



# IBM Deskstar

3.5 inch ATA/IDE hard disk drive

## Installation and reference manual



## **Technical support**

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Troubleshooting and Frequently Asked Questions sections are provided in the Appendix of this manual to aid you in the installation of your IBM Deskstar. If the answer to your installation question is not found in this manual, call technical support. Before calling, please gather as much of the following information as possible:

- IBM drive model number, part number, and serial number
- Operating system
- BIOS manufacturer, version, and date
- Any error codes and when they occurred
- System type and manufacturer
- Motherboard manufacturer
- Chipset manufacturer
- Adapter card manufacturer
- Other devices in systems
- Bus/cable layout (location of device, which device is at the end)
- Applications used (if relevant)

### **In North America**

*Web* [www.ibm.com/harddrive](http://www.ibm.com/harddrive)  
*Voice* 888.IBM.5214 or 507.286.5825  
*Fax* 507.253.DRIVE  
*e-mail* [drive@us.ibm.com](mailto:drive@us.ibm.com)

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*Voice* 44.1475.898.125  
*e-mail* [drive@uk.ibm.com](mailto:drive@uk.ibm.com)

### **In Singapore**

*Voice* 65.1800.840.9292 or 65.840.9292  
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*Voice* 49.7032.153050  
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# IBM Deskstar

## 3.5 inch ATA/IDE hard disk drive

# Installation and reference manual

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## Introduction

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This manual was prepared to aid you in the installation of your new IBM Deskstar hard disk drive. Installation instructions are provided for the following model numbers:

- DTLA-3XXXXX
- DPTA-3XXXXX
- DJNA-3XXXXX

### **DTLA model drives**

Your IBM Deskstar drive supports Ultra ATA/100 and is backward compatible with lower bus speeds, allowing it to obtain interface transfer rates of up to 100 MB per second. Your drive will function at the maximum speed supported by your system components. To obtain Ultra ATA/100 performance, the following components are required:

- 40 pin, 80 conductor ATA/IDE cable
- A controller card or motherboard chipset with Ultra ATA/100 or higher capability
- Ultra ATA/100 compatible BIOS

### **DPTA and DJNA model drives**

Your IBM Deskstar drive supports Ultra ATA/66 and is backward compatible, allowing it to obtain interface transfer rates of up to 66.6 MB per second. Your drive will function at the maximum speed supported by your system components. To obtain Ultra ATA/66 performance, the following system components are required:

- 40 pin, 80 conductor ATA/IDE cable
- A controller card or motherboard chipset with Ultra ATA/66 or higher capability
- Ultra ATA/66 compatible BIOS

The IBM Deskstar drives listed above also support the following interface data transfer rates:

Ultra ATA Mode 2	33.3 MB per second
Multi-word DMA Mode 2	16.6 MB per second
Advanced PIO Mode 4	16.6 MB per second

Further information on Ultra ATA/100 and Ultra ATA/66 is located in the Frequently Asked Questions section of this manual.



## Getting started

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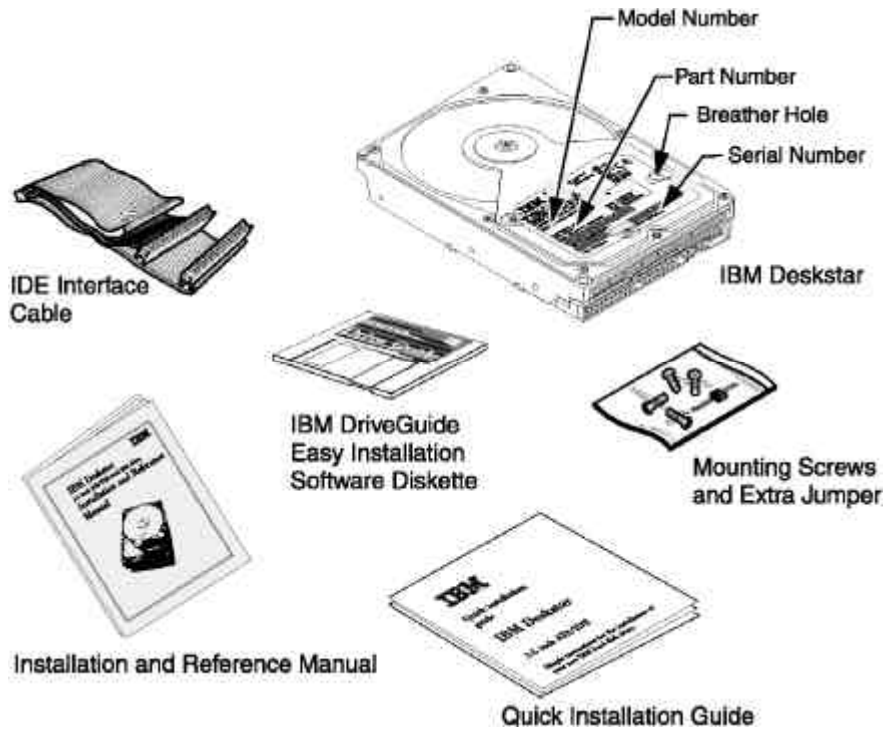
*IMPORTANT: If you have an existing drive in your system, perform a backup to avoid any loss of data during installation. Refer to your operating system manual for instructions on how to use the system's backup utility.*

### Package contents

The following items are included with your IBM Deskstar retail packaged drive.

- Deskstar drive, contained in an electrostatic discharge (ESD) protective bag
- Mounting screws
- Extra jumper
- 40 pin, 80 conductor ATA/IDE interface cable
- IBM Deskstar Installation and Reference Manual
- IBM Deskstar Quick Installation Guide
- IBM DriveGuide Easy Installation Software diskette

*Note: It is important to save the original drive packaging for shipping if warranty service is required.*



### **Handling precautions**

*CAUTION: Most hard disk drive damage is caused by poor handling, physical impact, or electrical shock. Heeding the precautions listed below may eliminate the occurrence of such damage.*

- To prevent damage from impact or vibration always set the drive down gently.
- Do not open the ESD bag containing the drive until required.
- Handle the drive carefully by the edges. Do not touch the exposed printed circuit board or any electronic components.
- Do not press on the top or bottom of the drive.
- Do not cover the drive's breather hole.
- Before handling the drive, discharge any static electricity from you and your clothing. With one hand, touch an unpainted metal surface on your computer chassis, then touch the ESD bag with the other hand. Remain in contact with the chassis and the bag for at least two seconds.

### **Tools for installation**

You may need the following items to install the IBM Deskstar drive.

- A flat-blade screw driver
- A Phillips head screw driver
- A small needle-nose pliers or tweezers.
- Your computer system manual
- Operating system startup diskette (see the FAQ section for instructions to create a startup diskette)
- Drive rails (Drive rails for 5.25 inch bays may be purchased at your local computer store, through your system manufacturer, or by calling the IBM Hard Disk Drive Technical Support Center.)

### **IBM DriveGuide Easy Installation Software**

#### *Overview*

IBM DriveGuide partitions and formats a hard disk drive in less time than traditional partition and format programs. An integral part of IBM DriveGuide is EZ-BIOS. EZ-BIOS provides BIOS support for drives larger than 8.4GB, allowing earlier systems to utilize a drive's full capacity. IBM DriveGuide will also allow you to copy system files to your IBM Deskstar or to copy the files from an existing hard drive to your new drive.

### *Compatibility*

To use IBM DriveGuide and EZ-BIOS to partition and format the full capacity of a hard drive greater than 8.4GB, your operating system must support Interrupt 13 Extensions. (See the Frequently Asked Questions section of this manual for more information.) IBM DriveGuide is compatible with the following operating systems:

- DOS versions 5.0 and later\*
- Windows 3.1x and Windows for Workgroups 3.11\*
- Windows 95 and 98
- Windows NT\*\*
- OS/2 Warp versions 3.0 and 4.0\*\*

\*Drive capacity limited to 8.4GB

\*\*FAT16 file system support only

Linux, Unix, Apple, and Netware provide their own partitioning and installation software.

### ***Known issues***

The following issues may be encountered during IBM DriveGuide installation:

- Award BIOS systems may hang during installation of drives larger than 32 GB.
- AMI BIOS systems may hang during drive detection.
- The IBM DriveGuide copy process may hang at 99%.

Workarounds for the above issues are addressed in the Advanced Troubleshooting section of this manual.

### **Options for installation**

You are now ready to begin installing your IBM Deskstar hard disk drive. The following sections present four sets of installation instructions:

- Install a new drive as Master
- Add a new drive as Slave
- Replace and copy a Master drive
- Add a new Master drive, install old Master as Slave and copy

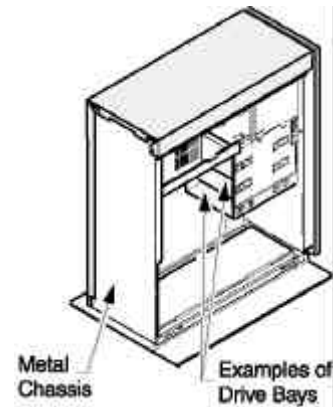


## **Install a new drive as Master**

The following steps install the IBM Deskstar in a new system or replace your system's existing Primary Master with the IBM Deskstar.

### **Begin the hardware install**

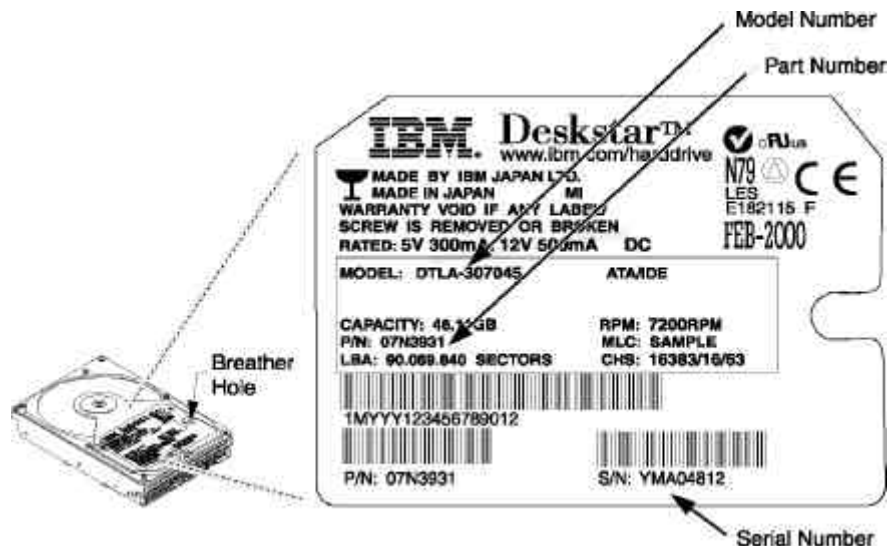
- Turn off your computer system.
- Remove cover as instructed by your computer system manual.
- Discharge static electricity by touching an unpainted metal surface on your computer chassis with one hand. Touch the ESD bag with the other hand.
- Unplug your computer. Remain in contact with the chassis and the bag for at least two seconds.
- If replacing a drive or replacing a cable with a 40 pin, 80 conductor ATA/IDE cable, remove it. Store the drive or cable in a safe place in case it should be needed again.



### **Configure the jumper settings**

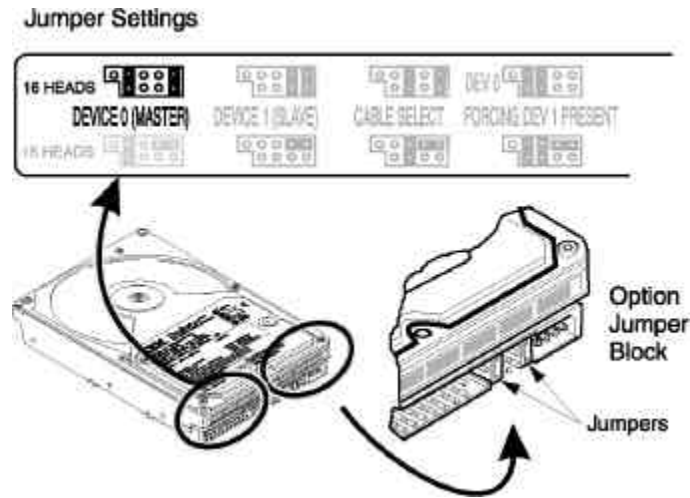
- Remove the drive from its ESD bag.
- Record the serial number, part number, and model number in the spaces provided in the Appendix for future reference.

*Note: Placement of model, part, and serial numbers may vary.*



- Leave the jumpers as set. The jumpers are factory set to Master, 16 heads.

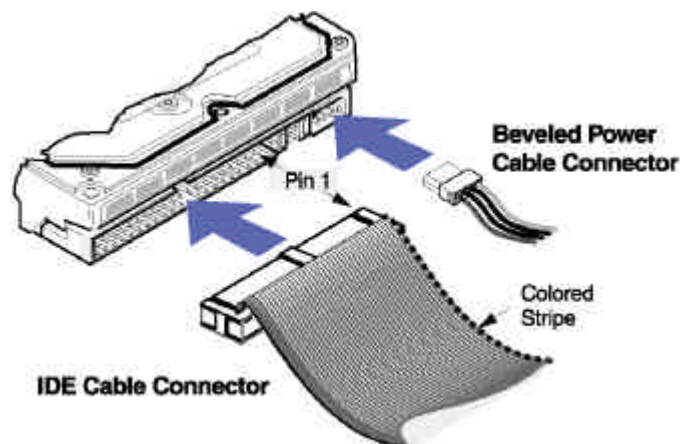
Note: The IBM Deskstar has an option jumper block located next to the interface connector. Setting these jumpers allows you to use the different options of the hard disk drive. See the "Jumpers" section of the Appendix for jumper setting descriptions.



### Attach the cables

Note: With some system chassis, it may be more convenient to attach the cable after the drive is mounted. The order of the steps below may change depending upon your system.

Note: The 40 pin, 80 conductor ATA/IDE cable provided with the IBM Deskstar is color coded for the master, slave, and system connectors. The Master connector is black, the Slave connector is gray, and the system connector is blue.



- To use the provided ATA/IDE cable, remove the existing cable from the primary ATA/IDE connector of your motherboard or controller card.
- Attach the blue connector of the ATA/IDE cable to the ATA/IDE connector marked “Primary” or “0” on the motherboard or controller card. The primary ATA/IDE connector controls the first and second ATA/IDE devices in the system.

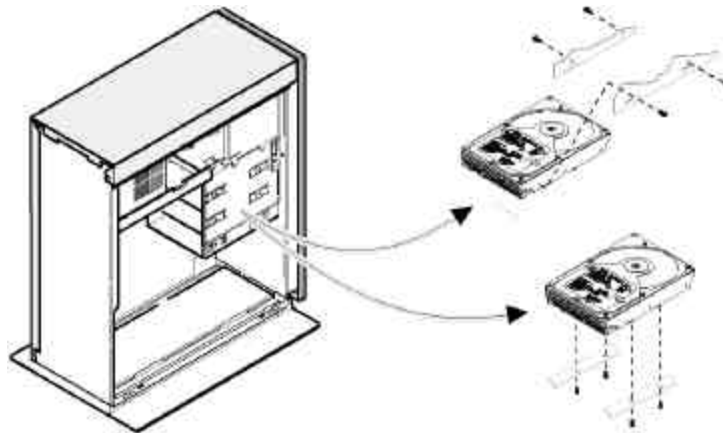
*Note: The pin 1 edge of an ATA/IDE cable is marked with a colored stripe. The connectors are also keyed to insert one way only.*

- Attach a power cable to the hard disk drive.
- Attach the black connector of the ATA/IDE cable to the hard disk drive.

