

POWERQUEST

Drive Image™

THE COMPLETE SOLUTION FOR COPYING HARD DRIVES



User Guide

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Drive Image 1.0 User Guide

Drive Image by PowerQuest

Manual Version 1.1

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Glossary

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About This User Guide

This user guide was written to help you set up and run PowerQuest Drive Image. It is divided into ten parts:

- Introduction
- Getting Started
- Creating Image Files
- Restoring Image Files
- Copying Disk To Disk
- Additional Utilities
- Appendix A: Background Information
- Appendix B: Additional Resource Information
- Appendix C: Troubleshooting
- Appendix D: PowerQuest Technical Support Contact Information
- Glossary
- Index

The Introduction provides an overview of PowerQuest Drive Image and lists the hardware and software requirements.

Chapter 1: Getting Started provides step-by-step instructions on preparing to run Drive Image.

Chapter 2: Creating Image Files provides step-by-step instructions on how to create image files.

Chapter 3: Restoring Image Files provides step-by-step instructions on how to restore image files.

Chapter 4: Copying Disk To Disk provides step-by-step instructions on how to directly copy partitions from one drive to another, without creating an image file.

Chapter 5: Additional Utilities provides information on DriveMapper and MagicMover two utilities that are packaged with Drive Image.

Appendix A: Background Information provides important information about partitions, drive letter assignments, and file systems. Understanding how these areas relate to each other is necessary for you to effectively use Drive Image.

Appendix B: Additional Resource Information reviews creating a bootable DOS floppy, loading DOS device drivers from a bootable floppy, and using FDISK and FORMAT to create and format partitions. It also provides device driver information, common jumper settings, and hard drive manufacturer information.

Appendix C: Troubleshooting provides a reference for Frequently Asked Questions and reviews error messages with their solutions.

Appendix D: PowerQuest Technical Support Contact Information covers what you should do before you contact technical support and provides a form for contacting PowerQuest technical support.

The **Glossary** defines common terms found in the Drive Image User Guide.

The **Index** helps you locate the different topics discussed in the Drive Image User Guide.

Introduction

This section contains the following information:

- What is Drive Image?
- Drive Image Professional Version
- Drive Image System Requirements

What is Drive Image?

Drive Image is for PC users who want a fast, complete solution for system backups and recovery. With Drive Image you can easily create and store a compressed image file of an entire hard drive or individual partitions on a, JAZ, Zip, network or secondary hard drive, CD-ROM, or other removable media device. The image file can then be restored from the source and used for complete operating system, application and data recovery. In addition to providing reliable system backup and recovery, Drive Image is also an efficient means of replicating your system when upgrading to a new hard drive.

NOTE: To use Drive Image to replicate multiple workstations see information on the Drive Image Professional version (page xii).

Using its patent-pending SmartSector technology, Drive Image is up to two to three times faster than straight file-by-file, or sector-by-sector methods of copying because it copies only used sectors. This not only speeds up the copy process, it also saves valuable disk space.

Drive Image also includes other useful features such as the ability to resize partitions, disk to disk copying within the same computer, and file system error and bad sector checking to prevent copying problems. Context-sensitive online help is available by pressing <F1>.

Drive Image supports the file systems of all versions of Windows 95, Windows NT, Windows 3.x, DOS, and OS/2 including FAT, FAT32, NTFS, and HPFS partition types. Because Drive Image understands the internal structure of these file systems, partition resizing and fast SmartSector copying can occur.

Drive Image also provides limited support for NetWare, Linux, UNIX and other partition types. However, Drive Image copies such partitions sector by sector and does not resize them on the destination drive, making the image file creation and restore process for these file systems more time-consuming. Additionally, internal disk location references are not modified on the destination drive. This may make these partitions unbootable or otherwise inaccessible. PowerQuest will not support problems caused by NetWare, Linux, or UNIX partition types.

Drive Image is a DOS-based program that can be run from the hard drive in DOS or MS-DOS mode or from a floppy diskette after booting DOS. Because multi-tasking operating systems like Windows 95 and Windows NT operate with open files on the hard drive, it is necessary to run Drive Image from DOS so that the image files are an exact copy of your hard drive. Only by running in DOS is the hard drive completely inactive with no open files.

This Drive Image technology is brought to you by PowerQuest, the makers of PartitionMagic. PartitionMagic 3.0 is the revolutionary utility that lets you reclaim wasted disk space, safely boot and run multiple operating systems, and organize and protect your data.

NOTE: For more information on PartitionMagic, see “Benefits of Using Partition Magic” in *Appendix B* (page 61).

Drive Image Professional Version

If you want the absolute fastest way to replicate workstations, a Drive Image Professional Version is available for use on multiple PCs. For more information contact PowerQuest sales at 801-437-8900 or visit our web site at <http://www.powerquest.com>.

Drive Image System Requirements

Hardware/Software	Minimum	Recommended
Processor	Intel 386SX	Intel 486 or above
RAM	8 MB (16 MB required for FAT32 or NTFS)	16 MB
3.5-inch diskette drive	None	3.5-inch diskette drive
CD-ROM drive	Any speed	Any speed
Hard drive free space	5 MB	5 MB
Operating System	Windows 3.x, 95, NT, DOS 5.0, OS/2*	Windows 3.x, 95, NT, DOS 5.0, OS/2*
Monitor	VGA	SVGA
Pointing Device	No pointing device is required to operate Drive Image.	Microsoft mouse (or compatible pointing device)

* For Windows NT and OS/2 users, Drive Image must be run from a bootable floppy. For more information, see "Installing and Running Drive Image from DOS or OS/2" in *Getting Started*.

NOTE: Because of operating system conflicts that can result from different hardware configurations, Drive Image was not intended to copy or image a hard drive that will be used in a system with different hardware configurations.

NOTE: You must have Windows 3.x, 95 or NT to run DriveMapper or MagicMover.

Chapter 1

Getting Started

This chapter contains the following information:

- Pre-requisites to Using Drive Image
- Installing Drive Image
- Running Drive Image
- Installing and Running Drive Image from DOS and OS/2
- Uninstalling Drive Image

Pre-requisites to Using Drive Image

Before using Drive Image, it is important that you perform the following:

- Run a disk utility such as ScanDisk or CHKDSK on each partition of the source drive to check for file system errors.
- Verify that there is sufficient space on the destination drive to restore the desired partitions from an image file.
- OS/2 users using FAT partitions with extended attributes must have a minimum of 5 MB of free space on each partition so that they can be resized on the destination drive.

Installing Drive Image

You can install Drive Image from any of the following operating systems:

- Windows 3.x
- Windows 95
- Windows NT

NOTE: If you are using DOS or OS/2, see “Installing and Running Drive Image in DOS or OS/2” later in this chapter.

To install Drive Image, perform the following:

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

NOTE: There is an option to create diskettes from the install on the CD-ROM.

2. Start the installation program.
 - a. If you are using Windows 3.x or Windows NT 3.51, select **Run** from the Program Manager File menu. Type *drive*:**SETUP**, in which *drive* is the drive letter of your CD-ROM drive, and click **OK**.
 - b. If you are using Windows 95 or Windows NT 4.0, the install is an autorun program and will launch automatically when the CD is placed in your CD-ROM drive.

A dialog appears containing the following options:

- Install Drive Image
- Install MagicMover
- Create Diskettes
- Technical Support Helps

3. Select the option you want and follow the on-screen instructions.

NOTE: On a Windows NT system, Drive Image must be installed to a FAT partition and can only be run after booting DOS. If you do not have DOS, the **Create Drive Image Diskette Setup** option found under **Create Diskettes**, creates a DOS bootable floppy.

Running Drive Image

There are two ways to run Drive Image. You can run Drive Image from a floppy diskette or from the hard drive if you have booted DOS or MS-DOS mode.

Running Drive Image from a Floppy Diskette

If you want to run Drive Image from a floppy diskette, perform the following:

Windows 3.x and Windows 95

1. Insert your bootable diskette that was created during the install process.
2. Reboot your machine.
3. Insert your Drive Image diskette that was created during the install process, type **A:\PQDI** and press **<Enter>**.

Windows NT, OS/2, and DOS

1. Insert your bootable diskette that was created during the install process.
2. Reboot your machine.

Running Drive Image from a Hard Drive

If you want to run Drive Image from your hard drive, perform the following:

1. Launch the program.
 - a. If you are using Windows 3.x, open the **Drive Image by PowerQuest** program group and double-click the **Drive Image** program icon.
 - b. If you are using Windows 95, click **Start|Programs|Drive Image by PowerQuest|Drive Image**.
 - c. If you are using Windows NT, you must boot to DOS, use Windows 95 MS-DOS mode, or run Drive Image from the bootable floppy.

NOTE: To run Drive Image on NT or OS/2 FAT partitions, first boot in DOS or MS-DOS mode, switch to the directory to which you have installed Drive Image, and run PQDI.

Installing and Running Drive Image from DOS or OS/2

To create a bootable floppy from which to run Drive Image, follow these instructions:

1. Insert a blank 1.44 MB diskette into the diskette drive.
2. Insert the Drive Image CD into the CD-ROM drive.
3. From a DOS or OS/2 command prompt, change to the OS2DOS directory on the Drive Image CD.
4. Type **MAKEDISK *drive***: where *drive* is the drive letter of the diskette drive and press **<Enter>**. This creates a Drive Image bootable diskette.
5. To run Drive Image, insert the Drive Image bootable diskette into the diskette drive and restart the computer.

Uninstalling Drive Image

To uninstall Drive Image, perform the following:

1. Launch the uninstall program.
 - a. If you are using Windows 3.x or Windows NT 3.51, double-click the **Uninstall Drive Image** icon in the **Drive Image by PowerQuest** program group.
 - b. If you are using Windows 95 or Windows NT 4.0, click **Start|Programs|Drive Image by PowerQuest|Uninstall Drive Image**.

OR

Click Start|Settings|Control Panel|Add/Remove Programs.

2. Follow the instructions on the screen.

Chapter 2

Creating Image Files

This chapter contains the following information:

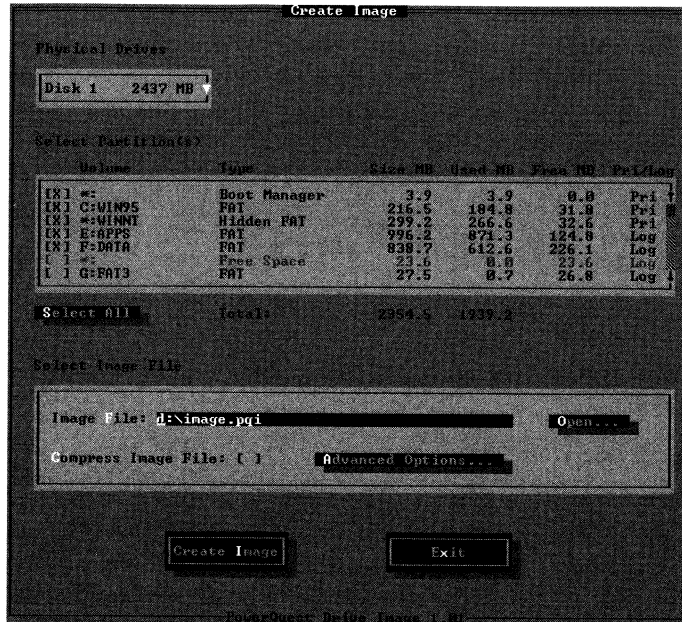
- Procedure
- Create Image Options

Procedure

To create a snapshot, or image, of the contents of any partition(s), perform the following:

1. On the title screen of the Drive Image program, click **Create Image** (Alt+C).

The **Create Image** dialog appears.



2. Select the drive containing the partitions you wish to include in the image file from the **Physical Drives** drop-down list box in the **Source** group box.

If you just have one drive, **Disk 1** is your only option. To see other drives on a multiple drive system, click the down-arrow in the **Physical Drives** drop-down list box and select the desired drive.

3. In the **Select Partition(s)** window, click on any of the source drive's partitions that you wish to include in the image file, or click **Select All** (Alt+S) to automatically select all partitions.

An 'X' appears in the check box to the left of a selected partition.

The **Total** field keeps a running total of the disk space for all selected partitions, as well as the total used space within the partitions.

NOTE: In order to restore the image file, you will need space on the destination drive that is at least equivalent to the total space (used and unused) the selected partitions consume on the source drive.

4. From the **Select Image File** group box, enter the image filename in the **Image File** field, for example: *drive:\image1.pqi*.

NOTE: If the drive and directory are not specified in the filename, Drive Image automatically saves the image file to the Drive Image program directory (PQDI).

You may also click **Open** (Alt+O) to browse the directory tree for your desired path and/or filename. If you select a pre-existing image file, the following message appears: **Image file already exists. Do you want to replace file? WARNING: Existing data in file will be lost. Yes/No.**

NOTE: You can save your image file to any physical or logical drive which has a drive letter: floppy drives, secondary hard drives, network drives, removable media storage devices such as JAZ, Zip, CD-ROM, etc.

NOTE: If Drive Image detects that you are saving your image file to a removable medium, such as a JAZ or Zip drive, it enables a media-spanning feature that spreads the image file over a series of disks.

5. If you wish to compress the image file, mark the **Compress Image File** check box (Alt+C).

This is useful if you are using the image as a system backup file or saving to a removable storage device.

NOTE: Compression is disabled by default.

6. If you want to adjust the compression level or disable file system error-checking, click **Advanced Options** to access the **Create Image Options** dialog.

NOTE: For information on option settings, see “Create Image Options” (page 8).

7. After making changes in the **Create Image Options** dialog, click **OK** (Alt+O) to return to the **Create Image** dialog.

