drive.
5. Check the drive alignment and tighten the screws. Do not overtighten.

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## Step 6. Attaching the cables to the drive

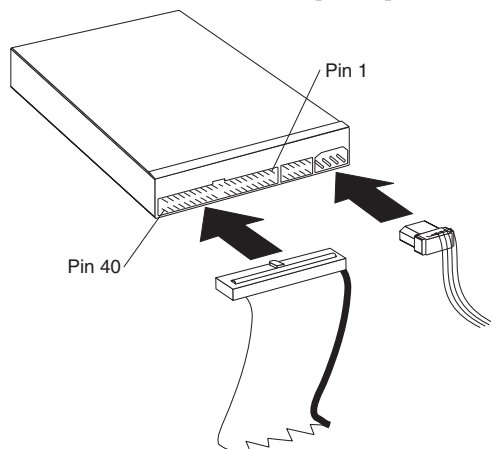
Use the following procedure to attach the cables.

1. Locate a free device connector on the IDE cable in your computer. The illustration shows an IDE cable with three connectors and two attached devices.



Connect one end of the IDE cable to the IDE port, and connect the other end to a storage device. You can attach an additional storage device to the middle connector. The IDE port can be on the computer system board or on an adapter installed in an expansion slot. For the best signal quality when you have only one device on the IDE cable, connect the device to the connector on the end opposite the IDE port.

2. Attach an available connector on the interface cable to the connector on the hard disk drive, as shown. Be sure that the colored wire is connected to pin 1 on the drive connector and is the closest wire to the 4-pin dc power connector.



**Note:** Many newer hard disk drives can transfer data at rates of 66 or 100 MB per second (MBps). You must use the newer 80-wire IDE cables to enable your drive to transfer data at these rates. Like the older 40-wire IDE cables, the 80-wire IDE cables are no longer than 45.72 cm (18 in.) long and have two to three cable connectors. If you use a 40-wire IDE cable with a drive that is capable of the faster data transfer rates, performance will be limited to a data transfer rate of 33 MBps.

3. Find an unused power connector on a cable coming from the computer power supply and attach it to the four-pin dc power connector. The power connector is keyed so that it attaches one way only. Do not force it. If the connector does not attach using reasonable pressure, recheck the orientation of the cable connector to the drive connector, and try again.

If all power cables are in use, purchase a dc Y-connector (available at many electronics stores) and split a connection to provide power for more devices.

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## Step 7. Completing the installation of the drive

To complete the installation of the drive:

1. Verify that the hard disk drive is securely mounted and the cables are firmly attached.
2. Verify that the cables do not interfere with the computer cover and do not block the power-supply fan blades or air-flow paths.
3. Reinstall the computer cover.
4. Reconnect all devices. Make sure that the keyboard, mouse, and monitor cables are firmly connected.
5. Reconnect all ac power cords.

---

## Preparing the drive for use

When you restart your computer, the configuration-setup information screen displays because you changed the hardware in your computer. Some computers require you to make configuration choices the first time you restart after installing a new device. If the screen does not display, see your computer documentation for information about how to access it. For most IBM computers, you can see the configuration information during computer startup by pressing F1 when the configuration graphic displays in the upper right corner of your screen.

Check your configuration-setup information for one of the following:

- If the configuration-setup program reports the size of your new drive as what you expected, save your changes, close the configuration program, and continue with “Partitioning and formatting your drive.”
- If the configuration-setup program reports your new drive capacity as much less than what you expected, refer to the *Enhanced IDE Hard Disk Drive User's Guide Supplement* for information on correcting BIOS limitations, and then go to “Partitioning and formatting using Disk Manager” on page 1-18.
- If your computer seems to stop responding, or if it does not restart successfully, go to “Problem solving” on page 1-19.

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## Partitioning and formatting your drive

**Attention Windows 2000, Windows NT, and OS/2 Users:** If you placed a **2 GB Clip** jumper on your drive as directed by the *Enhanced IDE Hard Disk Drive User's Guide Supplement*, you must use Disk Manager to partition and format the drive. For more information, go to “Partitioning and formatting using Disk Manager” on page 1-18.

