

PartitionMagic

™

USER GUIDE

PartitionMagic User Guide

PartitionMagic by PowerQuest
Manual Version 5

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Introduction

1

CHAPTER

Introduction

What are Partitions and Why are They Important?

You've had a grueling day at work. All you can think about is a nice quiet nap. But when you enter your spacious new home you walk into a nightmare—there aren't any walls! Your son is jamming with his rock band. Your daughter is gabbing on the phone, with the radio at full blast. And your spouse is playing a take no prisoners round of Super Sonic Space Blasters. All that space and nowhere to run!

A house with just one room would be difficult to live in. Surprisingly, this is the way most people organize their hard disks. Operating systems, applications and valuable data are typically thrown together into a single large room or partition. And as hard disks get bigger the problem just becomes worse.

Hard disk partitions are the rooms and walls that can help you organize, optimize and secure your hard disk. Partitions, unlike directories, are physically separate areas of a hard disk. They are often referred to as drives with drive letters assigned to them such as C: and D:. Because they are physically separate locations on a hard disk, partitions offer security for sensitive files that directories can't provide. Power users have used partitions for many years to get the most out of their hard disks. However, until PartitionMagic was introduced, the process of hard disk partitioning was very tedious and time consuming. The traditional process to partition a hard disk requires the following steps:

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1 Back up all data on the hard disk. This is time consuming. The larger the disk and number of files, the longer this step takes. A high-capacity disk drive back-up could take three hours or longer.

2 Delete the existing partition using the operating system's FDISK utility. This process destroys all data on the partition.

3 Create new partitions on the hard disk using the FDISK utility. This is a difficult process because FDISK is a non-intuitive, character-mode utility. If you do not specify the proper sizes, you may need to repeat the entire process.

4 Format the new partitions using the operating system's FORMAT utility. FORMAT is used independently of FDISK and will destroy all data that exists on the partition.

5 Reinstall the operating system. Many backup programs do not completely store all operating system files. Reinstalling the operating system from the source diskettes or CD is often necessary.

6 Restore the data. This process is the reverse of Step 1 and requires about the same amount of time.

It's no wonder that disk partitioning was left to the realm of the power user. But PartitionMagic

forever changes the way you will think of and use, hard disk partitions.

What is PartitionMagic?


PartitionMagic (patents pending) is a powerful new tool that lets you get the most out of your hard disk by letting you graphically remodel your hard disk with the click of your mouse. Not only can you add new partitions to your hard disk but you can shrink, expand and move existing partitions in minutes—without destroying data. For the first time, you can organize, optimize and secure your hard disk like a power user without the traditional hassles of hard disk partitioning.

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PartitionMagic 2.0 features an intuitive graphical user interface.


What's new in PartitionMagic 2.0?


Version 2.0 builds on the strengths of 1.0 by adding:


 **Non-destructive cluster resizing** - when you modify FAT partitions with PartitionMagic, clusters are automatically resized. This feature can help you recover up to hundreds of megabytes of hidden storage due to inefficient cluster sizes.


 **Create new partitions** - Visually create partitions without FDISK.

 **Delete existing partitions** - PartitionMagic lets you see exactly which partition you wish to delete.

 **Format** - Rapidly format both FAT and HPFS partitions in one easy step.


 **Hide/Unhide Partitions** - Hide your data partition while you are away from your home or office so that other people using your PC won't inadvertently damage valuable files.


 **Expand Windows 95 root directory** - If you have Windows 95 on your system you can double the number of long file names allowed in the Windows 95 root directory.

 **Set Active Partition** - Select which primary partition will boot.

 **Move NTFS partitions.**

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 **Enhanced User Interface** - Now you can see even more information about your partitions.

 **Enhanced Documentation** - In addition to information on the features of PartitionMagic, this manual illustrates a number of effective hard disk scenarios and gives you step by step information on how to configure your system.

What Does PartitionMagic do for Me?

PartitionMagic exploits the full capacity and potential of your hard disk. It greatly enhances your ability to organize, optimize and secure your system.


Organize

 Create room for Boot Manager for OS/2 users.

 Create a separate partition for OS/2 or Windows 95.

 Create a separate partition for data to facilitate regular back ups.

 Separate operating systems, applications and data.

 Use partitions as flexible super-directories to organize large numbers of files and directories.

 Manage non-dedicated network servers more efficiently by separating server software from client software.

 Consolidate unused portions of several partitions into a larger, more useful block.

Optimize

- ☐ Recover up to hundreds of megabytes of hard disk space by resizing inefficient FAT clusters.
 - ☐ Get critical system information faster and more accurately by using Partition-Magic's Check and Info options instead of the CHKDSK utility that ships with OS/2, Windows 95 and DOS.
 - ☐ Ensure optimum system compatibility since PartitionMagic doesn't use any software TSRs (terminate and stay resident) or device drivers.
 - ☐ Explore the advantages of High Performance File System (HPFS).
- Secure
- ☐ Use partitions to separate data from operating systems and applications.
 - ☐ Hide and unhide partitions to protect data.
 - ☐ Maintain system integrity by running different operating systems in different partitions.
 - ☐ Test new or unstable software in a separate partition.

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About This Guide

This manual was written to help you understand and use key concepts to create and effectively manage hard disk partitions. It is divided into eight chapters:

- ☐ Introduction
- ☐ Concepts
- ☐ Getting Started
- ☐ Using PartitionMagic
- ☐ Hard Disk Partitioning Scenarios
- ☐ Appendix
- ☐ Glossary
- ☐ Index

Chapter 1: Introduction provides an overview of PartitionMagic, information about this guide and hardware and software requirements.

Chapter 2: Concepts provides important information about partitions, drive letters, file systems, optimizing hard disks with partitions and using PartitionMagic with other programs. Understanding how these areas relate to each other is necessary for you to effectively use PartitionMagic.

Chapter 3: Getting Started gives step-by-step procedures about how to install and start PartitionMagic.

Chapter 4: Using PartitionMagic explains the various PartitionMagic options and how to use them.

Chapter 5: Hard Disk Partitioning Scenarios provides step-by-step instructions for several hard disk configurations so that you can get the most out of your hard disk.

The **Appendix** provides useful information not covered elsewhere in this guide including troubleshooting information and how to obtain product 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.

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System Requirements

The following tables show the minimum and recommended hardware and software requirements your system should meet for you to install and use PartitionMagic.

HARDWARE/SOFTWARE MINIMUM RECOMMENDED

Processor 386SX 486 or better

RAM: Windows 95 4MB 8MB

OS/2 8MB 8MB
DOS 4MB 8MB
Diskette Drive 3.5 (1.44MB) 3.5 (1.44MB)
Hard Disk Free Space 4.5MB 4.5MB
Operating System Windows 95 Windows 95
OS/2 2.1 OS/2 2.1 or later
DOS 5.0 DOS 5.0 or later
Monitor VGA Super-VGA
Pointing Device No pointing device is Mouse (or compatible required to operate pointing device)
PartitionMagic

Concepts

CHAPTER

2

Concepts

Understanding Partitions

Hard disk partitions are physically separate areas you create on your hard disk. You can divide your hard disk into a maximum of four primary partitions (see Figure 2-1). Because some operating systems allow only one primary partition to be visible at a time, exchanging data between primary partitions is not always allowed.

FIGURE 2-1. Hard Disk separated into four primary partitions.

If your computer has multiple primary partitions, you must specify which one you want to be active each time you start or reboot your computer. When your computer is started, the code in the Master Boot Record (MBR) on your hard disk scans the partition table for the active partition, from which it will boot. PartitionMagic's Set Active option lets you easily choose which partition you want to designate as the active partition. For more information, see Set Active Partition under Advanced Options in Chapter 4.

Partition
1
Partition
2
Windows NT
Boot Manager
DOS 5.0 OS/2
Partition
3
Partition
4

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One of the four primary partitions can be an extended partition that can be divided into multiple logical drives (see Figure 2-2). Logical drives are so called because they appear as different disk drives each having a separate drive letter, but actually exist on the same physical disk. Each logical drive can be seen from any of the primary partitions as long as the logical drive has a file system that is recognized by the operating system. FAT partitions are recognized by OS/2, DOS, Windows, Windows 95 and

Windows NT. HPFS partitions are only recognized by OS/2 and Windows NT. Incidentally, using OS/2's FDISK, you do not explicitly create an extended partition—it is created the first time you create a logical drive. PartitionMagic offers greater flexibility

by creating the extended partition explicitly. OS/2 can boot from a logical drive. DOS and most other operating systems can only boot from primary partitions.

FIGURE 2-2. Primary partitions and logical drives in an extended partition.

NOTE: In this guide, primary partitions and logical drives are often generically referred to as partitions.

Drive Letters

When you boot your computer, the operating system assigns each partition a different letter. Drive letter C is assigned to the active primary partition on the first physical drive, then D is assigned to the first recognized primary partition on the next physical drive, and so on until all physical drives have been scanned. Next, all logical partitions are assigned succeeding drive letters, starting with the first physical drive. If you have two physical drives, each having primary partitions, you may have noticed that C is on your first drive, yet D is on your second drive (see Figure 2-3).

PRIMARY

D: PROGRAMS C: OS E: DATA FILES

EXTENDED

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FIGURE 2-3. Two physical hard disks attached to the same computer. Drive letters are in order as assigned by OS/2.

Changing Drive Letters

The drive letters assigned to partitions when the computer is booted can change depending

on the operating system you boot. OS/2 can recognize HPFS and FAT file systems, but DOS and Windows 95 can recognize FAT partitions only. Therefore, if you boot the hard disk in Figure 2-3 from a DOS or Windows 95 partition, Drive E: will remain the same, but Drive H: will become Drive F:, and Drive I: will become Drive G:.

IMPORTANT: When using PartitionMagic, some operations may change drive letter assignments. This can cause problems if drive letters are referenced in system files such as CONFIG.SYS and AUTOEXEC.BAT, or within applications such as a word processing program. For example, if you use the Create option to create a logical partition in free space that is before logical drive G:, the newly created partition becomes drive G:, G: changes to H:, H: changes to I: and so on. The reverse occurs when you use the Delete option to remove a partition.

The Convert and Format options can change drive letter assignments under DOS if you change a FAT partition to HPFS. Because DOS does not recognize HPFS, the partition will no longer have a drive letter under DOS.

Plan carefully to avoid unwanted drive letter changes. When a new logical partition is created at the end of a drive, drive letter assignments on that drive do not change. If you have more than one disk and do not plan to add more, create a primary parti-

C:

FAT

EXTENDED

DISK 1

PRIMARY

E:

FAT

F:

HPFS

D:

FAT

EXTENDED

DISK 2

PRIMARY

H:
FAT
I:
FAT
G:
HPFS

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tion on each disk. The drive letters for these primary partitions will not change as you create and delete logical partitions. If you do add a disk, creating a primary partition on it will change the drive letters of all logical partitions. If you want to create a partition in the free space next to existing partitions without changing current drive letter assignments, first move the existing partitions to the left until the free space is shifted to the end of the disk.

HINT: Placing all HPFS formatted partitions **AFTER** any existing **FAT** partitions will ensure that your **FAT** drive letters remain the same in **BOTH DOS** and **OS/2**.

Windows NT

Sometimes using PartitionMagic confuses Windows NT in that Windows NT changes drive letter assignments. Use Disk Administrator to change the drive letters back to the values you prefer.

Multiple Visible Primaries

Historically, though you could have as many as four primary partitions, only one was visible (accessible) at a time while the others were hidden. This rule was defined by the original architecture of the PC. Newer operating systems such as Windows 95, Windows NT and DOS 5.0 or higher allow you to use multiple visible primaries (MVPs). If your hard disk has MVPs, drive letters are assigned as previously explained for the first visible primary on each drive. MVP drive letters are assigned after logical partitions.

PartitionMagic supports the creation of MVPs. If you are running one of these operating systems, you may find that MVPs help you create partitions with minimal impact on existing drive letters. Use the Hide/Unhide Partition option to set primary partitions as visible or hidden.

IMPORTANT: Avoid creating MVPs if you are using OS/2. Because OS/2 does not support MVPs, creating them can cause data loss.

File Systems

An operating system assigns drive letters only to drives that are formatted with file systems the operating system can recognize. A file system is how the operating system organizes files on a disk.

FAT (File Allocation Table) is the file system for DOS and Windows 95. File data is

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stored in clusters. Since the number of clusters supported by the FAT file system is small, large partitions must use large, inefficient cluster sizes. For more information see Optimizing Hard Disks with Partitions later in this chapter.

HPFS (High Performance File System), OS/2's preferred file system, can often access files faster than FAT. In addition, HPFS is designed to allocate contiguous space for files, specifically to prevent the fragmentation that quickly occurs on FAT partitions. HPFS allocates file data in sectors, avoiding the waste caused by large, FAT clusters.

NTFS (New Technology File System) was developed by Microsoft and is only accessible through Windows NT.

NetWare uses a file system developed by Novell to run on NetWare servers.

PartitionMagic shows NetWare version 3.x or 4.x partitions. In many cases, NetWare is installed on a drive where there is also a DOS partition so the computer

can be used as both a server and a workstation.