8. Click **Create Image** (Alt+I).

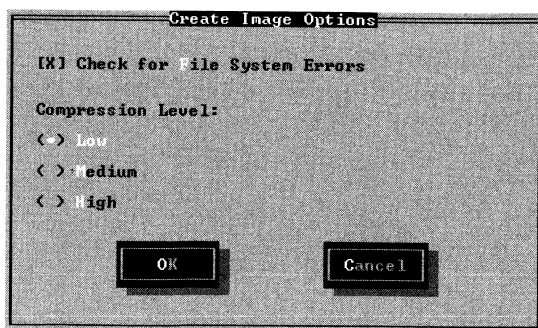
NOTE: If Drive Image detects that you are saving your image file to a removable medium, such as a JAZ or Zip drive, it enables a media-spanning feature that spreads the image file over a series of disks. As you are saving the image file, be sure to number the disks in order, since you must insert them in order when restoring the image file. Drive Image permits you to span a maximum of 50 disks with a limit of 12 partitions per image file. You must also have at least 100K of available space on each disk in the series.

The **Create Image Progress** dialog appears, tracking the following items:

- Entire process percentage
 - Sub-process percentage
 - Image filename
 - Current partition being created
 - Total megabytes to copy
 - Processing rate in megabytes per minute
 - Time remaining to complete create process
 - Time elapsed
9. Upon completion, the following message appears: **Image was copied successfully to file: <image filename>**. Click **OK** (Enter) to return to the **Create Image** dialog.
10. Click **Exit** (Alt+X) to return to the title screen.

Create Image Options

The **Create Image Options** dialog appears when you click **Advanced Options** in the **Create Image** dialog. The following options are available from the **Create Image Options** dialog.



Check for File System Errors

In the **Create Image Options** dialog, unmark the **Check for File System Errors** check box (Alt+F) if you want to disable error-checking.

If you have already used a disk utility program such as ScanDisk or Norton's Disk Doctor to check your hard drive for errors, it is not necessary to have Drive Image check for file system errors. Unmarking **Check for File System Errors** saves time in creating the image file.

If you did not run a disk utility program before loading Drive Image, leave the **Check for File System Errors** check box marked. This allows Drive Image to abort the imaging process if it encounters file system errors. In the event that the imaging process is aborted, all successfully imaged partitions remain intact in the image file.

Compression Level

If you marked **Compress Image File** in the **Select Image File** group box, you can select a compression level of **High**, **Medium**, or **Low**. **Low** is the system default. Low level compression gives you an approximate 2:1 compression ratio.

NOTE: Compression increases with each level. Be aware, however, that higher compression levels require significantly more processing time.

Chapter 3

Restoring Image Files

This chapter contains the following information:

- Procedure
- Free Space Options

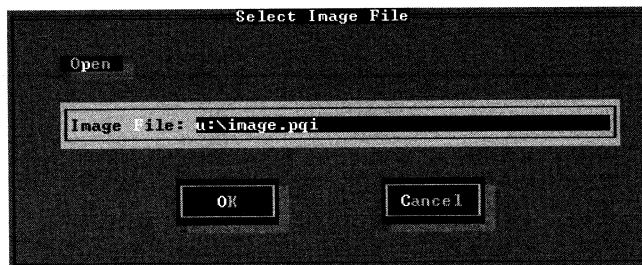
Procedure

NOTE: If you are restoring an image file to setup a new hard drive on a machine with a BIOS older than 1994, see “Older Computer BIOSes that Require Drive Overlay Software” in *Appendix B*.

To restore an image file to any drive, perform the following:

1. On the title screen of the Drive Image program, click **Restore Image** (Alt+R).

The **Select Image File** dialog appears.

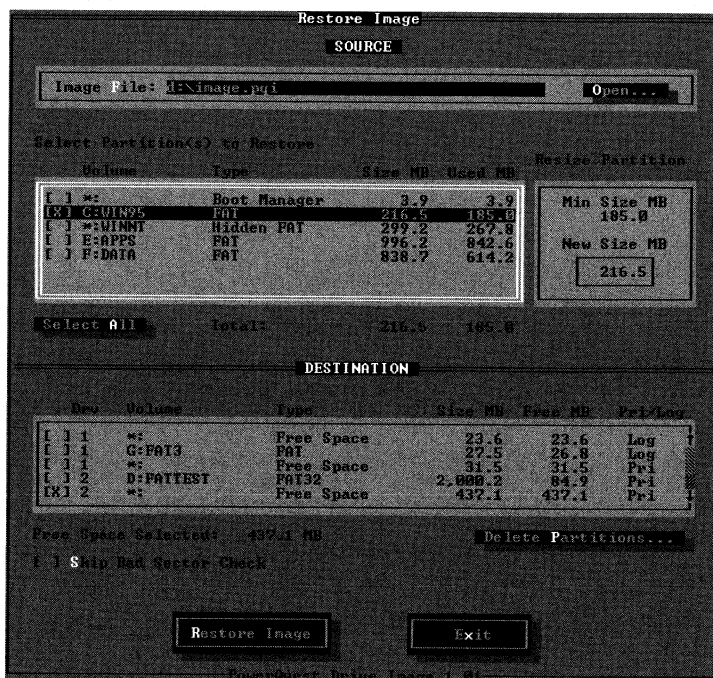


2. Enter the complete image filename in the **Image File** field, for example: *drive:\image1.pqi*, where *drive* is the drive letter of the destination drive or click, **Open** (Alt+P) to browse the directory tree for the desired path and image filename.

NOTE: If a drive and directory are not specified in the filename, Drive Image automatically retrieves the specified image file, if it exists, from the Drive Image program directory (PQDI).

3. Once the image filename is entered, click **OK** (Alt+O).

The **Restore Image** dialog appears.



4. If you wish to select a different image file, enter the new filename in the **Image File** field, or click **Open** (Alt+O) in the **Source** group box to browse the directory tree.
5. To include one of the image file partitions in the restore, click the partition in the **Select Partition(s) to Copy** window, or click **Select All** (Alt+S) to automatically select all partitions.

An 'X' appears in the check box to the left of a selected partition.

The **Total** field keeps a running total of the disk space for all selected partitions, as well as the total used space within the partitions.

NOTE: In order to restore the image file partitions, you will need space on the destination drive that is at least equivalent to the total space (used and unused) consumed by the selected partitions.

6. The **Resize Partition** group box enables you to resize individual image file partitions. If you wish to resize a partition, perform the following:
 - a. In the **Select Partition(s) to Copy** window, position the focus bar over the desired partition.

NOTE: To position the focus bar without accidentally selecting or deselecting partitions, click the border of the **Select Partition(s) to Copy** window and use your keyboard's arrow keys to move the focus bar over the desired partition. If you mouse click on any of the partitions, you will either select or deselect them.

- b. Enter the desired size for the partition in the **New Size MB** field within the **Resize Partition** group box.

NOTE: You must enter a value that is at least equal to the number in the **Min Size MB** field. Drive Image rounds the new size up to the nearest cylinder on the destination drive.

NOTE: Since Drive Image restores partitions to the destination drive in their original size and then resizes them one at a time, the destination free space must be large enough to accommodate all the selected partitions in their original size.

7. The main window in the **Destination** group box lists all available drives, the sizes and types of their existing partitions, and non-partitioned free space. Select the drive and non-partitioned free space to which you wish to restore the partitions contained in the image file.

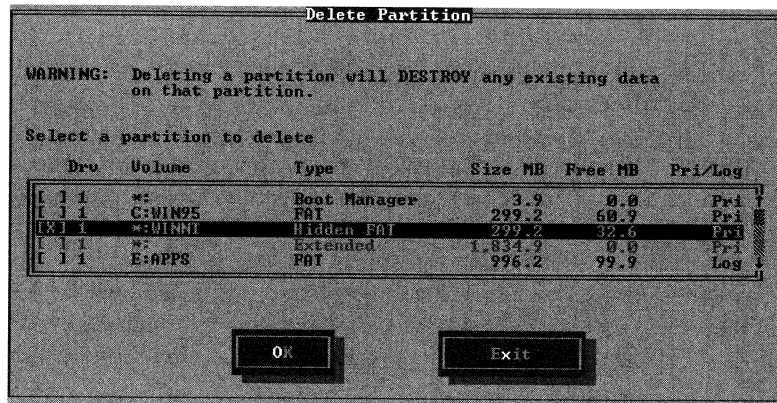
By default, Drive Image selects the largest block of non-partitioned free space as the destination for the image file restore.

NOTE: You must have enough space on the destination drive to restore the image file partitions in their original size. While image file partitions may be resized, Drive Image restores partitions to the destination drive in their original size and then resizes them one at a time.

If you select an existing partition on your destination drive, the following message appears: **Item selected is not free space. Disk Images can only be restored into existing free space. Do you wish to delete this partition to create free space? WARNING: Deleting a partition will DESTROY any existing data on that partition. Yes/No.** If you click **Yes**, Drive Image deletes the selected partition and labels it as free space.

8. **Delete Partitions** (Alt+P) offers an alternate method for deleting existing partitions on the destination drive to create free space. To delete partitions, perform the following:
 - a. Click **Delete Partition**.

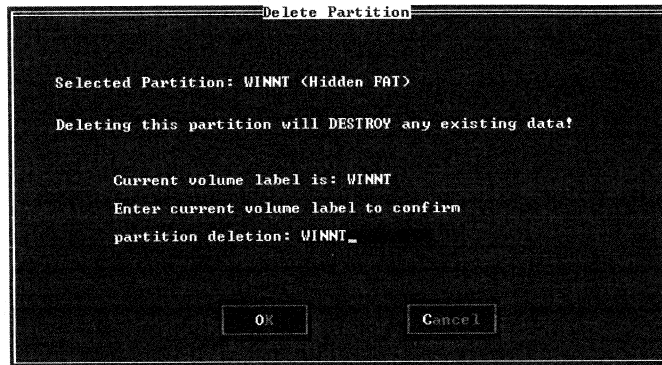
The **Delete Partition** dialog appears.



- b. Select the partition you wish to delete.
 - c. Click **OK** (Alt+O).

The **Delete Partition** dialog displays the following information:

- Partition selected for deletion
- Warning message: **Deleting this partition will DESTROY any existing data!**
- Current volume label
- Confirmation field



d. Enter the partition (volume) label in the confirmation field.

e. Click **OK** (Alt+O) to delete the partition.

If the operation is successful, a dialog appears displaying the following message: **Volume <volume name> was deleted successfully.**

f. Click **OK** to return to the **Delete Partitions** dialog.

g. If you do not wish to delete any more partitions, click **Exit** (Alt+X) to return to the **Restore Image** dialog.

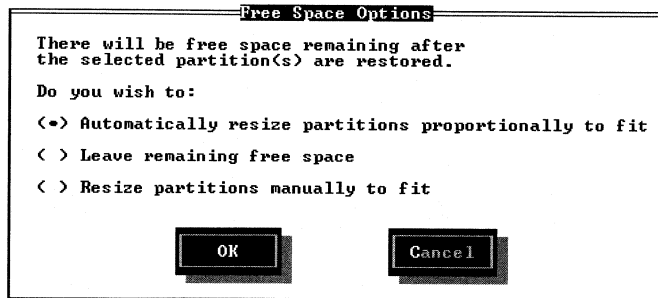
9. If you want to disable bad sector-checking, mark the **Skip Bad Sector Check** (Alt+S) box.

NOTE: If you have already used a disk utility program such as ScanDisk or Norton's Disk Doctor to check your hard drive for bad sectors, it is not necessary to have Drive Image check for bad sectors. Marking Skip Bad Sector Check saves time in restoring the image file. However, if you did not run a disk checking utility, leave the Skip Bad Sector Check box unmarked.

10. Click **Restore Image** (Alt+R).

If the free space on the destination drive is greater than the space required to restore the selected partition(s), the **Free Space Options** dialog appears.

NOTE: For information on option settings, see **Free Space Options** (page 17).



NOTE: If Drive Image detects that you are restoring your image file from removable media, such as JAZ or Zip disks, it enables a media-spanning feature that is capable of reading the image file from a series of disks. As Drive Image prompts you for each disk, be careful to insert the disks in the order that you previously numbered them.

The **Restore Image Progress** dialog appears, tracking the following items:

- Entire process percentage
- Sub-process percentage
- Image filename
- Current partition being restored
- Total megabytes to restore
- Processing rate in megabytes per minute
- Time remaining to complete restore process
- Time elapsed

Upon completion, the following message appears: **Image was restored successfully.**

11. Click **OK** (Enter) to return to the **Restore Image** dialog.
12. Click **Exit** (Alt+X) to return to the title screen.

WARNING: Drive Image automatically creates an extended partition when you restore an image of one logical drive. If you have several logical drive images, you must first resize the extended partition with PartitionMagic or create the extended partition before you restore multiple images of logical partitions.

Because most operating systems do not support multiple, visible primary partition, if you restore a logical image to a primary slot, you must delete it.

WARNING: Restoring multiple logical drive images can cause the drive letters of subsequent partitions to change, and that may make the computer fail to boot or cause applications to fail. For information on why drive letters change and how to fix them, refer to *Appendix A*, “How the OS Assigns Drive Letters” (page 48) and “Problems Caused by Drive Letter Changes” (page 53).

Free Space Options

The following Free Space Options are available when restoring partitions if the free space on the destination drive is greater than the space required by the partition(s).

Automatically Resize Partitions Proportionally to Fit

Mark this option to allow Drive Image to automatically expand the partitions in equal proportions to occupy the destination drive's remaining free space.

Leave Remaining Free Space

Mark this option if you want leave any remaining free space unused on the destination drive after the partitions are restored.

Resize Partitions Manually to Fit

Mark this option to return to the **Restore Image** dialog where you can manually increase the size of the partitions to occupy the destination drive's remaining free space.

NOTE: For more information on resizing partitions, see step 6 of the “Procedure” section (page 13).

