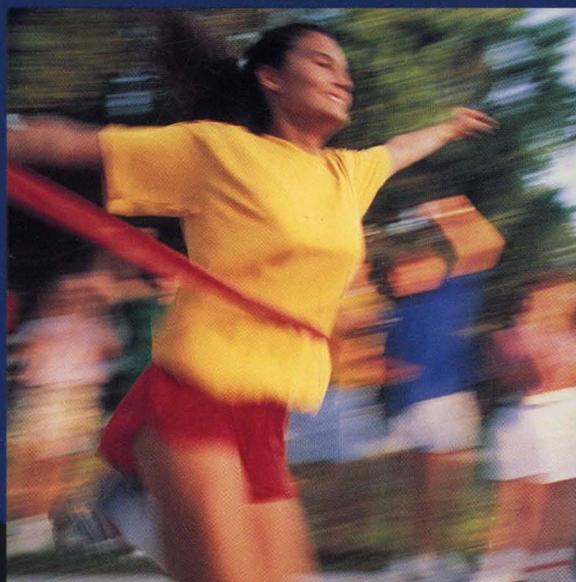


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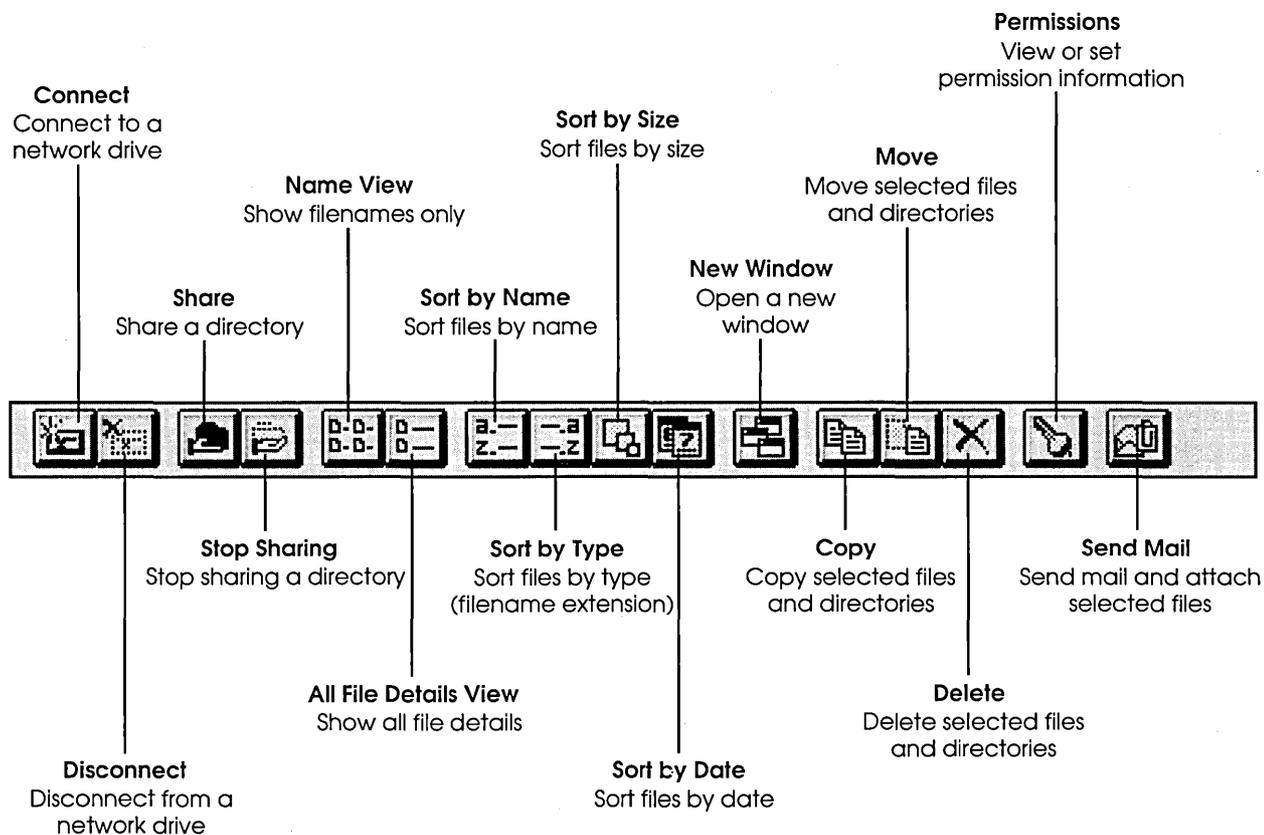
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