FILE & DISK MANAGEMENT



ALFRED GLOSSBRENNER

Includes 3.5-Inch Disk Packed with Crucial Shareware Utilities and Tools:



- McAfee's Anti-Virus Package —The top-rated tool for tracking down and removing computer viruses—keep them from infecting your system
- DIET The 100 % DOS-compatible file shrinker that can nearly DOUBLE the size of your disk
- ORG Boosts your disk's performance by quickly (and visually) defragmenting your files
 PLUS a clutch of tools to help you clean up your disk and keep it in fighting trim

FILE & DISK MANAGEMENT: FROM CHAOS TO CONTROL

Alfred Glossbrenner

Osborne McGraw-Hill

Berkeley New York St. Louis San Francisco Auckland Bogotá Hamburg London Madrid Mexico City Milan Montreal New Delhi Panama City Paris São Paulo Singapore Sydney Tokyo Toronto Osborne **McGraw-Hill** 2600 Tenth Street Berkeley, California 94710 U.S.A.

For information on translations or book distributors outside of the U.S.A., please write to Osborne **McGraw-Hill** at the above address.

File & Disk Management: From Chaos to Control

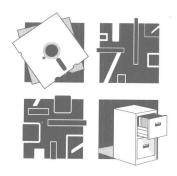
Copyright © 1993 by McGraw-Hill, Inc. All rights reserved. Printed in the United States of America. Except as permitted under the Copyright Act of 1976, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written permission of the publisher, with the exception that the program listings may be entered, stored, and executed in a computer system, but they may not be reproduced for publication.

1234567890 DOC 998765432

ISBN 0-07-881834-6

Information has been obtained by Osborne McGraw-Hill from sources believed to be reliable. However, because of the possibility of human or mechanical error by our sources, Osborne McGraw-Hill, or others, Osborne McGraw-Hill does not guarantee the accuracy, adequacy, or completeness of any information and is not responsible for any errors or omissions or the results obtained from use of such information.

FILE & DISK MANAGEMENT: FROM CHAOS TO CONTROL



About the Enclosed Software

Disk Contents There are 11 shareware programs on the disk—a toolkit to hard disk management. Appendix B of this book will explain how to install and get up to speed with these programs.

The disk includes the complete McAfee Anti-Virus Package consisting of three programs: SCAN, CLEAN, and VSHIELD that find, kill, and protect against viruses. DIET, the superb dynamic file compressor that allows you to compress and decompress files on the fly is also here along with ORG, the terrific disk defragmenter. FORMATQM allows you to format disks just by feeding them into the disk drive. *Back Off!* searches for unnecessary files for deletion. CLEANUP finds all the little 0, 1, or 2 byte files that other programs leave behind. FD finds duplicate files and lets you do as you wish with them. DISKID handles volume and disk labels. Finally, FINDTYPE lets you display all of the drive type settings in your BIOS drive tables to help with installation of a disk drive.

All of these programs represent the best in quality for managing your hard disk. If you do intend to use them, each program tells you how to register the shareware (a small fee is required).

System Requirements IBM PC or compatible Intel 8086 machines or higher, MS DOS 3.0 or higher, hard disk, and 640K of memory with at least 1.4 MB disk space.

WARNING: BEFORE OPENING THE DISK PACKAGE OPPOSITE, CAREFULLY READ THE TERMS AND CONDITIONS OF THE DISK WARRANTY FOUND ON THE BACK OF THIS PAGE.

DISK WARRANTY

地不是3000000

This software is protected by both United States copyright law and international copyright treaty provision. You must treat this software just like a book, except that you may copy it into a computer to be used and you may make archival copies of the software for the sole purpose of backing up your software and protecting your investment from loss.

By saying, "just like a book," Osborne McGraw-Hill means, for example, that this software may be used by any number of people and may be freely moved from one computer location to another, so long as there is no possibility of it being used at one location or on one computer while it is being used at another. Just as a book cannot be read by two different people in two different places at the same time, neither can the software be used by two different people in two different places at the same time (unless, of course, Osborne's copyright is being violated).

LIMITED WARRANTY

Osborne McGraw-Hill warrants the physical disk enclosed herein to be free of defects in materials and workmanship for a period of sixty days from the purchase date. If Osborne McGraw-Hill receives written notification within the warranty period of defects in materials or workmanship, and such notification is determined by Osborne McGraw-Hill to be correct, Osborne McGraw-Hill will replace the defective disk(s).