### **Mount the drive**

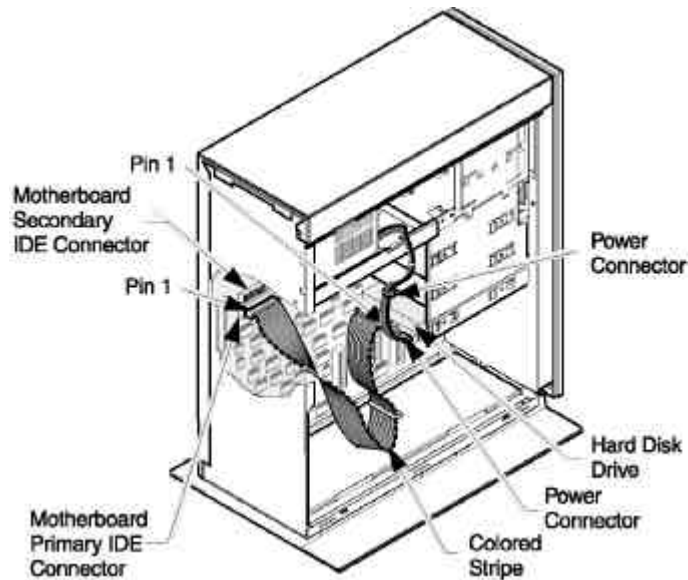
*Note: Drive bays and other enclosures vary in size and orientation from system to system. They may be oriented vertically, horizontally, upside down, or sideways. The IBM Deskstar can be mounted with any side or end vertical or horizontal, but must not be mounted in a tilted position.*

- Mount the drive as instructed by your computer system manual.



### Complete the hardware install

- Check the ATA/IDE cable and power connections.
- Ensure proper ATA/IDE cable and power cable routing.
- Recover any loose screws or parts.
- Replace the computer system cover.
- Plug in your computer and turn it on.



### Set the BIOS/CMOS

*Note: BIOS setups vary from system to system and these instructions are intended only as a guide.*

- Run the BIOS/CMOS setup utility. Key stroke sequences for accessing your BIOS are often displayed at boot, or can be found in your computer system manual.
- Locate disk drive type settings. Select the option for Autodetect, Primary Master, if available. If your computer autoconfigures itself at boot time, verify drive detection and capacity. If autodetection is unavailable, set the disk drive type to a User Definable Type (UDT) and enter the CHS parameters 1024 cylinders, 16 heads, and 63 sectors. If Autodetect or a UDT is unavailable, select Drive Type 1.
- Select translation or LBA options as provided by your computer system.
- Record drive CHS parameters and capacity as reported by the BIOS in the spaces provided in the Appendix. If the capacity displayed by the BIOS does not match your drive capacity, it is likely your system does not support drives greater than 8.4 GB.
- Save the settings and exit.

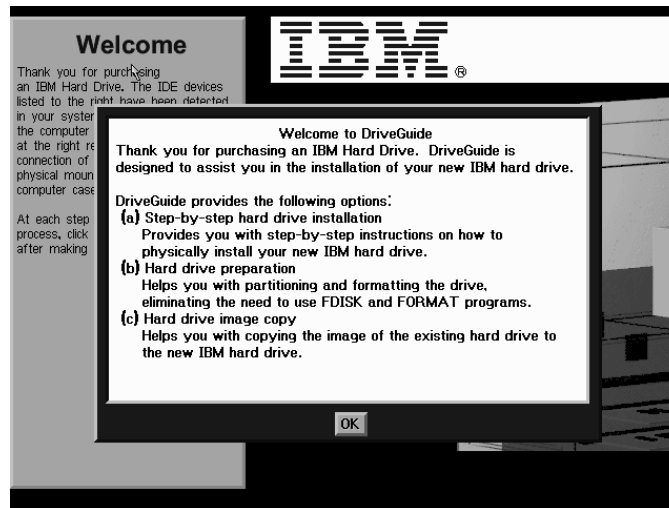
## Partition and format with IBM DriveGuide Easy Installation Software

*Note: You may choose to use Fdisk to partition and format your hard drive. Refer to the section entitled Fdisk and Format in the Appendix for more information.*

Due to system and hard drive variations, the IBM DriveGuide screens displayed may be different than those presented here.

*Note: Many BIOS setups refer to the drives in a system as 0, 1, and so on. IBM DriveGuide refers to drives as 1, 2, etc.*

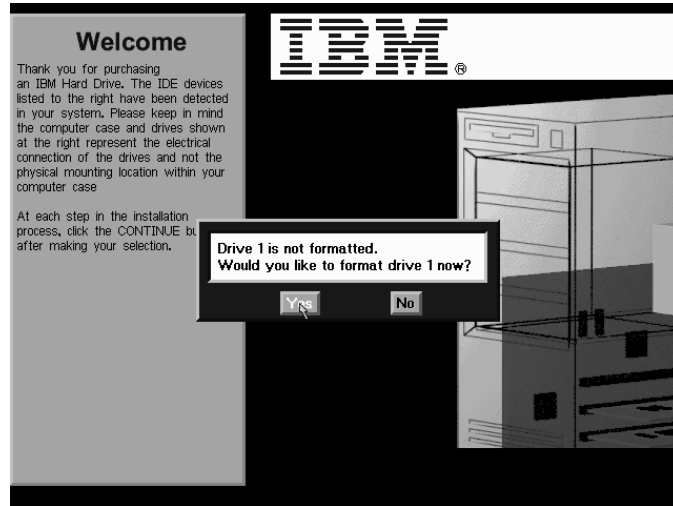
- Boot your computer with the IBM DriveGuide diskette in drive A. The IBM DriveGuide logo is displayed with the message "Loading DriveGuide - Please Wait".
- The Welcome screen is displayed. Click "OK".



*Note: If a mouse is not detected, a screen is displayed explaining the use of Tab and Enter to navigate.*

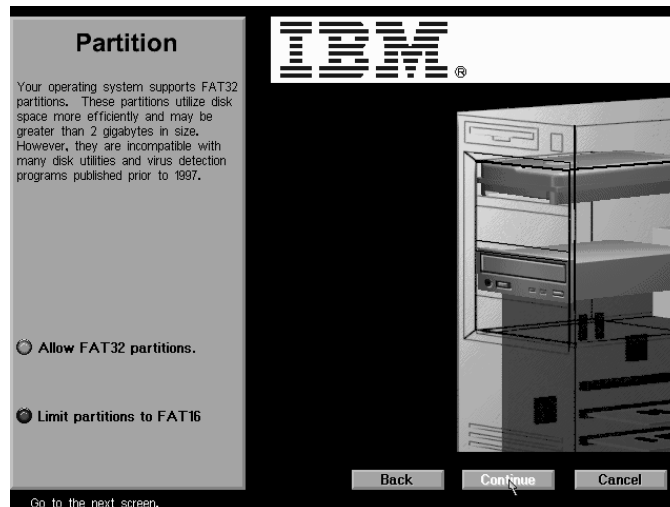
- A License Agreement is displayed. Click "Accept".
- The first screen on the following page appears. The message "Drive 1 is not formatted" is displayed. Select "Yes" to format the specified drive. Click "No" if the wrong drive is specified or you want to proceed manually.

*Note: If your drive is already formatted, a Welcome screen is displayed with three options; guided install, partition and format, and advanced options.*

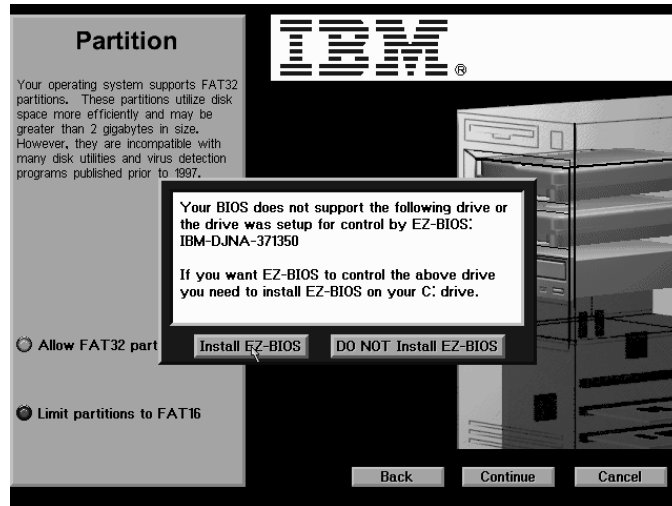


- The message "Insert a DOS system disk or a Windows 9x startup disk into the floppy drive A:" is displayed. Insert the startup disk you will be using to install the operating system.
- Choose the type of File Allocation Table (FAT) to be used in your drive partitions.

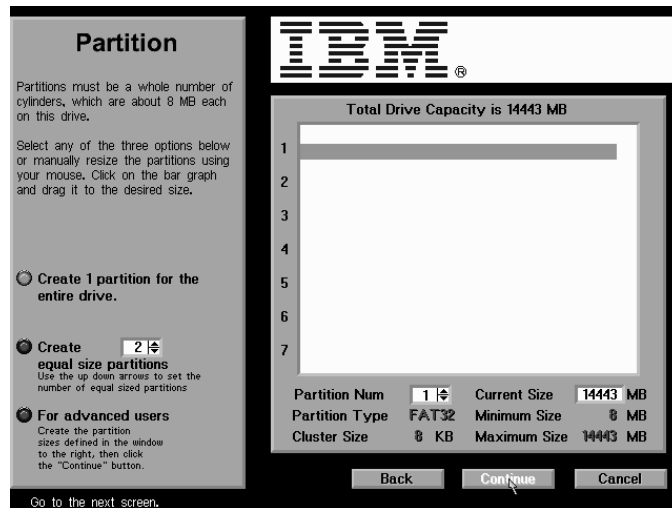
*Note: Select FAT32 or FAT16 if you are using Windows 95 SR2 or Windows 98. FAT 32 partitions utilize disk space more efficiently and may be greater than 2GB in size. If you are using DOS, Windows 3.1x, or an earlier version of Windows 95, select FAT16.*



- EZ-BIOS is required if your drive is larger than 8.4GB and your system BIOS does not support large capacities. Select “Install EZ-BIOS”. If you select “Do Not Install EZ-BIOS” your capacity will be limited to 8.4GB.

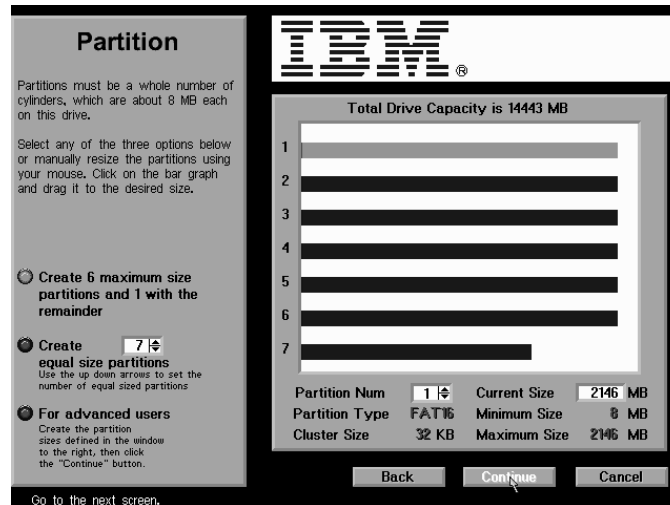


- If you selected FAT32, the following screen is displayed. Select an option. Click “Continue”.

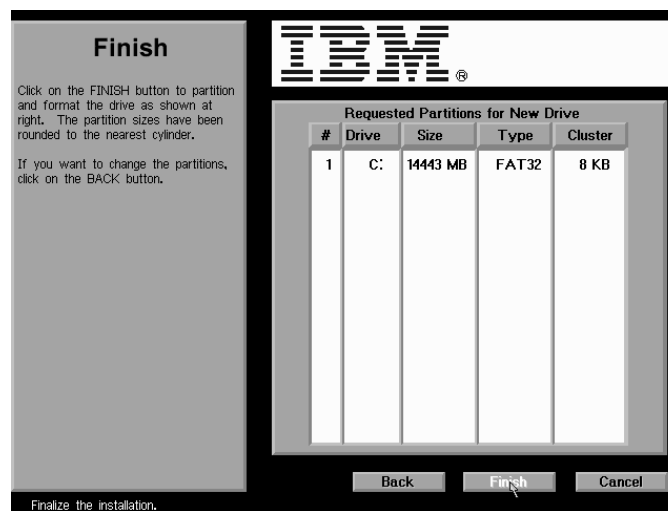


- If you selected FAT16, the following screen is displayed. Select an option. Click “Continue”.

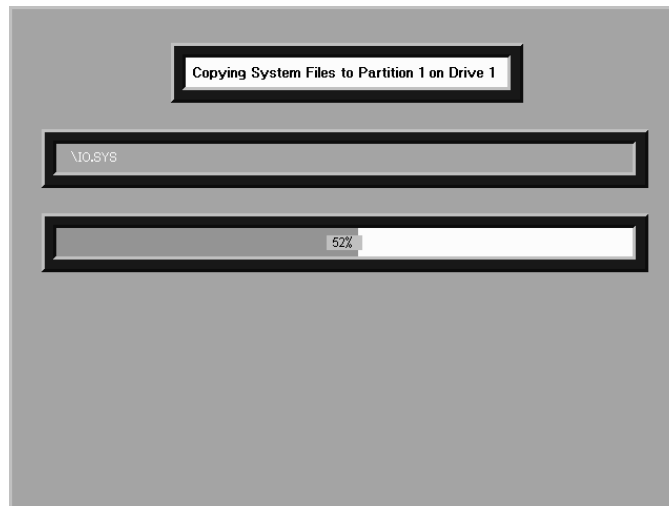
*Note: DOS, Windows 3.1x, and early versions of Windows 95 only support FAT16. FAT16 file systems have a 2.1GB partition limit. If you have one of these operating systems, you must create multiple partitions of 2.1GB or less.*



- Your partition selections are displayed. Select “Back” to change your selections. Select “Finish” to partition and format your hard drive.



- The message “DriveGuide will now partition and format the hard drive. This is your last chance to cancel” is displayed. Select “Continue” to partition and format.
- IBM DriveGuide is now copying data to your drive.



- The message “Remove disk from floppy drive” is displayed. Remove the IBM DriveGuide diskette and click “Okay”. The drive installation is complete. If EZ-BIOS was installed, do not insert a floppy until prompted by EZ-BIOS.

### Operating system installation

*IMPORTANT: If the operating system presents the option to partition and format your drive, skip this step. IBM DriveGuide has already partitioned and formatted your drive.*

If EZ-BIOS was not installed during IBM DriveGuide installation, proceed to your operating system installation instructions.

If EZ-BIOS was installed during IBM DriveGuide installation, you must allow EZ-BIOS to load in memory prior to booting to a floppy. Perform the boot process below or your drive’s capacity and partitions will be unavailable.

- Boot your system to the hard drive to load EZ-BIOS in memory. EZ-BIOS displays this message:

```
EZ-BIOS: Initializing...
EZ-BIOS: Hold the CTRL key down for Status Screen or
to boot from floppy...
```

- Press the **CTRL** key. A status screen is displayed.
- Insert the operating system setup diskette and press **A** to boot from a floppy.

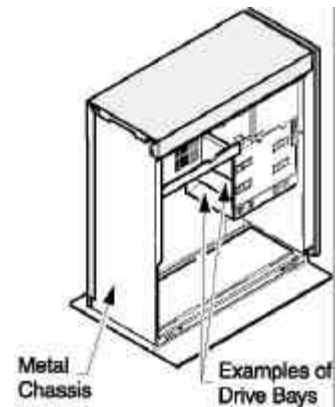


## Add a new drive as Slave

The following steps install the IBM Deskstar as the Primary Slave in a system with an existing drive as Primary Master.