Chapter 4

Copying Disk to Disk

This chapter contains the following information:

- Procedure
- Disk to Disk Copy Options
- Free Space Options

Procedure

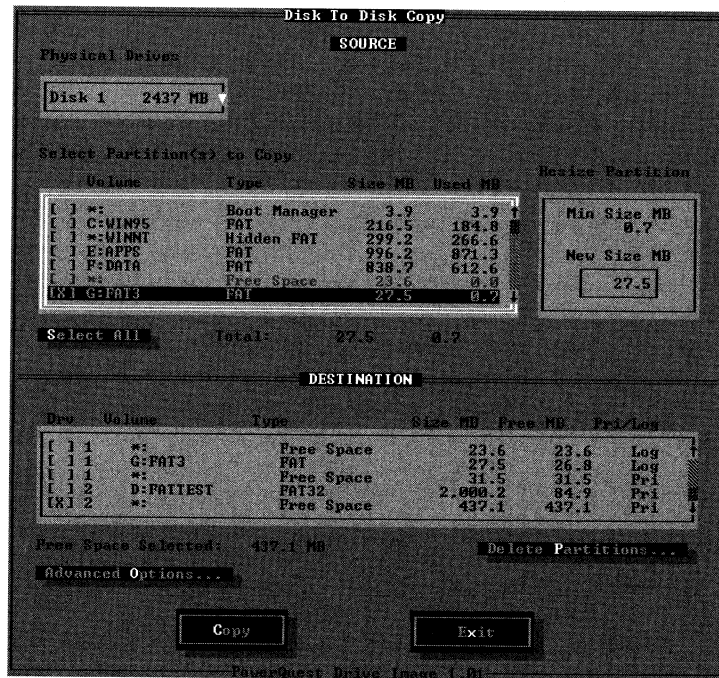
NOTE: If you are upgrading to a new hard drive, refer to *Appendix B* for the following information:

- Common Jumper Settings
- Hard Drive Manufacturer's Contact Information
- Using Drive Image with SCSI Hard Drives
- Using Drive Image with Older Computers BIOSes that Require Drive Overlay Software

To directly copy partitions from one drive to another (without creating an image file), perform the following:

1. On the title screen of the Drive Image program, click **Disk To Disk** (Alt+T).

The **Disk To Disk Copy** dialog appears.



2. Select the drive containing the partitions you wish to copy from the **Physical Drives** drop-down list box in the **Source** group box.

If you just have one drive, **Disk 1** is your only option. To see other drives on a multiple drive system, click the down-arrow in the **Physical Drives** drop-down list box and select the desired drive.

3. In the **Select Partition(s) to Copy** window, click on any of the source drive's partitions to include them in the copying process, or click **Select All** (Alt+S) to automatically select all partitions.

An 'X' appears in the check box to the left of a selected partition.

The **Total** field keeps a running total of the disk space for all selected partitions, as well as the total used space within the partitions.

NOTE: In order to copy partitions, you will need space on the destination drive that is at least equivalent to the total space (used and unused) occupied by the selected partitions.

4. The **Resize Partition** group box enables you to resize a partition copied to the destination drive. If you wish to resize a partition, perform the following:
 - a. In the **Select Partition(s) to Copy** window, position the focus bar over the desired partition.

NOTE: To position the focus bar without accidentally selecting or deselecting partitions, click the border of the **Select Partition(s) to Copy** window and use your keyboard's arrow keys to move the focus bar over the desired partition. If you mouse click on any of the partitions, you will either select or deselect them.

- b. Enter the desired size for the partition in the **New Size MB** field within the **Resize Partition** group box.

NOTE: You must enter a value that is at least equal to the number in the **Min Size MB** field. Drive Image rounds the new size up to the nearest cylinder on the destination drive.

NOTE: Since Drive Image copies all selected partitions to the destination drive in their original size and then resizes them one at a time, the destination free space must be large enough to accommodate all the selected partitions in their original size.

5. The main window in the **Destination** group box lists all available drives, the sizes and types of their existing partitions, and non-partitioned free space. Select the drive and non-partitioned free space to which you wish to copy the selected partitions.

By default, Drive Image selects the largest block of non-partitioned free space as the destination to copy the selected partition(s).

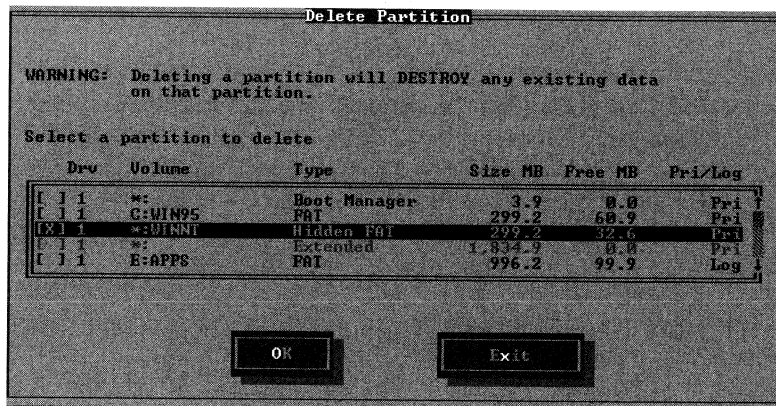
NOTE: You must have enough space on the destination drive to copy the partitions in their original size. While partitions may be resized, Drive Image copies partitions to the destination drive in their original size and then resizes them one at a time.

If you select an existing partition on your destination drive, the following message appears: **Item selected is not free space. Do you wish to delete this partition to create free space? WARNING: Deleting a partition will DESTROY any existing data on that partition. Yes/No.** If you click **Yes**, Drive Image deletes the selected partition and labels it as free space.

6. **Delete Partitions** (Alt+P) offers an alternate method for deleting existing partitions on the destination drive to create free space. To delete partitions, perform the following:

- a. Click **Delete Partitions**.

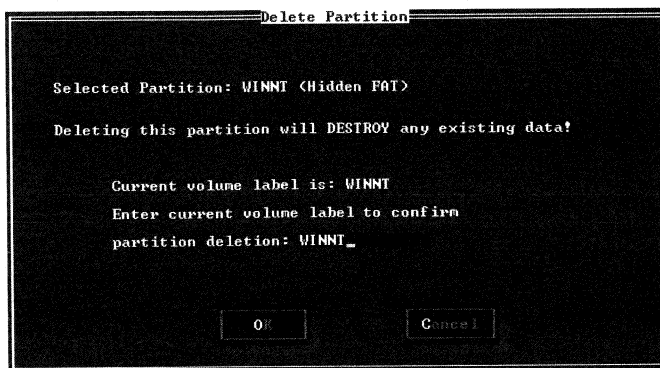
The **Delete Partition** dialog appears.



- b. Select the partition you wish to delete.
- c. Click **OK** (Alt+O).

The **Delete Partition** confirmation dialog appears, displaying the following information:

- Partition selected for deletion
- Warning message: **Deleting this partition will DESTROY any existing data!**
- Current volume label
- Confirmation field



- d. Enter the partition (volume) label.
- e. Click **OK** (Alt+O) to delete the partition.

Upon deletion, a dialog appears displaying the following message: **Volume <volume name> was deleted successfully.**

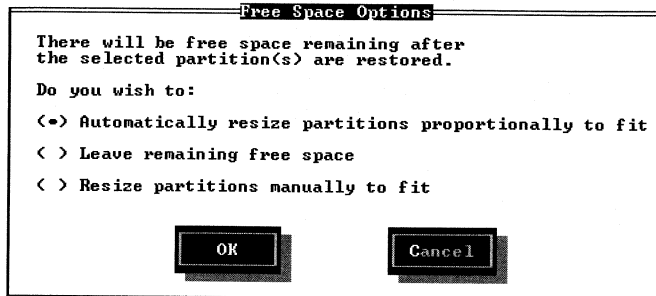
- f. Click **OK** to return to the **Delete Partitions** dialog.
 - g. If you do not wish to delete any more partitions, click **Exit** (Alt+X) to return to the **Disk to Disk Copy** dialog.
7. If you want to disable file system error-checking or bad sector checking, click **Advanced Options** (Alt+O) to access the **Disk To Disk Copy Options** dialog.

NOTE: For information on option settings, see “Disk To Disk Copy Options” (page 25).

8. After making changes in the **Disk To Disk Copy Options** dialog, click **OK** (Alt+O) to return to the **Disk To Disk Copy** dialog.

9. Click **Copy** (Alt+C).

If the free space on the destination drive is greater than the space required to restore the selected partition(s), the **Free Space Options** dialog appears.



NOTE: For information on free space option settings, see **Free Space Options** (page 26).

The **Disk To Disk Copy** Progress dialog appears, tracking the following items:

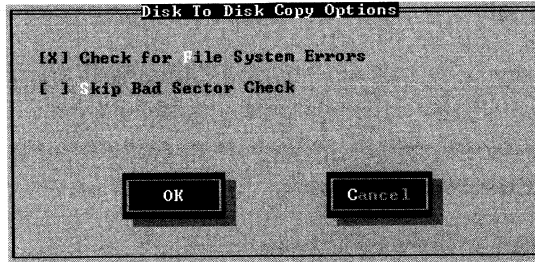
- Entire process percentage
- Sub-process percentage
- Current active partition (not the partition being restored)
- Total megabytes to copy
- Processing rate in megabytes per minute
- Time remaining to complete restore process
- Time elapsed

Upon completion, the following message appears: **Selected partition(s) copied successfully!**

10. Click **OK** (Enter) to return to the **Disk To Disk Copy** dialog.
11. Click **Exit** (Alt+X) to return to the title screen.

Disk To Disk Copy Options

The **Disk to Disk Copy Options** dialog appears when you click **Advanced Options** in the **Disk to Disk Copy** dialog. The following options are available from the **Disk to Disk Copy Options** dialog.



Check for File System Errors

In the **Disk To Disk Copy Options** dialog, unmark the **Check for File System Errors** check box (Alt+F) if you want to disable error-checking.

If you have already used a disk utility program such as ScanDisk or Norton's Disk Doctor to check your hard drive for errors, it is not necessary to have Drive Image check for file system errors. Unmarking **Check for File System Errors** saves time in copying partitions.

If you did not run a disk checking utility before loading Drive Image, leave the **Check for File System Errors** check box marked. This allows Drive Image to abort the copying process if it encounters file system errors. In the event that the copying process is aborted, all successfully copied partitions remain intact on the destination drive.

Skip Bad Sector Check

If you want to disable bad sector-checking, mark the **Skip Bad Sector Check** box.

If you have already used a disk utility program such as ScanDisk or Norton's Disk Doctor to check your hard drive for errors, it is not necessary to have Drive Image check for bad sectors. Marking **Skip Bad Sector Check** saves time in copying partitions. However, if you did not run a disk checking utility, leave the **Skip Bad Sector Check** box unmarked.

Free Space Options

The following Free Space Options are available when copying partitions if the free space on the destination drive is greater than the space required by the partition(s).

Automatically Resize Partitions Proportionally to Fit

Mark this option to allow Drive Image to automatically expand the partitions in equal proportions to occupy the destination drive's remaining free space.

Leave Remaining Free Space

Mark this option if you want leave any remaining free space unused on the destination drive after the partitions are copied.

Resize Partitions Manually to Fit

Mark this option to return to the **Disk to Disk Copy** dialog where you can manually increase the size of the partitions to occupy the destination drive's remaining free space.

NOTE: For more information on resizing partitions, see step 4 of the “Procedure” section (page 21).

Chapter 5

Additional Utilities

To simplify partition management, PowerQuest has included DriveMapper and MagicMover with Drive Image.

DriveMapper

DriveMapper is a wizard for Windows 3.x, Windows 95, and Windows NT that allows you to easily alter drive letter assignments for partitions and your CD-ROM drive. Because some files, such as .INI, configuration, and preferences fields, may keep references to the old drive letters, your system may not function properly when drive letters have changed. You can use DriveMapper to search for these references and change them to the new drive letter assignments.

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

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

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

NOTE: For information on making the operating system change your CD-ROM drive letter, see “Making the Operating System Assign a CD-ROM Drive Letter” in *Appendix B*.

Avoid Using DriveMapper With Multiple Operating Systems

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

- Drive letter assignments depend on which file systems an operating system supports. If you do not put all FAT32, NTFS, and HPFS partitions after all FAT partitions, drive letters change depending on the operating system that is running, and DriveMapper may be unable to correctly identify which changes should be made.
- Registry settings are changed for the current operating system only. If you rerun DriveMapper from another operating system, references in files are already changed and further changes introduce errors.
- DriveMapper does not update files contained in hidden partitions. If you are using multiple primary partitions for different operating systems, only the active primary partition may be visible. Thus, only files in that primary partition are updated.

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

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

Change Drive Letters in the Correct Order

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

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

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

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

Changing References for One Drive Letter

NOTE: For information on making the operating system change your CD-ROM drive letter, see “Making the Operating System Assign a CD-ROM Drive Letter” in *Appendix B*.

To change references for one drive letter, perform the following:

1. From Windows 3.x, launch DriveMapper by double-clicking the DriveMapper icon in the Drive Image by PowerQuest program group.

OR

From Windows 95 or NT, click **Start|Programs|Drive Image by PowerQuest|DriveMapper**.

2. Click **Next** to go to the **Drive Letter Changes** screen.
3. Select **Only one drive letter changed** and click **Next**.
4. Type the old drive letter in the first field.
5. Type the new drive letter in the second field and click **Next**.

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

6. When the Search Results screen appears, click **Next** to change all references.

OR

Select **View changes to be made** and click **Next** to select which references should be changed.

7. When you have changed your drive references, click **Finish**.

Changing References for More Than One Drive Letter

NOTE: For information on making the operating system change your CD-ROM drive letter, see “Making the Operating System Assign a CD-ROM Drive Letter” in *Appendix B*.

To change references for more than one drive letter, perform the following:

1. From Windows 3.x, launch DriveMapper by double-clicking the DriveMapper icon in the Drive Image by PowerQuest program group.

OR

From Windows 95 or NT, click **Start|Programs|Drive Image by PowerQuest|DriveMapper**.

2. Click **Next** to go to the **Drive Letter Changes** screen.
3. Select **More than one drive letter changed** and click **Next**.
4. Type the old drive letter in the first field.
5. Type the new drive letter in the second field and click **Next**.

DriveMapper searches for references to the old drive letter. This may take several minutes. A progress window displays the percentage of the task completed.

6. When the Search Results screen appears, click **Next** to change all references.

OR

Select **View Changes To Be Made** and click **Next** to select which references should be changed.