The entire and exclusive liability and remedy for breach of this Limited Warranty shall be limited to replacement of defective disk and shall not include or extend to any claim for or right to cover any other damages, including but not limited to, loss of profit, data, or use of the software, or special, incidental, or consequential damages or other similar claims, even if Osborne McGraw-Hill has been specifically advised of the possibility of such damages. In no event will Osborne McGraw-Hill's liability for any damages to you or any other person ever exceed the lower of the suggested list price or actual price paid for the license to use the software, regardless of any form of the claim.

OSBORNE, A DIVISION OF McGRAW-HILL, INC., SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Specifically, Osborne McGraw-Hill makes no representation or warranty that the software is fit for any particular purpose, and any implied warranty of merchantability is limited to the sixty-day duration of the Limited Warranty covering the physical disk only (and not the software) and is otherwise expressly and specifically disclaimed.

This limited warranty gives you specific legal rights; you may have others which may vary from state to state. Some states do not allow the exclusion of incidental or consequential damages, or the limitation on how long an implied warranty lasts, so some of the above may not apply to you.

Publisher Kenna S. Wood

Acquisitions Editor
Jeffrey M. Pepper

Technical Editor
Nick DiMuria

Copy Editor
Carl Wikander

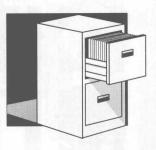
Proofreaders
Mick Arellano
Carol Burbo

Indexer
Frances Bowles

Technical Illustrator Susie C. Kim

Computer Designer Helena Charm

Cover Designers
Mason Fong



NTRODUCTION

No personal computer user can get very far these days without a hard disk drive. For all but the most elementary computing tasks, a hard drive is as essential as a monitor, keyboard, or random access memory. So it's no accident that hard disk drives are now considered standard equipment and are included in even the least expensive computer packages.

Yet a hard disk is far more than just another system component. It is not something you can merely plug in, turn on, and forget about. A hard disk drive is a *system* in and of itself.

It is a powerful, sophisticated, infinitely customizable tool that forms the very heart of your personal computer. If it isn't chosen with care, if it isn't regularly maintained, if it isn't tuned to its peak performance, *all* of your personal computing activities will suffer.

Unfortunately, the ins and outs of hard disk drives have always been shrouded in mystery. This guide rips away the veil. It will tell you everything you need to know to take full advantage of today's hard disk technology—regardless of your level of personal computing experience:

- ▶ If you have yet to buy a computer, this book will show you what to look for in a hard disk system—and possibly save you from making a terrible mistake by buying a drive too small, too slow, or too costly for your needs. It lays out your options, explains the various features to consider, and shows you how to get the best deal.
- ▶ If you already have a system, the book will show you how to get more speed, more performance, and even more storage space out of your current drive. Remember—if your hard disk drive isn't performing at its best, you can't perform at your best.
- ► If you're an old hand and long-time hard disk user, you're sure to find some tips, tricks, and techniques that have eluded you over the years. How long has it been since you *really* tweaked your system? Is it time at last to get a tape backup system?
- ▶ What are you doing about security these days? This guide contains the answers, information, and contacts you need.

But the good news doesn't end there. This guide not only tells you what you need to know, it gives you the software tools you need to put this knowledge into practice. On the disk bound into this book, you will find many of the key programs you need to whip your hard drive into shape and keep it in fighting trim, while protecting it from invasion by computer viruses.

For example, the disk includes the complete McAfee Anti-Virus package. McAfee's famous SCAN program will examine your entire system for preexisting virus infections. Detected viruses can then be rooted out and removed with CLEAN. Once you're certain your system is virus-free, VSHIELD can keep it that way by shielding your computer from future virus infections.

There is also a clutch of utilities that can free up an amazing amount of disk space simply by identifying and letting you delete old, unused, and "accidental" files. For major space recovery, there is DIET, a program that can reduce the space occupied by both your program and data files by as much as 40 percent. Yet "DIET-ed" programs and files run and load so fast that you will never suspect that they have been compressed. And those are just a few of the goodies you will find on the disk.

For a complete explanation and software installation instructions, please see Appendix B, "About the Disk Included with This Book." Appendix B will also tell you how to obtain the software on a 5 1/4-inch disk if you do not have a 3 1/2-inch disk drive.