### Begin the hardware install

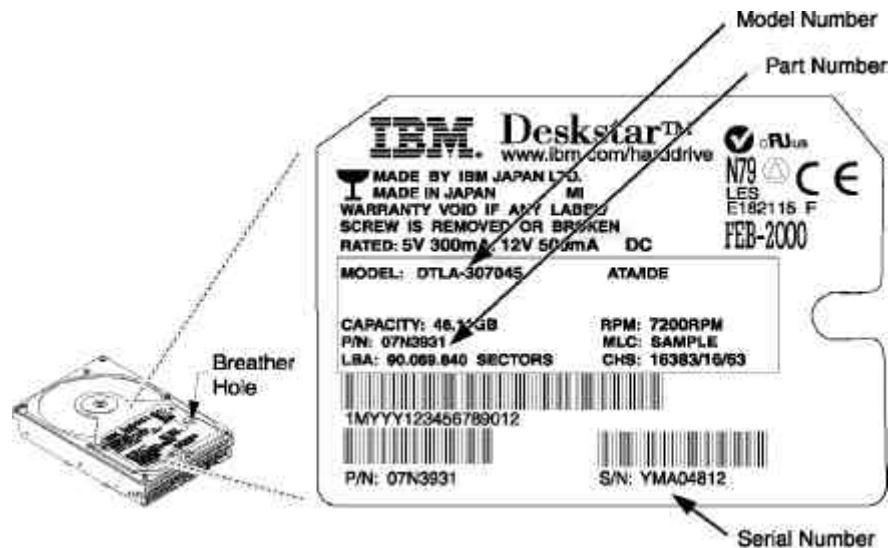
- Turn off your computer system.
- Remove the cover as instructed by your computer system manual.
- Discharge static electricity by touching an unpainted metal surface on your computer chassis with one hand. Touch the ESD bag with the other hand.
- Unplug your computer. Remain in contact with the chassis and the bag for at least two seconds.
- Note the mounting position of existing drives and cables.
- If replacing a drive or replacing a cable with a 40 pin, 80 conductor ATA/IDE cable, remove it. Store the drive in a safe place in case it should be needed again.



### Configure the jumper settings

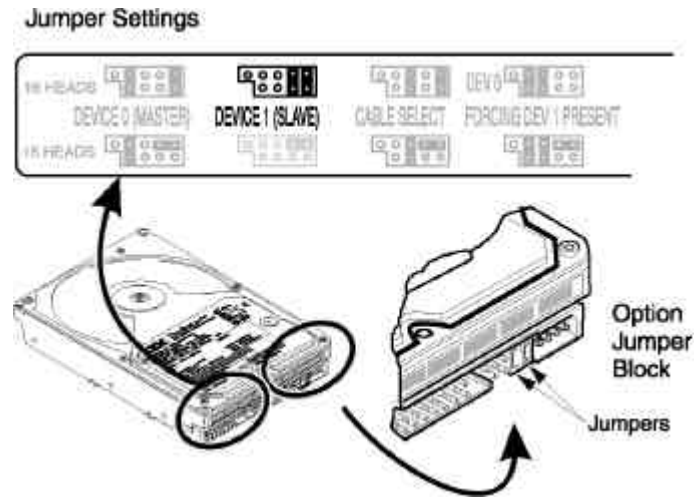
- Remove the drive from the ESD bag.
- Record the serial number, part number, and model number in the spaces provided in the Appendix for future reference.

*Note: Placement of model, part, and serial numbers may vary.*



- Set the jumpers to Slave, 16 heads.

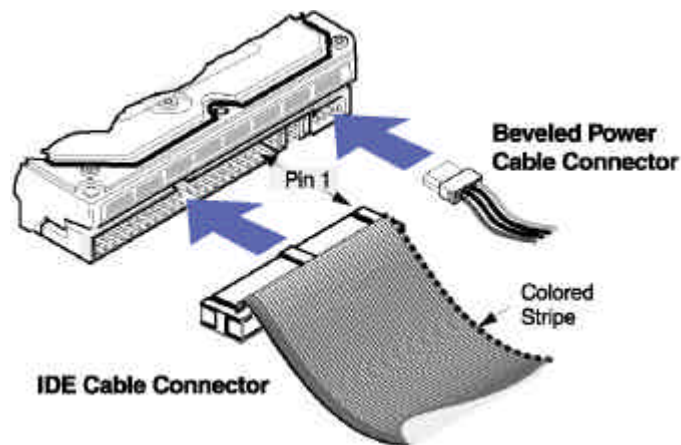
*Note: The IBM Deskstar has an option jumper block located next to the interface connector. Setting these jumpers allows you to use the different options of the hard disk drive. See the “Jumpers” section of the Appendix for jumper setting descriptions.*



### Attach the cables

*Note: With some system chassis, it may be more convenient to attach the cable after the drive is mounted. The order of the steps below may change depending upon your system.*

*Note: The 40 pin, 80 conductor ATA/IDE cable provided with the IBM Deskstar is color coded for the Master, Slave, and system connectors. The Master connector is black, the Slave connector is gray, and the system connector is blue.*



- To use the provided ATA/IDE cable, remove the existing cable from the primary ATA/IDE connector of your motherboard or controller card.
- Attach the blue connector of the ATA/IDE cable to the ATA/IDE connector marked “Primary” or “0” on the motherboard or controller card. The primary ATA/IDE connector controls the first and second ATA/IDE devices in the system.

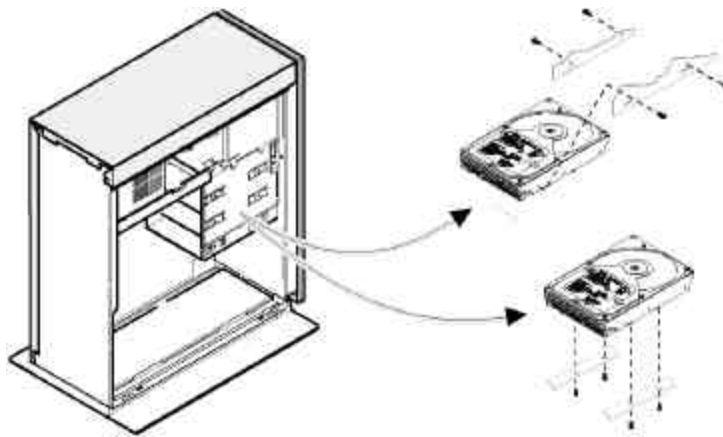
*Note: The pin 1 edge of an ATA/IDE cable is marked with a colored stripe. The connectors are also keyed to insert one way only.*

- Attach a power cable to each hard disk drive.
- Attach the black connector of the ATA/IDE cable to the Master drive.
- Attach the gray connector of the ATA/IDE cable to the Slave drive.

### **Mount the drive**

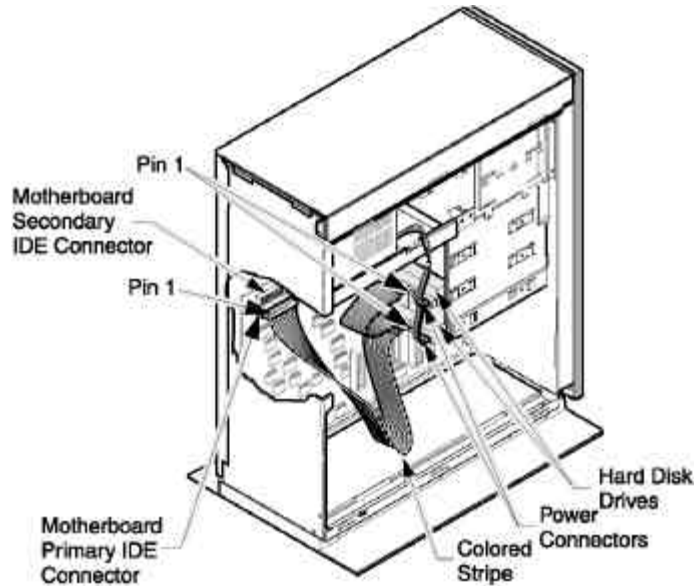
*Note: Drive bays and other enclosures vary in size and orientation from system to system. They may be oriented vertically, horizontally, upside down, or sideways. The IBM Deskstar can be mounted with any side or end vertical or horizontal, but must not be mounted in a tilted position.*

- Mount the drive as instructed by your computer system manual.



### Complete the hardware install

- Check the ATA/IDE cable and power connections.
- Ensure proper ATA/IDE cable and power cable routing.
- Recover any loose screws or parts.
- Replace the computer system cover.
- Plug in your computer.



### Set the BIOS/CMOS

*Note: BIOS setups vary from system to system and these instructions are intended only as a guide.*

- Run the BIOS/CMOS setup utility. Key stroke sequences for accessing your BIOS are often displayed at boot, or can be found in your computer system manual.
- Locate disk drive type settings. Select the option for Autodetect, Primary Slave, if available. If your computer autoconfigures itself at boot time, verify drive detection and capacity. If autodetection is unavailable, set the disk drive type to a User Definable Type (UDT) and enter the CHS parameters 1024 cylinders, 16 heads, and 63 sectors. If Autodetect or a UDT is unavailable, select Drive Type 1.
- Select translation or LBA options as provided by your computer system.
- Record drive CHS parameters and capacity as reported by the BIOS in the spaces provided in the Appendix. If the capacity displayed by the BIOS does not match your drive capacity, it is likely your system does not support drives greater than 8.4 GB.
- Save the settings and exit.

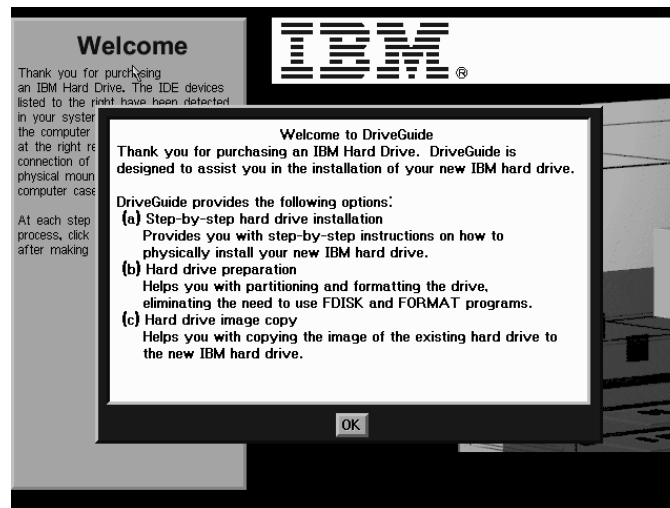
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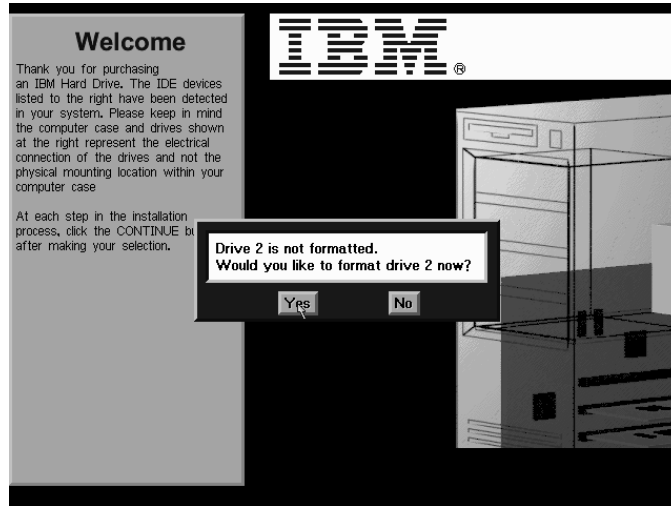
- Boot your computer with the IBM DriveGuide diskette in drive A. The IBM DriveGuide logo is displayed with the message "Loading DriveGuide - Please Wait".
- The Welcome screen is displayed. Click "OK".



*Note: If a mouse is not detected, a screen is displayed explaining the use of Tab and Enter to navigate.*

- A License Agreement is displayed. Click "Accept".

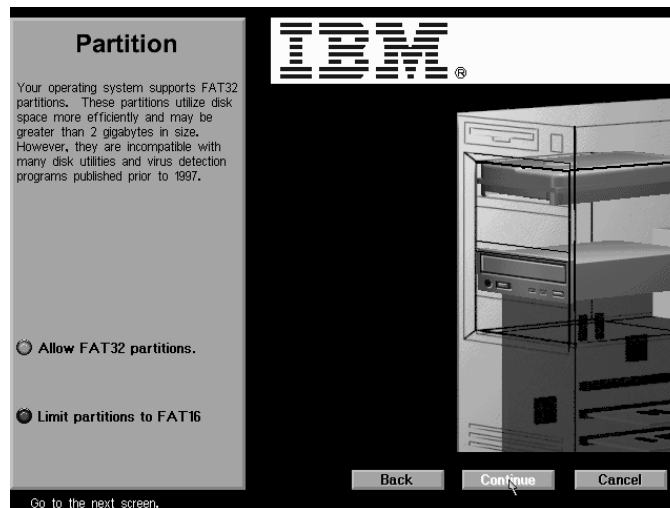
- The message “Drive 2 is not formatted” is displayed. Select “Yes” to format the specified drive. Click “No” if the wrong drive is specified or you want to proceed manually.



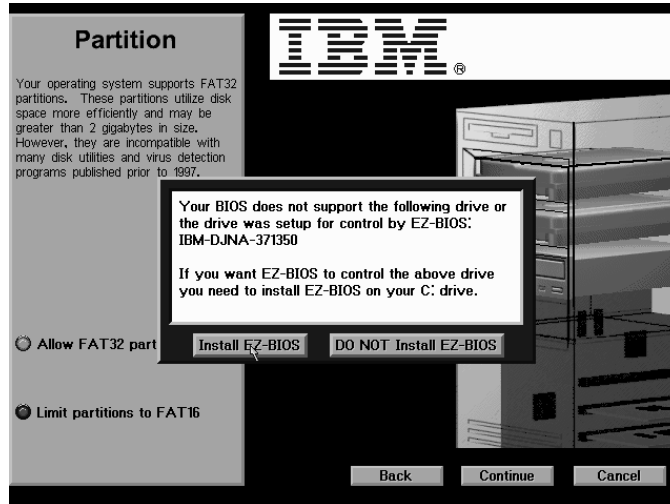
*Note: If IBM DriveGuide detects two drives, follow the instructions displayed to copy files from one drive to another, if desired. If your drive is already formatted, a Welcome screen is displayed with three options; guided install, partition and format, and advanced options.*

- Choose the type of File Allocation Table (FAT) to be used in your drive partitions.