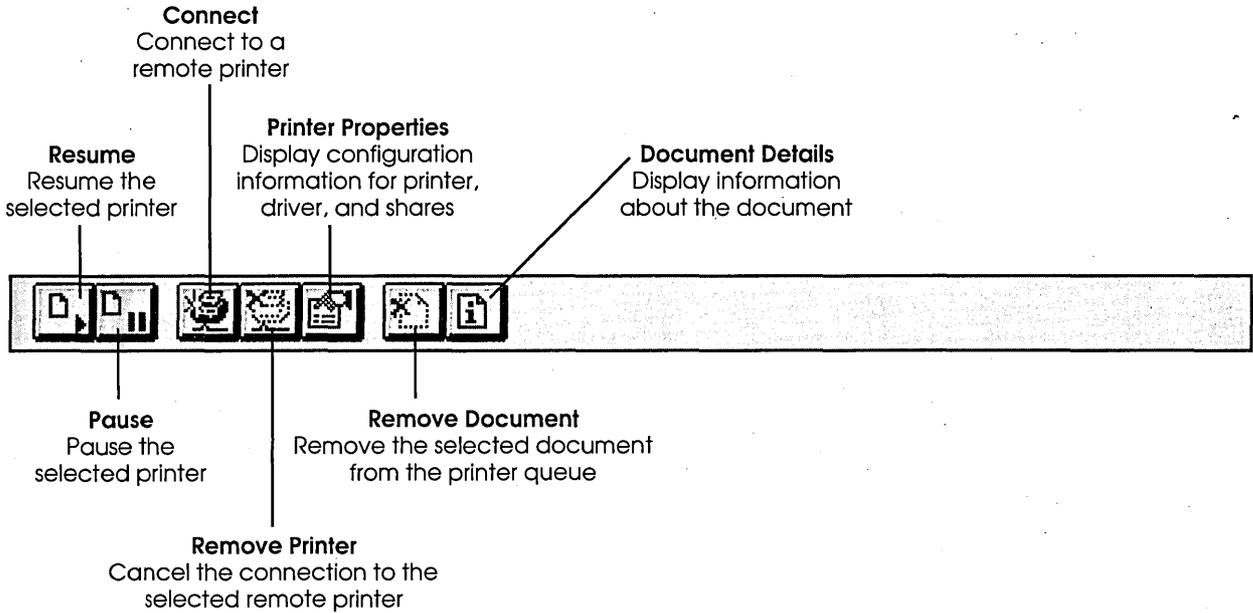
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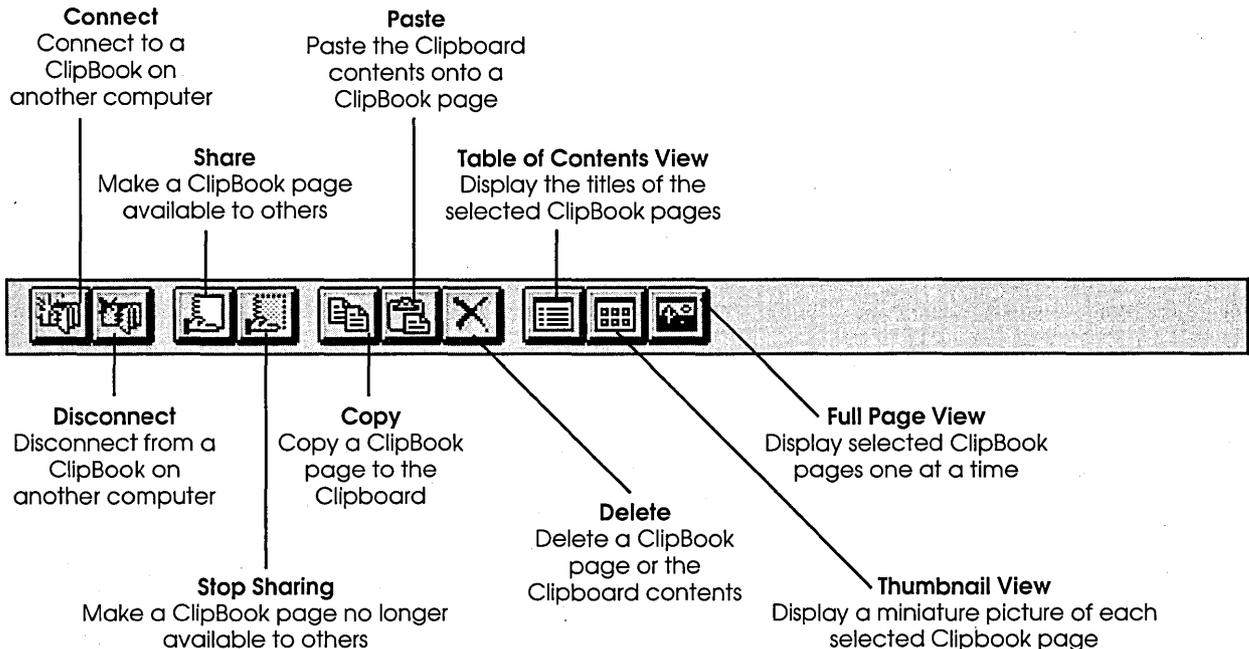
File Manager Toolbar

