



# SCSI Hard Disk Drives For IBM PCs

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*User's Guide*

OPTIONS  
*by IBM*

**Note:** If you are using this product in the United States, Canada, or Puerto Rico, be sure to read the SCSI Hard Disk Drive User's Guide Supplement before using this information and the product it supports.

*For all other countries, the warranty terms and conditions applicable in the country of purchase are available from IBM or your reseller.*

#### **First Edition (May 1997)**

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## ***Safety: Read First***



**CAUTION:** Read the Safety Information in Appendix A, page 3-1, before installing this product.

**DO NOT** print this page—replace with World Wide 'Read First' translations.

## ***About This Book***

This book contains user information for the IBM SCSI Hard Disk Drive.

Part 1 contains quick installation instructions in the following languages:

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

Part 2 has more detailed user information and contains:

- IBM SCSI Hard Disk Drive product description
- Preparation and handling instructions
- Installation and configuration instructions
- Problem solving information

Part 3 contains safety, specification, service, warranty, and notice information.

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

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## Part 1: Quick Installation Guide

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Part I contains the IBM SCSI Hard Disk Drive installation instructions in abbreviated form. For a description of the hard disk drive and more detailed information about how to install and use the drive, see "Part 2: User's Guide" on page 2-1.



**Caution:** Read the Safety Information in Appendix A, on page 3-1 before installing this product.

In addition to this book, this option package contains:

- SCSI hard disk drive
- Option jumpers
- Mounting screws
- SCSI Hard Disk Drive User's Guide Supplement

### Preparing to Install the Drive

The following general instructions apply to most computers. If you need more information, see the documentation that comes with your computer.

1. Each SCSI device, including the SCSI adapter, must be assigned a SCSI identification number (ID). Use the following information to select the SCSI ID.

You cannot assign the same ID to multiple devices on the same SCSI adapter.

The ID you assign to your new drive depends on the number of SCSI devices connected to the SCSI adapter, the SCSI IDs already assigned to those devices, and the maximum number of IDs for your SCSI adapter.

SCSI ID 7 is normally reserved for the SCSI adapter.

Assign the higher priority SCSI IDs (the highest priority is normally 7) to devices, such as hard disk drives, that are faster and are used the most. Assign lower priority SCSI ID numbers to slower SCSI devices, such as CD-ROM drives and tape drives. SCSI ID priorities are assigned by the SCSI adapter.

Most SCSI adapters require a specific ID, such as ID 6, for the drive that contains the operating system and will be your startup drive.

Determine which SCSI IDs are already assigned to avoid assigning duplicate ID numbers. Some SCSI adapters have a utility program that you can use to identify the SCSI IDs that are already in use.

2. Turn off all attached devices before turning off the computer. Unplug the power cord for the computer; then open the computer.
3. Before opening the static-protective bag containing the drive, touch the bag to an unpainted metal surface on the computer for at least two seconds. Remove the drive from the static-protective bag and handle it by the edges. Do not touch any exposed components on the drive.
4. Set the SCSI ID.

**Note:** See the SCSI Hard Disk Drive User's Guide Supplement for more information about the configuration jumper block.

The SCSI ID positions on the jumper block are **SCSI ID 3 2 1 0**. Each pin position is assigned a value based on its position on the configuration jumper block. The total value of the positions where you place jumpers determines the SCSI ID for the drive. The jumper pin position values are:

Jumper SCSI ID = SCSI ID Value 1  
Jumper SCSI ID 1 = SCSI ID Value 2  
Jumper SCSI ID 2 = SCSI ID Value 4  
Jumper SCSI ID 3 = SCSI ID Value 8

SCSI ID Value 8 is only available on fast/wide SCSI hard disk drives.

For example:

If you do not install jumpers, the SCSI ID is .  
If you install jumpers on ID and 1, the SCSI ID is 3.  
If you install jumpers on ID 1 and 2, the SCSI ID is 6.  
If you install jumpers on ID 1 and 3, the SCSI ID is 1.

Save any spare jumpers; you might have to change the SCSI ID. Do not store spare jumpers on the jumper block. They can damage the drive.

5. Set the Auto-Start jumper.

If auto-start is enabled, the drive starts when the computer is turned on. If auto-start is not enabled the drive does not start until it receives the Start Unit command from the SCSI adapter. See the SCSI Hard Disk Drive User's Guide Supplement to determine if auto-start is enabled or disabled for your drive. If auto-start is disabled, most SCSI adapters sequence drive startup by sending the Start Unit commands to the drives one at a time starting with the highest priority SCSI ID.

Be sure that auto-start is disabled when you are installing the hard disk drive in an IBM PC server.



For more information about drive startup, see the documentation that comes with your SCSI adapter.

6. Terminate the drive if it is at the end of the chain.

A SCSI device chain is made up of one or more SCSI devices connected by a SCSI cable to a SCSI adapter. To make sure your devices operate properly, you must terminate the device end of the SCSI chain. If your new SCSI Hard disk drive will be at the end of the chain, place a jumper on the enable active-termination pins unless the SCSI cable is self-terminating. The factory setting normally is; no active-termination jumper installed.

Do not end the SCSI chain with devices that use passive termination, such as some CD-ROMs, tape drives, and optical drives. Be sure that only one device, the device at the end of the SCSI cable, is terminated. If your new drive is not at the end of the SCSI cable, do not install a terminating jumper.

---

## Installing the Drive

Follow these instructions to install the drive. If you need more information, see the documentation that comes with your computer.