The supplied software constitutes nothing less than a complete hard disk toolkit—programs you'll use again and again to keep your disk in shape, maximizing both disk performance and capacity.

And there's still more! By special arrangement with Athena Software, every reader of this book is entitled to receive a special edition of Disc Director, one of the best DOS shell programs on the market. Even experienced DOS users will find that Disc Director makes routine tasks so easy that it is irresistible. (See Appendix C, "Disc Director Documentation," for details.)

And even more? Yes, absolutely. Not only is this guide packed with vital hard disk information; not only does it place an entire software toolkit in your hands; it also offers you inexpensive access to scores of personally selected utilities and tools that can make using a computer easier than you ever thought possible. (See Appendix D, "Glossbrenner's Choice," for details.)

The author and publisher have made every attempt to create what can only be called "the ultimate hard disk book." So when the question is asked: Who is this book for?, the answer is plain. It is for anyone interested in selecting, installing, maintaining, backing up, protecting and *using* a hard disk drive.

If this description applies to you, the book you're holding can save you a great deal of time and a great deal of money—while helping you get the *most* out of your hard disk investment.

INTRODUCTION	xiii
CHAPTER 1 QUICK-START GUIDE	1
■ HOME IS WHERE THE HARD DISK IS ■ WHAT YOU'LL FIND BETWEEN THE COVERS ■ WHERE TO BEGIN? ■ THUMBNAIL COMPUTER TUTORIAL	
CHAPTER 2 HARD DISK BASICS	15
■ THE ORIGINS OF DATA STORAGE ■ EARLY SOLUTIONS TO THE STORAGE ISSUE ■ MASS STORAGE: THE GOAL OF ALL HARD DISK SYSTEMS ■ GETTING MORE DATA ON THE DISK ■ THE MEDIA AND THE MESSAGE: WHY A HARD DISK IS HARD ■ HOW HARD DISKS WORK ■ HOW DATA IS RECORDED ■ THE CONTROLLER RUNS THE SHOW ■ THE REST OF THE STORY ■ CONCLUSION	
CHAPTER 3 HOW AND WHERE TO BUY A HARD DISK	51
■ SOME GENERAL ADVICE ABOUT YOUR PURCHASE ■ QUICK-START GUIDE ■ PAST, PRESENT, AND FUTURE ■ SCSI: SMALL COMPUTER SYSTEMS INTERFACE ■ IDE: INTEGRATED DRIVE ELECTRONICS ■ MEASURING HARD DISK PERFORMANCE ■ THE HARD DISK WORLD TODAY ■ IDE BUFFERS AND CACHES ■ DATA TRANSFER RATES ■ HOW TO CHOOSE A HARD DISK ■ OTHER CONSIDERATIONS ■ UPGRADING YOUR BIOS ■ BUYING AN IDE HOST ADAPTER ■ HIGH-PERFORMANCE AND SPECIAL IDE ADAPTERS ■ WHERE TO BUY YOUR HARD DISK	
CHAPTER 4 HARD DISK INSTALLATION FROM A TO Z	99
■ ASSUMPTIONS ABOUT YOU AND YOUR MACHINE ■ AN OVERVIEW OF THE INSTALLATION PROCESS ■ PREPARING THE OPERATING THEATER ■ WHAT TO DO ABOUT MISSING PARTS ■ HARD DISK INSTALLATION FOR AT-STYLE AND XT- OR PC-CLASS MACHINES ■ IF YOU HAVE A PS/1 OR PS/2 ■ LEADING HARD DRIVE MANUFACTURERS ■ CONCLUSION	