If you are using OS/2 on your existing drive, go to “Partitioning and formatting using OS/2” on page 1-16.

If you are using Windows NT or Windows 2000 on your existing drive, or you will install Windows NT on the first drive in the computer, go to “Partitioning and formatting using Windows NT or Windows 2000” on page 1-16.

If your new drive is the only hard disk drive installed in the computer, and you will install an operating system other than Windows NT, go to “Partitioning and formatting using Disk Manager” on page 1-18.

## Partitioning and formatting using OS/2

If you are using OS/2 on your existing drive, use the following procedures to partition and format the new drive so you can install OS/2:

1. Refer to the *Enhanced IDE Hard Disk Drive User's Guide Supplement* for information on how to obtain the OS/2 device drivers necessary to use the full capacity of your drive.
2. Partition and format your new drive for OS/2 using the FAT16 or HPFS file system (or both), using directions in the *OS/2 User's Guide*.

**Note:** In larger capacity drives, the OS/2 operating system can partition only up to the first 2.14 GB, or the first 1024 logical cylinders, of the drive using the FAT file system. However, you can partition the entire drive using the HPFS file system.

To determine the extent of the drive capacity that OS/2 and FAT can partition (see the *Enhanced IDE Hard Disk Drive User's Guide Supplement* for specifications on logical sectors and logical heads on your drive), use the following equation:

1024 (default number of cylinders) multiplied by your drive's logical sectors multiplied by your drive's logical heads multiplied by 512 bytes

Since you cannot partition the entire capacity of the drive using FAT, you must use HPFS to partition the rest of the drive.

3. If you choose to make your new drive a start drive, refer to your *OS/2 User's Guide* for information on installing OS/2 on your new drive.

## Partitioning and formatting using Windows NT or Windows 2000

To partition your drive using Windows NT or Windows 2000, follow the instructions for your operating system.

### Windows NT

**Note:** If you are using Windows NT and you are installing a drive larger than 9 GB, you must obtain the Windows NT Service Pack 3 or later so that your system can realize the full capacity of your drive.

To obtain the Windows NT Service Pack 3 or later:

1. Go to the Microsoft Web site at <http://www.microsoft.com>
2. Select **Free Downloads**.
3. Select **Support Drivers, Patches and Service Packs**.
4. Follow the on-screen instructions.



If you are adding your drive in a computer that has Windows NT installed on an existing drive, follow the instructions below to partition and format your new hard disk drive using the NTFS (NT File System) convention:

1. Turn on your computer.
2. Click **Start** → **Programs** → **Administrative Tools (Common)**.
3. Click the **Disk Administrator** icon.
4. Follow the on-screen instructions to partition and format an additional hard disk drive.

### **Windows 2000**

If you are adding your drive to a computer that has either the Windows 2000 Server or Windows 2000 Professional operating system installed on an existing drive, follow the instructions below to partition and format your new EIDE drive.

1. Turn on your computer.
2. Click **Start** → **Programs** → **Control Panel**.
3. Double-click **Administrative Tools**.
4. Double-click **Computer Management**.
5. Double-click **Storage**.
6. Double-click **Disk Management**.
7. From the menu bar, click **Action** → **All Tasks** → **Create Volume**. The Create Volume Wizard window opens.
8. Follow the on-screen instructions to partition and format the drive.

**Note:** If you are installing your drive in a computer that has no hard disk drive, follow the instructions below to partition and format your new hard disk drive for the Windows NT or Windows 2000 operating system using NTFS:

1. Insert the first Windows NT or Windows 2000 installation diskette (*Setup Disk #1*) in the diskette drive or insert the Windows NT or Windows 2000 installation CD into your CD-ROM drive.
2. Restart your computer.
3. Use the instructions in the Windows NT or Windows 2000 user's guide to partition and format your drive for Windows NT or Windows 2000.

## Partitioning and formatting using Disk Manager

**Attention:** Partitioning a hard disk drive or installing the Disk Manager utility program on the drive erases all data on the drive.

