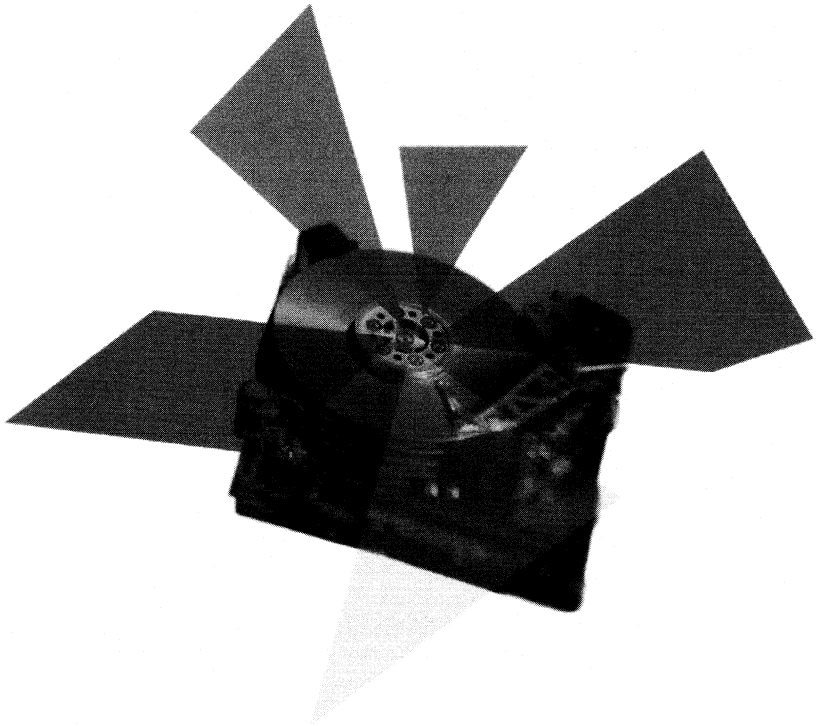
POWERQUEST

PartitionMagic®

HARD-DISK PARTITIONING ON THE FLY

User Guide



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PartitionMagic 3.0
User Guide
PartitionMagic by PowerQuest
Manual Version 7

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Important: Read this before using your copy of PowerQuest's PartitionMagic.

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Appendix B: Troubleshooting

About This Guide

This manual was written to help you understand and use key concepts to effectively manage your hard drive using hard-disk partitions. It is divided into eight parts:

- Introduction
- Getting Started
- Hard-Disk Partitioning Scenarios
- Product Capabilities
- Concepts
- Appendices
- Glossary
- Index

The Introduction provides an overview of PowerQuest's PartitionMagic and lists its hardware and software requirements.

Chapter 1: Getting Started gives step-by-step procedures for installing and running PartitionMagic.

Chapter 2: Hard-Disk Partitioning Scenarios provides step-by-step instructions for creating useful hard-disk configurations.

Chapter 3: Product Capabilities explains the various PartitionMagic options and how to use them.

Chapter 4: Concepts provides important information about partitions, drive letter assignments, file systems, and optimizing hard disks with partitions. Understanding how these areas relate to each other is necessary for you to effectively use PartitionMagic.

The Appendices provide useful information not covered elsewhere in this guide. They include information about using PartitionMagic with other programs, troubleshooting, running diagnostic programs, and contacting PowerQuest for technical support.

The Glossary defines common terms associated with PartitionMagic.

The Index provides reference information that you will find helpful as you install and use PartitionMagic.

Introduction 1

How PartitionMagic Helps You

Imagine how disorganized your office would be if you didn't have a file cabinet and instead kept all your files in one drawer. As you added files to the drawer, you would waste more and more time searching for the information you needed. Surprisingly, this is similar to the way most people organize the space on their hard disks. Instead of dividing up the space into multiple partitions to use it more efficiently (like having multiple file cabinet drawers), they store all their valuable data files, operating systems, and applications on a single partition.

PowerQuest's PartitionMagic (patents pending) is a powerful, 32-bit software tool that lets you repartition your hard disk with a click of your mouse. Your new partitions will be like file cabinet drawers in which you can separate your operating systems, applications, and data files.

By separating these different files on your system, you get the most out of your hard disk by reclaiming wasted disk space, safely running multiple operating systems, and protecting your data.

The FAT (file allocation table) file system is used by popular operating systems including DOS, Windows 3.x, Windows 95, and, optionally, by Windows NT and OS/2. Because of limitations with this file system, as much as 40% of your computer's hard disk can be wasted. PartitionMagic lets you reclaim wasted space quickly and safely, without data loss, by using smaller, more efficient partition sizes.

PartitionMagic also lets you reliably run multiple operating systems in separate, secure partitions on the same machine. PartitionMagic includes Boot Manager, a utility that allows you to choose which operating system you want to use when you boot your computer.

Furthermore, PartitionMagic enables you to secure your data by physically separating it from other files. Separate data partitions also make it easier for you to back up the data files to a network or Zip drive.

Once you organize, optimize, and secure your hard disk, you can take advantage of PartitionMagic's other useful features. For instance, you can view comprehensive information about your hard-disk geometry and your hardware system. You can also resize root directories in Windows 95 to make room for more long file names. And, you can easily transfer data to a new hard drive by using PartitionMagic's PartitionCopy option. With PartitionMagic, configuring your hard disk has never been simpler.

New in PartitionMagic 3.0

PowerQuest's PartitionMagic 3.0 offers the following features:

- Create, resize, and move FAT partitions
- **NEW** Create, resize, and move FAT32 partitions
- **NEW** Create, resize, and move NTFS partitions
- Create, resize, and move HPFS partitions
- Resize FAT clusters
- **NEW** Boot Manager to manage multiple operating systems
- **NEW** MagicMover
- **NEW** PartitionCopy
- **NEW** Cluster Analyzer
- **NEW** DriveMapper utility to remap drive letters
- **NEW** PQ Boot utility
- **NEW** Convert from FAT32 to FAT16 and back
- Convert FAT partitions to HPFS with data in place
- **NEW** Enhanced documentation with step-by-step partitioning scenarios
- Hide or unhide partitions
- Expand the Windows 95 root directory to accommodate more long file names
- **NEW** Extensive file system diagnostics
- **NEW** Support for Windows NT 64KB FAT clusters
- **NEW** Set Label to name and organize partitions
- **NEW** More online Help

Back Up Your Hard Disk

You should back up your hard disk before you use PartitionMagic. While PartitionMagic has been thoroughly tested to be safe and reliable, other factors, such as power failures, operating system bugs, and hardware defects, can put your data at risk. No software program, including PartitionMagic, is perfect. Before you use any utility that makes extensive changes to your hard disk, you should back up your data.

System Requirements

The following table shows the minimum and recommended hardware and software requirements for installing and using PowerQuest's PartitionMagic.

HARDWARE/SOFTWARE	MINIMUM	RECOMMENDED
Processor	386SX	486 or above
RAM	8MB (16MB required for FAT32 or NTFS)	16MB
CD-ROM drive	Any speed	Any speed
Hard-disk free space	8MB	8MB
Operating system	Windows 95 Windows 3.1 OS/2 2.1 DOS 5.0	Windows 95 Windows 3.1 OS/2 2.1 or above DOS 5.0 or above
Monitor	VGA	Super-VGA
Pointing device	No pointing device is required to operate PartitionMagic.	Microsoft mouse (or compatible pointing device)

Chapter 1

Getting Started

Installing PartitionMagic

You can install PartitionMagic from any of the following operating systems: Windows 3.x, Windows 95, Windows NT, or OS/2. To install PartitionMagic if you do not have Windows or OS/2, see *Running the PartitionMagic DOS Text Mode Executable* on page 156.

NOTE: If you do not have access to a CD-ROM drive, a 3.5-inch diskette version of PartitionMagic is available from PowerQuest for a nominal fee. See Appendix D for more information.

To install PartitionMagic:

1. Insert the CD-ROM into your CD-ROM drive.

2. To start the installation program:

   If you are using **Windows 3.x** or **Windows NT 3.51**, select **Run** from the Program Manager File menu. Type *drive*:**\SETUP**, in which *drive* is the drive letter of your CD-ROM drive, and click **OK**.

   If you are using **Windows 95** or **Windows NT 4.0**, select **Start**, then **Run** from the Taskbar. Type *drive*:**\SETUP**, in which *drive* is the drive letter of your CD-ROM drive, and click **OK**.

   If you are using **OS/2**, from an OS/2 prompt type *drive*:**\OS2\SETUP**, in which *drive* is the drive letter of your CD-ROM drive. Press **Enter**.

3. Follow the installation instructions on the screen.

NOTE: When you install PartitionMagic, the DriveMapper and PQ Boot programs are automatically installed. You can also install PowerQuest MagicMover separately. For more information about running and using these programs, see the corresponding sections in Chapter 3.

Running PartitionMagic

NOTE: When you run PartitionMagic from Windows 3.x, Windows 95, DOS, or OS/2, you can use it to modify the partitions of all supported file systems (FAT, FAT32, NTFS, and HPFS).

To run PartitionMagic:

1. If you are using **Windows 3.x**, open the **PartitionMagic by PowerQuest** program group and double-click the **PartitionMagic 3.0** program icon.

   If you are using **Windows 95**, select **Start**, choose **Programs**, choose the **PartitionMagic by PowerQuest** folder, and click the **PartitionMagic 3.0** program.

   If you are using **Windows NT**, you must boot DOS, use Windows 95 MS-DOS mode, or boot OS/2 before running PartitionMagic.

NOTE: PartitionMagic is a new breed of disk utility that makes changes to partitions that may not have been anticipated by operating system designers. Thus, PartitionMagic cannot be run from some operating systems. We are working with operating system vendors to eliminate these types of limitations.

If you are using **DOS**, change to the directory in which you installed PartitionMagic (typically, C:\PQMAGIC) and type **PQMAGIC**. Press **Enter**.

If you are using **OS/2**, open the **PartitionMagic by PowerQuest** folder and double-click the **PartitionMagic 3.0** icon.

IMPORTANT: If you cannot modify partitions with PartitionMagic in OS/2 because of open files, see *Running the PartitionMagic OS/2 Text Mode Executable* on page 156.

Uninstalling PartitionMagic

NOTE: If you installed the Boot Manager program that comes with PartitionMagic and want to uninstall it at the same time you uninstall PartitionMagic, you will need to delete the Boot Manager partition with PartitionMagic before uninstalling PartitionMagic. After you have deleted the PartitionMagic Boot Manager partition, you can use PartitionMagic to add the free space to one of your existing partitions before uninstalling PartitionMagic.

To uninstall PartitionMagic:

1. If you are using **Windows 3.x** or **Windows NT 3.51**, double-click the **Uninstall PartitionMagic** icon in the **PartitionMagic by PowerQuest** program group.

   If you are using **Windows 95** or **Windows NT 4.0**, click **Start**, then **Programs**, then **PartitionMagic by PowerQuest**, and then **Uninstall PartitionMagic**.

   If you are using **OS/2**, delete the **PartitionMagic by PowerQuest** folder and the installation folder (typically, C:\PQMAGIC).

2. Follow the instructions on the screen.

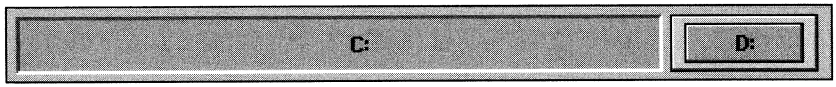
Chapter 2

Hard-Disk Partitioning Scenarios

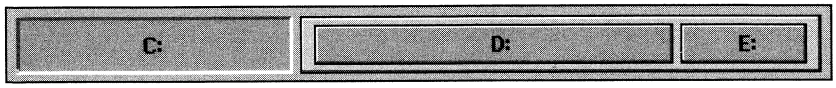
To help you get started using PartitionMagic, we have provided three basic partitioning scenarios that were designed for the user who has never partitioned a hard drive. All three scenarios assume that the user is starting with only a C: partition and has at least 200–500MB of available disk space. The steps must be modified if this is not the case.

The three scenarios are summarized below.

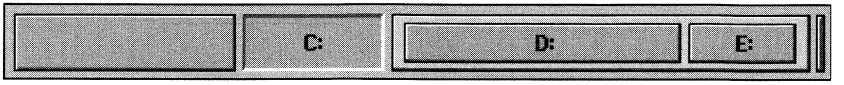
- **Scenario 1: Organize and Protect Data:** Scenario 1 shows you how to create a separate partition for data.



- **Scenario 2: Reclaim Wasted Disk Space:** Scenario 2 will help you reclaim wasted disk space and organize and protect your data by creati
- ng two additional partitions—one for applications and one for data.



- **Scenario 3: Run Multiple Operating Systems:** Scenario 3 will guide you through the steps of creating three new partitions—one for a second operating system, one for applications, and one for data. Scenario 3 also explains how to set up Boot Manager so that every time you turn on your PC, you can easily select which operating system you want to start.



For more advanced scenarios, visit our home page at http://www.powerquest.com.

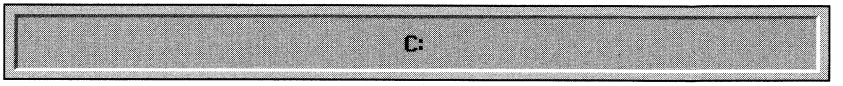
NOTE: The following scenarios assume that you have already familiarized yourself with the PartitionMagic interface and with the program's basic features. They also assume that you understand the fundamental concepts behind hard-disk partitioning. If you begin to work through these scenarios and find that you need to have a better understanding of how the program works, please refer to the Product Capabilities and Concepts chapters for detailed discussions of the PartitionMagic options and the concepts mentioned in this chapter.

Scenario 1: Organize and Protect Data

With PartitionMagic, you can create a partition to organize your hard disk in minutes. By creating a physically separate partition for your valuable data files, you will protect them from potentially unstable applications and operating systems. You will also simplify backups, especially on external drives such as Zip drives and network drives, because you can limit the backup to only the partition containing the data you need.

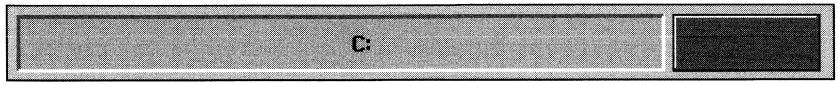
To create a separate FAT data partition, follow these simple steps:

1. Start PartitionMagic as instructed in *Running PartitionMagic* on page 8.



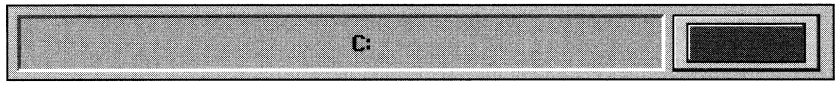
2. In the partition list or partition map on PartitionMagic's Main Window, click on your C: partition, and then choose the **Resize** button.

3. In the Resize Partition dialog, use your mouse to drag the right edge of the partition to the left until the Free Space After field equals the size that you would like to make your data partition. For example, if you intend to back up your data partition to a 100MB Zip drive, you could create a 100MB data partition to make backing up data easier. Choose **OK**. After the operation is complete, choose **OK**. The partition map will look similar to the figure below.



4. In the partition list or map, click on the free space you just created, and then choose the **Create** button.

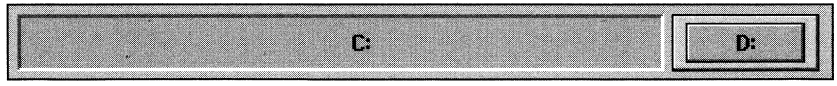
5. In the Create Primary Partition dialog, select **Extended** from the Partition Type drop-down list. Choose **OK**. After the operation is complete, choose **OK**.



6. In the partition map or list, click on the free space within the extended partition, and then choose the **Create** button.

7. In the Create Logical Partition dialog, select **FAT** from the Partition Type drop-down list. Next, enter a name for the partition in the New Label field (for example, DATA). Choose **OK**. After the operation is complete, choose **OK**.

8. Choose **Exit**. When the dialog appears informing you to reboot, choose **Reboot**. After your computer reboots, your new data partition will be your D: partition.



9. If your CD-ROM drive letter was D: before you completed this scenario, it will now be E:. To redirect your programs that run from CD-ROM from D: to E:, start the DriveMapper program by clicking on its icon in the PartitionMagic by PowerQuest program group or folder, and follow the instructions on your screen. For details on using DriveMapper, see *DriveMapper* on page 110.

IMPORTANT: When you reboot your computer, your CD-ROM drive will receive a new drive letter. If you cannot access the CD-ROM drive, see *Making the Operating System Assign a CD-ROM Drive Letter* on page 160.

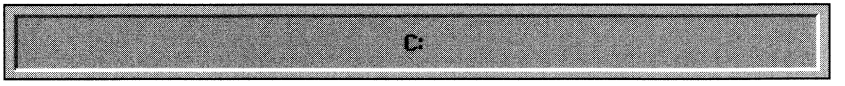
10. From your Windows File Manager, Explorer, or My Computer folders, you can now transfer your data folders and files from your C: partition to your D: partition. In addition, you can change the default settings for saving files from C: to D: in your applications.

Scenario 2: Reclaim Wasted Disk Space

Scenario 2 will help you create two additional FAT partitions—one for your applications and one for your data files. By dividing your hard disk into three separate, smaller partitions (one for your operating system, one for your applications, and one for your data), PartitionMagic automatically changes the cluster size to reclaim up to hundreds of megabytes of wasted disk space. In addition, your applications will not become fragmented as quickly, which means that they will load faster.

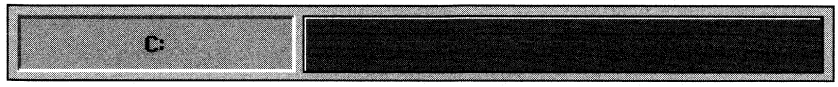
To create separate partitions for your applications and data files, follow these simple steps:

1. Start PartitionMagic as instructed in *Running PartitionMagic* on page 8.



2. From the partition list or partition map on PartitionMagic's Main Window, click on your C: partition, and then choose the **Resize** button.

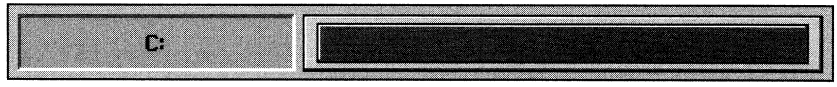
3. In the Resize Partition dialog, use your mouse to drag the right edge of the partition to the left until the Free Space After field equals the size that you would like to allocate to your applications (D:) and data (E:) partitions. For example, if you wanted to allocate 300MB for your applications partition and 100MB for a data partition, resize the partition to the left until the Free Space After field equals 400MB. Choose **OK**. After the operation is complete, choose **OK**.



HINT: If your current C: partition is greater than 1,024MB (it will have 32KB clusters), we recommend that you resize it below 1,024MB to take advantage of a smaller cluster size. For example, if the partition size is from 512–1,023MB, the cluster size will be 16KB. For other partition sizes and their default cluster sizes, see the chart on page 31.

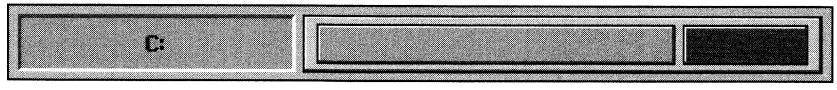
4. In the partition map or list, click on the free space you have just created, and then choose the **Create** button.

5. In the Create Primary Partition dialog, select **Extended** from the Partition Type drop-down list. Choose **OK**. After the operation is complete, choose **OK**.



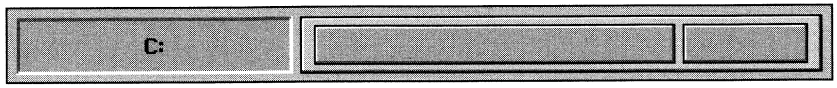
6. Click on the free space within the extended partition, and then choose the **Create** button.

7. In the Create Logical Partition dialog, select **FAT** from the Partition Type drop-down list. Next, enter a name for your D: applications partition (for example, **APPS**) in the New Label field, and then enter the number of megabytes you want to allocate to the partition. Remember to leave some space for your data partition. Choose **OK**. After the operation is complete, choose **OK**.

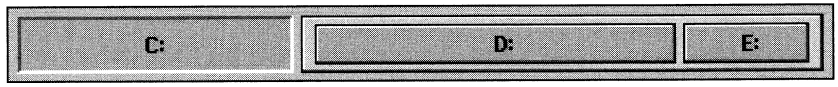


8. Click on the remaining free space within the extended partition, and then choose the **Create** button.

9. In the Create Logical Partition dialog, select **FAT** from the Partition Type drop-down list. Next, enter a name for your E: data partition (for example, **DATA**) in the New Label field. Choose **OK**. After the operation is complete, choose **OK**.



10. Choose **Exit**. When the dialog appears informing you to reboot, choose **Reboot**. After your computer reboots, your new applications partition will be your D: partition, and your new data partition will be your E: partition.



11. If your CD-ROM drive letter was D: before you completed this scenario, it will now be F:. To redirect your programs that run from CD-ROM from D: to F:, start the DriveMapper program by clicking its icon in the PartitionMagic by PowerQuest program group or folder, and follow the instructions on your screen. For details on using DriveMapper, see *DriveMapper* on page 110.

IMPORTANT: When you reboot your computer, your CD-ROM drive will receive a new drive letter. If you cannot access the CD-ROM drive, see *Making the Operating System Assign a CD-ROM Drive Letter* on page 160.

12. You can now use PowerQuest MagicMover to move your applications from your C: partition to your D: partition. (See *MagicMover* on page 99.) Then, from your Windows File Manager, Explorer, or My Computer folders, you can transfer your data folders and files from your C: partition to your E: partition. In addition, you can change the default settings for saving files from C: to E: in your applications.

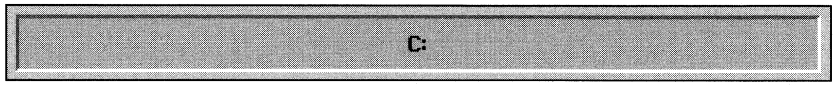
Scenario 3: Run Multiple Operating Systems

This scenario will make it easy for you to install and use a second operating system on your computer by separating operating systems into their own secure partitions. In addition, this scenario will help you reclaim wasted disk space and organize and protect your data by creating two additional partitions—one for applications and one for data.

Once you install a second operating system, the Boot Manager program included with PartitionMagic lets you easily select which operating system you want to use when you start your machine.

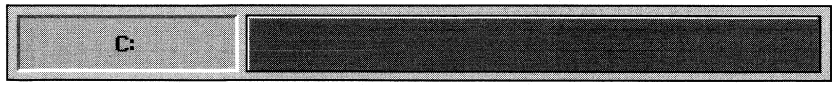
To create separate partitions for your operating system and for your application and data files, follow these simple steps:

1. Start PartitionMagic as instructed in *Running PartitionMagic* on page 8.



2. From the partition list or partition map on PartitionMagic's Main Window, click on your C: partition, and then choose the **Resize** button.

3. In the Resize Partition dialog, use your mouse to drag the right edge of the partition to the left until the Free Space After field equals the size that you would like to allocate to your second operating system (C: hidden), applications (D:), and data (E:) partitions. For example, if you wanted to allocate 100MB for your new operating system partition, 300MB for your applications partition, and 100MB for a data partition, resize the partition to the left until the Free Space After field equals 500MB. Choose **OK**. After the operation is complete, select **OK**.



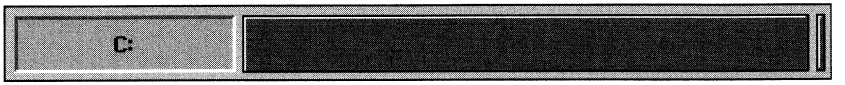
HINT: If your current C: partition is greater than 1,024MB (it will have 32KB clusters), we recommend that you resize it below 1,024MB to take advantage of a smaller cluster size. For example, if the partition size is from 512–1,023MB, the cluster size will be 16KB. For other partition sizes and their default cluster sizes, see the chart on page 31.

4. In the partition map or list, select the free space to the right of the C: partition by clicking on it.

5. Choose **Install Boot Manager** from the Boot Manager menu on PartitionMagic's Main Window. The Install Boot Manager dialog will appear.

6. Select **End of Free Space** under Position, and choose **OK**.

NOTE: PartitionMagic creates a partition, installs the Boot Manager program in it, and sets the newly created partition as the active partition.

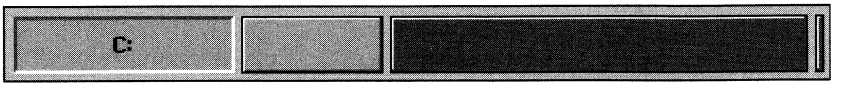


7. Click on the C: partition and choose **Add to Boot Manager Menu** from the Boot Manager menu.

8. Enter a menu name for the operating system in your C: partition (for example, **WinNT**, **Win95**, **OS/2**, and so on). This name will appear in the Boot Manager startup menu. Unlike a volume label, the Boot Manager menu name can contain lowercase letters and most symbols. Choose **OK**.

9. Click on the free space to the right of the C: partition, and then choose the **Create** button.

10. In the Create Primary Partition dialog, select **FAT** from the Partition Type drop-down list. Next, enter a name for your C: second operating system partition (for example, **WINNT**, **WIN95**, **OS2**, etc.) in the New Label field, and then enter the number of megabytes you want to allocate to the partition. Remember to leave enough space for your applications and data partitions. Choose **OK**. After the operation is complete, select **OK**.

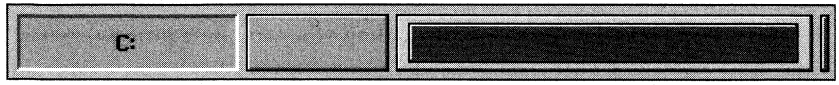


11. Click on the newly created partition, and then choose **Add to Boot Manager Menu** from the Boot Manager menu.

12. Enter a menu name for the second operating system or use the default shown. Choose **OK**.

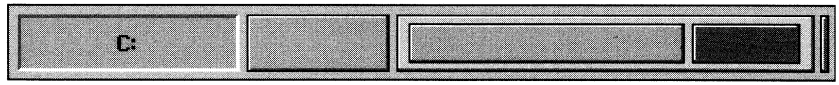
13. Click on the free space to the right of your newly created partition, and then choose the **Create** button.

14. In the Create Primary Partition dialog, select **Extended** from the Partition Type drop-down list. Choose **OK**. After the operation is complete, select **OK**.



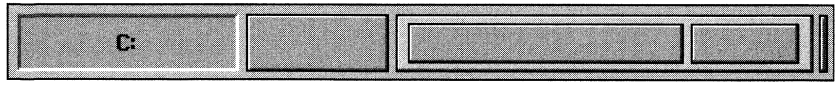
15. Click on the free space within the extended partition, and then choose the **Create** button.

16. In the Create Logical Partition dialog, select **FAT** from the Partition Type drop-down list. Next, enter a name for your D: applications partition (for example, **APPS**) in the New Label field, and then enter the number of megabytes you want to allocate to the partition. Remember to leave enough space for a data partition. Choose **OK**. After the operation is complete, select **OK**.



17. Click on the remaining free space within the extended partition, and then choose the **Create** button.

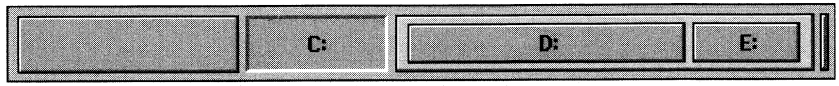
18. In the Create Logical Partition dialog, select **FAT** from the Partition Type drop-down list. Next, enter a name for your E: data partition (for example, **DATA**) in the New Label field. Choose **OK**. After the operation is complete, choose **OK**.



19. Click on your hidden primary partition.

20. Choose **Set Active** from the Advanced menu. When the dialog appears, choose **OK**.

21. Choose **Exit**. When a dialog appears informing you to reboot your computer, choose **Reboot**. After your computer reboots, you will have a hidden primary partition, a new active (visible) primary (C:) partition, a D: applications partition, an E: data partition, and a small Boot Manager partition.



IMPORTANT: When you reboot your computer, you will need to have a bootable diskette for installing your new operating system (since your new active partition does not yet have an OS on it and is not yet bootable).

22. Install the new operating system using the instructions and the diskettes or CD-ROM that came with it.

23. Once your new operating system is installed, set the Boot Manager partition active with PartitionMagic, FDISK, or Disk Administrator.

NOTE: To set the Boot Manager partition active with PartitionMagic, you will need to install PartitionMagic into your new operating system partition. See *Installing PartitionMagic* on page 7 for instructions.

NOTE: The Boot Manager startup menu will now appear every time you start your computer. This menu allows you to choose which operating system you want to boot.

24. If your CD-ROM drive letter was D: before you completed this scenario, it will now be F:. To redirect your programs that run from CD-ROM from D: to F:, start the DriveMapper program by clicking on its icon in the PartitionMagic by PowerQuest program group or folder, and follow the instructions on your screen. For details on using DriveMapper, see *DriveMapper* on page 110.

25. You can now use PowerQuest MagicMover to move applications from your C: partition to your D: partition. (See *MagicMover* on page 99.) Then, from your Windows File Manager, Explorer, or My Computer folders, you can transfer your data folders and files from your C: partition to your E: partition. In addition, you can change the default settings for saving files from C: to E: in your applications.

IMPORTANT: When you reboot, your CD-ROM drive will receive a new drive letter. If you cannot access the CD-ROM drive, see *Making the Operating System Assign a CD-ROM Drive Letter* on page 160.

Chapter 3

Product Capabilities

This chapter discusses how to navigate PartitionMagic's interface and how to use PartitionMagic's commands, with particular emphasis on the commands in the Options and Advanced menus.

Integrity Checks

PartitionMagic checks disk integrity with a sophisticated system of analysis and validation that operates behind the scenes every time you start the program or use an option. An initial integrity check scans your disk and reports any partition problems that may prevent PartitionMagic's options from operating properly. This integrity check acts as an early warning system to keep you informed of your disk's status and as an assurance that your disk's structure is thoroughly analyzed and verified before you alter it using PartitionMagic.

If your physical disk passes the initial integrity check, you can select the disk's partitions and perform PartitionMagic's various options. If your disk fails the initial integrity check, an error message is displayed instead of the partition list. This does not indicate a problem with PartitionMagic (because no disk modification options have been initiated), but with your disk. Correct the disk problem (see *Resolving Partition Table Errors* on page 164), then restart PartitionMagic.

In addition to the integrity check at startup time, PartitionMagic performs two integrity checks, which are displayed in the Progress dialog shown below, during each operation. The first check tests the integrity of the file system in the partition before an operation begins (similar to CHKDSK or SCANDISK). The second integrity check is made to verify the validity of your disk's data after an operation is completed. From start to finish, PartitionMagic cautiously scrutinizes your disk and informs you immediately if it detects any irregularities.

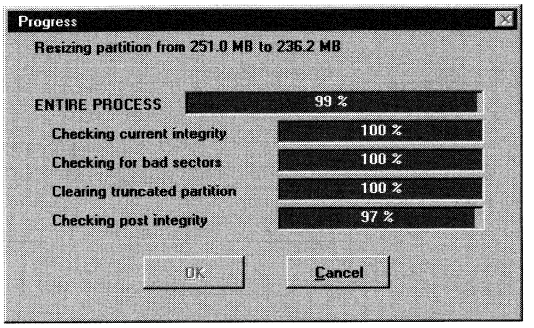


Figure 3.1: The Progress dialog shows an operation's status and displays integrity checks.

NOTE: The Progress dialog also allows you to cancel an operation by choosing the Cancel button. This button is grayed out (disabled) when canceling would leave the partition in an unusable state. Choosing Cancel will not undo changes that have already taken place, but data is never lost when Cancel is chosen.

Introduction to the Interface

PartitionMagic allows you to navigate through the interface using either your mouse and keyboard or using your keyboard only.

Navigating With a Mouse and Keyboard

PartitionMagic's interface is easy to use, allowing you to select partitions, menus, and text fields and choose menu items, list items, buttons, and other controls by single-clicking the primary (usually the left) mouse button. Many of these items use dialogs in which you type in values or names.

You can also use the right mouse button to bring up a pop-up menu containing the same items that appear on the Options menu. To bring up the pop-up menu, place the mouse pointer over the desired partition on the partition map or partition list and click the right mouse button. Once the pop-up menu is displayed, highlight an option and click the primary mouse button once to choose that option.

Navigating With a Keyboard

You can also navigate through PartitionMagic using only your keyboard to select menus, buttons, and all other controls.

Selecting Items From a Menu

To select a menu item, press Alt+<underlined letter>. For example, if you press Alt and the letter D, the Drives menu will appear. When the menu is displayed, you can select an item by either typing the underlined letter or highlighting an item by using the up and down arrow keys and pressing Enter. To deselect a menu before choosing an item, press the Alt key again.

Selecting Items From Dialogs

To select items from dialogs using the keyboard, move the focus, which is shown by a bolder line around a button or by a dashed box around items in lists, by pressing the Tab key.

