SCSI Hard Disk Drives For IBM PCs

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 (January 1999)

Contents

Safety: Read first

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

Bitte beachten: Vor der Installation dieses Produkts bitte die Sicherheitsinformationen im Anhang (Seite 3-1) durchlesen.

ATTENTION: Lire les Consignes de Sécurité en Annexe, page 3-1, avant d'installer ce produit.

Precaución: Antes de instalar este producto, lea la información sobre seguridad que aparece en el apéndice, páginas 3 a 1.

注意：この製品をインストールする前に、付録ページ 3-1 の安全に関する表示をお読み下さい。

ATTENZIONE: Prima di procedere all'installazione di questo dispositivo, leggere le Informazioni sulla sicurezza nell'Appendice a

ADVERTÊNCIA: Leia a informação sobre segurança no Apêndice, página 3-1, antes de instalar este produto.

OPOZORNĚNÍ: Před instalací tohoto výrobku si přečtěte Informace o bezpečnosti v Dodatku, str. 3-1.

BEMÆRK: Læs sikkerhedsinformationen i tillægget, side 3-1, før du installerer dette produkt.

LET OP: Voordat dit produkt wordt geïnstalleerd dient de informatie over veiligheid in de bijlage op pagina 3-1 gelezen te worden.

ATTENTION: Avant d'installer ce produit, veuillez lire les renseignements en matière de sécurité à la page 3-1 de l'Annexe.

VAROITUS: Lue liitteen sivulla 3-1 olevat turvallisuusohjeet, ennen tämän laitteen asentamista.

זהירות: קרא את הוראות הבטיחות המופיעות בנספח, עמ' 3-1, לפני התקנת מכשיר זה.

FIGYELMEZTETÉS: Mielôtt beszerelné a terméket, olvassa el a függelék 3-1 oldalán található biztonsági információkat.

주의 : 본 제품을 설피하기 전에 부록의 3쪽 1항에 있는 안전 수칙을 숙독한다.

ADVARSEL: Les informasjonen om sikkerhet i Appendiks, side 3-1, før du installerer dette produktet.

UWAGA: Przed zainstalowaniem tego wyrobu należy przeczytać informację dotyczącą bezpieczeństwa w Załączniku na str. 3-1.

CUIDADO: Leia as Informações de Segurança no Anexo, página 3-1, antes de instalar este produto.

小心：請在安裝本產品之前仔細閱讀3-1頁附錄中的安全信息。

Opozorilo: Upoštevajte varnostna obvestila v dodatku, stran 3.-1., preden napravo instalirate.

VARNING: Läs säkerhetsinformationen i bilagan, sid. 3-1 innan du installerar denna produkt.

Product registration

Thank you for purchasing your new IBM Ultra2 SCSI hard drive. Please 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:

http://www.pc.ibm.com/register

IBM will send you information and updates on your registered product unless you indicate on the Web site questionnaire that you do not want to receive further information.

About this book

This book contains user information for the IBM Ultra2 SCSI Hard Disk Drive.

Part 1 contains quick installation instructions in the following languages:

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

Part 2 has more detailed user information and contains:

- IBM Ultra2 SCSI Hard Disk Drive product description
- Preparation and handling instructions
- Installation and configuration instructions
- Problem-solving information

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

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

Part 1: Quick Installation Guide

Part 1 contains the IBM Ultra2 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.

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 IBM computers and to most other 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 table as a guideline for selecting the ideal SCSI ID for your device:

SCSI Device	Ideal SCSI ID
Tape Drive	0
CD-ROM Drive	1
High-density diskette drive	2
Removable hard drive	3
Third hard disk drive	4
Second hard disk drive	5
Startup hard disk drive	6
SCSI adapter	7
Additional hard disk drives	15 through 8 (decreasing order of priority)

The information listed below provides additional guidelines for setting SCSI IDs.

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 6) 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.

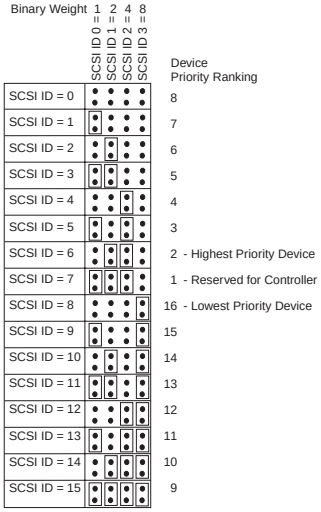
Narrow SCSI devices (devices with 50-pin connectors) such as high-density diskette drives, CD-ROM drives, smaller tape drives and removable hard drives can only connect to the wide bus using a 50/68-pin connector or through a separate 50-conductor cable. These narrow devices can only use SCSI ID addresses 0 through 6. They must be assigned to the lowest priority SCSI IDs available in that range.

Most IBM computer systems ship with the SCSI adapter preset to look to SCSI ID 6 for the startup drive that contains your operating system.

Before you install the drive, determine which SCSI IDs are already assigned to avoid assigning duplicate ID numbers.

2. If you are replacing an installed hard disk drive, make a backup copy of the data from the drive you are replacing.
3. Turn off all attached devices before turning off the computer. Unplug the power cord for the computer; then open the computer.
4. Before opening the static-protective bag containing the drive, touch the bag and your hand to an unpainted metal surface on the computer for at least two seconds in order to discharge static electricity. Remove the drive from the static-protective bag and handle the drive by the edges. Do not touch any exposed components on the drive.
5. Set the SCSI ID for your drive by placing jumpers on the appropriate drive jumper pins. See the diagram below for information on SCSI ID jumper placement.

   Note: The orientation of the jumper pins on the diagram might be the reverse of the orientation of the jumper pins on your drive. Be sure to refer to your *SCSI Hard Disk Drive User's Guide Supplement* to confirm the correct jumper placement.



Save any spare jumpers; you might need to change the SCSI ID later. Refer to the *SCSI Hard Disk Drive User's Guide Supplement* to see if you can safely store spare jumpers on the drive jumper pins.

6. Refer to the *SCSI Hard Disk Drive User's Guide Supplement* to determine if Auto Start (also called Auto Spinup or Motor Start) is enabled on your drive jumper pins. If Auto Start is enabled, this drive starts at once when the computer is turned on. However, starting all drives simultaneously might overload the computer power supply. If you want to sequence drive startup in order to flatten the power peak required for drive startup, be sure that Auto Start is **not** enabled. If Auto Start is not enabled, the drive is prevented from starting until it receives the Start Unit command from the SCSI adapter. Most SCSI adapters send the Start Unit commands to the drives sequentially from SCSI ID 0 to SCSI ID 15.

   Note: If you are installing your drive in a server, be sure that Auto Start is **disabled**.

   On IBM computer systems, use the following instructions to verify that the SCSI adapter will send the Start Unit command to your drive.

   a. Turn on your computer.
   b. Press Ctrl+A at the SCSI Adapter Power-On Self-Test (POST) screen.
   c. Select **Configure/View Host Adapter Settings** and press Enter.
   d. Select **SCSI Device Configurations** and press Enter.
   e. Be sure that **yes** is selected for **Send Start Unit Command** under the SCSI ID assigned to your drive.
   f. Press Esc twice to save changes.
   g. Select **Yes** to exit Utilities.

   For more information, consult your drive and power supply specifications.

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

7. 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 both ends; *there are no exceptions*.

   Termination is subject to the following guidelines:

   Ultra2 SCSI drives do not provide termination.
   You cannot end the SCSI chain with devices that use passive termination, such as some CD-ROM drives, tape drives, and optical drives.
   Only one device, the device at the end of the SCSI cable, a **68**-pin device, can be terminated.
   If the SCSI cable is not self-terminating, 50-pin devices connected by pin converters cannot be at the end of the chain.

Use the table below to determine a termination solution for your drive.

Cabling Scenario	Termination Solution
Computer system with self-terminating SCSI cable	Simply add the drive to the system; the cable provides termination.
Computer system with the last SCSI device terminating the chain	Add the drive, but not at the end of the chain; the last SCSI device provides termination.
The drive will be the only device on a single-drop cable	1. Obtain a Method inline terminator.[1] 2. Attach the inline terminator to the drive, then connect the drive to the single-drop cable. **Note:** Adding the inline terminator will reduce the maximum data transfer speed to 40 MB/sec. .