Linux Ext2 is a file system developed for the Linux operating system.

Optimizing Hard Disks with Partitions

Modern high-capacity hard disks and competing operating systems are driving the demand for hard disk organization and management techniques. Partitioning is one of the most effective methods available to you for organizing your hard disk because it provides a more general level of organization than do directories and files. Another attractive feature of partitions is enhanced data security by separating data from operating systems and applications. Finally, using multiple FAT partitions can help you use your hard disk's full storage capacity. Three main reasons to partition your disk(s) are organization, optimization and integrity/security .

Organization

Partitioning your hard disk provides you with high-level data organization, especially if your hard disk contains multiple operating systems. You may want to designate a small partition as your boot partition, a separate partition for each of your operating systems, then one partition for your application files and another one for data files. Typically, only one primary partition on each drive is assigned a drive letter. All

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other primary partitions are typically hidden. As a result, primary partitions should be reserved for operating systems that cannot be installed to logical partitions. Applications and data files should be placed in logical partitions so they will be visible regardless of which primary partition is active.

PartitionMagic makes it very easy to shrink an existing partition, creating free space where you can create additional partitions for new operating systems such as Windows 95 and OS/2, as well as logical partitions for your program data.

PartitionMagic makes it much easier to test and evaluate new operating systems since you can shrink and expand partitions as needed. For additional information see Hard Disk Partitioning Scenarios in Chapter 5.

Dividing a disk into partitions is similar to dividing a house into rooms. If you had all your possessions in a one-room house it would be difficult to find individual items and to keep some activities from interfering with other activities. By using rooms in a house you can organize kitchen items and activities, TV room items and activities, etc. PartitionMagic can help you organize your data by helping you create different partitions for different purposes according to your unique needs.

Also, working with a drive letter rather than a lengthy path specification means shorter path statements and less chance of typographical errors when you are entering path names through the keyboard.

Optimization

In addition to organization and security, partitions can help you access the full storage capacity of your hard disk. All data on a FAT partition is stored in allocation units, or clusters. Cluster sizes are initially determined by the size of the partition when it is formatted.

Below 256MB, the file cluster size is 2KB or 4KB. This jumps to 8KB between 256MB and 511MB, 16KB between 512MB and 1023MB, and 32KB above 1024MB.

This is significant because most files are relatively small. Small files waste almost the entire cluster, so you will find it more efficient to create multiple partitions on your hard disk with smaller, more efficient clusters.

Using Partitions to Recover Wasted Space on Your Hard Disk

The FAT file system is used by DOS, Windows 3.x, Windows 95 and optionally by OS/2 and Windows NT. FAT was created during the PC industry's early days for floppy

diskettes and small hard disks. Because FAT's basic structure remains unchanged, it can waste hundreds of MBs of storage space on a new high-capacity hard disk.

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FAT divides each partition into storage units called clusters. The maximum number of clusters allowed on a FAT partition is approximately 65,000. On a 120MB partition, the cluster size is 2KB. However, on a 1.2GB partition, the cluster size is increased to 32KB. A file that is only 1 byte long uses an entire cluster. For example, the size of a typical AUTOEXEC.BAT file is only about 500 bytes (0.5KB). Yet on a FAT partition, this file would occupy an entire cluster (32KB), effectively wasting 31.5KB of disk space. Larger cluster sizes waste more space on FAT partitions. The following table shows how much space is wasted on a typical partition. The actual amount of wasted hard disk space depends upon the number and size of the files on your hard disk.

Total Partition Size	Minimum Required Cluster Size	Space Wasted
16-127MB	2KB	2%
128-255MB	4KB	4%
256-511MB	8KB	10%
512-1023MB	16KB	25%
1024-2048MB	32KB	40%

As drive usage and cluster size increase, so does the amount of wasted space.

Dividing drives into multiple, smaller partitions reduces the amount of wasted space.

Security/Integrity

If you are running multiple operating systems on your computer, partitions can maintain each operating system's integrity by keeping them in separate partitions. File security can be enhanced by using partitions to separate data from operating systems. You can also create a partition to store a daily backup of critical data. A more sophisticated backup partition can enhance system security by providing a redundant source on the system for diagnostic software and as a secondary boot partition

should the primary boot partition become corrupted. PartitionMagic makes it much easier to test and evaluate new operating systems since you can shrink and expand partitions as needed. Also, should a power failure cause disk corruption in a partition, other partitions on the drive are typically unaffected.

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Calculating Your Hard Disk's Storage Efficiency

To calculate the storage efficiency of a hard disk partition:

1 Run PartitionMagic's **Check** option (see Check under Selecting and Option in Chapter 4.

2 Divide the bytes unused in file clusters by the bytes used disk space.

3 Multiply the result of Step 2 by 100. The final result is the percentage of used disk space that is wasted.

Example:

$5,157,274 \div 34,381,824 \times 100 = 15\%$

bytes unused bytes used WASTED

in file clusters disk space DISK SPACE!

1024 Cylinder Limits & Enhanced IDE

This section contains important information concerning the 1024 cylinder limit, Enhanced

IDE drives and the impact these elements have on partitioning your hard disk.

1024 Cylinder Limit

Can PartitionMagic see an entire large drive? A general rule is that if FDISK can see the entire drive, so can PartitionMagic. DOS limits hard disk access above 1024 cylinders. New computers usually avoid the 1024 cylinder limit because they incorporate a translation either within the drive, with a device driver, or with the computer BIOS (Basic Input/Output System). This translation "tricks" DOS into thinking that the drive has less than 1024 cylinders.

When you are running PartitionMagic from DOS and any part of a partition goes past cylinder 1023, no operations are allowed on that partition. If the extended partition goes beyond cylinder 1023, no operations are allowed on any logical partitions. Use Info to see what cylinder the last physical sector occupies.

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Enhanced IDE

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. Enhanced IDE (EIDE) is a marketing program started by Western Digital to promote a subset of the features of the emerging ATA-2 standard. Unfortunately, there is confusion in the industry because suppliers label their products as EIDE even though they may not adhere to the ATA-2 standard or the Western Digital subset. As a result, many products are only partially enhanced.

To qualify as EIDE, a product must support drives greater than 528 million bytes (504MB). The 504MB limit arises because of limitations to the size of the cylinder, head and sector (CHS) values that can be used to address a drive. The INT 13h ROM BIOS limits cylinders to 1024 and sectors per track to 63. The WD1003 hardware interface to the drive limits the heads to 16. The result, $1024 * 16 * 63 * 512$ (512 bytes per sector) is 528 million bytes per device. EIDE supports larger drives by changing the head limit in the hardware interface from 16 to 256. The result, $1024 * 256 * 63 * 512$ is 8.4 billion bytes per device. This change requires support in the BIOS, the disk controller and the disk drive.

Logical Block Addressing (LBA)

Many users mistakenly believe that LBA is required to break the 504MB limit. DOS uses CHS values to communicate with a disk drive through the BIOS, regardless of any LBA setting in the BIOS. The BIOS still limits the cylinder value to 1023. An EIDE compatible BIOS supports larger drives by presenting to DOS (or other BIOS callers) a logical drive geometry rather than the physical drive geometry obtained from the drive. The CHS values of the geometry are translated by the BIOS. The most common translation, called head doubling, involves doubling the head count and halving the cylinder count until the number of cylinders falls below 1024. An EIDE compatible BIOS translates logical CHS values to either physical CHS values or LBA values for communication over the hardware interface to the drive. There are some types of BIOS that do not enable all EIDE capabilities unless the LBA setting is turned on. This is true if the BIOS follows the Western Digital Enhanced IDE Implementation Guide. To complicate matters, this type of BIOS changes how it translates logical CHS values when the LBA mode is changed. This can cause corruption of all files and partitions on the hard disk! Do not change the BIOS LBA mode if data is present on the drive! If the BIOS follows the Phoenix Enhanced BIOS specifications (as do Phoenix and AMI), this problem does not occur.

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Finally, when using one or more operating systems that do not access the drive through the BIOS, it is important that all operating systems use the same logical CHS translation scheme. If they do not, PartitionMagic may complain about the partition tables, FDISKs from the respective operating systems may see different sets

of partitions, and using the drive may cause file and partition corruption. Presently, it is not clear how to determine the logical CHS translation scheme employed by an operating system other than by trial and error.

Getting Started

CHAPTER

3

Getting Started

Running PartitionMagic

PartitionMagic is designed to run from the floppy drive. No installation to the hard drive is required. To run PartitionMagic from the floppy drive:

Step 1

If you are using:

Windows 95 – Exit to MS-DOS mode by clicking Start, then Shut Down from the Taskbar. In the “Shut Down Windows” menu, select “Restart the computer in MS-DOS mode” and then click Yes. Proceed to Step 2.

Windows – Exit to DOS by selecting Exit Windows from the Program Manager File menu. Then select OK. Proceed to Step 2.

DOS – Proceed to Step 2.

OS/2 – Boot DOS. Proceed to Step 2.

Note: You may need to install a DOS mouse driver to use a mouse with Partition-Magic. Consult your mouse documentation for instructions. You can also navigate through PartitionMagic using only the keyboard. See Using a Mouse and Keyboard with PartitionMagic in Chapter 4 for instructions.

Step 2

Once in DOS or MS-DOS mode, insert PartitionMagic Disk 1 into the floppy drive, type A:\PQMAGIC and then press Enter (use A:\PQMAGICD in OS/2 version).

Note: If you only run OS/2 and do not have access to DOS, use Disk 2 of 2 and see Starting PartitionMagic from OS/2 Maintenance Mode later in this chapter.

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Make sure to read the README.TXT file on the distribution diskette to find out about any last-minute changes, notices, or warnings to be aware of when using PartitionMagic.

CD-ROM USERS: When you create a new partition, it will be assigned a drive letter in sequential order. The CD-ROM drive letter will default to the last available letter. This will require you to reinstall the programs that run from CD-ROM so that they will recognize the new drive letter. To prevent the drive letter from changing in the future, you may want to assign a higher drive letter such as M: or N: to the CD-ROM for DOS or Windows 95. For more information on how CD-ROM drives or any form of removable media are affected when using PartitionMagic, see

the Technical Support area on our home page at <http://www.powerquest.com>.

Starting PartitionMagic from OS/2 Maintenance Mode

If you want to modify your OS/2 boot partition, you must boot from an alternate source. Normally, you should boot OS/2 in Maintenance Mode from a floppy diskette, then run PartitionMagic. Otherwise, you can boot DOS or OS/2 from another partition. To run PartitionMagic in OS/2's 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 Maintenance Mode. (For OS/2 2.x, press **Esc** instead of **F3**.)

4 In Maintenance Mode, run **PQMAGICT** from floppy diskette or from a partition other than the partition you want to modify.

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When you run PartitionMagic in Maintenance Mode you may receive the error SYS1804: The system cannot find the file VIOCALLS. To solve this, copy VIOCALLS.DLL and PQMAGICT.EXE to a clean floppy diskette, then start PQMAGICT.EXE from the floppy diskette. You should copy VIOCALLS.DLL from the disk or diskettes you used to boot OS/2. Use the table below.

Boot source Location of VIOCALLS.DLL

Installation diskettes Install Disk 1

Utility diskettes Utility Disk 2

Hard disk \OS2\DLL

Although PartitionMagic runs as a text mode application while in Maintenance Mode, it operates in a fashion similar to the graphical user interface described in Chapter 4.

Using PartitionMagic with Other Programs

Utility Programs

Repair utilities such as Norton AntiVirus (NAV), Norton Disk Doctor (NDD), Windows NT Emergency Repair Disk, etc. often keep backup copies of the system areas on your hard disk (the partition table and boot sectors) so they can restore them if they are damaged.

Partitioning software such as FDISK and PartitionMagic change the system areas of your hard disk. If you allow a repair utility to restore an old backup over the top of your changes, you can lose all data on your hard disk. Refreshing or re-initializing the backups made by your repair utilities after using partitioning software, will safeguard your hard disk and prevent data loss. See the README.TXT file for more information.

 Virus protection utilities

 Utilities that boot multiple operating systems from a single partition

 Disk utilities capable of backing up partition tables and boot sectors

OS/2's Dual Boot honors boot sector changes made by PartitionMagic. System Commander 2.0 and later honor boot sector changes made by PartitionMagic. System Commander 2.06 or later may be required for installation on drives PartitionMagic has modified.

Virus Protection Software

PartitionMagic makes changes to the Master Boot Record and the boot sectors of partitions. Virus protection software should be able to tell that PartitionMagic is changing partition tables and is not changing 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.

Some motherboards contain virus protection software within the BIOS. If this caus-es

a problem when you are running PartitionMagic, disable the virus protection, then restart PartitionMagic.

Stacker Compatibility

PartitionMagic is compatible with Stacker for OS/2 and DOS. This means that PartitionMagic can manipulate the physical partitions (uncompressed drives) which 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 shows the drive letter for the physical partition (uncompressed drives) and not the Stacker drives. 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, use the LABEL command to assign each stacked drive the volume label STACVOL XXX where 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 your preferences.