1. Mount the drive in either a horizontal or vertical position. Use the mounting screws in the option package to secure the hard disk drive into position. (Using other screws might damage the drive.) If you are installing the hard disk drive in a 5.25-inch bay, you will need expansion brackets (not included) to mount the drive.
2. Connect the drive to a free SCSI interface cable connector.

The drive position on the SCSI cable is not related to the SCSI ID you assign to the drive or to the drive letter assigned by your operating system. For best signal quality, connect your first SCSI device at the end connector opposite the SCSI adapter. If you are installing more than one SCSI device, start at the first free connector on the end opposite the adapter and work toward the adapter.

3. Connect an available power-cable connector to the four-pin power connector on the drive. Replace the computer cover and reconnect any disconnected cables. Reconnect the ac power cord to the computer and turn the computer on.

The first time you start your computer after installing the new drive, you might have to answer questions about the new configuration or you might have to use the SCSI adapter utility program to update the configuration.

If you installed the drive in an IBM server using Windows NT, open the Disk Administrator and follow the instructions on the screen to configure your drive. If you are using an operating system such as Novell or UNIX, see the documentation that comes with your operating system.

#### Notes:

1. If you are installing the primary drive in a Micro Channel computer, you might have to restore the IML or System Partition using your Reference and Diagnostic Diskettes.
2. If you are installing a secondary drive in a Micro Channel computer, you must configure the drive using your System Partition or Reference Diskette. Refer to your computer documentation for more information about Micro Channel requirements.

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## Preparing the Drive for Use

**Attention:** Partitioning and formatting a hard disk drive erases all user data on the drive.

You must partition and format your drive before you can use it. If you want to start your operating system from a hard disk drive (the primary drive), the drive must have an active primary partition (normally C). You can then use the remaining space on the disk for an extended partition that you can divide into logical drives.

In most computers that have an IDE hard disk drive, you cannot restart the computer from the SCSI hard disk drive. Normally, only the primary partition on the IDE drive can be *active* (contains your operating system and is used for startup) and only the *active* partition can be used as the startup drive. If your SCSI hard disk drive contains a primary partition, it must be *inactive*. If you are unsure about restarting your computer from the SCSI hard disk drive, see the documentation that comes with your computer and SCSI adapter.

## Selecting a Primary Partition or Logical Drive Size

The largest primary partition or logical disk size that you can create under the DOS, Microsoft Windows 95, Windows 3.x, and OS/2 operating systems using the file allocation table (FAT) conventions is approximately 2.14 GB. (When referring to hard-disk-drive capacity, GB means 1 000 000 000 bytes.)

If you are using another operating system, such as Novell or Windows NT, see the documentation that comes with your computer and operating system for information about partition sizing.

If you are installing a drive larger than 2.14 GB and you are using the FAT conventions, you must create multiple partitions.

To create multiple partitions:

Select a primary partition size and create the primary partition.

Create an extended logical partition using the remaining space on the drive.

Create one or more logical drives in the extended partition.

If you are using OS/2 and HPFS, see your operating system documentation for information about partition sizing.

If you are using the Fixed Disk Setup Program (FDISK) to create partitions and logical drives and you want to create the maximum size primary partition or logical drive (2.14 GB), you must specify the size as 2047 MB. (FDISK uses the software industry binary-base number system where one binary MB is 1 048 576 bytes.)

## Preparing the Primary Drive for DOS or Windows under DOS

If you are installing the drive that will contain your operating system (the primary drive), find your operating system installation diskettes and insert the first operating system installation diskette into the diskette drive (or insert the operating system installation CD if your operating system is installed from the CD-ROM drive). Restart your computer. The operating system screens lead you through partitioning and formatting the drive.

After you create the primary partition, you can use the remaining disk space for an extended partition. The operating system prompts you to partition the free space during the installation process. Follow the instructions on the screen to create one or more logical drives within the extended partition.

## Preparing a Secondary Drive for DOS or Windows under DOS

A secondary drive is any hard disk drive that does not contain the active primary partition (the partition that contains your operating system). Normally you allocate all of the disk space on a secondary drive to an extended partition and then create logical drives in the extended partition. For more information about creating partitions see the documentation that comes with your operating system.

The following example uses the FDISK and FORMAT commands to partition and format an extended partition on a secondary hard disk drive.

1. At the DOS prompt, type **fdisk** and press **Enter**.
2. FDISK displays the current fixed-disk drive message, containing the current fixed-disk drive number, above the FDISK menu. The fixed-disk drive number is not associated with the logical drive letters assigned by FDISK. Check the current fixed disk drive number to be sure that you partition the correct hard disk drive.  
  
The default current fixed disk drive is the fixed disk drive containing the active primary partition (drive C). To change the fixed disk drive number for the secondary drive:
  - a. Select **Change current fixed disk** from the FDISK menu.
  - b. Select the new drive number from the drive list.
  - c. Return to the FDISK menu.
3. Select **Create DOS partition or Logical DOS Drive** and press **Enter**.
4. Select **Create Extended DOS Partition** and press **Enter**. The default size is the remaining space on the drive. You must accept the default size to use the full capacity of your drive.
5. The Create Logical DOS Drive(s) in the Extended DOS Partition screen displays. Follow the instructions on the screen to create one or more logical drives within the extended partition.
6. When you are finished Press **ESC** to return from FDISK.
7. When you are prompted, restart your computer and format your logical drives.

8. To format a logical drive, type *format x:* (where *x* is the logical drive letter assigned by FDISK) at the DOS prompt and press **Enter**.