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, or the special screws with grommets included in some computer systems, 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 3.5-inch-to-5.25-inch conversion hardware (not included) or a tray to mount the drive. You can purchase a conversion kit (PN 70G8165) from your IBM reseller.
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.

[1] *You can purchase an inline active terminator, such as the Method DM6100-02-68 ADR, from Technical Cable Concepts, Inc. (1-800-832-2225 or 1-714-835-1081).*

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 Microsoft Windows NT, open the Disk Administrator and follow the on-screen instructions 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 the documentation that came with your operating system for more information about Micro Channel requirements.

Partitioning and formatting the drive

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.

Each operating system has unique directions for partitioning and formatting a drive. Be sure to refer to the documentation that comes with your operating system before continuing with the instructions below for Windows NT, Windows 98 and 95, OS/2, and DOS and Windows 3.x.

Partitioning and formatting using Windows NT and NTFS

If you added your drive to a computer that has Windows NT on an existing drive, follow the instructions below to partition and format your new SCSI drive using the NTFS (NT File System) convention.

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

If you installed your drive to a computer that had no existing drive, follow the instructions below to partition and format your new SCSI drive for the Windows NT operating system using NTFS.

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

Partitioning and formatting using Windows 98 or Windows 95 and FAT32

See your operating system user's guide for instructions on partitioning and formatting a drive using Windows 98 or Windows 95.

The latest releases of Microsoft operating systems, including Windows 98 and Windows 95 OSR2, have an option for a 32-bit file allocation table called FAT32. FAT32 supports partitions as large as 2 TB[2] and cluster sizes of 4 KB[3] for partitions up to 8 GB.[4] 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.

If you have FAT16, partition your drive using instructions given in "Partitioning and formatting using DOS or Windows 3.x and FAT16."

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2 *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.*

3 *When referring to cluster sizes, KB (kilobyte) means 1 024 bytes.*

4 *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.*

Partitioning and formatting using OS/2 and HPFS

If you are using OS/2, you can use the high performance file system (HPFS) developed for OS/2, or 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 instructions on using FAT16 to partition a drive, go to "Partitioning and formatting using DOS or Windows 3.x and FAT16."

To prepare the new drive using OS/2:

1. Partition and format your new drive for OS/2 using the FAT16 or HPFS file system, or both FAT16 and HPFS, using directions given 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.

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

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

If you use the DOS-based Fixed Disk Setup Program (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. (FDISK uses the software industry binary-base number system where one binary MB is 1 048 576 bytes.)

Partitioning and formatting using DOS or Windows 3.x and FAT16

The largest partition size that you can create using the 16-bit file allocation table (FAT16) file is approximately 2.14 GB.

If you are installing a drive larger than 2.14 GB and you are using the FAT16 convention, 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 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.

Preparing the primary drive for DOS or Windows 3.x

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 3.x

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.

Quick Installation (Translate)

Part 1 contains the IBM Ultra2 SCSI Hard Disk Drive installation instructions in abbreviated form.

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 IBM computers and to most other 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 table as a guideline for selecting the ideal SCSI ID for your device:

SCSI Device	Ideal SCSI ID
Tape Drive	0
CD-ROM Drive	1
High-density diskette drive	2
Removable hard drive	3
Third hard disk drive	4
Second hard disk drive	5
Startup hard disk drive	6
SCSI adapter	7
Additional hard disk drives	15 through 8 (decreasing order of priority)

The information listed below provides additional guidelines for setting SCSI IDs.

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 6) 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.

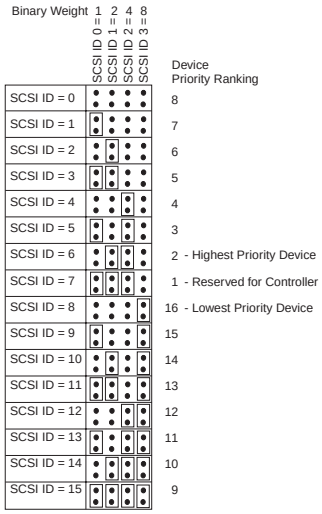
Narrow SCSI devices (devices with 50-pin connectors) such as high-density diskette drives, CD-ROM drives, smaller tape drives and removable hard drives can only connect to the wide bus using a 50/68-pin connector or through a separate 50-conductor cable. These narrow devices can only use SCSI ID addresses 0 through 6. They must be assigned to the lowest priority SCSI IDs available in that range.

Most IBM computer systems ship with the SCSI adapter preset to look to SCSI ID 6 for the startup drive that contains your operating system.

Before you install the drive, determine which SCSI IDs are already assigned to avoid assigning duplicate ID numbers.

2. If you are replacing an installed hard disk drive, make a backup copy of the data from the drive you are replacing.
3. Turn off all attached devices before turning off the computer. Unplug the power cord for the computer; then open the computer.
4. Before opening the static-protective bag containing the drive, touch the bag and your hand to an unpainted metal surface on the computer for at least two seconds in order to discharge static electricity. Remove the drive from the static-protective bag and handle the drive by the edges. Do not touch any exposed components on the drive.
5. Set the SCSI ID for your drive by placing jumpers on the appropriate drive jumper pins. See the diagram below for information on SCSI ID jumper placement.

   Note: The orientation of the jumper pins on the diagram might be the reverse of the orientation of the jumper pins on your drive. Be sure to refer to your *SCSI Hard Disk Drive User's Guide Supplement* to confirm the correct jumper placement.



   Save any spare jumpers; you might need to change the SCSI ID later. Refer to the *SCSI Hard Disk Drive User's Guide Supplement* to see if you can safely store spare jumpers on the drive jumper pins.

6. Refer to the *SCSI Hard Disk Drive User's Guide Supplement* to determine if Auto Start (also called Auto Spinup or Motor Start) is enabled on your drive jumper pins. If Auto Start is enabled, this drive starts at once when the computer is turned on. However, starting all drives simultaneously might overload the computer power supply. If you want to sequence drive startup in order to flatten the power peak required for drive startup, be sure that Auto Start is **not** enabled. If Auto Start is not enabled, the drive is prevented from starting until it receives the Start Unit command from the SCSI adapter. Most SCSI adapters send the Start Unit commands to the drives sequentially from SCSI ID 0 to SCSI ID 15.

   Note: If you are installing your drive in a server, be sure that Auto Start is **disabled**.

   On IBM computer systems, use the following instructions to verify that the SCSI adapter will send the Start Unit command to your drive.

   a. Turn on your computer.
   b. Press Ctrl+A at the SCSI Adapter Power-On Self-Test (POST) screen.
   c. Select **Configure/View Host Adapter Settings** and press Enter.
   d. Select **SCSI Device Configurations** and press Enter.
   e. Be sure that **yes** is selected for **Send Start Unit Command** under the SCSI ID assigned to your drive.
   f. Press Esc twice to save changes.
   g. Select **Yes** to exit Utilities.

   For more information, consult your drive and power supply specifications.

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

7. 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 both ends; *there are no exceptions*.

   Termination is subject to the following guidelines:

   Ultra2 SCSI drives do not provide termination.
   You cannot end the SCSI chain with devices that use passive termination, such as some CD-ROM drives, tape drives, and optical drives.
   Only one device, the device at the end of the SCSI cable, a **68**-pin device, can be terminated.
   If the SCSI cable is not self-terminating, 50-pin devices connected by pin converters cannot be at the end of the chain.

Use the table below to determine a termination solution for your drive.

Cabling Scenario	Termination Solution
Computer system with self-terminating SCSI cable	Simply add the drive to the system; the cable provides termination.
Computer system with the last SCSI device terminating the chain	Add the drive, but not at the end of the chain; the last SCSI device provides termination.
The drive will be the only device on a single-drop cable	1. Obtain a Method inline terminator.[5] 2. Attach the inline terminator to the drive, then connect the drive to the single-drop cable. **Note:** Adding the inline terminator will reduce the maximum data transfer speed to 40 MB/sec. .

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, or the special screws with grommets included in some computer systems, 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 3.5-inch-to-5.25-inch conversion hardware (not included) or a tray to mount the drive. You can purchase a conversion kit (PN 70G8165) from your IBM reseller.
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.