In order to shrink a physical partition containing a Stacker compressed drive, you may have to shrink the Stacker drive first. 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 drive,

1 Restart your system into DOS (if necessary).

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2 Type **STAC** to open Stacker's DOS Toolbox.

3 Choose **Configure - Change Drive Size**, then select the Stacker drive.

4 To make the Stacker drive larger, choose **Increase Stacker drive size**.

—or—

To make the Stacker drive smaller, choose **More uncompressed space available**.

5 When Stacker displays the acceptable drive size range, type the new size for your Stacker compressed drive.

6 If you agree with the displayed results, choose **Perform changes on Stacker drive**.

—or—

If you do not agree with the displayed results, choose **Modify settings**, or choose **Exit**.

7 When you are prompted, press **Enter** to restart your system. (Stacker 4.0 for OS/2 & DOS User's Guide, pp. 44-45.)

Restoring System Files

Because 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, make 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.

Using PartitionMagic

CHAPTER

4

Using PartitionMagic

Backing Up Your Hard Drive

Remember to back up your hard drive 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 such extensive changes to your hard drive, you should back up your data.

Integrity Checks

PartitionMagic was designed 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 exposes any partition problems that may prevent PartitionMagic's options from operating properly. This integrity check acts as (1) an early warning system to keep you informed of your disk's status and, (2) an assurance that your disk's structure is thoroughly analyzed and verified before you alter it using PartitionMagic. If your disk passes the initial integrity check, you are granted access to the disk's partitions and can perform its 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 (since no disk modification options have been initiated), but with your disk. Correct the disk problem, then restart PartitionMagic (see Resolving Partition Table Errors in Appendix A).

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During any operation, PartitionMagic provides you with an information window that informs you of the operation's progress (see Figure 4-1). The first step of any operation is to check the integrity of the file system in the partition (similar to CHKDSK or SCANDISK). As the last step, PartitionMagic launches another integrity check to verify the validity of your disk's data. From start to finish, PartitionMagic cautiously scrutinizes your disk and informs you immediately if any irregularities are detected.

FIGURE 4-1. Progress Window.

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Introduction to the Interface

The PartitionMagic Main Window contains information about your hard disk and is divided into three sections—Physical Drives, Partitions and Options—through which you perform a simple, three-step process: 1) Select a physical drive, 2) Select a partition and 3) Select an option.

FIGURE 4-2. PartitionMagic Main Window.

Resizing the Main Window

When you start PartitionMagic, the program displays a window that fits well on your display (see Figure 4-2). PartitionMagic lets you resize your Main Window to show more information (see Figure 4-3). If you expand the window horizontally (by

moving the right border), two additional columns of information are displayed: Status and Pri/Log (see Partition List under Selecting a Partition later in this chapter). Also, if your system is equipped with additional hard disks that are not displayed in the Main Window, expanding the window will display as many as eight disks. If you expand the window vertically (by moving the top or bottom border), more Partition List items are displayed.

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HINT: By selecting the Advanced Dialogs under the Preferences menu, PartitionMagic will display more information, including the cluster sizes, while shrinking or expanding partitions.

FIGURE 4-3. Expanded Main Window.

Using a Mouse and Keyboard with PartitionMagic

Most operations in PartitionMagic can be performed by single-clicking the primary mouse button (typically, the left button). Use this button to click on menus, Physical Drives, Partitions (the partition map and partition list) and Options. Two alternative ways of interfacing with PartitionMagic are through the secondary (right) mouse button and the keyboard.

PartitionMagic features an options pop-up menu when you click the secondary mouse button on the Partition List or the Partition Map (see Figure 4-4). This pop-up menu contains all options applicable to the partition to which the cursor is pointing. Once the pop-up menu is displayed, click the primary mouse button once to choose an option.

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FIGURE 4-4. Main Window with pop-up option menu displayed.

You can also navigate through PartitionMagic using only your keyboard by pressing **Alt+<underlined letter>** to choose a menu, then typing the **underlined letter** to choose options within a menu. You can also use the arrow keys to move within a menu or window section.

Using the Menu Bar

While you can access PartitionMagic's primary options through the Option buttons on the Main Window, to access all of the available options, you must go through the menu bar. In fact, any function that destroys data (such as Delete or Format) must be done using the menu bar. This is a safety feature to guard against accidentally destroying data.

Selecting a Physical Drive

The Physical Drives section displays your system's disk drives. If there is more than one drive, the current drive is highlighted. To change to another drive, click on that drive with your mouse. To change to another drive using the menu bar, select the Drives menu, then choose the desired drive in the drop-down menu. To change to another drive using the keyboard, press **Alt+D** to

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activate the Drives menu, use the up (↑) and down (↓) arrow keys until the desired drive is highlighted, then press **Enter** to choose the menu item.

If your system is equipped with more hard disks than are displayed in the Main Window, you can resize the window horizontally to show as many as eight hard disks in the Physical Drives section, or you can select the drive from the Drives menu.

Selecting a Partition

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

If there is 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 (↓) arrows to highlight the desired partition, then press **Enter**.

If the selected drive contains more partitions than are displayed in the Main Window, you can resize the Main Window vertically to show more partitions in the Partition List, or you can select the partition from the Partitions menu.

Partition Map

The partition map shows the partition sizes to scale. If a partition's size is too small, the graphic assumes the width of the drive letter and colon(:). If too many small partitions are present, only the colon (:) is shown. If the selected physical drive contains logical drives, the partition map shows the logical drives enclosed by the extended partition.

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To make different file systems easily identifiable, PartitionMagic shows each partition with a different color for each file system type. Run PartitionMagic to see the actual colors:

Unformatted partitions are shown as FAT if they can be formatted as FAT or HPFS. If any part of a partition extends beyond cylinder 1024, the partition is shown as HPFS because it can be formatted only as an HPFS partition. Moving or resizing an unformatted partition

(within or beyond cylinder 1024) can cause it to change between FAT and HPFS.

Partition List


The partition list displays the partitions, their drive letters, volume labels, file system type, partition size, used space, and free space. If you expand the Main Window, two additional columns are displayed: Status (active, hidden, or neither), and Pri/Log (primary or logical).

In the partition list, 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

Logical drives are displayed with the drive letter and volume label indented. If a partition is not formatted or if a Check operation failed, the Used MB and Free MB columns are replaced with "Unformatted" or "Check Failed" respectively.

HINT: You can convert megabyte (MB) values to bytes by multiplying the megabyte value by 1,048,576.

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Selecting an Option

This section describes options that allow you to modify the selected partition to your specifications. You can choose any of these options with either a mouse or a keyboard.

To choose an option using a mouse, place the mouse pointer on the option and click the left mouse button. To choose an option using a keyboard, press

Alt+<underlined-letter>. To choose options within a menu, choose either the Options menu or the Advanced menu, then type only the underlined letter.

HINT: You can also choose an option by placing your mouse pointer on the desired partition in either the Partition Map or the Partition List, right-clicking your mouse to display a pop-up menu of options, then choosing the option from the list. By default, the menu only displays the main options. To access all options (both those on the Options menu and the Advanced menu), select **Advanced Dialogs** from the Preferences menu, then right-click the partition again (see Figure 4-5).

FIGURE 4-5. Main Window with advanced Pop-up Options Menu Displayed.

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This option displays information about the status and structure of the partition. The FAT Partition Information dialog box fields are described below. On an HPFS partition, this dialog box is slightly different. See pages 53-56. For NTFS partitions, see pages 56-57; for all others, see pages 57-58.

FAT Info Results

When you choose the Info option on a FAT partition, the following dialog box is displayed. **Selected Partition** describes the drive letter, volume label, file system type and serial number of the selected partition.

Partition type describes the type of partition: 12-bit FAT; 16-bit FAT, less than 32MB; or 16-bit FAT, more than 32MB.

First physical sector and **Last physical sector** show the location of the first and last physical sectors of the partition. These fields also display the cylinder numbers, head numbers and sector numbers of the first and last sectors.

Total physical sectors shows the total number of sectors on the partition, as well as the partition's size in MB. This size can be larger than the number of sectors used by the file system because it is often necessary for file systems to leave some sectors unused.

Info

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Used clusters shows the number of clusters that currently are allocated to hold data. This field also displays the size in MB of these used clusters. Free clusters shows the number of clusters that are not allocated to hold data. This field also displays the size in MB of these free clusters.

Bad clusters shows the number of unusable clusters on the partition. This field also displays the size in MB of these bad clusters.

Total clusters adds the previous three fields (used clusters, free clusters and bad clusters) together and shows the total number of clusters on the partition. This field also shows the size of the clusters in MB.

Choose **More** to display additional information about the partition.

Bytes per DOS 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.

Sectors per FAT displays the number of sectors in each file allocation table and the number of file allocation tables on the selected partition.

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Root directory size displays the number of file entries in the root directory and the number of sectors in which they reside.

First FAT sector displays the logical sector number of the first FAT sector on the selected partition.

First Root sector displays the logical sector number of the first root directory sector

on the selected partition.

First Data sector displays the logical sector number of the first data sector on the selected partition.

Physical Geometry displays the number of cylinders, heads and sectors of the physical drive on which the selected partition resides.

HPFS Info Results

When you choose the Info option on an HPFS partition, the following Info Results dialog box is displayed.

Selected Partition describes the drive letter, volume label, file system type and serial number of the selected partition.

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Formatted type describes the type of HPFS format on the partition. This is typically OS/2 2.x HPFS.

First physical sector and **Last physical sector** show the location of the first and last physical sectors of the partition. These fields also display the cylinder numbers, head numbers and sector numbers of the first and last sectors.

Total physical sectors shows the total number of sectors on the partition, as well as the partition's size in MB. This size can be larger than the number of sectors used by the file system because it is often necessary for file systems to leave some sectors unused.

Used sectors shows the amount of disk space the file system is currently using.

Free sectors shows the amount of free space in the partition.

Bad sectors shows the amount of unusable space in the partition.

Total sectors adds the previous three fields (used sectors, free sectors and bad sectors) together and shows the total number of sectors on the partition. The number of sectors can be less than the total physical sectors because HPFS rounds the number down to a multiple of four.

Choose **More** to display additional information about the partition.

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Partition status displays one or more of the following values:

Active - OS/2 is running and data has been written to the partition.

Dirty - OS/2 was shutdown improperly and is not running.

Corrupt - One or more sectors are bad and the partition needs to be checked.

HotFixes - Problems that have been hotfixed.

Not Active - The partition is not in use.

Last Chkdsk displays the date of the last CHKDSK. If CHKDSK has never been run, this field displays "Never."

Last Optimize displays the last date the partition was optimized. If the partition has never been optimized, this field displays "Never."

First DirBlock sector displays the first sector of the DirBlock band. The DirBlock band is usually preallocated near the center of the disk to reduce head movement.

Last DirBlock sector displays the last sector of the DirBlock band.

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Free DirBlocks displays the number of unused DirBlocks in the DirBlock band and the total number of DirBlocks present. If the DirBlock band fills, additional DirBlocks are allocated from the data area.

Spare DirBlocks used displays the number of spare DirBlocks used and the total number of spare DirBlocks present. Spare DirBlocks are allocated in case no space is available for a directory operation that forces a directory B-tree rebalance operation.

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. CHKD-SK transfers the data from a hot-fix sector to a good sector and makes the hot-fix sector available again.

Physical geometry displays the total number of cylinders, heads and sectors of the physical drive on which the selected partition resides.

NTFS Info Results

When you choose Info on an NTFS partition, the following dialog box is displayed.

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Selected Partition describes the file system type and serial number of the selected partition.

First physical sector and **Last physical sector** show the location of the first and last physical sectors of the partition. These fields also display the cylinder numbers, head numbers and sector numbers of the first and last sectors.

Total physical sectors shows the total number of sectors on the partition, as well as the partition's size in MB. This size can be larger than the number of sectors used by the file system because it is often necessary for file systems to leave some sectors unused.

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 first cluster of the Master File Table (MFT).

File Record Size gives the size of each file record in the MFT. The file record size ranges from 1K to 4K.

Physical Geometry displays the number of cylinders, heads and sectors of the physical drive on which the selected partition resides.

Other Info Results

If you choose Info on an area that is not a FAT, HPFS, or NTFS partition (such as another partition or free space), a generic Partition Information dialog box is displayed which provides information about the selected partition.

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Selected Partition describes the partition type, or identifies the area as free space.

First physical sector and **Last physical sector** show the location of the first and last physical sectors of the partition. These fields also display the cylinder numbers, head numbers and sector numbers of the first and last sectors.

Total physical sectors shows the total number of sectors on the partition as well as the partition's size in MB. This size can be larger than the number of sectors used by the file system because it is often necessary for file systems to leave some sectors unused.

Physical Geometry displays the number of cylinders, heads and sectors of the physical drive on which the selected partition resides.

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This option performs a check operation on the selected partition.

You can perform this operation on both FAT and HPFS partitions. It is faster and more informative than the operating system CHKDSK command. If you are performing this operation on a FAT partition, the results of this operation are displayed for the data area—or cluster area—only. The results of a check disk operation on an HPFS partition, however, reflect the entire partition and are given in sectors.