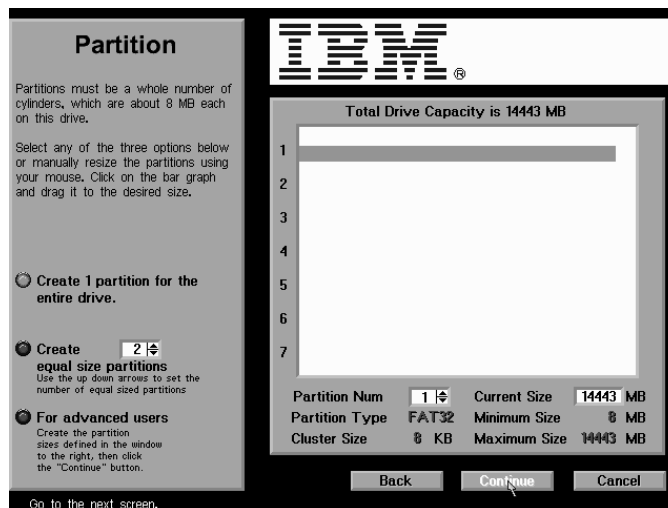
*Note: Select FAT32 or FAT16 if you are using Windows 95 SR2 or Windows 98. FAT32 partitions utilize disk space more efficiently and may be greater than 2 GB in size. If you are using DOS, Windows 3.1x, or an earlier version of Windows 95, select FAT16.*



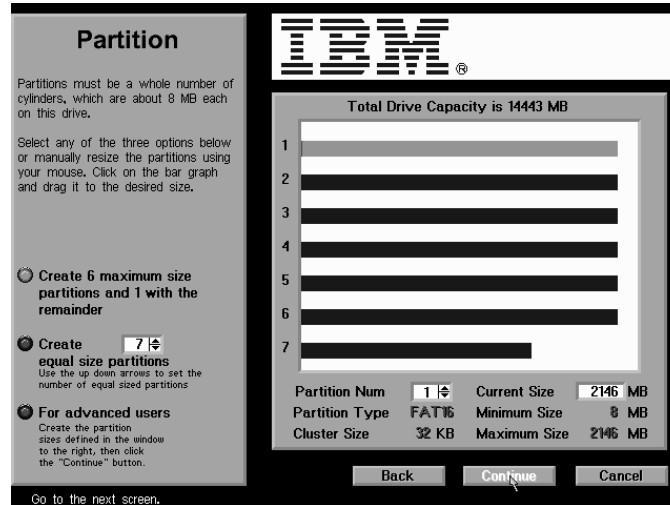
- IBM DriveGuide tests the drive to see if EZ-BIOS is required. EZ-BIOS is required if your drive is larger than 8.4GB and your system BIOS does not support large capacities. Select "Install EZ-BIOS". If you select "Do Not Install EZ-BIOS" your capacity will be limited to 8.4GB.



- If you selected FAT32, the following screen is displayed. Select an option. Click "Continue".

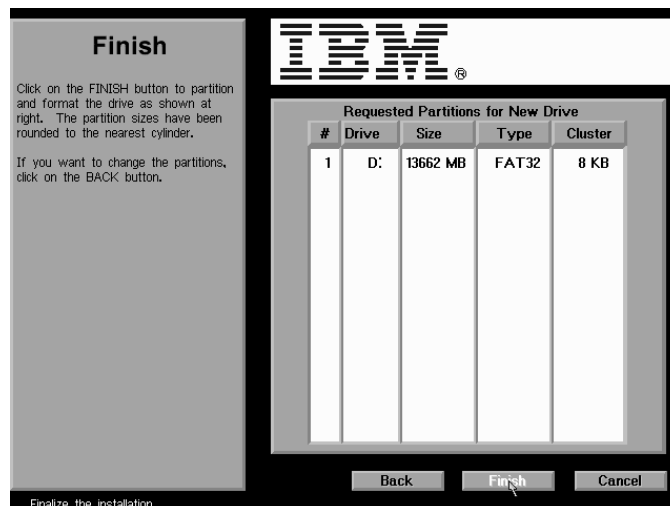


- If you selected FAT16, the following screen is displayed. Select an option. Click “Continue”.



*Note: DOS, Windows 3.1x, and early versions of Windows 95 only support FAT16. FAT16 file systems have a 2.1GB partition limit. If you have one of these operating systems, you must create multiple partitions of 2.1GB or less.*

- Your partition selections are displayed. Select “Back” to change your selections. Select “Finish” to partition and format your hard drive.



- The message “DriveGuide will now partition and format the hard drive. This is your last chance to cancel” is displayed. Select “Continue” to partition and format.
- If copy was selected, IBM DriveGuide is now copying data to your drive.



- The message “Remove disk from floppy drive” is displayed. Remove the IBM DriveGuide diskette and click “Okay”. The installation is now complete. If EZ-BIOS was installed and you are rebooting to a diskette, see the important note below.

*IMPORTANT: If EZ-BIOS was installed during IBM DriveGuide installation, you must allow EZ-BIOS to load in memory prior to booting to a floppy. If you do not perform the floppy boot process below your drive’s capacity and partitions will be unavailable.*

*Boot your system to the hard drive to load EZ-BIOS in memory. EZ-BIOS displays this message:*

```
EZ-BIOS: Initializing...
EZ-BIOS: Hold the CTRL key down for Status Screen or
to boot from floppy...
```

*Press the CTRL key. A status screen is displayed.*

*Insert the boot diskette and press A to boot from a floppy.*

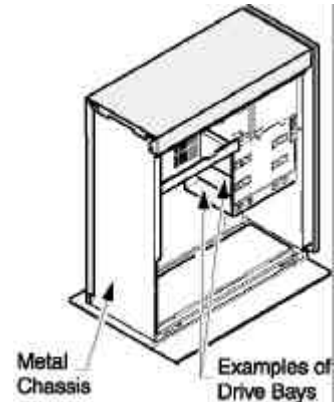


## Replace and copy a Master drive

The following steps replace an existing Primary Master drive with the IBM Deskstar and install the existing drive as Primary Slave. Data is then copied from the Primary Slave to the IBM Deskstar before the Primary Slave is removed.

### Begin the hardware install

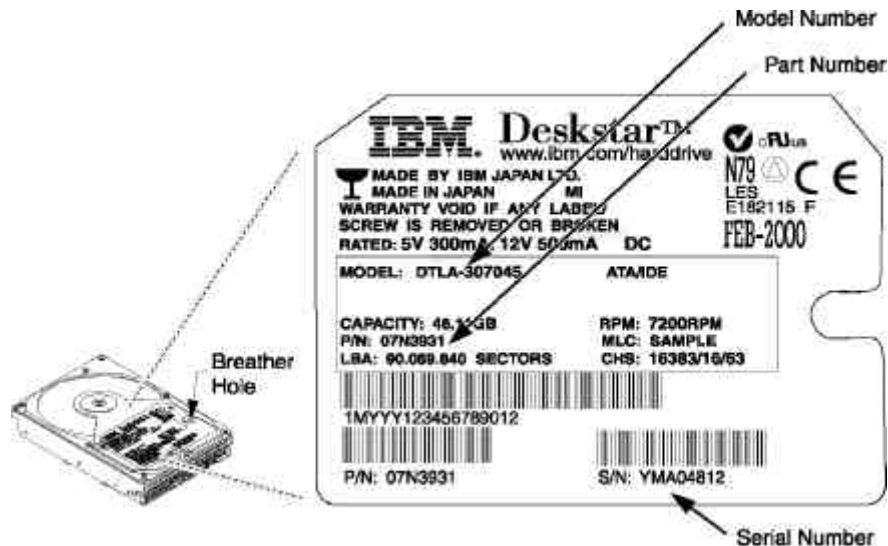
- Turn off your computer system.
- Remove cover as instructed by your computer system manual.
- Discharge static electricity by touching an unpainted metal surface on your computer chassis with one hand. Touch the ESD bag with the other hand. Remain in contact with the chassis and the bag for at least two seconds.
- Unplug your computer.
- Note mounting position of existing drives and cables.
- If replacing a cable with a 40 pin, 80 conductor ATA/IDE cable, remove it now.



### Configure the jumper settings

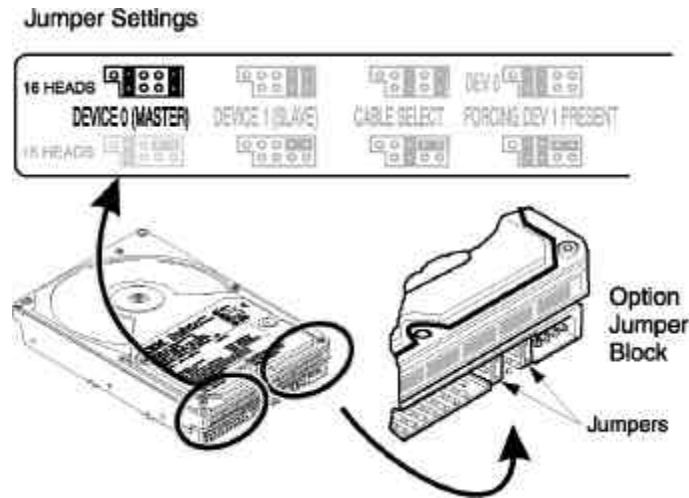
- Remove the drive from its ESD bag.
- Record the serial number, part number, and model number in the spaces provided in the Appendix for future reference.

*Note: Placement of model, part, and serial numbers may vary.*



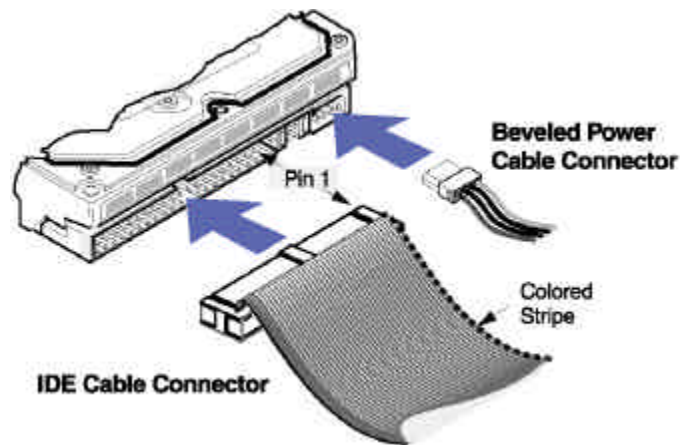
- Leave the IBM Deskstar jumpers as set. The jumpers are factory set to Master, 16 heads.
- Set the jumpers on the existing drive for Slave. Refer to the existing drive label or manual for jumper settings. You may need to remove the existing drive to change the jumpers.

*Note: The IBM Deskstar has an option jumper block located next to the interface connector. Setting these jumpers allows you to use the different options of the hard disk drive. See the "Jumpers" section of the Appendix for jumper setting descriptions.*



### Attach the cables

*Note: With some system chassis, it may be more convenient to attach the cable after the drive is mounted. The order of the following steps may change depending upon your system.*



*Note: The 40 pin, 80 conductor ATA/IDE cable provided with the IBM Deskstar is color coded for the Master, Slave, and system connectors. The Master connector is black, the Slave connector is gray, and the system connector is blue.*

- To use the provided ATA/IDE cable, remove the existing cable from the primary ATA/IDE connector of your motherboard or controller card.
- Attach the blue connector of the ATA/IDE cable to the ATA/IDE connector marked "Primary" or "0" on the motherboard or controller card. The primary ATA/IDE connector controls the first and second ATA/IDE devices in the system.

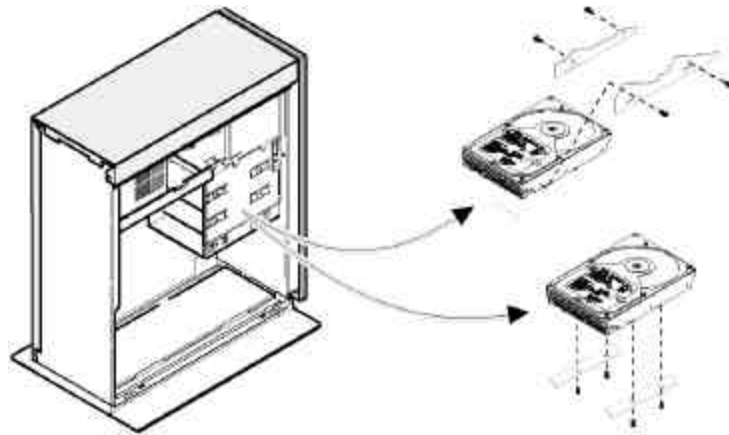
*Note: The pin 1 edge of an ATA/IDE cable is marked with a colored stripe. The connectors are also keyed to insert one way only.*

- Attach a power cable to each hard disk drive.
- Attach the black connector of the ATA/IDE cable to the Master drive.
- Attach the gray connector of the ATA/IDE cable to the Slave drive.

### **Mount the drive**

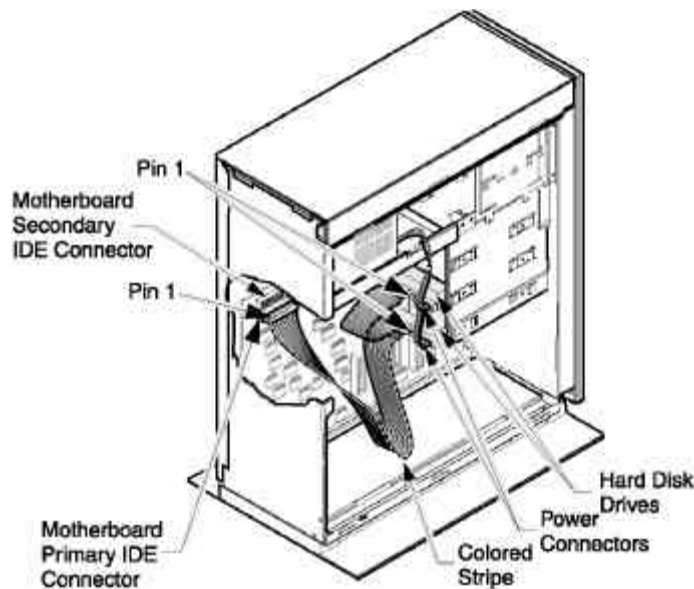
*Note: Drive bays and other enclosures vary in size and orientation from system to system. They may be oriented vertically, horizontally, upside down, or sideways. The IBM Deskstar can be mounted with any side or end vertical or horizontal, but must not be mounted in a tilted position.*

- Mount the drive as instructed by your computer system manual.



### Complete the hardware install

- Check the ATA/IDE cable and power connections.
- Ensure proper ATA/IDE cable and power cable routing.
- Recover any loose screws or parts.
- Plug in your computer.



### Set the BIOS/CMOS

*Note: BIOS setups vary from system to system and these instructions are intended only as a guide.*

- Run the BIOS/CMOS setup utility. Key stroke sequences for accessing your BIOS are often displayed at boot, or can be found in your computer system manual.
- Locate disk drive type settings. Select the option for Autodetect, Primary Master and Slave, if available. If your computer autoconfigures itself at boot time, verify drive detection and capacity. If autodetection is unavailable, set the disk drive type to a User Definable Type (UDT) and enter the CHS parameters 1024 cylinders, 16 heads, and 63 sectors. If Autodetect or a UDT is unavailable, select Drive Type 1.
- Select translation or LBA options as provided by your computer system.
- Record drive CHS parameters and capacity as reported by the BIOS in the spaces provided in the Appendix. If the capacity displayed by the BIOS does not match your drive capacity, it is likely your system does not support drives greater than 8.4 GB.
- Save the settings and exit.

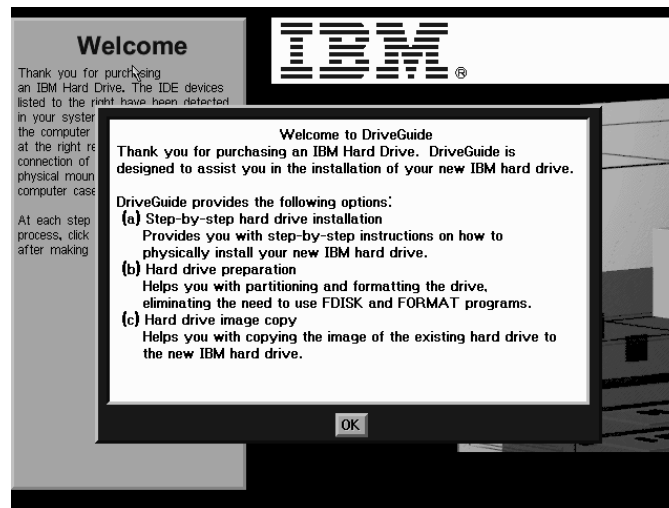
## Partition, format, and copy with IBM DriveGuide Easy Installation Software

*Note: You may choose to use Fdisk to partition and format your hard drive. Refer to the section entitled Fdisk and Format in the Appendix for more information.*

Due to system and hard drive variations, the IBM DriveGuide screens displayed may be different than those presented here.