For lists that have several items, use the up and down arrows to highlight an item. Once you have selected the menu item or button you want, press Enter. For cascading menus, such as Skip Bad Sector Checks, highlight the item, press Enter to display the next menu, highlight the next item using the up and down arrow keys, and press Enter again.

PartitionMagic's Three-Step Process

The PartitionMagic Main Window contains general information about your hard disk and its partitions. It is divided into three areas: Physical Drives, Partitions, and Options. To get information about a partition or to alter it, you perform a simple, three-step process: 1) select a physical drive, 2) select a partition, and 3) select an option.

Selecting a Physical Drive

In the Physical Drives area of the Main Window, PartitionMagic displays the currently selected drive and its size in megabytes (MB). You can change to another drive using the drop-down list in the Physical Drives area or using the menu bar.

Selecting a Drive Using the Drop-Down List

To change to another drive using the drop-down list, click the arrow button to the right of where the current disk is displayed to reveal a drop-down list containing all the available drives on your system. Move the mouse pointer to highlight the drive you want and click the left mouse button.

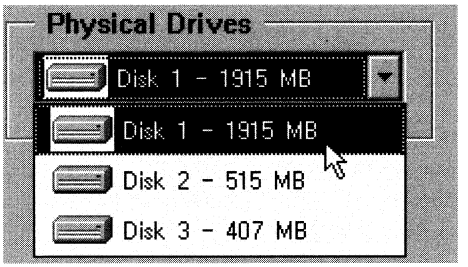


Figure 3.2: Using the mouse to select a physical drive

From the keyboard, use the Tab key to move the focus until it is on the Physical Drives field (the field will be surrounded by a dashed box) and press Enter. Use the up and down arrow keys to highlight the drive you want and press Enter.

Selecting a Drive Using the Menu Bar

To change to another drive using the menu bar and a mouse, click Drives to reveal the drop-down menu, move the mouse to highlight the drive, and click the primary mouse button.

From the keyboard, press Alt+D to activate the Drives menu, use the up and down arrow keys to highlight the desired drive, and press Enter to choose the drive.

Selecting a Partition

The Partitions area displays information about the selected drive's partitions in graphic and text forms.

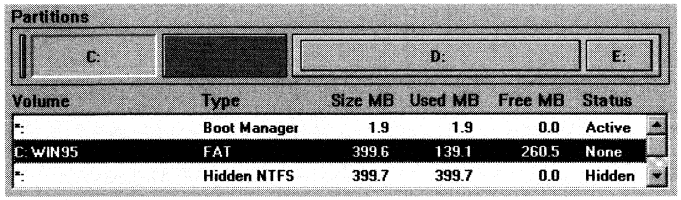


Figure 3.3: Partition information displayed graphically and in text

If the selected drive contains more than one partition, the selected partition is highlighted. To change to another partition, click on that partition with your mouse in the partition map, the partition list, or the Partitions menu. To select a partition using your keyboard, press Alt+P to activate the Partitions menu, use the up and down arrow keys to highlight the desired partition, and press Enter.

Partition Map

The partition map shows the partition sizes to scale. If the selected physical drive contains logical partitions, the partition map shows the logical partitions enclosed by the extended partition.

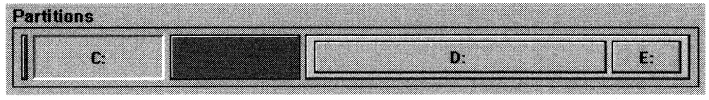


Figure 3.4: The partition map

The partition map displays the partitions in different colors, according to the file systems that are on the partitions. A legend shows the file systems and their corresponding colors. Run PartitionMagic to see the actual colors.

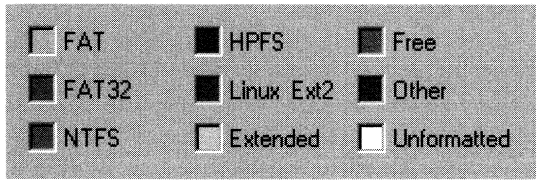


Figure 3.5: Different colors represent the file systems.

Partition List

The partition list displays the partitions, their drive letters, volume labels, file system types, partition sizes, amounts of used and free space, and their status. You can expand the Main Window to display one additional column: Pri/Log (primary or logical).

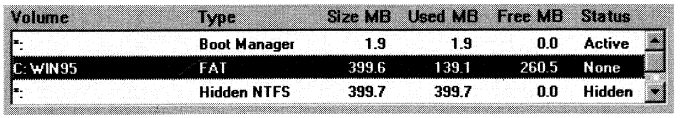


Figure 3.6: The partition list shows information about the partitions.

Drive letters for primary partitions are flush left, followed by a colon and the volume name. For logical partitions, the drive letters and volume labels are indented. An asterisk (*) is used in place of a drive letter for:

- Hidden primary partitions
- Extended partitions
- Partitions with file systems not supported by the active operating system
- Free space

The size of a partition, the used space within a partition, and free (available for data) space are displayed in megabytes. The Used MB and Free MB columns show how much space is used and how much remains on a partition.

NOTE: You can convert megabyte values to bytes by multiplying the megabyte value by 1,048,576.

If a Check operation fails on a partition, the Used MB and Free MB columns are replaced with "Check Failed." You should fix any errors encountered. For more information, see *Resolving Check Errors* on page 163.

A partition's status will be one of the following:

- **Active** status is given to the partition the computer boots from.

NOTE: If you are using Boot Manager, the Boot Manager partition should be the active partition. Only one partition at a time will be active.

- **Hidden** partitions are not assigned a drive letter. Partitions may be hidden by the operating system automatically (for example, it hides all primary partitions except the active one), by Boot Manager, or by you.
- **None** is given if the partition is not active, hidden, or bootable.
- **Bootable** is possible only when you use Boot Manager. Any partition that is listed in the Boot Manager menu is designated as bootable.
- **Bootable hidden** designates a partition that is both bootable and hidden.

NOTE: If you are using Boot Manager, PartitionMagic puts an asterisk preceding the status of the default Boot Manager selection (the partition you selected as the default active partition).

Selecting an Option

Once you have selected a drive and a partition, you can choose an option by using the Options buttons on the Main Window, the pop-up menu, or the Options and Advanced menus on the menu bar. As explained above, you can use either the mouse or the keyboard to choose an option.

NOTE: The Options buttons enable you to choose options that can be performed on the partition you selected. If the Option cannot be performed, the button will be grayed out.

Using the Options Buttons

To choose an option using the Options buttons, place the mouse pointer on the option and click the primary mouse button. As a safety feature, PartitionMagic does not allow you to access all available options through the Options buttons on the Main Window. You must choose any function that destroys data from either the menu bar or the pop-up menu.

Using the Menu Bar

To choose an option using the menu bar and the mouse, select the Options or Advanced menu by clicking on it in the menu bar, move the mouse to highlight a menu item, and click the mouse button. To choose an option using a keyboard, press Alt+O or Alt+A to access the Options or Advanced menu respectively. Then, type only the underlined letter.

Using the Pop-up Menu

To choose an option using the pop-up menu, place your mouse pointer on the desired partition in either the partition map or the partition list, right-click your mouse to display a pop-up menu of options, highlight the option, and click the primary mouse button. By default, the pop-up menu displays the same items that are on the Options menu. To have items from both the Options menu and the Advanced menu appear on the pop-up menu, select Advanced Context Menus from the Preferences menu, then right-click the partition again.

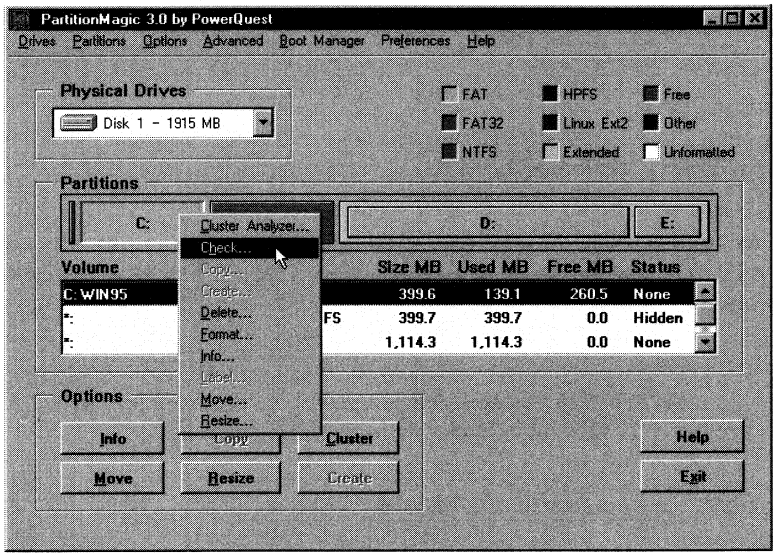


Figure 3.7: Main Window with pop-up option menu displayed

Options

This section describes items on the Options menu. These items allow you to modify the selected partition to your specifications.

Cluster Analyzer

This option is available only for partitions that use the FAT and FAT32 file systems. The FAT file system allocates disk space for file storage in units of one or more sectors called clusters or allocation units. On FAT partitions, each file is allocated at least one cluster of disk space. As a result, space is wasted in clusters that hold files smaller than the size of the cluster. Thus, a small cluster size means less waste.

A drive's cluster size is set by DOS's FORMAT, depending on the size of the partition, as shown in the table below.

	Drive Size	FAT Type	Sectors Per Cluster	Cluster Size
Hard Disks	0MB–15MB	12-bit	8	4KB
	16MB–127MB	16-bit	4	2KB
	128MB–255MB	16-bit	8	4KB
	256MB–511MB	16-bit	16	8KB
	512MB–1,023MB	16-bit	32	16KB
	1,024MB–2,047MB	16-bit	64	32KB

Figure 3.8: DOS/Windows default FAT cluster size

The PartitionMagic Cluster Analyzer allows you to change the cluster size on a FAT partition without destroying data. When you choose this option, PartitionMagic analyzes the selected FAT partition and displays the Cluster Analysis dialog shown in Figure 3.9.

NOTE: It is not recommended that you use the smallest cluster size on partitions containing a single, large file, such as a database or swap file.

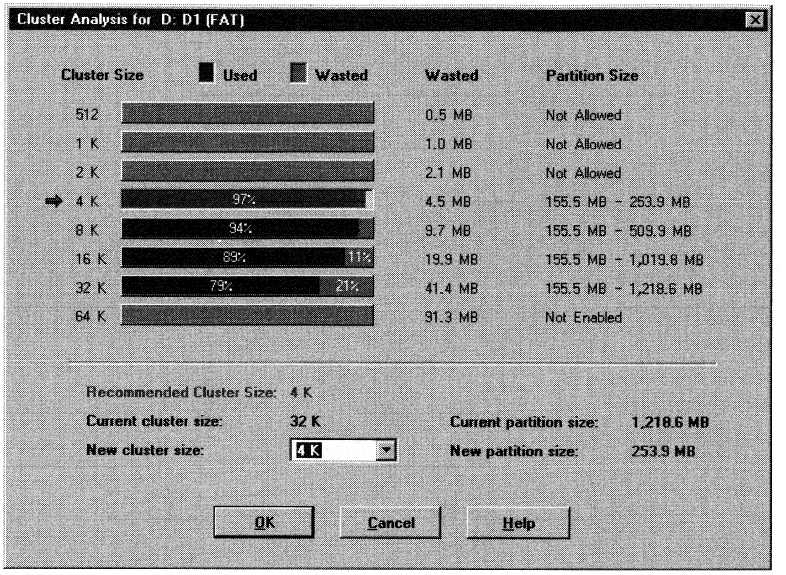


Figure 3.9: The Cluster Analysis dialog helps you choose the best cluster size.

The Cluster Analysis dialog displays the possible cluster sizes from 512 bytes to 64KB. For each cluster size, PartitionMagic shows the following:

- A bar graph and percentages represent how much space would be used and how much space would be wasted if you chose that cluster size for the currently selected partition. PartitionMagic puts an arrow to the left of the recommended cluster size and highlights the bar graph displaying the selected partition's current cluster size.
- Space wasted is displayed (in megabytes) to the right of the bar graph.
- Possible partition size (in megabytes) is displayed to the right of space wasted.

If a cluster size requires a partition size that is too small for the data and files on the selected partition, PartitionMagic displays the words "Not Allowed" in the Partition Size column. Also, the 64KB cluster size is used only for Windows NT. Therefore, the words "Not Enabled" appear for it in the Partition Size column. You can enable the 64KB cluster size for Windows NT, but it is not recommended. For more information, see *Allow NT 64K FAT Clusters* on page 93.

Below the partition analysis information, the Cluster Analyzer dialog shows the following:

- **Recommended cluster size** (If you currently have the recommended size, this line reads "No cluster size change recommended.")
- **Current cluster size**
- **New cluster size** drop-down box from which you can select a new cluster size
- **Partition type**, which shows either FAT or FAT32
- **Current partition size**
- **New partition size**, which shows how the selected partition's size will change if you select a new cluster size

PartitionMagic adheres to the established limits for partition and cluster sizes. You cannot select a cluster size that is invalid for the selected partition.

To change the cluster size of a FAT partition:

WARNING: Do not choose the 64KB cluster size unless you have Windows NT and a 2GB drive or larger.

1. Select a FAT or FAT32 partition you want analyzed.

2. Choose **Cluster Analyzer** from the Options menu.

3. Using the information on the Cluster Analysis window, decide which cluster size would be best, or use the recommended size.

4. Click on the **New cluster size** drop-down list to display the available cluster sizes.

5. Highlight your desired cluster size.

WARNING: Converting a FAT partition that contains OS/2 data to a FAT32 partition will destroy the Extended Attributes and make the data inaccessible by OS/2. In the lower right corner of the dialog, a line that reads New Partition Type tells whether the options you choose will create a FAT or FAT32 partition.

6. Choose **OK**.

Check

This option checks the integrity of the selected partition. You can perform this operation on FAT, FAT32, NTFS, and HPFS partitions.

NOTE: The Check option does not display information about the status and structure of a partition as do the DOS, Windows, and OS/2 CHKDSK utilities. For that information, use the Info option (see *Info* on page 46).

PartitionMagic also checks for OS/2 Extended Attribute errors on FAT partitions. If you do not use OS/2 or previously used OS/2 but no longer do, you may choose Ignore OS/2 EA Errors on FAT under the Preferences menu, as these errors are not a concern.

WARNING: OS/2 users should not enable Ignore OS/2 Errors on FAT because undetected errors of this type could cause data loss.

To check a partition's integrity:

1. Select the desired partition from the partition map or partition list on the Main Window.

2. Choose **Check** from the Options menu.

Check Results

When you choose Check, PartitionMagic displays the Check dialog shown below.

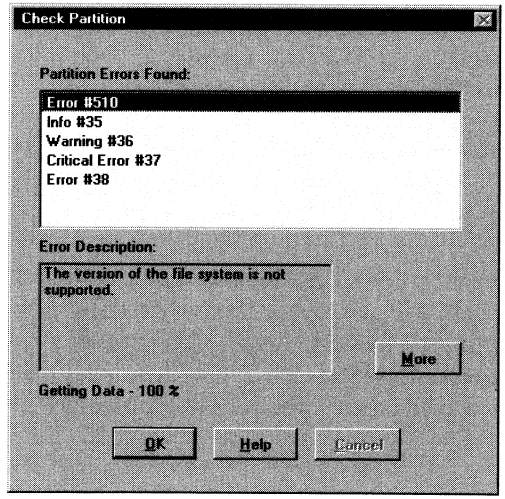


Figure 3.10: The Check dialog displays errors found on the partition.

In the lower left portion of the dialog, PartitionMagic displays the percentage of data it has checked.

If the Check operation does not discover any errors on the partition, PartitionMagic displays the message "None Found" in the Partition Errors Found box. If the Check operation discovers any errors on the partition, PartitionMagic displays the errors in the Partition Errors Found box.

In addition, PartitionMagic provides a brief description of the highlighted error in the Error Description box. If there is more than one error, you can highlight each error for a brief description. For more information on a specific error, highlight the error and click the More button to see the Help entry on that topic. The More button is grayed out if no additional information is available.

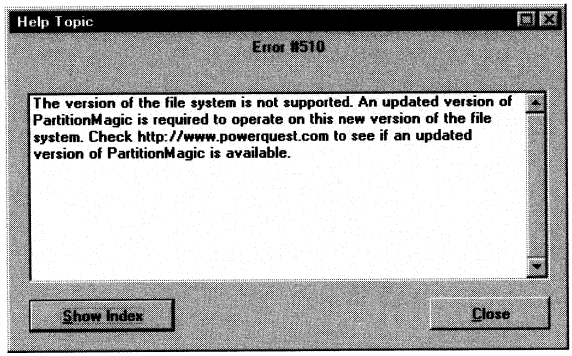


Figure 3.11: The More button takes you to the Help entry on that topic.

When a Check Operation Fails

If a Check operation finds errors on the partition, the partition has failed the check. Until the problem is corrected, the partition list displays "Check Failed" in the Used MB and Free MB columns, and most options are grayed out (not allowed). For help in correcting the problem, see *Resolving Check Errors* on page 163.

Copy

This option allows you to make an exact duplicate of a partition without any data loss. The copy is the same size (or slightly different if copied to a different physical disk) and file type and contains the same data as the original.

The Copy option allows you to specify a hard-disk drive and the free space on that drive where you want to place the copy. PartitionMagic can copy a partition to any location with sufficient free space in which to place the copy.

NOTE: When you copy a partition, you must copy it to free space that is equal to or larger than the size of the partition being copied.

Reasons why you might want to copy a partition include the following:

- You need to clone your operating system before upgrading to a new version or a different operating system so that windows, program icons, and properties are maintained.
- You have placed a larger hard-disk drive on the system and want to quickly move the smaller disk's contents to it.
- You want to make a primary partition a logical partition, or vice versa.
- You want to change the relative order of partitions.
- You want to back up a partition.

To copy a partition:

1. Select either the partition you want to copy or the free space where you want the copy to be located from the partition map or partition list on PartitionMagic's Main Window.

2. Choose **Copy** from the Options menu.

3. If you selected the partition to be copied in step 1, select the free space in which you want the copied partition located.

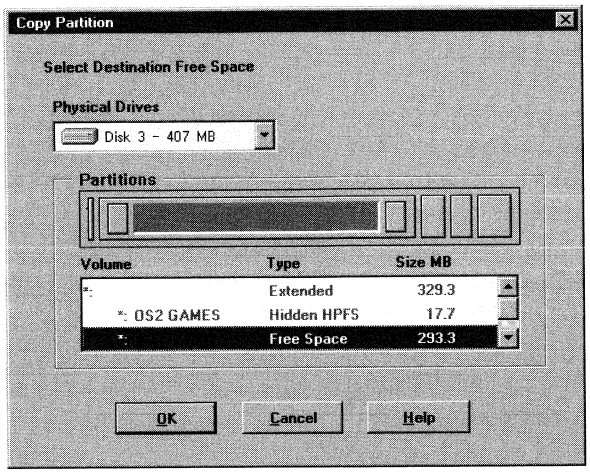


Figure 3.12: This dialog lets you select free space for the copied partition.

-Or-

If you selected the free space in which you want the partition located in step 1, select the partition to be copied from the dialog.

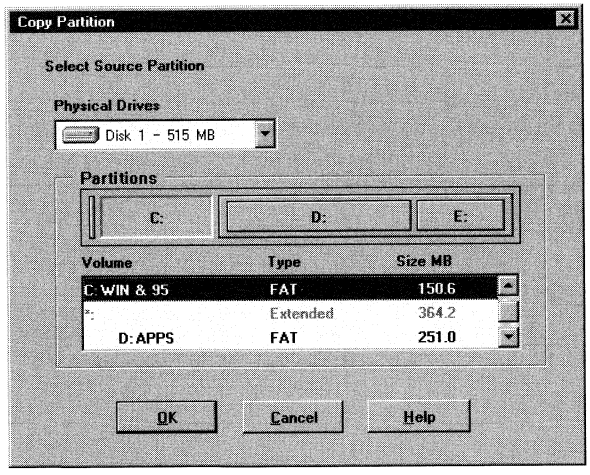


Figure 3.13: The Copy Partition dialog lets you select the original partition.

4. Choose **OK**.

Create

The Create option lets you create primary partitions, extended partitions, and logical partitions. On a single hard disk, you can have no more than either four primary partitions or three primary partitions and one extended partition. Within the extended partition, you can create additional subdivisions called logical partitions. You should create primary partitions to install operating systems and logical partitions for all other purposes, such as storing data and applications.

Where to Create a Partition

To create a partition, free space must exist on the hard disk. If you want to create a partition but there is no free space on the disk, you will have to use the Resize option and possibly the Move option to resize partitions smaller and move them until you get the free space to the desired location.

The position of the free space determines what kind of partition you can create. Free space on a hard disk can be either inside or outside an extended partition. If there is no extended partition on the hard disk, you can use PartitionMagic to create either a primary or an extended partition in the free space you select. If an extended partition already exists on the hard disk, you can create a primary partition by selecting free space outside the extended partition. If you select free space inside the extended partition, you can create a logical partition. To create a logical partition when no extended partition exists, use Create to first create an extended partition, then select the free space inside the extended partition, and select Create again.

If necessary, use Resize Left Boundary or Resize Right Boundary to adjust the boundaries of the extended partition to move the free space in or out of the extended partition. If you do not know what type of partition you want to create, see *Understanding Partitions* on page 125. For more information about moving free space inside or outside the extended partition, see the Create examples that start on page 41.

Drive Letter Changes

When creating a new partition, pay strict attention to the rules used by Windows NT, Windows 95, DOS, and OS/2 to assign drive letters. (See *How the OS Assigns Drive Letters* on page 137.)

NOTE: Creating a new logical partition always changes the drive letter assigned to your CD-ROM. This means that you will not be able to access programs that reside on the CD-ROM drive unless you change all references to it. (See *Understanding Drive Letters* on page 137.)

You can use the PowerQuest DriveMapper wizard (see *DriveMapper* on page 110), which is included with PartitionMagic, to alter batch files, .INI files, Windows 95, DOS, and OS/2 settings, registry values, and other files that refer to files on the CD-ROM. You may find it best, however, to add all new partitions to the right of any current partitions so that existing drive letters are not affected.

Creating a Partition

To create a new partition:

WARNING: Before you begin this procedure, make sure you understand how drive letters can be affected. See *How the OS Assigns Drive Letters* on page 137.

1. Select the free space in which you want to create a partition from the partition map or partition list on the Main Window.

NOTE: Remember, the location of the free space you select determines what kind of partition you can create. See *Where to Create a Partition* on page 38.

2. Choose **Create** using one of the methods described above. A dialog similar to the one below is displayed.

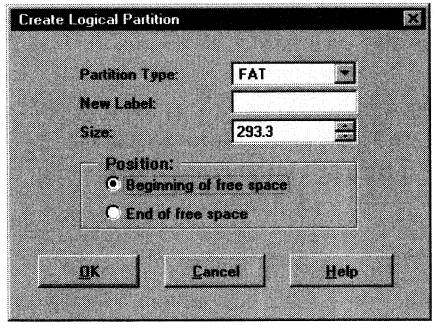


Figure 3.14: Use this dialog to create a logical partition.

3. Fill in the fields as explained below.

   a. **Partition Type** allows you to specify the kind of partition you will create: FAT, FAT32, NTFS, HPFS, Extended, or Unformatted. If you specify FAT, FAT32, NTFS, or HPFS, the partition will automatically be formatted with the appropriate file system as it is created. If you do not know what type of partition you want to create, see *Understanding Partitions* on page 125.

NOTE: PartitionMagic will handle bad hard-disk sectors according to the preference you choose. For more information, see *Skip Bad Sector Checks* on page 96.

To be formatted with the FAT32 file system, a partition must be larger than 512MB, and your operating system must have FAT32 support. However, you can use Advanced FAT Properties on the Advanced menu to change these properties later. If your computer does not have FAT32 support, FAT32 will not appear as a partition type.

   b. **New Label** (optional) allows you to type in a label (name) for FAT, FAT32, NTFS, and HPFS partitions. This label will appear on the partition list after the drive letter. You may want to use a label that tells you what is on the partition, such as the name of the operating system, APPS, or DATA.

   c. **Size** allows you to specify the size of the partition you want to create. If you type in a size, the value may change slightly to one the drive's geometry supports.

HINT: When creating a partition that will contain an operating system, add 20–30MB more space in the partition than the operating system requires. Swap files or video graphic drivers may require the extra space.

   d. **Position** allows you to specify whether you want the partition at the beginning or at the end of the free space. This is available only if you choose a partition size (in the Size field) that is smaller than the free space you selected.

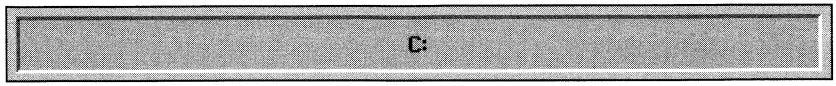
4. When you have filled in the fields correctly, choose **OK**.

NOTE: The drive letters for newly created partitions will appear after you reboot your computer.

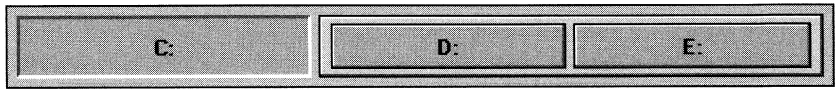
Create—Example 1

This example shows you how to create new logical partitions to separate your operating systems from your applications and data files. We are assuming you have only a primary C: partition with unused space within the partition. If the above is true and you follow these instructions, you will have a C: primary partition for your operating systems and D: and E: logical partitions for your applications and data files.

Before:



After:



1. **Resize** the C: partition smaller. (For instructions, see *Resize* on page 62.)

HINT: Resize the C: partition smaller by the same amount that you want to allocate to the D: and E: partitions. This will create free space for the new D: and E: partitions.

2. From the partition map or the partition list on the Main Window, select the free space to the right of the C: partition and choose **Create**.

3. In the Partition Type field, choose **Extended**. Choose **OK**.

4. Click on the free space within the extended partition and choose **Create** again.

5. When the dialog appears, do the following:

   a. In the Partition Type field, select **FAT**.

   b. Go to the New Label field and type in a volume label, such as **APPS**.

   c. Go to the Size field and type in the number of megabytes you want to allocate to the D: partition.

   d. Choose **OK**.

6. Click on the free space within the extended partition and choose **Create** again.

7. When the dialog appears, do the following:

   a. In the Partition Type field, select **FAT**.

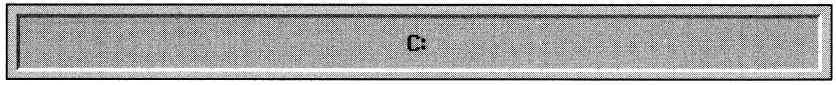
   b. Go to the New Label field and type in a label for the E: partition, such as **DATA**.

   c. Choose **OK**.

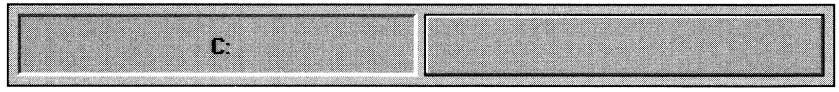
Create—Example 2

This example shows you how to create an additional primary partition to install a second operating system. We assume you have only one primary C: partition on your hard disk.

Before:



After:



1. **Resize** the C: partition smaller. (For instructions, see *Resize* on page 62.)

HINT: Resize the C: partition smaller by the same amount that you want to allocate to the new primary partition. This will create free space for the new primary partition.

2. From the partition map or the partition list on the Main Window, select the free space that is to the right of the C: partition and choose **Create**.

3. When the dialog appears, do the following:

   a. In the Partition Type field, choose **FAT**.

   b. Go to the New Label field and type in a label, typically the name of the operating system you will install in that partition.

   c. Go to the Size field and type in the partition size you want.

   d. Choose **OK**.

4. Set the new partition active (see *Set Active* on page 79).

You can now install another operating system in the second primary partition. To switch between the two operating systems with PartitionMagic, use Set Active to select the desired partition and reboot. Or, use a boot utility like Boot Manager or PQ Boot.

Delete

This option deletes a partition and destroys all its data. To ensure that you don't accidentally delete a partition, you must initiate this procedure through either the Options menu or the pop-up menu that displays when you right-click on a partition. This option is not available as a button on the Main Window.

To further protect your data, PartitionMagic requires you to type in the volume label before it will delete a partition. Each partition is given a volume name either by you or by PartitionMagic. If you choose not to give the volume a label when you create a partition, PartitionMagic requires that you type NO NAME to confirm deletion.

To delete an extended partition, you must first delete all logical partitions within the extended partition.

WARNING: Performing this procedure will destroy all data on the selected partition and may change drive letter assignments. See *How the OS Assigns Drive Letters* on page 137 and *Problems Caused by Drive Letter Changes* on page 142.

To delete a partition:

1. From the partition list or the partition map on the Main Window, select the partition you want to delete.

2. Choose **Delete** using one of the methods described above. The following dialog is displayed.

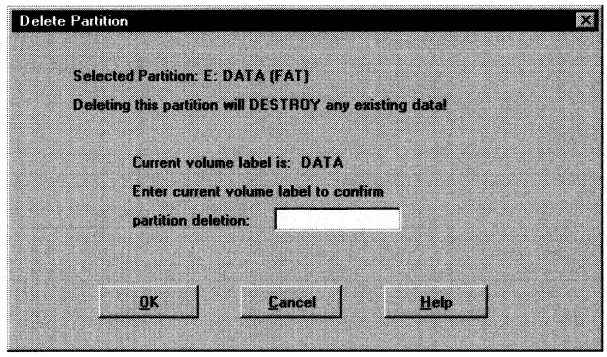


Figure 3.15: You must type in the name of the partition (volume) to be deleted.

3. Type the volume label in the field.

NOTE: In the Delete Partition dialog, PartitionMagic displays a line that reads "Current volume label is:" followed by the volume label. In the above graphic, the volume label is DATA.

4. Choose **OK** to delete the partition.

Format

This option formats a partition, destroying all its data in the process. This option allows you to format a partition with a different file system and volume label. Because this operation destroys data, you must initiate this procedure through either the Options menu or the pop-up menu that displays when you right-click on a partition. This option is not available as a button on the Main Window.

NOTE: To change a FAT partition to HPFS without destroying the existing files, use the Convert to HPFS option (see page 81). To convert a FAT partition to FAT32, or vice versa, use the Advanced FAT Properties option (see page 69).

As an added precaution against accidental data loss, PartitionMagic requires you to type the volume label in a field in the Format Partition dialog before it will perform the Format operation. The current volume label is shown above this field.

WARNING: This procedure destroys all data on the selected partition and may change drive letter assignments. See *How the OS Assigns Drive Letters* on page 137 and *Problems Caused by Drive Letter Changes* on page 142.

To format a partition:

1. Choose **Format** using one of the methods described above. The following dialog is displayed.

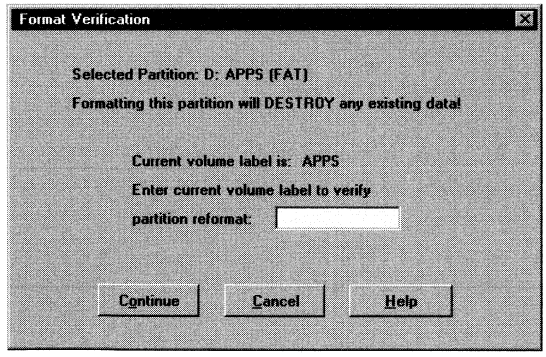


Figure 3.16: Verify that the displayed partition is correct by typing in the volume label.

2. Type the volume label in the field.

3. Choose **Continue** to verify your intent to format the partition. The following dialog is displayed.

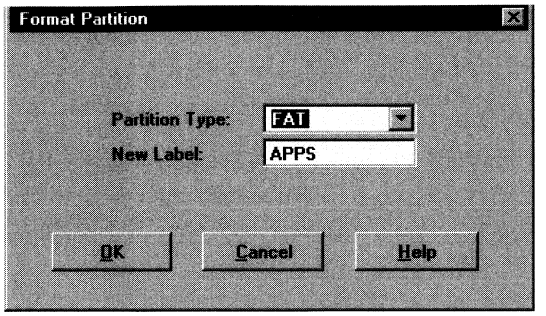


Figure 3.17: The Format Partition dialog lets you choose the partition type and a new label.

4. Fill in the fields as explained below.

   a. Select the partition type you want (FAT/FAT32, NTFS, or HPFS).

NOTE: If you select FAT/FAT32 and your operating system has FAT32 support and the partition is larger than 512MB, then the partition is formatted with the FAT32 file system. To convert between FAT and FAT32, use the Advanced FAT Properties option (see page 69).

   b. (Optional) Type in a label for the partition.

5. Choose **OK.**

Info

This option displays information about the status and structure of a selected partition. This information is displayed in tabbed pages.

To move from one page to another, you can either click on the appropriate tab (the tabs are always visible across the top of the pages) or use the Previous and Next buttons on the bottom of each page. If you are navigating using the keyboard, use Alt+P and Alt+N to move to the previous or to the next page. On the Info pages, each succeeding page from left to right contains information that is more technical.

Depending on the file system the partition uses, you may see different tabbed pages. The tabbed pages are Disk Usage, Cluster Waste, Errors, Partition Info, FAT Info, HPFS Info, and NTFS Info. The information on each page is described below.