[5] *You can purchase an inline active terminator, such as the Method DM6100-02-68 ADR, from Technical Cable Concepts, Inc. (1-800-832-2225 or 1-714-835-1081).*

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 Microsoft Windows NT, open the Disk Administrator and follow the on-screen instructions 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 the documentation that came with your operating system for more information about Micro Channel requirements.

Partitioning and formatting the drive

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.

Each operating system has unique directions for partitioning and formatting a drive. Be sure to refer to the documentation that comes with your operating system before continuing with the instructions below for Windows NT, Windows 98 and 95, OS/2, and DOS and Windows 3.x.

Partitioning and formatting using Windows NT and NTFS

If you added your drive to a computer that has Windows NT on an existing drive, follow the instructions below to partition and format your new SCSI drive using the NTFS (NT File System) convention.

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

If you installed your drive to a computer that had no existing drive, follow the instructions below to partition and format your new SCSI drive for the Windows NT operating system using NTFS.

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

Partitioning and formatting using Windows 98 or Windows 95 and FAT32

See your operating system user's guide for instructions on partitioning and formatting a drive using Windows 98 or Windows 95.

The latest releases of Microsoft operating systems, including Windows 98 and Windows 95 OSR2, have an option for a 32-bit file allocation table called FAT32. FAT32 supports partitions as large as 2 TB[6] and cluster sizes of 4 KB[7] for partitions up to 8 GB.[8] 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.

If you have FAT16, partition your drive using instructions given in "Partitioning and formatting using DOS or Windows 3.x and FAT16."

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6 *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.*

7 *When referring to cluster sizes, KB (kilobyte) means 1 024 bytes.*

8 *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.*

Partitioning and formatting using OS/2 and HPFS

If you are using OS/2, you can use the high performance file system (HPFS) developed for OS/2, or 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 instructions on using FAT16 to partition a drive, go to "Partitioning and formatting using DOS or Windows 3.x and FAT16."

To prepare the new drive using OS/2:

1. Partition and format your new drive for OS/2 using the FAT16 or HPFS file system, or both FAT16 and HPFS, using directions given 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.

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

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

If you use the DOS-based Fixed Disk Setup Program (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. (FDISK uses the software industry binary-base number system where one binary MB is 1 048 576 bytes.)

Partitioning and formatting using DOS or Windows 3.x and FAT16

The largest partition size that you can create using the 16-bit file allocation table (FAT16) file is approximately 2.14 GB.

If you are installing a drive larger than 2.14 GB and you are using the FAT16 convention, 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 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.

Preparing the primary drive for DOS or Windows 3.x

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 3.x

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.

Product registration

Thank you for purchasing your new IBM Ultra2 SCSI hard drive. Please 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:

http://www.pc.ibm.com/register

IBM will send you information and updates on your registered product unless you indicate on the Web site questionnaire that you do not want to receive further information.

Product service and warranty information

For technical support, support hours, and warranty terms and conditions, see the enclosed inserts, or contact your IBM reseller or IBM marketing representative.

Part 2: User's Guide

Product description

Your SCSI hard disk drive is a new Ultra2 SCSI device that uses low-voltage differential (LVD) signal transmission that can accelerate data transfer speed and lengthen a SCSI device chain. Ultra2 SCSI devices, working only with other Ultra2 SCSI devices on a SCSI device chain, provide a maximum instantaneous data transfer rate of 80 MB/sec. You can also connect up to 16 Ultra2 SCSI devices together on a SCSI device cable that can be as long as 12 meters. Ultra2 SCSI drives also have single-ended transceivers which allow the drives to work with single-ended SCSI devices. However, when an Ultra2 SCSI drive is connected with single-ended devices on a SCSI device chain, the maximum data transfer rate is reduced to 40 MB/sec, and the maximum SCSI cable length for the device chain is reduced to 3 meters when less than four devices are on the chain or 1.5 meters when four or more devices are on the chain.

Your Ultra2 SCSI drive meets the Small Computer System Interface (SCSI) standard set by the American National Standards Institute (ANSI), and can be installed only in a computer that uses the SCSI architecture.

You can configure your new SCSI hard disk drive in any of 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
Option 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.

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 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 3.5-inch-to-5.25-inch conversion hardware (not included). You can purchase a conversion kit (PN 70G8165) from your IBM reseller. You might need flat-blade and Phillips-head screwdrivers to install the drive.

Some installations also require mounting rails or other special hardware in addition to the conversion hardware.

Software
An operating system such as:

Windows NT
Windows 98
Windows 95
Windows 3.x
OS/2
DOS 5.0 or later

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.

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 “Copying files to your new primary drive” on page 2-15, or the documentation that comes with your operating system.

Creating a system diskette

If your computer will not restart, you might be able to recover by using a System Diskette. The System Diskette allows 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. 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:

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 on-screen instructions.
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 98 or Windows 95:

1. Click **Start** from the main screen.
2. Select **Settings**; click **Control Panel**.
3. From the Control Panel screen, double-click **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 **OS/2 System** on your Desktop.
2. Double-click **System Setup**.
3. Double-click **Create Utility Diskettes**. The Create Utility Diskettes screen displays.
4. Follow the instructions on the screen. OS/2 creates three Utility Diskettes.

You can also create the Utility Diskettes from the OS/2 CD-ROM by running **cdinst.cmd** from the file directory.

Installing the drive

These instructions are general guidelines for installing the IBM Ultra2 SCSI Hard Disk Drive in most computers. For specific information, see the documentation that comes with your computer.

Step 1. Selecting a SCSI ID

Each SCSI device, including the SCSI adapter, must be assigned a SCSI identification number (ID). Use the following table as a guideline for selecting the ideal SCSI ID for your device:

SCSI Device	Ideal SCSI ID
Tape Drive	0
CD-ROM	1
High-density diskette drive	2
Removable hard drive	3
Third hard disk drive	4
Second hard disk drive	5
Startup hard disk drive	6
SCSI adapter	7
Additional hard disk drives	15 through 8 (decreasing order of priority)

For more information on setting SCSI IDs, use the following guidelines.

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 6) 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.

Narrow SCSI devices (devices with 50-pin connectors) such as high-density diskette drives, CD-ROM drives, smaller tape drives and removable hard drives can only connect to the wide bus using a 50/68-pin connector, or through a separate 50-conductor cable. These narrow devices can only use SCSI ID addresses 0 through 6. They must be assigned to the lowest priority SCSI ID's available in that range.

Most IBM computer systems ship with the SCSI adapter preset to look to SCSI ID 6 for the startup drive that contains your operating system.

Before you install the drive, determine which SCSI IDs are already assigned to avoid assigning duplicate ID numbers.

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 2-15 before you disconnect the old drive.

Step 3. Unpacking the drive

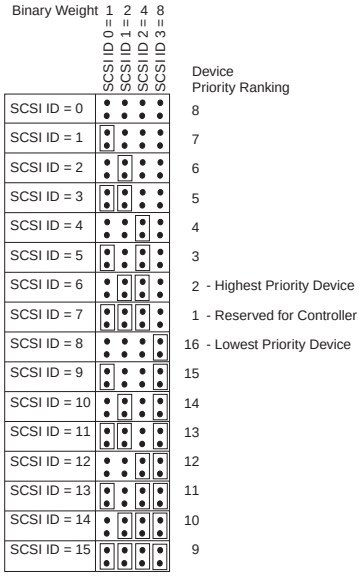
Use the following procedure to unpack and handle the drive. To prevent damage to the drive, limit handling to a minimum.

1. Before opening the static-protective bag containing the drive, touch the bag and your hand 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.

Step 4. Setting the SCSI ID for the drive

Set the SCSI ID for your drive by placing jumpers on the appropriate drive jumper pins. See your *SCSI Hard Disk Drive User’s Guide Supplement* and the diagram below for information on SCSI ID jumper placement.

Note: The orientation of the jumper pins on the diagram might be the reverse of the orientation of the jumper pins on your drive. Be sure to use the *SCSI Hard Disk Drive User’s Guide Supplement* to confirm the correct jumper placement.



Save any spare jumpers; you might have to change the SCSI ID. Refer to the *SCSI Hard Disk Drive User's Guide Supplement* to see if you can safely store spare jumpers on the drive jumper pins.

Step 5. Determining whether to disable Auto Start or Auto Spinup

> **Note:** Be sure that Auto Start is disabled when you are installing the hard disk drive in an IBM PC server.