### **Preparing the Primary Drive for OS/2**

If the drive you are installing will be the primary drive and you are using OS/2 2.0, OS/2 2.11, or OS/2 Warp 3.0, use the following procedure to partition and format your new hard disk drive.

1. Insert the *OS/2 Installation Diskette* into drive A.
2. Turn on your computer.
3. When the OS/2 logo screen displays, remove the diskette.
4. Insert *Diskette 1* and press **Enter**.
5. Follow the instructions on the screen to complete the drive preparation.

### **Preparing a Secondary Drive for OS/2**

To partition and format a secondary hard disk drive under OS/2, use the FDISK and FORMAT programs. The procedures are similar to those used for DOS or Windows under DOS.

### **Preparing a Drive for Windows NT**

To partition and format a primary hard disk drive under Windows NT, answer the drive preparation questions that display while you are installing your Windows NT operating system.

To partition and format a secondary hard disk drive under Windows NT, open the Disk Administrator icon and follow the instructions for partitioning and formatting a hard disk drive.

If you are using another operating system, such as Novell or UNIX see the documentation that comes with your operating system for information about partitioning and formatting a hard disk drive.

### *Introduction*

The IBM SCSI Hard Disk Drive is a 3.5-inch drive that meets the Small Computer System Interface (SCSI) standard set by the American National Standards Institute (ANSI). The drive can only be installed in a computer that uses the SCSI architecture.

You can configure your new SCSI hard disk drive in the following ways:

Single-drive configuration

- To add a hard disk drive to a computer
- To replace an installed hard disk drive

Multiple-drive configuration

- To operate with installed IDE hard disk drives
- To operate with installed SCSI hard disk drives

In addition to this book, this option package contains:

- SCSI hard disk drive
- Jumpers
- Mounting screws
- SCSI Hard Disk Drive User's Guide Supplement

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

### *Before You Begin*

If you are installing the SCSI hard disk drive in a disk-array system, do not use these installation instructions. See the instructions that come with the disk-array system.

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### **Preparing for Installation**

To install the SCSI hard disk drive you need the following:

#### **Documentation**

The documentation that comes with your computer, SCSI adapter, and operating system.

#### **SCSI adapter and SCSI interface cable**

Your computer must have a SCSI adapter and a SCSI cable with an available interface connector. If you are not sure about your computer interface type, see the documentation that comes with your computer.

#### **Drive mounting location**

The hard disk drive you are installing is designed for a 3.5-inch bay, but it can be adapted to fit into a 5.25-inch bay.

To mount the hard disk drive in a 5.25-inch bay, you will need to attach a pair of 3.5-inch to 5.25-inch adapter brackets (available from your IBM reseller, computer dealer, or electronics store). You

might need flat-blade and Phillips-head screwdrivers to install the drive.

Some installations also require mounting rails in addition to the brackets (available at your computer dealer or electronics store). Special mounting hardware is needed for some installations. If you are not sure about what is needed for your computer, contact your dealer or refer to the documentation that comes with your computer.

#### **Software**

An operating system such as:

- DOS 5.0 or later
- Windows 3.x or later
- Windows 95
- Windows NT
- OS/2

If you are installing the hard disk drive as the primary drive (startup drive) in a Micro Channel computer, you will need the Reference Diskette and Diagnostic Diskette for your computer.

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### **Planning Partition Sizes**

You must partition and format the hard disk drive before you can use it. Your operating system uses partitions to efficiently organize the data and files on the drive. If you want to start your operating system from a hard disk drive (the primary drive), the drive must have an active primary partition (normally C). You can use the remaining space on the drive for an extended partition that you can divide into logical drives.

In most computers that have an IDE hard disk drive, you cannot restart the computer from the SCSI hard disk drive. Normally, only the primary partition on the IDE drive can be *active* (contains your operating system and is used for startup) and only the *active* partition can be used as the startup drive. If your SCSI hard disk drive contains a primary partition, it must be *inactive*. If you are unsure about restarting your computer from the SCSI hard disk drive, see the documentation that comes with your computer and SCSI adapter.

### **Sizing the Primary Partition**

The largest primary partition or logical disk size that you can create using the DOS, Windows 95, Windows 3.x, and OS/2 operating systems that use the file allocation table (FAT) conventions is approximately 2.14 GB. (When referring to hard-disk-drive capacity, GB means 1 000 000 000 bytes.)

If you are using another operating system, such as Novell, UNIX or Windows NT, see the documentation that comes with your computer and operating system for information about partition sizing.

If you are installing a drive larger than 2.14 GB and you are using the FAT conventions, you must create multiple partitions. To create multiple partitions:

Select a primary partition size and create the primary partition.

Create an extended logical partition using the remaining space on the drive.

Create one or more logical drives in the extended partition.

If you are using OS/2 and HPFS, see your operating system documentation for information about partition sizing.

If you are using the Fixed Disk Setup Program (FDISK) to create partitions and logical drives and you want to create the maximum size primary partition or logical drive (2.14 GB), you must specify the size as 2047 MB. (FDISK uses the software industry binary-base number system where one binary MB is 1 048 576 bytes.)

**Note:** If you are installing the hard disk drive that will contain your primary partition, install the operating system as part of the installation procedure.

## Selecting a Primary Partition or Logical Drive Size

Base your partitions and partition sizes on how you use your computer.

Use a larger partition size for the convenience of having many files in one directory structure or for large databases.

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

Partition Size	Cluster Size (FAT)
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 - 1.07 GB	16 KB
1.07 GB - 2.14 GB	32 KB

These examples illustrate how partition size relates to data storage efficiency.