CHAPTER 5 TRACKS IN THE WILDERNESS: FORMATTING AND PARTITIONING THE DISK	131
■ OVERVIEW: THE WHY'S AND WHEREFORE'S ■ STEP ONE: CMOS SETUP ■ STEP TWO: PARTITIONING THE DISK ■ STEP 3: FORMAT ALL DRIVES ■ PARTITIONING ADVICE ■ SECTORS, CLUSTERS, AND THE FAT ■ ST-506 (MFM/RLL) DRIVES ■ APPLYING A LOW-LEVEL FORMAT ■ SPEEDSTOR FROM STORAGE DIMENSIONS, INC. ■ DISK MANAGER FROM ONTRACK COMPUTER SYSTEMS, INC. ■ CONCLUSION	
CHAPTER 6 SETTING UP AND LOADING THE DISK	171
■ THE AUTOEXEC.BAT FILE ■ THE CONFIG.SYS FILE ■ SETTING UP YOUR OWN CONFIG.SYS AND AUTOEXEC.BAT FILES ■ ORGANIZATIONAL FUNDAMENTALS: SUBDIRECTORIES AND FILES ■ DOS DISK MANAGEMENT COMMANDS ■ SUB-SUBDIRECTORIES, AND A WORD ON TECHNIQUE ■ PLANNING THE LAYOUT OF YOUR DISK ■ LOADING UP THE DISK ■ CONCLUSION	
CHAPTER 7 NAVIGATING YOUR SYSTEM WITH DOS	209
■ THE FIVE UNIVERSAL HARD DISK TASKS ■ DOS, SHELLS, AND MENU SYSTEMS ■ WHAT'S IN A FILENAME? ■ DOS, AT YOUR COMMAND ■ ANOTHER LOOK AT PATH ■ TASK 1: WHERE AM I? ■ TASK 2: MOVING SOMEPLACE ELSE ■ TASK 3: TAKING A LOOK AROUND ■ TASK 4: DOING SOMETHING ■ TASK 5: TREE WORK ■ SUMMARY OF BASIC DOS NAVIGATION ■ ADVANCED NAVIGATION TECHNIQUES ■ PRODUCTIVITY ENHANCERS FOR ALL USERS ■ CONCLUSION	
CHAPTER 8 DOS SHELLS, MENUS, AND FRONT-ENDS	261
■ WHY USE A SHELL? ■ BASIC FEATURES OF SHELL PROGRAMS ■ SUMMARY OF BASIC SHELL FEATURES ■ NEW AND UNIQUE SHELL FEATURES ■ SURVEYING THE SHELL MARKET ■ DR DOS AND VIEWMAX ■ THE MICROSOFT DOS SHELL ■ MENU SYSTEMS AND MENU MAKERS ■ DEDICATED TASK SWAPPERS ■ CONCLUSION	

CHAPTER 9 MANAGING AND MAINTAINING YOUR DISK	299
■ THE THREE MAJOR PROBLEMS ■ FILE ACCUMULATION—THE GREAT OFFENDER ■ HOW TO CLEAN UP YOUR DISK ■ WHAT TO DO? WHAT TO DO? ■ CHKDSK—SEEK AND CORRECT ■ THE PROBLEM OF FRAGMENTED FILES ■ CONCLUSION: USE THE TECHNOLOGY!	
CHAPTER 10 BACKUP BASICS AND SOFTWARE	323
■ BLOWUPS HAPPEN: THE NEED FOR REGULAR BACKUPS ■ SOFTWARE OPTIONS AND ALTERNATIVES ■ THE DOS BACKUP PROGRAMS ■ AN INTRODUCTION TO BACKUP SOFTWARE ■ CRUCIAL POINTS AND TIPS FOR IMPROVED BACKUP PERFORMANCE ■ SELECTED BACKUP SOFTWARE ■ ESTABLISHING A BACKUP STRATEGY ■ ADDITIONAL COMPONENTS OF A BACKUP STRATEGY ■ CONCLUSION	
CHAPTER 11 BACKUP HARDWARE	355
■ STREAMING TAPE: THE PREFERRED METHOD ■ BACKUP HARDWARE OPTIONS ■ HOW TO CHOOSE A BACKUP HARDWARE SYSTEM ■ UNDERSTANDING TAPE SYSTEMS ■ QIC RECOMMENDATIONS ■ OTHER TAPE BACKUP SYSTEMS ■ MAGNETIC DISK SYSTEMS ■ OPTICAL DISKS ■ CONCLUSION	
CHAPTER 12 DISASTER PREVENTION AND	
RECOVERY	393
■ WHAT KIND OF DISASTERS? ■ HOW TO PREVENT DISASTERS ■ THE FIVE LOGICAL PARTS OF A HARD DISK ■ RECOVERING FROM DISASTER ■ CONCLUSION	
CHAPTER 13 FILE RECOVERY	421
■ ALL IS NOT LOST! ■ HOW DOS HANDLES FILES ■ DOS AND THE DISK: PUTTING IT ALL TOGETHER ■ DATA RECOVERY SOFTWARE ■ FILE RECOVERY WITH DOS ■ FILE RECOVERY SOFTWARE: AS CRUCIAL AS AN INSURANCE POLICY ■ SEVEN RULES FOR EASY FILE RECOVERY	