To install Disk Manager in order to partition and format your new drive:

**Note:** Disk Manager will add a **Dynamic Drive Overlay (DDO)** to your drive if it finds a BIOS limitation on your system. DDO is a device driver that Disk Manager adds to your drive, enabling your computer to access the full drive capacity. For information on starting your computer from a diskette or CD after DDO is added, see “Starting your computer from a diskette or CD after Disk Manager adds DDO to the drive”

1. Turn off the computer.
2. Insert the *DiskGo!* CD into your CD-ROM drive and restart the computer.
3. If Disk Manager does not start automatically, type *x:dm* (where *x* is the drive letter of your CD-ROM) at the DOS prompt and press Enter.
4. Follow the on-screen instructions.
5. In the Disk Manager main menu, select **View/Print Online Manual** and press Enter to view information on how to partition your drive and install your operating system.
6. Return to the main menu, select **Easy Disk Installation**, and press Enter to accept the default drive partitioning. If you do not want to accept the default drive partitioning, select **Advanced Disk Installation** to select custom partition sizes.
7. Follow the on-screen instructions to partition the drive.
8. To install an operating system on your new drive, use the instructions in the *Disk Manager Online Manual*.

### Starting your computer from a diskette or CD after Disk Manager adds DDO to the drive

When Disk Manager adds a DDO device driver to your drive to correct BIOS problems on your system, the DDO device driver must be loaded every time you turn on your computer.

To restart your computer from a diskette after Disk Manager adds DDO:

1. Remove the diskette, if present, from the diskette drive.
2. From drive C, start the computer.
3. When the DDO blue banner displays, press the Spacebar.
4. Insert your startable diskette into the diskette drive and press the Spacebar again. You can now start your computer from your startable diskette.

This process assures that your computer will be able to fully access the entire capacity of your hard drive.

If you ever need to restart your computer from a recovery CD, you must follow the Disk Manager on-screen instructions on starting your computer from CDs after Disk Manager has added DDO to the drive.

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## Problem solving

If you install your new hard disk drive and the startup program seems to stop responding or does not report the new drive correctly, there might be a hardware problem or a BIOS limitation.

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### Correcting hardware problems

To isolate and correct a hardware problem, try the following:

1. Use the following procedures to check the cable connections and the jumper settings.
  - a. Turn off the computer.
  - b. Unplug the cables from the power outlets for your computer and all attached devices.
  - c. Remove the computer cover and disconnect the IDE cable from the drive.
  - d. Verify that the colored wire is connected to pin 1 on the drive connector and is the closest wire to the 4-pin power connector. Some connectors are keyed and will fit only one way. Do not force the connector onto the pins. If the connector does not seem to fit, recheck the orientation of the cable connector to the drive connector, and try again.
  - e. Check the configuration jumper setting on all devices on all IDE ports. For more information about the jumper settings, see “Step 3. Setting the configuration jumpers” on page 1-10, or refer to the *Enhanced IDE Hard Disk Drive User's Guide Supplement*.
  - f. Verify that the power cable is correctly attached to the drive.
  - g. Replace the computer cover.
  - h. Reconnect the power cord to the computer.
  - i. Restart your computer.
    - If the problem does not happen again, go back to “Preparing the drive for use” on page 1-15 to restart the preparation process.
    - If the problem happens again, continue with step 2.
2. Check for a conflict with another device and restart the computer with only the new hard disk drive connected.