If you create a 2.14 GB partition (2047 binary MB), each disk cluster is 32 KB. (In binary notation, KB means 1 024 bytes.) A one KB file uses one cluster (32 KB) of disk space.

If the partition size is 1.00 GB (977 binary MB), the cluster size is 16 KB. A one KB file uses one cluster (16 KB) of disk space.

A normal mix of application and data files can include thousands of different sized files. If you replace your disk drive with a larger capacity drive, normally you will create a larger primary partition or logical drive on the new device. When you copy files from a smaller to a larger partition, the same files might take surprisingly more disk space. The increase in disk space for the same files is caused by the increase in cluster size.

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## Backing Up Files

If you are replacing an installed hard disk drive, make a backup copy of the data from the drive that you are replacing.

You can use the XCOPY program to copy groups of files, including directories and subdirectories, from one drive to another. If the destination already contains a file or directory with the same name, XCOPY prompts you for a decision about overwriting the file. If you need more information about XCOPY or backing up your hard disk drive, see the documentation that comes with your operating system.

If you are replacing your primary hard disk drive, read “ Copying Files to Your New Primary Drive.” on page 2-13 before you disconnect the old drive.

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## Creating a System Diskette

If your computer will not restart, you might be able to recover by using a System Diskette. When you restart your computer, the Basic Input/Output System (BIOS) checks the diskette drive for a System Diskette before it checks the primary partition on the hard disk drive.

The System Diskette contains the minimum set of files needed to start your computer. In addition to the minimum set of files, you might want to copy other useful files to the System Diskette, such as FDISK, FORMAT, XCOPY, CHKDSK, and MEM.

To create a System Diskette for DOS (for computers using Microsoft Windows 3.x):

1. Insert a blank diskette into drive A.
2. At the DOS prompt, type **format a: /s**. The /s parameter creates the System Diskette.
3. Follow the instructions on the screen.
4. When the format process completes, copy the FDISK.COM, FORMAT.COM, DISKCOPY.EXE, CHKDSK.COM, and MEM.EXE utility programs from the DOS directory to the diskette.

To create a System Diskette for Windows 95:

1. Click on **Start** from the main screen.
2. Select **Settings**; click on **Control Panel**.
3. From the Control Panel screen, double-click on **Add/Remove Programs**.
4. Select the **Startup Disk** tab; follow the instructions on the screen.



To create Utility (System) Diskettes for OS/2:

1. Double-click on **OS/2 System** on your Desktop.
2. Double-click on **System Setup**.
3. Double-click on **Create Utility Diskettes**. The Create Utility Diskettes screen displays.
4. Follow the instructions on the screen. OS/2 creates three Utility Diskettes.

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## Handling Precautions

Follow these instructions to avoid damage to your hard disk drive during installation.

Do not open the static-protective bag until you are ready to install the drive. Static electricity can damage the drive.

Before opening the static-protective bag containing the drive, touch the bag to an unpainted metal surface on the computer for at least two seconds.

Remove the drive from the bag and handle it by the edges. Handle the drive with care. Dropping or jarring the drive can damage the heads and rotating disks inside the drive housing.

Do not touch any exposed components on the drive.

If you must put the drive down, place the static-protective bag on a flat padded surface, such as a magazine and place the drive on the bag with the component side facing up.

## *Installing the Drive*

These instructions are general guidelines for installing the IBM SCSI Hard Disk Drive in most computers. For specific information, see the documentation that comes with your computer.

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### Step 1. Selecting a SCSI ID

Each SCSI device, including the SCSI adapter, must be assigned a SCSI identification number (ID). You cannot assign the same ID to multiple devices on the same SCSI adapter. The SCSI IDs are 0 to 15 or 0 to 7 depending on your SCSI adapter. ID number 7 is normally reserved for the SCSI adapter. Be sure to read the documentation that comes with your adapter before you install your new drive.

Use the following guidelines to select a SCSI ID:

The SCSI adapter assigns a priority to each SCSI ID number. The higher ID numbers normally are assigned the higher priorities. Assign the higher ID numbers to hard disk drives or other devices that are used most often or are faster than other devices in the SCSI chain. Assign lower ID numbers to slower SCSI devices, such as CD-ROM drives or tape drives.

For example, your SCSI IDs might be assigned as follows:

SCSI adapter	-	SCSI ID 7
SCSI hard disk drive	-	SCSI ID 6
SCSI CD-ROM drive	-	SCSI ID 3
SCSI tape drive	-	SCSI ID 2

Your SCSI adapter might contain a utility program that you can use to find a free SCSI ID number. If your adapter does not have a utility program, you can see the SCSI ID assignments for most SCSI adapters by pressing **Ctrl+A** when the SCSI adapter prompt displays during the computer startup sequence.

For more information about assigning a SCSI ID, see the documentation that comes with your computer or SCSI adapter.

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## Step 2. Opening the Computer

Turn off the computer and unplug the power cords for the computer and all attached devices. Open the computer. For specific information on opening your computer see the documentation that comes with your computer.

If you are replacing your primary hard disk drive, read “ Copying Files to Your New Primary Drive.” on page 2-13 before you disconnect the old drive.

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## Step 3. Unpacking the Drive

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

1. Before opening the static-protective bag containing the drive, touch the bag to an unpainted metal surface on the computer for at least two seconds.
2. Remove the drive from the static-protective bag and handle it by the edges. Do not touch any exposed components on the drive.

