

PC Hardware
Chapter 9 HardDrives
Installing An IDE Hard Drive

Objective

The objective of this lab exercise is to configure one IDE hard drive when a slave drive is not present. After completing this lab exercise, you will be able to:

- Install and remove an IDE hard drive.

Lab Setup & Safety Tips

- Always unplug the power cord and properly ground yourself before touching any component inside a computer.

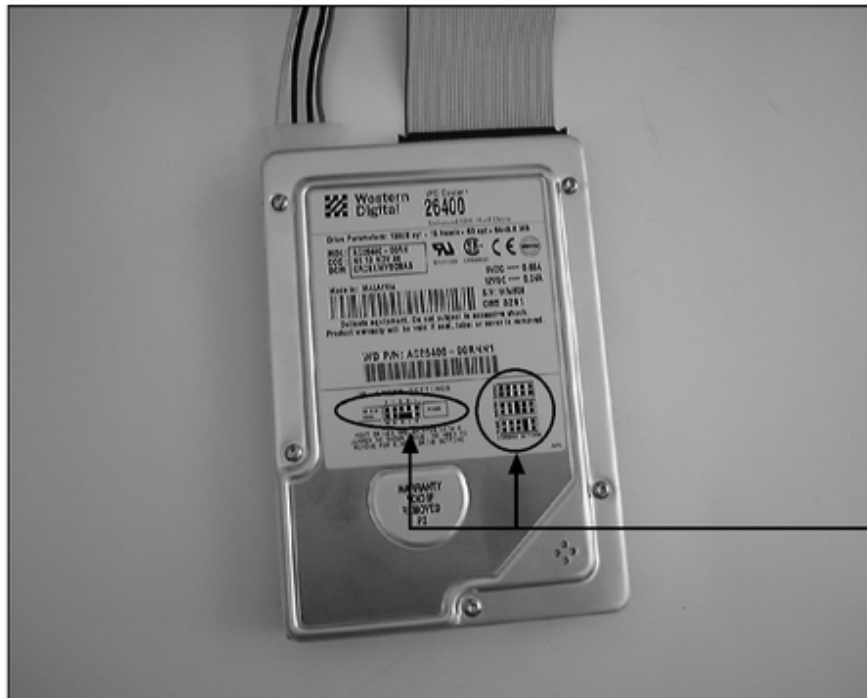
ACTIVITY

Installing an IDE hard drive

1. Power off the lab workstation and unplug the power cord (it is not necessary to unplug all other cords).
 2. Remove the case from the lab workstation.
 3. Read Table 7-1 for reference and then record the jumper configuration for your hard drive. (*Note:* Refer to the hard drive documentation for a description of jumper settings.)
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4. Connect the IDE data cable and the power connector. The red stripe on the data cable should be aligned with the pin 1 setting on the hard drive.)
 5. For safety, stand clear of the workstation and plug in the power cord.
 6. When the workstation boots, enter the Setup program.
 7. Verify that the BIOS automatically detected the hard drive.
 8. Save the BIOS changes and exit the Setup program.

Table 7-1 Jumper settings on an IDE hard drive

Configuration	Description
Single-drive configuration	This is the only hard drive on this IDE channel. (This is the standard setting.)
Master-drive configuration	This is the first of two drives, it most likely is the boot device.
Slave-drive configuration	This is the second drive using this channel or data cable.
Cable-select configuration	The cable select data cable determines which drive is the master and which is the slave.



Diagrams of jumper settings

Figure 7-1 An IDE drive most likely will have diagrams of jumper settings for master and slave options printed on the drive housing

Lab Notes

IDE Controllers – Most system boards manufactured today have two integrated IDE controllers, although this practice is relatively new. There was a time when IDE controllers were typically purchased separately and installed into expansion card. System boards have evolved since then, but sometimes when you have servicing older computers, you might have to install an expansion card to provide an additional IDE controller.