*Note: Many BIOS setups refer to the drives in a system as 0, 1, and so on. IBM DriveGuide refers to drives as 1, 2, etc.*

- Boot your computer with the IBM DriveGuide diskette in drive A. The IBM DriveGuide logo is displayed with the message "Loading DriveGuide - Please Wait".
- The Welcome screen is displayed. Click "OK".

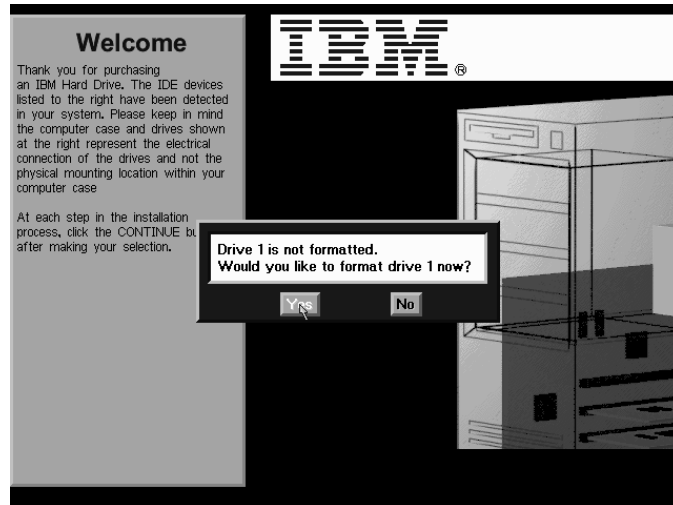


*Note: If a mouse is not detected, a screen is displayed explaining the use of Tab and Enter to navigate.*

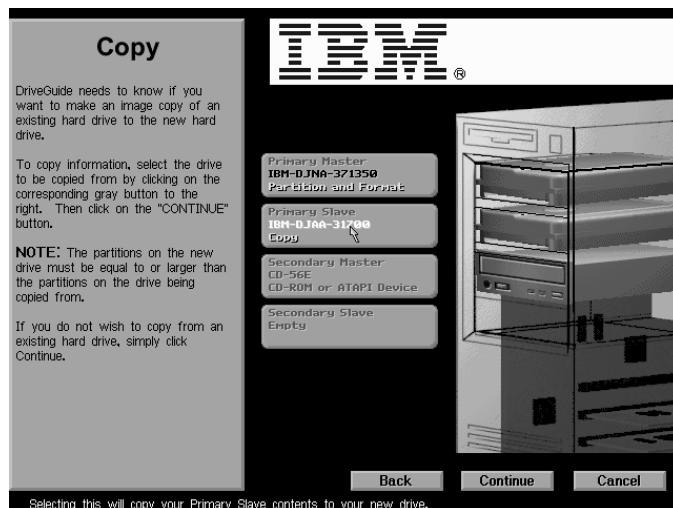
- A License Agreement is displayed. Click "Accept".

- The message “Drive 1 is not formatted” is displayed. Select “Yes” to format the specified drive. Click “No” if the wrong drive is specified or you want to proceed manually.

*Note: If your drive is already formatted, a Welcome screen is displayed with three options; guided install, partition and format, and advanced options.*

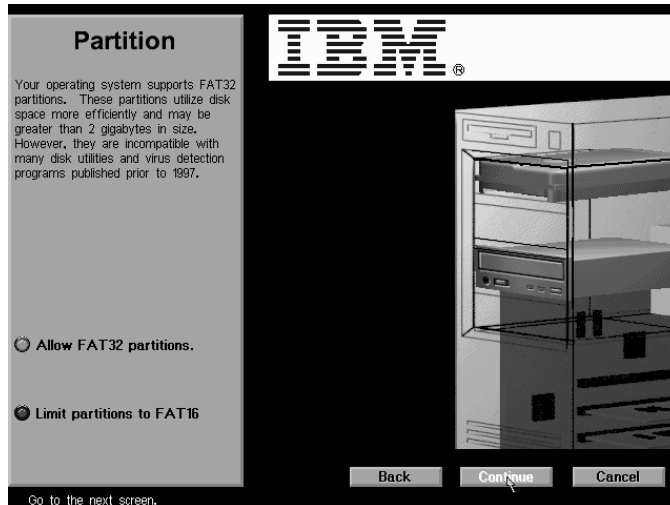


- Select the drive to be copied from by clicking on the gray button to the right. Click “Continue”.

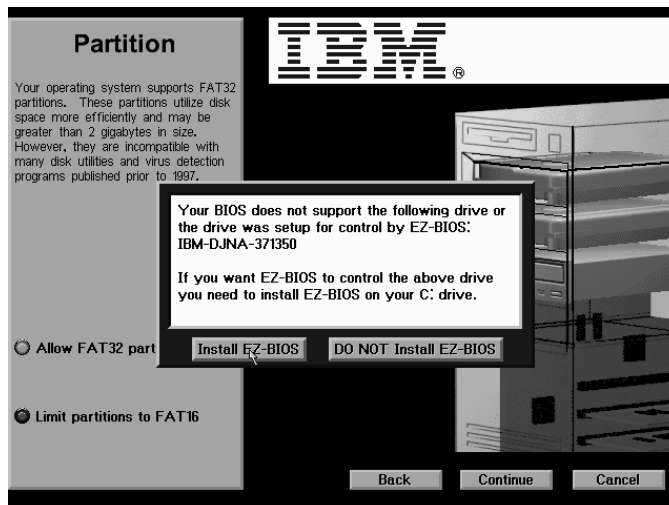


- Choose the type of File Allocation Table (FAT) to be used in your drive partitions.

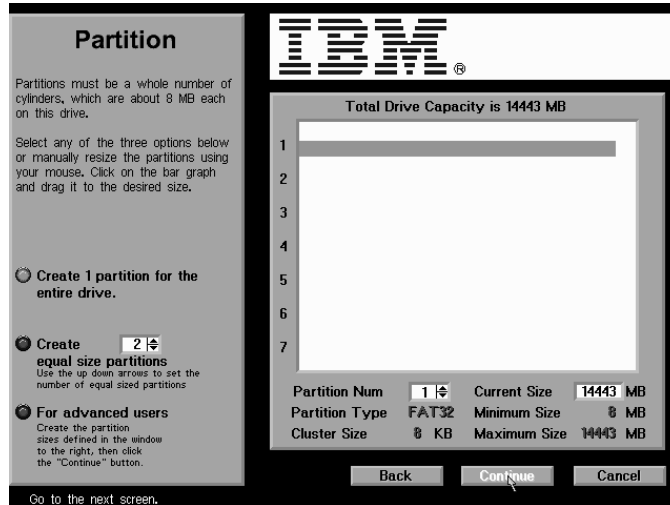
*Note: Select FAT32 or FAT16 if you are using Windows 95 SR2 or Windows 98. FAT32 partitions utilize disk space more efficiently and may be greater than 2 GB in size. If you are using DOS, Windows 3.1x, or an earlier version of Windows 95, select FAT16.*



- IBM DriveGuide tests the drive to see if EZ-BIOS is required. EZ-BIOS is required if your drive is larger than 8.4GB and your system BIOS does not support large capacities. Select "Install EZ-BIOS". If you select "Do Not Install EZ-BIOS" your capacity will be limited to 8.4GB.

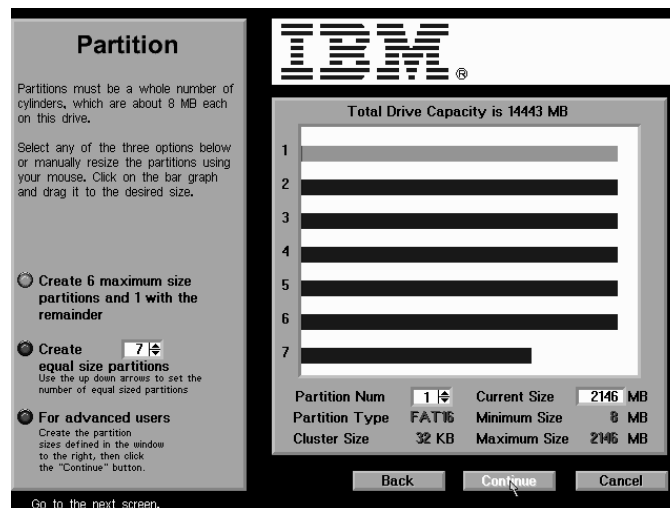


- If you selected FAT32, the following screen is displayed. Select an option. Click “Continue”.

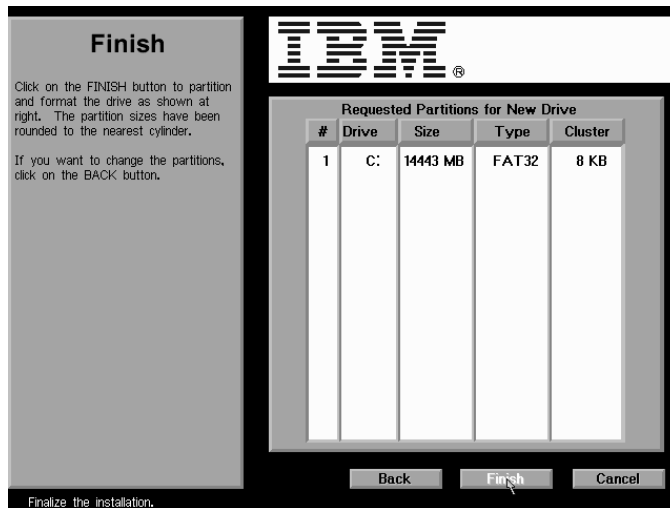


- If you selected FAT16, the following screen is displayed. Select an option. Click “Continue”.

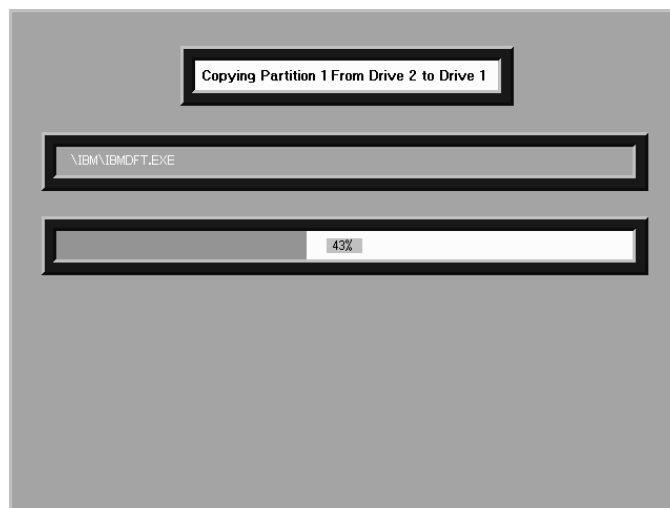
*Note: DOS, Windows 3.1x, and early versions of Windows 95 only support FAT16. FAT16 file systems have a 2.1GB partition limit. If you have one of these operating systems, you must create multiple partitions of 2.1GB or less.*



- Your partition selections are displayed. Select “Back” to change your selections. Select “Finish” to partition and format your hard drive.



- The message “DriveGuide will now partition and format the hard drive. This is your last chance to cancel” is displayed. Select “Continue”.
- IBM DriveGuide is now copying data to your drive.



- The message “Remove disk from floppy drive” is displayed. Remove the IBM DriveGuide diskette and click “OK”. Turn off your computer.
- Remove the Slave drive from the system. Replace the system cover.
- Access your BIOS setup. Set the Drive Type setting for Primary Slave to “None” or “Not Installed”. Save the settings, exit, and reboot the system. The installation is now complete. If EZ-BIOS was installed and you are rebooting to a diskette, see the following important note.

*IMPORTANT: If EZ-BIOS was installed during IBM DriveGuide installation, you must allow EZ-BIOS to load in memory prior to booting to a floppy. If you do not perform the floppy boot process below your drive’s capacity and partitions will be unavailable.*

*Boot your system to the hard drive to load EZ-BIOS in memory. EZ-BIOS displays this message:*

```
EZ-BIOS: Initializing...
EZ-BIOS: Hold the CTRL key down for Status Screen or to boot
from floppy...
```

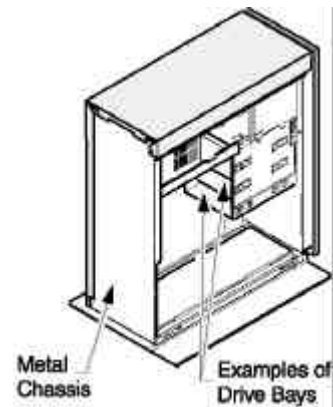
*Press the CTRL key. A status screen is displayed.
Insert the boot diskette and press A to boot from a floppy.*

## Add a new Master drive, install old Master as Slave and copy

The following steps replace your existing Primary Master with your IBM Deskstar, install your existing drive as Primary Slave, and copy files from the Primary Slave to the Primary Master.

### Begin the hardware install

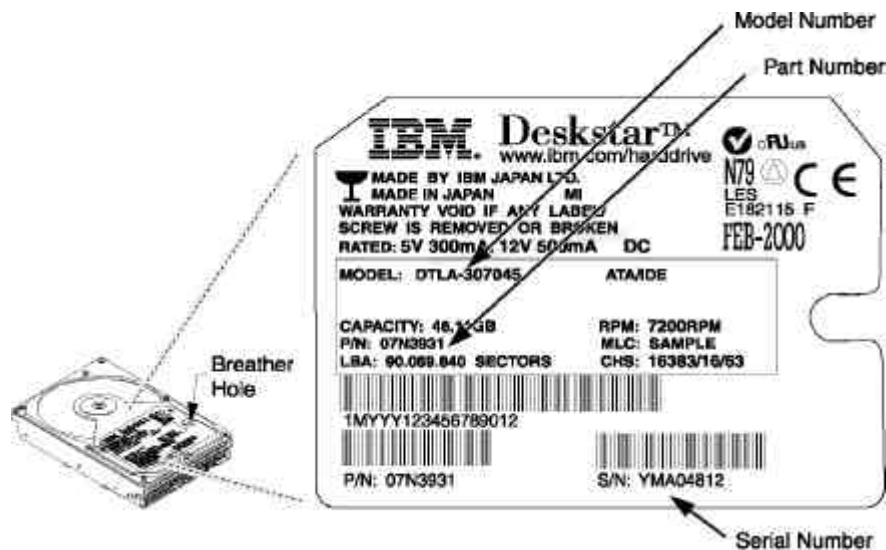
- Turn off your computer system.
- Remove cover as instructed by your computer system manual.
- Discharge static electricity by touching an unpainted metal surface on your computer chassis with one hand. Touch the ESD bag with the other hand. Remain in contact with the chassis and the bag for at least two seconds.
- Unplug your computer.
- Note mounting position of existing drives and cables.
- If replacing a cable with a 40 pin, 80 conductor ATA/IDE cable, remove it now.