3. If you must put the drive down, place the static-protective 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 4. Setting the Jumpers

See the SCSI Hard Disk Drive User’s Guide Supplement in your package for specific information about the jumper block on your hard disk drive.

### Setting the SCSI ID

The SCSI ID positions on the jumper block are **SCSI ID 3 2 1 0**. Each pin position is assigned a value based on its position on the jumper block. The total value of the positions where you place jumpers determines the SCSI ID for the drive. The jumper pin position values are:

Jumper SCSI ID	=	SCSI ID Value 1
Jumper SCSI ID 1	=	SCSI ID Value 2
Jumper SCSI ID 2	=	SCSI ID Value 4
Jumper SCSI ID 3	=	SCSI ID Value 8

SCSI ID Value 8 is only available on fast/wide SCSI hard disk drives.

For example:

If you do not install jumpers, the SCSI ID is .  
If you install jumpers on ID and 1, the SCSI ID is 3.  
If you install jumpers on ID 1 and 2, the SCSI ID is 6.  
If you install jumpers on ID 1 and 3, the SCSI ID is 1 .

Save any spare jumpers; you might have to change the SCSI ID. Do not store spare jumpers on the jumper block. They can damage the drive.

### Setting Auto-Start

**Note:** Be sure that auto-start is disabled when you are installing the hard disk drive in an IBM PC server.

A hard disk drive uses much more power during the startup sequence than in normal operation. If you have more than one hard disk drive, you can configure auto-start to flatten the startup power peak required from the computer power supply as follows:

Use the SCSI Hard Disk Drive User's Guide Supplement to locate the auto-start pin position.

If auto-start is enabled, all attached drives start when the computer is turned on.

If the auto-start position is not enabled the drives are prevented from starting until each drive receives the Start Unit command from the SCSI adapter. See the SCSI Hard Disk Drive User's Guide Supplement to determine if auto-start is enabled or disabled for your drive.

The SCSI adapter sequences drive startup by sending the Start Unit commands to the drives one at a time starting with the highest priority SCSI ID.

For SCSI adapters that do not send the Start Unit command, see the documentation that comes with your SCSI adapter.

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## Step 7. Terminating the SCSI Chain

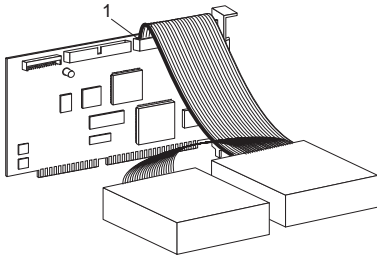
A SCSI device chain is made up of one or more SCSI devices connected by a SCSI cable to a SCSI adapter. To prevent signal reflections on the interface cable, the SCSI device chain must be terminated at the Adapter and at the last device on the SCSI chain. Both ends of the chain must be terminated; *there are no exceptions*.

**Note:** Do not confuse termination power with device termination. The SCSI adapter normally supplies termination power and the SCSI device terminates the chain. For more information about termination power, see the documentation that comes with your SCSI adapter.

To terminate the SCSI chain:

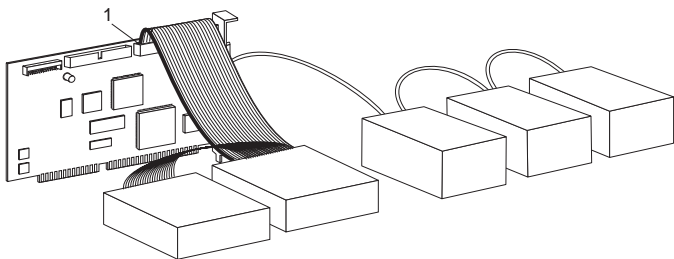
1. Terminate only the ends of the SCSI chain.
2. Remove any terminators or terminating jumpers on devices in the middle of the chain.
3. When installing a hard disk drive in an external enclosure, plug an external terminator into the free connector on the enclosure at the end of the chain. Do not install a termination jumper on the device inside the enclosure.
4. If the SCSI adapter is in the middle of the chain, termination must be disabled on the SCSI adapter and the devices at both ends of the chain must be terminated.

The following illustration shows a two-device internal SCSI chain.



The last device on the SCSI chain and the SCSI adapter must be terminated.

The following illustration shows internal and external device chains attached to the same SCSI adapter.



You must connect active terminators to the SCSI devices at the ends of both cables. In the above configuration, the SCSI adapter is in the *middle* of the chain and is not *terminated*.

If the drive is at the end of an internal SCSI chain, place a jumper in the active-termination position unless the SCSI cable is self-terminating.

If the device at the end of the chain is passively terminated (some CD-ROM, tape, or optical drives), reorder the SCSI chain and put an actively terminated device at the end. Remove the termination from any devices not at the end of the SCSI chain.

When located at the end of the SCSI chain, most external enclosures require you to install an active terminator on the output terminal. Do not terminate a SCSI device installed inside an external enclosure.

### Installing Other Jumpers

Spindle Sync, Parity Disable, Write Protect, Auto Start Delay, Disable Unit Attention, and other jumper positions that might be on the jumper block for your drive are not needed for most installations.