7. When you have changed the references for the first drive, click **Restart** to change references for another drive letter and repeat steps 1–6.
8. When finished changing your drive references, click **Finish**.

MagicMover

MagicMover helps you move applications from one partition to another. For example, you can use Drive Image to restore partitions to a new drive and then you can use MagicMover to move applications from one partition to another along with all their related files and operating system settings.

PowerQuest has included two versions of MagicMover:

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

32-Bit Version

This section explains how to install and use the 32-bit version of MagicMover. If you are running Windows 3.x, you should refer to the “16-Bit Version” section (page 34).

Installing MagicMover

To install the 32-bit version of MagicMover from Windows 95 or Windows NT 4.0, perform the following:

1. Insert the Drive Image CD-ROM into your CD-ROM drive.
2. Click **Start|Run**.
3. Launch the installation program by typing *drive*:**ASETUP32.EXE** in the Run dialog box (where *drive* is the drive letter of the CD-ROM drive) and then pressing **<Enter>**.
4. In the Installation Options dialog, select **Install PowerQuest MagicMover**.
5. Follow the on-screen instructions.

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

Moving Applications

Moving applications involves three simple steps:

1. Select the application to move.
2. Select the destination location (the drive and directory where you want to move the application).
3. Review the operation summary (optional).

These three steps are shown on the right side of MagicMover's main window. A red arrow displays next to the step you are currently performing. When you complete that step, the red arrow moves to the next step and a green check displays next to the completed step.

To move an application using the 32-bit version of MagicMover, perform the following:

1. Launch MagicMover (if you installed to the default location, click **Start|Programs|PowerQuest MagicMover|PowerQuest MagicMover**).

Because your system changes any time you install or delete files and applications, MagicMover now performs a scan to obtain the most current information about your system. The scan locates all files on your system and determines their sizes, dates, and interdependencies, such as which executables use which DLLs and their variants (OCX, VBX, etc.).

When the scan is complete, MagicMover's main window appears.

Displayed on the right side of this window are the three steps to move an application.

On the left side of the window is an icon representing the applications on the desktop, an icon representing applications in the **Start** menu, and icons representing the drives that MagicMover found when it scanned your system.

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

2. Double-click the appropriate icon.
3. Double-click the desired folder.

4. Select the program you wish to move by clicking its icon.

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

When you select an icon, the complete file path for the represented application displays.

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

MagicMover makes sure that it is safe to move the applications and files you have selected. A status bar appears to show you the progress of the analysis. If MagicMover cannot move the application, a dialog appears notifying you that the program or folder cannot be moved.

NOTE: MagicMover cannot move any application from the Windows directory or any of its subdirectories.

The three steps to move an application are shown in this dialog box. Step one now has a green check beside it, indicating that it is complete.

The first field in this dialog shows the complete path where the application you want to move is currently installed. The dialog also shows the approximate combined size of the files being moved.

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

6. In the **Select The Destination Folder** field, specify where you want to move the application.

You may either type the full path.

OR

Click **Browse** to select a destination from the directory tree. Double-click directories to open them. Click **OK** when you have selected the desired directory.

7. When you have selected the directory to which you wish to move the application, click **Move**.

A progress bar appears. MagicMover moves the necessary files to the selected drive and directory, updates the links between the application's files, updates the appropriate Windows Registry entries and .INI files, and scans the links.

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

8. When you are finished moving applications, click **Close** to exit MagicMover.
9. Reboot the computer.

16-Bit Version

This section explains how to install and use the 16-bit version of MagicMover. If you are running Windows 95 or Windows NT, you should refer to the "32-Bit Version" section (page 31).

Installing MagicMover

To install the 16-bit version of MagicMover from Windows 3.x, perform the following:

1. Insert the Drive Image CD-ROM into your CD-ROM drive.
2. Select **Run** from the Program Manager File menu.
3. Launch the installation program by typing *drive*:**SETUP16.EXE** and then pressing **<Enter>** (where *drive* is the drive letter of the CD-ROM drive).
4. In the Installation Options dialog, select **Install PowerQuest MagicMover**.
5. Follow the on-screen instructions.

The installation program creates a new program group with the appropriate icons.

NOTE: By default, MagicMover is installed to *drive*:\PowerQuest MagicMover; however, during installation you can specify another location.

Moving Applications

Moving applications involves three simple steps:

1. Select the application to move.
2. Select the destination location (the drive and directory where you want to move the application).
3. Review the operation summary (optional).

These three steps are shown on the right side of MagicMover's main window. A red arrow displays next to the step you are currently performing. When you complete that step, the red arrow moves to the next step and a green check displays next to the completed step.

To move an application using the 16-bit version of MagicMover, perform the following:

1. Launch MagicMover (if you installed to the default location, double-click the **PowerQuest MagicMover** icon in the **PowerQuest MagicMover** program group).

Because your system changes any time you install or delete files and applications, MagicMover now performs a scan to obtain the most current information about your system. The scan locates all files on your system, determining their sizes, dates, and interdependencies, such as which executables use which DLLs and their variants (OCX, VBX, etc.).

When the scan is complete, MagicMover's main window appears.

Displayed on the right side of this window are the three steps to move an application.

On the left side of the window is an icon representing the applications on your system and icons representing the drives that MagicMover found when it scanned your system.

NOTE: You can click Cancel at any time to cancel the operation and you can click **Back** to return to the previous step.

2. Double-click the appropriate icon.
3. Double-click the desired folder.

4. Select the program you wish to move by clicking its icon.

When you select an icon, the complete file path for the represented application displays.

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

MagicMover makes sure that it is safe to move the applications and files you have selected. A status bar appears to show you the progress of the analysis. If MagicMover cannot move the application, a dialog appears notifying you that the program or folder cannot be moved.

NOTE: MagicMover cannot move any application from the Windows directory or any of its subdirectories.

The three steps to move an application are shown in this dialog box. Step one now has a green check beside it, indicating that it is complete.

The first field in this dialog shows the complete path where the application you want to move is currently installed. The dialog also shows the approximate combined size of the files being moved.

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

6. In the **Destination** field, specify where you want to move the application.

You may either type the full path.

OR

Click **Browse** to select a destination from the directory tree. Double-click directories to open them. Click **OK** when you have selected the desired directory.

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

A progress bar appears. MagicMover moves the necessary files to the selected drive and directory, updates the links between the application's files, updates the appropriate Windows Registry entries and .INI files, and scans the links.

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

8. When you are finished moving applications, click **Close** to exit MagicMover.
9. Reboot the computer.

Background Information

This appendix presents the concepts you must understand to use Drive Image successfully. Included are the following:

- What is a Hard Drive?
- How is Data Stored and Retrieved?
- What is Disk Formatting?
- File Systems
- Understanding Partitions
- Understanding Drive Letters

What Is a Hard Drive?

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

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

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

Figure A.1 shows the basic components of a hard drive.

How Is Data Stored and Retrieved?

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

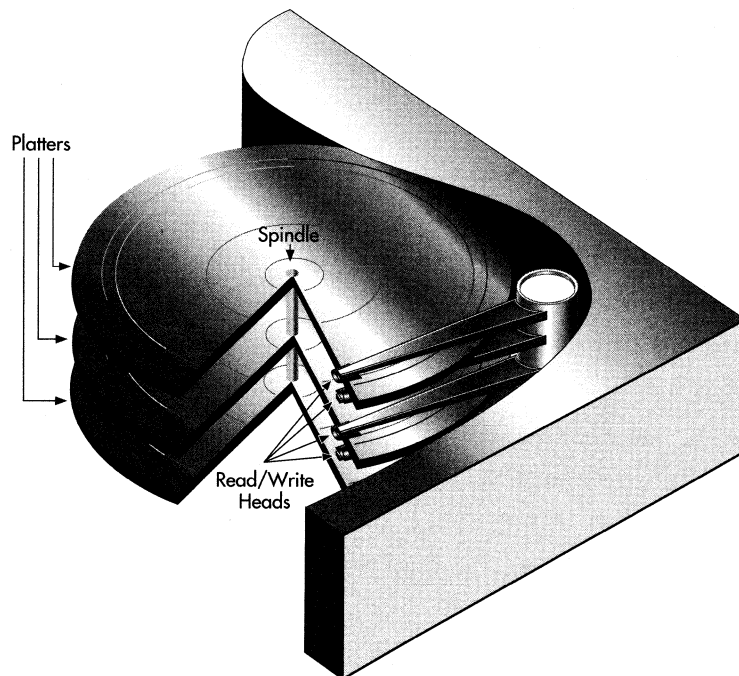


Figure A.1

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

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

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

What Is Disk Formatting?

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

Physical Formatting

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

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

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

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

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

After a hard drive is physically formatted, the magnetic properties of the coating on areas of the disk may gradually deteriorate. Consequently, it becomes difficult for the read/write heads of the disk to write a bit pattern on the disk that can later be read from the disk.

When this happens, the sectors that do not hold data well are called "bad sectors."

Fortunately, the quality of modern disks is such that bad sectors are rare. Furthermore, modern computers can usually determine when a sector is bad, mark the sector bad (so it will never be used), and then use an alternate sector.

Figure A.2 shows the physical format of a typical hard drive.

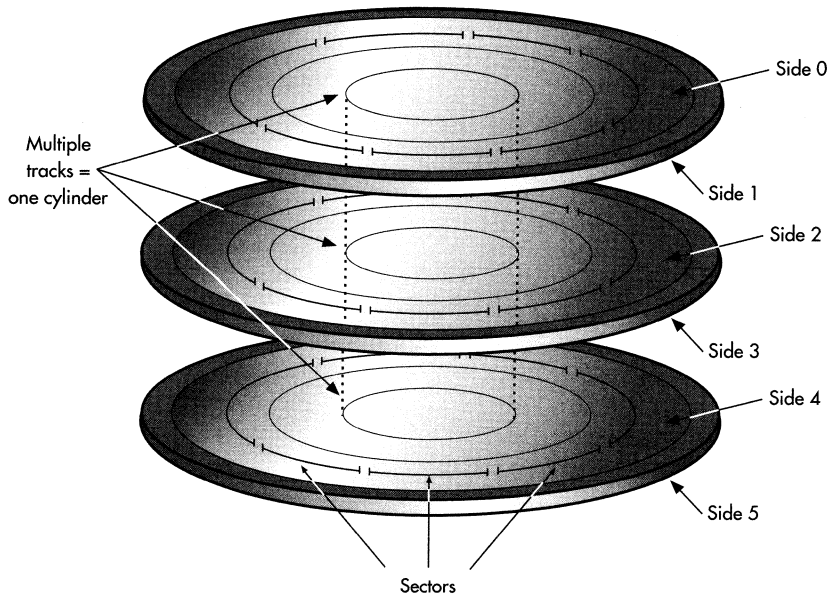


Figure A.2

Logical Formatting

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

Before a disk is logically formatted, it can be divided into partitions. A different file system (logical format) can be applied to each partition.

Partitions will be treated in detail in “Understanding Partitions” (page 45), and file systems are treated in detail in the next section.

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

File Systems

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

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

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

FAT

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

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

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

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

The FAT file system can support a maximum of 65,525 clusters. Thus, the cluster size used depends on the amount of available volume space the maximum size of a FAT volume is 2 gigabytes (GB). Whatever the size of the volume, the cluster size must be large enough so that all available space can be included within 65,525 clusters. The larger the available space, the larger the cluster size must be.

FAT32

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

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

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

NTFS

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

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

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

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

HPFS

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

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

NetWare, Linux Ext2, and UNIX

Drive Image also provides limited support for NetWare, Linux, UNIX and other partition types. However, Drive Image copies such partitions sector by sector and does not resize them on the destination drive, making the image file creation and restore process for these file systems more time-consuming. Additionally, internal disk location references are not modified on the destination drive. This may make these partitions unbootable or otherwise inaccessible. PowerQuest will not support problems caused by unsupported partition types.

Understanding Partitions

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

Why Use Multiple Partitions?

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

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

Partition Types

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

You can have as many as four main partitions on your hard drive, one of which may be an extended partition. Thus, at most, you can have four primary partitions or three primary partitions and one extended partition.

Primary Partitions

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

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

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

Extended Partitions

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

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

Logical Partitions

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

Figure A.3 shows a hard drive that contains four main partitions: three primary partitions and one extended partition. The extended partition has been divided into two logical partitions. Each primary partition has been formatted to use a different file system (FAT, NTFS, and HPFS). The two logical partitions have both been formatted to use the FAT file system.

Although Figure A.3 shows all partitions on a single side of one platter, in actual use the partitions would probably be spread across the sides of several platters.

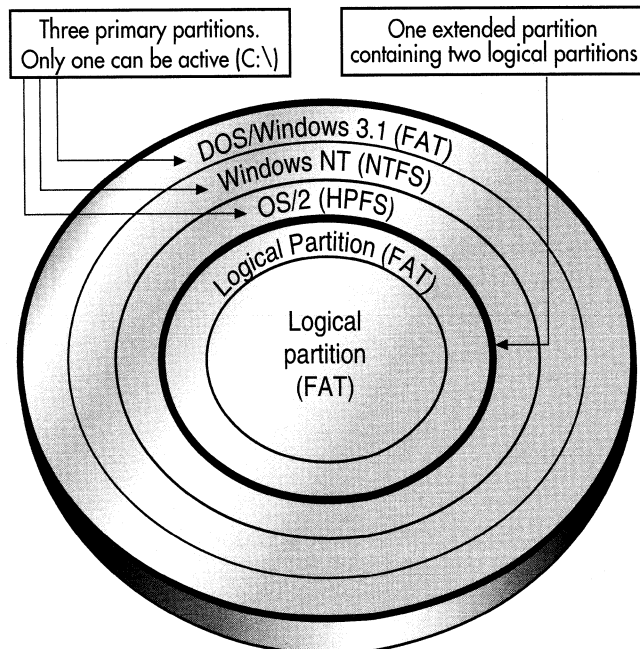


Figure A.3

Understanding Drive Letters

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

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

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

How the OS Assigns Drive Letters

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

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

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

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

To illustrate how drive letters are assigned, let's examine a few examples. First, let's look at a computer with one hard drive, on which DOS is installed. The hard-disk partitioning is shown in Figure A.4 below.