Refer to the *SCSI Hard Disk Drive User's Guide Supplement* to determine if Auto Start (also called Auto Spinup or Motor Start) is enabled on your drive jumper pins. If Auto Start is enabled, this attached drive starts at once when the computer is turned on. However, starting two or more drives simultaneously might overload the computer power supply. If you want to sequence drive startup in order to flatten the power peak required for drive startup, be sure that Auto Start is **not** enabled. If Auto Start is not enabled, the drive is prevented from starting until it receives the Start Unit command from the SCSI adapter. Most SCSI adapters send the Start Unit commands to the drives sequentially from SCSI ID 0 to SCSI ID 15.

On IBM computer systems, you must use the following instructions to verify that the SCSI adapter will send the Start Unit command to your drive.

1. Turn on your computer.
2. Press Ctrl+A at the SCSI Adapter Power-On Self-Test (POST) screen.
3. Select **Configure/View Host Adapter Settings** and press Enter.
4. Select **SCSI Device Configurations** and press Enter.
5. Be sure that **yes** is selected for **Send Start Unit Command** under the SCSI ID assigned to your drive.
6. Press Esc twice to save changes.
7. Select **Yes** to exit Utilities.

For more information, consult your drive and power supply specifications.

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

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

Installing other jumpers

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

Step 6. Terminating the SCSI chain

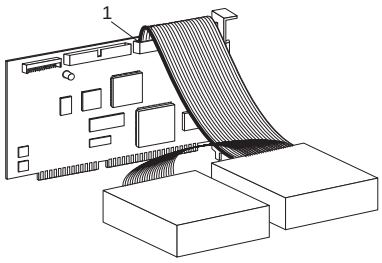
Note: Do not confuse termination power with device termination. The SCSI adapter normally supplies termination power and the SCSI device terminates the chain. For more information about termination power, see the documentation that comes with your SCSI adapter.

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 SCSI cable, the SCSI device chain must be terminated with active terminators at both ends; *there are no exceptions*.

Termination is also subject to the following guidelines:

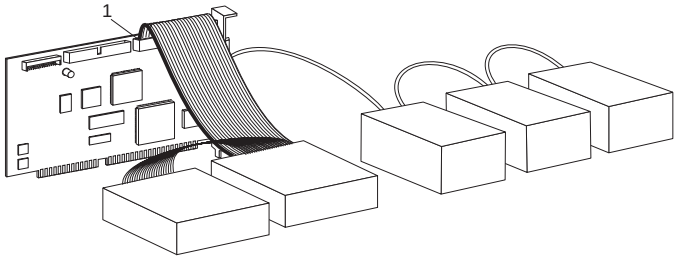
Ultra2 SCSI drives do not provide termination.

Be sure to terminate only the *ends* of the SCSI chain. For example, the last device and the SCSI adapter `1` shown in the diagram below must be terminated.



Remove any terminators or terminating jumpers on devices in the middle of the chain.

In the diagram below, the SCSI adapter `1` is in the *middle* of the chain and is not *terminated*.



You cannot end the SCSI chain with devices that use passive termination, such as some CD-ROM drives, tape drives, and optical drives.

Only one device, the device at the end of the SCSI cable, a **68**-pin device, can be terminated.

If the SCSI cable is not self-terminating, 50-pin devices connected by pin converters cannot be at the end of the chain.

If the hard disk drive in an external enclosure needs termination, plug an external terminator into the free connector on the enclosure at the end of the chain. Do not also install a termination jumper on the device inside the enclosure.

Use the table below to determine a termination solution for your drive.

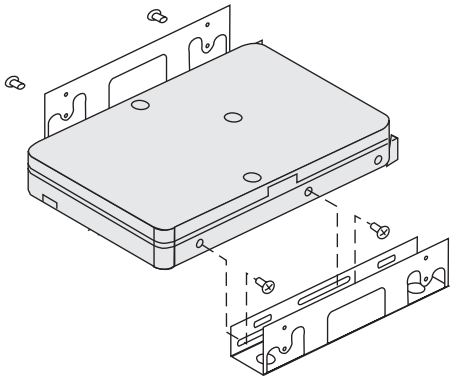
Cabling Scenario	Termination Solution
Computer system with self-terminating SCSI cable	Simply add the drive to the system; the cable provides termination.
Computer system with the last SCSI device terminating the chain	Add the drive, but not at the end of the chain; the last SCSI device provides termination.
The drive will be the only device on a single-drop cable	1. Obtain a Method inline terminator.[9] 2. Attach the inline terminator to the drive, and connect the drive to the single-drop cable. **Note:** Adding the inline terminator will reduce the maximum data transfer speed to 40 MB/sec. .

Step 7. Preparing the drive for a 5.25-inch bay

Attention: 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.

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.



[9] *You can purchase an inline active terminator, such as the Method DM6100-02-68 ADR, from Technical Cable Concepts, Inc. (1-800-832-2225 or 1-714-835-1081).*

You can use a 3.5-inch-to-5.25-inch conversion tray (not included) instead of the brackets. You can purchase the conversion tray (IBM PN 70G8165) from your IBM reseller. Refer to the documentation that comes with the conversion tray kit for instructions on attaching the tray.

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

Step 8. Mounting the drive in the bay

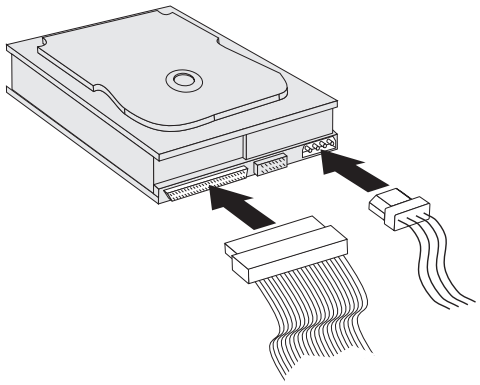
To mount the drive in a horizontal or a vertical bay:

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 or the special screws with grommets provided with some IBM computer systems; 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 9. Attaching the cables to the drive

The connector on one end of the internal SCSI 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 cable. One end of the SCSI cable connects to the SCSI adapter and the other end has connectors for attaching multiple SCSI devices.



2. Attach an available connector on the SCSI cable to the connector on the hard disk drive, as shown.

If you are connecting your new drive to a SCSI adapter that has 68-pin D-shell connectors, the connector is narrower at the top and will fit only one way.

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, as shown.

   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 10. 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 operating system documentation for more information about Micro Channel requirements.

Partitioning and formatting the drive

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.

Each operating system has unique directions for partitioning and formatting a drive. Be sure to refer to the documentation that comes with your operating system before continuing with the instructions below for Windows NT, Windows 98 and 95, OS/2, and DOS and Windows 3.x.

Partitioning and formatting using Windows NT and NTFS

If you added your drive to a computer that has Windows NT on an existing drive, follow the instructions below to partition and format your new SCSI drive using the NTFS (NT File System) convention.

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

If you installed your drive to a computer that had no existing drive, follow the instructions below to partition and format your new SCSI drive for the Windows NT operating system using NTFS.

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

Partitioning and formatting using Windows 98 or Windows 95 and FAT32

See your operating system user's guide for instructions on partitioning and formatting a drive using Windows 98 or Windows 95.

The latest releases of Microsoft operating systems, including Windows 98 and Windows 95 OSR2, have an option for a 32-bit file allocation table called FAT32. FAT32 supports partitions as large as 2 TB[10] and cluster sizes of 4 KB[3] for partitions up to 8 GB.[12] 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.

If you have FAT 16, partition your drive using instructions given in "Partitioning and formatting using DOS or Windows 3.x and FAT16" on page 2-13.

Partitioning and formatting using OS/2 and HPFS

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 information on partitioning a drive using FAT16, go to "Partitioning and formatting using DOS or Windows 3.x and FAT16" on page 2-13.

To prepare the new drive using OS/2:

1. Partition and format your new drive for OS/2 using the FAT16 or HPFS file system, or both FAT16 and HPFS, using directions given 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.

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

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10 *When referring to hard-disk-drive capacity, TB (terrabyte) means 1 000 000 000 000 bytes; total user-accessible capacity may vary depending on operating system.*

11 *When referring to cluster sizes, KB (kilobyte) means 1 024 bytes.*

12 *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.*

For more information on partition size limits for FAT16, see "Selecting a primary partition or logical drive size" on page 2-13.