---

### Step 5. Preparing the Drive for a 5.25-inch Bay

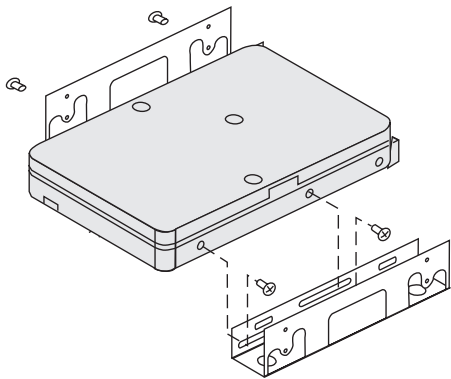
<p><b>Attention:</b> Use the mounting screws that come with the drive to attach the brackets to the drive. Using the wrong size screws might damage the drive.</p>
--

To install the drive in a 5.25-inch bay:

1. Attach a pair of 3.5-inch to 5.25-inch expansion brackets (not included in this option package), as shown in the illustration .

Some computers require special hard disk drive mounting hardware to ensure that the drive fits securely into the bay.

2. Contact your computer dealer or refer to the documentation that comes with your computer if you need specialized mounting hardware or more information.



---

### Step 6. Mounting the Drive in The Bay

To mount the drive in either a horizontal or a vertical bay:

1. Slide the drive into the bay.
2. Align the drive-bay screw holes with the threaded holes in the drive housing (or bracket).
3. Use the mounting screws in the option package, using other screws might damage the drive. Thread the screws to loosely attach the drive to the bay. Usually two screws are used on each

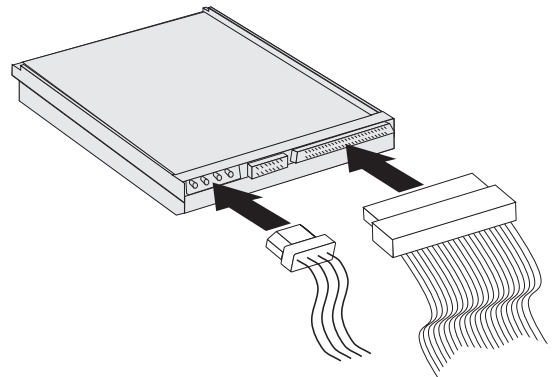
side. Some installations use the screw holes on the bottom (circuit board side) of the drive.

4. Check the drive alignment and tighten the screws. *Do not overtighten.*

---

### Step 8. Attaching the Cables to the Drive

The connector on one end of the internal SCSI interface cable connects to the hard disk drive and the other end connects to the SCSI adapter. For the best signal quality, use the free device connector that gives you the maximum amount of cable between the drive and the SCSI adapter. The SCSI adapter can be on the system board or it can be installed in an expansion slot.



1. Locate a free device connector on the SCSI interface cable. One end of the interface cable connects to the SCSI adapter and the other end has connectors for attaching multiple SCSI devices.

2. Attach an available connector on the interface cable to the connector on the hard disk drive.

If you are connecting your new drive to a SCSI adapter that has 68-pin D-type connectors, the connector is narrower at the top and will fit only one way. If your SCSI adapter has 50-pin connectors, match pin 1 on the drive connector with pin 1 (the colored wire) on the interface cable.

**Attention:** Do not force the power connector into the drive. If the connector does not seat using reasonable pressure, turn it around and try again.

3. Find an unattached power connector coming from the computer power supply and attach it to the four-pin dc power connector on the back of the drive.

If all power cables are in use, purchase a dc Y-connector (available at most electronic stores) and split a connection to make room for more devices.

---

## Step 9. Closing the Computer

To complete the hardware section of the drive installation:

1. Be sure that the hard disk drive is securely mounted and the connectors are firmly attached.
2. Be sure 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.
5. Check your keyboard, mouse, and monitor for loose connections.
6. Plug all power cords into electrical outlets.

The first time you restart your computer after installing the new drive, you might have to use the SCSI adapter utility program to update the configuration information.

### Notes:

1. If you are installing the primary drive in a Micro Channel computer, you might have to restore the IML or System Partition using your Reference and Diagnostic Diskettes.
2. If you are installing a secondary drive in a Micro Channel computer, you must configure the drive using your System Partition or Reference Diskette.

Refer to your computer documentation for more information about Micro Channel requirements.

## *Preparing the Drive for Use*

**Attention:** Partitioning and formatting a hard disk drive erases all user data on the drive.

You must partition and format the hard disk drive before you can use it. If you want to start your operating system from the drive (primary drive), the drive must have an active primary partition (normally C). You can use the remaining space on the drive for an extended partition that you can divide into logical drives.

In most computers that have an IDE hard disk drive, you cannot restart the computer from the SCSI hard disk drive. Normally, only the primary partition on the IDE drive can be *active* (contains your operating system and is used for startup) and only the *active* partition can be used as the startup drive. If your SCSI hard disk drive contains a primary partition, it must be *inactive*. If you are unsure about restarting your computer from the SCSI hard disk drive, see the documentation that comes with your computer and SCSI adapter.

### **Preparing the Primary Drive for DOS or Windows under DOS**

If you are installing the drive that will contain your operating system (the primary drive), find your operating system installation diskettes and insert the first operating system installation diskette into the diskette drive (or insert the operating system installation CD if your operating system is installed from the CD-ROM drive). Restart your computer. The operating system screens lead you through partitioning and formatting the drive.

After creating the primary partition, you can use the remaining disk space for an extended partition. Follow the instructions on the screen to create one or more logical drives within the extended partition.

### **Preparing a Secondary Drive for DOS or Windows under DOS**

A secondary drive is any hard disk drive that does not contain the active primary partition (the partition that contains your operating system). Normally you allocate all of the disk space on a secondary drive to an extended partition and then create logical drives in the extended partition. For more information about creating partitions see the documentation that comes with your operating system.