Pin 1 – Remember that the red strip on an IDE data cable always should be aligned with the pin 1 on the device to which it is being connected. (Note: When you are connecting an IDE hard drive to an IDE data cable, the red stripe or pin on one side should be attached to the same side of the hard drive as the power connector.)

Review Questions

Circle True or False.

1. You can identify the location of pin 1 for an IDE ribbon cable by the red line.
True / False
2. Typically, the BIOS must be modified when the hard drive configuration has been changed.
True / False
3. You always should unplug the hard drive cables while the PC is powered on. True / False
4. It is a good practice to write down the jumper configuration of a hard drive before you remove it from a computer. True / False
5. Are all IDE hard drive controllers integrated on a system board? Explain your answer.

6. Donna wants to install a second hard drive in her PC. She currently has only one IDE controller, which has both a hard drive and CD-ROM drive attached to it. Without upgrading the system board, describe how Donna can add a second hard drive to her system. Also list the hardware she needs to complete the upgrade.

PC Hardware
HardDrives Part II
Installing A Second IDE Hard Drive

Objective

The objective of this lab exercise is to configure one lab workstation to use two IDE hard drives at the same time. After completing this lab exercise, you will be able to:

- Install, remove, and configure a PC to use one or more IDE hard drives at the same time.
- Understand and describe the differences between the Cable Select and the Master/Slave configurations.

Additional Devices

- Two IDE hard drives (one should already be installed in the lab workstation)
- Two hard drive jumpers (normally already are on the hard drives)
- One Cable Select IDE data cable
- One standard IDE data cable (Master/Slave)
- Hard drive mounting brackets (if necessary and as determined by your instructor)
- 1 mounting bay for the second hard drive

Lab Setup & Safety Tips

- The lab workstation should be previously configured with a standard IDE data cable and one IDE hard drive set to single drive configuration.
- Always unplug the power cord and properly ground yourself before touching any component inside a computer.

ACTIVITY

Installing a Slave drive using the Master/Slave configuration

1. Power off the lab workstation and unplug the power cord (it is not necessary to unplug all other cords).
2. Remove the case from the lab workstation.
3. Locate the hard drive.
4. Unplug the IDE cable and the power connector from the hard drive.
5. View the hard drive jumper configuration (if necessary physically remove the hard drive).
6. Verify that the installed hard drive is set to Master. (*Note:* Refer to the hard drive documentation for a description of the jumper settings.)
7. Set the jumper on the second hard drive to the Slave position.
8. Locate an available bay to mount the second hard drive.

9. Mount the second hard drive.
10. Plug in the power connectors to each hard drive.
11. Plug in the IDE data cable to each hard drive.
12. For safety stand clear of the case and plug in the power cord.
13. With both hard drives plugged in, power on the lab workstation and wait for the BIOS error message.
14. Enter the Setup program, and follow the menu instructions for the workstation's BIOS to validate the hard drive changes. (*Note:* The BIOS should now recognize two hard drives.)
15. Save the changes and reboot the workstation.
16. Boot into the operating system to verify that it recognizes the additional drive.

Installing a Slave drive using Cable Select

1. Power off the lab workstation and unplug the power cord.
2. Unplug the power connectors and the data cables of both IDE hard drives.
3. Unplug the IDE data cable from the system board.
4. Connect the Cable Select data cable to the system board in the same manner that the standard IDE data cable was connected. (*Note:* The difference between a Cable Select and a standard data cable is that the Cable Select data cable is marked by a notch or hole.)
5. Change the jumper settings on both hard drives to the Cable Select position.
6. Plug in the power connectors to each of the IDE hard drives.
7. Remember that the first hard drive on a Cable Select data cable will be the Master, and the second drive will be the Slave, plug in the IDE data cables, and set the original drive as Master.
8. With both hard drives plugged in, power on the lab workstation and wait for the BIOS error message.
9. Enter the Setup program and follow the menu instructions for the workstation's BIOS to validate the hard drive changes. (*Note:* The BIOS should now recognize two hard drives.)
10. Save the changes and reboot the workstation.