FAT Check Results

When you choose this option on a FAT partition, the following Check Results dialog box is displayed. (On an HPFS partition, this dialog box is slightly different. See pages 61-63.)

Check

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The information in the FAT Check Results dialog box is explained below.

Describes the drive letter, volume label, file system type and serial number of the selected partition.

Number of used bytes, files and hidden files on the selected partition.

Number of bytes unused in allocated file clusters on the selected partition (slack space).

Number of bytes and directories on the selected partition.

Number of bytes of used disk space on the selected partition. This is the total of the three previous lines. (Values given in bytes and clusters.)

Number of bytes of free disk space on the selected partition. (Values given in bytes and clusters.)

Number of bytes of bad disk space on the selected partition. (Values given in bytes and clusters.)

Number of bytes of total disk space on the selected partition. This is the total of the three previous lines. (Values given in bytes and clusters.)

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Number of bytes in OS/2 extended attributes, as well as the number of files and directories that have extended attributes.

Number of bytes in Microsoft long file names, as well as the number of files and directories that have Microsoft long file names.

HPFS Check Results

When you choose this option on an HPFS partition, the following Check Results dialog box is displayed.

NOTE: Information reported by PartitionMagic differs slightly from information reported by OS/2's CHKDSK. See PartitionMagic's Check Option vs. OS/2's CHKDSK in Appendix A for an explanation.

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The information in the HPFS Check Results dialog box is explained below.

Describes the drive letter, volume label, file system type and serial number of the selected partition.

Number of used bytes, files and hidden files on the selected partition.

Number of bytes unused in file sectors on the selected partition (slack space).

Number of bytes in directories and the number of directories on the selected partition.

Number of bytes in file/dir fnodes. An fnode is a key system structure of the HPFS file system. Each fnode is 512 bytes long. One fnode exists for each file or directory in the partition.

Number of bytes HPFS reserves for other structures stored in the partition.

Number of bytes of used disk space on the selected partition. This is the total of the five previous lines.

Number of bytes of free disk space on the selected partition.

The amount of bad disk space that exists in the partition.

The total amount of disk space in the partition. This is the total of the three previous lines.

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The number of bytes used by extended attributes (EAs). Under HPFS, a file may have specific information associated with it, in addition to the standard DOS attributes (read only, system, hidden and archive).

When a Check Fails

If a Check operation fails, an error message displays the first problem encountered. Choose **OK**, then correct the problem using the operating system's CHKDSK function (SCANDISK on DOS 6.2 or later) or a third-party utility program. While a partition has a Check Failed status, the partition list shows Check Failed and most options are grayed out (not allowed).

Resolving Check Errors

Many errors can be detected after selecting the Check option or when starting an operation before any changes are made to the partition (see Appendix A: Troubleshooting for a list of error codes.) If PartitionMagic detects a problem with a partition, it refuses to modify it since doing so may put the data at risk. If you receive an error message, exit PartitionMagic and run the CHKDSK program (without /F) on the same partition to further diagnose the problem. (The DOS CHKDSK program does not detect problems in extended attributes.) If PartitionMagic's Check operation shows a problem and CHKDSK does not, PartitionMagic may have detected an error that CHKDSK ignores. In this case contact PowerQuest Technical Support for assistance. See Appendix B: Product Support.

HINT: If you do not have a backup copy of your hard disk, create one before proceeding. The CHKDSK program usually detects the same errors as the PartitionMagic Check option. If this is the case, run CHKDSK /F (or SCANDISK on DOS 6.2 or later) on the partition to fix the problem. After running CHKDSK /F, try running CHKDSK without /F to make sure the partition is fixed. CHKDSK should pass twice consecutively before proceeding. Once CHKDSK is satisfied that the partition is clean, run PartitionMagic's Check option. If PartitionMagic still shows a problem, or if CHKDSK still will not pass the partition, reformat the partition and restore your files from the backup copy.

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This option allows you to move a disk partition from one part of a drive 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 box. 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 MB) 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 field size will occasionally change to a value close to the value entered. This reflects the actual value to which the partition can be changed based on the drive's geometry.

Hint: Move operations are faster when the **Skip Bad Sector Test** is selected from the preference menu.

Moving a partition creates a new or enlarged area of the free space adjacent to the relocated partition. You can use this space by either moving, expanding, or creating

a new partition. If no free space exists to the left or to the right of the partition, the










Move

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move operation is not allowed. Free space, unknown partitions and partitions failing the check operation cannot be moved.

Open Files

You cannot run PartitionMagic from the partition you are modifying, and you cannot modify partitions that contain open files (except under OS/2 Maintenance Mode or DOS). This means you cannot run PartitionMagic from the partition you want to move. In addition to the obvious sources of open files, the following are some 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

Due to FAT constraints, PartitionMagic requires that FAT partitions remain within the first 1024 cylinders of the hard disk. Also, OS/2 cannot safely boot from any partition (even an HPFS partition) that has any portion of that partition beyond the first 1024 cylinders of the hard disk. (See page 20 for information on the 1024 cylinder limitation.)

Move Progress Window

After you begin a Move operation, PartitionMagic displays a progress window which provides information about the operation. Choose **Cancel** if you want to cancel the operation. The Cancel button is grayed out (disabled) when canceling would leave the partition in an unusable state. Choosing Cancel may not undo changes that have already taken place; data is never lost when Cancel is chosen. The progress window's OK button is grayed out (disabled) during the operation and becomes enabled once the operation completes. Choose **OK** to close the window.

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Move Examples

Example 1: **Moving free space from a logical partition to a primary partition.**

You want to increase the size of your primary partition by moving free space from a logical partition.

Before:

After:

- 1 Shrink (Resize) your D: partition to create free space outside of D:.
- 2 Move the D: partition to the right of the free space.
- 3 Select the extended partition.
- 4 Choose **<Resize** to move the free space to the outside of the extended partition.
- 5 Select the C: partition and Resize (expand) your primary C: partition into the free space.

Example 2: **Moving your C: partition to make room for Boot Manager.**

You want to have Boot Manager at the beginning of your C: primary partition.

Before:

After:

- 1 Shrink (Resize) the C: partition by 1MB.
- 2 Move the C: partition to the right of the 1MB free space.

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This option lets you resize a partition. When a partition is resized, data is consolidated, not compressed. If you want to shrink a partition, there must be free space within the partition.

If you want to expand a partition, there must be free space to the right of the partition.

HINT: Partitions can only expand to the right, so if the free space is not immediately to the right of the partition in which you want it to reside, you may have to move partitions around to get the free space in the proper position. (See Move on page 64.)

Specify how you want the partition resized by either (1) dragging the appropriate resize handle, (2) clicking the arrows on either side of the partition map, or (3) clicking inside a field and using your keyboard to specify the new size (in MB) of the partition. When you change the value in one field, the value in 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 field size will occasionally change to a value close to the value entered. This reflects the actual value to which the partition can be changed based on the drive's geometry.

When you resize a 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 TSR programs or device drivers to ensure file system compatibility. Even if you boot from a floppy diskette or

Resize

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access the partition from another operating system, the partition is still valid and accessible.

Open Files

You cannot run PartitionMagic from the partition you are modifying, and you cannot modify partitions that contain open files (except under OS/2 Maintenance Mode or DOS). This means you cannot run PartitionMagic from the partition you want to resize. See Open Files on page 65 for sources of open files.

Advanced Resize Options




If you enable Advanced Dialogs in the Preferences menu before choosing the Resize option, you will be shown the Resize Partition advanced dialog box. This dialog box adds a control to select the partition size based on the desired cluster size. Use this control when you want to resize a partition to obtain a desired cluster size.

Click on the Cluster Size drop-down list to display the available cluster sizes, or Tab to the control and use the up (↑) and down (↓) arrows to change the selection. PartitionMagic

adheres to the established limits for partition and cluster sizes, so no TSRs or device drivers are necessary. When you select a cluster size that is not valid for the current partition size, a smaller, valid partition size is automatically selected.

Resize Limitations

There are several limitations to resizing partitions, including:

-  PartitionMagic will not allow you to modify the partition from which you are running.
-  FAT partitions cannot include any space on the hard disk beyond cylinder 1023. (See page 20 for information on the 1024 cylinder limitation.)
-  A small amount of free space in the partition is required for PartitionMagic to create

necessary structures when expanding the partition.

1024 Cylinder Limit

The Resize option respects the FAT limitation that the partition exist entirely within the first 1024 (numbered 0-1023) cylinders of a hard disk. If DOS were to attempt to write to a position beyond 1024, the data would wrap around and overwrite the boot sector of the hard disk. (See page 20 for information on the 1024 cylinder limitation.)

PartitionMagic Structures

A partition can only be reduced to the current “used” size plus a small buffer area. Data is

consolidated to the front of the partition as needed but no data compression takes place.

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Because of a FAT partition’s structure, it is often possible to shrink or expand a partition a second time to a size even smaller or larger than the first time. In certain instances a FAT partition cannot be enlarged if the partition contains no free space. PartitionMagic needs a small buffer area of free space within the partition to perform an expansion. If you have a full partition and plenty of free space, yet are not able to expand 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 expand the partition by a small amount (1MB or less), then expand the partition a second time once the first operation has completed. This process provides the necessary buffer area needed by PartitionMagic.

It is difficult to calculate in advance the minimum size an HPFS partition may be resized. During an HPFS Resize (shrink) operation, if PartitionMagic runs out of space, it returns an error without completing the operation. However, the integrity of the HPFS partition and data is maintained at all times.

Resize Progress Window

After you begin a Resize operation, PartitionMagic displays a progress window which provides information about the operation. Choose **Cancel** if you want to cancel the operation. The Cancel button is grayed out (disabled) when canceling would leave the partition in an unusable state. Choosing Cancel may not undo changes that have already taken place, but data is never lost when Cancel is chosen. The progress window’s OK button is grayed out (disabled) during the operation and becomes enabled once the operation is complete. Choose **OK** to close the window.

If the operation recovers wasted disk space, the number of bytes recovered is displayed in the Progress Window after the operation completes.

Drive Letter Changes

If you use the Resize option to create space for a new partition, pay strict attention to the rules used by Windows 95, DOS and OS/2 to assign drive letters (see Drive Letters in Chapter 2). One side effect of changing drive letters is the inability to access programs that reside on the affected drives. Your programs are still in their original partition, but the partition has been assigned a new drive letter. To access those programs, you must alter batch files, .INI files, Windows 95, DOS and OS/2 settings, registry values and other scripts that refer to files on the partition. Since this can be a tedious process, you may want to delete the newly inserted partition to restore the

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drive letters to their original state. You may find it best to add all new partitions after any current partitions so that existing drive letters are not affected.

If your boot partition has had its drive letter reassigned, the operating system will not be able to boot. In order to return the operating system to its original bootable state, you must remove the newly inserted partition(s) to restore the drive letters or

you must reinstall the operating system in that partition.

If the selected partition is an extended partition with free space at the left end of the partition, the Move button changes to <Resize for the Resize Left Boundary operation. Resize Left Boundary changes the size of the extended partition by moving the left boundary. To shrink an extended partition, there must be free space inside the right end of the extended partition. The physical locations of logical drives are not affected by a Resize Left Boundary operation. Use Resize> to move the right boundary of the extended partition.

If the selected partition is an extended partition with the free space at the right end of the partition, the Resize button changes to Resize>. Resize> is the same operation as Resize. To shrink an extended partition, there must be free space inside the right end of the extended partition. The physical locations of logical drives are not affected by a Resize Right Boundary operation. Use <Resize to move the left boundary of the extended partition.

NOTE: OS/2's FDISK attempts to automatically update the size of the extended partition. But 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. Subsequently using another FDISK program (such as DOS's FDISK) can 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, then resize it as small as possible.

Resize >

< Resize

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Resize Examples

Example 1: **Shrink one logical partition and add the free space to another logical partition.** In this example we are assuming you have a C: primary partition and D: and E: logical partitions. Note: You can easily modify these steps to fit your specific configuration.

Before:

After:

- 1 Shrink (Resize) your D: partition by the same amount you want to add to your E: partition.
- 2 Move your E: partition to the left of the free space.
- 3 Expand (Resize) your E: partition into the free space.

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Example 2: **Resizing a primary partition and adding the free space to a logical partition.** In this example we are assuming you have a C: primary partition and want to shrink it and add the free space to a D: logical partition.

Before:

After:

- 1 Shrink (Resize) your C: partition by the same amount you want to add to your D: partition.
- 2 Select the extended partition by clicking on it in the partition map or partition list.

- 3 Choose **<Resize** to move the free space inside of the extended partition.
- 4 Move the D: partition to the left of the free space.
- 5 Select the D: partition and Resize your D: partition into the free space.

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This option only exists in the OS/2 and DOS product. It converts the selected partition's file system type from FAT (File Allocation Table) to HPFS (High Performance File System). PartitionMagic will preserve long file names created by Microsoft operating systems (Windows NT 3.5, Windows 95) (see long files names in the Glossary). If a file has a Workplace shell long name extended attribute, the attribute is preserved. All file data is preserved.