Disk Usage

The Disk Usage page is available for the FAT, FAT32, NTFS, and HPFS file systems. This page shows you the following information in bytes, megabytes, and as a percentage:

- **Used** space on the partition, including space wasted by clusters
- **Free** space on the partition
- **Bad** space on the partition
- **Total** space on the partition (by adding the three previous lines)

PartitionMagic also displays the same information in a pie chart, as shown in the following figure.

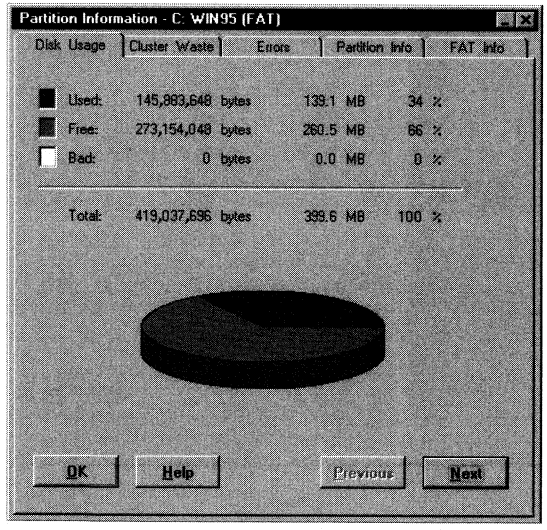


Figure 3.18: This tabbed page shows information about how much of the disk is in use.

Cluster Waste

The Cluster Waste page applies only to partitions that use either the FAT or FAT32 file system. This page shows the following:

- **Current cluster size** in bytes or kilobytes
- **Data** stored on the partition in bytes and megabytes
- **Wasted** space on the partition in bytes and megabytes
- **Total Used** space in bytes and megabytes (by adding the numbers on the two previous lines)

The amount of space for data and the space wasted in the partition are also represented in a bar graph with percentages, as shown in the following figure.

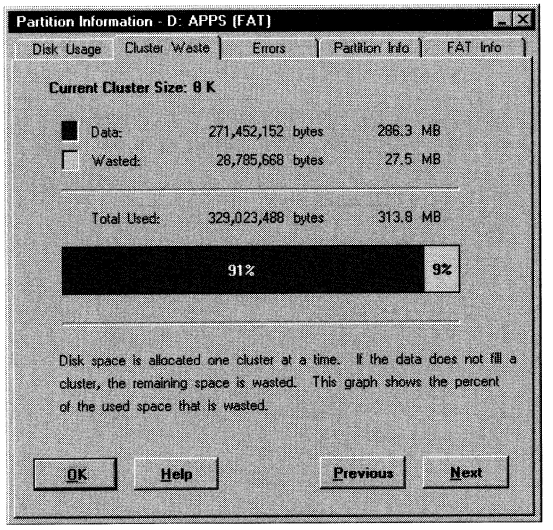


Figure 3.19: This tabbed page shows how (FAT) cluster size affects wasted disk space.

Errors

The error page applies to the FAT, FAT32, NTFS, and HPFS file systems. When you choose the Info option, PartitionMagic performs a check of the specified partition and displays the results in the tabbed page shown in the following figure. (This page is the same as the dialog that appears when you use the Check option.)

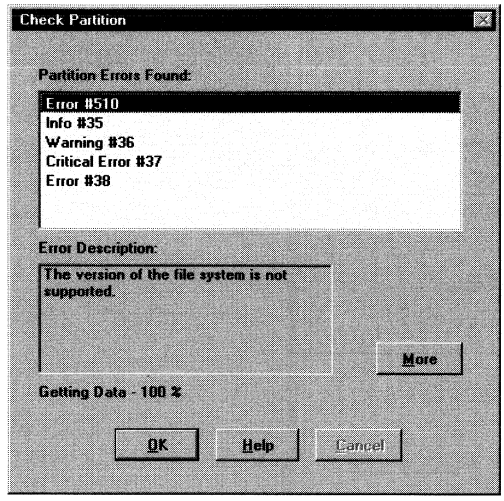


Figure 3.20: This tabbed page shows errors found during a check.

If the check discovers any errors on the partition, PartitionMagic displays the errors in the Partition Errors Found box. In addition, PartitionMagic provides a brief description of the error in the Error Description box. If there is more than one error, you can highlight each error for a description. You can often get more information on a particular error by highlighting the error and clicking the More button to display the Help topic on that item, as shown in Figure 3.21. If no further information is available, the More button will be grayed out.

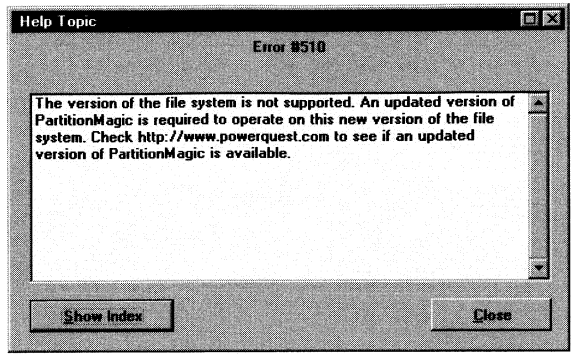


Figure 3.21: This Help Topic dialog shows additional information about errors.

Partition Info

This tabbed page is available for all types of partitions, including free space and extended partitions. Information on this tabbed page includes the following:

- **Partition type** is shown in hexadecimal followed by a text description of the partition or file system type (such as FAT, FAT32, NTFS, HPFS, and so on). The hexadecimal designation is a conventional way to display partition types.
- **Serial Number** is shown here if the partition's file system uses serial numbers. Not all file systems use serial numbers.

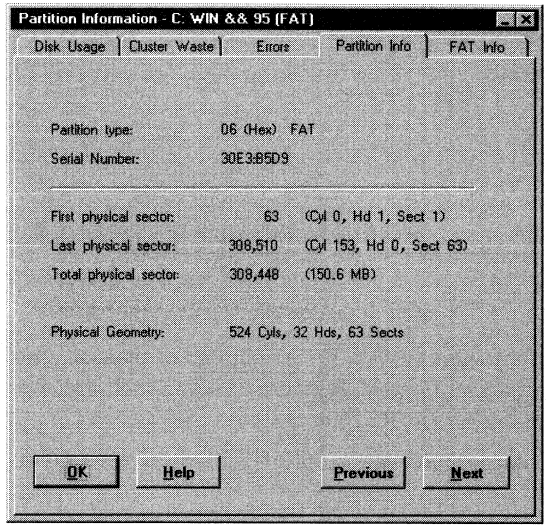


Figure 3.22: This tabbed page gives information about the partition.

The next section of this tabbed page shows physical information about the partition, including the following:

- **First Physical Sector** shows the logical number and the location (cylinder, head, and sector) where the partition begins.
- **Last Physical Sector** shows the logical number and the location (cylinder, head, and sector) where the partition ends.
- **Total Physical Sectors** gives the number of sectors in the partition.
- **Physical Geometry** shows the number of cylinders, heads, and sectors of the physical disk drive on which the partition resides.
- **Boot Manager Name** shows the volume name as it appears in the Boot Manager menu, if you are running Boot Manager. If the partition is the Boot Manager default selection, "Current Default" will be shown in parentheses.

File System-Specific Pages

When you choose Info for a partition using the FAT, FAT32, NTFS, or HPFS file system, PartitionMagic shows one of the following three pages: FAT Info, NTFS Info, or HPFS Info.

FAT Info

This tabbed page applies only to partitions that use the FAT or FAT32 file system. The first section on this page provides the following information about the file system:

- **Sectors per FAT** shows the number of sectors in each file allocation table and the number of file allocation tables on the selected partition.
- **Root directory capacity** shows the number of possible entries and the number of sectors in the root directory. Because a FAT32 root directory can grow as needed, this line is left blank for FAT32 partitions.
- **First FAT sector** shows the logical sector number within the partition where the FAT begins.
- **First Data sector** shows the logical sector number within the partition where the data portion of the partition begins.

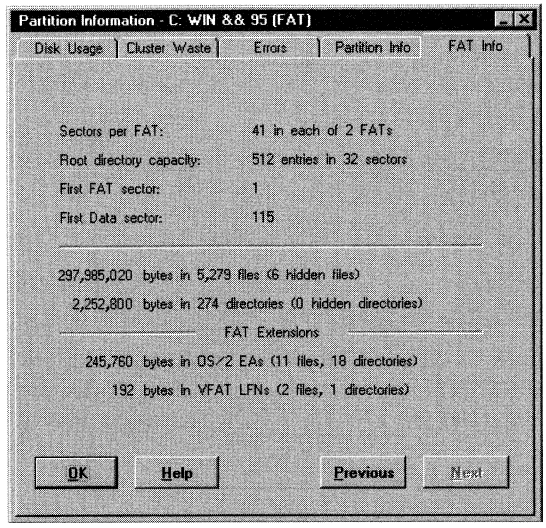


Figure 3.23: This tabbed page gives information on the selected FAT partition.

The next section of this page gives the following information:

- Number of bytes in files on the partition, the number of files, and the number of those files that are hidden
- Number of bytes in directories on the partition, the number of directories, and the number of those directories that are hidden

Several extensions to the FAT file system exist. The final section of this page gives the following information about FAT extensions:

- Number of bytes used for OS/2 Extended Attributes and how many files and directories the Extended Attributes are associated with
- Number of bytes used for long file names and the number of files and directories the long file names are associated with

NTFS Info

The first section of this tabbed page shows the following file system information for the selected partition:

- **NTFS Version** shows the version number. The most recent version is 1.2.
- **Bytes per NTFS sector** displays the number of bytes in each logical sector on the selected partition. (There are always 512 bytes in each physical sector.)
- **Cluster size** displays the size of each cluster and the number of sectors in each cluster on the selected partition.
- **First MFT Cluster** shows the logical number of the first cluster in the master file table (MFT).
- **File Record Size** gives the size of file records in the MFT.

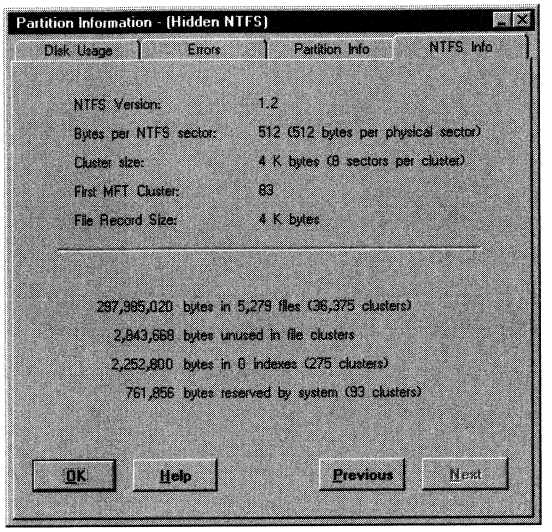


Figure 3.24: This tabbed page gives information on the selected NTFS partition.

The next section shows information similar to that shown by NTFS CHKDSK, including the following:

- Number of files and the bytes and clusters allocated to them
- Of the clusters used in files, the number of wasted bytes resulting from the cluster size
- Number in indexes (directories) and the space allocated to them, shown in bytes and clusters
- Space reserved for other system structures, shown in both bytes and clusters

HPFS Info

This tabbed page contains information that pertains only to HPFS partitions. The first section shows information regarding the partition's status and about the file system. Partition status displays one or more of the following values:

- **Active** means that OS/2 is running and data has been written to the partition.
- **Dirty** means that Windows NT or OS/2 was shut down improperly and is not running.
- **Corrupt** means that one or more sectors are bad, and the partition needs to be checked.
- **Hot Fixes** means that problems have been hot fixed.
- **Not Active** means the partition is not in use.

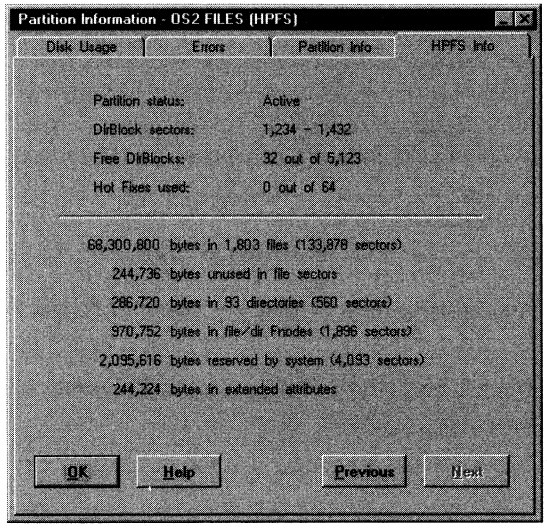


Figure 3.25: This tabbed page gives information on the selected HPFS partition.

The rest of the first section shows the following information about the file system:

- **DirBlock sectors** shows the range (the first and last sector numbers) of sectors in the DirBlock band. The DirBlock band is usually preallocated near the center of the disk to reduce head movement.
- **Free DirBlocks** displays the number of unused DirBlocks in the DirBlock band and the total number of DirBlocks. If the DirBlock band fills up, additional DirBlocks are allocated from the data area.
- **Hot Fixes used** displays the number of hot-fix sectors used and the total number of hot-fix sectors available. Hot-fix sectors are used temporarily to handle write errors. CHKDSK /F transfers the data from a hot-fix sector to a good sector and makes the hot-fix sector available again.

The next section shows information similar to that shown by HPFS CHKDSK.

NOTE: Information reported by PartitionMagic differs slightly from information reported by OS/2's CHKDSK. See *Using PartitionMagic's Info Option on HPFS Partitions* on page 162 for an explanation.

This information includes the following:

- Number of bytes and files on the partition and number of sectors used for files
- Number of unused bytes in file sectors, which is equivalent to wasted bytes in FAT clusters (However, because HPFS allocates space by sectors, less space is wasted.)
- Number of bytes in directories, the number of directories on the partition, and the number of sectors used for directories
- Number of bytes in file/dir Fnodes, also shown as the number of sectors

NOTE: An Fnode is a key structural element of the HPFS file system. Each Fnode is 512 bytes (one sector) long. One Fnode exists for each file or directory in the partition.

- Number of bytes reserved by the system, also shown as the number of sectors
- Number of bytes used for Extended Attributes (EAs)

Label

This option allows you to change a partition's volume label. Giving your partitions meaningful names will make managing them easier. For example, you can label a partition that contains mostly games as GAMES so that you can tell at a glance what is on that partition.

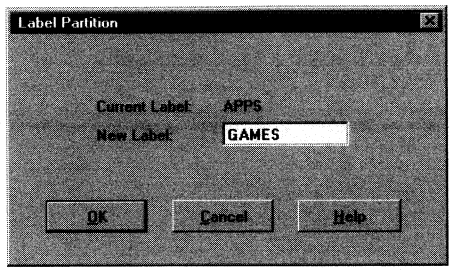


Figure 3.26: This dialog lets you give the partition a different label.

Labels can be up to 11 characters long and are shown in all capital letters. Labels follow the same rules as DOS names, with two exceptions: 1) spaces are allowed, and 2) no dot is required between the first eight letters and the last three.

To change the partition label:

1. Select the partition whose label you want to change.
2. Choose **Label** from the Options menu.
3. Type the new label in the field.
4. Choose **OK**.

Move

This option allows you to move a partition from one part of a hard disk to another. When you move a partition, the partition's data (as well as the data within other partitions on the disk) remains unaffected.

The allowable distance a partition can be moved is determined by the available space adjacent to the partition. This is displayed in the Free Space Before and Free Space After text boxes in the Move Partition dialog shown below.

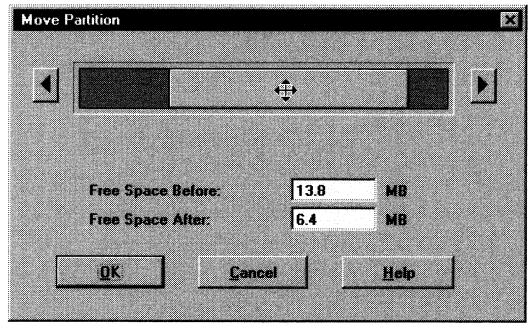


Figure 3.27: The Move Partition dialog presents several ways to move a partition.

Specify how far you want the partition moved within the contiguous free space by either 1) dragging the partition to the location you want, 2) clicking the arrows on either side of the partition map, or 3) clicking inside a field and using your keyboard to specify the size (in megabytes) of space you want to exist before or after the partition. When you change one field, the other field automatically adjusts accordingly. (If you do not want to use a mouse, you can use the Tab key to move between fields.)

NOTE: The number you type in will often change slightly to a value that the drive's geometry will allow.

HINT: If you know that your disk has no bad sectors, choose Skip Bad Sector Checks from the Preferences menu to make Move operations faster.

Moving a partition creates a new or enlarged area of free space adjacent to the relocated partition. You can use this space by either moving, resizing larger, or creating a new partition. If no free space exists to the left or to the right of the partition, the move operation is not allowed. Free space, unknown partitions, and partitions failing the Check operation cannot be moved.

The Open Files Limitation of OS/2

Under OS/2, you cannot run PartitionMagic from the partition you are modifying, and you cannot modify partitions that contain open files. This means you cannot run PartitionMagic from the partition you want to move. In addition to the obvious sources of open files, the following may also be sources of open files under OS/2:

- Files or directories mentioned in CONFIG.SYS
- The swap file (SWAPPER.DAT)
- Operating system files
- Boot files
- Driver files
- DLLs
- Directories in the PATH statement
- Running applications
- The current directory of a command prompt

Move Limitations

Because of limitations of the FAT file system, PartitionMagic requires that FAT partitions remain within the first 1,024 cylinders of the hard disk. Also, OS/2 and Windows NT cannot safely boot from any partition (even an NTFS or HPFS partition) that extends beyond the first 1,024 cylinders of the hard disk. (See *Understanding the BIOS 1,024 Cylinder Limit* on page 145 for information on the 1,024 cylinder limitation.)

Moving a Partition

To move a partition:

1. From the partition list or partition map in the Main Window, select the partition you want to move.

2. Choose **Move** from the Options menu.

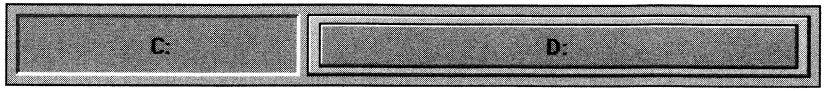
3. Using one of the methods described above, indicate where you want to move the partition.

4. Choose **OK**.

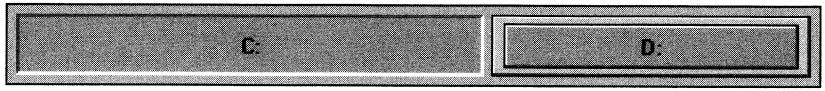
Move—Example 1

This example shows you how to increase the size of a primary partition by moving free space from a logical partition.

Before:



After:



1. **Resize** your D: partition smaller to create free space outside D:. (For instructions, see *Resize* on page 62.)

2. Choose **Move** from the Options menu and move the D: partition to the right of the free space using one of the methods described above.

3. Select the extended partition.

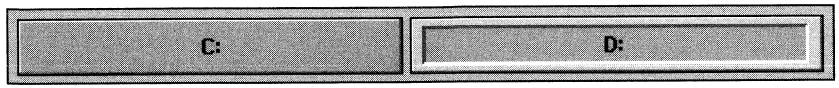
4. Choose **<Resize** to move the free space to the outside of the extended partition by moving the left boundary of the extended partition as far as possible to the right.

5. Select the C: partition and **Resize** your primary C: partition into the free space.

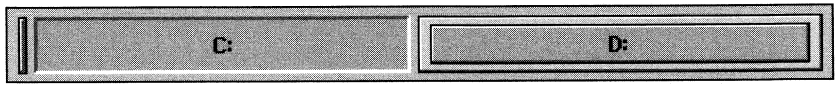
Move—Example 2

This example shows you how to make room for Boot Manager at the beginning of your C: primary partition.

Before:



After:



1. **Resize** the C: partition smaller by 1MB. (See *Resize* on page 62.)

2. Choose **Move** from the Options menu and move the C: partition to the right of the 1MB free space.

Resize

This option lets you change the size of a partition. When you resize a partition, data is consolidated, not compressed. If you want to resize a partition smaller, there must be unused space within the partition. If you want to resize a partition larger, there must be free space to the right of it.

HINT: If the free space is not immediately to the right of the partition you want to resize larger, move partitions to get the free space to the right of the proper partition. (See *Move* on page 58.)

You must resize primary and logical partitions from the right. You can resize extended partitions from either the right or the left if free space is available.

HINT: When you resize a partition that contains an operating system, leave 20–30MB more space in the partition than the operating system requires. Swap files or drivers may require the extra space.

When you resize a FAT partition, PartitionMagic transparently resizes the clusters to their optimal size for the partition. In addition, PartitionMagic always chooses a value that is valid for the FAT file system, so you are not required to load any terminate-and-stay-resident (TSR) programs (programs that stay in memory but that you may not see working, such as DOSKEY) or device drivers to ensure file system compatibility. Even if you boot from a diskette or access the partition from another operating system, the partition is still valid and accessible.

Resize Limitations

There are several limitations to resizing partitions, including:

- FAT partitions cannot include any space on the hard disk beyond cylinder 1,023. (See *Understanding the BIOS 1,024 Cylinder Limit* on page 145 for information on the 1,024 cylinder limitation.)
- PartitionMagic requires free space in a partition to resize it. A partition can be reduced only to the current "used" size (shown under Used MB on the partition list) plus a small buffer area. During a Resize operation, data is consolidated to the front of the partition as needed, but no data compression takes place. Because of a FAT partition's structure, it is often possible to resize a partition smaller or larger a second time to a size even smaller or larger than the first time.

In certain instances, a FAT partition cannot be resized larger if the partition contains no free space. If you have a full partition and plenty of free space to the right of it, yet are not able to enlarge your partition, you may have to clear out some of the files in the partition in order to make room for PartitionMagic to work. You may be able to resize the partition larger by a small amount (1MB or less) and then resize the partition larger a second time once the first operation is complete. This process provides the necessary buffer area needed by PartitionMagic. To see how much space is needed in a partition to resize past a cluster boundary, see the table under *Freeing Disk Space Before Enlarging a FAT Partition* on page 134.

- It is difficult to calculate in advance the minimum size to which an NTFS or HPFS partition may be resized. During an NTFS or HPFS Resize operation, if PartitionMagic runs out of space, it returns an error without completing the operation. However, the integrity of the NTFS or HPFS partition and data is maintained at all times.
- Under OS/2, PartitionMagic will not allow you to modify the partition from which you are running or partitions that contain open files. This means that under OS/2, you cannot run PartitionMagic from the partition you want to resize. See *The Open Files Limitation of OS/2* on page 59 for sources of open files.

Methods of Resizing a Partition

When you select a partition from the partition map or partition list on the Main Window and choose Resize, PartitionMagic displays the dialog shown below.

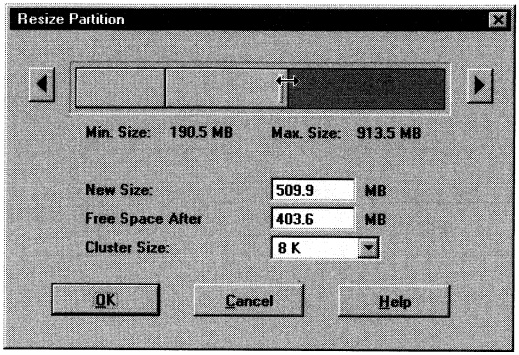


Figure 3.28: The Resize Partition dialog provides several methods for resizing a partition.

The Resize Partition dialog shows you the current size of the partition on a partition map across the top. Just below the partition map, PartitionMagic displays the minimum and maximum sizes to which you can resize the selected partition. The dialog also contains two fields showing the size of the partition (in megabytes) and the size of the free space after the partition (in megabytes). For FAT partitions, a drop-down list with cluster sizes is also included.

When you reach this dialog, you should indicate the new size of the partition using one of the methods described below.

Partition Map Handle

PartitionMagic provides a handle on the partition map that you can click and drag until the partition is the size you prefer.

Arrow Buttons

To the right and left of the partition map are arrow buttons. By clicking an arrow button once, you can resize the partition larger or smaller by the minimum increment, making very fine adjustments. If you wish to use this method, use the partition map handle to resize the partition to approximately the right size, and then click the arrow buttons until the partition is the size you prefer.

New Size Field

You can also resize a partition by typing the new size (in megabytes) in the New Size field.

Free Space After Field

You can resize a partition by specifying the amount of free space to create to the right of it. Type the size of the free space in the Free Space After field.

NOTE: In the New Size and Free Space After fields, the number you type in will often change slightly to a value the drive's geometry will allow.

Cluster Size Drop-Down List

This control applies to FAT partitions only. When you select a FAT partition and choose Resize, PartitionMagic also displays a drop-down list in the Resize Partition dialog. The drop-down list presents a number of options for the cluster size. This control is used to resize the partition smaller to gain the benefit of a smaller cluster size while using the largest partition size possible for that cluster size.

If FAT32 Options is enabled and you choose a cluster size that will create a FAT32 partition, the word "FAT32" will be displayed to the right of the drop-down list.

WARNING: Windows 95B is the only operating system that supports the FAT32 file system. You must have Windows 95B to access files on FAT32 partitions.

Also, converting a FAT partition that contains OS/2 data to a FAT32 partition will destroy the Extended Attributes and make the data inaccessible by OS/2.

To change the FAT cluster size, click on the arrow next to the Cluster Size drop-down list to reveal the list of available cluster sizes, highlight the desired cluster size, and click the left mouse button. PartitionMagic changes the other values to show you how the partition size will be affected if you choose OK.

PartitionMagic adheres to the established limits for partition and cluster sizes. When you select a cluster size that is not valid for the current partition size, a smaller, valid partition size is automatically selected.

HINT: To find the recommended cluster size for a FAT partition, you may want to choose the Cluster Analyzer option. For more information, see *Cluster Analyzer* on page 31.

<Resize

If the selected partition is an extended partition with free space inside or outside the left end of the partition, the Move button changes to <Resize for the Resize Left Boundary operation. Resize Left Boundary resizes an extended partition by moving the left boundary. The physical locations of logical partitions are not affected by a Resize Left Boundary operation.

Resize>

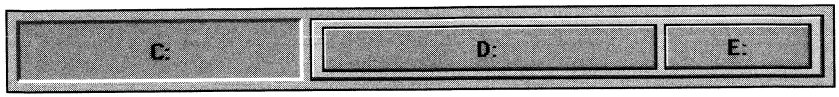
If the selected partition is an extended partition with the free space inside or outside the right end of the partition, the Resize button changes to Resize>. Resize> resizes an extended partition by moving the right boundary. To resize an extended partition smaller, there must be free space inside the right end of the extended partition. The physical locations of logical partitions are not affected by a Resize Right Boundary operation. Use <Resize to move the left boundary of the extended partition.

NOTE: When free space exists at the end of the extended partition and OS/2's FDISK is used to create a primary partition in the free space, the size of the extended partition is not updated. This results in a primary partition occupying the same space as the extended partition. If you subsequently use another FDISK program (such as DOS's FDISK), you may create a logical partition in the same location as the primary partition. Accessing either partition will cause data loss to the other partition. Use PartitionMagic to safely create partitions. Or use PartitionMagic to check for free space at the end of the extended partition and eliminate it. If free space occupies the last space in the extended partition, select the extended partition and then resize it as small as possible.

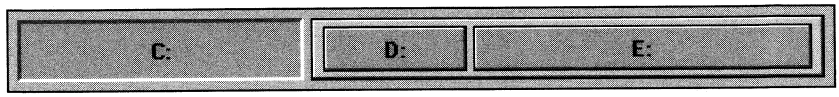
Resize—Example 1

This example shows you how to resize one logical partition smaller and add the free space to another logical partition. We are assuming you have a C: primary partition and D: and E: logical partitions. You can modify these steps to fit your specific configuration.

Before:



After:



1. **Resize** your D: partition smaller by the same amount you want to add to your E: partition using one of the methods described previously.

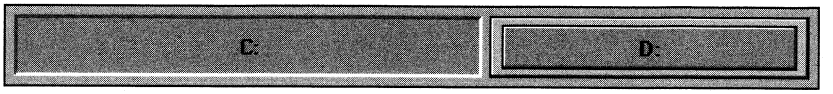
2. Move your E: partition to the left of the free space. (For instructions, see *Move* on page 58.)

3. **Resize** your E: partition larger into the free space using one of the methods described previously.

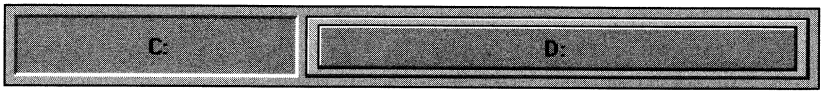
Resize—Example 2

This example shows you how to resize a primary partition smaller and add the free space to a logical partition. We are assuming you have a C: primary partition and a D: logical partition.

Before:



After:



1. **Resize** your C: partition smaller by the same amount you want to add to your D: partition using one of the methods described previously.

2. Select the extended partition by clicking on it in the partition map or partition list in the Main Window.

3. Move the D: partition to the left of the free space. (For instructions, see *Move* on page 58.)

4. Select the D: partition and **Resize** your D: partition into the free space.

Advanced Options

You can access these options through the Advanced menu on the Main Window or by choosing Advanced Context Menus from the Preferences menu and then right-clicking on an applicable partition in the partition map or partition list to bring up a pop-up menu.

Advanced FAT Properties

This option is for users who are very familiar with FAT partitions and their properties. The Advanced FAT Properties dialog presents all of the properties of a FAT partition that can be changed and the various ways to change them. It is a combination of the Resize, Cluster Analyzer, Label, and Resize Root options, as shown in the dialog below.

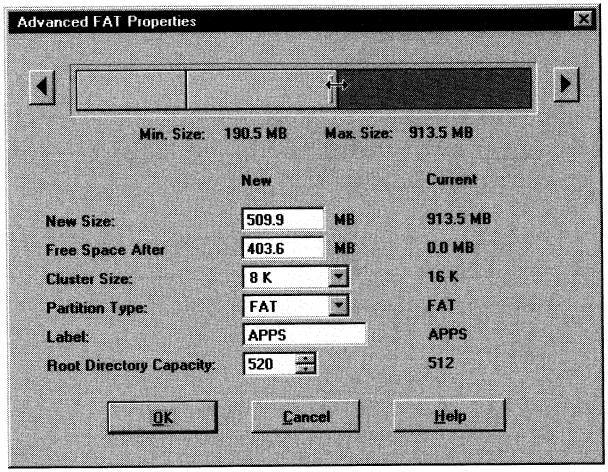


Figure 3.29: This dialog presents all of the FAT properties in one location.

Overview

At the top of the dialog is a partition map, along with arrow buttons, that also appears in the Resize Partition dialog. The minimum and maximum possible partition sizes are directly under the partition map.

Below the partition map, there are two columns. The column on the left consists of controls that allow you to change the FAT partition's properties. The column on the right shows the partition's current properties for comparison.

NOTE: Some of these properties are interrelated and changing one may affect others. When you make a change, note what other changes have occurred and decide whether you really want those changes before choosing OK.

Resizing the Partition

When you resize a partition, data is consolidated, not compressed. If you want to resize a partition smaller, there must be unused space within the partition. If you want to resize a partition larger, there must be free space to the right of it.

HINT: If the free space is not immediately to the right of the partition you want to resize larger, move partitions to get the free space to the right of the proper partition. (See *Move* on page 58.)

When you resize a FAT partition, PartitionMagic transparently resizes the clusters to their optimal size for the partition. PartitionMagic always chooses a value that is valid for the FAT file system, so you are not required to load any terminate-and-stay-resident (TSR) programs (programs that stay in memory but that you may not see working, such as DOSKEY) or device drivers to ensure file system compatibility. Even if you boot from a diskette or access the partition from another operating system, the partition is still valid and accessible.

HINT: When you resize a partition that contains an operating system, leave 20–30MB more space in the partition than the operating system requires. Swap files or drivers may require the extra space.

Resize Limitations

There are several limitations to resizing partitions, including:

- FAT partitions cannot include any space on the hard disk beyond cylinder 1,023. (See *Understanding the BIOS 1,024 Cylinder Limit* on page 145 for information on the 1,024 cylinder limitation.)
- PartitionMagic requires free space in a partition to resize it. A partition can be reduced only to the current "used" size (shown under Used MB on the partition list) plus a small buffer area. During a Resize operation, data is consolidated to the front of the partition as needed, but no data compression takes place. Because of a FAT partition's structure, it is often possible to resize a partition larger or smaller a second time to a size even smaller or larger than the first time.

  Sometimes, a FAT partition cannot be resized larger if the partition contains no free space. If you have a full partition and plenty of free space to the right of it, yet are not able to enlarge your partition, you may have to clear out some of the files in the partition to make room for PartitionMagic to work. You may be able to enlarge the partition by a small amount (1MB or less) and then resize the partition larger a second time once the first operation is complete. This process provides the necessary buffer area needed by PartitionMagic. To see how much space is needed in a partition to resize past a cluster boundary, see the table under *Freeing Disk Space Before Enlarging a FAT Partition* on page 134.
- Under OS/2, PartitionMagic will not allow you to modify the partition from which you are running or partitions that contain open files. This means that under OS/2, you cannot run PartitionMagic from the partition you want to resize. See *The Open Files Limitation of OS/2* on page 59 for sources of open files.