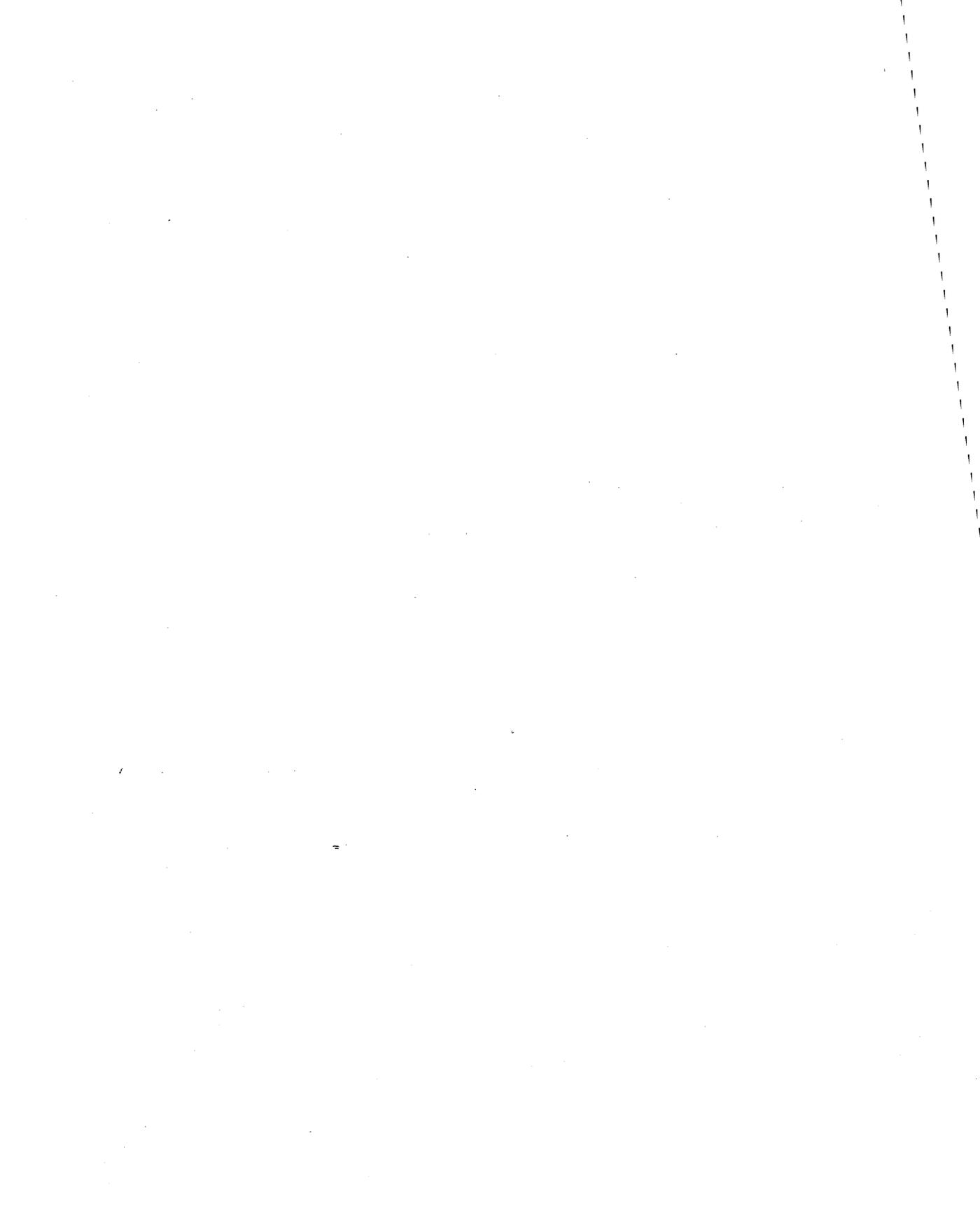


Print Manager Toolbar



ClipBook Viewer Toolbar







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Chapters at a Glance

Introduction xxvii

PART 1: Introducing Windows NT 1

Chapter 1 Getting Acquainted with Windows NT 3

Chapter 2 Managing Programs with Program
Manager 55

Chapter 3 Managing Files, Directories, and Disks
with File Manager 77

Chapter 4 Customizing Windows NT with Control
Panel 123

Chapter 5 Exchanging Information: The Clipboard,
ClipBook Viewer, and OLE 167

PART 2: Networking with Windows NT 196

Chapter 6 An Overview of Networking with
Windows NT 199

Chapter 7 Printing 211

Chapters at a Glance

Chapter 8	Using Mail	235
Chapter 9	Using Schedule+	273
PART 3: Security and Administration		310
Chapter 10	Users, Passwords, Policies, Permissions, and Rights	313
Chapter 11	File Security with NTFS	333
Chapter 12	Auditing Security	349
Chapter 13	Backing Up and Restoring Files	361
PART 4: Running Applications		398
Chapter 14	Using Write	401
Chapter 15	Using Terminal	441
Chapter 16	Using Paintbrush	473
Chapter 17	Using the Desktop Accessories	525
Chapter 18	Working from the Command Prompt . . .	573
Chapter 19	Customizing Command Prompt Sessions and Character-Based Programs	627
PART 5: Maintaining Your System		676
Chapter 20	Managing Disks	679
Chapter 21	Monitoring System Performance	713
Chapter 22	Using the Windows NT Setup Program . . .	761
<i>Index</i>		<i>779</i>

Table of Contents

Introduction *xxvii*

PART 1: Introducing Windows NT 1

Chapter 1 Getting Acquainted with Windows NT	3
Starting and Ending a Windows NT Session	5
Logging On	5
Locking, Logging Off, and Shutting Down	7
Starting and Ending Programs	8
Killing a Bad Application	8
Switching Between Programs	9
Using Task List	10
Working with Windows	11
Maximizing, Minimizing, and Restoring	12
Moving and Sizing Windows	13
Application Windows and Document Windows	14
Manipulating Document Windows	15
Working with Menus and Dialog Boxes	16
The Control Menu and the Menu Bar	16
Choosing Commands with the Mouse	16
Choosing Commands with the Keyboard	17
What's on the Control Menu	18
Commands That Bring Up Dialog Boxes	20
The Ins and Outs of Dialog Boxes	20