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

If you use the DOS-based Fixed Disk Setup Program (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. (FDISK uses the software industry binary-base number system where one binary MB is 1 048 576 bytes.)

Partitioning and formatting using DOS or Windows 3.x and FAT16

The largest partition size that you can create using the 16-bit file allocation table (FAT16) file is approximately 2.14 GB.

If you are installing a drive larger than 2.14 GB and you are using the FAT16 convention, 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 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 (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 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.

Preparing the primary drive for DOS or Windows 3.x

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 3.x

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.

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 or cable terminator terminates the SCSI cable. There must be a terminator or a terminating device at the end of 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 you are installing the drive in an IBM PC Server, be sure that auto-start is not active.

Turn off all attached devices before turning off the computer. Unplug the computer power cord. 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 priority SCSI ID available (6) 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 your new SCSI drive to an existing UltraSCSI chain.

- 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).
- The total length of cable for a chain comprised of only Ultra2 SCSI devices must be less than or equal to 12 meters (39 ft 4 in).

Older SCSI devices might not support synchronous data transfer. If you have an older SCSI drive, CD-ROM drive, 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.

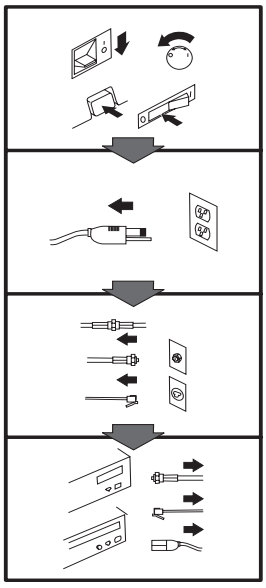
If you are attaching an UltraSCSI device in an external enclosure and the faster data transfer rate does not work, use your Ultra SCSI adapter utility to disable the faster data transfer rate.

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.

Part 3: Appendixes

Appendix A. Safety Information



To Disconnect:

⚠ **Danger:**

Electrical current from power, telephone, and communication cables is hazardous. To avoid shock hazard, disconnect cables as shown before opening the computer covers to install this product. The power cord must be used with a properly grounded outlet.

- Turn Everything OFF.
- First, remove power cord from outlet. (In the U.K., by law, the power cord must be disconnected after the telephone line cable.)
- Remove signal cables from receptacles.
- Remove all cables from devices.

Vor dem Entfernen der Anschlüsse:

⚠ **Vorsicht:**

Befolgen Sie die folgenden Schritte, um gesundheitliche Schäden durch stromführende Telefon- und Verbindungskabel auszuschließen. Um eine Berührungsspannung zu vermeiden, Kabel vor dem Öffnen der Computerabdeckungen bei der Installation dieses Produktes, wie abgebildet, herausziehen. Das Netzkabel darf nur an eine ordnungsgemäß geerdete Steckdose angeschlossen werden.

- Schalten Sie alle Geräte AUS.
- Ziehen Sie zuerst das Netzkabel aus der Steckdose.
- Entfernen Sie die Signalkabel von den Anschlußbuchsen.
- Entfernen Sie alle Kabel von den Geräten.

Précautions de déconnexion

⚠ **Danger:**

Le courant électrique des câbles électriques, téléphoniques et de communication est dangereux. Pour éviter tout risque d'électrocution, déconnectez les câbles comme indiqué avant d'ouvrir les capots de l'ordinateur pour installer ce produit. Il convient d'utiliser le câble d'alimentation avec une prise correctement raccordée à la terre.

- Eteignez tous les appareils.
- Débranchez tout d'abord le câble d'alimentation de la prise de courant. (Au Royaume-Uni, la législation exige que le câble d'alimentation soit débranché après le câble téléphonique).
- Débranchez les câbles de signalisation des prises femelles.
- Débranchez l'ensemble des câbles des périphériques.

Para desconectarse

⚠ **Peligro:**

La corriente eléctrica procedente de cables de alimentación, teléfono y comunicaciones es peligrosa. Para evitar descargas eléctricas, desconecte los cables tal y como se muestra y abra las cubiertas del ordenador antes de instalar este producto. El cable de alimentación debe utilizarse con una toma debidamente conectada a tierra.

- Desconecte todo.
- En primer lugar, retire el cable de alimentación de la toma.(En el Reino Unido, la legislación determina que el cable de alimentación se desconecte después del cable de línea telefónica.)
- Retire los cables de señal de los receptáculos correspondientes.
- Retire todos los cables de los dispositivos.

取外し時：

⚠危険：
電源、電話及び通信ケーブルからの電流は危険なものです。電気ショックの危険を避けるために、この製品をインストールするためにコンピューターのカバーを取外す前に、次の順序でケーブルを取外してください。

- すべての電源を切ってください。
- 始めにコンセントから電源コードを取外してください。
- コネクターから通信ケーブルを取外してください。
- 装置から全てのケーブルを取外してください。

Per scollegare:

⚠ **Pericolo:**

La corrente elettrica che attraversa i cavi di alimentazione, i cavi telefonici e i cavi per le comunicazioni è pericolosa. Per evitare il rischio di scosse elettriche, prima di procedere all'apertura del coperchio dell'elaboratore per installare il dispositivo, scollegare i cavi nel modo qui indicato. Il cavo di alimentazione deve essere inserito in una presa elettrica collegata correttamente a terra.

- Spegnere tutto (posizione OFF).
- Innanzitutto, scollegare il cavo di alimentazione dalla presa. (nel Regno Unito, per disposizione di legge, è obbligatorio scollegare il cavo di alimentazione dopo aver scollegato il cavo telefonico).
- Scollegare i cavi di segnale dai connettori.
- Scollegare tutti i cavi dai dispositivi.

Para desligar

⚠ **Perigo:**

A corrente elétrica da unidade de alimentação, do telefone e dos cabos de comunicação é perigosa. Para evitar o risco de choques elétricos, desligue os cabos de acordo com as instruções relativas à instalação antes de abrir as tampas do computador para instalar este produto. O cabo de alimentação deve ser usado numa tomada devidamente ligada à terra.

- Desligue tudo
- Primeiro remova o cabo de alimentação da tomada. (De acordo com as leis do Reino Unido, o cabo de alimentação deve ser desligado depois do cabo da linha telefônica.)
- Remova os cabos de sinal dos receptáculos.
- Remova todos os cabos dos dispositivos.

Odpojení:

⚠ **Výstraha:**

Elektrický proud ze sit'ových, telefonnich a komunikačních kabelů je nebezpečný. Abyste při instalaci tohoto výrobku předešli úrazu elektrickým proudem, před otevřením krytů počítače odpojte kabely dle obrázku. Sit'ový kabel musí být použit s řádně uzemněnou zásuvkou.

- Vypněte všechna připojená zařízení.
- Najdříve odpojte sit'ový kabel ze zásuvky. (Ve Spojeném království musí být podle zákona sit'ový kabel odpojen až po odpojení telefonní přípojky).
- Odpojte signálové kabely.
- Odpojte všechny kabely perifernich zařízení.

Læs følgende inden frakobling:

⚠ **Fare:**

Elektrisk strøm fra strømførende kabler og telefon- og kommunikationskabler er farlig. For at undgå elektrisk stød skal du sørge for at koble kablerne fra som vist, før du åbner computerens dæksler for at installere dette produkt. Den strømførende ledning skal tilsluttes en javdet stikkantakt.

- SLUK for alt.
- Fjern først den strømførende ledning fra stikkantateten. (I Storbritannien skal den strømførende ledning frakobles efter telefonkablet iflg. lov).
- Fjern signalkabler fra kontakter.
- Fjern alle kabler fra enheder.

Ontkoppelen

⚠ **Gevaarlijk:**

Elektrische stroom afkomstig uit netsnoeren, telefoonkabels en communicatiekabels kan gevaarlijk zijn. Als u dit produkt wilt installeren, moet u, ter voorkoming van elektrische schokken, voordat u de computer openmaakt de kabels, zoals afgebeeld, ontkoppelen. Sluit het netsnoer altijd aan op een geaard stopcontact.