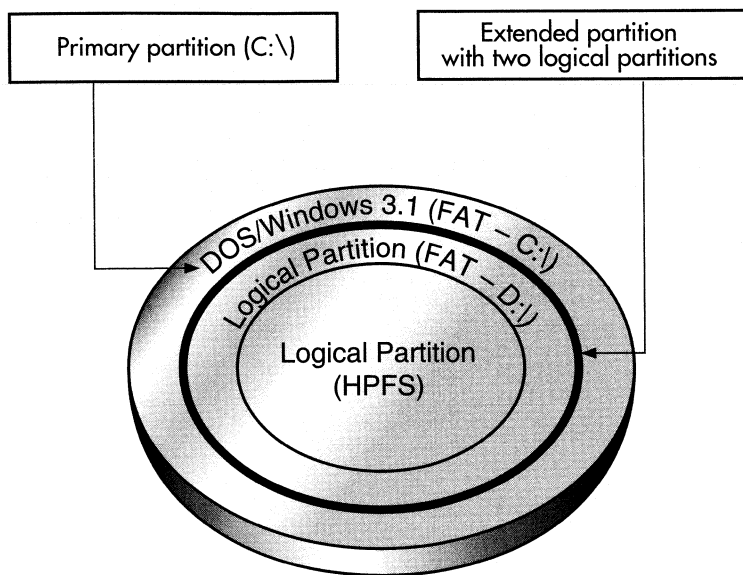


Figure A.4

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

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

Now let's consider an example with a computer identical to the computer in the first example except that a second hard drive has been installed. Figure A.5 shows the configuration.

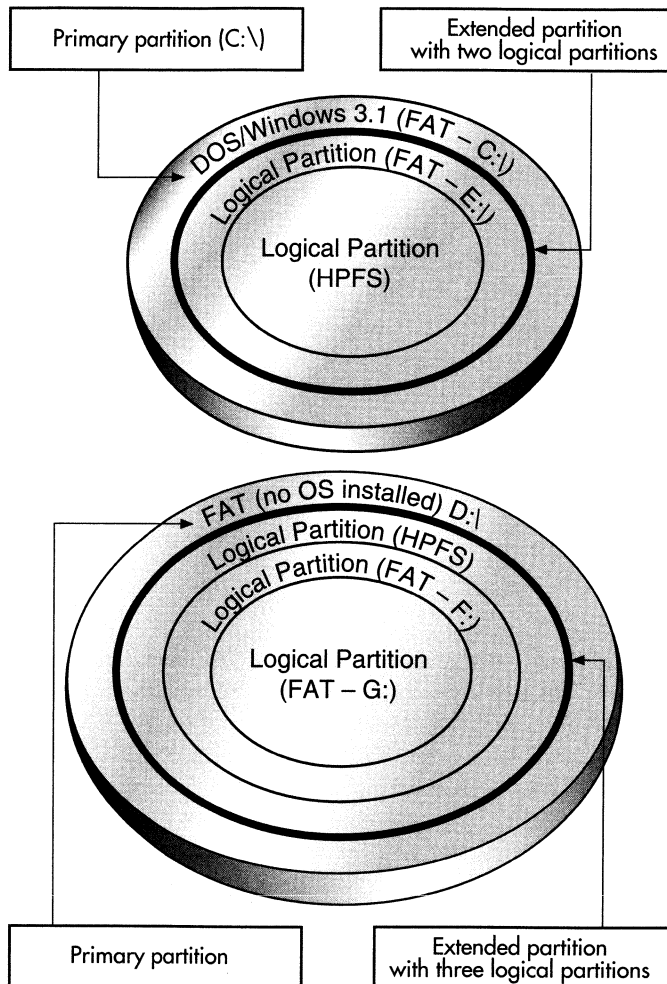


Figure A.5

The first disk is partitioned in exactly the same way as shown in Figure A.5 above. It has the same file systems on the partitions, and DOS is installed on the single primary partition.

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

Figure A.5 shows how drive letters would be assigned if the system were booted with DOS from the first hard drive.

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

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

For our third and final example, let's look at how drive letters would be assigned on the same computer, with exactly the same hard drives and disk partitioning as considered in the previous example, if the computer were booted with OS/2 (from the first logical partition on the second disk) rather than with DOS. Drive letters would be assigned as shown in Figure A.6.

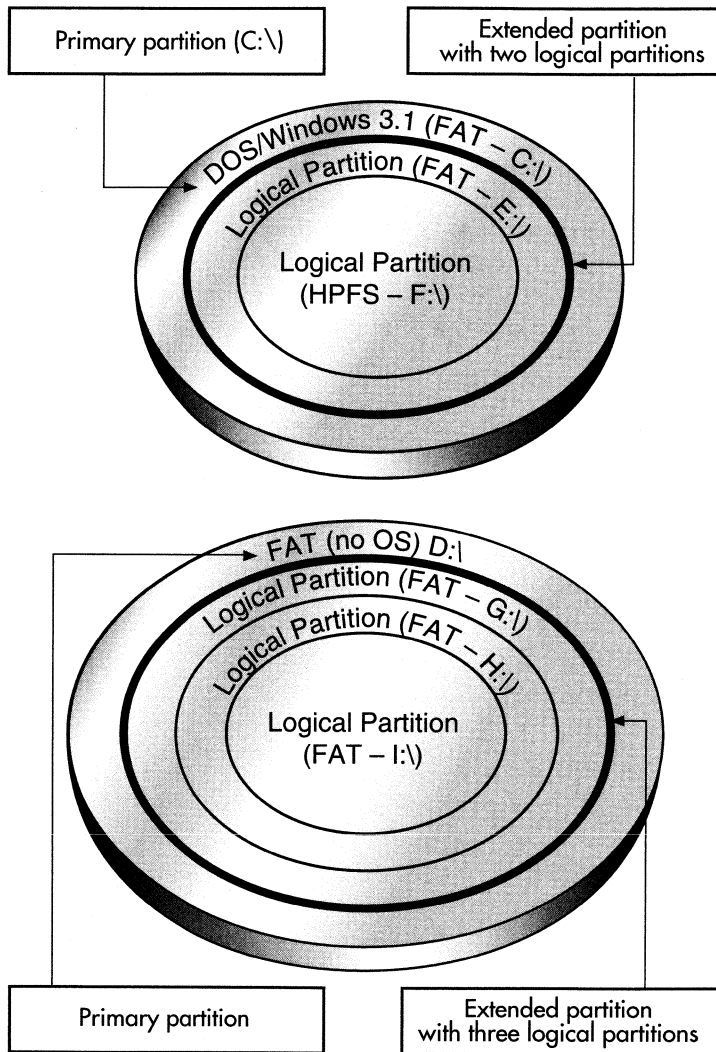


Figure A.6

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

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

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

Problems Caused by Drive Letter Changes

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

For example, suppose you had a computer with one hard drive that was partitioned like the hard drive discussed in example one in the previous section, with the drive letters assigned by DOS as shown in Figure A.4.

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

Now suppose that you added a second hard drive to your system and partitioned it as explained in example two and as shown in Figure A.5 in the previous section. The drive letter for the partition holding your applications would change (from D: to E:). Now when you double-clicked a GUI icon to start an application, the GUI would look on drive D: to find and run the application, but the application would not be there it would be on the E: drive.

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

Fixing Problems Caused by Drive Letter Changes

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

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

NOTE: For details on using DriveMapper, see “DriveMapper” in *Additional Utilities* (page 27)

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

NOTE: After a partition is created or deleted, when you reboot the system the operating system sometimes fails to assign a drive letter to the CD-ROM drive. If this happens, follow the instructions in “Making the Operating System Assign a CD-ROM Drive Letter” of *Appendix B* (page 69).

Partitioning to Avoid Drive Letter Changes

Before creating image files with Drive Image, you can use some of the following partitioning strategies on your source drive to avoid unwanted drive letter changes on your destination drive.

Preventing Changes Caused by Adding Primary Partitions

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

Preventing Changes Caused by Adding Logical Partitions

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

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

Preventing Changes Caused by Booting a Different OS

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

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

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

Appendix **B**

Additional Resource Information

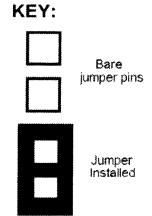
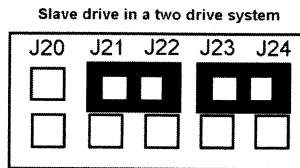
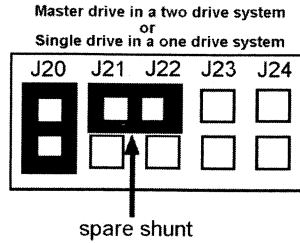
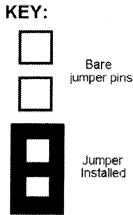
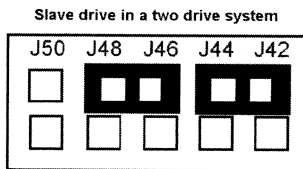
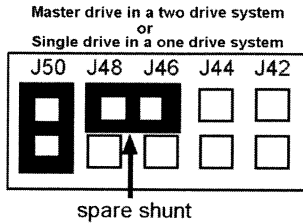
This appendix contains the following information:

- Common Jumper Settings
- Hard Drive Manufacturer's Contact Information
- Loading External Drive Device Drivers from DOS
- External Drive Manufacturer's Contact Information
- Benefits of Using PartitionMagic
- Using FDISK & FORMAT to Create and Format Partitions
- Using Drive Image with SCSI Hard Drives
- Using Drive Image with Older Computers BIOSes that require Drive Overlay Software
- Making the Operating System Assign a CD-ROM Drive Letter

Common Jumper Settings

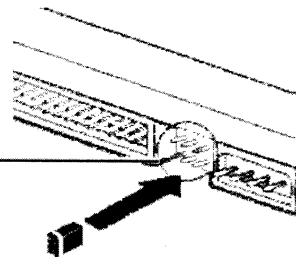
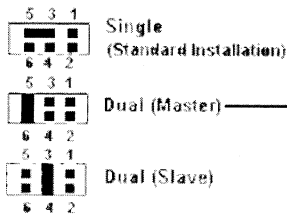
This section provides common jumper settings for most Maxtor and Western Digital IDE or EIDE hard drives. All other drive manufacturers do NOT have standard settings for most of their hard drives. To find the jumper settings for hard drives not listed in this section, consult your hard drive installation guide or see the next section, "Hard Drive Manufacturer Contact Information" for World Wide Web site addresses, telephone numbers and other contact information. In most cases, the hard drive manufacturer's web site will contain the information you need to install the hard drive correctly.

Common Maxtor Jumper Settings

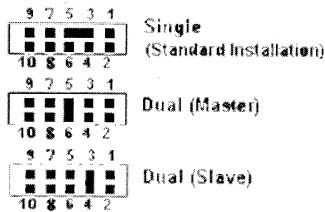


Common Western Digital Jumper Settings

6-Pin Drive



10-Pin Drive



For specific questions regarding Maxtor or Western Digital hard drives, the user should refer to their user's manual, visit the corporate web site or contact their technical support.

Hard Drive Manufacturer Contact Information

If you cannot find the specific hard drive information you are looking for in the Drive Image User Guide, please contact the manufacturer directly. Contact information for the most common hard drive manufacturers is provided below.

Another resource is the web page, <http://blue-planet.com/tech/index.html>. In addition to the list of most common hard drive manufacturers, you can also find a complete listing of jumper settings for every hard drive ever made.

Conner

- URL: <http://www.conner.com>
- Tech Support Phone: 408-438-8222
- Tech Support Fax: 408-438-8137
- Fax Back Support: 408-438-2620
- Automated Support: 800-732-4283

Fujitsu

- URL: <http://www.fcpa.com>
- Tech Support Phone: 800-626-4686
- Fax Back Support: 408-428-0456

Maxtor

- URL: <http://www.maxtor.com>
- Tech Support Phone: 800-2-Maxtor or 800-262-9867
- Tech Support Fax: 303-678-2260
- E-mail: TechnicalAssistance@Maxtor.com

Micropolis

- URL: <http://www.micropolis.com>
- Tech Support Phone: 818-709-3325
- Tech Support Fax: 818-709-3408
- Fax Back Support: 800-395-3748
- E-mail Support: tomb@earthlink.net

Quantum

- URL: *http://www.quantum.com*
- Tech Support Phone: 800-826-8022
- Tech Support Fax: 408-894-3282
- Fax Back Support: 800-434-7532

Samsung Electronics America

- URL: *http://www.samsung.co.kr*
- Tech Support Phone: 800-726-7864
- Fax Back Support: 800-229-2239

Seagate

- URL: *http://www.seagate.com*
- Tech Support Phone: 408-438-8222
- Tech Support Fax: 408-438-8137
- Fax Back Support: 408-438-2620
- Automated Support: 800-732-4283

Western Digital

- URL: *http://www.wdc.com*
- Tech Support Phone: 507-286-7900
- Fax Back Support: 714-932-4300

Loading External Drive Device Drivers from DOS

In order to use Drive Image with external drives, you must load the external drive device drivers from DOS. For specific information on setting up a DOS bootable floppy or loading a DOS device driver, contact your manufacturer directly. See “External Drive Manufacturer's Contact Information” below for a listing of external drive manufacturers.

External Drive Manufacturer's Contact Information

Iomega URL:

<http://www.iomega.com>

Syquest URL:

<http://www.syquest.com>

Cheyenne URL:

<http://www.cheyenne.com>

Panasonic URL:

<http://panasonic.com>

Benefits of Using PartitionMagic

In addition to Drive Image and DriveCopy, PowerQuest Corporation also makes PartitionMagic. PartitionMagic 3.0 is the revolutionary utility that lets you reclaim wasted disk space, safely boot and run multiple operating systems and organize and protect your data.

Reclaim Wasted Disk Space

Everyone wants to get the most they can out of their hard drive. But, up to 40 percent of your hard drive may be totally wasted due to inefficient storage methods. PartitionMagic 3.0 increases your usable disk space by shrinking large FAT partitions and restructuring cluster sizes to reclaim up to hundreds of megabytes of lost disk space.