### Configure the jumper settings

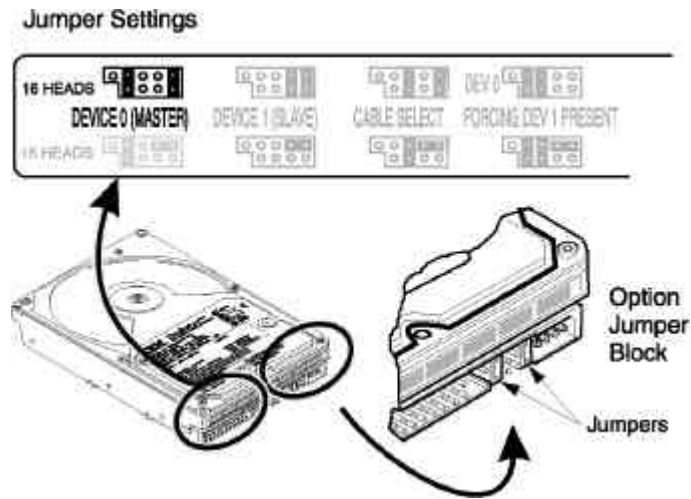
- Remove the drive from its ESD bag.
- Record the serial number, part number, and model number in the spaces provided in the Appendix for future reference.

*Note: Placement of model, part, and serial numbers may vary.*



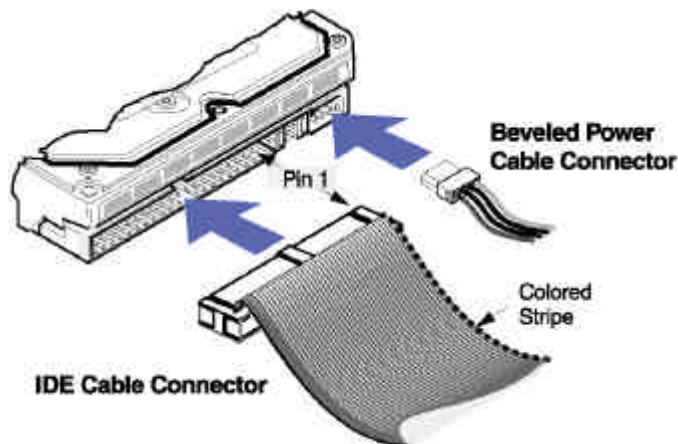
- Leave the IBM Deskstar jumpers as set. The jumpers are factory set to Master, 16 heads.
- Set the jumpers on the existing drive for Slave. Refer to the existing drive label or manual for jumper settings. You may need to remove the existing drive to change the jumpers.

*Note: The IBM Deskstar has an option jumper block located next to the interface connector. Setting these jumpers allows you to use the different options of the hard disk drive. See the "Jumpers" section of the Appendix for jumper setting descriptions.*



### Attach the cables

*Note: With some system chassis, it may be more convenient to attach the cable after the drive is mounted. The order of the following steps may change depending upon your system.*



*Note: The 40 pin, 80 conductor ATA/IDE cable provided with the IBM Deskstar is color coded for the Master, Slave, and system connectors. The Master connector is black, the Slave connector is gray, and the system connector is blue.*

- To use the provided ATA/IDE cable, remove the existing cable from the primary ATA/IDE connector of your motherboard or controller card.
- Attach the blue connector of the ATA/IDE cable to the ATA/IDE connector marked "Primary" or "0" on the motherboard or controller card. The primary ATA/IDE connector controls the first and second ATA/IDE devices in the system.

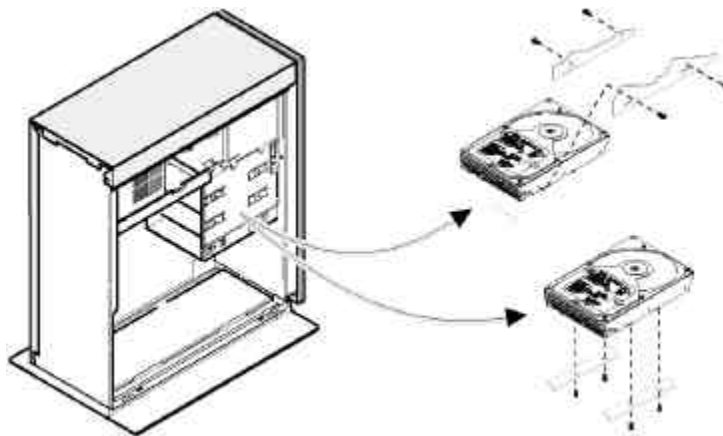
*Note: The pin 1 edge of an ATA/IDE cable is marked with a colored stripe. The connectors are also keyed to insert one way only.*

- Attach a power cable to each hard disk drive.
- Attach the black connector of the ATA/IDE cable to the Master drive.
- Attach the gray connector of the ATA/IDE cable to the Slave drive.

### **Mount the drive**

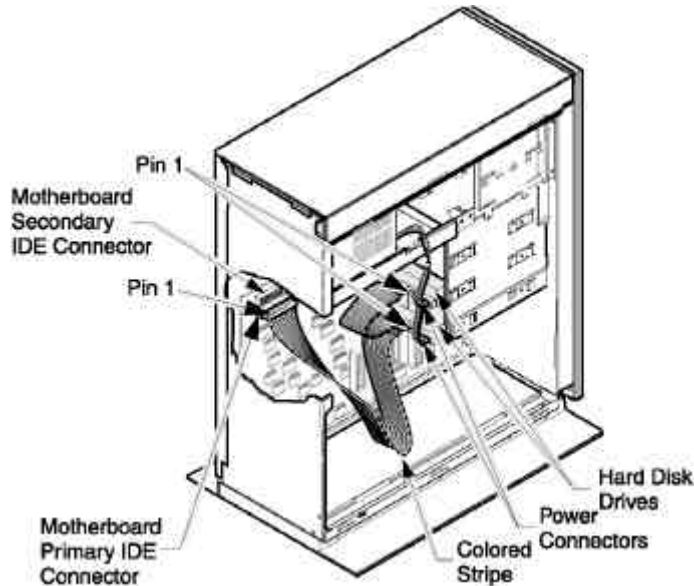
*Note: Drive bays and other enclosures vary in size and orientation from system to system. They may be oriented vertically, horizontally, upside down, or sideways. The IBM Deskstar can be mounted with any side or end vertical or horizontal, but must not be mounted in a tilted position.*

- Mount the drive as instructed by your computer system manual.



### Complete the hardware install

- Check the ATA/IDE cable and power connections.
- Ensure proper ATA/IDE cable and power cable routing.
- Recover any loose screws or parts.
- Replace the system cover.
- Plug in your computer.



### Set the BIOS/CMOS

*Note: BIOS setups vary from system to system and these instructions are intended only as a guide.*

- Run the BIOS/CMOS setup utility. Key stroke sequences for accessing your BIOS are often displayed at boot, or can be found in your computer system manual.
- Locate disk drive type settings. Select the option for Autodetect, Primary Master and Slave, if available. If your computer autoconfigures itself at boot time, verify drive detection and capacity. If autodetection is unavailable, set the disk drive type to a User Definable Type (UDT) and enter the CHS parameters 1024 cylinders, 16 heads, and 63 sectors. If Autodetect or a UDT is unavailable, select Drive Type 1.
- Select translation or LBA options as provided by your computer system.
- Record drive CHS parameters and capacity as reported by the BIOS in the spaces provided in the Appendix. If the capacity displayed by the BIOS does not match your drive capacity, it is likely your system does not support drives greater than 8.4 GB.
- Save the settings and exit.

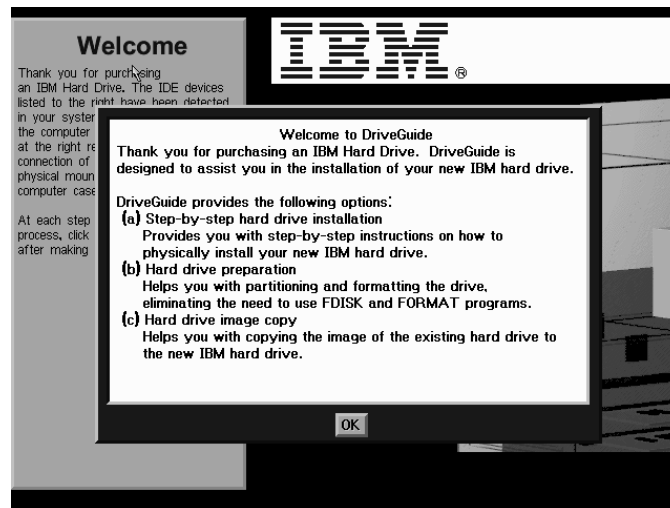
## Partition, format, and copy with IBM DriveGuide Easy Installation Software

*Note: You may choose to use Fdisk to partition and format your hard drive. Refer to the section entitled Fdisk and Format in the Appendix for more information.*

Due to system and hard drive variations, the IBM DriveGuide screens displayed may be different than those presented here.

*Note: Many BIOS setups refer to the drives in a system as 0, 1, and so on. IBM DriveGuide refers to drives as 1, 2, etc.*

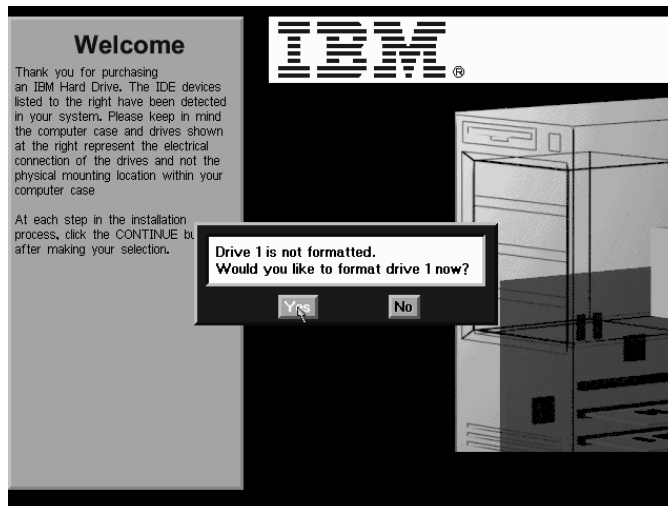
- Boot your computer with the IBM DriveGuide diskette in drive A. The IBM DriveGuide logo is displayed with the message "Loading DriveGuide - Please Wait".
- The Welcome screen is displayed. Click "OK".



*Note: If a mouse is not detected, a screen is displayed explaining the use of Tab and Enter to navigate.*

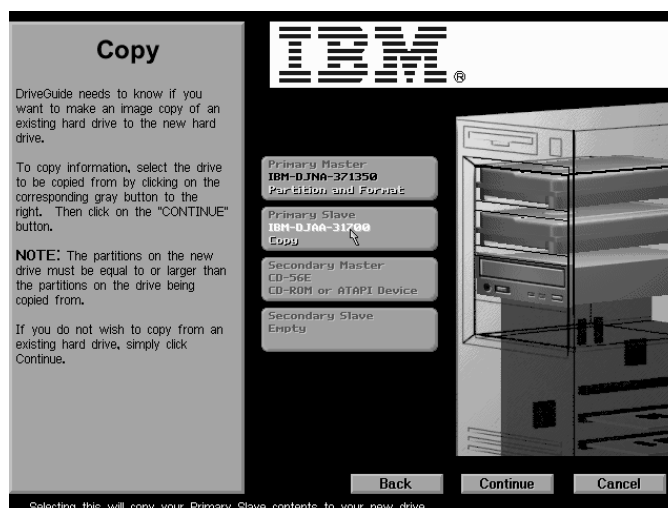
- A License Agreement is displayed. Click "Accept".

- The message “Drive 1 is not formatted” is displayed. Select “Yes” to format the specified drive. Click “No” if the wrong drive is specified or you want to proceed manually.



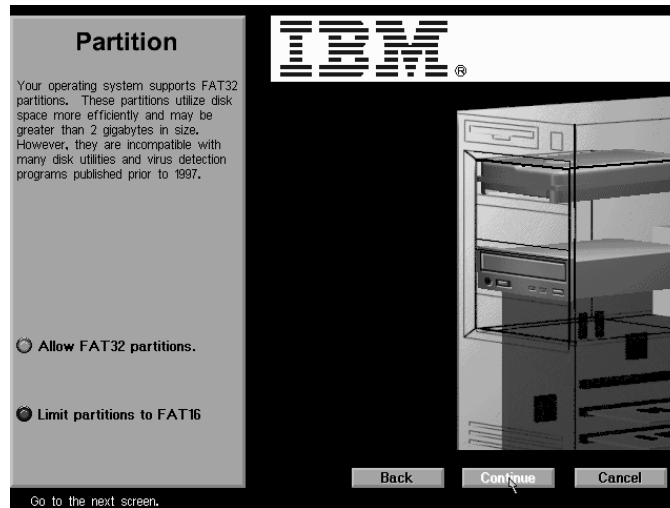
*Note: If your drive is already formatted, a Welcome screen is displayed with three options; guided install, partition and format, and advanced options.*

- Select the drive to be copied from by clicking on the gray button to the right. Click “Continue”.

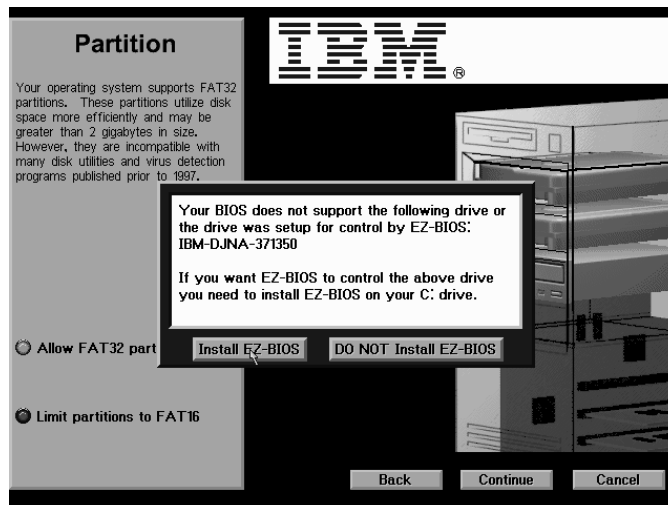


- Choose the type of File Allocation Table (FAT) to be used in your drive partitions.

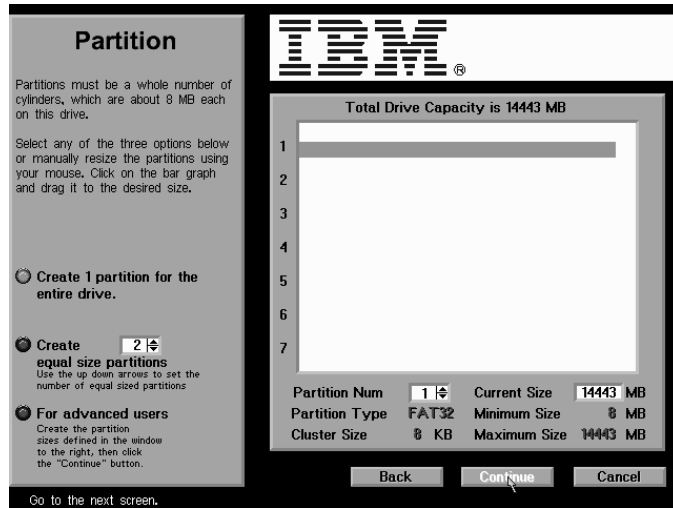
*Note: Select FAT32 or FAT16 if you are using Windows 95 SR2 or Windows 98. FAT32 partitions utilize disk space more efficiently and may be greater than 2 GB in size. If you are using DOS, Windows 3.1x, or an earlier version of Windows 95, select FAT16.*



- IBM DriveGuide tests the drive to see if EZ-BIOS is required. EZ-BIOS is required if your drive is larger than 8.4GB and your system BIOS does not support large capacities. Select "Install EZ-BIOS". If you select "Do Not Install EZ-BIOS" your capacity will be limited to 8.4GB.