The following example uses the FDISK and FORMAT commands to partition and format an extended partition on a secondary hard disk drive.

1. At the DOS prompt, type **fdisk** and press **Enter**.
2. FDISK displays the current fixed-disk drive message, containing the current fixed-disk drive number, above the FDISK menu. The fixed-disk drive number is not associated with the logical drive letters assigned by FDISK. Check the current fixed disk drive number to be sure that you partition the correct hard disk drive.

The default current fixed disk drive is the fixed disk drive containing the active primary partition (drive C). To change the fixed disk drive number for the secondary drive:

- a. Select **Change current fixed disk** from the FDISK menu.
  - b. Select the new drive number from the drive list.
  - c. Return to the FDISK menu.
3. Select **Create DOS partition or Logical DOS Drive** and press **Enter**.
  4. Select **Create Extended DOS Partition** and press **Enter**. The default size is the remaining space on the drive. You must accept the default size to use the full capacity of your drive.
  5. The Create Logical DOS Drive(s) in the Extended DOS Partition screen displays. Follow the instructions on the screen to create one or more logical drives within the extended partition.
  6. When you are finished, press **ESC** to return from the FDISK menu.

7. When you are prompted, restart your computer and format your logical drives.
8. To format a logical drive, type *format x:* (where *x* is the logical drive letter assigned by FDISK) at the DOS prompt and press **Enter**.

### Preparing the Primary Drive for OS/2

If the drive you are installing will be the primary drive and you are using OS/2 2.0, OS/2 2.11, or OS/2 Warp 3.0, use the following procedure to partition and format your new hard disk drive.

1. Insert the OS/2 *Installation Diskette* into drive A.
2. Turn on your computer.
3. When the OS/2 logo screen displays, remove the diskette.
4. Insert *Diskette 1* and press **Enter**.
5. Follow the instructions on the screen to complete the drive preparation.

### Preparing a Secondary Drive for OS/2

To partition and format a secondary hard disk drive under OS/2, use the FDISK and FORMAT programs. The procedures are similar to those used for DOS or Windows under DOS.



## Preparing a Drive for Windows NT

To partition and format a primary hard disk drive under Windows NT, answer the drive preparation questions that display while you are installing your Windows NT operating system.

To partition and format a secondary hard disk drive under Windows NT, open the Disk Administrator icon and follow the instructions for partitioning and formatting a hard disk drive.

If you are using another operating system, such as Novell or UNIX, see the documentation that comes with your computer and operating system for information about partitioning and formatting the primary drive.

### Copying Files to Your New Primary Drive.

**Note:** This procedure is included as an alternate method for transferring files from one hard disk drive to another. If you are not sure about your operating system configuration parameters or about applications or files that might be open do not use this procedure.

If you are replacing your primary drive, you can install your operating system and other applications on your new primary drive. As an alternative, you can use the following procedure to copy your installed operating system and applications from your old primary drive to your new primary drive.

1. Leave your existing primary hard disk drive installed and install your new drive as a second drive.

2. Use FDISK to create a primary partition on the new drive. You can have only one active primary partition on the computer so this will be an inactive primary partition.
3. Exit FDISK and restart your computer. FDISK assigns a drive letter to the inactive partition. Use the FORMAT command to format the new drive.
4. Use XCOPY to copy directories and files from the C drive to your inactive primary partition on the new drive. For information about XCOPY options, see the documentation that comes with your operating system. Before you run XCOPY, close all other applications including Windows. If an active application locks data files, the files might not be copied.
5. Open FDISK and display the current drive partitioning information. Select the current startup partition drive number and make this partition inactive (you no longer can restart from this partition).  
  
Select the new drive number and make its primary partition active.
6. Press **ESC** to exit FDISK. Restart your computer when prompted.
7. Turn off your computer and disconnect the power cord. Open up the computer and set the SCSI ID for the new drive to the ID your SCSI adapter requires for the primary drive, for example, SCSI ID 0 or 6. To avoid duplicate SCSI IDs for the two drives, remove the original startup drive or change the SCSI ID of the original drive.

8. Close the computer, reconnect the power cord, and restart the computer. The computer starts from the primary partition on the new drive.

If files are not copied correctly from your old drive, your computer might not start correctly. If this happens you must reinstall your operating system on the new drive. For more information, see the documentation that comes with your operating system.

## ***Solving Problems***

Using the information in this section, you might be able to solve the problem yourself or gather information that you can pass to the service representative when you make your call.

### **Your computer or hard disk drive does not operate correctly.**

Check the drive to ensure that all power and signal cables are securely attached.

Check the SCSI-ID jumper setting. No two SCSI devices can have the same SCSI ID. This includes the SCSI adapter.

Be sure that the last device terminates the SCSI cable. There must be a terminator or a terminating device at the last device on the SCSI cable. You must terminate both internal and external SCSI cables. Remove any terminators on devices that are not at the end of the cable.

If your new drive is at the end of the chain, be sure there is a jumper in the active-termination position.

If you are installing the drive in an IBM PC Server, be sure that auto-start is not active.

Remove the drive. Check for bent or misaligned pins. If there are no problems, reinstall the drive.

### **Your computer does not configure the hard disk drive correctly.**

Most configuration problems are caused by incorrect termination or incorrect SCSI ID configuration. If multiple SCSI devices are attached, disconnect all other SCSI devices on the chain. Assign the highest available SCSI ID to the drive and terminate the drive. Try to detect the drive using your SCSI adapter utility program.