Methods of Resizing a Partition

You can indicate the new size of the partition using one of the methods described below.

- The handle on the partition map lets you click and drag until the partition is the size you prefer.
- Arrow buttons to the right and left of the partition map allow you to resize the partition larger or smaller by the minimum increment, making very fine adjustments. If you wish to use this method, use the partition map handle to resize the partition to the approximate size, and then click the arrow buttons until the partition is the size you prefer.
- The New Size field allows you to resize a partition by typing the new size (in megabytes).
- The Free Space After field allows you to resize a partition by specifying the amount of free space to create to the right of it.

NOTE: In the New Size and Free Space After fields, the number you type in will often change slightly to a value the drive's geometry will allow.

- The Cluster Size drop-down list lets you select from the possible cluster sizes. This control is used to resize the partition smaller to gain the benefit of a smaller cluster size while using the largest partition size possible for that cluster size.

  If FAT32 Options are enabled and you choose a cluster size that will create a FAT32 partition, FAT32 will automatically be selected in the Partition Type drop-down list.

WARNING: Windows 95B is the only operating system that supports the FAT32 file system. You must have Windows 95B to access files on FAT32 partitions.

To change the FAT cluster size, click on the arrow next to the Cluster Size drop-down list to reveal the list of available cluster sizes, highlight the desired cluster size, and click the left mouse button. PartitionMagic changes the other values to show you how the partition size will be affected if you choose OK.

PartitionMagic adheres to the established limits for partition and cluster sizes. When you select a cluster size that is not valid for the current partition size, a smaller, valid partition size is automatically selected.

HINT: To find the recommended cluster size for a FAT partition, you may want to choose the Cluster Analyzer option. For more information, see *Cluster Analyzer* on page 31.

Setting the Partition Type

The Advanced FAT Properties dialog's Partition Type field has a drop-down list that allows you to explicitly change the file system used on the selected partition from FAT to FAT32, or vice versa.

NOTE: To create FAT32 formatted partitions, your computer normally must have Windows 95 4.00.95.950B or above, which currently comes only preinstalled on the computer by the manufacturer.

To determine if your operating system offers FAT32 support, click on **FAT32 Options** in the Preferences menu, and then select **Autodetect**. Then, click on **Preferences** and look at the status behind the FAT32 Options menu item. If the status is (Enabled), your computer has FAT32 support.

WARNING: Converting a FAT partition that contains OS/2 Extended Attributes to a FAT32 partition will destroy the Extended Attributes and make the data inaccessible by OS/2.

Select this field by clicking in it with the mouse or using the Tab key to move the focus until it is highlighted. Then, highlight your choice using the mouse pointer or the up and down arrow keys.

Labeling the Partition (Volume)

The next field on the dialog allows you to type in a new label for the partition. The label follows the DOS naming convention with two exceptions: 1) spaces are allowed, and 2) no dot is required between the first eight and last three characters. You can use up to 11 characters (including spaces) for each label. Giving your partitions meaningful names, such as the name of the operating system or what kind of data is on them, will make managing them easier.

Resize Root

On a FAT partition, you can change the maximum number of entries that can be placed in the root directory. The number of root entries is set at the time the partition is formatted; the limit does not expand automatically as it does in a subdirectory or a FAT32 partition. You may want to increase this number when using Microsoft long file names in the root directory. During this operation, the data within the partition remains unaffected.

Select the new capacity using one of the following methods:

- Click on the arrow buttons to the right of the value to change the value by the correct increments.
- Use the up and down arrow keys to change the value by the appropriate increments.
- Type a value into the New capacity field.

NOTE: The value often changes to one that preserves the current cluster alignment. Any number you type will be rounded to the next valid value.

Bad Sector Retest

The Bad Sector Retest option enables you to check sectors on FAT partitions that have been marked as "bad" by the FAT file system and to recover any sectors that are actually usable.

Because the FAT file system tracks bad sectors at the cluster level, it will show an entire cluster as bad even though the problem may be in only a single sector. (You can find out whether a partition contains bad clusters by using the PartitionMagic Info option as described on page 46.)

When you use PartitionMagic to move or resize a partition or to decrease or increase a partition's cluster size, PartitionMagic marks all new clusters containing any part of old bad clusters as bad (in the case of moving partitions or increasing cluster size), or it divides bad clusters into multiple bad clusters (in the case of decreasing cluster size). PartitionMagic does this to be conservative; the clusters may have been marked bad by a factory format program capable of discovering hard-to-detect problems that subsequent retesting may not find.

After you perform any of these operations, if PartitionMagic reports that the partition contains bad clusters, you can use Bad Sector Retest to retest the bad sectors and reclaim any good ones.

To retest sectors marked as bad:

1. From the partition map or partition list in the Main Window, select the partition you want to retest.

2. Choose **Bad Sector Retest** from the Advanced menu. The following dialog is displayed.

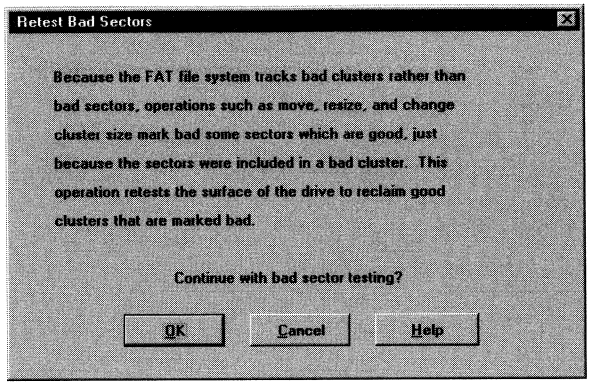


Figure 3.30: This dialog asks you to confirm that you want to retest bad sectors.

3. Choose **OK**.

Hide/Unhide Partition

The Hide/Unhide Partition option allows you to secure partitions against unwanted user access. You can perform this operation on any FAT, FAT32, NTFS, or HPFS partition.

If you hide a partition, the next time you boot your computer the partition will not be assigned a drive letter. Conversely, if you unhide a partition, the next time you boot your computer the partition will be assigned a drive letter.

NOTE: You cannot boot from a hidden logical partition.

WARNING: Hiding or unhiding a partition can cause the drive letters of subsequent partitions to change, and that may make the computer fail to boot or cause applications to fail. For information on why drive letters change and how to fix them, see *How the OS Assigns Drive Letters* on page 137 and *Problems Caused by Drive Letter Changes* on page 142.

If your hard disk has more than one primary partition, only one is visible by default. When you use the Set Active option, PartitionMagic unhides the selected primary partition and hides other primary partitions. While you can unhide more than one primary partition with PartitionMagic, we recommend that you do not.

To hide or unhide a partition:

1. From the partition list or partition map in the Main Window, select the partition you want to hide or unhide.

NOTE: How the menu item reads depends on whether the partition is currently hidden or not. If the selected partition is currently hidden, the item will read Unhide Partition. If it is visible, the item will read Hide Partition.

2. Choose **Hide Partition** from the Advanced menu to hide the selected partition. The following dialog will appear.

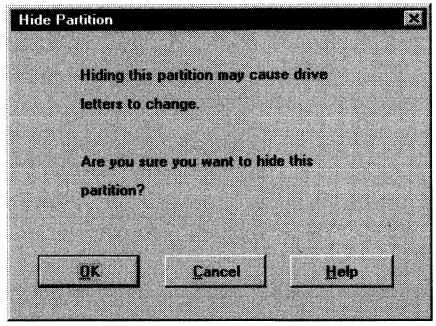


Figure 3.31: The Hide Partition dialog asks for confirmation before proceeding.

-Or-

Choose **Unhide Partition** from the Advanced menu to unhide a partition. The following dialog will appear.

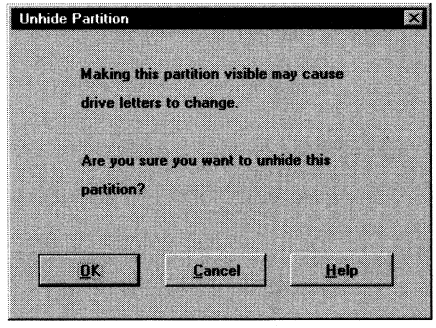


Figure 3.32: This dialog asks for confirmation before unhiding a partition.

WARNING: Attempting to use multiple visible primary partitions may cause data loss.

3. Choose **OK**.

For the change to take effect, you must reboot your computer.

Resize Root

The Resize Root option lets you change the maximum number of entries that can be placed in the root directory of a FAT partition. The number of root entries is set at the time the partition is formatted; the limit does not expand automatically as it does in a subdirectory or in a FAT32 partition. You may want to increase this number if you use Microsoft long file names in the root directory. During this operation, the data within the partition remains unaffected.

When you choose this option, PartitionMagic displays the Resize Root dialog shown below.

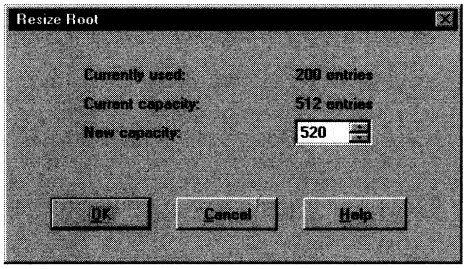


Figure 3.33: The Resize Root dialog allows you to change the capacity of the root directory.

This dialog shows the following:

- **Currently used** is the number of entries used in the root directory.
- **Current capacity** is the maximum number of entries currently possible.

NOTE: The difference between these two is the number of free root entries available.

- **New capacity** is the number of entries you want to have possible.

To resize the root directory capacity:

1. From the partition list or partition map in the Main Window, choose **Resize Root** from the Advanced menu.

2. Click on the **New capacity** field.

3. Select the new capacity using one of the following methods:

- Click on the arrow buttons to the right of the value to change the value by the correct increments.
- Use the up and down arrow keys on the keyboard to change the value by the appropriate increments.
- Type the new capacity in the field.

NOTE: The number you type in the field will often change to one that preserves the current cluster alignment. Any number you type will be rounded to the next valid value.

Set Active

The Set Active option allows you to make the currently selected partition the active partition. The active partition is the partition the computer boots from. Only one partition can be active at a time. To boot your computer from a partition, it must be on the first drive, and it must contain an operating system. When your computer is started or rebooted, it reads the partition table of the first drive, scans it to find out which partition is active, and boots from that partition.

WARNING: Before you make a partition active, it must be bootable. If the partition is not bootable or if you are not certain if it is, have a boot diskette ready. (To create a boot diskette, see *Using an Operating System Boot Diskette* on page 158.)

If you are using, the Boot Manager partition should be the active partition. (OS/2's FDISK uses the term "Startable" rather than "Active.")

PartitionMagic hides nonactive FAT, NTFS, and HPFS primary partitions (unlike the FDISK programs of Windows 95 and DOS). Hiding other primary partitions makes it easy to install multiple operating systems and choose among them using Set Active. For example, if you have DOS/Windows and want to install Windows 95 in a separate partition, resize the DOS partition smaller, create another primary partition, set it as the active partition, and then boot from the Windows 95 installation diskettes.

To set the active partition:

1. From the partition list or partition map in the Main Window, select the primary partition you want to make active.

2. Choose **Set Active** from the Advanced menu. The following dialog appears.

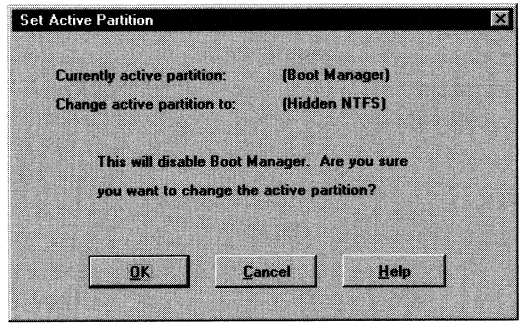


Figure 3.34: The Set Active Partition dialog allows you to change the active partition.

3. Choose **OK**.

Convert to HPFS

This option converts the selected partition's file system from FAT to HPFS. During this operation, PartitionMagic preserves all file data, as well as all long file names created by Microsoft Windows NT and Windows 95 and all Workplace shell long name Extended Attributes.

WARNING: You must have OS/2 to access files on an HPFS partition. Without OS/2, you will lose all files on the selected partition when you convert to HPFS. Also, take special precaution when using this option because the conversion from FAT to HPFS cannot be reversed.

Converting a FAT Boot Drive to an HPFS Boot Drive

You can convert a FAT boot drive to an HPFS boot drive by performing the following steps:

1. Back up the data on your boot drive. Because the Convert operation cannot be undone, we strongly recommend that you take this precautionary step.

NOTE: If a Corrective Service Facility (CSF) has been applied to your version of OS/2, you need to make new Install/Utility diskettes and use them in place of the original OS/2 diskettes.

2. Reboot your system (either from a diskette, from a partition other than the one you are converting, or from DOS).

3. Run PartitionMagic from a partition other than the one you are converting. (Or, you can run the PartitionMagic OS/2 text mode executable from OS/2 Maintenance Mode. See *Running the PartitionMagic OS/2 Text Mode Executable* on page 156 for more information.)

4. Select the FAT partition you want to convert.

5. Choose **Convert to HPFS** from the Advanced menu to begin the conversion operation. The following dialog will appear.

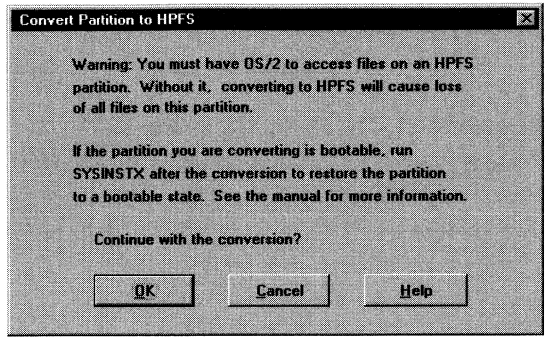


Figure 3.35: This dialog asks for confirmation before converting a partition from FAT to HPFS.

6. When the conversion is finished, choose **Exit** to exit PartitionMagic.

7. Copy the SYSINSTX.COM file from the OS/2 Installation Disk to the root of the new HPFS partition.

8. Copy UHPFS.DLL from the OS/2 Disk 2 to the root of the new HPFS partition. (If you have the CD-ROM version of OS/2, consult your IBM documentation for instructions about how to create a diskette from the disk image.)

9. Change to the new HPFS partition by typing *drive*: (where *drive* is the drive letter of the partition you converted from FAT to HPFS).

10. From the root of the new HPFS partition, type SYSINSTX *drive*: (where *drive* is the drive letter of the partition you converted from FAT to HPFS).

11. Verify that HPFS.IFS is listed in the CONFIG.SYS file, in a line similar to the following:

```
IFS=C:\OS2\HPFS.IFS /CACHE:256 /CRECL:4 /AUTOCHECK:C
```

If this line is not present, add it, replacing C: and :C with the actual drive letter of the partition you just converted.

IMPORTANT: If you want to be able to boot to the command line using ALT+F1, make this change to all CONFIG.* files in \OS2\BOOT.

12. Verify that HPFS.IFS is present in the OS2 directory. If not, copy it from the OS/2 Installation Disk 1. Your HPFS partition is now bootable.

Boot Manager

Boot Manager from IBM, included with PartitionMagic, lets you quickly and easily choose which operating system you want to start every time you start or restart your computer. You must install Boot Manager into free space outside any extended partition. The Boot Manager partition must be set as the active partition so that it loads first, prompting you to choose an operating system.

These sections explain how to install, configure, and customize Boot Manager.

Planning the Boot Manager Setup

To make using Boot Manager as easy and efficient as possible, you will want to plan carefully and possibly make changes to your hard disk's organization. In particular, you should consider the following:

- Boot Manager must be installed in the first 2GB of space on the first physical hard drive.

NOTE: Boot Manager does not support FAT32.

- You should install DOS, Windows 95, Windows NT, and versions of OS/2 prior to 2.0 in primary partitions.

NOTE: For information explaining which operating systems can be installed in primary or in logical partitions, see *Operating System–Specific Boot Information* on page 129.

- To avoid losing usable disk space, create all primary partitions contiguously, at the beginning or end of the free space area.
- Put all installable file systems, such as NTFS and HPFS, at the end of the disk. This will avoid unwanted drive letter changes when you change operating systems.
- Be aware of operating system–specific restrictions on the hard disk. For example, to run properly, DOS 3.3 must be installed in a primary partition within the first 32MB of the hard disk.
- You can install both DOS and a version of the Windows NT operating system in the same primary partition if you want to use the Dual Boot feature within your Boot Manager setup. You can also do this for DOS and OS/2.
- You may want to move some of the partitions on your hard disk to ensure that drive letters are not affected by changing operating systems. If so, see *Move* on page 58 and *Copy* on page 36.

Install Boot Manager

Installing Boot Manager is simple. To install Boot Manager, use the following steps:

NOTE: Boot Manager must be installed in its own primary partition in the first 2GB of space on the first physical drive.

1. From the partition map or partition list in PartitionMagic's Main Window, select free space outside any extended partition at the end of your disk. (If there is currently no free space on the disk, use the Resize (page 62) and Move (page 58) features to create and place the free space where you want it.)

2. Choose **Install Boot Manager** from the Boot Manager menu on PartitionMagic's Main Window. The following dialog appears.

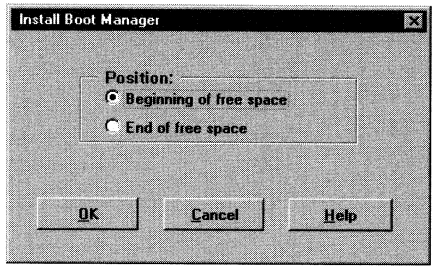


Figure 3.36: This dialog lets you choose whether to install Boot Manager at the beginning or end of free space.

3. Choose whether you want the partition created at the beginning or end of the free space (beginning is the default).

4. Choose **OK**.

The installation program creates a partition, installs Boot Manager, and sets the newly created partition as the active partition.

Preferences

This option lets you set preferences for Boot Manager. When you choose Preferences from the Boot Manager menu on PartitionMagic's Main Window, PartitionMagic displays the dialog shown below, which allows you to set the Startup Menu Delay and the Startup Menu Mode. The default partition, which you set using the Set as Default Menu Item in the Boot Manager menu on the PartitionMagic Main Window, is also shown. For more information on the default partition, see *Set as Default Menu Item* on page 90.

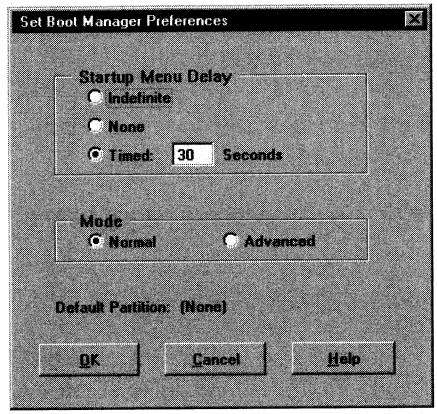


Figure 3.37: This dialog allows you to set Boot Manager preferences.

Setting the Startup Menu Delay

This preference allows you to specify how long the Boot Manager startup menu, which comes up when you start your computer, will be displayed before it starts an operating system. The three choices are Indefinite, None, and Timed.

- **Indefinite** means that when you start your computer, the Boot Manager startup menu will be displayed until you choose which operating system to boot.
- **None** means that Boot Manager will immediately start the default operating system.
- **Timed** means that Boot Manager will wait the amount of time you specify before starting the default operating system. During this time, you can wait for the default operating system, or you can choose a different operating system to boot.

  This option lets you specify a value between between 1 and 999 seconds. When you install Boot Manager, this preference is set as Timed and the default time is 30 seconds.

NOTE: When the Boot Manager startup menu displays, you can also press Esc to disable the timer and revert to indefinite delay.

Choosing the Mode

Mode refers to how much information Boot Manager displays on the Boot Manager startup menu that appears when you start your computer. The two choices are Normal or Advanced. The default is Advanced.

Normal mode displays a list of names you assign to partitions containing operating systems. You assign these names when you use the Add to Boot Manager Menu item. Once they are added to the Boot Manager startup menu, these partitions are referred to as "bootable."

Advanced mode displays this list and adds more information about the partitions. In addition to the partition names, it will display the following:

- The number of the physical disk the partition is on
- The drive letter that would be assigned if it were started (if you don't have NTFS drives)
- Whether the partition is a primary or logical partition
- The size of the partition
- The partition type
- Whether or not the partition is currently hidden

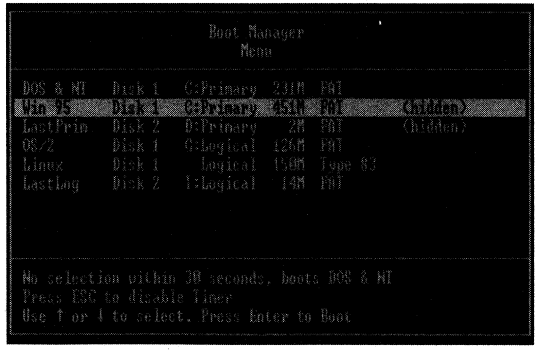


Figure 3.38: The Boot Manager startup menu displaying information in Advanced mode

Add to Boot Manager Menu

Once Boot Manager is installed, you use Add to Boot Manager Menu to place items on the Boot Manager startup menu. The startup menu items represent bootable partitions—those containing operating systems. When you add an item to the startup menu, you choose a name for the selected partition. Boot Manager then displays that name as a partition you can boot from in the startup menu that appears when you start your computer.

WARNING: Do not add partitions to the Boot Manager startup menu that do not contain operating systems. You will not be able to boot from those partitions.

To add an item to the Boot Manager startup menu:

1. From the partition list or partition map in the PartitionMagic Main Window, select the partition you want to appear on the Boot Manager startup menu.

2. Choose **Add to Boot Manager Menu** from the Boot Manager menu on PartitionMagic's Main Window. The following dialog will appear.

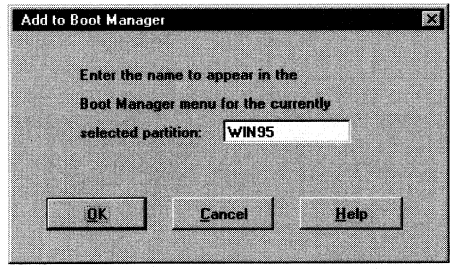


Figure 3.39: This dialog allows you to add bootable partitions to the Boot Manager startup menu.

3. In the dialog's text field, type the name that you want to represent the selected partition on the Boot Manager startup menu. You can assign any name you want. It can be up to eight characters long, use uppercase and lowercase letters, and include non-English characters, numerals, spaces, and symbols. Characters you access by pressing the Ctrl key and another key are not allowed, however.

NOTE: You may want to choose a name that tells you what operating system is on the partition.

4. Choose **OK**.

Change Name on Menu

This option allows you to rename an item on the Boot Manager startup menu by using the following steps.

1. From the partition list or partition map in PartitionMagic's Main Window, select the partition whose name you want to change on the Boot Manager startup menu.

2. Choose **Change Name on Menu** from the Boot Manager menu on PartitionMagic's Main Window. The following dialog will appear.

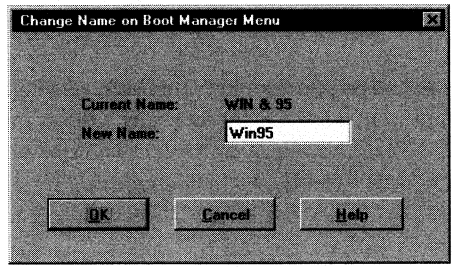


Figure 3.40: This dialog lets you change the name of Boot Manager startup menu items.

3. In the dialog's text field, type in the new name for the Boot Manager startup menu item. You can assign any name you want. It can be up to eight characters long, use uppercase and lowercase letters, and include non-English characters, numerals, spaces, and symbols. Characters you access by pressing the Ctrl key and another key are not allowed, however.

NOTE: You may want to choose a name that tells you what operating system is on the partition.

4. Choose **OK**.

Set as Default Menu Item

With this feature, you can set a default partition—the partition that Boot Manager will select to boot the computer if you do not select one before the time delay runs out. If you do not set a default partition, Boot Manager will start from the last partition your computer started from if the time delay runs out before you select a partition.

In the Main Window, PartitionMagic places an asterisk by the status of the partition selected as the Boot Manager startup menu default item. The startup menu default item is also noted on the Partition Info tabbed page of the default partition.

To set a partition as the Boot Manager startup menu default item:

1. From the partition list or partition map on PartitionMagic's Main Window, select the partition you want to make the Boot Manager startup menu default item.

2. Choose **Set as Default Menu Item** from the Boot Manager menu on PartitionMagic's Main Window.

Remove From Boot Manager Menu

If you want to take an item off the Boot Manager startup menu, use the steps below. When you choose this item, the partition is removed from the startup menu without further confirmation.

1. From the partition list or partition map on PartitionMagic's Main Window, select the partition you want to remove.

2. Choose **Remove from Boot Manager Menu** from the Boot Manager menu on PartitionMagic's Main Window.

If you mistakenly remove an item from the Boot Manager startup menu, use Add to Boot Manager Menu to put it on the startup menu again.

Preferences

PartitionMagic allows you to set some preferences for the program. Unless you change items in the Preferences menu, they will remain at your preferred settings every time you use PartitionMagic.

This menu contains five preferences, as shown in the dialog below.

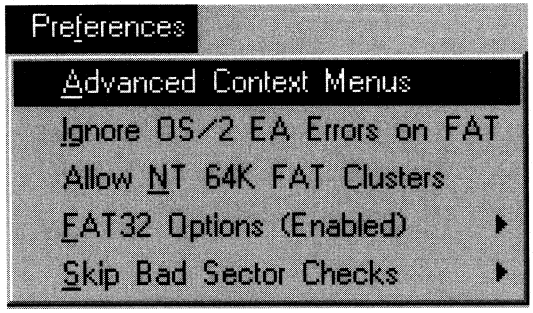


Figure 3.41: The five items on the Preferences menu

Advanced Context Menus

You can choose Advanced Context Menus to access items from the Advanced menu (see *Advanced Options* on page 69) through the pop-up menu that appears when you right-click on a partition in the partition list or partition map on PartitionMagic's Main Window. When this preference is enabled, PartitionMagic displays a check mark next to the preference.

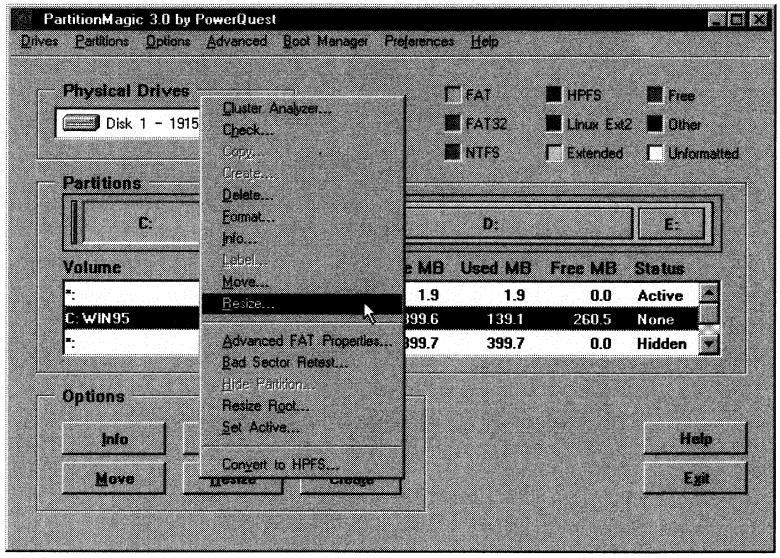


Figure 3.42: Pop-up menu containing items from Options and Advanced menus

Ignore OS/2 EA Errors on FAT

This preference tells PartitionMagic whether or not it should ignore OS/2 Extended Attribute errors when it checks a FAT partition. If you do not currently have OS/2 on your computer, you can enable this preference (the default setting for this preference is disabled). If you have OS/2 on your computer, make sure this preference is disabled.

WARNING: If you have OS/2 on your computer, do not enable this preference. Problems could go undetected and data loss could occur.

This preference is a toggle and, like a light switch, is either on (enabled) or off (disabled). When it is enabled, there is a check mark next to the item on the Preferences menu. When disabled, there is no check mark. For example, in Figure 3.43, this preference is disabled and PartitionMagic will not ignore these errors.

To enable or disable this preference:

1. Choose **Ignore OS/2 EA Errors on FAT** from the Preferences menu on PartitionMagic's Main Window.

Allow NT 64K FAT Clusters

Enabling this preference lets Windows NT users create FAT partitions with 64KB clusters. Using 64KB clusters will enable Windows NT to support very large drives (larger than 2GB). You should use 64KB partitions only with Windows NT. Because Windows 3.x, Windows 95, and DOS do not support cluster sizes larger than 32KB, you should never access a 64KB partition using any of these operating systems.

This preference is a toggle and, like a light switch, is either on (enabled) or off (disabled). This preference is set as disabled every time you start PartitionMagic. When this preference is enabled, there is a check mark next to the item on the Preferences menu. When disabled, there is no check mark. Enabling this preference affects the Create, Resize, and Cluster Analyzer options, making the 64KB cluster size available.

WARNING: If you are using multiple operating systems, you may want to avoid using 64KB clusters.

To enable or disable this preference:

1. Choose **Allow NT 64K FAT Clusters** from the Preferences menu on PartitionMagic's Main Window.

FAT32 Options

To create FAT32 formatted partitions, your computer normally must have Windows 95 4.00.95.950B or later, which currently comes only preinstalled on the computer by the manufacturer. PartitionMagic normally detects (because Autodetect is the default setting for this preference) whether or not your computer has FAT32 support. However, PartitionMagic allows you to override the Autodetect option.

Under FAT32 Options, you have three options:

- **Autodetect** automatically checks whether or not your computer has FAT32 support. If it detects FAT32 support, PartitionMagic displays the word "Enabled" in parentheses after FAT32 Options on the Preferences menu, and you can create or format FAT32 partitions with options such as Resize, Cluster Analyzer, Create, and so on. If it does not detect FAT32 support, PartitionMagic displays the word "Disabled" in parentheses after FAT32 Options on the Preferences menu, and you will not be able to create partitions formatted for FAT32.
- **Enable** will override Autodetect and allow you to create partitions formatted for FAT32. Only advanced users should enable this option. Advanced users might use this to format a drive for another computer.

WARNING: Enabling this option on a system that does not have FAT32 support will make it impossible to access partitions that you change to FAT32 with that computer.

- **Disable** also overrides Autodetect, allowing you to disable FAT32 support so that a partition is not inadvertently created or formatted as FAT32. You may want to disable this option if you are using multiple operating systems because only Windows 95 supports FAT32, and that would limit the usefulness of the partition.

To set this preference:

1. Choose **FAT32 Options** from the Preferences menu on the PartitionMagic Main Window to reveal a cascading menu, as shown in the following dialog.

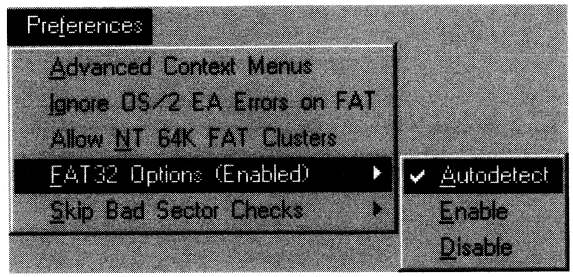


Figure 3.43: This menu item allows you to autodetect FAT32 support or override this capability.

2. Highlight your preference and either click on it or press **Enter**.

Skip Bad Sector Checks

By default, PartitionMagic performs extensive testing to detect bad sectors on your hard disk when modifying partitions. Newer drive types (such as Enhanced IDE and SCSI) often handle bad sectors internally, making such testing superfluous. For this reason, PartitionMagic allows you to bypass the tests by enabling Skip Bad Sector Checks. In the cascading menu under Skip Bad Sector Checks, there will be a check next to each drive on which PartitionMagic will skip the tests.

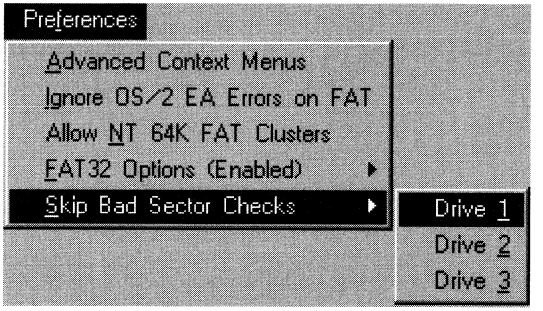


Figure 3.44: This cascading menu allows you to treat each drive separately.

WARNING: If you skip bad sector checks and your hard disk has bad sectors, data loss can result. However, the Move, Copy, Resize, and Format operations are faster when Skip Bad Sector Checks is selected.