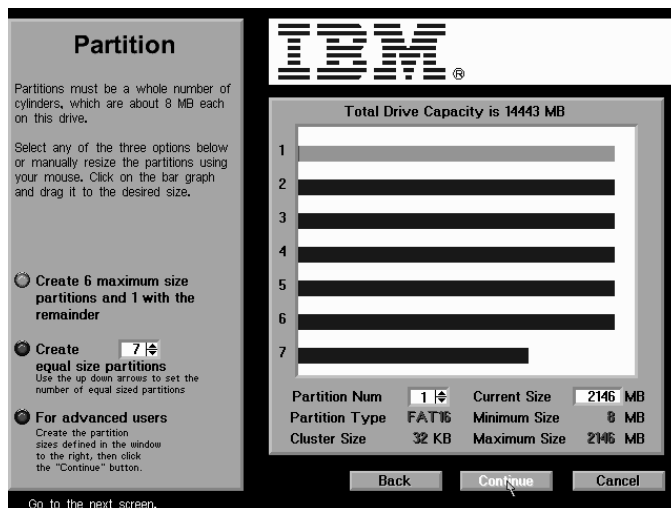


- If you selected FAT32, the following screen is displayed. Select an option. Click “Continue”.

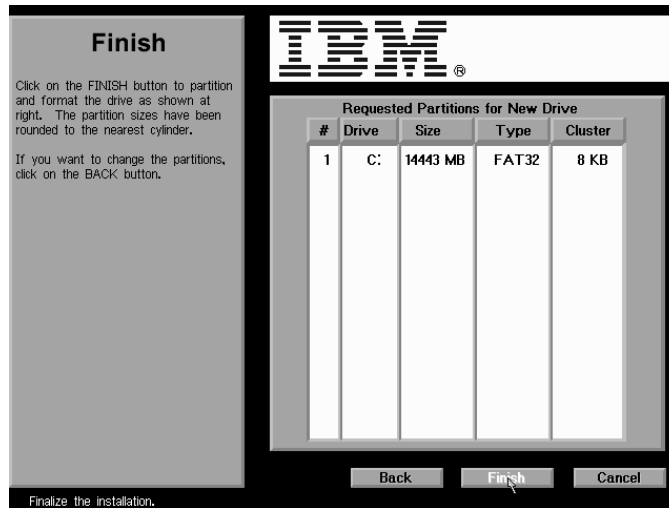


- If you selected FAT16, the following screen is displayed. Select an option. Click “Continue”.

*Note: DOS, Windows 3.1x, and early versions of Windows 95 only support FAT16. FAT16 file systems have a 2.1GB partition limit. If you have one of these operating systems, you must create multiple partitions of 2.1GB or less.*



- Your partition selections are displayed. Select “Back” to change your selections. Select “Finish” to partition and format your hard drive.



- The message “DriveGuide will now partition and format the hard drive. This is your last chance to cancel” is displayed. Select “Continue”.
- IBM DriveGuide is now copying data to your drive.



- The message “Remove disk from floppy drive” is displayed. Remove the IBM DriveGuide diskette and click “Okay”. The installation is now complete. If EZ-BIOS was installed and you are rebooting to a diskette, see the important note below.

*IMPORTANT: If EZ-BIOS was installed during IBM DriveGuide installation, you must allow EZ-BIOS to load in memory prior to booting to a floppy. If you do not perform the floppy boot process below your drive's capacity and partitions will be unavailable.*

*Boot your system to the hard drive to load EZ-BIOS in memory. EZ-BIOS displays this message:*

```
EZ-BIOS: Initializing...
EZ-BIOS: Hold the CTRL key down for Status Screen or to boot
from floppy...
```

*Press the CTRL key. A status screen is displayed.
Insert the boot diskette and press A to boot from a floppy.*

## Appendix

---

Record your IBM Deskstar drive information here:

Serial number	
Part number	
Model number	
Cylinders	
Heads	
Sectors	
Capacity	

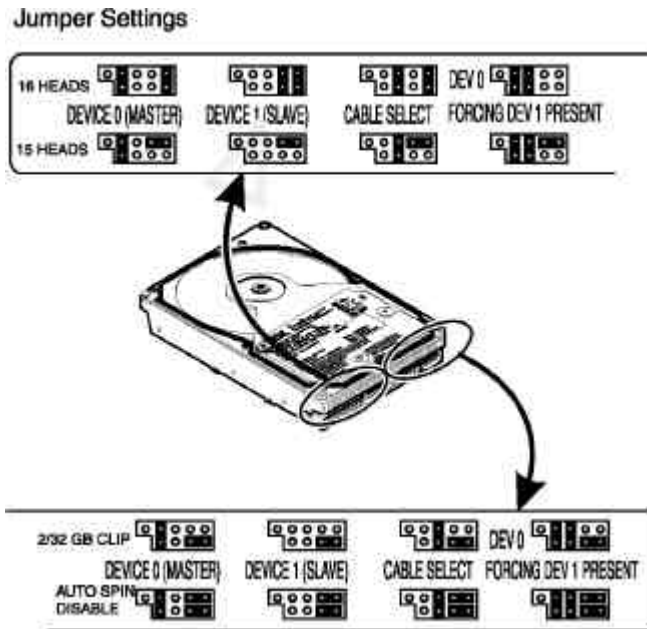
### Cables

#### *40 pin, 40 conductor ATA/IDE cables*

This cable type will support up to and including ATA/33 (UDMA mode 2). Cables cannot be in excess of 18 inches and are limited to the attachment of 2 ATA devices plus the system board connector. The jumper settings designate a Master or Slave drive, not the position of the drive on the cable.

#### *40 pin, 80 conductor ATA/IDE cables*

This cable type is constructed using the Cable Select configuration. It will support Ultra ATA/100 and Ultra ATA/66 interface transfer rates and is backward compatible. The extra 40 conductors are grounded shields to improve signal quality and reduce crosstalk. The connectors of the 80 conductor cable are color-coded. The black connector specifies Master drive connection, gray specifies Slave drive connection, and blue specifies connection to the ATA/IDE port of the motherboard or controller card.



## Jumpers

### Master

If the IBM Deskstar is the only drive on the cable, or the Master drive on a two-drive cable, set the jumpers for Master.

### Slave

If the IBM Deskstar is the Slave drive on a two-drive cable, set the jumpers for Slave.

### Cable Select

The 40 pin, 80 conductor ATA/IDE cable included with your drive is constructed using the Cable Select configuration. If your motherboard or controller card supports Cable Select, you can set the drive address jumper to Cable Select. Attach the drive to the black connector for Master or the gray connector for Slave. Attach the blue connector to the system ATA/IDE port on the motherboard or controller card.

### Slave Present (Device 0 Forcing Device 1 Present)

If your Slave drive is an older drive that may not signal its presence on the bus, set the jumpers on your Master drive to Slave Present.

### 2/32 GB Clip

For a DJNA model drive:

If your BIOS is incompatible with cylinder values higher than 4,096 cylinders, the 2/32 GB clip jumper truncates the cylinder and LBA count of your drive to 4,096 cylinders (2 GB capacity).

For a DTLA or DPTA model drive with a capacity lower than 34GB:

If your BIOS is incompatible with cylinder values higher than 4,096 cylinders, the 2/32 GB clip jumper truncates the cylinder count of your drive to 4,096 cylinders (2 GB capacity). The LBA value of the drive is unchanged.

For a drive with a capacity of 34GB or higher:

If your BIOS is incompatible with LBA values higher than 66,055,248 sectors, the 2/32 GB clip jumper truncates the LBA value to 66,055,248 sectors (32 GB capacity).

#### *16 Head/15Head*

The default configuration of the drive is 16 heads. Some systems may require the drive to be jumpered to 15 heads. This does not reduce the capacity of the drive. See the Frequently Asked Question section of this manual for more information.

#### *Auto Spin Disable*

This jumper allows the drive to be powered up in Standby mode.

### **Fdisk and format**

*IMPORTANT: If you have already used IBM DriveGuide to partition and format your drive, Fdisk and Format are not required.*

#### *Partitioning with FDISK.EXE*

You may choose FDISK.EXE or a similar partitioning software from your operating system to partition your hard disk drive. Follow the instructions provided with your operating system to partition the hard disk drive.

*Note: If your drive is larger than 8.4GB and FDISK.EXE recognizes only 8.4GB of the full capacity, your BIOS may not be supporting Interrupt 13 Extensions. Refer to the section entitled Set the BIOS/CMOS in the appropriate installation option.*

#### *Formatting with FORMAT.EXE*

Follow the instructions provided with your operating system to format the hard disk drive. Formatting will verify the hard disk media and create File Allocation Tables for the partition.

### **Troubleshooting**

If you are having difficulties with your IBM Deskstar, the following checklist may help solve the problem.

1. Can you hear or feel the drive spinning up?

*HINT: Listen when you first turn on the system power. A spinning drive will produce a whining noise when power is first applied. The noise is easier to hear when you first start the system. If you do not hear the drive spinning, ensure the power connector is plugged into the drive. If possible, try another power connector or try the drive in another system. You can also feel a spinning drive vibrate slightly when it is first powered up.*

If the drive does not spin up, ensure the jumpers and cables are connected correctly. If they are connected correctly, skip to the Advanced Troubleshooting section.

2. If the drive spins, does the BIOS see the drive?

*HINT: With Autodetection selected, your BIOS displays the recognized capacity of your hard drive.*

If the BIOS does not see the drive, ensure the BIOS is set to Autodetect and ATA/IDE ports are enabled. If they are set correctly, skip to the Advanced Troubleshooting section.

3. If the BIOS sees the drive, does Fdisk recognize the drive?

*HINT: Fdisk is a utility used to partition and format hard disk drives. The Fdisk program can be found on your operating system startup diskette or in the operating system directory on your C: drive. Use option 4 to Display the active partition or option 5 to select a different drive if the system has more than one drive.*

If Fdisk does not see the drive, skip to the Advanced Troubleshooting section.

4. If Fdisk sees the drive, does it see the full capacity?

*HINT: Option 4 in Fdisk displays the drive capacity and partition sizes.*

If Fdisk does not see the drive's full capacity, IBM DriveGuide may be required to partition and format the drive. Refer to the section of this manual entitled IBM DriveGuide Easy Installation Software.

*Note: The Fdisk function shipped with Windows 95 and Windows 98 contains a bug which causes the DTLA-307075 drive to be reported with a maximum capacity of 7768 MB. This is only a display error and does not affect correct operation of, or access to, the full capacity of the drive. Contact Microsoft for more information.*

5. If Fdisk sees the full capacity, partition and format the drive.

*WARNING: Partitioning and formatting will destroy data. If the data on the drive must be recovered, call the IBM Hard Disk Drive Technical Support Center.*

### **Advanced troubleshooting**

The following tips may help you resolve installation problems.

- If the computer system won't boot:  
Set the jumpers for 15 heads or jumper the drive for 2/32 GB clip. See Frequently Asked Questions for more information.
- If the drive is the only device on the bus:  
Place the drive at the end of the cable and jumper it as Master.

- If the drive is one of two devices on the bus:  
One device must be Slave and one must be Master.
- Systems using Cable Select:  
Systems using Cable Select have a unique ATA/IDE cable. The position on the cable can determine whether the drive is the Master or Slave drive. To determine if the system uses Cable Select, refer to your system documentation. Jumpering a drive to Master or Slave overrides the Cable Select function of a Cable Select cable.
- Ensure all connectors are seated correctly.  
Pin 1 (striped conductor) is located nearest to the power connector. Power connectors are beveled to insert one way only.
- Check for bent pins.  
If possible, try replacing the cable. Total cable length should not exceed 18 inches.
- For drives greater than 8.4GB (or 512MB/2GB/4GB in some older systems):  
Upgrade BIOS to latest version, install a controller card capable of supporting large drive capacities, or install IBM DriveGuide if necessary.
- Try running the drive with all other devices removed.
- If the drive is in a removable carrier, try removing the drive from the carrier and attaching it directly to the bus.
- Microsoft Windows NT, 95A, and DOS must be installed within the first 1024 cylinders.
- When attaching a drive that supports Ultra ATA/100 or Ultra ATA/66 to a compatible controller or motherboard, make sure you are using a 40 pin, 80 conductor ATA/IDE cable and the devices are attached to the correct connectors:
  - Blue - Motherboard or controller
  - Black - Master device
  - Gray - Slave device
- If you are attaching a drive that supports Ultra ATA/100 or Ultra ATA/66 to an Ultra ATA/33 or lower controller or motherboard and experience the following problems:

System hangs during boot with DMA enabled in Windows 95 or 98.

System runs, but is transferring all data in PIO mode 4 in Windows 95 or 98.

System refuses to boot with a bus mastering driver added in Windows 95 SR2 or NT.

Obtain a new BIOS from your BIOS manufacturer. IBM also provides the IBMATASW.EXE utility to enable or disable Ultra ATA/100 or Ultra ATA/66 support on the drive. When Ultra ATA/100 or Ultra ATA/66 support is disabled, the drive operates

in Ultra ATA/33 mode, compatible with Ultra ATA/33 capable controllers. The utility can be downloaded from the IBM Web site at:

**<http://www.storage.ibm.com/techsup/hddtech/welcome.htm>**

- If you are using IBM DriveGuide to install a drive with a capacity of 32 GB or larger in a system with Award BIOS and the system hangs during drive detection:

Reboot the system and hold the F4 key to bypass autodetection of the drive(s). This should keep the system from hanging and allow the user to boot into IBM DriveGuide.

*Note: In some systems it may be necessary to repeat this procedure several times to guarantee that the hang condition can be bypassed.*

Once in DriveGuide, proceed through the partition and format and allow EZ-BIOS to be installed.

- If you are using IBM DriveGuide to install a drive in a system with AMI BIOS and the system hangs during drive detection:

Access the BIOS setup screen by pressing the DEL key when prompted during the system startup.

When the system BIOS screen is displayed, change the setting for the drive you have added from "AUTOdetect" to USER Defined".

Change the default setting for the number of logical cylinders for your new drive from 16,383 to 1,023.

Exit the BIOS setup and save your changes.

Once in DriveGuide, proceed through a partition and format and allow EZ-BIOS to be installed.

- If you are using IBM DriveGuide to copy a partition on an existing drive to a new drive and the copy process hangs at 99%:

This is a known IBM DriveGuide anomaly on certain systems and is not a cause for concern. The partition information will have been copied successfully. Remove the DriveGuide diskette and reboot the system. Your new drive should be fully accessible.

If the answer to your installation question is not found here, call the IBM Hard Disk Drive Technical Support Center. Before calling, please gather as much of the following information as possible:

- IBM drive model number, part number, and serial number
- Operating system
- BIOS manufacturer, version, and date
- Any error codes and when they occurred
- System type and manufacturer
- Motherboard manufacturer
- Chipset manufacturer
- Adapter card manufacturer
- Other devices in systems
- Bus/cable layout (location of device, which device is at the end)
- Applications used (if relevant)



## **Frequently asked questions**

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### **1. Do I have to use IBM DriveGuide Easy Installation Software to partition and format my hard drive?**

No. You may use Fdisk and Format or similar partitioning software from your operating system to partition and format your hard disk drive. Refer to the section of the Appendix titled Fdisk and Format.

### **2. How can I obtain full capacity from my IBM Deskstar?**

If LBA or Large options are not available in your system's BIOS, you can:

- Contact your BIOS manufacturer for an upgrade.
- Install an ATA/IDE controller card with an onboard BIOS that supports larger drive capacities.
- Use DriveGuide to complete installation of your IBM Deskstar.