IMPORTANT: 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 Backup the data on your boot drive. Because the Convert operation cannot be undone, we strongly recommend that you take this precautionary step.
- 2 Reboot your system (either from a diskette, or from a partition other than the one you are converting).
- 3 Run PartitionMagic (either from a diskette, or from a partition other than the one you are converting).
- 4 Select the partition you want to convert.
- 5 Choose **Convert** to begin the conversion operation.
- 6 When the conversion is finished, choose **Exit** to exit PartitionMagic.
- 7 Copy the SYSINSTX.COM file only from the OS/2 Installation disk to the root of the new HPFS partition.
- 8 Copy UHPFS.DLL from the OS/2 Diskette 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 **x:** (where **x** is the partition you converted from FAT to HPFS).
- 10 From the root of the new HPFS partition, type **SYSINSTX x:** (where **x** is the partition you converted from FAT to HPFS).
- 11 Verify that HPFS.IFS is listed in the CONFIG.SYS file, with a line similar to:
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.

Convert

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

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

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.

Convert Progress Window

After you begin a Convert operation, PartitionMagic displays a progress window which provides information about the operation.

Choose **Cancel** if you want to cancel the operation. The Cancel 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. The progress window's OK button is grayed out (disabled) during the operation and becomes enabled once the operation completes. Choose **OK** to close the window.

If the operation recovered wasted disk space, the number of bytes recovered is displayed in the Progress Window after the operation completes.

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Choose this option to create a partition. In addition to the Create button in the Main Window, you can access this option through the Options menu or through the pop-up menu that displays when you right-click your mouse on a Free Space area.

The position of the free space determines the type of partition created. For example, if the free space is outside the extended partition, a primary partition will be created. Likewise, if the free space is inside the extended partition, a logical partition will be created. 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 in Chapter 2. For more information about moving free space inside or outside of the extended partition, Create Examples later in this chapter.

IMPORTANT: Before you begin this procedure, make sure you understand how drive letters can be affected. See Changing Drive Letters under Drive Letters in Chapter 2.

To create a new partition,

1 Choose Create using one of the methods described above. The following dialog box is displayed.

2 Fill in the fields as explained below.

Type/File System · Specify the type of file system that you want to assign to the partition. The four available types are FAT, HPFS, Extended and Unformatted. If you specify FAT or HPFS, the partition will automatically be formatted as it is created.

Create

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New Label – For FAT and HPFS partitions specify the label name in this field.

Size – Specify the size of the partition. The size may change to a value close to the value entered, reflecting the drive's geometry constraints.

Position – If you specify a size (in the Size field) that is smaller than the free space, you can choose whether you want the partition at the beginning or at the end of the free space.

Advanced Options

The following are advanced options which are displayed in the Create Partition dialog box only if you chose **Advanced Dialogs** from the Preferences menu before you began the Create operation.

Test for Bad Sectors – Select **Yes** if you want the partition checked for bad sectors during the format. If you know your hard disk remaps bad sectors, it is ok to skip bad sector testing.

Advanced Fat Options

Cluster Size - Specify the cluster size by choosing a value from the drop-down list. When you select a partition size that is invalid or non-optimal for the selected cluster size, a different cluster size is automatically selected. When you select a cluster size that is invalid for the selected partition size, a smaller valid partition size is automatically selected.

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Root Entries - Specify the maximum number of entries you want created in the root directory (64-1024). The number of root entries does not expand automatically as it does in a subdirectory. You may want to specify more than the default of 512 entries when using long file names. Use the Root Entries spin-box to change the number of entries. The value changes by 32 (the number of entries in one sector). Any number you type will be rounded up to the next valid value.

Create Examples

Remember that the position of the free space determines the type of partition created. If the free space is outside the extended partition, a primary partition will be created. Likewise, if the free space is inside the extended partition, a logical partition will be created. To create a logical partition when no extended partition exists, use Create to first create an extended partition.

Example 1: Creating new logical partitions to separate your operating systems from your applications and data files. In this example we are assuming you only have a primary C: partition with free space within the partition. When you are through you will have a C: partition for your operating systems and D: and E: partitions for your applications and data files.

Before:

After:

1 Shrink (Resize) the C: partition. (**HINT:** Shrink the C: partition 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 Select the free space that is to the right of the C: partition and choose **Create** from the Main Window.

3 In the Type/File System field, choose **Extended**. Choose **OK**.

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

5 In the Type/File System Box, select a FAT partition, then specify a volume label and number of MBs you want to allocate to the D: partition. Choose **OK**.

6 Repeat step 4 and 5 to create your E: partition.

Example 2: Creating 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 Shrink (Resize) the C: partition. (**HINT:** Shrink the C: partition 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 Select the free space that is to the right of the C: partition and choose **Create** from the Main Window.

3 In the Type/File System field, choose **FAT**, select your volume label and partition size. Choose **OK**.

4 Set the new partition active (see **Set Active** on page 84).

You can now install another operating system in the second primary partition. To switch between the two operating systems, use **Set Active** to select the desired partition

and reboot. Or use a boot utility like Boot Manager or System Commander.

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This option deletes a partition and all its data. Because this is an operation that destroys data, PartitionMagic forces you to 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 delete extended partitions, first delete all logical partitions.

DATA LOSS WARNING

Performing this procedure will destroy all data on the selected partition.

To delete a partition,

1 Choose Delete using one of the methods described above. The following dialog box is displayed.

2 As an added precaution against accidental data loss, PartitionMagic requires you to type the volume label in the field before it will perform the Delete operation.

The volume label appears in the dialog box following the line Current volume label is:.

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

IMPORTANT: Before you begin this procedure, make sure you understand how drive letters can be affected. See Changing Drive Letters under Drive Letters in Chapter 2.

Delete

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This option formats a partition and allows you to specify a file system and volume label. Because this is an operation that destroys data, PartitionMagic forces you to 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.

DATA LOSS WARNING

Performing this procedure will destroy all data on the selected partition.

To change a FAT partition to HPFS without destroying the existing files, use the

Convert option.

To format a partition,

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

2 As an added precaution against accidental data loss, PartitionMagic requires you to type the volume label in the field before it will perform the Format operation. The volume label appears in the dialog box following the line Current volume label is:.

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

Format

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4 Fill in the fields as explained below.

File System - Select the type of file system you want (FAT or HPFS).

New Label (Optional) - Enter a label for the partition.

Advanced Options

The following are advanced options which are displayed in the Format Partition dialog box only if you chose **Advanced Dialogs** from the Preferences menu before you began the Format operation.

Test for Bad Sectors - Select the check box if you want the partition checked for bad sectors during the format. If you know your hard disk remaps bad sectors, it is

ok to skip bad sector testing.

Advanced FAT Options

Cluster Size – Specify the cluster size by choosing a value from the drop-down list. PartitionMagic adheres to the established limits for partition and cluster sizes. Only valid cluster sizes for the selected partition size are displayed. To interactively change both partition size and cluster size, format the partition, then use the Resize option.

Root Entries – Specify the maximum number of entries you want created in the root directory (64-1024). The number of root entries does not expand automatically as it does in a subdirectory. You may want to specify more than the default of 512 entries when using Microsoft long file names. Use the Root Entries spin-box to change the number of entries. The value changes by 32 (the number of entries in one sector). Any number you type will be rounded up to the next valid value.

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Advanced Options

These options can be accessed through the Advanced menu, or by choosing Advanced Dialogs from the Preferences menu, then right-clicking on an applicable partition.

Cluster Resize

FAT allocates disk space for files in units of one or more sectors. These units are called clusters or allocation units. On any FAT partition, a 1-byte file is allocated 1 cluster of disk space, wasting the unused area of the cluster. A file that is 3.2 clusters large is given 4 clusters. Overall, a small cluster size means less waste. The cluster size for a drive is decided by FORMAT, depending on the size of the partition (see Figure 4-6 on the following page).

On a FAT partition, you can change the size of its clusters without destroying data. It is not normally necessary to use this option since PartitionMagic operations automatically

keep the cluster size as small as possible. One scenario in which the smallest cluster size is not recommended is a partition with a single, large file such as a large data base or swap file.

When you choose this option, the Resize Clusters dialog box is displayed. Click on the New cluster size drop-down list box to display the available cluster sizes, or use the up and down arrows to change the selection. PartitionMagic adheres to the established limits for partition and cluster sizes, so no TSRs or device drivers are necessary. When you select a cluster size that is invalid for the current partition size, a smaller, valid partition size is automatically selected. The current partition size is displayed so you can see when an implicit resize occurs.

FIGURE 4-6. FAT Cluster Information

Root Resize

On a FAT partition, you can change the maximum number of entries that can be placed in the root directory. When you choose this option, the Resize Root dialog box is displayed showing you the number of Used root entries and current Maximum root entries. (The difference between these two is the number of free root entries available.) Enter the amount you want in the New maximum entries field.

The Resize Root dialog box allows you to change the number of root directory entries for a FAT partition. The data within the partition remains unaffected. The number of root entries is set at the time the partition is formatted; the limit does not

DRIVE FAT SECTORS CLUSTER

SIZE TYPE PER SIZE

CLUSTER

HARD 0MB - 15MB 12-bit 8 4K

DISKS

16MB - 127MB 16-bit 4 2K
128MB - 255MB 16-bit 8 4K
256MB - 511MB 16-bit 16 8K
512MB - 1023MB 16-bit 32 16K
1024MB - 2047MB 16-bit 64 32K

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expand automatically as it does in a subdirectory. You may want to increase this number when using Microsoft long file names in the root directory. The dialog box shows the number of entries currently in use as well as the maximum number of entries currently allowed. Click on the New maximum entries up and down arrows to change the number of entries, or use the up and down arrows to change the value. The value changes by the amount necessary to preserve the current cluster alignment. Any number you type will be rounded up to the next valid value.

Set Active

If you have multiple primary partitions, only one can be active at a time. When your computer is started or rebooted, it reads the partition table of the first drive, scans it for the active partition and boots that partition. The Set Active Partition dialog box allows you to make the currently selected partition active. If the selected partition is on the first drive, it must be bootable or you will not be able to boot your computer from that partition.

Unlike Windows 95 and DOS's FDISK, PartitionMagic hides non-active FAT, HPFS and NTFS primary partitions. Use this feature 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, shrink the DOS partition, create another primary partition, set it as the active partition, then boot from the Windows 95 installation diskettes.

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If you have a boot utility (such as Boot Manager) that resides in a primary partition, it should be the active partition. OS/2's FDISK uses the term "Startable" rather than "Active."

IMPORTANT: Avoid creating MVPs if you are using OS/2. Because OS/2 does not support MVPs, creating them can cause data loss.

Hide/Unhide Partition

This menu item is dependent on the currently selected partition. If it is a hidden partition,

the menu reads Unhide Partition. If it is a visible partition, it reads Hide Partition. You can perform Hide/Unhide Partition on any primary or logical FAT, HPFS, or NTFS partition. **Note:** You can not boot from a hidden logical partition.

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

Take care when using these options because hiding or unhiding a partition causes the drive letters of subsequent partitions to change. This can make the computer fail to boot, or cause applications to fail.

If you create more than one primary partition on a drive, only one is visible by default. When you use the Set Active option, that primary partition will be unhidden and other primary partitions will be hidden. PartitionMagic allows you to unhide more than one primary partition. While some operating systems support multiple

visible primary partitions, OS/2 does not.

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Warning: Attempting to use multiple visible primary partitions will confuse the drive letter assignments of Boot Manager and OS/2's FDISK and possibly cause data loss.

Bad Sector Retest

This option retests the clusters that are marked as bad in a FAT partition to determine their actual status. If you increase a partition's cluster size, or move a partition, all new clusters that contain any part of an old bad cluster must also be marked as bad. PartitionMagic does this to be conservative; the clusters may have been marked bad by a factory format program capable of finding hard-to-detect problems. Retesting the sectors may not detect the problem sectors as well. Only clusters marked bad are retested. 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 only be in a single sector. If you decrease the partition's cluster size, bad clusters will be divided into multiple bad clusters. Choosing **Bad Sector Retest** may change some clusters marked as "bad" to "good."

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Preferences Menu

The Preference menu contains two options—Advanced Dialogs and Skip Bad Sector Checks—which are explained below. Each time you start PartitionMagic, the preference settings revert to the defaults.

Advanced Dialogs

Choosing this option causes additional fields to display in the Create Partition, Format Partition and Resize Partition dialog boxes. These fields allow you to set the partition's cluster size, number of entries allowed in the partition's root directory and/or bad sector testing. Choosing Advanced Dialogs also allows you to access Advanced Options through the pop-up menu that appears when you right-click on an applicable partition. See Advanced Options earlier in this chapter.

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 setting the Skip Bad Sector Tests to on (3).

Hint: Move operations are faster when the Skip Bad Sector Test 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 allow PartitionMagic to check the older drive while skip-ping the checks on the newer.

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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, the Help menu and the F1 key. Choosing any of these 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 box which lists all help topics in alphabetical order. To display a topic, highlight it using the primary mouse button (or the arrow keys and space

bar on your keyboard), then choose **Show Topic** (see Figure 4-7).

FIGURE 4-7. Help Index Dialog Box.