Notice that PartitionMagic offers you the flexibility of setting this option individually for each of your physical drives. Assume your system has two disks, one older and one newer. You can set PartitionMagic to check the older drive while skipping the checks on the newer.

Help

PartitionMagic comes equipped with useful online Help information and instructions to help you better understand and use the PartitionMagic program. You can access online Help through the Help button or the Help menu.

By choosing either of these, you will activate the Help window. The Help window has two modes: Help Topic and Help Index. The Help Index mode will display the Help Index dialog, which lists all help topics in alphabetical order.

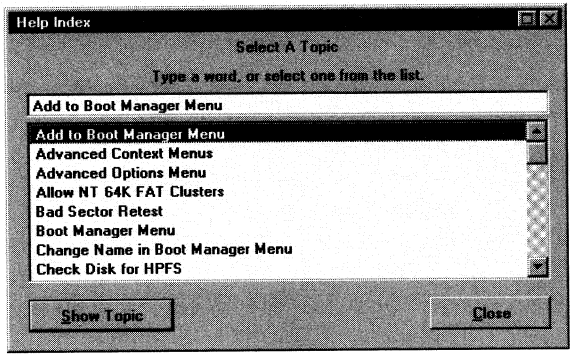


Figure 3.45: The Help Index lists topics alphabetically for easy access.

To display a topic for which you need help:

1. Highlight the topic using the primary mouse button (or the arrow keys and space bar on your keyboard).

2. Choose **Show Topic**. Notice that when the Help Topic dialog is displayed (as shown in Figure 3.46), the button changes from Show Topic to Show Index.

3. Choose **Show Index** to return to the Help Index dialog.

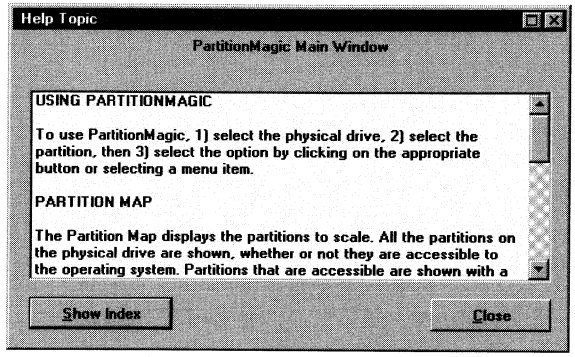


Figure 3.46: The Help Topic dialog gives information about the subject requested. To return to the Help Index, choose Show Index.

You can access additional features through the Help menu, which contains three options: Topic List, General, and About. Choosing Topic List will display the Help Index dialog. Choosing General will display a topic that provides basic information about PartitionMagic's Main Window. This topic is also displayed when you select the Help button on the Main Window. Choosing About displays a dialog box that contains PartitionMagic's version number and copyright information.

Exiting and Rebooting

This option exits you completely out of the PartitionMagic program. If rebooting your computer is necessary, PartitionMagic will prompt you with a dialog.

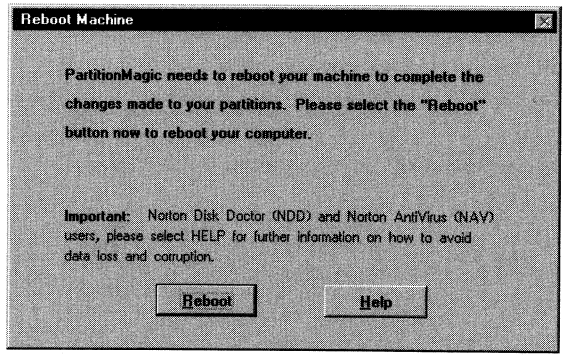


Figure 3.47: When you make changes that require you to reboot, PartitionMagic displays this dialog when you choose Exit.

To exit PartitionMagic and reboot, if necessary:

1. Exit PartitionMagic from the Main Window by clicking the **Exit** button or choosing **Exit** from the Drives menu.

2. If the above dialog prompts you to reboot, choose **Reboot** to reboot your computer.

NOTE: If you use OS/2, you can save your OS/2 desktop and reboot by choosing the **Shut Down** button on the LaunchPad or by right-clicking the desktop and selecting **Shut Down** from the desktop pop-up menu instead of selecting the PartitionMagic Reboot button.

MagicMover

To make partitioning even easier, PowerQuest has included MagicMover with PartitionMagic. MagicMover helps you move applications from one partition to another. For example, you can use PartitionMagic to create logical partitions within an extended partition and use MagicMover to move applications to one of the newly created logical partitions.

PartitionMagic includes two versions of MagicMover:

- A 32-bit version for Windows 95 and Windows NT 4.0
- A 16-bit version for Windows 3.x

32-Bit Version of MagicMover

This section explains how to install and use the 32-bit version of MagicMover. If you are running Windows 3.x, you should follow the instructions under *16-Bit Version of MagicMover* on page 105.

Installing MagicMover

To install the 32-bit version of MagicMover from Windows 95 or Windows NT 4.0, follow these steps:

1. Insert the PartitionMagic CD-ROM into your CD-ROM drive.

NOTE: If you are installing MagicMover from 3.5-inch diskettes, insert the MagicMover diskette labeled 32-Bit Version for Windows 95 and NT into your diskette drive, click the **Start** button, and then click **Run**. In the Run dialog box, type **a:\setup32.exe** and press **Enter**. Then, follow the on-screen instructions.

2. Click the **Start** button and then click **Run**.

3. Launch the installation program by typing *x:***\setup32.exe** in the Run dialog box (where x is the drive letter of the CD-ROM drive) and then pressing **Enter**.

4. In the Installation Options dialog, select **Install PowerQuest MagicMover**.

5. Follow the on-screen instructions.

NOTE: By default, MagicMover icons are installed under Start, Programs, PowerQuest MagicMover. However, during the installation, you can choose to install MagicMover in a different location.

Moving Applications With the 32-Bit MagicMover

Moving applications involves three simple steps: select the application to move, select the destination location (the drive and directory where you want to move the application), and review the operation summary (optional). These three steps are shown on the right side of MagicMover's main window. A red arrow is shown next to the step that you are performing. When you have completed that step, the red arrow moves to the next step and a green check is displayed next to the step that has been completed.

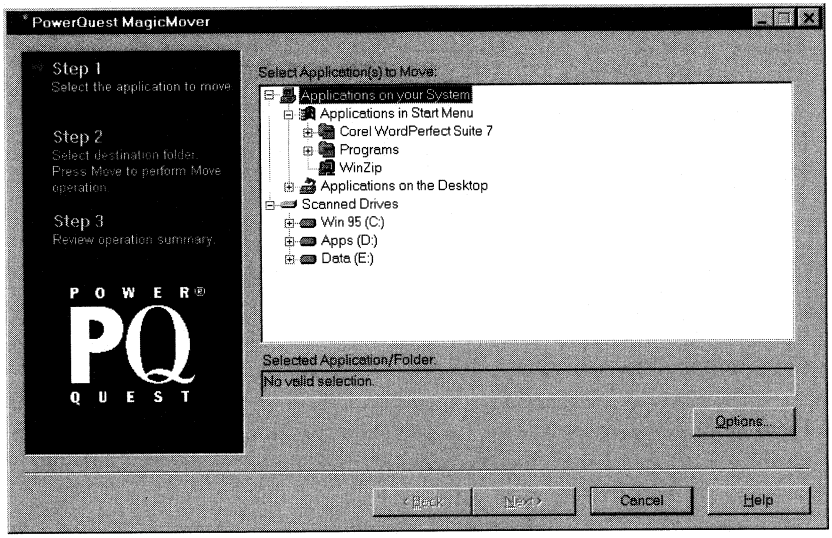


Figure 3.48: MagicMover's main window (32-bit version)

To move an application using the 32-bit version of MagicMover, follow these steps:

NOTE: You can cancel the operation at any time by clicking Cancel or you can go back to the previous step by clicking the Back button.

1. Launch MagicMover from the location where you installed it. (For example, you might click **Start**, **Programs**, **PowerQuest MagicMover**, **PowerQuest MagicMover**.)

   Because your system changes any time you install or delete files and applications, MagicMover next performs a scan to obtain the most current information about your system. The scan locates all files on your system, determining their sizes, dates, and interdependencies, such as which executables use which DLLs and their variants (OCX, VBX, etc.). When the scan is complete, you will see MagicMover's main window as shown in Figure 3.48.

   On the right side of this window, the three steps described previously are displayed. On the left side of the window, you will see an icon representing the applications on the desktop, an icon representing applications in the Start menu, and icons representing the drives that MagicMover found when it scanned your system.

2. Find the application you want to move by double-clicking the appropriate icon, then double-clicking folders, and then clicking individual applications to select them.

NOTE: You can select an individual application or a complete program group.

   When you select an icon, the complete file path for the application that icon represents will be displayed.

3. When you have selected the application you want to move, click the **Next** button.

   When you click the Next button, MagicMover will analyze the applications and files you want to move to see if it is safe to move them. A status bar will appear to show you the progress of the analysis.

NOTE: If MagicMover cannot move the application, it will inform you. MagicMover cannot move any application from the Windows directory or any of its subdirectories.

If MagicMover can move the application, the dialog box shown below will replace the main window. The three steps are also shown in this dialog box. Step one will now have a green check beside it, indicating that it is completed. The first field in this box will show the complete path where the application you want to move is currently installed. Below that is the Select the Destination Folder field.

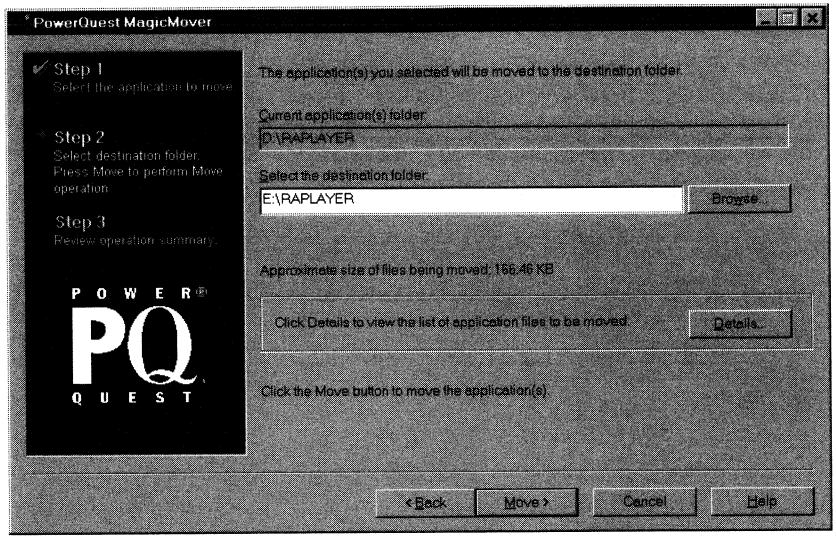


Figure 3.49: Selecting where to move the application

4. In the Select the Destination Folder field, specify where you want to move the application by either typing the full path in the field or by clicking the **Browse** button, moving though the directory structure by double-clicking directories to open them, and clicking **OK** when you have the desired directory selected.

   This dialog box also shows the approximate combined size of the files being moved.

NOTE: To view a complete list of all of the files that will be moved and changes that will be made to the Registry and .INI files, click **Details**.

5. When you have selected the application you want to move and the destination directory where you want to move it, click **Move**.

   After you click Move, a progress bar will appear. MagicMover will move the necessary files to the drive and directory you specify, update the links between the application's files, and update the Windows Registry and .INI files so that the application will function correctly.

   When the move is complete, a dialog box will appear showing you which applications were moved (in icon form), the drive and directory to which they were moved, and the actual size of files moved. You can also review the actions that MagicMover took during the operation by clicking **Details**.

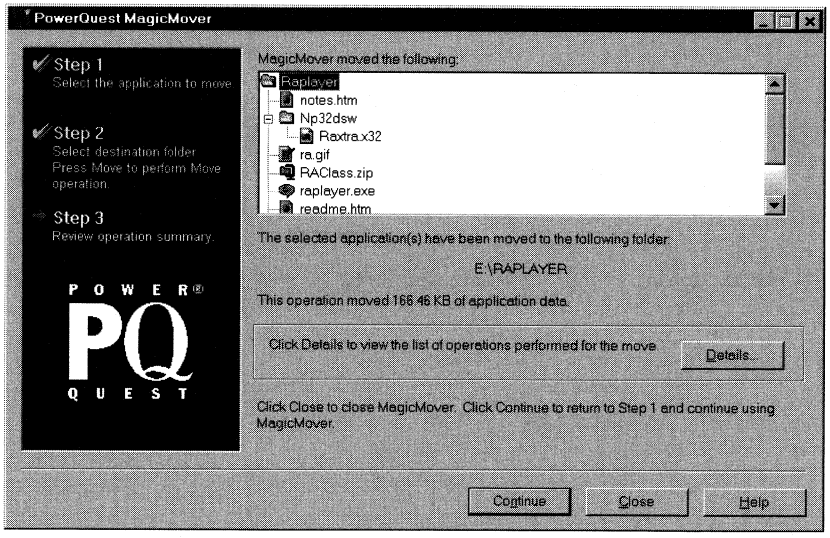


Figure 3.50: This window allows you to review the actions MagicMover took to move the application.

6. When you are finished moving applications, click **Close** to exit MagicMover.

7. Reboot the computer.

16-Bit Version of MagicMover

This section explains how to install and use the 16-bit version of MagicMover. If you are running Windows 95 or Windows NT, you should follow the instructions under *32-Bit Version of MagicMover* on page 100.

Installing MagicMover

To install the 16-bit version of MagicMover from Windows 3.x, follow these steps:

1. Insert the PartitionMagic CD-ROM into your CD-ROM drive.

NOTE: If you are installing MagicMover from 3.5-inch diskettes, insert the MagicMover diskette labeled 16-Bit Version for Windows 3.x into your diskette drive. Select **Run** from the Program Manager File menu. In the Run dialog, type **a:\setup16.exe** and press **Enter**. Follow the on-screen instructions.

2. Select **Run** from the Program Manager File menu.

3. Launch the installation program by typing **a:\setup16.exe** and then pressing **Enter**.

4. In the Installation Options dialog, select **Install PowerQuest MagicMover**.

5. Follow the on-screen instructions.

The installation program will create a new program group with the appropriate icons.

NOTE: By default, MagicMover icons are installed in a directory called "PowerQuest MagicMover" that the installation program creates. However, during the installation, you can choose to install MagicMover in a different location.

Moving Applications With the 16-Bit MagicMover

Moving applications involves three simple steps: select the application to move, select the destination location (the drive and directory where you want to move the application), and review the operation summary (optional). These three steps are shown on the right of MagicMover's main window. A red arrow next to the step shows you which step you are performing. When you have completed that step, a green check replaces the red arrow.

Figure 3.51: MagicMover's main window (16-bit version)

To move an application using the 16-bit version of MagicMover, follow these steps:

NOTE: You can cancel the operation at any time by clicking Cancel or go back to the previous step by clicking the Back button.

1. Launch MagicMover from the location where you installed it. (For example, you double-click the **PowerQuest MagicMover** icon in the **PowerQuest MagicMover** program group or from the location you specified during the installation.)

   Because your system changes any time you install or delete files and applications, MagicMover next performs a scan to obtain the most current information about your system. The scan locates all files on your system, determining their sizes, dates, and interdependencies, such as which executables use which DLLs and their variants (OCX, VBX, etc.). When the scan is complete, you will see MagicMover's main window as shown in Figure 3.52.

   On the right side of this window, the three steps described previously are displayed. On the left side of the window, you will see an icon representing the applications on your system and icons representing the drives that MagicMover found when it scanned your system.

2. Find the application you want to move by double-clicking the appropriate icon, then double-clicking folders, and then clicking individual applications to select them.

   When you select an icon, the complete file path for the application that icon represents will be displayed.

3. When you have selected the application you want to move, click the **Next** button.

   When you click the Next button, MagicMover will analyze the items you want to move to see if it is safe to move it. A status bar will appear to show you the progress of the analysis.

NOTE: If MagicMover cannot move the item, it will inform you. MagicMover cannot move any application from the Windows directory or any of its subdirectories.

If MagicMover can move the application, the dialog box shown below will replace the main window. The three steps are also shown in this dialog box. Step one will now have a green check beside it, indicating that it is completed.

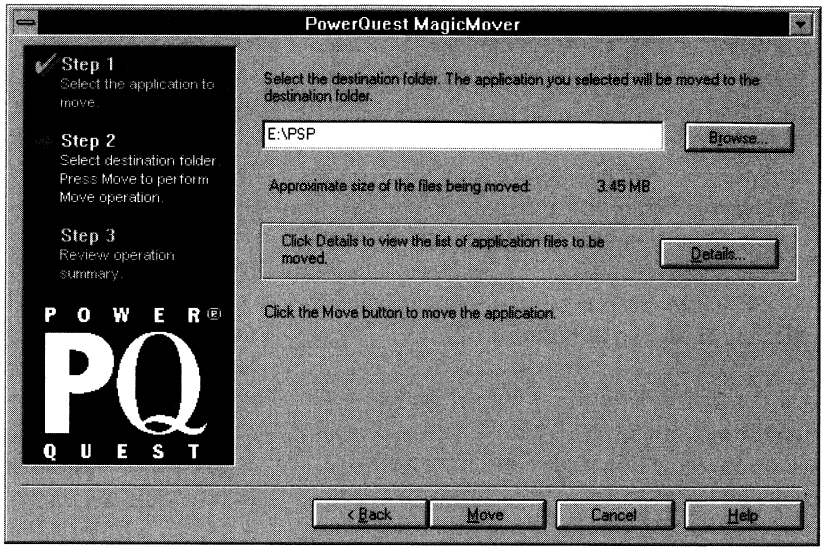


Figure 3.52: Choosing the directory where you want to move the application

4. Specify where you want to move the application by either typing the full path in the destination field or by clicking the browse button, moving though the directory structure by double-clicking directories to open them, and clicking **OK** when you have the desired directory selected.

   This dialog box also shows the approximate combined size of the files being moved.

NOTE: To view a complete list of all of the files that will be moved and changes that will be made to the Registry and .INI files, click **Details**.

5. When you have selected the files you want to move and the destination directory where you want to move the files, click **Move**.

   After you click Move, the area to the right of the steps will change to show a progress bar. MagicMover will move the files, change the appropriate Windows Registry entries and .INI files, and scan the links.

   When the move is complete, a dialog box will appear showing you which applications were moved (in icon form), the drive and directory to which they were moved, and the actual size of files moved. You can also review the actions that MagicMover took during the operation by clicking **Details**.

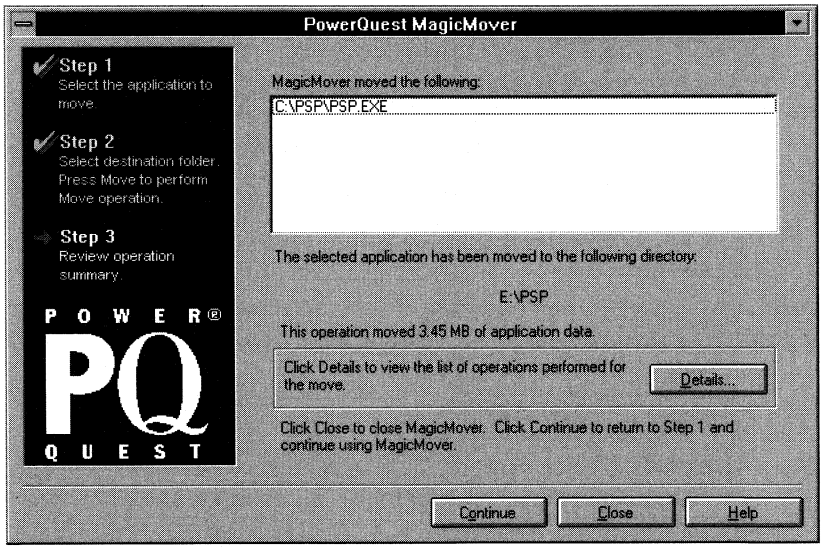


Figure 3.53: This dialog allows you to review what actions MagicMover took to move the application.

6. When you are finished moving applications, click **Close** to exit MagicMover.

7. Reboot the computer.

DriveMapper

DriveMapper is a wizard for Windows 3.x, Windows 95, and Windows NT that allows you to easily change drive letter references in files on your system. You should use DriveMapper after you make changes to your hard disk with PartitionMagic (using Create, Delete, Hide Partition, and so on) that alter drive letter assignments for partitions and your CD-ROM drive.

HINT: If you are using Windows NT as your only operating system, we recommend that you use Disk Administrator rather than DriveMapper. Disk Administrator will allow you to set the drive letters for your partitions so that adding and removing partitions will not cause any drive letters to change.

NOTE: If you have installed an alternative desktop on Windows 3.11 or Windows 95 with the files residing on a different drive than the Windows system files, DriveMapper may not be able to adjust your paths. DriveMapper is a Windows program and must have Windows loaded in order to run. If the drive letter has been changed for the drive that holds your desktop files, you may not be able to bring up Windows.

Because some files, such as .INI, configuration, and preferences fields, may keep references to the old drive letters, your system may not function properly when drive letters have changed. You can use DriveMapper to search for these references and change them to the new drive letter assignments.

NOTE: DriveMapper corrects one drive letter at a time. If you have only one drive letter change (such as your CD-ROM drive), you need change only one reference. If more than one letter has changed, you will have to change the drive letters one at a time in the correct order.

Avoid Using DriveMapper With Multiple Operating Systems

If you run multiple operating systems on your computer, using DriveMapper is not recommended. Instead, you should reinstall applications. The following issues make using DriveMapper in a multiple operating system environment difficult and error-prone:

- Drive letter assignments depend on which file systems an operating system supports. If you do not put all FAT32, NTFS, and HPFS partitions after all FAT partitions, drive letters will change depending on the operating system that is running, and DriveMapper may be unable to correctly identify which changes should be made. For more information on how drive letters are assigned, see *How the OS Assigns Drive Letters* on page 137.
- Registry settings are changed for the current operating system only. If you rerun DriveMapper from another operating system, references in files will already be changed and further changes will introduce errors.
- Files contained in hidden partitions will not be updated when DriveMapper runs. If you are using multiple primary partitions for different operating systems, only the active primary partition may be visible. Thus, only files in that primary partition will be updated.

NOTE: While you can rerun DriveMapper multiple times and use the /SSD (Select Search Drives) switch when starting DriveMapper (to allow you to specify which drives to search), doing so requires careful attention to detail, and errors are probable.

- While DriveMapper can update most OS/2 references, it does not change OS/2 Extended Attributes.

Change Drive Letters in the Correct Order

You must change drive letters in the correct order to avoid destroying original references before they are used to make the appropriate changes for other drive letters. For example, assume that you have two partitions on your hard disk assigned the drive letters C: and D: and a CD-ROM drive assigned E:. If you create a logical partition between C: and D:, the drive letter of D: would change to E:, and the drive letter of E: would change to F:. However, references in certain files would continue to reflect the old drive letter assignments. You can use DriveMapper to first change the drive E: references to F: and then the drive D: references to E:.

WARNING: When you make a change to your hard disk that adds drive letters, always change the highest affected drive letter first. If you change them in a different order, you will change source references needed to change other drive mappings.

You can also make changes to your hard disk that will decrease the number of drive letters. To illustrate a case in which you would decrease the number of drive letters, assume that you have four partitions on your hard disk: C:, D:, E:, and F:. If you delete D:, E: would change to D:, and F: would change to E:. Starting with the lowest affected drive letter, use DriveMapper to reassign the current drive letter in files that contain incorrect references.

WARNING: When you make a change to your hard disk that decreases the number of drive letters, always change the lowest affected drive letter first. If you change them in a different order, you will change source references needed to change other drive mappings.

Changing References for One Drive Letter

1. From Windows, launch DriveMapper by double-clicking its icon in the PartitionMagic by PowerQuest program group.

-Or-

From Windows 95, click **Start**, then **Programs**, then **PartitionMagic by PowerQuest**, and then **DriveMapper**.

2. Go to the screen labeled Drive Letter Changes by clicking **Next**.

3. Select **Only one drive letter changed** and click **Next**.

4. Type the old drive letter in the first field.

5. Type the new drive letter in the second field and click **Next**.

NOTE: DriveMapper will now search for references to the old drive letter. This may take several minutes. A progress window displays the percentage of the search completed.

6. When the Search Results screen appears, either click **Next** to change all of the references found or select **View changes to be made** and click **Next** to view and select which changes will be made.

7. When DriveMapper has completed the job, click **Finish**.

Changing References for More Than One Drive Letter

1. From Windows, launch DriveMapper by double-clicking its icon in the PartitionMagic by PowerQuest program group.

-Or-

From Windows 95, click **Start**, then **Programs**, then **PartitionMagic by PowerQuest**, and then **DriveMapper**.

2. Go to the screen labeled Drive Letter Changes by clicking **Next**.

3. Select **More than one drive letter changed** and click **Next**.

4. Type the old drive letter in the first field.

5. Type the new drive letter in the second field and click **Next**.

NOTE: DriveMapper will now search for references to the old drive letter. This may take several minutes. A progress window displays the percentage of the task completed.

6. When the Search Results screen appears, either click **Next** to change all of the references found or select **View changes to be made** and click **Next** to view and select which changes will be made.

7. When DriveMapper has changed all the references for that drive letter, choose either **Restart** to change references for another drive letter and repeat steps 1–6 or choose **Finish** when you are done.

PQ Boot

PQ Boot is a command-line utility that allows you to quickly change between bootable primary partitions. This utility is provided for users who will only occasionally change the active partition and therefore do not need to install Boot Manager.

To change the active partition, you may either run PQ Boot from DOS as a simple command with the applicable switch (if you know which partition you want to be active) or run PQ Boot in interactive mode to first see a list of the available bootable primary partitions from which you can choose.

Using PQ Boot With Command-Line Switches

PQ Boot is often used with one of the switches below (type **pqboot** *switch,* in which *switch* is one of the following):

- **/A** allows you to mark a partition as active without rebooting. If you enter this switch without a /P or /V switch, PQ Boot will enter interactive mode.
- **/P:***number* enables you to specify which partition should be active by entering the switch (**/P:**) and then the ID number of the partition (*number*). Use pqboot /s to see a list of ID numbers.
- **/S** displays a list of the partitions on the disk and information about each partition, including ID numbers and volume names. PQ Boot does not enter interactive mode with this switch.
- **/V:***label* allows you to select a partition by its volume label (*label*).
- **/?** shows a brief description of the switches and a few examples of how to use PQ Boot.

To run PQ Boot with a switch:

1. If you are not in DOS, exit to DOS.

2. Type **pqboot** *switch* (in which *switch* is the appropriate switch above).

NOTE: If you use the Windows NT operating system, type **pqbootnt** instead of pqboot.

PQ Boot will then reboot the computer from the primary partition you selected or display information as you requested.

For example, to set the second available bootable partition active using the ID number without rebooting, you would type **pqboot /p:2 /a**. Or, to simply view which partitions are available, you would type **pqboot /s**.

Using PQ Boot Interactive Mode

In interactive mode, PQ Boot displays a list of the available bootable primary partitions, as shown below.

```
ID Volume      Type Status            Size(MB) Used(MB) Free(MB)
1  C:NO NAME   FAT Primary,Bootable   125.0    250      0.0
2  *:NO NAME   FAT Primary            125.0    250      0.0

Enter ID:
```

To make another bootable primary partition the active partition, you simply type the ID number of that partition (as shown in the first column of the list) at the Enter ID: prompt and press **Enter**. PQ Boot will set the partition active and reboot the computer.

To start PQ Boot in interactive mode, type **pqboot** on the command line or choose the **PQ Boot** icon in the PartitionMagic by PowerQuest program group or folder.

NOTE: If you use the Windows NT operating system, type **pqbootnt** instead of pqboot.

Chapter 4

Concepts

This chapter presents concepts you must understand to use PartitionMagic successfully.

What Is a Hard Disk?

A hard disk is the part of a computer used for permanent data storage.

The basic components of a hard disk are: a number of rigid disks called platters; a spindle, on which the platters are mounted and rotated; a number of read/write heads, at least one for each side of each platter; and some integrated electronics that allow the computer to move the read/write heads and thus write data to and read data from the platters.

Platters are generally made of metal, and both sides are covered with a thin layer of iron oxide, which has strong magnetic properties.

Figure 4.1 shows the basic components of a hard disk.

How Is Data Stored and Retrieved?

The platters of a hard disk are attached to the central spindle, which rotates them at the same speed. Above and below each platter is at least one arm with a read/write head attached. Each arm extends over the platter and can move back and forth between the center and the outside edge so that the read/write head can be positioned anywhere over the platter.

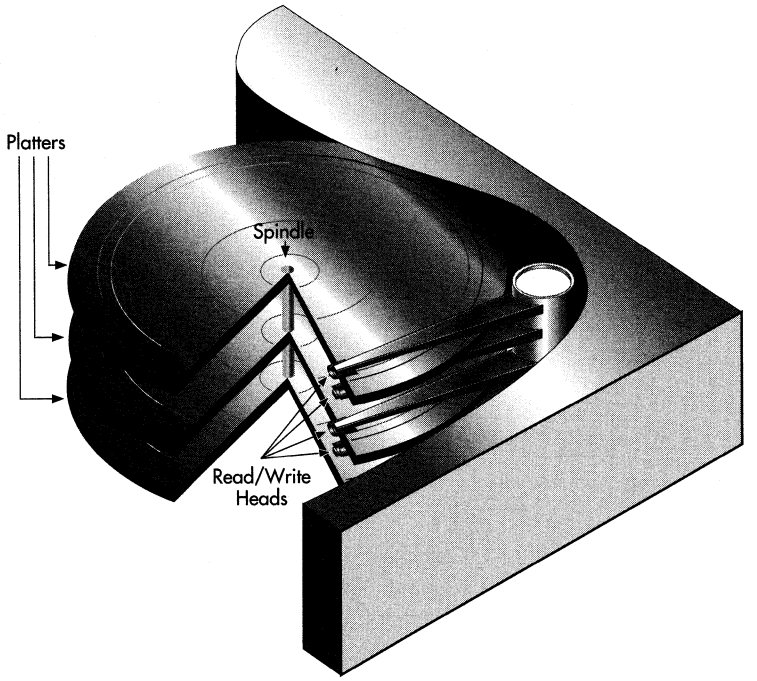


Figure 4.1

Computers record data on hard disks as a series of bits. A bit is stored as a magnetic charge (positive or negative) on the oxide coating of a disk platter.

When a computer wants to save data, it sends the data to the hard disk as a series of bits. As the hard disk receives the bits, it uses the read/write heads to magnetically record or "write" the bits on one of the platters.

When the computer requests data stored on the disk, the platters rotate and the read/write heads move back and forth over them. This allows random access to data (rather than requiring sequential access, as with a magnetic tape). The read/write heads read data by determining the magnetic field of each bit, positive or negative. Because hard disks are capable of random access, they typically can access any data within a few millionths of a second.

What Is Disk Formatting?

Because even the smallest hard disk can store millions of bits, there must be a way of organizing the disk so that it can easily find any particular sequence of bits. The most basic form of disk organization is called formatting. Formatting prepares the hard disk so that files can be written to the platters and then quickly retrieved when needed. Hard disks must be formatted in two ways: physically and logically.

Physical Formatting

A hard disk must be physically formatted before it can be logically formatted. A hard disk's physical formatting (also called low-level formatting) is usually performed by the manufacturer.

Physical formatting divides a hard disk platter into its basic physical elements: tracks, sectors, and cylinders. These elements define the way in which data is physically recorded on and read from the disk.

Tracks are concentric circular paths written on each side of each platter, like those on a record or compact disc. The tracks are identified by number, starting with track zero at the outer edge.

The set of tracks that lie at the same distance from the center on all sides of all platters is called a "cylinder." Computer hardware and software frequently work using cylinders.

Tracks are divided into areas called "sectors," which are used to store a fixed amount of data. Sectors are usually formatted to contain 512 bytes of data (there are 8 bits in a byte).

After a hard disk is physically formatted, the magnetic properties of the coating on areas of the disk may gradually deteriorate. Consequently, it becomes difficult for the read/write heads of the disk to write a bit pattern on the disk that can later be read from the disk. When this happens, the sectors that do not hold data well are called "bad sectors." Fortunately, the quality of modern disks is such that bad sectors are rare. Furthermore, modern computers can usually determine when a sector is bad, mark the sector bad (so it will never be used), and then use an alternate sector.

Figure 4.2 shows the physical format of a typical hard disk.