- a. Turn off the computer.
  - b. Unplug the cables from the power outlets for your computer and all attached devices.
  - c. Remove the computer cover and disconnect all devices from the IDE ports.
  - d. Connect the new hard disk drive as the master drive on the primary IDE port. You might have to reset the configuration jumper. (The *Enhanced IDE Hard Disk Drive User's Guide Supplement* lists the jumper settings for your drive.)
  - e. Replace the computer cover.
  - f. Recheck all external cables.
  - g. Restart the computer and check the drive size reported by the configuration-setup program. If the drive is not detected at all, go to "Overcoming BIOS limitations" on page 1-21. If the hard disk drive is now correctly detected, you have an incompatibility problem with one of the disconnected devices.
  - h. To isolate an incompatibility problem, try the following actions:
    - Refer to the user's guides for the attached devices.
    - Use the *Disk Manager Online Manual* for information about jumper settings for hard disk drives from other manufacturers. To open the *Disk Manager Online Manual*, go to the *x:* prompt (where *x* is the drive letter of your CD-ROM) on DOS, insert the *DiskGo!* CD into your CD-ROM drive, type *dm/h*, and press Enter.
    - If the conflicting device is a hard disk drive that is not an IBM product, check the Web site for the drive manufacturer or call the help desk of the drive manufacturer.
    - When you have corrected the incompatibility problem, go back to "Preparing the drive for use" on page 1-15 to complete the disk drive preparation process.
3. If the drive is detected, but the drive capacity is not correctly reported, you will need to address a BIOS limitation on your computer that prevents it from recognizing the full capacity of the drive. For more information, continue with "Overcoming BIOS limitations" on page 1-21.

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## Overcoming BIOS limitations

The basic input and output system (BIOS) manages communication between the processor and the input-output devices. Your computer BIOS might contain limitations that can keep the computer from recognizing the full capacity of your drive or from recognizing your large drive at all. (Refer to the *Enhanced IDE Hard Disk Drive User's Guide Supplement* for important information on configuration jumper settings that might help your computer overcome BIOS limitations in order to recognize the full capacity of your drive.)

To solve BIOS limitations in IBM computers, install *Disk Manager* using instructions in "Partitioning and formatting using Disk Manager" on page 1-18.

The following procedures contain steps to solve most known BIOS limitations in non-IBM computers.

1. Access your configuration-setup information.
2. Select the drive number for the new drive that you are installing.
  - Based on BIOS type, number of IDE controllers, and number of IDE devices in your computer, the configuration-setup program displays options for up to four devices.
  - Normally, drives 1 and 2 are connected to the primary IDE port and drives 3 and 4 are connected to the secondary IDE port.
  - If you have two IDE ports, drives 1 and 3 are the master devices and drives 2 and 4 are the slave devices.
  - If you have one IDE controller, drive 1 is the master device and drive 2 is the slave device.
3. Based on your configuration, one of the following options will be available. The choices (listed in order of preference) are:
  - a. Select the **Auto Detect** configuration-setup option, if available.
    - If your configuration-setup information displays the correct capacity, go to "Partitioning and formatting your drive" on page 1-15.
    - If your configuration-setup information does not display the correct capacity, install Disk Manager using instructions in "Partitioning and formatting using Disk Manager" on page 1-18.
  - b. Select the **User Definable** drive type. The User Definable type for the BIOS configuration will be a number between 47 and 49. Enter 1024 for cylinders, 16 for heads, and 63 for sectors. Set the Landing Zone and Write Precomp entries to zero. When the partitioning process completes, the configuration-setup information displays 504 MB, but you can use the full capacity of your drive. Save the changes and exit from the configuration-setup program. Then install Disk Manager using instructions in "Partitioning and formatting using Disk Manager" on page 1-18.

- c. Select **Drive Type 1**. The value displayed for the type 1 drive is 10 MB. When the partitioning process completes, the configuration-setup information still displays 10 MB, but you can use the full capacity of your drive. Save the changes and exit from the configuration-setup program. Then install Disk Manager using instructions in “Partitioning and formatting using Disk Manager” on page 1-18.

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## Managing your hard disk drive

The *DiskGo!* CD contains hard disk management programs that:

- Reconfigure your applications that access your CD-ROM drive
- Copy files from your old hard disk drive to your new drive without changing directory or file names
- Run diagnostic programs to test and manage your drive

The hard disk drive management programs are:

- FileCopy
- CD Update
- Disk utilities and diagnostics

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### FileCopy

**Note:** The customized installation instructions created by the DiskGo! utility program for Windows 98, Windows 95, and Windows 3.1 include directions on running FileCopy.

FileCopy is a program that runs under DOS and copies all files from one drive to another. You can use FileCopy to simplify the task of adding a new hard disk drive that will replace your startup drive and will contain your operating system.