11. Boot into the operating system to verify that it recognizes the drives correctly.
12. Shut down the workstation and power it off.
13. Unplug the power cable and secure the case.

Lab Notes

The following is a brief description of the most commonly used jumper settings:

Master—When a drive is set to Master, it normally is the first hard drive from which the PC attempts to boot.

Slave—When a drive is set to Slave, it is the secondary hard drive. This drive is normally referred to as D.

Cable Select—When a drive is configured to use Cable Select, the Master/Slave designation is determined by the drive's cable position rather than its jumper settings. Using a standard Cable Select data cable, the hard drive connected closest to the system board becomes the Master, and the drive farthest from the system board becomes the Slave.

How is a Cable Select data cable different from other cables?—All Cable Select data cables can easily be recognized as such by a small hole punched somewhere in the data cable. If you cannot locate a small hole somewhere in the data cable, then it is not Cable Select-compliant and you must use the Master/Slave configuration.

How does the Master/Slave configuration work?—When two IDE drives are jumpered to use the Master/Slave configuration, the drives begin sharing one onboard hard drive controller. This means that when a drive is configured as a slave, the electronics for its onboard controller are disabled. The electronics located on the master hard drive then begin to communicate with the IDE controller for both the master and the slave hard drive.

Review Questions

Circle True or False.

1. When using Cable Select, the location of a hard drive on the data cable determines whether it will be the Master or Slave. True / False
2. You can add as many as three devices to an IDE channel. True / False
3. When two hard drives are present, the Master drive is drive D. True / False
4. How can you easily identify a Cable Select data cable?

5. What are the three standard jumper options available with an IDE hard drive?

6. How many devices can be attached to an IDE cable?

PC Hardware HardDrives Part III Understanding FDISK

Objective

The FDISK utility allows you to add, remove, and view your hard drive's partition configuration. After completing this lab exercise, you will be able to:

- Use the FDISK utility to view drive configuration information.
- Add and remove partitions using the FDISK utility.
- Use the FDISK utility to set an active partition.
- Describe the relationship between a logical drive and an extended partition.

Additional Devices

- A DOS system boot disk with the FDISK utility

Lab & Safety Tips

- Warning: The steps in the following activity will erase all data currently stored on your lab workstation. Back up any stored data before you proceed with this lab exercise.
- Any changes made using the FDISK utility will affect the data stored on the partition or partitions that were modified. Be careful!

ACTIVITY

Viewing the current hard drive configuration

1. Power off your lab workstation.
2. Insert the boot disk into drive A.
3. Power on your lab workstation and allow it to boot from the floppy disk.
4. At the A prompt, type **FDISK**. Your screen should resemble Figure (7-8).