CHAPTER 14 VIRUS AND SECURITY ISSUES THE NEED FOR HARD DISK DATA SECURITY LEVELS OF THE GAME THE EVOLVING ENCRYPTION OPTION SIMPLE SECURITY THE PHYSICAL SIDE OF THE THREAT VIRUSES, WORMS, AND OTHER EVIL THINGS HOW TO TELL IF YOU'RE INFECTED CONCLUSION	455
CHAPTER 15 FILE & DISK MANAGEMENT: MAXIMIZING PERFORMANCE	487
■ THE PATH TO MAXIMUM PERFORMANCE ■ REPLACE THE DRIVE ■ INSTALL A SOFTWARE CACHE ■ HARDWARE CACHING FOR NETWORK SERVERS ■ DEFRAGMENTING YOUR DISK ■ INTERLEAVE ADJUSTMENTS (NON-IDE DRIVES) ■ MANAGING SUBDIRECTORIES FOR BETTER PERFORMANCE ■ TWEAKING YOUR CONFIG.SYS ■ FASTOPEN CONSIDERATIONS ■ PATH AND DATAPATH 3.0 (DPATH30.COM) ■ ADDITIONAL PERFORMANCE TWEAKS ■ OPTIMIZING YOUR PRINTER ■ TWEAKING THE CONSOLE (KEYBOARD AND SCREEN) ■ CONCLUSION	
CHAPTER 16 MAXIMIZING STORAGE SPACE	521
■ SPACE-SAVING TECHNIQUES ■ BUILDING GOOD HABITS ■ CHKDSK, FIND DUPLICATES, AND BACK OFF! ■ ELIMINATE SLACK SPACE ■ USING COMPRESSION PROGRAMS ■ MAKING A FILE SELF-EXTRACTING ■ "ON-THE-FLY" COMPRESSION ■ DYNAMIC FILE COMPRESSORS ■ THE MATSUMOTO DIET ■ CONCLUSION	
CHAPTER 17 PERFORMANCE TOOLS: BATCH FILES, DOSKEY, AND CED	553
■ COMMAND REFRESHER AND COMMAND TIPS ■ "CASE" STUDIES IN BATCH FILES ■ ADDING A HELP FUNCTION TO BATCH FILES ■ COMBINING BATCH FILES TO SAVE DISK SPACE ■ YOU CAN GO HOME AGAIN ■ POWERFUL TOOLS FOR BATCH FILES ■ BATCH FILE UTILITY TOOLBOX ■ REAL POWER WITH EBL ■ MAKING THE MOST OF DOSKEY ■ CED, THE COMMAND EDITOR THAT BEATS DOSKEY ■ CONCLUSION	FRAFIO MALUS M TALL TO MALUE AEK

CHAPTER 18 NETWORK INSTALLATIONS AND NOVFII 581 ■ LOCAL AREA NETWORKS: THE CONCEPT ■ PEER-TO-PEER NETWORKS ■ THE SOFTWARE IS THE KEY ■ THE NOVELL APPROACH ■ NETWORK HARD DISK PURCHASE CONSIDERATIONS ■ RAID! DRIVES AND SLEDS ■ INSTALLATION AND FORM FACTOR SETTING UP, NAVIGATING, AND MAINTAINING NETWORK SERVERS ■ SECURITY, BACKUPS, AND DISASTER PREVENTION ■ PEAK PERFORMANCE ■ ADDITIONAL NETWORKING CONSIDERATIONS ■ ADD-ON NETWORKING SOFTWARE ■ CONCLUSION APPENDIX A HARD DISK TROUBLESHOOTING 603 ■ GENERAL RULES FOR HARD DISK TROUBLESHOOTING ■ LOW-LEVEL FORMAT PROBLEMS FDISK ERRORS AND OTHER LOW-LEVEL PROBLEM REPORTS ■ CHKDSK OR CHECK DISK ■ COMMON HARD DISK PROBLEMS AND THEIR SOLUTIONS ■ IMPORTANT DOS ERROR MESSAGES ■ CONCLUSION APPENDIX **B** ABOUT THE DISK INCLUDED WITH THIS BOOK 627 ■ QUICK PROGRAM SUMMARY ■ THE SHAREWARE IMPERATIVE ■ HOW TO INSTALL THE SUPPLIED SOFTWARE ■ USING GMENU ■ MENU A—MAXIMIZING HARD DRIVE CAPACITY ■ MENU B—FORMATOM, DISKID, AND FINDTYPE ■ MENU C—THE MCAFEE ANTI-VIRUS PACKAGE ■ MENU D—OTHER MCAFEE ANTI-VIRUS FILES CONCLUSION APPENDIX C DISC DIRECTOR DOCUMENTATION 645 ■ SOFTWARE LICENSE AGREEMENT AND COPYRIGHT ■ INTRODUCTION ■ INSTALLATION, KEYS, MICE, TREES, AND VIEWS ■ DRIVE AND BRANCH MENUS ■ SUBDIR AND FILE MENUS, AND DO FILE BOX ■ LOCATE, OTHER, AND VIEW