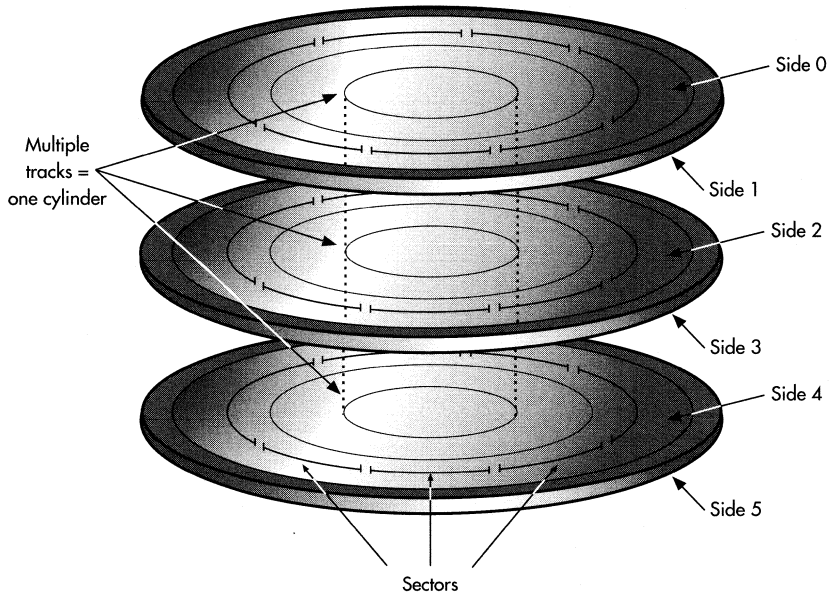


Figure 4.2

Logical Formatting

After a hard disk has been physically formatted, it must be logically formatted. Logical formatting places a file system on the disk. A file system allows an operating system (OS), such as DOS, OS/2, Windows 95, or Windows NT, to use the available space to store and retrieve files. Logical formatting can be done with the formatting utilities that are provided with operating systems, but PartitionMagic makes it easier.

Before a disk is logically formatted, it can be divided into partitions. A different file system (logical format) can be applied to each partition. (Partitions will be treated in detail in *Understanding Partitions* on page 125, and file systems are treated in detail in the next section.)

After a disk partition has been logically formatted, it is referred to as a volume. As part of the formatting operation, the formatting utility will ask you to give the partition a name, called the "volume label." This name enables you to identify the volume (partition) thereafter.

File Systems

All file systems consist of the structures necessary for storing and managing data. These structures typically include an operating system boot record, files, and directories. A file system performs three main functions: 1) tracking allocated and free space, 2) maintaining directories and file names, and 3) tracking where the different portions of each file are physically stored on the disk.

There are many file systems in use today. Different file systems can be used (recognized) by different operating systems. Some OSs can recognize only one file system; other OSs can recognize several different file systems. Some of the most common file systems are the following:

- File Allocation Table (FAT)
- File Allocation Table 32 (FAT32)
- New Technology File System (NTFS)
- High Performance File System (HPFS)
- NetWare File System
- Linux Ext2

FAT

The FAT file system is the file system used by DOS, Windows 3.x, and, ordinarily, by Windows 95. The FAT file system can also be used by Windows NT and OS/2.

The FAT file system is characterized by the use of a file allocation table (FAT) and clusters. In the FAT file system, clusters are the smallest unit of data storage; they consist of a number of disk sectors. The FAT is used to record which clusters are used, which are unused, and where files are located. The file allocation table is the heart of this file system and is duplicated to protect its data.

The FAT file system also uses a root directory that has a maximum allowable number of directory entries and that must be at a specific location on the volume. In operating systems that use the FAT file system, the root directory is represented by the forward slash character (\), and it is the directory that is initially displayed when the operating system boots.

When you create a file or a subdirectory, information about that file or subdirectory is stored in the root directory in the form of a directory entry. For example, a FAT directory entry holds information such as the file name, the size of the file, a date and time stamp that indicates when the file was last changed, the starting cluster number (which cluster holds the first portion of the file), and the file attributes (hidden, system, etc.).

You can use PartitionMagic's Resize Root option to change the size (number of root entries) available in a FAT root directory (within the predefined limits). For details, see *Resize Root* on page 78.

The FAT file system can support a maximum of 65,525 clusters. Thus, the cluster size used depends on the amount of available volume space—the maximum size of a FAT volume is 2 gigabytes (GB). Whatever the size of the volume, the cluster size must be large enough so that all available space can be included within 65,525 clusters. The larger the available space, the larger the cluster size must be. (For more information, see *Making Efficient Use of Disk Space* on page 132.)

On a FAT volume, you can use all PartitionMagic features.

FAT32

FAT32 is the file system used by updated versions of Windows 95 (version 4.00.950B or above). At the time this manual went to press, FAT32 was available only preinstalled on computers from selected manufacturers. (Microsoft plans to release an upgrade to Windows 95 that will make FAT32 generally available.) DOS, Windows 3.1, Windows NT, and the original version of Windows 95 will not recognize FAT32 volumes, and they are thus unable to boot from or use files from a FAT32 volume. (This may change in the case of Windows NT.)

FAT32 is an enhancement of the FAT file system and is based on 32-bit file allocation table entries, rather than on the 16-bit entries the FAT file system uses. As a result, FAT32 supports much larger volumes (up to 2 terabytes).

The FAT32 file system uses smaller clusters than the FAT file system (for example, 4KB clusters for volumes as large as 8GB), has duplicate boot records, and features a root directory that can be any size and that can be located anywhere on the volume.

On a FAT32 volume, you can use all PartitionMagic features except Resize Root, which is unnecessary for the FAT32 file system.

NTFS

The New Technology File System (NTFS) is accessible only through the Windows NT operating system. NTFS is not recommended for use on disks of less than 400MB because it uses a great deal of space for system structures.

The central system structure of the NTFS file system is the master file table (MFT). NTFS keeps multiple copies of the critical portion of the master file table to protect against data loss.

NTFS uses clusters to store data files, but the size of the cluster is not dependent on the size of the volume. A cluster size as small as 512 bytes can be specified, regardless of volume size. Using small clusters reduces the amount of wasted disk space and the amount of file fragmentation, a condition where files are broken up over many noncontiguous clusters and which results in slower file access. Thus, NTFS provides good performance on large drives.

The NTFS file system also supports hot fixing, through which bad sectors are automatically detected and marked so that they will not be used.

On an NTFS volume, you can use all PartitionMagic features except features that are specific to the FAT and FAT32 file systems.

HPFS

The High Performance File System (HPFS) is the preferred file system for OS/2 and is also supported by older versions of Windows NT. Unlike FAT, HPFS sorts the directory based on file names, and it uses a more efficient structure to organize the directory. As a result, file access is often faster than on FAT volumes. In addition, HPFS makes much more efficient use of disk space than does the FAT file system.

HPFS allocates file data in sectors instead of clusters. To keep track of which sectors have or have not been used, HPFS organizes a volume into 8MB bands, with 2KB allocation bitmaps between the bands. This banding improves performance because the read/write heads don't have to return to track zero each time the OS needs to access information about volume space.

On an HPFS volume, you can use all PartitionMagic features except features that are specific to the FAT and FAT32 file systems.

NetWare File System

The Novell NetWare network operating system uses the NetWare File System, which was developed specifically for use by NetWare servers.

PartitionMagic identifies NetWare 3.x or 4.x partitions. You can use PartitionMagic only to view the partition information for NetWare 3.x and 4.x partitions.

Linux Ext2

The Linux Ext2 file system was developed for the Linux operating system (a freeware version of the UNIX operating system). The Linux Ext2 file system supports a maximum volume size of 4 terabytes.

PartitionMagic identifies Linux Ext2 partitions. On a Linux Ext2 volume, you can use PartitionMagic only to view the partition information.

Understanding Partitions

A partition is a physical division of your hard disk. Once a disk has been physically formatted, it can be divided into separate partitions (after which logical formatting is done).

Why Use Multiple Partitions?

Many hard disks are formatted as one large partition. This doesn't provide the best possible data security, or allow you to organize files so they are easy to find, or allow you to make the most efficient use of your disk space.

If you want to install more than one operating system on a disk, or make the most efficient possible use of the disk space, or make your files as secure as possible, or physically separate data so that it is easy to find any file and easy to back up data, you will have to understand how to use multiple partitions of different kinds.

Partition Types

There are two main kinds of partitions: primary and extended. In addition, extended partitions can be further subdivided into logical partitions.

NOTE: You can have only four main partitions on your hard disk, one of which may be an extended partition. Thus, at most, you can have four primary partitions or three primary partitions and one extended partition.

Primary Partitions

A primary partition may contain any operating system (OS) as well as data files, such as applications and user files. A primary partition is logically formatted to use a file system compatible with the operating system that is installed on it.

If you create multiple primary partitions, only one primary partition may be active at a time. When one primary partition is active, data in other primary partitions is not accessible. Thus, the data in a primary partition can be accessed (for all practical purposes) only by the OS installed on that partition.

If you must install more than one operating system on your hard disk, you will probably need to create multiple primary partitions because most operating systems can be booted only from a primary partition.

Extended Partitions

The extended partition was invented as a way of getting around the arbitrary four-partition limit. It is essentially a container in which you can further physically divide your disk space by creating an unlimited number of logical partitions (further physical subdivisions of the disk space).

An extended partition doesn't directly hold data. You must create logical partitions within the extended partition; these hold the data. The logical partitions must be logically formatted; each can have a different file system. After logical formatting, each logical partition is a separate disk volume.

Logical Partitions

Logical partitions may exist only within an extended partition and are meant to contain only data files and OSs that can be booted from a logical partition (for example, OS/2, OS/2 Warp, Linux, and Windows NT). OSs that can be booted from a logical partition, such as OS/2, should usually be installed in a logical partition; this saves primary partitions for other uses.

Figure 4.3 shows a hard disk that contains four main partitions: three primary partitions and one extended partition. The extended partition has been divided into two logical partitions. Each primary partition has been formatted to use a different file system (FAT, NTFS, and HPFS). The two logical partitions have both been formatted to use the FAT file system.

Although the figure shows all partitions on a single side of one platter, in actual use the partitions would probably be spread across the sides of several platters.

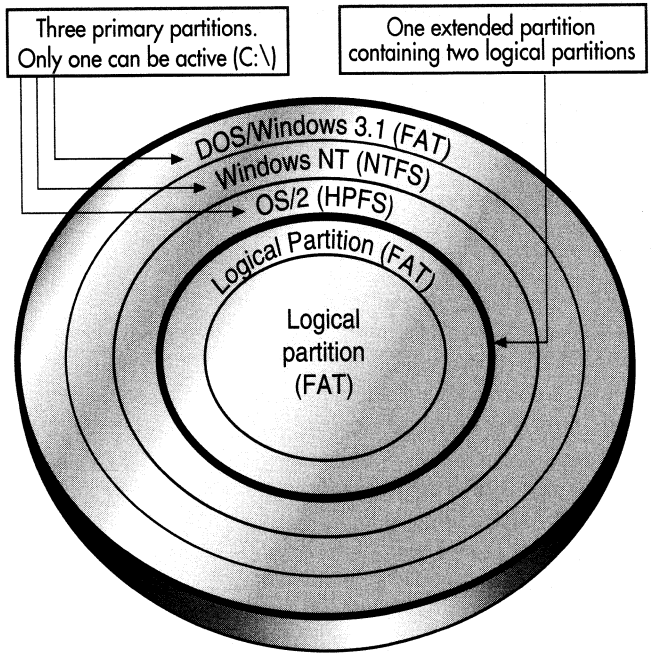


Figure 4.3

Understanding How a Computer Boots

The way a computer boots from a hard disk depends on the way the hard disk is partitioned and on the operating system being booted.

The Basic Boot Process

When you turn on the power to your computer, the central processing unit (CPU) takes control. The CPU immediately executes the instructions built into the computer's ROM BIOS, a program that contains the startup procedures. The last part of the BIOS instructions is the boot routine. The BIOS boot routine tries to start an operating system by reading the master boot record (MBR) from the first sector of the first physical hard disk.

The master boot record contains a master boot program and a partition table that describes the disk partitions. The BIOS boot routine reads the master boot program into memory and relinquishes control to it. When the master boot program gets control, it looks at the partition table to see which primary partition is active (there may be multiple primary partitions).

If the hard disk has more than one primary partition, each bootable primary partition will have its own boot record in the first sector of the partition. This boot record holds a boot program designed specifically to start the operating system installed on that partition. (The OS-specific boot record is written to the partition either when the partition is logically formatted, or later, with an OS-specific utility such as the DOS SYS utility.)

The master boot program starts the boot program for the active partition (for an explanation of the active partition, see *Setting an Active Primary (Boot) Partition* on page 131). Finally, the boot program for the active partition loads the files for the operating system installed on that partition.

Figure 4.4 shows a hard disk with three primary partitions; it has a master boot record and three partition (OS-specific) boot records.

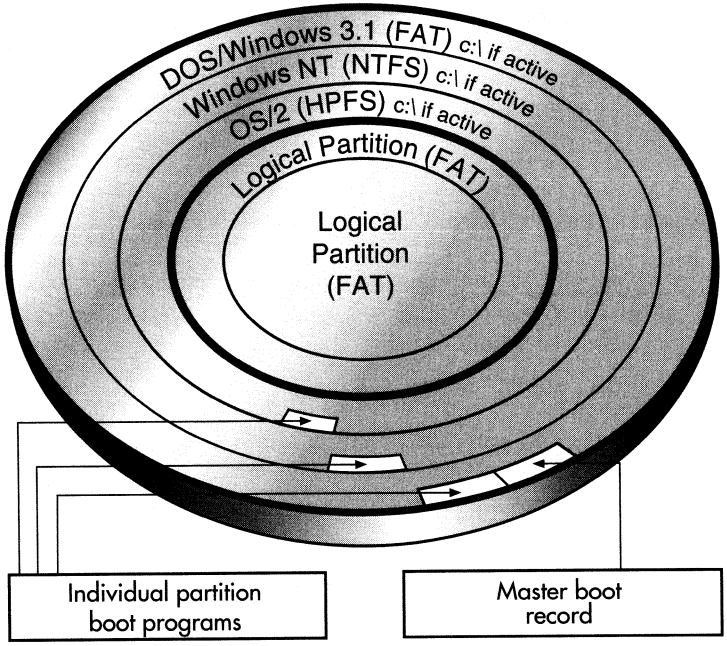


Figure 4.4

Operating System–Specific Boot Information

Most operating systems, including DOS, Windows 3.x, Windows 95, and Windows NT, rely on the active primary partition when they boot from a hard disk. However, different operating systems rely on the active primary partition in different ways.

DOS, Windows 3.x, and Windows 95 must boot from an active primary partition on the first physical drive.

Windows NT can boot from a logical partition in an extended partition, but the Windows NT boot program must be in the active primary partition on the first physical drive.

OS/2 can be booted from a logical partition if the extended partition containing the logical partition does not extend beyond the first 1,024 cylinders of the hard disk and an OS/2-aware boot utility, such as the Boot Manager utility provided as part of your PartitionMagic software, is present on the drive. The PartitionMagic Boot Manager utility must be in its own primary partition on the first physical drive. (PartitionMagic automatically creates the necessary partition during Boot Manager installation.)

PartitionMagic: The Partitioning Tool

Now that you know what partitions are and how important it can be to have multiple partitions on a hard disk, you can understand how to make use of PartitionMagic and why PartitionMagic is the easiest and fastest method of managing disk partitions.

One reason PartitionMagic is so useful is that it combines the capabilities of the different operating system tools that were, until PartitionMagic, the only means of managing partitions. For example, with PartitionMagic, you can create and logically format a partition in one simple step (rather than using the FDISK and FORMAT utilities provided with the operating system).

PartitionMagic is also useful because it has partition management capabilities that the different operating system tools do not have. For example, with the PartitionMagic Info option, you can get information about a partition that you cannot get by using tools provided with the operating system.

Most importantly, unlike operating system tools, PartitionMagic enables you to manage partitions without destroying the data within them. You can change the number, size, and location of partitions, all without ever having to go though the tedious, time-consuming task of restoring your data files from a backup.

Managing Partitions

The remaining sections of this chapter introduce you to concepts and activities that you must understand to use disk partitioning to your best advantage. Some sections contain references to other sections that explain PartitionMagic features that you can use to apply the concept being presented.

Setting an Active Primary (Boot) Partition

When you create multiple primary partitions to hold different operating systems, you must tell the computer which primary partition (on the first physical hard disk) to boot from. The primary partition you tell the computer to boot from is called the active partition. (The boot partition must be a primary partition.)

If there is not an active primary partition on the first physical hard disk, your computer will not be able to boot from your hard disk. For details, see *Understanding How a Computer Boots* on page 128.

WARNING: Before you make a primary partition active, make sure that it is a bootable partition, meaning that it has been logically formatted and the necessary operating system files are installed. Otherwise, when you attempt to reboot the computer, it will not boot.

PartitionMagic's Set Active option lets you easily choose which primary partition you want to be the active partition. For more information, see *Set Active* on page 79.

PQ Boot is a command-line utility that lets you quickly reset the active primary partition and then reboot with the OS installed in that partition. For more information, see *PQ Boot* on page 114.

PartitionMagic is also shipping with Boot Manager, a program that allows you to choose the boot partition each time the computer is started. For details on Boot Manager, see *Creating a Boot Manager Partition* on page 146 and *Boot Manager* on page 84.

Making Good Use of Logical Partitions

There are three good reasons for creating an extended partition and dividing it into logical partitions: 1) to access the same files from multiple OSs, 2) to make efficient use of disk space, and 3) to physically separate groups of files for organizational or security reasons.

Accessing the Same Files From Multiple OSs

You can access data stored in any logical partition from multiple OSs installed in different primary or logical partitions, as long as the different OSs can all read the file system in which the data is stored.

For example, refer to the partitioning shown in Figure 4.4. Because the DOS/Windows, Windows NT, and OS/2 operating systems can all read FAT partitions, you could make any of the three primary partitions active (boot with any of the three operating systems), and that partition's operating system would be able to read and use any files installed or created within either of the logical partitions.

Making Efficient Use of Disk Space

If you have a large hard disk and you use the FAT file system for a large portion of your data storage, you can prevent wasted disk space by using small FAT partitions. (To do this, you may have to create multiple logical partitions to hold user files.)

All data on a FAT partition is stored in allocation units called clusters (clusters consist of a fixed number of disk sectors). The cluster size is determined by the size of the partition. The larger the partition, the larger the cluster size you must use.

Using a large cluster size wastes disk space because even if a data file (or the last portion of a data file) is much smaller than the cluster size, the computer must still use a complete cluster to store the data. The following table shows the minimum cluster size and typical wasted space for various partition sizes.

Minimum and Maximum Partition Sizes	Minimum Required Cluster Size	Typical Wasted Space
16–127MB	2KB	2%
128–255MB	4KB	4%
256–511MB	8KB	10%
512–1,023MB	16KB	25%
1,024–2,047MB	32KB	40%
2,048–4,096MB	64KB	50%

You can prevent wasted disk space by using small partitions because small partitions use smaller cluster sizes.

For example, a 1,024MB partition would have a cluster size of 32KB. If you saved a 2KB file to a 1,024MB partition, an entire 32KB cluster would be used to save the file—30KB of space would be wasted. However, if you divided your data storage space into 120MB partitions (which would use 2KB clusters) and you saved a 2KB file, the file would fit neatly into a 2KB cluster, with no wasted space.

The rule is: the larger the cluster size of a FAT partition, the more wasted space.

If you have large FAT partitions, either primary or logical, you can probably recover wasted storage space by resizing them with the PartitionMagic Cluster Analyzer option and then dividing any recovered free space into other small partitions. See *Cluster Analyzer* on page 31 for information on how to use this option.

Simplifying File Access and Enhancing File Security

If you have a large hard disk and you place all your files in subdirectories under one root directory, the directory structure will quickly become complex, making work difficult. Separating files into logical groups within a number of logical partitions can enable you to minimize the complexity of your directory structure. When you must access a particular group of files, you can simply change to the logical partition holding that file group.

You can also use logical partitions to enhance security for sensitive files. For example, if you use multiple operating systems and you want to limit access to a particular group of files, you can place these files on a logical partition formatted with the file system of whatever operating system provides the best security features. Or, you could increase the chances that critical files would always be available by putting them on a logical partition formatted to use a file system that could be read by the operating system on two or more primary partitions—if one primary partition became corrupted, you could boot from the other primary partition and have continued access to the critical files.

Freeing Disk Space Before Enlarging a FAT Partition

If you decide to resize a FAT partition larger (with the PartitionMagic Resize option) and the resulting partition requires a larger cluster size, the larger cluster size will cause a greater waste of space (percentagewise) in the partition.

Because PartitionMagic must allocate space for the required cluster size when resizing a partition, there must be adequate unused space inside the partition. If the partition is almost full, there may not be enough space available. In this case, the partition resize operation will not be allowed. To resize the partition successfully, you will have to create free space by deleting some files within the partition or by moving some files to a different partition.

You can tell the approximate amount of free space necessary to resize a partition by referring to the following table. The last column shows the approximate amount of free space required to resize a partition within the size range shown in the first column. The actual amount of free space needed can vary, depending on the number of files in the partition and the file sizes.

Partition Size (within this range)	Required Cluster Size	Typical % Wasted Space	Free Space Typically Needed for Resize
128MB to 255MB	4KB	4%	5.1MB
256MB to 511MB	8KB	10%	25.6MB
512MB to 1,023MB	16KB	25%	128.0MB
1,024MB to 2,047MB	32KB	40%	409.6MB
2,048MB to 4,096MB	64KB	50%	1024.0MB

Using Windows NT 64KB Clusters

The Windows NT operating system supports a 64KB cluster size. However, a partition that uses a 64KB cluster size will almost always waste a considerable amount of disk space and won't be reliable under any operating system except Windows NT. Furthermore, there are other limitations noted by Microsoft. For these reasons, although PartitionMagic supports 64KB cluster sizes, this capability is disabled in PartitionMagic's default configuration.

If you wish to enable PartitionMagic support for 64KB cluster sizes, you can do so in the Preferences menu with the Allow NT 64K FAT Clusters setting. Changing this setting will enable the use of 64KB clusters throughout PartitionMagic. For details, see *Allow NT 64K FAT Clusters* on page 93.

Hiding and Unhiding Partitions

PartitionMagic allows you to hide partitions so that no operating system can see them. No user can access the files in a hidden partition, and the partition will not be visible in any application because the hidden partition will not be assigned a drive letter when the operating system boots. Subsequent partitions that are still visible to the operating system will be assigned a new drive letter.

Hiding a partition is useful when you don't want others to access sensitive data or you want to prevent others from inadvertently deleting needed files. You can hide any primary or logical FAT, FAT32, NTFS, or HPFS partition.

Of course, PartitionMagic also allows you to unhide (make visible) any partitions that you have hidden. (Making a partition visible makes it recognizable to operating systems that can recognize the file system on the partition. The partition will still not be recognizable to operating systems that cannot recognize the file system on the partition.)

WARNING: You must be careful when unhiding primary partitions. Generally, you should not make two primary partitions visible at the same time, as this can cause data loss with some operating systems.

For specific instructions on hiding and unhiding partitions, see *Hide/Unhide Partition* on page 76.

Understanding Drive Letters

When you boot your computer, the booted operating system assigns drive letters (C:, D:, etc.) to the primary and logical partitions on each hard disk. The drive letters assigned by the OS are used by you, your system, and applications to reference files on the partition.

The OS may change the drive letter assignments when you add or remove a second hard disk or add, remove, or copy a partition on any disk. The drive letter assignments may also change depending on the operating system you boot or if you reformat a partition with a different file system. If drive letter assignments change, parts of your system configuration might become invalid. For example, application start-up commands that are based on a drive letter may become invalid.

To avoid configuration changes and to be able to fix configuration problems, you need to understand several things: how the operating system assigns drive letters, the kinds of problems caused by drive letter changes, what you can do when partitioning to avoid drive letter changes, and how to fix configuration problems caused by unavoidable changes.

How the OS Assigns Drive Letters

Understanding the order in which an OS assigns drive letters is important.

Drive letters are first assigned to primary partitions in the order they appear on hard disks. Drive letter C: is assigned to the active primary partition on the first hard disk, then D: is assigned to the first recognized primary partition on the next hard disk, and so on, until a letter has been assigned to the first recognized primary partition on all hard disks.

Next, all logical partitions with a file system that the OS recognizes are assigned drive letters, starting with those on the first hard disk and proceeding in order.

Finally, CD-ROM drives and other types of removable media drives are assigned a drive letter.

NOTE: PartitionMagic will not partition CD-ROM, Jazz, and Zip disks (or any removable media), and the space on such disks will not be shown in the PartitionMagic interface. If you have any removable media disks, remember that they are assigned a drive letter after all hard-disk partitions are assigned a drive letter.

To illustrate how drive letters are assigned, let's examine a few examples. First, let's look at a computer with one hard disk, on which DOS is installed. The hard-disk partitioning is shown in Figure 4.5 below.

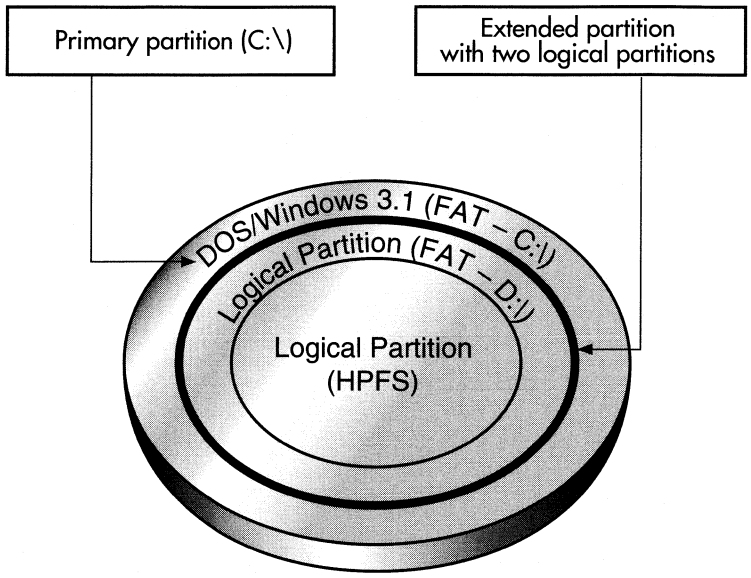


Figure 4.5

The disk is partitioned into a primary partition and an extended partition containing two logical partitions. The primary partition is formatted with the FAT file system and DOS has been installed on it. The first logical partition is formatted with the FAT file system, which DOS can recognize, but the second logical partition is formatted with the HPFS file system, which DOS cannot recognize.

On this disk, DOS would assign the drive letter C: to the primary partition and the drive letter D: to the first logical partition. It would not assign a drive letter to the second logical partition because it would not recognize the file system on that drive (HPFS).

Now let's consider an example with a computer identical to the computer in the first example except that a second hard disk has been installed. Figure 4.6 shows the configuration.

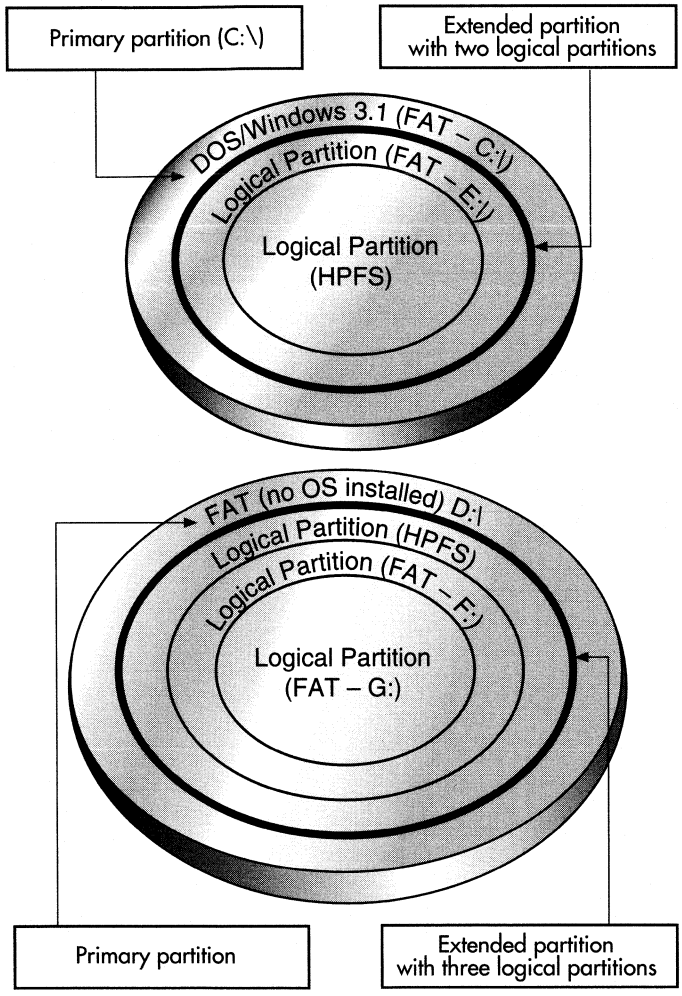

Primary partition (C:\)
Extended partition with two logical partitions
DOS/Windows 3.1 (FAT – C:)
Logical Partition (FAT – E:)
Logical Partition (HPFS)
FAT (no OS installed) D:
Logical Partition (HPFS)
Logical Partition (FAT – F:)
Logical Partition (FAT – G:)
Primary partition
Extended partition with three logical partitions

Figure 4.6

The first disk is partitioned in exactly the same way as shown in Figure 4.5 above. It has the same file systems on the partitions, and DOS is installed on the single primary partition.

The second disk has a primary partition and an extended partition containing three logical partitions. There is no OS installed on the primary (FAT) partition of the second hard disk. The first logical partition is an HPFS partition, and OS/2 is installed on it. The two remaining logical partitions are FAT partitions.

Figure 4.6 shows how drive letters would be assigned if the system were booted with DOS from the first hard drive.

First, DOS would assign the letter C: to the active primary partition on the first hard disk (FAT). Next, DOS would assign the drive letter D: to the first recognized primary partition on the second hard disk (FAT). Finally, DOS would assign drive letters to all logical partitions that contained a file system it could recognize. It would assign drive letter E: to the first logical partition on the first disk (FAT) but would skip the second logical partition of the first disk because it would not recognize the file system on that drive (HPFS). On the second disk, it would skip the first logical partition (HPFS), assign drive letter F: to the second logical partition (FAT), and assign drive letter G: to the third logical partition (FAT).

It is important to notice in this second example that the drive letter assigned to the first logical partition on the first hard disk changed from that assigned in the first example, even though the computer was booted with the same OS and the partitioning of the first disk did not change. The drive letter changed because a second drive was installed in the computer, and the OS assigned a drive letter (D:) to the first recognized primary partition on that second drive before assigning one to the first logical partition on the first drive.

For our third and final example, let's look at how drive letters would be assigned on the same computer, with exactly the same hard disks and disk partitioning as considered in the previous example, if the computer were booted with OS/2 (from the first logical partition on the second disk) rather than with DOS. Drive letters would be assigned as shown in Figure 4.7.

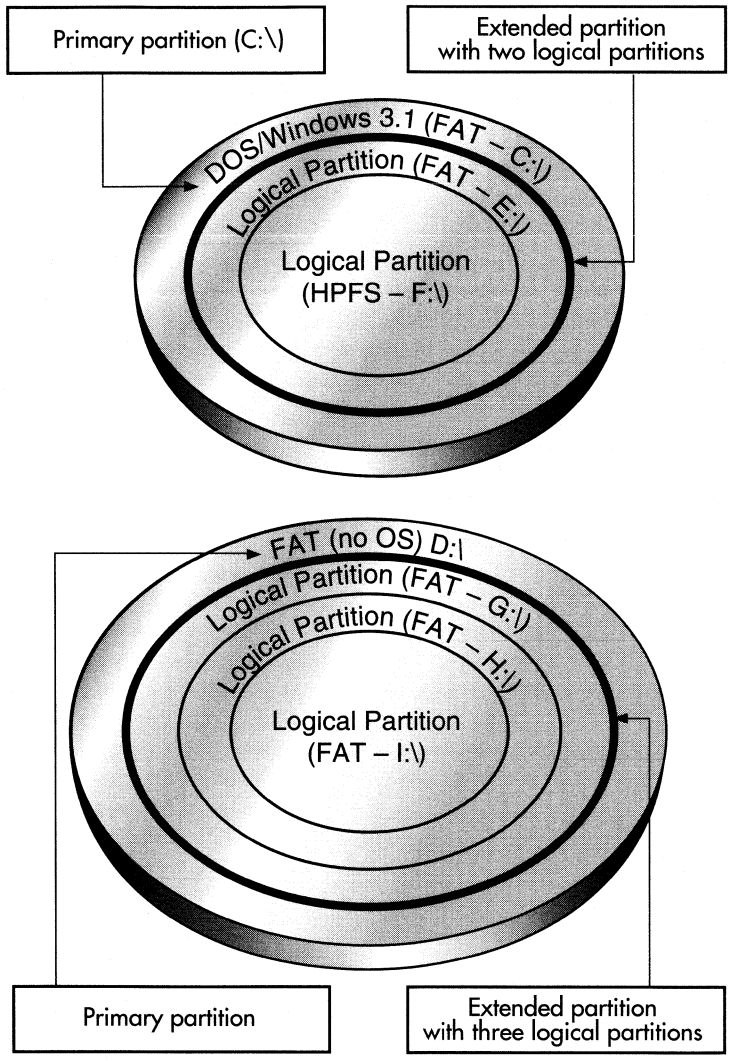

Primary partition (C:\)
Extended partition with two logical partitions
DOS/Windows 3.1 (FAT – C:\)
Logical Partition (FAT – E:\)
Logical Partition (HPFS – F:\)
FAT (no OS) D:\
Logical Partition (FAT – G:\)
Logical Partition (FAT – H:\)
Logical Partition (FAT – I:\)
Primary partition
Extended partition with three logical partitions

Figure 4.7

First, OS/2 would assign the letter C: to the primary partition on the first hard disk (OS/2 recognizes the FAT file system). Next, OS/2 would assign the drive letter D: to the primary partition on the second hard disk (FAT again). Then, OS/2 would assign drive letters to all logical partitions because all contain a file system it can recognize (either FAT or HPFS). On the first disk, it would assign E: to the first logical partition and F: to the second logical partition. On the second disk, it would assign G: to the first logical partition, H: to the second logical partition, and I: to the last logical partition.