If you have just installed a SCSI adapter and you are now installing the SCSI hard disk drive, your SCSI adapter must be correctly configured before you can activate the drive. To configure the adapter, you might need to know the available I/O addresses, IRQs, and ROM addresses. If you are unable to configure your adapter, you will not be able to use your SCSI device. If you need more information about configuring your adapter, see the documentation that came with your computer or SCSI adapter.

Termination power must be applied to the SCSI bus. This is not the same as signal termination. If your adapter does not supply termination power, power must be supplied by a device on the SCSI bus. Multiple devices can supply termination power to the bus, but only one device can terminate the SCSI chain.

Use the following cable length guidelines for attaching SCSI devices.

- The devices should not be less than 30 cm (11.8 in) apart on the device end of the cable.
- SCSI-2 and Ultra SCSI device cables should not exceed 3 meters (9 ft 10 in).
- If more than four devices are on the SCSI bus, the maximum cable length should not exceed 1.5 meters (4 ft 11 in).

Older SCSI devices might not support synchronous data transfer. If you have an older SCSI drive, CD-ROM, or tape drive in your computer, erratic operation or other problems might occur during *asynchronous* data transfer. If problems occur, remove the other drives on the cable and retry the operation. If this does not solve the problem, try using your SCSI adapter utility to select asynchronous data transfer for use with your SCSI adapter.

If you are installing a hard disk drive with a capacity larger than 1 GB, you might need to install additional software or select additional settings on your SCSI adapter to use the full capacity of your new drive. For more information about preparing drives larger than 1 GB, see “Preparing the Drive for Use” on page 2-11.

If you are attaching an Ultra SCSI device in an external enclosure and the faster data transfer rate does not work, use your Ultra SCSI adapter utility to disable the faster data transfer rate.

#### **You hear a repeated clicking sound when the drive starts.**

The electronics on the drive system board might be shorted to the computer frame. To check for a short, open the computer, support the drive, remove the mounting screws, and test the drive for proper operation. If the drive now operates correctly, you might have created a short by attaching the drive using screws that are too long.

#### **Drive fails to spin up correctly.**

Check for a jumper in the auto-start position. When you install a jumper on the auto-start pins, the hard disk drive motor starts when the computer is turned on. When the auto-start position is open the drive must receive a start command from the SCSI adapter before it can spinup. Some computers expect the drive to be spinning and do not wait for a command from the SCSI adapter. Also, you might have to select additional settings on your SCSI adapter.

If you need more information, see the documentation that comes with your operating system and SCSI adapter.



***Appendix A.***  
***Safety Information***

**To Disconnect:**

**DO NOT** print this page—replace with National Safety Information.

**DO NOT** print this page—replace with National Safety Information.

**DO NOT** print this page—replace with National Safety Information.

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## ***Appendix B.*** ***Technical Support***

Before calling IBM technical support, try to solve the problem problem yourself by using the information in “Solving Problems” on page 2-14. If you are unable to solve the problem yourself, this section contains information on how to reach your IBM technical support representative.

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### **Step 1. Preparing for the Call**

To assist your technical-support representative, have as much of the following information available as possible:

1. Computer manufacturer and model
2. Option name: IBM SCSI Hard Disk Drive
3. Proof of purchase
4. Exact wording of error messages
5. Description of the problem
6. Operating system and version
7. Installed devices and adapters

If possible, be at your computer. Your technical support representative might want to talk you through the problem during the call.

---

### **Step 2. Placing the Call to IBM**

Technical support is available during the warranty period to answer any questions about your new IBM option. Support response time will vary depending on the number and nature of calls received.

If the option is within the warranty period, support service is available. Marketing, installation, and configuration support will be withdrawn from the IBM PC Company HelpCenter 90 days after the option has been effectively withdrawn by marketing. If a call on the option is received 90 days after the effective date of withdrawal for the option, a fee might be charged. Additional assistance is available through the IBM PC Company Fax System, on-line services, and HelpWare offerings.

For the support telephone number and support hours by country, refer to the following table or to the enclosed technical support insert. If the number is not provided in the table or on an insert, contact your IBM reseller or IBM marketing representative.

<i>Support 24 hours a day, 7 days a week</i>	
Canada	1-800-565-3344
Puerto Rico	1-800-772-2227
United States	1-800-772-2227

## Hard Disk Drive Manufacturers

Use the following table for disk manufacturer information. For manufacturers not in the table, contact your IBM reseller.

Manufacturer	Telephone	BBS	Fax	Internet Address
IBM Corporation (USA)	1-800-772-2227	919-517-0001	800-426-3395	<a href="http://www.pc.ibm.com">http://www.pc.ibm.com</a> <a href="http://www.ibm.com">http://www.ibm.com</a>
Maxtor Corporation (USA)	1-800-2MAXTOR	303-678-2222 (2400 baud)	1-800-2MAXTOR 303-678-2260	<a href="http://www.maxtor.com">http://www.maxtor.com</a>
Quantum Peripherals (USA)	1-800-826-8022	1-408-894-3214	1-800-434-7532	<a href="http://www.quantum.com">http://www.quantum.com</a>
Seagate Technology, Inc.	1-800-SEAGATE	408-434-1080	1-800-SEAGATE 408-456-4496	<a href="http://www.seagate.com">http://www.seagate.com</a>
Western Digital Corporation (USA)	714-932-4900 507-286-7900	714-753-1234	714-932-4900 507-286-7900	<a href="http://www.wdc.com">http://www.wdc.com</a>



## ***Appendix C.*** ***Notices***

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