### **3. How do I know if my system has the components necessary to obtain Ultra ATA/100 or Ultra ATA/66 interface transfer rates?**

The following system components are required to obtain Ultra ATA/100 or Ultra ATA/66 interface transfer rates:

- 40 pin, 80 conductor ATA/IDE cable  
The connectors of this cable are color-coded. The black connector is for Master, gray is for Slave, and blue is for the ATA/IDE connector of the motherboard or controller card. The 40 pin, 80 conductor ATA/IDE cable is the same width as a standard IDE cable, however, each individual conductor is half the diameter of a standard IDE cable conductor.
- A controller card or motherboard chipset with Ultra ATA/100 or Ultra ATA/66 capability  
Refer to your controller card or system manual to determine if your system is Ultra ATA/100 or Ultra ATA/66 compatible or contact your controller card or motherboard manufacturer.
- Ultra ATA/100 or Ultra ATA/66 compatible BIOS  
Refer to your system manual or contact your BIOS manufacturer to determine if your BIOS is compatible.

### **4. Why is a 40 pin, 80 conductor ATA/IDE cable necessary for attachment of an Ultra ATA/100 or Ultra ATA/66 device?**

The added ground cables provide shielding and reduce crosstalk for higher frequency interfaces. If an Ultra ATA/100 or Ultra ATA/66 motherboard does not detect a 40 pin, 80 conductor cable and an Ultra ATA/100 or Ultra ATA/66 drive, the higher transfer rates provided by these interfaces are not available.

### **5. How will a drive that supports Ultra ATA/100 or Ultra ATA/66 run in a slower system?**

The IBM Deskstar drive is capable of Ultra ATA/100 or Ultra ATA/66 (UDMA mode 4)

operation. Your drive will function at the maximum speed supported by your system components.

Certain BIOS and motherboard chipset combinations function incorrectly when the drive reports a UDMA mode higher than the motherboard was designed for. Following is a list of problems and solutions related to specific operating systems.

- Windows 95  
When the system does not correctly switch to a compatible speed (i.e., ATA/33), complete startup of Windows 95 may fail after enabling the Direct Memory Access (DMA) feature in the Windows Control Panel.
- Windows 98  
When the system does not correctly switch to a compatible speed (i.e., ATA/33), complete startup of Windows 98 may fail after enabling the DMA feature in the Windows Control Panel.
- Windows NT 4.0  
The most common symptom is a failure to boot after a bus mastering driver has been added and loaded.

#### Solutions

- Obtain a new BIOS for the motherboard to correct the Ultra ATA/100 or Ultra ATA/66 detection problem.
- Alter the Deskstar drive to report ATA/33 capability. IBM offers a tool called IBMATASW.EXE to perform this alteration. Contact the IBM Hard Disk Drive Technical Support Center for more information.

#### **6. What is the difference between ATA/33 and Ultra ATA/66?**

Ultra ATA/66 is an extension to the Ultra DMA interface. It doubles the ATA/33 interface data transfer rate from 33 MB to 66 MB per second.

#### **7. What is ATA/100?**

ATA/100 is an extension of the Ultra DMA interface which enables data transfers as fast as 100 MB per second.

#### **8. What is the difference between FAT16 and FAT32?**

FAT16 is limited to 2.1GB per partition. This file system is widely compatible with OS/2, Windows NT 3.5 and 4.0. FAT32 allows a single partition to utilize the full drive capacity. Some disk utilities and virus scanners published before 1997 are incompatible with FAT32.

#### **9. Do I need to create more than one partition on my IBM Deskstar?**

Partition sizes are limited to 2GB in DOS, Windows 3.11 and Windows 95A due to the FAT 16 file system design. You need to create multiple partitions to utilize full drive capacity. If you are using Windows 95 SR2 or Windows 98 and FAT32, you may create one partition to utilize the full drive capacity. FAT 32 partitions may be incompatible with disk utilities and virus scanners published before 1997.

**10. When I create partitions using IBM DriveGuide Easy Installation Software, my partitions are smaller than the size I entered.**

Partitions begin and end on cylinder boundaries, IBM DriveGuide must allocate partitions that may be a few megabytes smaller than the size you entered. IBM DriveGuide adds these megabytes to free space for later partitions.

**11. I copied files from my old drive to my new IBM Deskstar. Why do the files take up more space on the new drive?**

Partitions are divided into units called clusters. The size of a cluster is based on the size of a partition. Because partitions on large capacity drives are bigger, the cluster sizes are bigger. The files take up more space because the partitions they're stored in are larger.

**12. Why is the capacity of my IBM Deskstar less than the capacity listed on the drive label?**

Some programs measure the capacity of a hard disk drive based on a kilobyte of 1,024 and a megabyte of 1,048,576 (1,024 x 1,024). Drive manufacturers state the capacity of a hard disk drive based on the decimal numbering system. For example:

$10,000,000,000 \text{ bytes} \div 1,024 = 9,765,625 \text{ kilobytes}$

$9,765,625 \text{ kilobytes} \div 1,024 = 9,536.74 \text{ megabytes}$

$9,536.74 \text{ megabytes} \div 1,024 = 9.31 \text{ gigabytes.}$

**13. Why doesn't my operating system show the full capacity of my drive?**

Few systems built before 1997 support drive capacities greater than 8.4 GB, because the CHS (Cylinders, Heads, Sectors) method of translation uses ID words 1, 3, and 6 of the Identify Drive Command. The maximum values for words 1, 3, and 6 are 16,383 cylinders, 16 heads and 63 sectors for a capacity of 8.4 GB. A new extended interrupt 13 function was defined to get beyond this boundary. By mid-1998, most new systems had introduced this support. Problems with systems which do not support greater than 8.4 GB can be solved with one of the following options:

- Obtain a BIOS upgrade from your system vendor that includes Extended Interrupt 13 support.
- Use IBM DriveGuide to install your IBM Deskstar.
- Purchase an IDE controller card with an onboard BIOS that supports Extended Interrupt 13.

**14. What capacity limitations should I be aware of when installing my operating system?**

DOS 6.22 and earlier versions, Windows 3.1, Windows for Workgroups are limited to 8.4 GB and do not support disk capacity beyond 8.4 GB.

Windows 95A supports Extended Interrupt 13. Windows 95 can see drives greater than 8.4 GB, but uses the FAT16 file system. The drive needs to be partitioned into 2047 MB partitions.

Windows 95 SR2 and Windows 98 support Extended Interrupt 13 and offer an option to use a FAT32 File System (Large Mode) and partitions larger than 2047 MB.

Novell Netware v3.12 does not support drives larger than 8.4 GB. If a drive larger than 8.4GB is attached, Netware will see only 8.4GB of the drive's capacity. More recent drivers for this release of Netware have been provided by Novell (IWSP6.exe). Windows NT 4.0 Service Pack 1 and 2, do not support IDE drives larger than 8.4 GB. Microsoft has added greater than 8.4 GB support with NT Service Pack 3, 4, or 5.

**15. Why did my drive letter assignments change after installing my IBM Deskstar?**

Drive letters are assigned by the operating system, not by the BIOS, hard drive, or IBM DriveGuide Easy Installation Software. The operating system assigns drive letters with each boot. The floppy drives are assigned first, then the hard drives, starting with the Primary Master ATA/IDE hard disk drive, followed by remaining devices in the system.

**16. When do I configure my drive for 15 heads rather than 16 heads?**

The default configuration of the IBM Deskstar is 16 heads. Your system may require the drive to be jumpered to 15 heads. Some computer systems translate a drive greater than 4 GB by multiplying the head count by 16. The result ( $16 \times 16 = 256$ ) is interpreted as 0 heads with 0 capacity and is an illegal head count. Jumpering the drive to 15 heads ( $16 \times 15 = 240$ ) produces a legal translation. The translated cylinder count varies to achieve the drive's full capacity.

**17. How do I create a Windows 95 or 98 startup diskette?**

If you have a bootable Windows operating system, follow the directions below to create a Windows 95 or 98 startup diskette.

- Insert a blank floppy disk into drive A.
- From Windows 95 or 98, double click *My Computer*.
- Double click *Control Panel*.
- Double click *Add/Remove Programs*.
- Select *Startup Disk* tab.
- Click *Create Disk*. Follow the prompts.

**18. How do I create a DOS startup diskette?**

If you have a bootable DOS operating system, follow the steps below to create a DOS startup diskette.

- Insert a blank floppy disk into drive A.
- At the *C:\* prompt, type *FORMAT A:/S* and press *ENTER*.
- Follow the instructions displayed.

**19. When do I use the 2/32 GB clip jumper?**

For a DJNA model drive:

If your BIOS is incompatible with cylinder values higher than 4,096 cylinders, the 2/32 GB

clip jumper can be used to truncate the cylinder and LBA count of your drive to 4,096 cylinders (2 GB capacity).

For a DPTA model drive with a capacity lower than 34GB:

If your BIOS is incompatible with cylinder values higher than 4,096 cylinders, the 2/32 GB clip jumper can be used to truncate the cylinder count of your drive to 4,096 cylinders (2 GB capacity). The LBA value of the drive is unchanged.

For a drive with a capacity of 34GB or higher:

If your BIOS is incompatible with LBA values higher than 66,055,248 sectors, the 2/32 GB clip jumper can be used to truncate the LBA value to 66,055,248 sectors (32 GB capacity). Alternatively, BIOS upgrades may be available to overcome this limitation. Contact your BIOS manufacturer for more information.



## **Glossary**

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### **ATA (Advanced Technology Attachment)**

ATA (also known as IDE) is the bus interface that replaced the controllers in original IBM compatible PCs.

### **ATA/33 (Ultra ATA/33)**

ATA/33 is also known as Ultra DMA Mode 2. ATA/33 is a 33 megabyte per second data transfer protocol for DMA commands.

### **ATA/66 (Ultra ATA/66)**

ATA/66 is also known as Ultra DMA Mode 4. ATA/66 is a 66 megabyte per second data transfer protocol for DMA commands.

### **ATA/100 (Ultra ATA/100)**

ATA/100 is a 100 MB per second data transfer protocol for DMA commands.

### **Autodetection**

A process that uses an IDE command called Identify to read disk parameters directly from a hard drive for use in the BIOS/CMOS settings.

### **BIOS (Basic Input/Output System)**

The BIOS is the first level of software contained in a computer. It provides basic, low-level control and program routines for keyboards, video, hard disk drives, and floppy drives. The BIOS provides the initial intelligence allowing the computer system to find an operating system to run.

### **Chipset**

The motherboard chipset controls the flow of information from the bus to memory and the processor.

### **CHS (Cylinders, Heads, and Sectors) Addressing**

Three values indicating a coordinate location of a data sector on a hard disk drive.

### **CMOS (Complimentary Metal Oxide Semiconductor)**

CMOS is a memory chip for storing a data record of the components installed in a computer. CMOS is powered by a small battery allowing it to retain data, even when the computer's main power is turned off.

### **Configuration**

Configuration refers to the type or quantity of devices in a computer system.

### **Controller Card**

A controller card is an add-on electronic adapter for controlling hard drives. Controller cards can be ATA or SCSI and are sometimes called adapters.

**Cylinder**

A cylinder is the set of tracks accessible by the magnetic heads in a given position without repositioning the head stack assembly.

**DMA (Direct Memory Access)**

Direct Memory Access is a protocol for transferring data to and from main memory without passing it through the processor. DMA improves speed and efficiency by allowing processing to continue while new data is retrieved from the drive.

**Electrostatic Discharge**

The rapid discharge of electricity caused by static buildup which can damage or destroy electronic equipment.

**FAT (File Allocation Table)**

The File Allocation Table is a group of sectors in a partition containing a map to address chains for files in a partition. There are two FAT copies in a partition.

**FAT16**

FAT16 uses a 16 bit field to address clusters in a logical partition. FAT16 is limited to approximately 2.1 gigabytes and 65000 clusters. FAT16 is compatible with DOS, Windows 3.1, 3.11 and 95 A, Windows NT 3.5 and 4.0, and OS/2.

**FAT32**

FAT32 uses a 32 bit field to address clusters in a logical partition. FAT32 allows partitions larger than 2.1 gigabytes and provides millions of clusters. FAT32 is compatible with Windows 95 SR2 and 98.

**Fdisk**

Fdisk is a DOS program used to partition a hard disk drive.

**Format**

A process which creates FAT tables for a partition.

**Head**

A head is an electromagnetic coil and metal pole that write and read back magnetic patterns on a disk.

**IDE (Integrated Drive Electronics)**

IDE (also known as ATA) is the bus interface that replaced the controllers in original IBM compatible PCs.

**Interface Data Transfer Rate**

The interface data transfer rate is the speed at which a hard disk drive transmits and receives data from the interface.

**Interrupt 13 and Interrupt 13 Extensions**

Interrupt 13 is the BIOS program routine for handling hard disk commands and data. The original Interrupt 13 BIOS program supported capacities up to 8.4 gigabytes. Interrupt 13 extensions are new BIOS routines added to support drive capacities greater than 8.4 gigabytes.

**Jumpers**

Jumpers are small pieces of plastic with a conductive center. Jumpers connect pins on a hard drive to set device options.

**LBA (Logical Block Addressing)**

Logical Block Addressing is a mode of accessing a location on a hard disk drive. LBA sequentially numbers the sectors on a disk, eliminating the need to calculate the cylinder, head, and sector coordinates of a data sector.

**Linux**

Linux is a UNIX operating system variant for the PC.

**Master**

Master is used in the original ATA specification for the first addressed drive (Device 0) on an ATA/IDE channel.

**Novell Netware**

Netware is a Novell network operating system and file server platform. Netware has several proprietary file systems.

**OS/2**

OS/2 is an IBM operating system. OS/2 supports HPFS (High Performance File System).

**Parameters**

Parameters (also known as geometry) are the cylinder, head, and sector values for defining the capacity of a hard disk drive.

**Partition**

A partition is a portion of a hard drive allocated to a particular file system and accessed as a single logical volume or drive letter. To partition a drive is to allocate an area to a drive letter or logical volume.

**PIO (Programmed input/output)**

PIO is a data transfer protocol using the processor to transfer the data from a hard disk drive to memory.

**Primary**

Primary indicates the first ATA/IDE channel of a computer. The Primary channel controls the first and second hard disk drives or ATA/IDE devices in a computer.

**Secondary**

Secondary indicates the second ATA/IDE channel of a computer. The secondary channel controls the third and fourth hard disk drives or ATA/IDE devices in a computer.

**Sector**

A sector is the minimum segment of track length that the hard disk drive can assign to store information. Sectors are 512 bytes in length on a PC compatible formatted hard disk drive.

**Setup**

Setup is a BIOS utility to specify values, parameters, and modes stored in battery powered CMOS memory for use by the system BIOS.

**Slave**

The term slave is used in the original ATA specification for the second addressed drive (Device 1) on an ATA/IDE channel.

**SR2 (Service Release 2)**

Service Release 2 is also known as Windows 95b, a later release of Windows. SR2 supports Fat32.

**Track**

A track is a logical group of sectors that can be accessed by a single magnetic head in a given position without repositioning the head stack assembly.

**Translation**

Translation is the process of redefining the physical parameters of a hard disk drive to parameters compatible with the BIOS and operating system of a computer.

**Ultra ATA**

Ultra ATA (also known as Ultra DMA) is a data transfer protocol for transferring data to and from main memory without passing it through the processor. Ultra ATA differs from traditional DMA by using a strobe signal to latch data at twice the data rate. Ultra ATA improves speed and efficiency by allowing the processor to perform other operations while data is retrieved from the drive.

**UNIX**

UNIX is an operating system developed for multitasking in a multi-user environment. The UNIX operating system was originally developed for use on minicomputers but has been adapted for mainframes, microcomputers, and PCs.

**Windows NT**

Windows NT is Microsoft's 32-bit New Technology operating system. Windows NT 3.5 and 4.0 support FAT16 and NTFS (New Technology File System). Windows NT 4.0 does not support FAT32.



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