MENUS

APPENDIX D GLOSSBRENNER'S CHOICE ABOUT GLOSSBRENNER'S CHOICE THE CORE COLLECTION TOP UTILITIES DOS AND COMPUTING SKILLS SPECIAL OFFERS AND SUPPLIED SOFTWARE GLOSSBRENNER'S DOS QUARTERLY GLOSSBRENNER'S CHOICE ORDER FORM TOP UTILITIES ON TOP UT

H A P T E R

QUICK-START GUIDE

A personal computer without a hard disk is like a car without an engine—you can push it around the parking lot, but you're never going to get it onto the highway. This wasn't always the case. Less than a decade ago, a computer with 64K of memory and one single-sided floppy drive was considered to be a very respectable business system. At the time, the few low-capacity hard disk drives that were available were financially out of reach for all but the most affluent computer users.

Things have changed enormously since then. Prices have plummeted and capacities have soared. And software has changed as well. Like two escapees from a chain gang, computer hardware and software alternately run ahead or behind, but they can never run very far from each other. Many programs today cannot be used on an all-floppy system. Their size and performance require a hard disk.

Thus, while it is possible to use a computer without a hard drive, it is increasingly impractical to do so. This is not to say that you should avoid buying a floppy-only system—that's still a reasonable, low-cost way to get started in computing. But if you're thinking of buying such a system, it is unrealistic to assume that it will give you everything you need. At some point in the very near future, you're going to need a hard drive. Only then can your computer approach its full potential.

Chapter 1

HOME IS WHERE THE HARD DISK IS

Why are hard drives so important? The two most obvious answers are capacity and speed. A hard drive of modest size can hold the equivalent of more than a hundred floppy disks. And even the slowest unit can make the contents of those disks available to you instantaneously, at least when compared to the time-consuming process of shuffling floppies into and out of a drive.

But even more important than these obvious advantages, a hard disk is where you *live* on your system. It is the very heart of your computer. After all, data processing equipment is worthless if it doesn't have data to process. The hard disk thus holds both your raw materials and your finished inventory. The keyboard, monitor, and system unit are just the machines on the shop floor.

As you might imagine, given the critical role it plays, a hard disk is not just another appliance. Its internal disk platters spin at 60 revolutions per second (or faster!), and its read/write heads dart back and forth across the surface in mere milliseconds, supported on an incredibly thin cushion of air. A hard disk drive is, in short, a complex piece of equipment. Everything about it requires a certain amount of care, from deciding where and how you buy your unit, to how you organize your information on the drive, to how you tweak it for maximum performance.

The dilemma faced by most current and prospective computer owners is this: They need dependable advice on these issues, but unfortunately have relatively few places to turn. A hard disk is the quintessential "black box"—you can't tell from the outside how it works, what it's doing, or what makes one model worth more than another. It was to answer questions like these that this book was written.

A BOOK FOR ALL USERS

Whether you currently have a hard disk and are interested in upgrading or buying a second drive, or you have yet to purchase your first computer, the information on these pages can save you time and money. As a help to brand-new and prospective users, the book is designed to be read from cover to cover, with each chapter building on the last, paving the way to true enlightenment. But it is also possible for more experienced users to plug in anywhere to pick up some tips and tricks or fill in the odd