Table of Contents

Using Scroll Bars	25
Scrolling with the Keyboard	27
Creating, Opening, and Saving Files	27
The File Menu	27
Creating a New File	28
Loading an Existing File from Disk into Memory	28
Saving a File for the First Time	30
Resaving a File	31
Saving a File Under a New Name	31
Entering and Editing Text in Documents	32
The Insertion Point	32
The I-Beam	33
The Selection	33
Positioning the Insertion Point	34
Selecting Text	35
Erasing Characters	36
Erasing Blocks of Text	36
Undoing a Deletion	36
Copying and Moving Text	37
Working with Graphics	37
Working with Fonts	40
Terminology	40
Fonts Supplied with Windows NT	42
Additional Font Resources	43
Your Printer's Own Font Resources	44
Getting Help	45
Keywords with Dotted Underscores	46
Finding Particular Topics with the Search Command	47
Searching for Help Topics Across Multiple Applications	48
Retracing Your Steps	50
Using the Browse Buttons	50
Setting Bookmarks	50
Printing Help Topics	51
Copying Information from the Help System	51
Using the Annotate Command to Add Your Own Help Messages	52
Getting Help on Help	53

Chapter 2	Managing Programs with Program Manager	55
Program Groups and Program Items		57
Program Groups Created When You Install Windows		58
Using the Startup Program Group		59
Working with Group Windows and Icons		59
Using the Window Menu		60
Arranging Program Items		61
Personal and Common Program Groups		61
Customizing Program Groups		62
Creating New Program Groups		62
Renaming Program Groups		63
Deleting Program Groups		64
Customizing Program Items for Your Applications		64
Moving Program Items Between Program Groups		64
Copying Program Items		65
Creating New Program Items		66
Creating Program Items with File Manager		71
Creating Program Items with the Setup Program		71
Creating Program Items to Launch Documents		71
Changing a Program Item's Properties		73
Deleting Program Items		75
Starting Programs with the Run Command		75
Finding Files with the Browse Button		76
The Minimize on Use Command		76
Saving Settings		76
Chapter 3	Managing Files, Directories, and Disks with File Manager	77
Exploring File Manager's Display		80
Icons Used in Directory Windows		82
Changing the Drive Display		83
Navigating Through a Directory Tree		84
Changing the Size of Tree and Directory Panes		85
Displaying One Pane at a Time		86
Customizing the Contents of Directory Panes		86
Changing the Information in the File Listing		87
Changing the Sort Order		89

Table of Contents

Filtering the File Listing	90
Changing File Manager's Font	90
Updating Directory Windows	91
Opening New Directory Windows	91
Organizing Directory Windows	92
Customizing the Toolbar	93
Repositioning and Removing Tools	94
Adding Tools and Resetting the Default Toolbar	94
Starting Programs from File Manager	95
Using Drag and Drop to Launch a Document File	96
Associating Documents with Programs	97
Printing Documents from File Manager	99
Using Drag and Drop to Embed Packaged Objects	100
Sharing Directories with Other Users on the Network	100
When You No Longer Want to Share	102
Connecting to Remote Directories	103
Choosing a Drive Letter	103
Using the Browser and the Path Line	104
Connecting to Root Directories	105
Maintaining Connections Between Sessions	106
Breaking Connections	106
Working with Files and Directories	106
Confirmation Options	106
Selecting Files with the Mouse or Keyboard	107
Selecting Files with the Select Files Command	108
Moving and Copying Files by Dragging Icons	109
Moving and Copying Entire Directories	113
Moving and Copying with Menu Commands	113
Deleting Files and Directories	114
Renaming Files and Directories	115
Creating New Directories	115
Searching for Files	116
Changing File Attributes	118
Formatting, Copying, and Labeling Disks	120
Formatting a Floppy Disk	120
Duplicating a Floppy Disk	121
Adding a Volume Label to a Hard Disk or Floppy Disk	121
Using File Manager to Create Program Items	121