It is important to notice in this third example that the drive letters assigned to all recognized logical partitions changed from those assigned in example two, even though the number of hard disks and the disk partitioning are exactly the same. The only difference is that the computer was booted with OS/2, which recognized the file system on all partitions and thus assigned them all letters.

Drive letter changes can occur for other reasons than those shown in these examples, including adding a partition, deleting a partition, or reformatting a partition with a different file system.

Problems Caused by Drive Letter Changes

A change in assigned drive letters can invalidate parts of your system configuration.

For example, suppose you had a computer with one hard disk that was partitioned like the hard disk discussed in example one in the previous section, with the drive letters assigned by DOS as shown in Figure 4.5.

Suppose also that you installed all of your applications in the first logical partition (D:) and used that drive letter for setting up an icon to start each application from some graphical user interface (GUI). Each time you double-clicked an icon to start an application, the GUI would look on drive D: to find and run the application.

Now suppose that you added a second hard disk to your system and partitioned it as explained in example two and as shown in Figure 4.6 in the previous section. The drive letter for the partition holding your applications would change (from D: to E:). Now when you double-clicked a GUI icon to start an application, the GUI would look on drive D: to find and run the application, but the application would not be there—it would be on the E: drive.

Changing the drive letter of any partition will affect any system configuration that is based on the original drive letter of the partition. For instance, commands based on a drive letter that are entered in your AUTOEXEC.BAT, CONFIG.SYS, WIN.INI, SYSTEM.INI, or other such system files might become invalidated.

Fixing Problems Caused by Drive Letter Changes

You can fix application configuration problems caused by drive letter changes using the DriveMapper utility that ships as part of your PartitionMagic software package.

With the DriveMapper utility, you can easily change drive letters used in application configurations. This utility quickly and automatically replaces any invalidated (reassigned) partition drive letter with the valid (newly assigned) partition drive letter. For details on using DriveMapper, see *DriveMapper* on page 110.

Occasionally, Windows NT 3.5x becomes confused by PartitionMagic and makes unnecessary changes to drive letter assignments. If this happens, upgrade to Windows NT 4.0 or use Windows NT's Disk Administrator to change the drive letters back, as needed.

NOTE: After a partition is created or deleted, when you reboot the system the operating system sometimes fails to assign a drive letter to the CD-ROM drive. If this happens, follow the instructions in *Making the Operating System Assign a CD-ROM Drive Letter* on page 160.

Partitioning to Avoid Drive Letter Changes

There are some partitioning strategies you can use to avoid unwanted drive letter changes.

Preventing Changes Caused by Adding Primary Partitions

To avoid changes to drive letter assignments caused by adding a primary partition, if possible add primary partitions only to hard disks that already have at least one primary partition—this will prevent changes in logical partition letter assignments.

Preventing Changes Caused by Adding Logical Partitions

Whenever you add a new logical partition to any hard disk, if possible add it as the last logical partition on the disk. Then, the drive letter assignments for all existing partitions on that disk (including logical partitions) will stay the same (as long as you continue to boot with an OS that recognizes all of the same primary and logical partitions).

If possible, add the new logical partition as the last logical partition on the last disk. Consequently, the drive letter assignments for the existing partitions on all disks (including logical partitions) will stay the same.

NOTE: If there is free space between existing partitions (primary or logical), move all existing partitions to the left until all free space is shifted to the end (right) of the disk. Then, create the new logical partition in the free space at the end.

Preventing Changes Caused by Booting a Different OS

To prevent many changes to drive letter assignments that are caused by booting different operating systems, place partitions formatted with file systems that will be recognized by only some operating systems after partitions with file systems that will be recognized by all operating systems.

For example, suppose you will use both DOS and Windows NT and, thus, some of your partitions will be formatted as FAT partitions and some will be formatted as NTFS partitions. Because Windows NT will recognize both FAT and NTFS partitions, if you place all NTFS partitions after any FAT partitions, the drive letters assigned to your FAT partitions will remain the same, regardless of whether you boot with DOS or Windows NT.

We recommend placing FAT32, NTFS, and HPFS partitions after all FAT partitions.

Understanding the BIOS 1,024 Cylinder Limit

You can use PartitionMagic to safely partition any drive, regardless of the number of cylinders the drive has. In fact, to prevent you from performing partition operations that might cause you problems, PartitionMagic is careful to observe the BIOS 1,024 cylinder limit on systems where it applies.

The BIOS 1,024 cylinder limit will apply to your system only if 1) you have a hard disk with a capacity of more than 504MB, 2) the hard disk was manufactured before (approximately) 1994, and 3) the BIOS in your system does not have the INT 13 BIOS extensions built in.

NOTE: You may also encounter problems if your hard disk is larger than 8GB.

If you have such a system and you use only DOS, neither the DOS FDISK utility nor PartitionMagic will allow you to see any cylinders beyond the 1,024th cylinder (or include them in any partition). Space beyond the 1,024th cylinder will always remain invisible.

NOTE: If you use DOS and your system has the INT 13 BIOS extensions, PartitionMagic will let you see cylinders past the normal 1,024 limit and perform operations on partitions extending past the 1,024 cylinder limit.

Even if you have a system to which the BIOS 1,024 cylinder limit applies, you will not encounter any PartitionMagic limitation unless 1) you use both DOS and another operating system, 2) the other operating system is able to see and use disk space past the first 1,024 cylinders of the disk, 3) you use PartitionMagic (while running the other OS) or the FDISK utility of the other OS to create a partition extending beyond the 1,024th cylinder, and 4) you then run the DOS PartitionMagic executable.

If you use an operating system that is able to see and use disk space past the first 1,024 cylinders of the disk (OS/2, for example) and you create a partition that uses space beyond the 1,024th cylinder (with either PartitionMagic or the FDISK utility of the other OS), you may (or may not) be able to see that partition when running the DOS PartitionMagic executable.

When you run the DOS PartitionMagic executable and are able to see a partition that extends beyond the 1,024th cylinder, you will not be able to perform any operation on the partition. This operation restriction applies to both primary partitions and extended partitions that contain space beyond the 1,024th cylinder. If an extended partition exceeds the 1,024 cylinder limit, you will not be able to perform any operations on any of the logical partitions in that partition (even logical partitions that individually contain no space extending past the 1,024th cylinder).

Creating a Boot Manager Partition

If you install more than one operating system (residing in different partitions), you can use Boot Manager, which is provided as part of your PartitionMagic software package so that you can easily choose which operating system you want to run. After you install and configure Boot Manager, it will take control of your computer's booting process and display a menu of available partitions (as you named them) from which you can choose to boot.

Boot Manager requires its own separate partition. When you install Boot Manager, PartitionMagic automatically creates the smallest possible Boot Manager partition.

The Boot Manager partition must be within the first 1,024 cylinders of the first hard disk. We recommend putting the Boot Manager partition at the end of the first hard disk (but not past the 1,024th cylinder on disks that have more than 1,024 cylinders). This may help prevent drive letter assignment problems that can occur with the Windows NT operating system.

You can use PartitionMagic to install Boot Manager at any time. However, if you want to install OS/2 on a logical partition, you must create the Boot Manager partition and install Boot Manager first.

For details on installing, configuring, and using Boot Manager, see *Boot Manager* on page 84.

Changing the BIOS LBA Mode Setting

WARNING: Never change the Logical Block Addressing (LBA) mode setting in your system BIOS once data is present on any hard disk! This may cause data corruption.

If your system BIOS was designed following the Western Digital Enhanced IDE Implementation Guide, changing the LBA mode setting will change how the system translates logical CHS values. This can cause corruption of all files and partitions on the hard disk! There may be other BIOS designs (besides Western Digital) for which this is also a problem.

If you must change the LBA mode setting in your BIOS, back up all data on your disk(s) first. Then, contact the appropriate technical support departments (the system and disk manufacturers) to ensure you understand how to proceed safely.

Restoring System Files

Because PowerQuest's PartitionMagic makes changes to some system files, restoring system files from a backup made prior to running PartitionMagic may cause problems. After making changes using PartitionMagic, create new backups and restore only user files from previous backups. Do not restore the following files from previous backups: BOOT.DOS, BOOT.OS2, BOOTSECT.DOS, BOOTSECT.W95.

Appendix A

Using PartitionMagic With Other Programs

Norton Utilities

You can safely use PowerQuest's PartitionMagic and Norton products together. The following information will help you avoid any problems.

Norton Disk Doctor

If an extended partition ends at the end of a drive, Norton Disk Doctor (NDD) will sometimes display this message: "An extended partition has invalid parameters and probably is inaccessible. Correct this situation if you are unable to access partitions on hard disk 1. Do you wish to correct this problem?" To eliminate this message, use PartitionMagic to resize the logical and extended partitions at the end of the drive to leave some free space before the end of the drive.

In addition, when you delete, move, or resize partitions, it appears to NDD that you could have inadvertently deleted a partition. NDD will display the following message: "If you are unable to access a disk that you previously could, you should revive this partition. Would you like to revive this partition?" If you inadvertently deleted a partition, select **Yes**. Otherwise, take the following steps so that this message is not displayed every time you run NDD:

1. Select **No**. NDD will display this message: "You have chosen not to revive the partition. Do you want Norton Disk Doctor to mark the partition so it doesn't ask about it again?"

2. Select **Yes**. This will result in the dialog Create Undo File.

3. Select **Skip Undo File**. (Creating an undo file uses dozens of diskettes.) The next message reads: "If you wish to undelete this partition at a later time, use the /UNDELETE switch."

4. Select **OK**. NDD will display this last message: "Partition information has been changed. Would you like to restart your computer?"

5. Select **Restart Your Computer**.

Norton AntiVirus

Norton AntiVirus (NAV) interprets changes to partition tables or boot records as a potential virus attack. PartitionMagic takes steps so that NAV will automatically reinoculate. Should NAV give you the choice of repairing the changes, **DO NOT** select Repair. Instead, inoculate after using PartitionMagic.

Disk Compression Utilities

DriveSpace and DriveSpace 3

To use PartitionMagic with DriveSpace, you must first change the size of a DriveSpace or DriveSpace 3 drive in Windows 95 by doing the following:

1. Double-click on the **My Computer** icon.
2. Right-click on the drive you wish to alter.
3. Choose **Properties** from the pop-up menu.
4. Select the **Compression** tab.
5. Select **Advanced** from the Compression menu.
6. This brings up the Advanced Properties menu, from which you should select **Run DriveSpace**.
7. This will bring up a list of your physical drives, compressed drives, and host drives. Choose the compressed volume you wish to change.
8. At the top of this menu will be three options: Drive, Advanced, and Help. Choose **Drive**.
9. From the Drive menu, choose **Adjust Free Space**.
10. This will bring you to the Adjust Free Space menu. At the bottom of this menu you will notice a slide bar. If you move the slide bar to the left, you will get more compressed space (the compressed volume will be larger). If you move the slide bar to the right, you will get more uncompressed space (the compressed volume will be smaller).

    If you wish to shrink the host for a compressed drive, move the bar to the right to create more uncompressed space on the host. You can then use PartitionMagic's Resize option to resize the host partition smaller. If you have already used the Resize option to resize the partition larger and want to add more space to the compressed volume, move the slide bar to the left.

Stacker

PowerQuest's PartitionMagic is compatible with Stacker for OS/2 and DOS. This means that PartitionMagic can manipulate the physical partitions (uncompressed drives) that contain the Stacker compressed drives (the STACVOL*.* hidden file). Use the Stacker DOS Toolbox to change the Stacker compressed drive size.

Under OS/2, it is important that PartitionMagic show the drive letter for the physical partition (uncompressed drive) and not the compressed drive. If the drive letter is incorrect, there is a potential for data loss. If the drive letter for the partition you wish to change is not correct, write down the existing volume label and use PartitionMagic's Label option to assign each stacked drive the volume label STACVOL XXX, in which XXX is unique for each drive. Do not assign the physical partition (the uncompressed drive that contains the STACVOL*.* hidden file) a volume label that starts with STACVOL. After using PartitionMagic, you can change the volume labels back to their original names.

In order to shrink a physical partition containing a Stacker compressed drive, you may first have to shrink the Stacker drive with the Stacker DOS Toolbox. After expanding a physical partition containing a Stacker compressed partition, you must expand the Stacker drive to make the new space available for compression.

To change the size of a Stacker (compressed) drive, refer to the instructions on pp. 44–55 of the *Stacker 4.0 for OS/2 and DOS User's Guide*.

Operating System Boot Utilities

Both OS/2's Dual Boot and System Commander 2.0 and above work with boot sector changes made by PartitionMagic. To install System Commander on drives PartitionMagic has modified, you may have to use System Commander 2.06 or above.

If you have System Commander on your machine, you must configure it so that it will not simultaneously unhide multiple primary partitions (which results in multiple visible primary partitions). To configure System Commander so that it will not create multiple visible primary partitions, follow these steps for each operating system selection available on the System Commander menu:

1. To modify the options for a specific operating system, highlight it from the Operating System Selection menu.

2. Hold the **ALT** key and press **S**. From the resulting menu, choose the **Local Special Options** menu.

3. Choose **Primary partitions accessible on drive 0**.

4. This will bring up a screen with three selections: ALL, AUTO, and NONE. It will usually be set to AUTO. Change it to **NONE**. The other primary partitions will now be hidden when this operating system boots.

5. Repeat this procedure for all operating system selections available on the menu.

Virus Protection Software

PowerQuest's PartitionMagic makes changes to the master boot record and to the boot sectors of partitions. Virus protection software should be able to tell that PartitionMagic is changing partition tables and not boot code. However, it is possible that unsophisticated virus protection programs may mistake PartitionMagic's changes as attempts to install a virus. If this occurs, turn the virus software off while using PartitionMagic and inform the virus software manufacturer of the problem.

Some motherboards contain virus protection software within the BIOS. If this causes a problem when you are running PartitionMagic, disable the BIOS virus protection, then restart PartitionMagic.

Drive Overlay Programs

Drive overlays (for example, Ontrack DDO, Microhouse EZ-Drive or Pro-Drive, Maxblast, WD DDO, and Seagate DDO) provide your computer with access to larger disk drives. PowerQuest's PartitionMagic is compatible with drive overlay programs if the overlay program is loaded before using PartitionMagic.

If you boot your computer from a diskette (by putting in the diskette and rebooting), the overlay will not load, and PartitionMagic will not get the correct information from your drive. You can boot from a diskette and still load the drive overlay by doing the following:

1. Start your machine as if you were going to boot from the hard disk.

2. When prompted, press the space bar.

3. This will bring up the drive overlay information. It will give you the option of booting from a diskette.

4. Choose this option and insert the boot diskette when prompted.

Appendix B

Troubleshooting

This appendix gives solutions to problems that you may encounter while using PowerQuest's PartitionMagic. It explains how to resolve Check option and partition table errors and the problems that cause the most commonly occurring error messages.

Miscellaneous Troubleshooting

This section addresses the following situations:

- Running the PartitionMagic DOS Text Mode Executable
- Running the PartitionMagic OS/2 Text Mode Executable
- Freeing Enough Conventional Memory to Run PartitionMagic
- Making the Operating System Assign a CD-ROM Drive Letter
- Using PartitionMagic's Info Option on HPFS Partitions
- Using PartitionMagic With a SCSI Hard Disk

Running the PartitionMagic DOS Text Mode Executable

If you do not have Windows 3.x, Windows 95, Windows NT, or OS/2 and therefore cannot install the PartitionMagic executable for those operating systems, you can run a PartitionMagic DOS text mode executable from the CD-ROM or from a DOS boot diskette. To run the text mode executable from CD-ROM or from a DOS boot diskette:

1. From a DOS prompt, type *drive*:\ **PQMAGICT**, in which *drive* is the drive letter of your CD-ROM drive or the drive holding the boot diskette that contains the PartitionMagic text mode executable.

2. Press **Enter**.

HINT: You may need to install your CD-ROM driver to access PartitionMagic on CD-ROM. Although the DOS text mode PartitionMagic executable runs in DOS text mode, it operates in a fashion similar to the graphical user interface version of PartitionMagic described in Chapter 3 of this user guide.

NOTE: If you do not have enough free conventional memory to run the PartitionMagic text mode version, refer to *Freeing Enough Conventional Memory to Run PartitionMagic* on page 158.

Running the PartitionMagic OS/2 Text Mode Executable

Because PartitionMagic will not allow you to modify partitions containing open files, you cannot run PartitionMagic from the same OS/2 partition you need to modify or from the boot partition. To modify an OS/2 partition with open files, you can boot OS/2 from diskettes and then run the PartitionMagic OS/2 text mode executable from OS/2 Maintenance Mode.

To run the PartitionMagic OS/2 text mode executable from OS/2 Maintenance Mode:

1. Boot from the OS/2 installation diskette.

2. Insert OS/2's Diskette 1 when you are prompted to do so.

3. When the Welcome screen is displayed, press **F3** to enter OS/2 Maintenance Mode. (For OS/2 2.x, press **Esc** instead of F3.)

4. In Maintenance Mode, run **PMAGICOT** from the CD-ROM root directory or from a partition other than the partition you want to modify.

NOTE: When you run PartitionMagic in Maintenance Mode, you may receive the following error: SYS1804: The system cannot find the file VIOCALLS.DLL. To resolve this problem, copy VIOCALLS.DLL and PMAGICOT.EXE to a clean diskette. You should copy VIOCALLS.DLL from the diskette(s) you used to boot OS/2. Use the table below to determine the location from which to copy VIOCALLS.DLL (depending on the source from which you booted OS/2).

Boot Source	Location of VIOCALLS.DLL
OS/2 installation diskettes	Install Disk 1
OS/2 utility diskettes	Utility Disk 2
Different OS/2 hard-disk partition	\OS2\DLL

Freeing Enough Conventional Memory to Run PartitionMagic

The DOS PartitionMagic executable running under DOS, Windows 3.x, and Windows 95 requires a minimum of 585KB of memory in the first 640KB of the computer's address space (conventional memory). If you try to run PartitionMagic from DOS, Windows, or Windows 95 and find you do not have enough free conventional memory, you can free enough additional memory in a number of ways.

Running MEMMAKER

MEMMAKER is a program that automatically configures your computer to save conventional memory (while still loading all of the device drivers and other programs you usually load when booting DOS). MEMMAKER frees conventional memory by moving as many programs as possible out of conventional memory into high memory. Run MEMMAKER by typing **MEMMAKER** at a DOS prompt. Follow the on-screen instructions.

Using the F8 Key to Keep Programs From Loading

If running MEMMAKER does not free enough conventional memory, you can free more by pressing the **F8** key right after booting your computer (while DOS is booting). If you press the **F8** key, when DOS reads the commands from the CONFIG.SYS and AUTOEXEC.BAT files on your hard disk, DOS will ask you if you want it to execute each command. When you see commands that load device drivers or TSR programs that you will not need to run PartitionMagic, answer **N** (no) to tell DOS not to execute that command (not load that software into memory). This will conserve conventional memory.

Using an Operating System Boot Diskette

If running MEMMAKER and using the F8 key does not free enough conventional memory, you can create a boot diskette that allows you to boot using a very minimal amount of conventional memory.

To create a boot diskette for any version of DOS, Windows, or Windows 95, place in your diskette drive (A:) any diskette that does not contain information you want to keep. Go to a DOS prompt, type **FORMAT A: /S**, and press **Enter**.

If you are using Windows 95 or Windows 3.11, you can also format your diskette from Windows 95 Explorer (with **Copy System Files** selected) or Windows 3.x File Manager (with **Make System Disk** selected).

After the diskette is formatted and the operating system files are transferred, you will be able to boot the computer from the diskette. If you restart your computer with the diskette in the A: drive, your computer will boot using a minimal amount of conventional memory. After you boot from the diskette, you can run PartitionMagic from either the diskette or your hard disk.

Creating a CONFIG.SYS File on the Boot Diskette

If making an ordinary boot diskette doesn't free enough conventional memory, you can create a customized boot diskette that will free even more conventional memory. (With the customized diskette, you will free more conventional memory by loading some of the DOS operating system into high memory.) To customize the diskette, you must create a CONFIG.SYS in the root directory (C:\ ). Do this as follows:

1. Go to a DOS prompt. Type **A:** and then press **Enter**. Verify that you have changed to the A: drive (you see the A:\> prompt).

2. Type **EDIT CONFIG.SYS** and then press **Enter**. This will start the DOS editor (you will see a blank screen).

3. In the editor, enter the following:

   If you are using only DOS (not using any version of Windows), enter:

   ```
   DEVICE=C:\DOS\HIMEM.SYS
   DOS=HIGH,UMB
   ```

   If you are using any version of Windows (3.x or Windows 95), enter:

   ```
   DEVICE=C:\WINDOWS\HIMEM.SYS
   DOS=HIGH,UMB
   ```

   All lines must be entered in the order shown.

4. Save the file (in the editor) by choosing **File** and **Save**. Then exit from the editor (**File** and **Exit**).

You can now reboot your computer from the customized boot diskette. When DOS loads, much of it will be loaded into high memory (saving a maximum amount of conventional memory).

Deleting Operating System Compression Files

If you use DOS 6.22 or Windows 95 and your system doesn't have any compressed drives (for example, DriveSpace, DoubleSpace, or Stacker), you can delete the operating system compression files DRVSPACE.BIN or DBLSPACE.BIN from any boot diskette you create. This will free more conventional memory because DOS 6.22 and Windows 95 load the contents of these files into memory, regardless of what's in the CONFIG.SYS or AUTOEXEC.BAT. These files are hidden system files, so if you wish to delete them you will have to do the following:

1. From the DOS prompt, type **A:** to ensure that these changes are made to your diskette and not your hard disk.

2. Enter **attrib -r -h -s *.bin**.

3. Enter **del *.bin**.

Making the Operating System Assign a CD-ROM Drive Letter

If your computer has a CD-ROM drive or any form of removable media, you should be aware of potential problems with the way drive letters are assigned to these devices.

PartitionMagic does not make drive letter assignments; this is a function of the operating system. The operating system assigns drive letters in the following order: The first recognized primary partition on each hard disk will receive a letter, followed by all logical partitions on each hard disk. Next, the CD-ROM drive and any other form of removable media will be assigned a letter. For more information, see *How the OS Assigns Drive Letters* on page 137.

Because the CD-ROM is one of the last drives to receive a letter, any partitions that you create or delete on any of your hard disks will affect the drive letter assignment of your CD-ROM drive. This change in drive letter assignments is usually performed by the operating system automatically. Occasionally, however, the operating system will fail to assign a new drive letter to the CD-ROM drive. If this should occur, please follow the steps listed below.

If you are using DOS/Windows 3.11 or are loading your CD-ROM drivers under DOS with Windows 95:

1. At a DOS prompt, enter **Edit C:\CONFIG.SYS**.

2. This will start the DOS editor program and open your CONFIG.SYS file. Look for this line: LASTDRIVE=*drive* (in which *drive* is any letter of the alphabet). Change *drive* to **Z**. This will allow the OS to assign all drive letters through Z.

3. Select **File**, then **Exit**. When you are asked whether you want to save the file, select **Yes**.

4. You should now be back to a C:\ prompt. Enter **Edit C:\AUTOEXEC.BAT**.

5. This will start the DOS editor program and open your AUTOEXEC.BAT file. Look for a line that includes the word "MSCDEX." The /L:*drive* parameter (in which *drive* is the drive letter that was assigned to your CD-ROM before you made changes with PartitionMagic) may appear at the end of this line. Change this letter to **Z**. Because the OS will assign all other available drive letters before assigning Z, this will ensure that partition changes you make in the future will not invalidate your CD-ROM drive letter. For more information, type **HELP MSCDEX** at a DOS prompt.

NOTE: If your computer is on a network, when you log in to the network the letter Z and other letters at the end of the alphabet may be assigned to network search drives. In this case, assign your CD-ROM a letter just before the last letter used by the network search drives.

6. Select **File**, then **Exit**. When you are asked whether you want to save the file, select **Yes**.

7. When you see the DOS prompt (C:\), reboot your machine.

If you are using Windows 95 and Windows 95 drivers for the CD-ROM:

1. Click **Start**. Select **Settings**, **Control Panel**, and **System**.

2. From the System Properties screen, select **Device Manager**.

3. This will bring up a list of the devices in your computer. Look for "CDROM." Double-click on it; the name of your CD-ROM drive will appear directly below. Double-click on it.

4. Select the **Settings** tab.

5. At the bottom of the Settings page, you will see the heading Reserved Drive Letters. Under this heading are two listings, Start Drive Letter and End Drive Letter. Change the values for these listings to **Z**. Because the OS will assign all other available drive letters before assigning Z, this will ensure that partition changes you make in the future will not invalidate your CD-ROM drive letter.

6. Select **OK** to close the Settings page. Then select **OK** to close the System Properties page.

7. When you are asked to restart your computer, select **Yes**.

Using PartitionMagic's Info Option on HPFS Partitions

When troubleshooting HPFS partitions, you should use PartitionMagic's Info option instead of OS/2's CHKDSK because OS/2's CHKDSK may report inaccurate information about HPFS partitions.

PartitionMagic displays all size information in bytes and in sectors (one sector = 0.5KB, or 512 bytes). OS/2's CHKDSK displays all size information in kilobytes (KB), rounds down to the nearest kilobyte, and contains minor inaccuracies (see the Technical Support area of PowerQuest's Web site for more information). As a result of CHKDSK's rounding, PartitionMagic and CHKDSK commonly report a partition size difference of 512 bytes. The size reported by PartitionMagic is accurate.

Using PartitionMagic With a SCSI Hard Disk

To use PartitionMagic on a SCSI hard disk, you must have a SCSI controller card that supports software Interrupt 13. Most SCSI controller cards let the user enable software Interrupt 13 support in the BIOS through the card. If your SCSI controller card does not allow you to set it to use software Interrupt 13, PartitionMagic will not work on drives attached to your SCSI adapter. Contact the manufacturer of the SCSI adapter to determine if your adapter can support software Interrupt 13. As a general rule, if FDISK can be used to partition the drive, so can PartitionMagic.

Resolving Check Errors

When an option is selected, PartitionMagic checks the integrity of a partition very thoroughly prior to making changes to a partition. These checks are substantially the same as those made by the operating system's CHKDSK, SCANDISK, or AUTOCHK utility. The Check and Info options perform these same checks and display error messages when they find problems.

If you receive a Check error message for any partition, after backing up your hard disk run your operating system's CHKDSK program on that partition (do not use the /F switch on the initial run). (Run SCANDISK if you have MS-DOS 6.x or Windows 95.) These programs usually show the same problem(s) as PartitionMagic (except the DOS CHKDSK program does not detect problems in Extended Attributes).

If CHKDSK (or SCANDISK) does not show the same error(s) that PartitionMagic's Check operation shows, contact PowerQuest at the numbers listed in Appendix D.

If the CHKDSK (or SCANDISK) program and the PartitionMagic Check option detect the same errors (which is usually the case) run CHKDSK with the /F switch to fix the problem(s). (Run SCANDISK if you have DOS 6.x or Windows 95.)

After running CHKDSK with the /F switch, try running CHKDSK without using the /F switch to make sure the partition is free of errors. Under OS/2, you should perform this procedure twice before proceeding.

After CHKDSK reports that the partition contains no errors, run PartitionMagic's Check option. If PartitionMagic still reports a problem, reformat the partition and restore your files from the backup copy to correct the error.

PartitionMagic also checks a partition after modifying it. If this check fails, report the problem to PowerQuest at the numbers provided in Appendix D. While data loss is possible, in this case it is not typical. The problem is usually a minor file system error that CHKDSK /F can correct without data loss. For more extensive errors, you may need to restore your files from a backup copy.

Resolving Partition Table Errors

Unless specific instructions are given later in this appendix, to resolve partition table errors you must create new, error-free partition tables. The general steps for doing this are as follows: 1) make sure you have no viruses (see *Partition Tables and Viruses* below), 2) back up the data on the affected partitions, 3) delete the partitions, 4) recreate them, and 5) restore their contents. You may need to use the FDISK program from a recent DOS version (earlier versions may refuse to delete HPFS or hidden partitions). The OS/2 FDISK program may recognize the partition's corruption and refuse to modify it.

Partition Tables and Viruses

If partition changes made under one operating system are not reflected under the other, and vice versa, it is possible that a master boot record (MBR) virus is present.

Use a virus check utility that can detect the latest viruses. If a virus is found, data loss is likely. Before removing the virus, boot each of the operating systems and use the PartitionMagic Check option to evaluate the integrity of the partition. Back up the files from any partition that passes the Check operation.

After backing up the files from all operating systems, remove the virus, then perform the Check operation on the partitions again. Delete and recreate any partitions that fail the check. Finally, reinstall the operating systems and restore the backup files as necessary.

Error Messages and Solutions

PartitionMagic error messages and possible resolutions are listed below, by number. The messages are also grouped in number ranges, by error category.

NOTE: If you encounter an error that is not mentioned in this appendix, visit PowerQuest's home page at http://www.powerquest.com for a complete listing.

Miscellaneous Errors (3–38)

#3 Not enough memory

The DOS PartitionMagic executable running under DOS, Windows 3.x, and Windows 95 requires a minimum of 585KB of memory in the first 640KB of the computer's address space (conventional memory) and 8MB of total memory. For possible solutions if you don't have enough conventional memory, see *Freeing Enough Conventional Memory to Run PartitionMagic* on page 158.

#8 Could not allocate/deallocate DOS real mode memory

The DOS PartitionMagic executable running under DOS, Windows 3.x, and Windows 95 requires some memory in the first 1MB of the computer's address space (PartitionMagic uses a DOS extender). If not enough memory is available, PartitionMagic cannot access the hard disk. For possible solutions, see *Freeing Enough Conventional Memory to Run PartitionMagic* on page 158.

#9 Not enough memory to complete the operation. No changes were made.

This error usually occurs when you are running the PartitionMagic OS/2 executable after booting OS/2 from diskette on a computer that has only 4MB of memory. When PartitionMagic is loaded into memory, about 300KB of memory remain. This may not be enough memory for PartitionMagic to complete selected operations. During an operation, PartitionMagic will determine whether there is enough free memory to continue safely. If PartitionMagic detects that there is not enough memory to complete the next set of changes, it will display this error. Rather than risk losing data, PartitionMagic aborts the operation without making changes.

The simplest solution in this case is to run the DOS executable, rather than the OS/2 executable.

#23 Unsupported version of operating system

The operating system versions that are required to run PartitionMagic are listed in the System Requirements table in the introduction to this user guide.

#26 XXXXX.DAT not found

The DOS PartitionMagic executable requires the data file PQDW95.DAT. This file contains user interface objects and must be in the same directory as PartitionMagic. For Help information, PQHELP.DAT is required. If a required .DAT file is missing, reinstall PartitionMagic. (The files cannot be simply copied from the CD-ROM because they are in compressed form.)

#27 Cannot lock drive

Under multitasking operating systems (such as OS/2 and Windows 95), PartitionMagic must lock a partition before it can safely modify it. If the hard disk contains files that are in use by another process, PartitionMagic cannot lock the partition. For information about how to avoid this error, see *The Open Files Limitation of OS/2* on page 59.

#34 This beta or evaluation version is no longer safe to use

PowerQuest occasionally releases beta versions and evaluation versions of PartitionMagic. Both versions are not as safe as release versions; therefore, PowerQuest builds an expiration date into each version. After a predetermined test period, the beta or evaluation version will no longer function.

#36 DPMI Server error

PartitionMagic DOS executables use a DOS extender. This error indicates a failure during a call made from PartitionMagic through the DOS extender (to DOS or to the BIOS). The DOS extender may be in conflict with other programs that use extended memory. DOS would load the conflicting programs from your CONFIG.SYS or AUTOEXEC.BAT file during the normal boot sequence.

You may be able to resolve this problem by pressing the **F8** key while booting DOS. After DOS boots and starts to read the commands from your CONFIG.SYS and AUTOEXEC.BAT files, DOS will ask you if you want to execute each command. When you see commands that load device drivers or TSR programs that you think might be conflicting with the PartitionMagic DOS extender, answer **N** (no) to tell DOS not to execute that command (not to load that software into memory). You will often be able to find a program configuration that will enable PartitionMagic (the DOS extender) to run without error.

#37 File or app is open on partition

Under multitasking operating systems (such as OS/2 and Windows 95), PartitionMagic must lock a partition before it can safely modify it. If the hard disk contains files that are in use by another process, PartitionMagic cannot lock the partition. For information about how to avoid this error, see *The Open Files Limitation of OS/2* on page 59.