Notice that when the Help Topic dialog box is displayed, the button changes from Show Topic to Show Index. Choose **Show Index** to return to the Help Index dialog box.

The Help menu contains three options: Topic List, General and About. Choosing **Topic List** will display the Help Index dialog box as shown in Figure 4-7. 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 version information, copyright information about the PartitionMagic program, as well as helpful telephone numbers and address information.

Help

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Choosing this option exits you completely out of the PartitionMagic program. If rebooting your computer is necessary, the following dialog box is displayed.

Choose **Reboot** to reboot your computer.

To save your OS/2 desktop and reboot, choose the **Shut Down** button on the LaunchPad, or right-click the desktop and select **Shut Down** from the desktop pop-up menu instead of selecting the PartitionMagic Reboot button.

Exit

Hard Disk Partitioning Scenarios

CHAPTER

Hard Disk

Partitioning Scenarios

Getting the Most Out of Your Hard Disk

This chapter is specifically for users who want to benefit from PartitionMagic as quickly as possible after installation. It provides step-by-step instructions for different hard disk scenarios. Each scenario is progressively more complex to accommodate the needs of different users. These scenarios will help you accomplish the three main reasons to partition your hard disks: organization, optimization and security/integrity. For more information about the value of partitioning see *Optimizing Hard Disks with Partitions* in Chapter 2.

Answering the following questions will help you determine the optimal configuration of your hard disk partitions:

- Do you want to separate data from operating systems and programs to increase security and organization?
- Do you want to increase the storage efficiency of your disk?
- Do you want to install multiple operating systems?
- Do you want to select which operating system to boot when you turn on your

computer?

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Example Hard Disk Scenarios for OS/2

The examples in this section assume you are starting with the following PC configuration:

a PC with a single hard disk formatted with a single FAT partition (C:) and loaded with DOS and Windows 3.x. However, even if your configuration is different, you can easily modify these steps for your particular environment.

Scenario 1

This scenario will take you from a single C: partition to three separate partitions: a Boot Manager partition; a C: primary partition for DOS and Windows 3.x; and a logical D: partition for OS/2 Warp. Your applications and data files will be shared between C: and D:. When you finish this scenario, you will have the flexibility of choosing which operating system you want to boot when you turn on your computer. Creating separate partitions will provide greater organization and will let you reduce the FAT cluster sizes to free up wasted disk space.

Before:

After:

BOOT MANAGER DOS/WINDOWS 3.X OS/2 WARP

To perform Scenario 1,

1 Shrink (Resize) the C: partition. (**HINT:** Shrink the C: partition by the same amount that you want to make the D: partition.) This will create free space for Boot Manager and for the new D: partition.

2 Move the C: partition 1 MB to the right to create free space for Boot Manager at the beginning of the drive.

3 Select the free space that is to the right of the C: partition and choose **Create**

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from the Main Window.

4 In the Type/File System field, choose **Extended** and select your partition size. (We recommend at least 90MB for OS/2 Warp without the Bonus Pack and 120MB with the Bonus Pack for the D: partition.) Choose **OK**.

5 Click on the free space within the extended partition and choose **Create** again. In the Type/File System Box, select a FAT partition, specify a volume label, then choose **OK**.

6 Choose **Exit** to exit PartitionMagic.

7 Install OS/2. When you are prompted, select **Advanced Installation**. On the Installation Drive Selection screen, select **Specify a different drive or partition**. When the Modifying Warnings screen is displayed, press **Enter** to continue. The OS/2 FDISK utility is displayed.

8 Use the OS/2 FDISK utility to perform the following steps:

a Install Boot manager by highlighting the free space at the beginning of the drive and selecting the Options menu. Choose **Install Boot Manager**.

b Use the Options menu to add the C: partition to the Boot Manager menu.

Call it "DOS." **NOTE:** If the **Add to Boot Manager Menu** item is disabled,

you have probably created a D: partition that extends beyond cylinder 1023 of your hard disk. Make the D: partition smaller, then add it to Boot Manager.

c Use the Options menu to set the D: partition as installable. This option also adds D: to the Boot Manager menu. Call it "OS/2."

9 Exit FDISK and finish installing OS/2 on the D: drive. You can now enjoy the flexibility of choosing between DOS/Windows 3.x and OS/2 when you first turn on your computer.

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Scenario 2

This scenario is identical to Scenario 1, except that it adds two additional logical drives for your applications and data. These logical drives will give you greater organization and smaller FAT cluster sizes.

Before:

After:

BOOT MANAGER DOS/WINDOWS 3.X APPS DATA OS/2

To perform Scenario 2,

1 Shrink (Resize) the C: partition. (**HINT:** Shrink the C: partition by the same amount that you wish to make the D:, E: and F: partitions.) This will create enough free space to allocate among Boot Manager and the new logical partitions.

2 Move the C: partition 1MB to the right to create free space for the Boot Manager.

3 Select the free space that is to the right of your C: partition and choose **Create**.

4 In the Type/File System field, choose **Extended** and select your partition size.

(Allocate all of the available free space to the right of the C: partition for the Extended partition). Choose **OK**.

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

6 In the Type/File System Box, select a FAT partition, then specify a volume label and number of MBs you want to allocate to the D: partition, Choose **OK**.

7 Repeat step 5 and 6 to create your E: and F: partitions (for OS/2 we recommend at least 90MB without the Bonus Pack and 120MB with the Bonus Pack).

8 Install OS/2. When you are prompted, select **Advanced Installation**. On the

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Installation Drive Selection screen, select **Specify a different drive or partition**.

When the Modifying Warnings screen is displayed, press **Enter** to continue. The OS/2 FDISK utility is displayed.

9 Use the OS/2 FDISK utility to perform the following steps:

a Install Boot manager by highlighting the free space at the beginning of the drive and selecting the Options menu. Choose **Install Boot Manager**.

b Use the Options menu to add the C: partition to the Boot Manager menu. Call it "DOS." **NOTE:** If the **Add to Boot Manager Menu** item is disabled, you

have probably created a D:, E: or F: partition that extends beyond cylinder 1023 of your hard disk. Make the partition smaller, then add it to Boot Manager.

d Use the Options menu to set the F: partition as installable. This option also adds F: to the Boot Manager menu. Call it "OS/2."

10 Exit FDISK and finish installing OS/2 on the F: drive. Congratulations, your hard disk is now organized and optimized. Drives D: and E: are available to copy files into. Use drive D: for your applications and E: for data.

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Example Hard Disk Scenarios for

Windows 95 & DOS

The examples in this section assume you are starting with the following PC configuration:

a PC with a single hard disk formatted with a single FAT partition (C:) and loaded with DOS and Windows 3.x. However, even if your configuration is different, you can easily modify these steps for your particular environment.

Scenario 1

This scenario will take you from a single C: partition to three separate partitions: a C: partition for DOS/Windows 3.x or Windows 95, a logical D: partition for your applications, and a logical E: partition for your data files. When you finish this scenario, you will have greater organization and smaller FAT cluster sizes to free up wasted disk space.

Before:

After:

DOS/WIN 3.X or WIN 95 APPS DATA

To perform Scenario 1,

1 Shrink (Resize) the C: partition. (HINT: Shrink the C: partition by the same amount that you wish to allocate to the D: and E: partitions). This will create free space for the new D: and E: partitions.

2 Select the free space that is to the right of the C: partition and chose Create from the Main Window.

3 In the Type/File System field, choose **Extended**. Choose **OK**.

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

5 In the Type/File System field, select a **FAT** partition, then specify a volume label and number of megabytes you want to allocate to the D: partition. Choose **OK**.

6 Repeat step 4 and 5 to create your E: partition.

Hint: Before you select the size of your partitions, see Figure 4-6 in Chapter 4 for information on efficient cluster sizes. We recommend between 2KB and 8KB cluster sizes for your applications and data files.

Congratulations. You have just configured your system to take advantage of smaller cluster sizes and greater organization.

Scenario 2

This scenario goes one step further than Scenario 1. It gives you the flexibility to migrate from DOS/Windows 3.x to Windows 95 at your own pace by allowing you to boot either DOS/Windows 3.x or Windows 95. When you are done with this scenario your hard disk will have the following configuration:

Before:

After:

DOS/WIN 3.X & APPS WIN 95 WIN 95 APPS DATA

C: Primary Partition (DOS/Win 3.x Bootable and DOS/Win 3.x applications)

This primary partition will contain the DOS/Window 3.x files and applications you wish to run from DOS/Windows 3.x. This partition should be at least 75 megabytes in size.

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C: Primary Partition (Windows 95 Bootable)

This primary partition will contain only Windows 95 files. This partition should be at least 75 megabytes in size.

D: Logical Partition (Windows 95 Applications)

This is where you will install all of the applications you wish to run with Windows 95. If you want to run applications with Windows 95 that still reside on

your DOS/Windows 3.x primary partition you will need to reinstall them to the D: partition.

E: Logical Partition (Data Files)

Store all of your data files on this partition (documents, spreadsheets, graphics, etc.). This is the only partition that you need to back up on a regular basis. Because data on this partition is separated from the other partitions, it is less likely to be corrupted by an application or operating system crash.

Note: This scenario requires you to create two C: partitions. Use PartitionMagic to create the partitions.

To perform Scenario 2,

1 Shrink (Resize) the C: partition to make room for additional partitions.

2 Create a 75MB primary partition for Windows 95. This is the second C: drive.

3 Create an extended partition and two logical partitions within it. (D: for Applications, E: for Data).

HINT: Assigning meaningful volume labels when creating partitions can help you keep track of where files should go and which C: primary partition is currently active.

4 Make a DOS bootable floppy diskette by typing `FORMAT A:/s` at the DOS command prompt. You will use this diskette in step 7.

5 Move all files (spreadsheets, graphics, documents, etc.) to the Data E: partition. In the future when you create new files save them to the E: partition.

6 Using PartitionMagic, set the new primary partition created in step 2 as Active.

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7 The new partition must be made bootable. Insert the bootable floppy created in step 4 into drive A: and reboot the computer. When the computer reboots, type `A:\SYS C:`.

8 If you will be installing Windows 95 from a CD-ROM, install the CD-ROM drivers to your new C: partition using the CD-ROM utility disk, then reboot the computer again.

9 From the new primary partition, type `A:\SETUP` if you are installing Windows 95 from floppy diskettes or `X:\SETUP` if you are installing Windows 95 from a CD-ROM (where X: is the drive letter of your CD-ROM drive). When you are prompted as to where you want to install Windows 95, it will default to `C:\WIN-DOWS`. If you are installing the Windows 95 upgrade, when prompted to the location of your old Windows directory, specify `A:\` and insert the first Windows 3.x floppy disk.

10 Install any applications that you wish to run with Windows 95 on your D: partition. You now have a system that can boot either Windows 3.x or Windows 95. To switch between the two without a boot utility such as OS/2's Boot manager or V Communication's System Commander, use PartitionMagic to set active the desired C: partition.

If you decide to migrate completely to Windows 95, simply delete your DOS/Windows 3.x primary partition, (make sure your Windows 95 primary partition is set Active) and then add the free space from the deleted partition to other partitions on the drive. Reinstall any remaining applications that were on your C: DOS/Windows 3.x primary partition to your D: applications partition.

You can easily modify this step-by-step process for your particular configuration needs as long as you remember the basic fundamentals of partitions described in *Optimizing Hard Drives with Partitions* in Chapter 2.

Appendix

APPENDIX

A

Troubleshooting

This section explains how to resolve Check Errors, partition table errors and lists the error messages you may encounter while using PartitionMagic. Only the most common messages are explained here. Appendix A also details the discrepancies between OS/2's CHKDSK and PartitionMagic's Check.

Resolving Check Errors (Error Codes 1000-2999)

Many errors can occur after selecting the Check option or when starting an operation before any changes are made to the partition. If PartitionMagic detects a problem with a partition, it refuses to modify it since doing so may decrease the amount of recoverable

data. If you receive an error message, exit PartitionMagic and run the CHKDSK program (without /F) on the same partition to further diagnose the problem. (The DOS CHKDSK program does not detect problems in extended attributes.) If

PartitionMagic's Check operation shows a problem and CHKDSK does not, either PartitionMagic has detected an error that CHKDSK ignores, or PartitionMagic has made a mistake. Either way, contact PowerQuest. See Appendix B: Product Support.

NOTE: If you do not have a backup copy of your hard disk, create one before proceeding. The CHKDSK program usually detects the same errors as the PartitionMagic Check option. If this is the case, run CHKDSK /F (or SCANDISK on DOS 6.2 or later) on the partition to fix the problem. After running CHKDSK /F, try running CHKDSK

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(without /F) to make sure the partition is fixed. CHKDSK should pass twice consecutively before proceeding. Once CHKDSK is satisfied that the partition is clean, run PartitionMagic's Check option. If PartitionMagic still shows a problem, CHKDSK /F may have introduced new errors. At this point, reformat the partition and restore your files from the backup copy.

PartitionMagic also performs a Check after modifying a partition. If the final Check fails, report the problem to PowerQuest. See Appendix B: Product Support. In this case, data loss is possible, but not typical. The problem is usually a minor file system error that can easily be corrected by CHKDSK /F. For more extensive errors, you may need to restore from a backup copy.