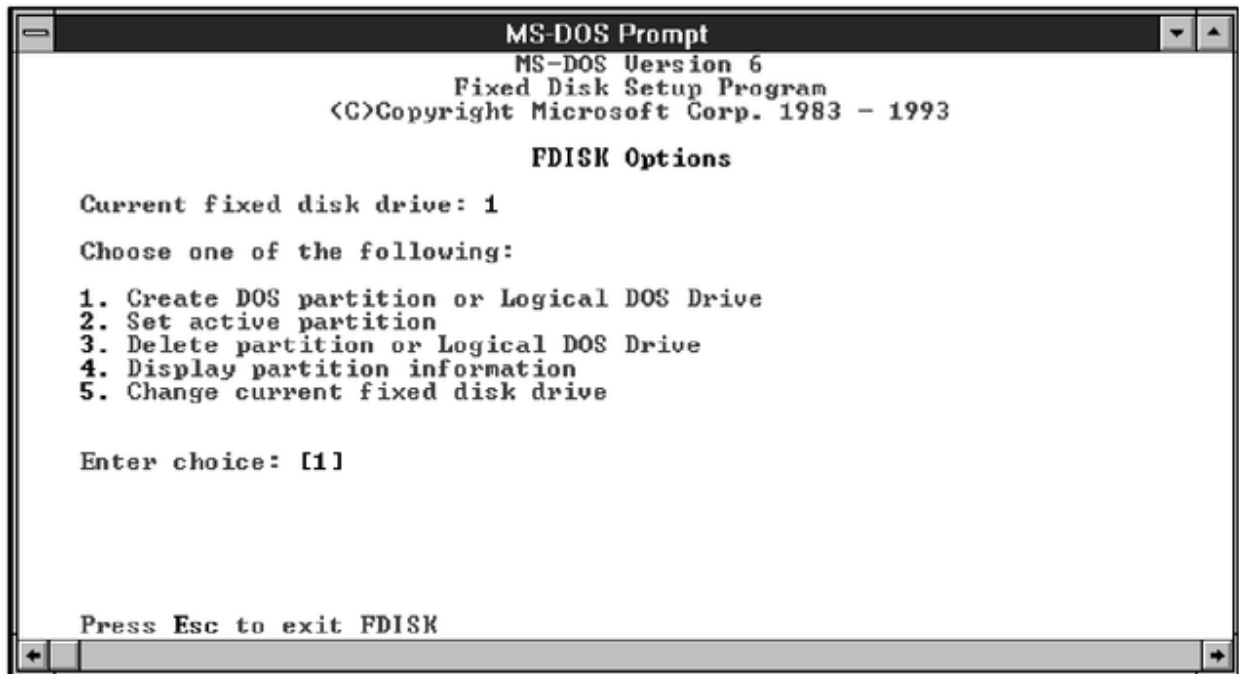


Figure 7-8 Fixed disk setup program (FDISK) menu

5. From the FDISK menu, select option 4 by typing 4 and then pressing Enter.
6. Observe your current hard drive configuration. In particular, note the volume label.

Deleting a partition

1. Press the Esc key to return to the Main Menu.
2. From the FDISK Main Menu, select option 3 by typing 3 and then pressing Enter.
3. Select the primary partition on your hard drive by typing 1 and pressing Enter.
4. Type 1 and press Enter.
5. Type the volume label of the primary partition.
6. Confirm the deletion by typing Y and pressing Enter.
7. Press the Esc key to return to the Main Menu.
8. Press Esc again to exit the FDISK utility.
9. Press the spacebar to restart the computer and the workstation.

Creating a partition

1. Boot the workstation using the floppy disk.
2. At the A prompt, type **FDISK**.
3. At the FDISK Main Menu, select option 1 and press **Enter**.
4. Type 1 and press **Enter**.
5. When the FDISK utility asks if you want to use all the available space for the primary partition and set it as active, select No by typing N and pressing **Enter**.
6. When FDISK prompts you to enter the amount of drive space you want to use, type **500** and press **Enter**.
7. If prompted for a volume label, type DRIVE 1 and press **Enter**.
8. Press Esc to return to the FDISK Main Menu.

Setting an active partition

1. Select option 2 from the FDISK Main Menu.
2. Choose the primary partition that you created by typing 1 and pressing **Enter**.
3. Press Esc to return to the main menu.
4. Press Esc to exit FDISK and press any key. Your workstation will restart.

Lab Notes

Extended partition—An extended partition is a section of the hard drive that allows the partitioning of logical drives. Note that there can be only one extended partition per hard drive.

Logical drive—A logical drive is a partition that holds a drive letter separate physical drive. Note that logical drives can be created only within extended partitions.

Active partition—If a partition is set as active, the system will attempt to boot from that partition.

FDISK/MBR—This command is used to refresh the master boot without causing any data loss.

Review Questions

Circle True or False.

1. When a partition's size is changed using the FDISK utility, the data contained on the partition is lost. True / False
2. The FDISK utility is used to partition and format hard drives. True / False
3. Extended partitions are always placed within logical drives. True I False

4. List three functions of the FDISK utility.

5. You are the desktop PC support technician for the GoodJob Corporation. John, one of your customers, suspects that his hard drive is not partitioned to use its full capacity. Describe how you would use the FDISK utility to show John his current hard drive configuration.