- Zet alles UIT.
- Haal eerst de stekker uit het stopcontact. (In het Verenigd Koninkrijk bent u wettelijk verplicht eerst de telefoonkabel en pas dan het netsnoer los te maken.)
- Haal de signaalkabels uit de ingangen.
- Verwijder alle kabels van de apparaten.

Pour déconnecter

⚠ **Danger:**

Le courant électrique des câbles électriques, téléphoniques et de communication est dangereux. Pour éviter tout risque d'électrocution lors de l'installation de ce produit, déconnectez les câbles tel que montré avant d'ouvrir les couvercles de l'ordinateur. Utilisez le câble d'alimentation avec une prise correctement raccordée à la terre.

- Éteignez tous les appareils.
- Débranchez d'abord le câble d'alimentation de la prise de courant. (Au Royaume-Uni, la réglementation exige que le câble d'alimentation soit débranché après le câble téléphonique.)
- Débranchez les câbles de transmission du signal des prises femelles.
- Débranchez tous les câbles des appareils.

Irrota laite seuraavasti:

⚠ **Vaara:**

Virta-, puhelin- ja tietoliikennejohdoissa liikkuva sähkövirta on vaarallista. Voit tätä laitetta asentaessasi välttää sähköiskut irrottamalla johtimet esitetyllä tavalla ennen tietokoneen kansien avaamista. Virtajohto on liitettävä oikein maadoitettuun pistorasiaan.

- Katkaise kaikista laitteista virta.
- Irrota virtajohto pistorasiasta. (Yhdistyneiden Kuningaskuntien lain mukaan virtajohto on irrotettava ennen puhelinjohdon irrottamista.)
- Irrota signaalikaapelit vastakkeista.
- Irrota kaikki johdot laitteista.

כדי לנתק:

⚠ **סכנה:**

זרם חשמלי מכבלי כח, טלפון ותקשורת מהווה סכנה. כדי למנוע התחשמלות, נתק את הכבלים לפי האיור לפני פתיחת מארז המחשב לשם התקנת מכשיר זה. את כבל החשמל יש לחבר לשקע מוארק כראוי.

- כבה את כל המפסקים.
- נתק תחילה את כבל החשמל מהשקע (בבריטניה החוק דורש לנתק את כבל החשמל אחרי כבל הטלפון).
- נתק את כבלי האותות משקעיהם.
- נתק את כל הכבלים מההתקנים השונים.

Szétcsatlakoztatás

⚠ **Balesetveszély:**

A hálózati, telefon és kommunikációs kábelben levő elektromos áram veszélyes. Az áramütés veszélyének elhárítása érdekében, a termék beszerelésekor, a számítógép burkolatának felnyitása előtt húzza ki a vezetékeket. A hálózati vezetéknek megfelelően földeltnek kell lennie.

- Kapcsoljon mindent KI.
- Először a hálózati vezetéket húzza ki az aljzatból. (Az Egyesült Királyságban előírás, hogy a hálózati vezetéket a telefonvezeték után kell szétosatlakoztatni.)
- Húzza ki a jel-kábelt az aljzatából.
- Húzza ki az összes vezetéket a berendezésekből.

차단하려면 :

⚠위험 :

전원, 전화, 통신 케이블에서 나오는 전류는 유해하다. 쇼크 위험을 없애려면 본 제품 설치를 위해 컴퓨터 뚜껑을 열기 전에 케이블을 차단한다. 전원 코드는 제대로 접지된 콘덴사와 사용돼야 한다.

- 모든 전원을 차단한다.
- 우선 콘덴사에서 전원 코드를 뺀다. (영국에서는 법으로, 전화선을 뺀 다음 전원 코드를 차단해야 한다.)
- 수신기로 부터 신축 케이블을 뺀다.
- 컴퓨터 장치에서 모든 케이블을 뺀다.

Frakobling

⚠ **Fare:**

Elektrisk strøm fra strøm -, telefon - og kommunikasjonskabler er farlig. For å unngå fare for støt, må du koble fra kabler, som vist, før du åpner datamaskindeksler for å installere dette produktet. Strømledningen må kun brukes i jordede stikkontakter.

- Slå alt AV.
- Trekk først ut strømledningen fra stikkontakten. (I Storbritannia sier loven at strømledningen må kobles fra etter telefonledningen.)
- Trekk ut signalkablene fra kontaktene.
- Trekk ut alle kablene fra enhetene.

Aby rozłączyć:

⚠ **Ostrzeżenie:**

Prąd elektryczny obecny w kablach zasilania, telefonicznych lub komunikacyjnych jest niebezpieczny. Aby uniknąć niebezpieczeństwa porażenia, przed otwarciem pokrywy komputera w celu zainstalowania tego wyrobu, należy odłączyć kable, jak to zostało pokazane. Musi być użyty przewód zasilania elektrycznego z odpowiednim uziemieniem.

- Wyłącz wszystko (położenie OFF).
- W pierwszej kolejnoci odłącz przewód zasilania elektrycznego z gniazdka. (W Wielkiej Brytanii prawo nakazuje, by przewód zasilania został odłączony po kablu linii telefonicznej).
- Wyłącz kable sygnałowe z gniazdek.
- Wyłącz wszystkie kable z urządzeń.

Para desligar:

⚠ **Perigo:**

A corrente eléctrica da unidade de alimentação, do telefone e dos cabos de comunicação é perigosa. Para evitar o risco de choques eléctricos, desligue o cabo de acordo com as indicações antes de abrir a caixa do computador para instalar este produto. O cabo de alimentação deve ser utilizado numa tomada devidamente ligada à terra.

- Desligue tudo.
- Primeiro, retire o cabo de alimentação da tomada.(De acordo com as leis do Reino Unido, o cabo de alimentação deve ser desligado depois do cabo da linha telefónica.)
- Retire os cabos de sinal das tomadas.
- Retire todos os cabos dos dispositivos.

斷開步驟 :

⚠危險 :

動力電纜、電話電纜和通信電纜上的電流是危險的。爲避免電擊危險，在打開電腦機蓋安裝本產品之前斷開電纜，如圖所示。動力電纜必須妥善接地。

- 關掉一切電源。
- 首先將動力電纜從輸出端取下。(根據英國法律規定，動力電纜必須在電話電纜之後斷開。)
- 從插座上取下信號電纜。
- 從裝置上取下所有電纜。

Izključenje:

⚠ **Nevarnost:**

Struja iz električnega, telefonskega ali komunikacijskega voda je nevarna. V namenu, da se izognete šoku, izključite vode, kot kaže slika, preden dvignete računalniške pokrove, da bi napravo instalirali. Strujni vod je treba uporabljati s primerno ozemljitvijo.

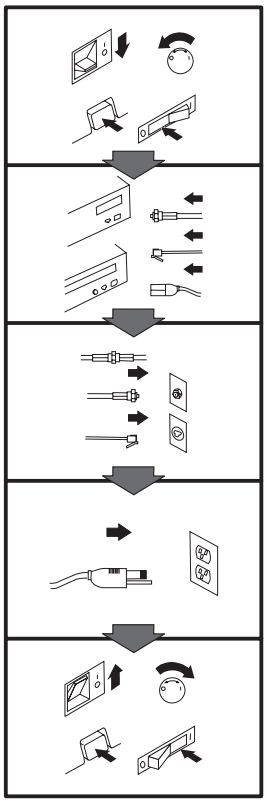
- Izključite vse (na “OFF”).
- Najprej odstranite strujni vod iz izhodnega vtikališča. (V Veliki Britaniji je po zakonu treba strujni vod izključiti po telefonskem vodu).
- Odstranite signalne vode iz sprejemnikov.
- Odstranite vse vode iz naprav.

Urkoppling

⚠ **Fara:**

Ström från el-, tele- och kommunikationskablar måste behandlas med försiktighet. För att undvika att få en elektrisk stöt måste du innan du öppnar höljet på datorn koppla ur kablarna enligt beskrivningen nedan. Strömkabeln måste alltid användas i ett jordat uttag.

- Stäng av allting.
- Ta först ur strömkabeln från strömuttaget. (I Storbritannien måste enligt lag strömkabeln tas ur efter telefonkabeln.)
- Ta bort signalkablarna från uttagen.
- Ta bort alla kablarna från enheterna.



To Connect:

⚠ Danger:

Electrical current from power, telephone, and communication cables is hazardous. To avoid shock hazard, connect cables as shown after closing the computer covers. The power cord must be used with a properly grounded outlet.