Safely Run Multiple Operating Systems

PartitionMagic 3.0 makes it easy to run multiple operating systems on the same machine without compatibility problems. Explore the new world of Windows 95 or NT while still relying on the security of your current operating system. And PartitionMagic 3.0 includes Boot Manager from IBM, making it easy to select an operating system every time you boot your computer.

Organize and Protect Data

Create a physically separate partition for your valuable data files to protect them from potentially unstable applications operating systems. This simplifies backups, especially to devices like Zip drives. PartitionMagic also includes a utility that lets you easily move applications from one partition to another with their files and operating system settings in place. With PartitionMagic it's easy to create, resize and move hard drive partitions on the fly.

Additional Benefits

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

Order Information

To purchase PartitionMagic, visit your local computer software store or call (800) 379-2566. You can also order PartitionMagic from our web site at <http://www.powerquest.com>. All credit card transactions are secure.

Using FDISK & FORMAT to Create and Format Partitions

This section explains how to create and delete partitions for the following situations:

Scenario 1:

If you copied a single FAT partition (C: drive) from your source hard drive to a destination hard drive larger than 2.1 GB, you now have unallocated disk space and need to create a partition(s). To create and format a partition(s) using FDISK and FORMAT, follow these simple steps:

NOTE: Using FDISK to create partitions from unallocated disk space is simple and will NOT destroy any existing data on the hard drive. FDISK, however, will NOT allow you to change partition sizes without destroying data.

1. At a DOS or MS-DOS prompt, type **FDISK** and press **<Enter>**.
2. Select **1** to Create DOS partition or Logical DOS Drive and press **<Enter>**.
3. Select **2** to Create Extended DOS partition and press **<Enter>**.
4. Press **<Enter>** again to create the Extended DOS partition.
5. Press **<ESC>**.
6. Press **<Enter>** to create the Logical DOS Drive within the Extended partition.
7. If your hard drive is larger than 4 GB then you can create a second Logical DOS partition with the remaining disk space. To do so press **<Enter>**.
8. Press **<ESC>** twice to return to a DOS or MS-DOS prompt.

To format your new partition(s) type **FORMAT *drive*:** at a DOS or MS-DOS prompt where *drive* is the drive letter of the new partition. You will now have additional partitions on your destination hard drive (example D:, E:).

Scenario 2:

If you want to leave your source drive in as a secondary or slave drive after the copy, you need to delete and recreate partitions so that drive letters will not conflict. To delete and recreate partitions on your source hard drive after the copy process is finished follow these steps:

NOTE: This process will delete the data on this hard drive; however, you have a complete copy on your destination drive.

1. If you have not already done so, change the jumper settings on the original source drive to reflect a secondary or slave setting in a two drive system. Then switch the jumper settings on the destination drive to reflect a primary or master setting in a two drive system.
2. At a DOS or MS-DOS prompt type, **FDISK** and press **<Enter>**.

NOTE: If you are asked whether you wish to enable large disk support, select **YES** and then press **<Enter>** UNLESS you plan on using other operating systems on your PC, including some versions of Windows 95 and Windows NT, as well as earlier versions of Windows and MS-DOS.

3. Select **5** to Change Current Fixed Disk Drive and press **<Enter>**.
4. At the Change Current Disk Drive Screen, choose **2** to change to your second disk drive and press **<Enter>**.
5. Next select **3** to Delete partition or Logical DOS drive and press **<Enter>**.
6. Choose to delete your logical drive(s) first and then your extended partition and then finally your primary partition(s). Or if you only have one partition on your source hard drive choose to delete the single primary partition.
7. Select **1** to Create DOS partition or Logical DOS Drive and press **<Enter>**.
8. Next select **2** to Create Extended DOS partition and press **<Enter>**.
9. Press **<Enter>** again to create the Extended DOS partition.
10. Press **<ESC>**.

11. Press <Enter> to create the Logical DOS Drive within the Extended partition.
12. If your hard drive is larger than 4 GB then you can create a second Logical DOS partition with the remaining disk space. To do so press <Enter>.
13. Press the <ESC> key twice to return to a DOS or MS-DOS prompt.
14. To format your new partition(s) type **FORMAT *drive*:** at a DOS or MS-DOS prompt where *drive* is the drive letter of the new partition.

You now have a new empty partition(s) in which to store your applications and data.

Using Drive Image with SCSI Hard Drives

To use Drive Image on a SCSI hard drive, you must have a SCSI controller card that supports software Interrupt 13. Most SCSI controller cards let the user enable software Interrupt 13 support in the BIOS through the card. If your SCSI controller card does not allow you to set it to use software Interrupt 13, Drive Image will not work on drives attached to your SCSI adapter. Contact the manufacturer of the SCSI adapter to determine if your adapter can support software Interrupt 13. As a general rule, if FDISK can be used to partition the drive, you can use Drive Image.

Using Drive Image with Older Computer BIOSes that Require Drive Overlay Software

Drive overlay software is needed, such as Disk Manager or EZ-Drive, if the system has an older BIOS and the disk copy is being made from IDE to IDE or IDE to SCSI.

NOTE: If copying SCSI to SCSI, the older BIOS does not come into play because SCSI has its own translation mechanism.

This section provides information on both IDE and SCSI hard drive installations. The following are scenarios which outline, step-by-step, the installation procedures for a variety of system configurations.

Scenario 1:

- The system has a BIOS that does not support drives over 504 MB in size.
- The source drive is an IDE drive that is smaller than 504 MB. It does not have a drive overlay program.
- The target drive is an IDE drive that is larger than 504 MB and needs to have a drive overlay program in order to be recognized by the older BIOS.

Steps:

1. Install the target drive as the master and the source drive as the slave and run the auto-detect in the BIOS.
2. Restart the computer with the drive overlay boot disk.
3. Install the drive overlay program to the target drive that is now set as the master (check with manufacturer).
4. Restart the computer again, allowing the drive overlay program to load.
5. Put your Drive Image bootable diskette in your diskette drive (A:).
6. In the drive overlay boot menu, select the option to boot from a floppy disk.
7. Make sure that Drive Image is showing the correct size for each drive and the correct order for the copy sequence.
8. Finish the copy process.

Scenario 2:

- The system has a BIOS that does not support drives over 504 MB in size.
- The source drive is an IDE drive that is larger than 504 MB and a drive overlay program is loaded.
- The target drive is an IDE drive that is larger than 504 MB and needs to have a drive overlay loaded.

Steps:

1. Set the target drive as master.
2. Set the source drive as slave.
3. Run the BIOS and auto-detect the drives.
4. Install the drive overlay software on the target computer.
5. Restart the computer and re-auto detect the drives.
6. Restart the computer and allow the drive overlay program to load.
7. Put your Drive Image bootable diskette in your diskette drive (A:).
8. In the drive overlay boot menu, select the option to boot from a floppy disk.
9. Make sure that Drive Image is showing the correct size for each drive and the correct order for the copy sequence.
10. Finish the copy process.

Scenario 3:

- The system has a BIOS that does not support drives over 504 MB in size.
- The source drive is an IDE drive larger than 504 MB and a drive overlay program is loaded.
- The target is a SCSI drive and will not need a drive overlay program.

Steps:

1. Leave the source drive set as the master.
2. Install the SCSI drive with the lowest SCSI ID in the SCSI chain.
3. Run the BIOS auto-detect and make sure it recognizes the IDE drive.
4. Run the SCSI BIOS to make sure the SCSI drive is recognized correctly.

5. Restart the computer and allow the drive overlay program to load.
6. Put your Drive Image bootable diskette in your diskette drive (A:).
7. In the drive overlay boot menu, select the option to boot from a floppy disk.
8. Make sure that Drive Image is showing the correct size for each drive and the correct order for the copy sequence.
9. Finish the copy process.

Scenario 4:

- The system has a BIOS that does not support drives over 504 MB in size.
- The source drive is an IDE drive larger than 504 MB and a drive overlay program is installed.
- The BIOS is upgraded to a BIOS that supports larger drives.
- The target drive is a SCSI drive that is larger than 504 MB.

Steps:

1. Leave the source drive set as the master.
2. Install the target drive and set it as drive 0.
3. Run the BIOS and auto-detect the drives.
4. Make sure that LBA is off for the source drive.
5. Run the SCSI BIOS to make sure the SCSI drive is recognized correctly.
6. Restart the computer and allow the drive overlay program to load.
7. Put your Drive Image bootable diskette in your diskette drive (A:).
8. In the drive overlay boot menu, select the option to boot from a floppy disk.
9. Make sure that Drive Image is showing the correct size for each drive and the correct order for the copy sequence.
10. Finish the copy process.

Scenario 5:

- The system has a BIOS that does not support drives over 504 MB in size.
- The source drive is an IDE drive larger than 504 MB and a drive overlay program is installed.
- The BIOS is upgraded to a BIOS that supports larger drives.
- The target is an IDE drive that is larger than 504 MB.

Steps:

1. Set the source drive as the master.
2. Set the target drive as the slave.
3. Run the new BIOS and auto-detect the drives.
4. Make sure that LBA is turned on for the target drive and off for the source drive.
5. Restart the computer and allow the drive overlay program to load.
6. Put your Drive Image bootable diskette in your diskette drive (A:).
7. In the drive overlay boot menu, select the option to boot from a floppy disk.
8. Make sure that Drive Image is showing the correct size for each drive and the correct order for the copy sequence.
9. Finish the copy process.

Making the Operating System Assign a CD-ROM Drive Letter

If your computer has a CD-ROM drive or any form of removable media, you should be aware of potential problems with the way drive letters are assigned to these devices.

Drive Image does not make drive letter assignments; this is a function of the operating system. The operating system assigns drive letters in the following order: The first recognized primary partition on each hard drive will receive a letter, followed by all logical partitions on each hard drive. Next, the CD-ROM drive and any other form of removable media will be assigned a letter.

Because the CD-ROM is one of the last drives to receive a letter, any partitions that you create or delete on any of your hard drives will affect the drive letter assignment of your CD-ROM drive. This change in drive letter assignments is usually performed by the operating system automatically. Occasionally, however, the operating system will fail to assign a new drive letter to the CD-ROM drive. If this should occur, please follow the steps listed below.

If you are using DOS/Windows 3.11 or are loading your CD-ROM drivers under DOS with Windows 95:

1. At a DOS prompt, type **Edit C:\CONFIG.SYS**.

This starts the DOS editor program and opens your CONFIG.SYS file.

2. Change **LASTDRIVE=*drive*** (in which *drive* is any letter of the alphabet) to **Z**.

This allows the OS to assign all drive letters through **Z**.

3. Click **FileExit**.

4. Click **Yes** to save the file.

5. You should now be back to a C:\ prompt. Type **Edit C:\AUTOEXEC.BAT**.

The DOS editor program starts and opens your AUTOEXEC.BAT file.

6. Look for a line that includes the word **MSCDEX**. The **/L:*drive*** parameter (in which *drive* is the drive letter that was assigned to your CD-ROM before you made changes with Drive Image) may appear at the end of this line. Change this letter to **Z**.

Because the OS assigns all other available drive letters before assigning Z, this ensures that partition changes you make in the future will not invalidate your CD-ROM drive letter.

For more information, type **HELP MSCDEX** at a DOS prompt.

NOTE: If your computer is on a network, when you log in to the network the letter Z and other letters at the end of the alphabet may be assigned to network search drives. In this case, assign your CD-ROM a letter just before the first letter used by the network search drives.

7. Select **File**, then **Exit**. When you are asked whether you want to save the file, select **Yes**.
8. When you see the DOS prompt (C:\), reboot your machine.

If you are using Windows 95 and Windows 95 drivers for the CD-ROM:

1. Click **Start|Settings|Control Panel|System**.
2. From the System Properties screen, select **Device Manager**.
This brings up a list of the devices in your computer.
3. Double-click **CDROM**.
4. Click the **Settings** tab.
5. At the bottom of the Settings page is the heading, **Reserved Drive Letters**. Under this heading are two listings, **Start Drive Letter** and **End Drive Letter**. Change the values for these listings to **Z**.

Because the OS assigns all other available drive letters before assigning Z, this ensures that partition changes you make in the future will not invalidate your CD-ROM drive letter.

6. Click **OK** to close the **Settings** page.
7. Click **OK** to close the **System Properties** page.
8. Click **Yes** to restart your computer.

Troubleshooting

This appendix gives solutions to problems that you may encounter while using PowerQuest's Drive Image. Included are the following:

- Frequently Asked Questions
- Freeing Enough Conventional Memory to Run Drive Image
- Resolving Check Errors
- Resolving Partition Table Errors
- Partition Tables and Viruses
- Error Messages and Solutions

Frequently Asked Questions

PowerQuest maintains the latest Frequently Asked Questions on their Web site at <http://www.powerquest.com/technical/index.html>.

Freeing Enough Conventional Memory to Run Drive Image

The DOS Drive Image executable running under DOS requires a minimum of 585KB of memory in the first 640KB of the computer's address space (conventional memory). If you try to run Drive Image from DOS and find you do not have enough free conventional memory, you can free enough additional memory in a number of ways.

Running MEMMAKER

MEMMAKER is a program that automatically configures your computer to save conventional memory (while still loading all of the device drivers and other programs you usually load when booting DOS). MEMMAKER frees conventional memory by moving as many programs as possible out of conventional memory into high memory. Run MEMMAKER by typing MEMMAKER at a DOS prompt. Follow the on-screen instructions.

Using the F8 Key to Keep Programs From Loading

If running MEMMAKER does not free enough conventional memory, you can free more by pressing <F8> right after booting your computer (while DOS is booting). If you press <F8>, when DOS reads the commands from the CONFIG.SYS and AUTOEXEC.BAT files on your hard drive, DOS will ask you if you want it to execute each command. When you see commands that load device drivers or TSR programs that you will not need to run Drive Image, answer N (no) to tell DOS not to execute that command (not load that software into memory). This will conserve conventional memory.