#38 Program is running from that partition

You have selected an operation that will modify the OS/2 partition from which PartitionMagic is running. Use the PartitionMagic DOS executable or copy PartitionMagic and any necessary .DAT files (see error #26) to a different partition or to a diskette, then run PartitionMagic from the different partition or the diskette.

Disk Access Errors (40–56)

Errors in the 40–56 number range indicate that accessing your disk is not possible, and, often, are the result of hardware problems. Some problems may have simple solutions. For other problems, the only solution may be replacing the hard disk. When possible, PartitionMagic detects major errors before any changes have been made so you can back up your data before replacing the hard disk.

#49 Write fault
#50 Read fault

PartitionMagic is unable to write to/read from a specific sector on the hard disk. There are a number of possible causes of this error:

1. If your PC beeps or displays a black box in the middle of the screen, virus protection is enabled in your computer's BIOS. Disable virus or boot sector protection in the BIOS.

2. A virus protection application (which may be a TSR or DLL program) is in use. Disable the application before using PartitionMagic.

3. There is a bad sector on the hard disk (this is usually the case with only older hard disks). Run SCANDISK on the hard disk to perform a surface scan to verify the existence of bad sectors. If your drive has bad sectors, we recommend you replace it.

4. You have set up disk mirroring with PC-Tools. Disable the disk mirroring option.

Miscellaneous Errors (70–72)

#70 Windows was detected
Because PartitionMagic makes low-level changes to your hard disk, it must have exclusive access to the disk in order to keep your data safe. Because Windows 3.x is a multitasking operating system that does not provide PartitionMagic exclusive access to the disk, it is not safe to run PartitionMagic under Windows 3.x. In your Program Manager, select **File**, choose **Exit Windows**, then restart PartitionMagic from DOS. The same problem can occur in Windows 95. From Windows 95, run PartitionMagic in MS-DOS mode.

#71 DesqVIEW was detected
Because PartitionMagic makes low-level changes to your hard disk, it must have exclusive access to the disk in order to keep your data safe. Exit DesqVIEW before running PartitionMagic.

#72 DOS Shell was detected
Because PartitionMagic makes low-level changes to your hard disk, it must have exclusive access to the disk in order to keep your data safe. Exit DOS Shell before running PartitionMagic.

Partition Table Errors (100–199)

Errors in the 100–199 number range are partition table errors. For general information about solving this type of error, see *Resolving Partition Table Errors* on page 164 and *Partition Tables and Viruses* on the same page.

#100 Partition table is bad
The master boot record (MBR) can contain, at most, one extended partition, and each extended partition boot record (EPBR) can contain, at most, one link to another EPBR. This error occurs when a partition table violates the foregoing rule. Since any modifications PartitionMagic makes may decrease the amount of data that is recoverable from the hard disk, PartitionMagic will not recognize any of the hard disk's partitions. If you must create new, error-free partition tables to resolve your problem, see *Resolving Partition Table Errors* on page 164 for instructions on doing so.

#104 No sectors in partition
No partition should contain zero sectors. Delete the partition before using PartitionMagic.

#105 Partition starts on wrong boundary
The hard-disk partition table contains erroneous values. PartitionMagic expects FAT, NTFS, and HPFS partitions to begin and end on the boundaries used by FDISK. If they do not, the disk may be partially corrupted. In this circumstance, if PartitionMagic were to make any modifications it might cause the loss of data. Therefore, PartitionMagic will refuse to recognize any of the hard disk's partitions. To resolve this problem, see the instructions in *Resolving Partition Table Errors* on page 164.

#106 Partition doesn't start with sector one
See error #105.

#107 Partition begins after end of disk
This error can occur when you are running PartitionMagic on a hard disk that uses more than 1,024 cylinders. Under DOS, PartitionMagic is restricted by the BIOS 1,024 cylinder limit. If any partitions extend beyond the limit, PartitionMagic cannot safely operate on the hard disk. To use the full capacity of hard disks with more than 1,024 cylinders, you must run the PartitionMagic executables under either OS/2 or Windows 95. This error can also occur when you are booting OS/2 from a diskette, and the correct drivers for the hard disk are not present on the diskette.

This error can also occur if a partition erroneously extends beyond the physical end of the hard disk. This may happen if the hard disk has been used on a different computer or with a different hard-disk controller or if BIOS settings have been changed. Be advised that the physical geometry of the hard disk may differ from the logical geometry assigned to the hard disk by the operating system.

#108 Partition doesn't end at end of cylinder
See error #105.

#109 Partition ends after end of disk
See error #107.

#110 Partition table number of sectors is inconsistent
The hard-disk partition table contains two inconsistent descriptions of the number of sectors on the hard disk. This error is serious if both DOS and another operating system use the hard disk. Because DOS uses one description and other operating systems may use the other, data loss is likely once the partition is almost full. To resolve this error, see the instructions in *Resolving Partition Table Errors* on page 164.

#111 Logical partition starts outside Extended
The hard-disk partition table contains erroneous values. All logical partitions must be totally contained within the extended partition. To resolve this error, see the instructions in *Resolving Partition Table Errors* on page 164.

#112 Logical partition ends outside Extended
See error #111.

#113 Partitions overlap
The hard-disk partition table contains erroneous values. If data partitions overlap, writing to one may destroy data in another.

This error is sometimes the result of an OS/2 FDISK bug. If free space exists within the extended partition, OS/2's FDISK program allows a primary partition to be created that overlaps the extended partition. A logical partition is subsequently created in the space occupied by the overlapping primary partition.

If a primary partition overlaps the end of the extended partition but does not overlap any logical partitions within the extended partition, the problem can be remedied by patching the partition table. **Only qualified individuals should attempt this repair! An incorrect patch could destroy all data on the hard disk!** In most instances, you should resolve the problem as explained in *Resolving Partition Table Errors* on page 164.

#116 Partition table Begin and Start inconsistent
The hard-disk partition table contains two inconsistent descriptions of the partition's starting sector. This error can occur if the operating system reports a hard-disk geometry that is different than the geometry in use when the partition table was written. Possible causes of the hard-disk geometry changing are: 1) different operating systems (for example, DOS and OS/2) report different hard-disk geometries, 2) you boot from a diskette that loads a different driver than is loaded when you boot from the hard disk, 3) upgrading the operating system (for example, from OS/2 2.x to OS/2 Warp) causes a different driver to be used, 4) the hard disk or controller has been changed, 5) the BIOS has been upgraded, 6) the BIOS LBA setting has been changed, or 7) there is a partition table virus present on the hard disk.

In most instances, you should resolve the problem as explained in *Resolving Partition Table Errors* on page 164. You can also use a virus scanning program to remove any partition table virus. Data loss is possible if the number of heads or sectors per track has changed since you first created your partitions.

#117 Partition's drive letter cannot be identified

Under OS/2, PartitionMagic must be able to find the drive letter for each partition before modifications can be made. There are various reasons why OS/2 might not be able to find a drive letter for each partition. For example, a driver on your system may change the drive letters from their defaults, or your partitions may not have serial numbers.

The solution is to run PartitionMagic from DOS or from MS-DOS mode (in Windows 95). When PartitionMagic runs from DOS or from MS-DOS mode, it does not need to be able to find the drive letter for each partition. Thus, if the problem indicated by this error message is the only problem, PartitionMagic will run successfully.

#118 Two partitions have the same serial number

PartitionMagic may require all partitions on your system to have unique serial numbers. This is typically the case when a drive letter change has occurred as a result of loading a driver for disk compression or drive letter remapping.

If this error occurs under OS/2 and you have Stacker (which assigns duplicate serial numbers), use the PartitionMagic Label option to assign each compressed volume the volume label STACVOL XXX, in which XXX is unique for each volume. Do not assign the host partition (the partition that contains the STACVOL*.* hidden file) a volume label that starts with STACVOL. Once each compressed volume is labeled, PartitionMagic ignores duplicate serial numbers on the compressed volumes. After using PartitionMagic, you can change the volume labels back to their original names.

You can use the SNUTIL utility included with PartitionMagic to change the serial numbers of physical FAT partitions. You cannot use SNUTIL for HPFS partitions, network volumes, compressed volumes, or other volumes that are not physical partitions.

#119 A drive has been formatted since starting PartitionMagic

When you start PartitionMagic, it reads information about each partition into memory. If you switch to another window and format a partition, you must exit PartitionMagic and restart it to allow PartitionMagic to recognize the change.

#120 The logical drive chain is incompatible

This error occurs under some OSs when logical partitions are not chained together in the expected order. DOS, OS/2, Windows 95, and Windows NT require that logical partitions be chained together in ascending order. Some other operating systems do not require this. For example, some versions of the Linux FDISK utility chain logical partitions together in the order they are created. This error message identifies a very dangerous situation; using the DOS FDISK in this situation can cause loss of one or more partitions.

For solutions to this problem, see the instructions in *Resolving Partition Table Errors* on page 164. If you decide to back up your data and recreate your partitions, you may have to use the same partitioning program that you used to create the partitions in order to delete them.

#121 The first sector of the drive cannot be read
The first sector of the hard disk (cylinder 0, head 0, sector 1) contains the master boot record (MBR) and the primary partition table. PartitionMagic cannot make changes to this hard disk because an error occurred when it read the first sector. See error #50 for information on resolving this error.

#122 A bad sector was found in the current or new partition area
The partition cannot be moved safely because there is a bad sector in the new or current partition area. When you see this error message, the move operation will be aborted before any corruption can occur. Try moving the partition to a different place. If your hard disk has bad sectors, we recommend that you replace the hard disk.

File I/O Errors (300–399)

#300 A file with the specified name already exists
This error message will be displayed if there is a file name conflict when PartitionMagic attempts to change a partition's cluster size. To perform a cluster resizing operation, PartitionMagic creates files that have a .MAG extension. If there are existing files that are named the same as the files PartitionMagic is trying to create, it will not write over these files.

The solution is to either rename or delete the existing files. To see existing files that have a .MAG extension, enter **ATTRIB *.MAG -r -s -h**. Then, look at the files to see what they are. If you need to keep the existing files, rename them (use a different extension). If you don't need to keep the existing files, delete them. Then, retry the operation.

Check Errors (500–599)

Check errors occur when PartitionMagic checks the integrity of a partition. For useful general information about resolving these errors, see *Resolving Check Errors* on page 163 in this appendix.

#500 Subdirectory is corrupted
This error message will reveal the name of the corrupted subdirectory. Back up the contents of that directory and its subdirectories. You can then delete the corrupted subdirectory.

#506 Not enough free space on partition to shrink
Some free space (which is dependent on the hard disk's current contents) is required to resize a partition smaller. Delete unneeded and duplicate files in the partition and then attempt the operation again.

#508 As specified, the operation does not change the partition
You have entered a value that is the same as or (when rounded to the required cylinder boundary) rounds to the same as the partition's present value. Enter a larger change.

#509 A bad sector was detected in the current or new FS area
In order to perform the resize operation that you requested, PartitionMagic attempted to expand the file system area. However, the program found a bad sector in the new area. Try moving the partition before you resize it. No corruption will occur when you encounter this error.

#510 The version of the file system is not supported
An updated version of PartitionMagic is required to operate on this new version of the file system. Visit http://www.powerquest.com for information about updated versions of PartitionMagic.

User Interaction Errors (950–999)

#950 Unable to detect any disk drives
No partitionable hard disks were found on your computer. Diskette drives and many removable media drives do not support partitioning. PartitionMagic cannot perform operations on disks in such drives.

#951 User entered an invalid value
The value entered is outside the range or (when rounded to the required cylinder boundary) rounds to a value that is outside the range for the operation specified. Check the displayed range and reenter the value.

#952 Value entered is the same as the current value
See error #508.

#953 Need larger change
See error #508.

#967 Could not perform operation to the value specified
This error occurs only in the enterprise version of PartitionMagic from a running script. If the value specified on a resize or move operation is not between the minimum and maximum possible, script execution will stop and this error will be displayed.

#968 Incorrect Volume Label entered, Deletion not performed
To delete a partition, PartitionMagic requires you to enter that partition's volume label. If the volume label you enter does not match the volume label of the partition you want to delete, this error will appear.

#969 Incorrect Volume Label entered, Unable to proceed.
To format an existing partition, PartitionMagic requires you to enter that partition's volume label. If the volume label you enter does not match the volume label of the partition you are attempting to format, this error will appear.

#970 Invalid Bad Sector Check value specified
This error occurs only in the enterprise version of PartitionMagic from a running script. If the script command SET DEFAULT BAD SECTOR TEST STATE is not followed by either ON or OFF, this error will be displayed.

#971 The label entered was too long
When you enter a volume label, the process that checks the validity of the label will display this message if the label is too long. The label must be no longer than 11 characters.

#972 Invalid characters in the label
When you enter a volume label, the process that checks the validity of the label will display this message if the label has characters that are invalid. Invalid characters include the following: [* ? : < > | + = ; \ / " ,].

#973 Volume Label cannot have leading spaces
When you enter a volume label, the process that checks the validity of the label will display this message if you enter a label in which a space or spaces are the leading characters.

#974 Root size specified was not in the valid range
This error occurs only in the enterprise version of PartitionMagic from a running script. If you use the Create, Format, or Resize Root commands, and the number of root entries specified is not within the acceptable range for that partition, PartitionMagic will display this error. Generally, the valid range will be from 64 to 1,024.

#975 The cluster size specified was invalid for this partition
This error message displays only in the enterprise version of PartitionMagic from a running script. Many commands have a cluster size option. If a script command specifies an invalid cluster size (for the type and size of the partition), PartitionMagic will display this error.

#976 Cannot create the file system specified in the current space
This error message displays only in the enterprise version from a running script. When you use the Create or Format commands, you must also choose a file system type. If the file system or partition type you specified cannot be created in the space available, PartitionMagic will display this error.

#977 Partition selected is invalid
This error message displays only in the enterprise version of PartitionMagic from a running script. If the partition selected from the Select Partition command is not a valid partition, PartitionMagic will display this error.

#978 Unable to set to the proper partition after the last operation. Script halted.
This error message displays only in the enterprise version of PartitionMagic from a running script. After each operation, PartitionMagic will ensure that the right partition is still selected. If PartitionMagic is not able to select the proper partition, it will end script processing and display this error.

Check Errors (1000–1500)

Check errors occur when PartitionMagic checks the integrity of a partition. For useful general information about resolving these errors, see *Resolving Check Errors* on page 163 in this appendix.

#1002 Found orphaned Extended Attribute
If this error occurs, boot OS/2 from a diskette and then run OS/2's CHKDSK program using the /F switch. If you no longer have OS/2 on your machine, you can select the Ignore OS/2 EA Errors on FAT option (under Preferences) in PartitionMagic.

#1010 Number of sectors not equal to file size
This error may indicate that there are open files on the hard disk. Shut down and restart OS/2. If this does not resolve the problem, run the OS/2 CHKDSK program.

#1015 System sector not marked unavailable

This error may indicate that there are open files on the hard disk. Shut down and restart OS/2, booting from diskettes. If this does not resolve the problem, run OS/2's CHKDSK program. This error message may also indicate that a file is listed with a file length of zero. OS/2's CHKDSK program will not fix this problem. As a last resort, delete the offending file.

#1019 Bitmap sectors not marked unavailable

This problem may indicate that there are open files on the hard disk. Shut down and restart OS/2. If this does not resolve the problem, run OS/2's CHKDSK program. As a last resort, delete the offending file.

This error message can also appear when you try to perform the Check operation on the partition from which PartitionMagic is running. Try running PartitionMagic from another partition or from a diskette.

#1027 Could not account for all sectors

This error may be resolved in one or more of the following ways:

1. If you are working with an HPFS386 partition, check the technical support area of PowerQuest's Web site for more information.

2. If you are trying to run PartitionMagic from the partition that you want to modify, run PartitionMagic from a different partition.

3. If CHKDSK has created any FOUND.000 or *.CHK files, delete them.

4. If the error message indicates the name of the offending file, delete it.

5. Turn off the disk-mirroring option in PC-Tools.

6. If none of the above solutions works, back up the partition, delete it, recreate it, and restore the data.

#1045 Stac volume detected—delete Stac volume before converting

This error message occurs when you attempt to convert a partition to HPFS, and the existing partition contains a STAC volume. Stacker cannot access a STAC volume that is on an HPFS partition. Delete the STAC volume from the partition before converting to HPFS.

NTFS Check Errors (1500–1699)

Errors 1500–1699 are NTFS-specific error messages. In this context, "attribute" does not mean read-only, hidden, system, and so on. Rather, "attribute" means one of a file's data streams.

Check errors occur when PartitionMagic checks the integrity of a partition. For useful general information about resolving these errors, see *Resolving Check Errors* on page 163 in this appendix.

#1501 Wrong version of NTFS
The partition was created using a version of the NTFS file format that PartitionMagic cannot work with.

#1503 Bad NTFS cluster size
The NTFS cluster size must be 512, 1,024, 2,048, or 4,096 bytes.

#1512 Restart record mismatch
The two restart entries in the journal file are different. This may happen if Windows NT is not properly shut down. To fix this problem, restart Windows NT and shut it down using the Shut Down command.

#1516 Partition improperly dismounted
The partition dirty flag is set in a restart record in the journal file. This error may have been caused by a power failure or system crash while the Windows NT operating system was writing the partition. Reboot Windows NT and execute CHKDSK /F to repair the damage.

#1527 Bad update sequence number
A buffer contains mismatched update sequence numbers. This error may have been caused by a power failure or system crash while the Windows NT operating system was writing to the partition. Reboot Windows NT and execute CHKDSK /F to repair the damage.

#1529 Information mismatch in directory entry
A file attribute stored in a file record is different from the attribute stored in its directory entry. If this error is in a system file (file 0–10), Windows NT's CHKDSK program will not fix it, but Windows NT will rebuild the root directory on the partition the next time the operating system is started.

#1538 Can't find contiguous space to move
The partition does not contain enough contiguous free space to hold the new copy of a file that must be contiguous. You will normally encounter this error when you use the Resize option to resize a partition smaller.

#1539 File size mismatch
The size of a system file (file 0–10) recorded in its file record does not match either the size recorded in its directory entry in the root directory or the size of its data stream.

#1544 External attribute list in external attribute
An external file record has an external attribute list.

#1545 File attributes out of order
The attributes in a file must appear in order of increasing numeric type.

#1546 Attribute neither resident nor nonresident
The attribute resident flag has a value other than resident or nonresident.

#1547 Wrong run limits
A run has more clusters than the difference between its highest and lowest cluster.

#1548 File table has fewer than 16 entries
The file table must have at least 16 entries.

#1549 File table has more than 4 billion entries
The file table must have fewer than 4 billion entries.

#1644 Bad system file sequence number
A system file has a bad sequence number. System files must have a sequence number from 0 to 10. A partition with this problem may pass a run of Windows NT's CHKDSK program, but Windows NT will not mount the partition the next time the operating system is started.

#1647 Error in root directory index
There is an error in the root directory's index. Running Windows NT's CHKDSK program will not fix this problem, but the Windows NT operating will automatically rebuild the root directory on the partition the next time it is started.

FAT Check Errors (2000–2099)

Check errors occur when PartitionMagic checks the integrity of a partition. For useful general information about resolving these errors, see *Resolving Check Errors* on page 163 in this appendix.

#2001 FAT copies are not identical

Run SCANDISK to fix this error.

This problem may also be caused by a virus. Run a virus checker and remove the virus if possible.

#2005 One or more lost clusters were found

Run SCANDISK or CHKDSK to fix this error.

#2012 Formatted FAT file system too big for partition

This error can be caused by the following circumstances:

1. The number of sectors in the partition is larger than 65,536, and the bsHugeSects field of the boot sector ("Big total number of sectors" in Norton's DISKEDIT utility) shows that there are more sectors in the partition than the partition table shows.

2. The number of sectors in the partition is less than 65,536, and the bsSects field of the boot sector ("Total sectors on disk" in Norton's DISKEDIT utility) shows that there are more sectors in the partition than the partition table shows.

This situation can result in data loss when the FAT file system tries to use space outside the partition that does not exist or that belongs to another partition. Since file data may exist outside the partition boundary, you cannot fix the problem by simply patching the boot sector.

To correct the error, back up all data on the partition, delete the partition, recreate the partition, and restore the data. Alternately, it has been reported that you can use Norton Disk Doctor to fix this problem.

#2013 A component of FAT geometry is bad

This error can be caused by the following circumstances:

1. The number of clusters on the hard disk is greater than the FAT limits allow. This can result from bad values in the boot sector for the number of sectors, FATs, root entries, reserved sectors, and sectors per cluster.

2. The number of sectors in the FAT is not large enough to hold the number of clusters present on the hard disk.

A qualified consultant may be able to fix the hard disk by performing simple patches. Alternately, you can back up the data on the partition, delete the partition, recreate the partition, and restore the files.

#2024 The OS/2 Extended Attribute file is corrupt

This error is caused by any program that mistakenly writes to or overwrites the OS/2 Extended Attribute file. If this error occurs, you should back up your data, delete the partition, recreate the partition, and restore your data.

Appendix C

Running Diagnostic Reports

PARTINFO Program

PARTINFO.EXE is a PartitionMagic program that you can use to generate a report that shows the contents of your hard disk's partition table. You can use the information in the report to solve various partitioning problems. (See *Error Messages and Solutions* on page 164.)

To run PARTINFO, first go to a C:\ prompt.

To send a report directly to your printer, enter:

PARTINFO >LPT1

To save the report as a text file (PARTINFO.TXT) in the C:\ directory, enter:

PARTINFO > C:\PARTINFO.TXT

You can send the results obtained by running PARTINFO to PowerQuest. Fax printed reports to 1-801-226-8941. Send a PARTINFO text file (PARTINFO.TXT) as an E-mail message attachment to support@powerquest.com. PowerQuest will help diagnose any problems and help you fix them.

When you send a PARTINFO report, please also include all information requested in the first two pages of Appendix D.

Appendix D

Technical Support

Before You Contact Technical Support

PowerQuest is committed to providing you with comprehensive technical support. However, before calling our technical support department, please try to resolve your problem by using this guide and the PartitionMagic online Help. Also, check the README.TXT file for information that has changed since this guide was printed.

If you cannot find the solutions you need in this guide or the PartitionMagic online Help, please have the following information ready or send it along when you contact technical support:

Your Company Name _____

Your Name _____

Your Voice Phone Number _____

Your Fax Phone Number _____

PartitionMagic Serial Number _____(Place Serial Number Sticker Here)_____

Computer Manufacturer _____

Computer Model and Model Number _____

Date of Computer Manufacture _____

Processor Type _____ (386, 486, Pentium)

Amount of Memory (RAM)_____**MB**

Operating System/Version Number _____ (DOS 6.21, etc.)

Other hardware. Include bus type (ISA, EISA, MCA, PCI, VESA), hard disk model, and external drives.

_____

_____

_____

_____

_____

Memory resident software. Include memory managers and list their version numbers.

_____

_____

_____

_____

_____

Contacting PowerQuest Technical Support

If you cannot get the help you need from this guide or the PartitionMagic online Help, you can contact our technical support department in any of the ways listed below. You must be a registered PartitionMagic user to receive the following types of technical support. PowerQuest offers free support for three months from the day we receive your registration.

Fax

801-226-8941

Fax the information listed on the pages above and a description of your problems to the technical support fax number. This service is available in the U.S. and Canada, 24 hours a day, 7 days a week. We try to respond to all fax requests within 24 hours.

BBS

801-226-5608

Call the PowerQuest bulletin board for product information and answers to frequently asked technical questions. The correct modem setup is N-8-1. Our BBS supports transmission speeds from 1200bps to 28.8Kbps.

Telephone

801-226-6834

Support is available Monday through Friday, 8 a.m. to 5 p.m. MST/MDT.

Internet

You can contact PowerQuest through the Internet by sending an E-mail message to **support@powerquest.com**. For additional information, visit our home page at **http://www.powerquest.com**.

Postal Service Mail

Our United States Postal Service address is:
PowerQuest Corp. • 1083 N State Street • Orem, Utah 84057 • USA

Ordering 3.5-Inch Diskettes or Other Products From PowerQuest

To purchase 3.5-inch diskettes of PartitionMagic 3.0 for a nominal fee or to purchase other products from PowerQuest, in the U.S., please call 1-800-379-2566, Monday through Friday, 8 a.m. to 5 p.m. MST, or send an E-mail message to magic@powerquest.com. Sorry, technical support is not available at this phone number or E-mail address.

Glossary G

active partition
One of the primary partitions on the first hard disk is marked "active," meaning it is the partition from which an operating system will be booted when the computer starts up.

ATA (PC AT Attachment)
A standard used by hard-disk drives to communicate with the controller ports or cards that allow the hard-disk drive to interface with the computer. Before ATA, there were numerous incompatible methods for interfacing hard-disk drives to computers. ATA simplifies this process, thus reducing the cost of developing and purchasing related hardware. ATA is the proper term for Integrated Drive Electronics (IDE).

ATA-2
ATA-2 is the common name for a new, enhanced IDE standard. ATA-2 is still evolving and has not yet been submitted for approval as an official standard. The ATA-2 proposal is formally named "American National Standard X3T10 948D."

BIOS (Basic Input/Output System)
The BIOS is the program code stored in a PC-compatible ROM to boot the computer and provide basic services such as low-level disk access.

bootable partition
1) A partition from which an operating system can be started. 2) A partition listed in the Boot Manager menu.

Boot Manager
A program that lets you choose the active operating system partition upon starting or rebooting your system.

boot record
See *master boot record* and *partition boot record.*

boot sector
The first sector of a hard-disk partition. If the partition is bootable, the boot sector contains a boot record, which is code used to boot the operating system installed on that partition.

CHS
Cylinder, head, sector. A three-dimensional address of a hard-disk sector.

cluster
The smallest allocation unit in the FAT, FAT32, and NTFS file systems.

cylinder
The set of all tracks, one on each side of each platter of a hard disk, that are located at the same distance from the center of a hard disk. See *track.*

DOS
An operating system developed by Microsoft for personal computers. While DOS stands for Disk Operating System, the operating system also manages other computer resources such as memory, printers, and networks. DOS can access partitions and logical drives formatted with the FAT file system, but not those formatted with the NTFS or HPFS file system.

drive
1) Short for hard-disk drive. 2) Short for logical drive.

drive letter
A single character in the range A to Z that identifies a partition or logical drive for use by an operating system. Not all partitions or logical drives are accessible by all operating systems. Also, the drive letters assigned by different operating systems to the same partition or logical drive may not be the same.

dual boot
1) An OS/2 feature that lets you boot either OS/2 or DOS from a primary partition. 2) A generic term referring to the ability to boot multiple operating systems from a single partition by replacing the boot sector code of the partition. This is also called "multi-boot."

EIDE (Enhanced Integrated Drive Electronics)
A marketing program that promotes certain features of ATA-2.

EPBR (extended partition boot record)

The IBM/Microsoft implementation of logical partitions makes each logical partition resemble a physical hard disk. On this "logical" hard disk, an EPBR occupies the same position as the MBR of a physical hard disk. The EPBR may contain two entries. One is a logical partition, corresponding to a physical partition on a physical drive. The other may be an entry for another EPBR, corresponding to the extended partition on a physical drive.

Extended Attribute (EA)

OS/2 uses Extended Attributes to store extra information related to specific files. EAs can contain virtually any type of information but are limited to a total size of 64KB. For example, a file's icon may be stored as an EA. Checksums, file types and dependencies, and user comments can also be stored as EAs.

extended partition

An extended partition is a special kind of primary partition that was developed to overcome the four partition limit. The extended partition is a container inside of which you can create logical partitions. The extended partition itself does not hold any data, nor is it assigned a drive letter. But logical partitions inside the extended partition can hold applications and data and are assigned drive letters.

FAT

A file system developed by Microsoft for DOS. The FAT file system is named after the file allocation table, one of the key architectural elements of the FAT file system. DOS, OS/2, Windows 95, and Windows NT can use partitions formatted with the FAT file system.

file system

The method an operating system uses to organize files on a disk. Common file systems are FAT, FAT 32, NTFS, and HPFS.

format

1) *v.* To construct the framework on the partition necessary for a file system to name, store, and retrieve files. 2) *n.* An operating system command that formats a partition.

free space

A section of your hard drive that is not currently assigned to a partition. Free space appears as a gray space on the PartitionMagic partition map. Free space is not recognized by the operating system. Usually, you do not want free space because that section of your hard drive will not be used. You can either resize a partition larger to incorporate free space or create a new partition in the free space. Do not confuse free space, which resides outside any partition, with unused space within a partition.

head
A side of a hard-disk platter. More specifically, the hardware assembly that reads and writes data on a hard-disk platter.

hexadecimal
A system of numbers with base 16 that uses the 16 digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, and F. The letters A, B, C, D, E, and F correspond to the numbers 10, 11, 12, 13, 14, and 15.

hot-fix
A method of detecting bad sectors on HPFS partitions during disk writes. Data on hot-fix sectors is relocated to free good sectors.

HPFS (High Performance File System)
HPFS is a file system developed by IBM and Microsoft and first made available with OS/2. Both OS/2 and Windows NT 3.x can use partitions formatted with HPFS.

IDE (Integrated Drive Electronics)
See *ATA*.

LBA (Logical Block Addressing)
1) In EIDE, a means of specifying sector addresses by replacing CHS values with a single linear 28-bit number. 2) Generically, a one-dimensional address of a hard-disk sector; contrast with *CHS*.

Linux Ext2
A file system developed for the Linux operating system.

logical drive
1) A contiguous area inside an extended partition that can be used by the operating system to store and retrieve files. The operating system typically assigns a letter (for example, D:, E:) to the logical drive. In this user guide, the term "logical partition" is used in place of "logical drive." 2) Any partition, CD-ROM, or other storage device that contains a file system and is assigned a drive letter.

logical partition
This user guide uses the term "logical partition" in place of "logical drive" to refer to a partition inside an extended partition.

long file names (LFN)
OS/2, Windows 95, Windows NT, and other operating systems do not have to adhere to DOS's file naming system, in which a file name can have no more than eight characters, with a three-character extension. File names that violate the DOS 8.3 format are considered long file names. Long file names can have as many as 254 characters. OS/2 uses a separate Extended Attribute file when storing long file names on a FAT partition. Windows 95 and Windows NT use additional directory entries. See *VFAT*.

lost clusters
Data areas on FAT partitions that are not part of any file's cluster chain. Lost clusters can occur when the file system does not completely update the FAT due to a system failure or power failure.

MB
Megabyte. One megabyte is equal to 1,048,576 bytes (1,024 x 1,024).

master boot record (MBR)
The master boot record is contained in the first sector of the first physical hard disk. The MBR consists of a master boot program and a partition table that describes the disk partitions. The master boot program looks at the partition table to see which primary partition is active. It then starts the boot program from the boot sector of the active partition.

multi-boot
See *dual boot*.

NTFS (New Technology File System)
A file system developed by Microsoft and accessible only through Windows NT. NTFS eliminates many of the shortcomings of the FAT and HPFS file systems, such as wasteful cluster sizes and a slow CHKDSK execution time.

operating system
An operating system allows programs to cooperatively use a computer's resources (for example, disks, memory, printers, and networks). Common operating systems are DOS, Windows 95, OS/2, and Windows NT.

OS/2
An operating system developed jointly by IBM and Microsoft. OS/2 can access partitions and logical partitions formatted with the FAT or the HPFS file system.

partition
A contiguous area of a hard disk that the operating system can format with a file system. PowerQuest often uses the term "partition" to mean either a primary or logical partition.

partition boot record
The partition (operating system–specific) boot record is contained in the first sector of a hard-disk partition. It is code used to boot the operating system installed on that partition.

primary partition
A partition referenced in the MBR partition table. Only four primary partitions can exist on a hard disk. One of these may be an extended partition. Only one primary partition on a drive may be active at a time. When one primary partition is active, the other primary partitions are typically not accessible. Data and programs are often placed on a logical partition inside an extended partition. This enables the data to be accessed by all primary partitions.

sector
The smallest addressable section on a disk. It is used to record one block of a program or data. Each head on each track is typically divided into 17 or more sectors.

track
A circular path on a disk to which data can be written and from which data can be read.

VFAT
VFAT is an extension to the FAT file system that adds support for long file names. Although the term "VFAT" originated as the name of the Windows for Workgroups FAT file system driver, it has come to refer to the extensions to the FAT file system added by Windows NT 3.51 and Windows 95.

visible partition
A partition that is assigned a drive letter by an operating system when it boots. You can access files, applications, and other data from visible partitions.

volume
1) A partition that has been high-level formatted by the formatting utility of a particular operating system; a logical partition. 2) A set of partitions handled by the operating system as if they were a single logical partition.

volume label
The name that you give to a volume. Volume labels allow you to easily identify volumes as you work in the partition section of the PartitionMagic interface. See *volume*.

Windows 95

An operating system developed by Microsoft. Windows 95 is a descendant of DOS and Windows 3.x. It can access primary and logical partitions formatted with the FAT file system. It supports long file names using the VFAT extension to FAT.

Windows NT

An operating system developed by Microsoft. Windows NT can access primary and logical partitions formatted with FAT and NTFS. Windows NT 3.x can also access HPFS.

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