Resolving Partition Table Errors (Error Codes 100-199)

To create new error-free partition tables: (1) backup the offending partitions, (2) delete them, (3) recreate them and (4) restore their contents. You may need to use the FDISK program from a recent DOS version. (Older 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 you use two operating systems and they are "seeing" different partitions, it is quite possible that an MBR virus is present. Use a virus check utility that can detect the latest viruses. If a virus is found, data loss is likely because two copies of the MBR are present. Before removing the virus, boot one of the operating systems and use Check to evaluate the integrity of the partition tables. Backup the files from any partition that passes the Check operation, then boot the other operating system and repeat the process.

After backing up from both operating systems, remove the virus, then re-Check the partitions. Delete and re-Create any partitions that fail the Check. Finally, reinstall the operating systems and restore the backup files.

Error Codes

#3 Not enough memory

The PartitionMagic box and User Guide explain the program's memory require-

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ments. Quitting other applications can often free enough memory for PartitionMagic to run. See System Requirements in Chapter 1.

#8 Could not allocate/deallocate DOS real mode memory

PartitionMagic DOS executables use a DOS extender to allow PartitionMagic (a 32-bit application) to run from DOS. To read from and write to the disk, PartitionMagic requires some memory in the first 1MB of the computer's address space. If not enough memory is available, PartitionMagic cannot access the disk. Use the DOS MEM command to determine how much memory you have available and what applications are using it. If you press F8 while booting DOS, you will be prompted as to whether or not you want to execute each CONFIG.SYS and AUTOEXEC.BAT command. By not running drivers or TSR programs that use memory, you can force DOS to boot with more memory available.

#9 Not enough memory to complete the operation. No changes were made.

PartitionMagic is extremely careful with your data. At certain points in the operation, checks are made to determine if it is safe to continue. At one of those checks, PartitionMagic detected that there was not enough memory to complete the next set of changes. Rather than risk losing data, PartitionMagic has aborted the operation. No data was lost and no apparent changes were made.

This error usually occurs when you are running PartitionMagic for OS/2 after booting from floppy on a 4MB computer. After PartitionMagic is loaded into memory, about 300Kb remain. The simplest solution is to run the DOS executable. Another alternative is to free up some memory which can be done by copying the first two OS/2 installation diskettes, identifying unused device drivers, then deleting the lines that load those drivers in the CONFIG.SYS file on the second diskette.

#23 Unsupported version of operating system

The PartitionMagic box and User Guide explain the operating system version that is required to run the program. See System Requirements in Chapter 1.

#26 XXXXX.DAT not found

The DOS executables require a data file containing the user interface objects to be located in the same directory as the executable. PQMAGICD.EXE that ships with the OS/2 and DOS version requires PQDPM.DAT. PQMAGIC.EXE that ships with the Windows 95 and DOS version requires PQDW95.DAT. Other executables require a data file for the Help information. If you received this message when pressing a Help button, the PQHELP.DAT file was not found.

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#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 drive contains files that are in use by another process, PartitionMagic cannot lock the drive. For information about how to avoid this error, see Move: Open Files in Chapter 4.

#34 This Beta or evaluation version is no longer safe to use

PowerQuest occasionally releases Beta versions of PartitionMagic. Beta versions are not as safe as release versions. To help you avoid accidentally running a Beta version when you want to run a release version, PowerQuest builds an expiration date into each Beta version. After a predetermined test period, the Beta version will no longer function. The error is also returned when using an evaluation version after the expiration date.

#36 DPMI Server error

PartitionMagic DOS executables use a DOS extender to allow PartitionMagic (a 32-bit application) to run from DOS. This error indicates that the DOS error has failed during a call from PartitionMagic through the DOS extender to DOS (or to the BIOS). DOS extenders often conflict with extended memory users loaded in CON-FIG.SYS or AUTOEXEC.BAT. If you press F8 while booting DOS, you will be prompted as to whether or not you want to execute each CONFIG.SYS and AUTOEXEC.BAT command. By not running several of these commands, you can often find a configuration that allows 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 drive contains files that are in use by another process, PartitionMagic cannot lock the drive. For information about how to avoid this error, see Move: Open Files in Chapter 4.

#38 Program is running from that partition

You have selected an operation that modifies the partition on which PartitionMagic resides. Copy PartitionMagic and any necessary .DAT files (see error #26) to a different partition or to a floppy disk, then run PartitionMagic from that partition or floppy disk.

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#70 Windows was detected

Because PartitionMagic makes low-level changes to the disk, it must have exclusive access to the disk in order to keep your data safe. Because Windows 3.x is a multi-tasking

operating system that does not provide PartitionMagic a way to guarantee exclusive access to the disk, it is not safe to run PartitionMagic under Windows 3.x. In Program Manager, select **File**, choose **Exit Windows**, then start PartitionMagic. Under Windows 95, use MS-DOS mode as explained in Chapter 3.

#71 DesqVIEW was detected

Because PartitionMagic makes low-level changes to the 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 the disk, it must have exclusive access to the disk in order to keep your data safe. Exit DOS Shell before running PartitionMagic.

(#100-199)

These are primarily Partition Table errors. See Resolving Partition Table Errors earlier in this appendix.

#100 Partition table is bad

The hard disk partition table contains erroneous values. The partition tables in the

#40 A hard disk is present but can't be accessed

#41 Can not write, disk is write protected

#42 Disk changed since last operation

#43 Unknown unit

#44 Drive not ready

#45 CRC error in data

#46 Seek error

#47 Unknown media type

#48 Sector not found

#49 Write fault

#50 Read fault

#51 General hard disk failure

#52 DMA error

#53 Lock violation

#54 Network device fault

#55 Specified drive is busy

#56 Unexpected internal error

(#40 through #56)

These errors indicate that I/O with your disk is not possible. This often indicates hardware problems with the disk. When possible, PartitionMagic detects such errors before any changes have been made so you can back up your data before upgrading to a new disk.

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Master Boot Record (MBR) and Extended Partition Boot Records (EPBR) can each contain one partition of type 5. This error occurs if a single partition table contains two type 5 entries. Since any modifications PartitionMagic makes may decrease the amount of data that is recoverable from the drive, PartitionMagic will not recognize any of the drive's partitions. You can use the PARTINFO utility to print the contents of the partition tables.

#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, HPFS and NTFS partitions to begin and end on the boundaries used by FDISK. If they do not, the disk may be partially corrupt and any modifications PartitionMagic makes may decrease the amount of data recoverable from the drive. Therefore, PartitionMagic refuses to recognize any of the drive's partitions. You can use the PARTINFO utility to print the contents of the partition tables.

#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 drive that uses more than 1024 cylinders. Under DOS, PartitionMagic is restricted by the BIOS 1024 cylinder limit. If any partitions extend beyond the limit, PartitionMagic cannot safely operate on the drive. You must use the OS/2 executables (PQMAGIC.EXE or PQMAGICT.EXE) to operate on the drive or run under Windows 95. This error can also occur when you are booting OS/2 from a floppy diskette if the correct drivers for the drive are not present on the diskette.

This error can also occur if a partition erroneously extends beyond the actual end of the drive. This may happen if the drive has been used on a different computer or with a different hard drive controller. You can use the PARTINFO utility to print the contents of the partition tables. Remember that the actual geometry of the drive may

differ from the logical geometry assigned to the drive by the operating system.

#108 Partition doesn't end at end of cylinder

See error #105.

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#109 Partition ends after end of disk

See error #107.

#110 Partition table number of sectors is inconsistent

The hard disk partition table contains erroneous values. The partition table contains two size descriptions which do not agree. You can use the PARTINFO utility to print the contents of the partition tables.

This error is serious if the drive is used by both DOS and OS/2. DOS uses one of the size descriptions and OS/2 uses the other. Data loss is likely once the partition is almost full.

#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. You can use the PARTINFO utility to print the contents of the partition tables.

#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. You can use the PARTINFO utility to print the contents of the partition tables.

This error is often the result of an OS/2 FDISK bug. If free space exists within the extended partition (often as a result of using the DOS FDISK program), OS/2's FDISK program allows a primary partition to be created that overlaps the extended partition. A logical drive 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 drive! Aside from patching the partition table, this problem can be fixed by creating new, error-free partitions. To create new partitions: (1) backup all partitions, (2) delete them, (3) recreate them and (4) restore their contents.

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#116 Partition table Begin and Start inconsistent

The hard disk partition table contains erroneous values. The partition table contains two disagreeing descriptions of the starting sector of the partition. This error can occur if the operating system reports a drive geometry that is different than the geometry in use when the partition table was written. Possible causes are: (1) different operating systems (e.g. DOS vs. OS/2) report different geometries, (2) booting from a floppy uses a different driver than booting from a hard disk, (3) upgrading the operating system (e.g. OS/2 2.x to OS/2 Warp) causes a different driver to be used, (4) the hard disk or controller is changed, (5) the BIOS is upgraded, or (6) the BIOS LBA setting is changed.

You can use the PARTINFO utility program provided with PartitionMagic to print the contents of the partition tables. Data loss is possible if the drive is written to using geometries that vary by number of heads or sectors per track. One user reported that scanning for and removing a partition table virus eliminated this error from his drive.

#117 Partition's drive letter cannot be identified

Under OS/2, PartitionMagic must know the drive letter for each partition before modifications can be made. A driver on your system may change the drive letters from their defaults; or your partitions may not have serial numbers.

#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 driver letter remapping.

If this error occurs under OS/2 and you have Stacker (which assigns duplicate serial numbers), use the LABEL command to assign each stacked volume the volume label STACVOL XXX where 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 stacked volume is labeled, PartitionMagic ignores duplicate serial numbers on the stacked volumes. After using PartitionMagic, you can change the volume labels to your preferences.

You may use the included SNUTIL utility to change the serial numbers of physical FAT partitions. SNUTIL cannot be used for HPFS partitions, network volumes, compressed volumes, or other volumes that are not physical partitions.

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#119 A drive has been formatted since starting PartitionMagic

When it is started, PartitionMagic 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

DOS, OS/2, Windows 95 and Windows NT require that logical partitions be chained together in ascending order. One or more of the logical drives are chained together in the wrong order. Other operating systems may not have this requirement. Some versions of Linux fdisk chain logical drives together in the order created. This situation is very dangerous and can cause loss of one or more partitions when using DOS's FDISK.

#121 The first sector of the drive can not be read

The first sector of the drive (cylinder 0, head 0, sector 1) contains the Master Boot Record (MBR) and the primary partition table. PartitionMagic can not make changes to this drive because an error occurred when reading the first sector.

#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. This will only occur when moving non-FAT partitions. No corruption will occur when this error is encountered.

#300 A file with the specified name already exists

This can occur if there is an error while changing cluster sizes on a partition. Type "ATTRIB *.MAG -r -s -h", then "DEL *.MAG". If you have any other files that end with .MAG, rename them or move them before deleting *.MAG.

(#500 through #505)

These are primarily Check errors. See Resolving Check Errors earlier in this appendix.

#500 Subdirectory is corrupted

#501 Cross-linked files were found

#502 Name already exists in directory

#503 Path was not found

#504 File not found

#505 Path was invalid

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#506 Not enough free space on partition to shrink

A certain amount of free space (dependent on the drive's current contents) is required to shrink the partition. Try deleting unused or duplicate files in the partition

before attempting the operation again.

#508 As specified, the operation does not change the partition

You have entered a value that is the same 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 requested resize operation, the file system area had to be expanded, but a bad sector was found in that new area. Try moving the partition before resizing. No corruption will occur when this error is encountered.

#950 Unable to detect any disk drives

No partitionable drives were found on your computer. Floppy drives and certain removable media drives do not support multiple partitions on one disk. Such drives cannot be manipulated by PartitionMagic.

#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 only occurs in the enterprise version when running from a script. If the value specified on a resize or move operation is not between the minimum and maximum

possible, the script will be halted and this error will be displayed.

#968 Incorrect Volume Label entered, Deletion not performed

In order to delete a partition, PartitionMagic requires that the user enter the volume label of the partition to be deleted. If the volume label that is entered does not match the volume label of the partition to be deleted, this error will be shown.

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#969 Incorrect Volume Label entered, Unable to proceed.

In order to format an existing partition, PartitionMagic requires that the user enter the volume label of the partition to be formatted. If the volume label that is entered does not match the volume label of the partition to be formatted, this error will be shown.

#970 Invalid Bad Sector Check value specified

This error only occurs in the enterprise version when running from a script. If the command SET DEFAULT BAD SECTOR TEST STATE is not followed with either ON or OFF, this error will be displayed.

#971 The label entered was too long

Whenever a volume label is entered, the process that checks validity of the label will display this message if the label entered is too long.

#972 Invalid characters in the label

Whenever a volume label is entered, the process that checks that validity of the label will display this message if the label has characters that are invalid. These characters include the following: * ? [] : < > | + = ; \ / " , .

#973 Volume Label can not have leading spaces

Whenever a volume label is entered, the process that checks that validity of the label will display this message if the label has spaces before the first valid character.