Using an Operating System Boot Diskette

If running MEMMAKER and using <F8> does not free enough conventional memory, you can create a boot diskette that allows you to boot using a very minimal amount of conventional memory.

To create a boot diskette for any version of DOS, perform the following:

1. Place in your diskette drive (A:) any diskette that does not contain information you want to keep.
2. Go to a DOS prompt, type **FORMAT *drive*: /S** (where *drive* is the drive letter of the diskette drive).
3. Press <Enter>.

After the diskette is formatted and the operating system files are transferred, you will be able to boot the computer from the diskette. If you restart your computer with the diskette in the diskette drive, your computer boots using a minimal amount of conventional memory. After you boot from the diskette, you can run Drive Image from either the diskette or your hard drive.

Creating a CONFIG.SYS File on the Boot Diskette

If making an ordinary boot diskette doesn't free enough conventional memory, you can create a customized boot diskette that will free even more conventional memory. (With the customized diskette, you will free more conventional memory by loading some of the DOS operating system into high memory.) To customize the diskette, you must create a CONFIG.SYS in the root directory (C:\). To create a CONFIG.SYS in the root directory, perform the following:

1. Go to a DOS prompt.
2. Type *drive:* (where *drive* is the drive letter of the diskette drive) and press <Enter>.

Verify that you have changed to the diskette drive (you see the *drive:\>* prompt).

3. Type **EDIT CONFIG.SYS** and press <Enter>.

This starts the DOS editor (you will see a blank screen).

4. In the editor, enter the following:

DEVICE=C:\DOS\HIMEM.SYS

DOS=HIGH,UMB

NOTE: All lines must be entered in the order shown.

5. Click **File|Save** to save the file.
6. Click **File|Exit** to exit the editor.

You can now reboot your computer from the customized boot diskette. When DOS loads, much of it is loaded into high memory, saving a maximum amount of conventional memory.

Deleting Operating System Compression Files

If you use DOS 6.22 and your system doesn't have any compressed drives (for example, DriveSpace, DoubleSpace, or Stacker), you can delete the operating system compression files DRVSPACE.BIN or DBLSPACE.BIN from any boot diskette you create. This frees more conventional memory because DOS 6.22 loads the contents of these files into memory, regardless of what's in the CONFIG.SYS or AUTOEXEC.BAT. These files are hidden system files, so if you wish to delete them you will have to perform the following:

1. From the DOS prompt, type *drive*: (where *drive* is the drive letter of the diskette drive).
2. Type **ATTRIB -R -H -S *.BIN**.
3. Type **DEL *.BIN**.

Resolving Check Errors

Drive Image checks the integrity of a partition very thoroughly prior to creating an image file or copying a partition. These checks are substantially the same as those made by the operating system's CHKDSK, SCANDISK, or AUTOCHK utility.

If you receive a Check error message for any partition, after backing up your hard drive, run your operating system's CHKDSK program on that partition. CHKDSK usually shows the same problem(s) as Drive Image

NOTE: Run SCANDISK if you have MS-DOS 6.x or Windows 95.

NOTE: The DOS CHKDSK program does not detect problems in Extended Attributes.

NOTE: If you are using CHKDSK, DO NOT use the /F switch on the initial run.

If CHKDSK (or SCANDISK) does not show the same error(s) that Drive Image shows, contact PowerQuest at the numbers listed in *Appendix D*.

If the CHKDSK (or SCANDISK) program and Drive Image detect the same errors (which is usually the case), run CHKDSK with the /F switch to fix the problem(s).

NOTE: Run SCANDISK if you have DOS 6.x.

After running CHKDSK with the /F switch, try running CHKDSK without using the /F switch to make sure the partition is free of errors. Under OS/2, you should perform this procedure twice before proceeding.

If Drive Image still reports a problem, reformat the partition and restore your files from the backup copy to correct the error.

Drive Image also checks a partition after restoring it. If this check fails, report the problem to PowerQuest at the numbers provided in Appendix D. While data loss is possible, in this case it is not typical. The problem is usually a minor file system error that CHKDSK /F can correct without data loss. For more extensive errors, you may need to restore your files from a backup copy.

Resolving Partition Table Errors

To resolve partition table errors, you must create new, error-free partition tables. To create new, partition tables, perform the following:

1. Make sure you have no viruses

NOTE: See “Partition Tables and Viruses” (page 78).

2. Back up the data on the affected partitions.

3. Delete the partitions

NOTE: You may need to use the FDISK program from a recent DOS version because earlier versions of DOS may refuse to delete HPFS or hidden partitions.

NOTE: If using OS/2, the OS/2 FDISK program may recognize the partition's corruption and refuse to modify it. In this case, use the FDISK program from a recent DOS version.

4. Recreate the partitions.
5. Restore the contents of the partitions.

Partition Tables and Viruses

If partition changes made under one operating system are not reflected under the other, and vice versa, it is possible that a master boot record (MBR) virus is present.

Use a virus check utility that can detect the latest viruses. If a virus is found, data loss is likely. If a virus is found, perform the following:

1. Before removing the virus, run ScanDisk or CHKDSK under each of the operating systems to evaluate the integrity of the partition.
2. Back up the files from any partition that passes the Check operation.
3. After backing up the files from all operating systems, remove the virus.
4. Run ScanDisk or CHKDSK under each of the operating systems again.
5. Delete and recreate any partitions that fail the check.
6. Reinstall the operating system(s).
7. Restore the backup files as necessary.

Error Messages and Solutions

Miscellaneous Errors (3–38)

#3 Not enough memory

The DOS Drive Image executable running under DOS requires a minimum of 585KB of memory in the first 640KB of the computer's address space (conventional memory) and 8MB of total memory. If you don't have enough conventional memory, see “Freeing Enough Conventional Memory to Run Drive Image” (page 73) for possible solutions.

#8 Could not allocate/deallocate DOS real mode memory

The DOS Drive Image executable running under DOS requires some memory in the first 1MB of the computer's address space (Drive Image uses a DOS extender). If not enough memory is available, Drive Image cannot access the hard drive. If you don't have enough conventional memory, see "Freeing Enough Conventional Memory to Run Drive Image" (page 73) for possible solutions.

#23 Unsupported version of operating system

The operating system versions that are required to run Drive Image are listed in "System Requirements" in the *Introduction* (page xiii).

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

PowerQuest occasionally releases beta versions and evaluation versions of Drive Image. Both versions are not as safe as release versions; therefore, PowerQuest builds an expiration date into each version. After a predetermined test period, the beta or evaluation version will no longer function.

#36 DPMI Server error

Drive Image DOS executables use a DOS extender. This error indicates a failure during a call made from Drive Image through the DOS extender (to DOS or to the BIOS). The DOS extender may be in conflict with other programs that use extended memory. DOS would load the conflicting programs from your CONFIG.SYS or AUTOEXEC.BAT file during the normal boot sequence.

You may be able to resolve this problem by pressing the F8 key while booting DOS. After DOS boots and starts to read the commands from your CONFIG.SYS and AUTOEXEC.BAT files, DOS will ask you if you want to execute each command. When you see commands that load device drivers or TSR programs that you think might be conflicting with the Drive Image DOS extender, answer **N** (no) to tell DOS not to execute that command (not to load that software into memory). You will often be able to find a program configuration that will enable Drive Image (the DOS extender) to run without error.

Disk Access Errors (40–56)

Errors in the 40-56 number range indicate that accessing your disk is not possible, and, often, are the result of hardware problems. Some problems may have simple solutions. For other problems, the only solution may be replacing the hard drive. When possible, Drive Image detects major errors before any changes have been made so you can back up your data before replacing the hard drive.

#49 Write fault

#50 Read fault

Drive Image is unable to write to/read from a specific sector on the hard drive. There are a number of possible causes of this error:

- If your PC beeps or displays a black box in the middle of the screen, virus protection is enabled in your computer's BIOS. Disable virus or boot sector protection in the BIOS.
- A virus protection application (which may be a TSR or DLL program) is in use. Disable the application before using Drive Image.
- There is a bad sector on the hard drive (this is usually the case with only older hard drives). Run SCANDISK on the hard drive to perform a surface scan to verify the existence of bad sectors. If your drive has bad sectors, we recommend you replace it.
- You have set up disk mirroring with PC-Tools. Disable the disk mirroring option.
- Your caching controller card is not set up properly.

Partition Table Errors (100–199)

Errors in the 100-199 number range are partition table errors. For general information about solving this type of error, see “Resolving Partition Table Errors” (page 77) and “Partition Tables and Viruses” (page 78).

#100 Partition table is bad

The master boot record (MBR) can contain, at most, one extended partition, and each extended partition boot record (EPBR) can contain, at most, one link to another EPBR. This error occurs when a partition table violates the foregoing rule. Since any modifications Drive Image makes may decrease the amount of data that is recoverable from the hard drive, Drive Image will not recognize any of the hard drive's partitions. If you must create new, error-free partition tables to resolve your problem, see “Resolving Partition Table Errors” (page 77).

#104 No sectors in partition

No partition should contain zero sectors. Delete the partition before using Drive Image.

#105 Partition starts on wrong boundary

The hard-disk partition table contains erroneous values. Drive Image expects FAT, NTFS, and HPFS partitions to begin and end on the boundaries used by FDISK. If they do not, the disk may be partially corrupted. In this circumstance, if Drive Image were to make any modifications it might cause the loss of data. Therefore, Drive Image will refuse to recognize any of the hard drive's partitions. To resolve this problem, see "Resolving Partition Table Errors" (page 77).

#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 Drive Image on a hard drive that uses more than 1,024 cylinders. Under DOS, Drive Image is restricted by the BIOS 1,024 cylinder limit. If any partitions extend beyond the limit, Drive Image cannot safely operate on the hard drive.

This error can also occur if a partition erroneously extends beyond the physical end of the hard drive. This may happen if the hard drive has been used on a different computer or with a different hard-disk controller or if BIOS settings have been changed. Be advised that the physical geometry of the hard drive may differ from the logical geometry assigned to the hard drive by the operating system.

#108 Partition doesn't end at end of cylinder

See error #105.

#109 Partition ends after end of disk

See error #107.

#110 Partition table number of sectors is inconsistent

The hard-disk partition table contains two inconsistent descriptions of the number of sectors on the hard drive. This error is serious if both DOS and another operating system use the hard drive. Because DOS uses one description and other operating systems may use the other, data loss is likely once the partition is almost full. To resolve this error, see "Resolving Partition Table Errors" (page 77).

#111 Logical partition starts outside Extended

The hard-disk partition table contains erroneous values. All logical partitions must be totally contained within the extended partition. To resolve this error, see “Resolving Partition Table Errors” (page 77).

#112 Logical partition ends outside Extended

See error #111.

#113 Partitions overlap

The hard-disk partition table contains erroneous values. If data partitions overlap, writing to one may destroy data in another.

This error is sometimes the result of an OS/2 FDISK bug. If free space exists within the extended partition, OS/2's FDISK program allows a primary partition to be created that overlaps the extended partition. A logical partition is subsequently created in the space occupied by the overlapping primary partition.

If a primary partition overlaps the end of the extended partition but does not overlap any logical partitions within the extended partition, the problem can be remedied by patching the partition table. Only qualified individuals should attempt this repair! An incorrect patch could destroy all data on the hard drive! In most instances, you should resolve the problem as explained in “Resolving Partition Table Errors” (page 77).

#116 Partition table Begin and Start inconsistent

The hard-disk partition table contains two inconsistent descriptions of the partition's starting sector. This error can occur if the operating system reports a hard-disk geometry that is different than the geometry in use when the partition table was written. Possible causes of the hard-disk geometry changing are:

- Different operating systems (for example, DOS and OS/2) report different hard-disk geometries.
- You boot from a diskette that loads a different driver than is loaded when you boot from the hard drive.
- Upgrading the operating system (for example, from OS/2 2.x to OS/2 Warp) causes a different driver to be used.
- The hard drive or controller has been changed.
- The BIOS has been upgraded
- The BIOS LBA setting has been changed.
- There is a partition table virus present on the hard drive.

In most instances, you should resolve the problem as explained in “Resolving Partition Table Errors” (page 77). You can also use a virus scanning program to remove any partition table virus. Data loss is possible if the number of heads or sectors per track has changed since you first created your partitions.

#120 The logical drive chain is incompatible

This error occurs under some OSs when logical partitions are not chained together in the expected order. DOS, OS/2, Windows 95, and Windows NT require that logical partitions be chained together in ascending order. Some other operating systems do not require this. For example, some versions of the Linux FDISK utility chain logical partitions together in the order they are created. This error message identifies a very dangerous situation; using the DOS FDISK in this situation can cause loss of one or more partitions.

For solutions to this problem, see the instructions in “Resolving Partition Table Errors” (page 77).

If you decide to back up your data and recreate your partitions, you may have to use the same partitioning program that you used to create the partitions in order to delete them.

#121 The first sector of the drive cannot be read

The first sector of the hard drive (cylinder 0, head 0, sector 1) contains the master boot record (MBR) and the primary partition table. Drive Image cannot make changes to this hard drive because an error occurred when it read the first sector. See error #50 for information on resolving this error.

#122 A bad sector was found in the current or new partition area

The partition cannot be moved safely because there is a bad sector in the new or current partition area. When you see this error message, the move operation will be aborted before any corruption can occur. Try moving the partition to a different place. If your hard drive has bad sectors, we recommend that you replace the hard drive.

Check Errors (500–599)

Check errors occur when Drive Image checks the integrity of a partition. For useful general information about resolving these errors, see “Resolving Check Errors” (page 76).

#500 Subdirectory is corrupted

This error message reveals the name of the corrupted subdirectory. Back up the contents of that directory and its subdirectories. You can then delete the corrupted subdirectory.

#506 Not enough free space on partition to shrink

Some free space (which is dependent on the hard drive's current contents) is required to resize a partition smaller. Delete unneeded and duplicate files in the partition and then attempt the operation again.

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

You have entered a value that is the same as or (when rounded to the required cylinder boundary) rounds to the same as the partition's present value. Enter a larger change.