- Turn everything OFF.
- Attach all cables to devices. (In the U.K., by law, the telephone cable must be connected after the power cord.)
- Attach signal cables to receptacles.
- Attach power cord to outlet.
- Turn device ON.

Vor dem Anschließen:

⚠ Vorsicht:

Befolgen Sie die folgenden Schritte, um gesundheitliche Schäden durch stromführende Telefon- und Verbindungskabel auszuschließen. Um eine Berührungsspannung zu vermeiden, Kabel nach dem Schließen der Computerabdeckungen, wie abgebildet, anschließen. Das Netzkabel darf nur an eine ordnungsgemäß geerdete Steckdose angeschlossen werden.

- Schalten Sie alle Geräte AUS.
- Schließen Sie alle Kabel an die Geräte an.
- Schließen Sie die Signalkabel an die dafür vorgesehenen Anschlußbuchsen an.
- Verbinden Sie das Netzkabel mit der Steckdose.
- Schalten Sie das Gerät EIN.

Avant de vous connecter

⚠ Danger:

Le courant électrique des câbles électriques, téléphoniques et de communication est dangereux. Pour éviter tout risque d'électrocution, connectez les câbles comme indiqué après avoir replacé les capots de l'ordinateur. Il convient d'utiliser le câble d'alimentation avec une prise correctement raccordée à la terre.

- Mettez tous les appareils hors tension.
- Raccordez l'ensemble des câbles aux périphériques. (Au Royaume-Uni, la législation exige que le câble téléphonique soit branché après le câble d'alimentation).
- Raccordez les câbles de signalisation aux prises femelles.
- Raccordez le câble d'alimentation à la prise de courant.
- Mettez les appareils sous tension.

Para conectarse

⚠ Peligro:

La corriente eléctrica procedente de cables de alimentación, teléfono y comunicaciones es peligrosa. Para evitar descargas eléctricas, conecte los cables tal y como se muestra después de cerrar las cubiertas del ordenador. El cable de alimentación debe utilizarse con una toma debidamente conectada a tierra.

- Desconecte todo.
- Conecte todos los cables a los dispositivos. (En el Reino Unido, la legislación determina que el cable de teléfono se conecte después del cable de alimentación.)
- Conecte los cables de señal de los receptáculos correspondientes.
- Conecte el cable de alimentación a una toma.
- Active el dispositivo.

接続時：

⚠ 危険：

電源、電話及び通信ケーブルからの電流は危険なものです。電気ショックの危険を避けるために、コンピューターのカバーを取り付け後に、次の順序でケーブルを接続してください。

- すべての電源を切ってください。
- すべてのケーブルを装置に接続してください。
- コネクターに通信ケーブルを接続してください。
- コンセントに電源コードを接続してください。
- 装置の電源を入れてください。

Per collegare:

⚠ **Pericolo**

La corrente elettrica che attraversa i cavi di alimentazione, i cavi telefonici e i cavi per le comunicazioni è pericolosa. Per evitare il rischio di scosse elettriche, collegare i cavi nel modo qui indicato solo dopo aver richiuso l'elaboratore con il coperchio. Il cavo di alimentazione deve essere inserito in una presa elettrica collegata correttamente a terra.

- Spegnere tutto (posizione OFF).
- Collegare tutti i cavi ai dispositivi. (nel Regno Unito, per disposizione di legge, è obbligatorio collegare il cavo telefonico dopo aver collegato il cavo di alimentazione).
- Collegare i cavi di segnale agli appositi connettori.
- Collegare il cavo di alimentazione a una presa elettrica
- Accendere la periferica (posizione ON)

Para ligar:

⚠ **Perigo:**

A corrente elétrica da unidade de alimentação, do telefone e dos cabos de comunicação é perigosa. Para evitar o risco de choques elétricos, ligue os cabos de acordo com as instruções relativas à instalação depois de fechar as tampas do computador. O cabo de alimentação deve ser usado numa tomada devidamente ligada à terra.

- Desligue tudo
- Ligue os cabos aos dispositivos. (De acordo com as leis do Reino Unido, o cabo de alimentação deve ser desligado depois do cabo da linha telefônica.)
- Ligue os cabos de sinal aos receptáculos.
- Ligue o cabo de alimentação à tomada.
- Ligue o dispositivo.

Připojení:

⚠ **Výstraha:**

Elektrický proud ze sit'ových, telefonních a komunikačních kabelů je nebezpečný. Abyste předešli úrazu elektrickým proudem, kabely dle obrázku připojte až po uzavření krytů počítače. Sit'ový kabel musí být použit s řádně uzemněnou zásuvkou.

- Vypněte všechna zařízení.
- Připojte všechny kabely periferních zařízení. (Ve Spojeném království musí být podle zákona telefonní přípojka připojena až po přípojení sit'ového kabelu).
- Připojte signálové kabely.
- Připojte sit'ový kabel do zásuvky.
- Zapněte přístroj.

Læs følgende inden tilkobling:

⚠ **Fare:**

Elektrisk strøm fra strømførende kabler og telefon- og kommunikationskabler er farlig. For at undgå elektrisk stød skal du sørge for at koble kablerne til som vist, før du lukker computerens dæksler igen. Den strømførende ledning skal tilsluttes en javdet stikkantakt.

- SLUK for alt.
- Tilslut alle kabler til enheder. (I Storbritannien skal telefonkablet tilsluttes efter den strømførende ledning iflg. lov).
- Tilslut signalkabler til kontakter.
- Tilslut den strømførende ledning til stikkontakten.
- TÆND for enheden.

Aansluiten

⚠ Gevaarlijk:

Elektrische stroom afkomstig uit netsnoeren, telefoonkabels en communicatiekabels kan gevaarlijk zijn. Ter voorkoming van elektrische schokken, moet u nadat de computer dichtgemaakt is de kabels, zoals afgebeeld, aansluiten. Sluit het netsnoer altijd aan op een geaard stopcontact.

- Zet alles UIT.
- Bevestig de snoeren aan de apparaten. (In het Verenigd Koninkrijk bent u wettelijk verplicht eerst het netsnoer en pas dan de telefoonkabel aan te sluiten.)
- Bevestig de signaalkabels in de juiste ingangen.
- Steek de stekker van het netsnoer in het stopcontact.
- Zet het apparaat AAN.

Pour connecter

⚠ Danger:

Le courant électrique des câbles électriques, téléphoniques et de communication est dangereux. Pour éviter tout risque d'électrocution, connectez les câbles tel que montré après avoir fermé les couvercles de l'ordinateur. Utilisez le câble d'alimentation avec une prise correctement raccordée à la terre.

- Mettez tous les appareils hors tension.
- Raccordez tous les câbles aux appareils. (Au Royaume-Uni, la réglementation exige que le câble téléphonique soit branché après le câble d'alimentation.)
- Raccordez les câbles de transmission du signal aux prises femelles.
- Raccordez le câble d'alimentation à la prise de courant.
- Mettez l'appareil sous tension.

Kytke seuraavasti:

⚠ Vaara:

Virta-, puhelin- ja tietoliikennejohdoissa liikkuva sähkövirta on vaarallista. Voit välttää sähköiskut liittämällä johdot esitetyllä tavalla, sen jälkeen kun olet sulkenut tietokoneen kannet. Virtajohto on liitettävä oikein maadoitettuun pistorasiaan.

- Katkaise kaikista laitteista virta.
- Liitä kaikki johdot laitteisiin. (Yhdistyneiden Kuningaskuntien lain mukaan virtajohto on liitettävä ennen puhelinjohdon irrottamista.)
- Liitä signaalikaapelit vastakkeisiin.
- Liitä virtajohto pistorasiaan.
- Kytke laitteeseen virta.

כדי לחבר:

⚠ סכנה:

זרם חשמלי מכבלי כח, טלפון ותקשורת מהווה סכנה. כדי למנוע התחשמלות, חבר את הכבלים לפי האיור אחרי סגירת מארז המחשב. את כבל החשמל יש לחבר לשקע מוארק כראוי.

- כבה את כל המפסקים.
- חבר את כל הכבלים להתקנים (בבריטניה החוק דורש לחבר את כבל הטלפון אחרי כבל החשמל).
- חבר את כבלי האותות לשקעיהם.
- חבר את כבל החשמל לשקע.
- הדלק את המכשיר.