#974 Root size specified was not in the valid range

This error only occurs in the enterprise version when running from a script. If on a create, format, or resize root command the number of root entries specified is not within the acceptable range for that partition, this error will be displayed. Generally, the valid range is from 64 to 1024.

#975 The cluster size specified was invalid for this partition

This error only occurs in the enterprise version when running from a script. Many of the commands have a cluster size option. If the cluster size option can not be given for the size option specified, this error will occur.

#976 Cannot create the file system specified in the current space

This error only occurs in the enterprise version when running from a script. When using the create or format commands, the file system option is necessary. If the file system or partition type specified can not be created in the space available, this error will be displayed.

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#977 Partition selected is invalid

This error only occurs in the enterprise version when running from a script. If the partition selected from the SELECT PARTITION command is not a valid partition, this error will be displayed.

#978 Unable to set to the proper partition after the last operation. Script Halted

This error only occurs in the enterprise version when running from a script. After each operation, PartitionMagic will make sure that the right partition is still selected. If for some reason PartitionMagic is not able to select the proper partition after an operation, it will end the script processing with this error. If this were not done, it would be possible to perform an operation on a partition that was not desired. This error should never occur.

(#1000 through #2999)

These are primarily Check errors. See Resolving Check Errors earlier in this appendix.

#1045 Stac volume detected — delete Stac volume before converting

This partition contains a STAC volume, and STAC cannot access a STAC volume that is on an HPFS partition. Delete the STAC volume from the partition before converting to HPFS.

#2020 The cluster alignment map is invalid

If you get this error, contact PowerQuest. No changes will be written to the disk if this error is encountered.

#2021 Data in the disk is not aligned as expected

If you get this error, contact PowerQuest. The cluster size could not be changed because not all data was aligned for the new cluster size. No corruption will occur when this error is encountered.

#2022 Data was not cleared from clusters that will be marked bad

If you get this error, contact PowerQuest. When changing the cluster size, every sector in each bad cluster must be assumed to be bad, and every cluster of the new size that contains even one of these bad sectors must be marked as bad. This error occurs if a cluster that needs to be marked as bad has not yet had its data moved. No corruption will occur when this error is encountered.



#2023 Data on the partition is preventing the operation

If you get this error, contact PowerQuest. An error was encountered while trying to move data in the partition. No corruption will occur when this error is encountered.

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PartitionMagic's Check Option vs. OS/2's CHKDSK

Information reported about HPFS partitions by OS/2's CHKDSK command will differ from information reported by PartitionMagic's Check option because:

-  OS/2 rounds down the figures
-  OS/2 reports some information incorrectly

OS/2's CHKDSK displays all size information in kilobytes (K) and rounds down to the nearest kilobyte. PartitionMagic displays all size information in bytes and in actual sectors (one sector=0.5K, or 512 bytes). Because of CHKDSK's rounding, a difference of 512 bytes between the two programs is common.

PartitionMagic displays an accurate number for the amount of disk space allocated for directories and system use. The number displayed by CHKDSK is not accurate. The reason for this is as follows:

1. HPFS partitions have a more complex and flexible structure than FAT partitions.

a) Each partition is divided into logical "data bands" that are 8MB in size (except for the last one, which may be 8MB or smaller).

b) All file data is allocated in 512-byte sectors in contrast with clusters on FAT partitions (which can range in size from 512 bytes up to 32K).

c) A special directory band (usually about 2% of the partition) is created near the center of the partition. Directories are usually stored in this band, which is reserved exclusively to hold directory blocks. All directories are composed of 4-sector directory blocks, and directory entries within these blocks support file names up to 255 characters long. All files are kept in sorted order using a B-tree scheme to accelerate initial file accesses.

d) Bitmaps are used to indicate whether or not sectors are allocated. Each bitmap is stored near the data band which it maps.

e) Every file and directory has a one-sector "fnode," whether the file has any data or not. Fnodes contain the first 15 bytes of the file name, allocation information, extended attributes and other information.

f) There are several other components of HPFS on the partition (e.g. hot-fix sectors, code-page sectors, allocation sectors, EA extents and spare directory blocks.)

2. The directory band is usually large enough to hold all directory information for

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the entire partition (except the root directory, which OS/2 places outside the directory band regardless of its size). It is possible, however, to have such a large number of files on the partition that the entire directory band becomes full. In this case, HPFS allocates 4-sector blocks of disk space to hold the directory band overflow.

3. When the disk is originally formatted, the entire directory band is considered part of the reserved system area, and its size is reported as such by CHKDSK. As directory blocks are allocated (by creating new directories, or by adding files to existing directories), the disk space used by these blocks is reported by both PartitionMagic and CHKDSK as used by directories, and the unused portions are still considered part of the system area.

4. Any time a file is created, a 512-byte fnode is created for it, and the space must be found inside one of the current directory's directory blocks to hold the file entry. If the block is too full for another entry, a new 4-sector directory block must be allocated in order to properly record the new file entry. As data is added to the file, additional sectors are allocated as needed. The minimum amount of space required when a file is created is 1 sector, and up to 5 sectors if a new directory block is also required—plus the sectors required to hold the file's data.

5. Any time a directory is created, a 512-byte fnode is created for it, a unique directory block (4 sectors) is allocated and initialized, and space must be located inside one of the current directory's directory blocks to hold the directory entry. If the block is too full for another entry, a new 4-sector directory block must be allocated in order to properly record the new file entry. As data is added to the

file, additional sectors are allocated as they are needed. The minimum amount of space required when a directory is created is 5 sectors, and up to 9 sectors if a new directory block is required.

6. All fnode sectors are taken from the user free space and reduce that space by 1 sector per file. If there is room in the directory band, all sectors used for directory blocks come from that band and from the reserved area. If the band is full, the directory blocks come from the user free space. CHKDSK improperly reports the usage of space inside the directory band.

7. When calculating the disk space utilized by each component of the partition's file system, PartitionMagic systematically looks at each component and adds up the space used by each one. There is no need to report inaccurate figures. One subtlety: HPFS reserves 2% of the disk space (up to 2MB) as "reserved." This is a calculated number and is included in the system-area number reported by both PartitionMagic and CHKDSK.

8. OS/2's CHKDSK stumbles when displaying the disk space used by the various

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HPFS partition components; it does not count actual sectors as it checks the disk, but rather assumes wrong allocation information for directory blocks and forces the number reported as reserved for system use to balance the totals.

a) Each directory consumes a minimum of 5 sectors (2.5K, one fnode and one 4-sector directory block). The total disk space taken up by directories is at least the product of the number of directories multiplied by 2.5K.

b) You can usually come close to matching the display of CHKDSK by counting only 1K per directory block. Add to that the true number of directory-block sectors residing outside the directory band (add at least 4, since the root directory is outside the directory band). Remember that some larger directories have 2 or more directory blocks. If you know precisely how many extra blocks there are and add 1K for each, you will arrive at the same number shown by CHKDSK.

c) You can run this test to prove how CHKDSK reports erroneous information:

i Run CHKDSK on an HPFS partition. Record the number of kilobytes in directories, reserved for system use and available for use. In addition, record the number of directories on the partition.

ii Run PartitionMagic's Check option on the same partition. Record the number of sectors in directories, reserved by the system and free disk space.

iii Create a subdirectory on that partition.

iv Run both CHKDSK and PartitionMagic's Check option once more on the same partition and compare the results. Notice that PartitionMagic correctly shows 4 more sectors (2K) used in the directory band and taken from the system area, while CHKDSK reports a difference of 0k to 1K due to rounding down.

v Contrast the test in steps i-iv with the display when a newly formatted HPFS partition is checked. The numbers will match since the root directory is outside the directory band and because CHKDSK properly counts up all directory-block sectors outside the band.

APPENDIX

B

Product Support

Before You Contact Product Support

Make sure you have the following information available before you contact product support.

PartitionMagic Serial Number _____

You must be a registered PartitionMagic user to receive technical support.

Computer model name and number. Note the processor type (e.g. 386, 486, Pentium) and the amount of memory.

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.

Operating System version number. _____
(place sticker here)

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Contacting PowerQuest

PowerQuest Corp. ☎ 1083 N State Street ☎ Orem, Utah 84057

Product Support Services

PowerQuest is committed to providing you with comprehensive technical support. If you have problems using PartitionMagic, try choosing **Help**, or see if your problem is covered in this User Guide. Also check the README.TXT file for information not covered in this guide.

If you cannot find the answers you need, check PowerQuest's technical support. Services such as our own bulletin board are available 24 hours a day, 7 days a week. If you still need help with PartitionMagic, please call our technical support line. PowerQuest offers free telephone support for 60 days from the day we receive your registration.

(801) 226-8941

FAX any problems you encounter to PowerQuest technical support. This service is available in the U.S. and Canada, 24 hours a day, 7 days a week.

(801) 226-5608

Call the PowerQuest bulletin board for product information and answers to frequently asked technical questions. Modem setup is N-8-1. Speeds supported are 1200-28.8Kbps.

(801) 226-6834

Once you register PartitionMagic, you are eligible to receive 60 days of free support from the day we receive your registration. Support is available Monday through Friday, 8am to 5pm MST.

INTERNET

You can correspond with PowerQuest through the Internet by sending an e-mail message to our address: support@powerquest.com. For additional information, visit our Home Page: <http://www.powerquest.com>.

Ordering Products from PowerQuest

In the U.S., call (800) 379-2566, Monday through Friday, 8 a.m. to 5 p.m. MST to order PowerQuest products. Sorry, technical support is not available at this number.

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Glossary

GLOSSARY

G

Active Partition - One of the primary partitions on the first drive is marked "active," meaning it will boot when the computer starts up.

ATA (AT Attachment) - ATA is a disk drive implementation designed to reduce interface costs and simplify firmware by integrating the hard drive controller onto the drive itself. 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.

Boot Manager - An OS/2 feature that lets you choose the active operating system partition upon starting or rebooting your system.

bootable partition - A partition from which an operating system can be started. (See also—primary partition.)

CHS - Cylinder, head, sector. A three-dimensional address of a hard disk sector.

cluster - The smallest allocation unit in the FAT file system.

cylinder - The group of tracks on all platters having the same track value. (See track.)

DOS - An operating system developed by Microsoft for personal computers. While DOS stands for Disk Operating System, in general the operating system also manages other computer resources such as memory, printer and networks. DOS can access partitions and logical drives formatted with the FAT file system, but not those formatted with the HPFS or NTFS file systems.

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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 - An OS/2 feature that lets you boot either OS/2 or DOS from a primary partition.

EIDE (Enhanced Integrated Drive Electronics) - A marketing program that promotes certain features of ATA-2. (See ATA-2.)

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 64K. 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 - One of the four primary partitions on a disk can be an extended partition. The extended partition can contain one or more logical drives. An extended partition can not be the active partition.

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 and Windows NT can all use partitions formatted as FAT partitions.

file system - The method of organizing files on a disk. Common file systems are DOS, HPFS and NTFS.

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.

head - A side of a hard disk platter. More specifically, the hardware assembly that reads and writes data on a hard disk platter.

hot-fix - A method of detecting bad sectors on HPFS partitions during disk writes. Data on hot-fix sectors are relocated to free good sectors.

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HPFS - High Performance File System is a file system developed by IBM and Microsoft and first made available with OS/2. OS/2 and Windows NT can both use partitions formatted with HPFS.

IDE (Integrated Drive Electronics) - (See ATA.)

LBA (Logical Block Addressing) - In EIDE, a means of specifying sector addresses by replacing CHS values with a single linear 28-bit number.

Linux Ext2 is a file system developed for the Linux operating system.

logical drive - 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 (e.g. F:, G:) to the logical drive.

long file names - OS/2, Windows 95, Windows NT and other operating systems do not have the limitation imposed by DOS where a file name can only be 8 characters long with a 3 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.

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 save all parts of a file due to a system failure or power failure.

MB - Megabyte. One megabyte is equal to 1,048,576 bytes (1024 x 1024).

MBR - The Master Boot Record (MBR) is the first sector of a hard disk. It contains a partition table and boot code to boot the computer from the active partition.

NetWare uses a file system developed by Novell to run on NetWare servers.

PartitionMagic shows NetWare version 3.x or 4.x partitions. In many cases, NetWare is installed on a drive where there is also a DOS partition so the computer can be used as both a server and a workstation.

NTFS (New Technology File System) was developed by Microsoft and is only accessible through Windows NT. NTFS eliminates many of the shortcomings of

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the FAT and HPFS file systems such as wasteful cluster sizes and long CHKD-SK running times.

operating system - An operating system allows programs to cooperatively use a computer's resources (e.g. disks, memory, printers, 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 drives formatted as FAT or HPFS.

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 partition or a logical drive.

primary partition - A partition referenced in the MBR partition table. 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 drive 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.

Windows 95 - An operating system developed by Microsoft. Windows 95 is a descendant of DOS and Windows 3.x. It can access partitions and logical drives formatted

with the FAT file system. It supports long file names.

Windows NT - An operating system developed by Microsoft. Windows NT can access partitions and logical drives formatted with FAT, HPFS and NTFS.

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