#509 A bad sector was detected in the current or new FS area

In order to perform the resize operation that you requested, Drive Image attempted to expand the file system area. However, the program found a bad sector in the new area. Try moving the partition before you resize it. No corruption will occur when you encounter this error.

#510 The version of the file system is not supported

An updated version of Drive Image is required to operate on this new version of the file system. Visit <http://www.powerquest.com> for information about updated versions of Drive Image.

Check Errors (1000–1500)

Check errors occur when Drive Image checks the integrity of a partition. For useful general information about resolving these errors, see “Resolving Check Errors” (page 76).

#1015 System sector not marked unavailable

This error may indicate that there are open files on the hard drive. Shut down and restart OS/2, booting from diskettes. If this does not resolve the problem, run OS/2's CHKDSK program. This error message may also indicate that a file is listed with a file length of zero. OS/2's CHKDSK program will not fix this problem. As a last resort, delete the offending file.

#1027 Could not account for all sectors

This error may be resolved in one or more of the following ways:

- If you are working with an HPFS386 partition, check the technical support area of PowerQuest's Web site for more information.
- If CHKDSK has created any FOUND.000 or *.CHK files, delete them.
- If the error message indicates the name of the offending file, delete it.
- Turn off the disk-mirroring option in PC-Tools.
- If none of the above solutions works, back up the partition, delete it, recreate it, and restore the data.

#1045 Stac volume detected delete—Stac volume before converting

This error message occurs when you attempt to convert a partition to HPFS, and the existing partition contains a STAC volume. Stacker cannot access a STAC volume that is on an HPFS partition. Delete the STAC volume from the partition before converting to HPFS.

NTFS Check Errors (1500–1699)

Errors 1500-1699 are NTFS-specific error messages. In this context, “attribute” does not mean read-only, hidden, system, and so on. Rather, “attribute” means one of a file’s data streams. Check errors occur when Drive Image checks the integrity of a partition. For useful general information about resolving these errors, “Resolving Check Errors” (page 76).

#1501 Wrong version of NTFS

The partition was created using a version of the NTFS file format that Drive Image cannot work with.

#1503 Bad NTFS cluster size

The NTFS cluster size must be 512, 1,024, 2,048, or 4,096 bytes.

#1512 Restart record mismatch

The two restart entries in the journal file are different. This may happen if Windows NT is not properly shut down. To fix this problem, restart Windows NT and shut it down using the Shut Down command.

#1516 Partition improperly dismounted

The partition dirty flag is set in a restart record in the journal file. This error may have been caused by a power failure or system crash while the Windows NT operating system was writing the partition. Reboot Windows NT and execute CHKDSK /F to repair the damage.

#1527 Bad update sequence number

A buffer contains mismatched update sequence numbers. This error may have been caused by a power failure or system crash while the Windows NT operating system was writing to the partition. Reboot Windows NT and execute CHKDSK /F to repair the damage.

#1529 Information mismatch in directory entry

A file attribute stored in a file record is different from the attribute stored in its directory entry. If this error is in a system file (file 0-10), Windows NT's CHKDSK program will not fix it, but Windows NT will rebuild the root directory on the partition the next time the operating system is started.

#1538 Can't find contiguous space to move

The partition does not contain enough contiguous free space to hold the new copy of a file that must be contiguous. You will normally encounter this error when you use the Resize option to resize a partition smaller.

#1539 File size mismatch

The size of a system file (file 0-10) recorded in its file record does not match either the size recorded in its directory entry in the root directory or the size of its data stream.

#1544 External attribute list in external attribute

An external file record has an external attribute list.

#1545 File attributes out of order

The attributes in a file must appear in order of increasing numeric type.

#1546 Attribute neither resident nor nonresident

The attribute resident flag has a value other than resident or nonresident.

#1547 Wrong run limits

A run has more clusters than the difference between its highest and lowest cluster.

#1548 File table has fewer than 16 entries

The file table must have at least 16 entries.

#1549 File table has more than 4 billion entries

The file table must have fewer than 4 billion entries.

#1644 Bad system file sequence number

A system file has a bad sequence number. System files must have a sequence number from 0 to 10. A partition with this problem may pass a run of Windows NT's CHKDSK program, but Windows NT will not mount the partition the next time the operating system is started.

#1647 Error in root directory index

There is an error in the root directory's index. Running Windows NT's CHKDSK program will not fix this problem, but the Windows NT operating will automatically rebuild the root directory on the partition the next time it is started.

Miscellaneous Drive Image Error Messages

#1701 Err disk not empty

Used in scripting. The DELETE ALL command failed to delete all the partitions on the drive.

#1800 Err partition not open

Attempted operation on a partition in an improperly opened image file.

#1801 Err partition not found

Did not find requested partition in image file.

#1802 Err corrupt bundle

Image file header information is not valid.

#1803 Err bundle read only

Attempted to delete or write to a partition in the image file which was opened in Read Only mode.

#1804 Err no bitmap Image

File contains no partition bitmap.

#1805 Err write failed

Error encountered while writing image to file.

#1806 Err out of memory

Out of Memory.

#1807 Err compression

Error encountered while compressing or decompressing image file data.

#1808 Err buffer too small

Buffer too small to read in partition bitmap.

#1809 Err no more free space

No more free space available to process remaining partitions.

#1810 Err open failed

Could not open image file.

#1811 Err read failed

Could not read from image file.

#1900 Err invalid drive number

Used in scripting. The script contains an invalid drive number.

FAT Check Errors (2000–2099)

Check errors occur when Drive Image checks the integrity of a partition. For useful general information about resolving these errors, see “Resolving Check Errors” (page 76).

#2001 FAT copies are not identical

Run SCANDISK to fix this error. This problem may also be caused by a virus. Run a virus checker and remove the virus if possible.

#2005 One or more lost clusters were found

Run SCANDISK or CHKDSK to fix this error.

#2012 Formatted FAT file system too big for partition

This error can be caused by the following circumstances:

- The number of sectors in the partition is larger than 65,536, and the bsHugeSects field of the boot sector (“Big total number of sectors” in Norton's DISKEDIT utility) shows that there are more sectors in the partition than the partition table shows.
- The number of sectors in the partition is less than 65,536, and the bsSects field of the boot sector (“Total sectors on disk” in Norton's DISKEDIT utility) shows that there are more sectors in the partition than the partition table shows.

This situation can result in data loss when the FAT file system tries to use space outside the partition that does not exist or that belongs to another partition. Since file data may exist outside the partition boundary, you cannot fix the problem by simply patching the boot sector.

To correct the error, back up all data on the partition, delete the partition, recreate the partition, and restore the data. Alternately, it has been reported that you can use Norton Disk Doctor to fix this problem.

#2013 A component of FAT geometry is bad

This error can be caused by the following circumstances:

- The number of clusters on the hard drive is greater than the FAT limits allow. This can result from bad values in the boot sector for the number of sectors, FATs, root entries, reserved sectors, and sectors per cluster.
- The number of sectors in the FAT is not large enough to hold the number of clusters present on the hard drive.

A qualified consultant may be able to fix the hard drive by performing simple patches. Alternately, you can back up the data on the partition, delete the partition, recreate the partition, and restore the files.

#2024 The OS/2 Extended Attribute file is corrupt

This error is caused by any program that mistakenly writes to or overwrites the OS/2 Extended Attribute file. If this error occurs, you should back up your data, delete the partition, recreate the partition, and restore your data.

Appendix **D**

PowerQuest Technical Support

Contact Information

This appendix contains the following information:

- Before you Contact Technical Support
- PowerQuest Problem Report
- Contacting PowerQuest Technical Support

Before You Contact Technical Support

PowerQuest is committed to providing you with comprehensive technical support. However, before calling our technical support department, please try to resolve your problem by using this guide, the online Help system, or check PowerQuest's Web site for frequently asked questions at <http://www.powerquest.com/technical/index.html>, or for international customers, see <http://www.powerquest.com/international/index.html>. Also, check the README.TXT file for information that has changed since this guide was printed.

PowerQuest Problem Report

If you cannot find the solutions you need in this guide, please have the following information ready or send it along when you contact technical support:

Your Company Name _____

Your Name _____

Your Voice Phone Number _____

Your Fax Phone Number _____

Drive Image Serial Number _____ (Place Serial Number Sticker Here)

Computer Manufacturer _____

Computer Model and Model Number _____

Date of Computer Manufacture _____

Processor Type _____ (386, 486, Pentium)

Amount of Memory (RAM) _____

KB Operating System / Version Number _____ (DOS 6.21, etc.)

Other Hardware. Include bus type (ISA, EISA, MCA, PCI, VESA), hard drive model, and external drives.

Memory Resident Software. Include memory managers and list their version numbers (for example, OnTrack's Disk Manager Version 6.0 or EZ-Drive Version 7.0).

Contacting PowerQuest Technical Support

If you cannot get the help you need from this guide, you can contact our technical support department in any of the ways listed below. You must be a registered Drive Image user to receive the following types of technical support. PowerQuest offers free support for three months from the day we receive your registration.

Fax

801-434-3060

Fax the information listed on the pages above and a description of your problems to the technical support fax number. This service is available in the U.S. and Canada, 24 hours a day, 7 days a week. We try to respond to all fax requests within 24 hours.

BBS

801-226-5608

Call the PowerQuest bulletin board for product information and answers to frequently asked technical questions. The correct modem setup is N-8-1. Our BBS supports transmission speeds from 1200bps to 28.8Kbps.

Telephone

801-226-6834

Support is available Monday through Friday, 8 a.m. to 5 p.m. MST/MDT.

Internet

You can contact PowerQuest through the Internet by sending an E-mail message to:
support@powerquest.com.

Corporate Web Site

http://www.powerquest.com.

Postal Service Mail

Our United States Postal Service address is:

PowerQuest Corp.
1083 N State Street
Orem, Utah 84057 U.S.A.

Contacting PowerQuest International Technical Support

Internet

Language	Email Address
French	europs@powerquest.com
English	europs@powerquest.com
German	europs@powerquest.com
Spanish	latina@powerquest.com

Telephone

Our European call centre is open from 9:00 to 18:00 CET and is available in the following languages:

Language	Location	Number
Dutch	Netherlands	(+31) 20 5813906
French	France	(+33) 1 69 32 49 30
German	Germany	(+49) 069 66 568 516
English	UK	(+44) 0171 341 55 17
English	Netherlands	(+31) 20 5813907
Fax (all languages)	Netherlands	(+31) 20 5813905

Glossary

ATA

A standard used by hard drives to communicate with the controller ports or cards that allow the hard drive to interface with the computer. Before ATA, there were numerous incompatible methods for interfacing hard drives to computers. ATA simplifies this process, thus reducing the cost of developing and purchasing related hardware. ATA is the proper term for Integrated Drive Electronics (IDE).

ATA-2

ATA-2 is the common name for a new, enhanced IDE standard. ATA-2 is still evolving and has not yet been submitted for approval as an official standard.

Batch Mode

Switches in a normally interactive program that prepare it to receive non-interactive command input.

BIOS (Basic Input/Output System)

The BIOS is the program code stored in a PC-compatible ROM to boot the computer and provide basic services such as low-level hard drive access.

Cloning

Copying a hard drive to an image file or destination disk to create an exact duplicate.

Destination

The destination hard drive is the drive that is copied to during a copy operation.

Disk

A hardware device to store data. A disk contains a Master Boot Record and partitions.

EIDE (Enhanced Integrated Drive Electronics)

A marketing program that promotes certain features of ATA-2.

Extended Partition

One of the four primary partitions on a hard drive can be an extended partition. Extended partitions do not directly hold data; rather, you can create an unlimited number of logical partitions within the extended partition to store data. An extended partition cannot be the active partition.

FAT File Allocation Table

File system used by DOS, Windows 95, NT and sometimes OS/2 to store and retrieve files and directories.

FAT32

FAT32 is the file system used by updated versions of Windows 95 (version 4.00.950B or above). FAT32 is an enhancement of the FAT file system and is based on 32-bit file allocation table entries, rather than on the 16-bit entries the FAT file system uses. As a result, FAT32 supports much larger volumes (up to 2 terabytes).

GB (Gigabyte)

1,073,741,824 bytes.

IDE

See ATA.

Image

An image is a snapshot of a drive's partition(s) that can be used to backup a system, install a new hard drive, or configure a new system.

Jumper

Metal prongs and a circuit completion cap on the outside of a hard drive. You can remove, reposition, and then replace the cap to create various jumper settings such as Master and Slave.

HPFS

High Performance File System an alternative to a FAT file system which is used by OS/2.

Interactive Mode

An operation mode where the program's responses alternate with user commands, each being dependent upon the other.

LBA (Logical Block Addressing)

1) In EIDE, a means of specifying sector addresses by replacing CHS values with a single linear 28-bit number. 2) Generically, a one-dimensional address of a hard-disk sector, contrast with *CHS*.

Linux

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

Logical Drive

A contiguous area inside an extended partition that can be used by the operating system to store and retrieve files.

Master

The first hard drive on an IDE hard drive controller.

MB (Megabyte)

1,048,576 bytes.

NetBIOS

A high level Network programming interface which is supported by lower level Network protocols such as IP/SP and TCP/IP.

NetWare

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

NTFS New Technology File System.

An alternative to FAT and HPFS file systems used by WinNT.

Partition

An uninterrupted area on a disk, defined in the Master Boot Record. Every partition contains a specific file system such as FAT, HPFS or NTFS.

Primary Partition

A partition referenced in the Master Boot Record partition table. Four primary partitions can exist on a hard drive. One of these may be an extended partition. Only one primary partition on a drive may be active at time. Data and applications are often placed on a logical partition inside an extended partition. This enables the data to be accessed by all primary partitions.

Restore

Downloading an image file to a destination drive. The Restore and DownLoad script arguments are interchangeable and accomplish the same function.

Slave

The second hard drive on an IDE hard drive controller.

Script File

A series of instructions, usually in text file format, written to be passed to a program running in batch mode.

Source

The Source hard drive is the drive from which the copy is made.

Volume

This User Guide uses the term volume interchangeably with partition.

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