Moving a single program to another drive (for example from the C drive to the D drive) can cause access problems in many applications. To avoid these problems, use the FileCopy utility program to copy all files from the source drive (normally C) to a destination drive (normally D). Then reconfigure (rejumper) the destination drive as the master drive, reconfigure or remove the original source drive, and restart your computer. The new drive becomes drive C and your applications run normally because they originally were on your old C drive. If you replace an older, slower drive, you might want to keep the old drive as a spare, or as a continuously updated backup drive.

If you are replacing your C drive with a new and much larger drive, the files that you copy from the smaller drive might use much more space because the new drive can have a larger cluster size. For information about cluster sizes, see “Selecting a drive partition size using FAT16” on page 1-7.

For more information about FileCopy, see the FileCopy online help. To access the FileCopy online help:

1. Insert the *DiskGo!* CD into your CD-ROM drive.
2. Open an editor and access the drive containing the root directory.
3. Open FILECOPY.TXT to view the FileCopy online information.

<p><b>Attention:</b> FileCopy does not check the destination drive. All data on the destination drive is overwritten.</p>
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Be sure to run SCANDISK, CHKDSK, or ErrorChecking to check for errors on the source drive before using FileCopy to copy files from the source drive to the destination drive.

To run SCANDISK in Windows 98 or Windows 95:

1. Click **Start**.
2. Select **Programs**.
3. Select **Accessories**.
4. Select **System Tools**.
5. Click **ScanDisk**.

To run SCANDISK in Windows 3.1:

1. Exit Windows and go to a DOS prompt.
2. Type SCANDISK *x*: (where *x* is the letter of the source drive).

To run CHKDSK:

1. Go to a DOS prompt.
2. Type CHKDSK *x*: (where *x* is the letter of the source drive).

To run ErrorChecking in Windows 2000:

1. Click **Start** → **Control Panel**.
2. Select **Administrative Tools**.
3. Select **Disk Management**.
4. From the Action menu, select **All Tasks**.
5. Select **Properties**.
6. Click the **Tools** tab.
7. Click **Check Now**.

To start FileCopy:

1. Insert the *DiskGo!* CD into your CD-ROM drive.
2. At the DOS prompt, type `filecopy:`.
3. Press Enter.
4. Follow the on-screen instructions.

**Note:** You are prompted to enter the source and destination drives. The program accepts C: or C. Press Esc at any time to cancel the copy.

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## CD Update

**Note:** The customized installation instructions created by the *DiskGo!* utility program for Windows 98, Windows 95, and Windows 3.1 include directions on running CD Update.

CD Update is a Windows-based utility program in *DiskGo!* that modifies your application configuration information to access a changed CD-ROM drive letter.

When you add a new hard disk drive, your operating system reassigns the drive partition letters based on priorities that are assigned after the partitions are defined and saved. Primary partitions are assigned the next available letter beginning with C. An extended partition is assigned the next available letter after letters have been assigned to all primary partitions. A CD-ROM drive is assigned the next available letter after all primary and extended partitions have been assigned. For example, if your CD-ROM was drive D and you have added a second hard disk drive with two partitions, CD Update would modify your CD-ROM drive configuration, changing it to drive F.

If you have any problems accessing CD-ROM applications or games after running CD Update, you will need to reinstall the applications or games.

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## Disk utilities and diagnostics

Store the *DiskGo!* CD in a safe place. The Disk Manager utility program on the CD contains a set of advanced hard disk drive diagnostic and test programs that might assist you if serious problems occur with your drive. Do not use these programs if you have not experienced problems with the hard disk drive. If you have a disk drive problem that you cannot solve and you call technical support for assistance, the support representative might want to talk you through solving the problem by using one or more of the diagnostic programs on the CD.

For more information about installing and using *Disk Manager*, see the *Disk Manager Online Manual*. To open the online help, go to a DOS prompt, insert the *DiskGo!* CD into your CD-ROM drive, type `x:dm\h` (where *x* is the drive letter of your CD-ROM); then press Enter.