6. Describe the relationship between a logical drive and an extended partition.

7. What is the difference between a physical drive and a logical drive?

PC Hardware
LAB HardDrives Part IV
Formatting And Disk Utilities

Objective

You must format a hard drive to install a file system. In this lab exercise you will learn how to properly install and optimize the FAT file system. After completing this lab exercise, you will be able to:

- Format a partition.
- Use the SCANDISK utility to optimize performance.
- Use the DEFRAG utility to optimize performance.

Additional Devices

- One DOS boot disk that includes the Format and SYS commands
- One DOS disk that contains both the SCANDISK and DEFRAG utilities

Lab Setup & Safety Tips

- Each workstation's hard drive should contain one unformatted primary partition that has been set as active.
- Be sure that the data stored on your lab workstation has been backed up before you proceed with this lab exercise.

ACTIVITY

Formatting the C drive

1. Power off your lab workstation.
2. Insert the boot disk into drive A.
3. Power on your lab workstation and allow it to boot from your DOS boot disk.
4. At the A prompt, type FORMAT C:.
5. When asked to confirm before proceeding, type Y and press **Enter**. The format command begins to format drive C.
6. When formatting is completed, type a volume label of DRIVE 1.

Making drive C bootable

You can use many different commands to make a drive bootable. Following are two examples of command sequences:

Example 1

1. Power off your lab workstation.
2. Insert the boot disk into drive A.

3. Power on your lab workstation and allow it to boot from your DOS boot disk.
4. At the A prompt, type SYS A: C: and press Enter.

Example 2

The /S switch tells DOS to add system information to the drive after it has been formatted. Use the /? option to view other FORMAT switches.

1. Power off your lab workstation.
2. Insert the boot disk into drive A.
3. Power on your lab workstation and allow it to boot from your DOS boot disk.
4. At the A prompt, type FORMAT C: /S
5. When asked to confirm before proceeding, type Y and press Enter.
6. When formatting is completed, type a volume label of DRIVE 1.

Using the SCANDISK utility

1. Insert the disk that contains the SCANDISK utility.
2. At the A prompt, type SCANDISK and press Enter.
3. Allow SCANDISK to verify your file and directory structure, and to complete a surface scan.
4. When SCANDISK has completed, use the View Log option to view any errors that SCANDISK might have encountered.
5. After examining the view log, exit the SCANDISK utility.

Using the DEFRAG utility

1. Insert the disk that contains the DEFRAG utility.
2. At the A prompt, type DEFRAG and press **Enter**.
3. Allow DEFRAG to reorganize the hard drive (this should happen quickly if the drive was formatted recently).
4. When the defragmentation is completed, exit the DEFRAG utility.

Lab Note:

What is a switch? – A switch is a parameter or variable that can be added to the end of a DOS command and that will change or enhance the meaning of the command.

DEFRAG – This utility is designed to optimize file access by moving file clusters into a continuous chain, thus increasing the speed of data retrieval. This utility should be used at least once a month to maintain optimum system performance.

SCANDISK - This utility is designed to search a hard drive for lost or cross-linked clusters and attempt to repair them. SCANDISK should be used at least once a month to maintain optimum system performance.

1. Using the SCANDISK utility will delete all files less than 512 K in size. True / False
2. The DEFRAG utility places file clusters in consecutive order. True / False
3. You should run the SCANDISK utility only once every three months. True / False
4. Describe the functionality of the DEFRAG utility.

5. You are currently employed as a PC desktop support technician at My World. One of your customers, Jamie, calls to tell you that her computer is running more slowly than it did last month. List two utilities that Jamie might use to improve the performance of her computer.

6. John is currently running DEFRAG, and it is taking a long time. John called you to ask what the DEFRAG program does, and why it seems to be so slow. Over the last year John has never run the DEFRAG utility. Describe to John both the purpose of the DEFRAG utility and explain why it is taking so long to run.