Csatlakoztatás:

⚠ Balesetveszély:

A hálózati, telefon és kommunikációs kábelben levő elektromos áram veszélyes. Az áramütés veszélyének elhárítása érdekében csak a számítógép burkolatának bezárása után csatlakcztassa a vezetékeket. A hálózati vezetéknek megfelelően földeltnek kell lennie.

- Kapcsoljon mindent KI.
- Csatlakoztassa a vezetékeket a berendezésekhez. (Az Egyesült Királyságban előírás, hogy a telefonvezetéket a hálózati vezeték után kell csatlakoztatni.)
- Csatlakoztassa a jelkábelt az aljzatába.
- Csatlakoztassa a hálózati vezetéket az aljzatába.
- Kapcsolja BE a készüléket.

연결하려면 :

⚠위험 :

전원, 전화, 통신 케이블에서 나오는 전류는 유해하다. 쇼크 위험을 없애려면 본 제품 설치를 위해 컴퓨터 뚜껑을 닫은 후에 케이블을 연결한다. 전원 코드는 제대로 접지된 콘덴사와 사용돼야 한다.

- 모든 전원을 차단한다.
- 장치에 모든 케이블을 연결한다. (영국에서는 법으로, 전화선을 먼저 연결한 다음 전원코드를 연결해야 한다.)
- 수신기에 신호 케이블을 연결한다.
- 콘덴사에 전원 코드를 연결한다.
- 컴퓨터 장치를 켠다.

Tilkobling

⚠ Fare:

Elektrisk strøm fra strøm -, telefon - og kommunikasjonskabler er farlig. For å unngå fare for støt, må du koble til kabler, som vist, etter at datamaskindekslene er lukket. Strømledningen må kun brukes i jordede stikkontakter.

- Slå alt AV.
- Koble alle kablene til enhetene. (I Storbritannia sier loven at telefonledningen må kobles til etter strømledningen.)
- Sett signalkablene i kontaktene.
- Sett strømledningen i stikkontakten.
- Slå apparatet PÅ.

Aby podłączyć:

⚠ Ostrzeżenie:

Prąd elektryczny obecny w kablach zasilania, telefonicznych lub komunikacyjnych jest niebezpieczny. Aby uniknąć niebezpieczeństwa porażenia, po zamknięciu pokryw komputera podłącz kable jak to zostało pokazane. Musi być użyty przewód zasilania elektrycznego z odpowiednim uziemieniem.

- Wyłącz wszystko (położenie OFF)
- Podłącz wszystkie kable do urządzeń (W Wielkiej Brytanii prawo nakazyje by kabel linii telefonicznej zostać podłączony po przewodzie zasilania).
- Podłącz kable sygnałowe do gniazdek.
- Podłącz przewód zasilania do gniazdka.
- Włącz urządzenie. (Położenie ON).

Para ligar:

⚠ Perigo:

A corrente eléctrica da unidade de alimentação, do telefone e dos cabos de comunicação é perigosa. Para evitar o risco de choques eléctricos, ligue os cabos de acordo com as indicações antes de fechar a caixa do computador. O cabo de alimentação deve ser utilizado numa tomada devidamente ligada à terra.

- Desligue tudo.
- Ligue os cabos aos dispositivos. (De acordo com as leis do Reino Unido, o cabo do telefone deve ser ligado depois do cabo de alimentação.)
- Ligue os cabos de sinal as tomadas.
- Ligue o cabo de alimentação à tomada.
- Ligue o dispositivo.

連接步驟：

⚠危險：

動力電纜、電話電纜和通信電纜上的電流是危險的。爲避免電擊危險，在蓋上電腦機蓋之後連接電纜，如圖所示。動力電纜必須妥善接地。

- 關掉一切電源。
- 將所有電纜連接於裝置。（根據英國法律規定，電話電纜必須在動力電纜之前連接。）
- 將信號電纜連接於插座。
- 將動力電纜連接於輸出端。
- 打開裝置電源。

Vključenje:

⚠ **Nevarnost:**

Struja iz električnih, telefonskih in komunikacijskih vodov je nevarna. Da se izognete šoku, vključite vode, kot kaže slika, po tem, ko ste zaprli računalniške pokrove. Strujni vod je treba uporabljati s primerno ozemljitvijo.

- Izključite vse (na “OFF”).
- Priključite vse vode na naprave. (V Veliki Britaniji je po zakonu treba telefonski vod vključiti po strujnem vodu).
- Priključite signalne vode sprejemnikom.
- Priključite električni vod izhodnemu vtikališču.
- Vključite napravo (na “ON”).

Anslutning

⚠ **Fara:**

Ström från el-, tele- och kommunikationskablar måste behandlas med försiktighet. För att undvika att få en elektrisk stöt måste du sedan du stängt höljet på datorn ansluta kablarna enligt beskrivningen nedan. Strömkabeln måste alltid användas i ett jordat uttag.

- Stäng av allting.
- Anslut alla kablarna till enheterna. (I Storbritannien måste enligt lag telefonkabeln anslutas efter strömkabeln.)
- Anslut signalkablarna till uttagen.
- Anslut strömkabeln till strömuttaget.
- Slå på enheten.

Appendix B. Help and service information

Before calling IBM technical support, try to solve the problem problem yourself by using the information in "Solving problems" on page 2-16. If you are unable to solve the problem yourself, this section contains information on how to reach your IBM technical support representative.

If you have questions about your new Options by IBM product, or require technical assistance, visit the IBM Personal Computing Support Web site at http://www.pc.ibm.com/support. For information about IBM, IBM PC products, or Options by IBM visit the IBM Personal Computing Web site at http://www.pc.ibm.com. Additionally, you can receive information from the IBM Automated Fax system at 1-800-426-3395 (in Canada, 1-800-465-3299), or from the Personal Systems Group Bulletin Board System (PSG BBS) at 1-919-517-0001. You can also get help and information through the IBM PC HelpCenter, 24 hours a day, seven days a week. Response time may vary depending on the number and nature of the calls received.

Marketing, installation, and configuration support through the HelpCenter will be withdrawn or made available for a fee, at IBM's discretion, 90 days after the option has been withdrawn from marketing. Additional support offerings, including step-by-step installation assistance, are available for a nominal fee.

During the warranty period, assistance for replacement or exchange of defective components is available. In addition, if your IBM option is installed in an IBM computer, you might be entitled to service at your location. Your technical support representative can help you determine the best alternative.

Step 1: Problem solving

You may be able to solve the problem yourself. Before calling the HelpCenter, please prepare for the call by following these steps:

1. If you are having installation or configuration problems, refer to the detailed sections on installation found in this manual.
2. Visit the Personal Computing Support Web site specific to the model of option you have purchased. Updated installation instructions, hints and tips, or updated system-specific notes are often published in this section. You might find that later device drivers are available that will improve the performance and compatibility for your new option.

   If you are installing this option in an IBM computer, also visit the applicable support Web page for that computer model. These pages might also contain useful hints and tips related to installation of this option and might refer to BIOS or device-driver updates required for your computer model. If you are installing the option in a non-IBM computer, refer to the manufacturer's Web site.
3. Check all cabling to be sure that it is correct as shown in this manual.

Step 2: Preparing for the call

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

1. Option name
2. Option part number
3. Proof of purchase
4. Computer manufacturer, model, serial number (if IBM), and manual
5. Exact wording of the error message (if any)
6. Description of the problem
7. Hardware and software configuration information for your system

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

Step 3: Placing the call to IBM

If you call 90 days or more after the date of withdrawal or after your warranty has expired, you might be charged a fee.

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, contact your IBM reseller or IBM marketing representative.

Support 24 hours a day, 7 days a week	
Canada	1-800-565-3344
U.S.A. / Puerto Rico	1-800-772-2227

Additional Technical Support Resources

Online technical support is available during the life of your product. Online assistance can be obtained through the Personal Computing Support Web site, the PSG Electronic Bulletin Board System, and the IBM Automated Fax System.

Online Technical Support	
IBM Personal Computing Support Web Site	http://www.pc.ibm.com/support
IBM PSG BBS	1-919-517-0001
IBM Automated Fax System	1-800-426-3395 1-800-465-3299 (in Canada)

Appendix C. Notices

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