Chapter 4 Customizing Windows NT with Control Panel . . .	123
Starting Control Panel	128
Changing Desktop Colors or Patterns	128
Choosing from the List of Color Schemes	130
Creating Your Own Color Scheme	130
A Few Limitations	133
Saving a Color Scheme	134
Customizing the Color Palette	135
Adding and Deleting Fonts	138
Adding Fonts	139
Deleting Fonts	140
Configuring Serial Ports	140
Customizing Your Mouse or Other Pointing Device	142
Customizing Your Desktop	144
Setting a Background Pattern	145
Changing the Behavior of Alt+Tab	147
Choosing a Screen Saver	147
Wallpapering Your Desktop	149
Controlling the Appearance of Icons and Their Labels	151
Turning on the Size-and-Position Grid	151
Setting Border Width	152
Setting the Cursor Blink Rate	152
Adjusting the Keyboard Repeat Rate	152
Setting Country-Specific Options	153
Changing Operating System Parameters	156
Changing the Default Operating System and Startup Delay	157
Adding Another Operating System to the Flex-Boot List	157
Changing the Size or Location of Your Paging File	158
Changing the Foreground/Background Tasking Balance	160
Setting the Date and Time	161
Using Alternative Mouse Pointers	162
Mapping Sound Files to System Events	162
Turning Off the Sound	163
Installing Drivers	163
Modifying Private INI Files	164
How INI Files Are Structured	164
How to Edit an INI File	165
Editing the WIN.INI and SYSTEM.INI Files	166

Table of Contents

Chapter 5 Exchanging Information: The Clipboard, ClipBook Viewer, and OLE	167
Using the Clipboard with Applications for Windows	169
The Copy, Cut, and Paste Commands	170
Copying a Full Screen or Window	170
Using the Clipboard with Non-Windows-Based Applications	171
Copying a Text or Graphics Block to the Clipboard	172
Pasting Information into a Non-Windows-Based Program	173
Using ClipBook Viewer	174
Viewing the Clipboard's Contents	176
Saving Clipboard Objects in Your Local ClipBook	179
Viewing the Contents of Your Local ClipBook	180
Reusing Pages from Your Local ClipBook	181
Sharing Clipboard Data	181
Connecting to Other Users' ClipBook Pages	184
Making Connections with OLE	184
Linking Versus Embedding	185
Embedding Packages	187
Why Use Packages?	188
Embedding a Packaged Object or File	189
Embedding a Packaged Command Line	192
Playing and Editing Embedded Packages	193
Packaging Files—the Direct Route	194
PART 2: Networking with Windows NT	196
Chapter 6 An Overview of Networking with Windows NT	199
Two Levels of Networking Support	201
The Workgroup	202
Sharing Resources	203
Connecting to Shared Resources	204
Reaching Beyond the Workgroup	204
Joining a New Workgroup or Changing the Name of Your Current Workgroup	205
Changing Your Computer Name	206
Logging onto a Different Computer in Your Workgroup	206
Servers and Domains	206
Sharing Resources	207

Trust Relationships Between Domains	208
Monitoring Use of Shared Resources	209
Changing Network Settings	210
Chapter 7 Printing	211
Introducing Print Manager	214
Changing the Default Printer	215
Setting Print Manager Options	216
Creating a New Logical Printer	216
Choosing a Printer Driver	219
Specifying a Port for Your Printer	221
Setting the Available Hours for Your Logical Printer	223
Using Separator Pages	224
Creating a Printer Pool	226
Setting Job Defaults	226
Setting a Priority Level for Your Logical Printer	227
Sharing a Printer	227
Changing a Printer's Properties	228
Setting Driver-Specific Options	228
Creating Custom Forms for Your Print Server	228
Connecting to a Shared Printer	229
Managing Documents in a Print Queue	230
Pausing and Resuming	230
Restarting a Document	231
Changing the Order of Documents in a Print Queue	232
Removing Documents from a Print Queue	232
Removing All Documents from a Print Queue	232
Changing the Priority of a Particular Document	232
Changing the Printing Hours for a Particular Document	233
Telling Print Manager Whom to Notify	233
Setting Permissions for Printers	234
Chapter 8 Using Mail	235
Mail in a Nutshell	237
Changing the Delivery Interval	238
To Get Immediate Delivery and Pickup	238
Important Features of Mail	238
Signing into Mail for the First Time	239
Creating Your Mail Account	240

Table of Contents

Starting and Ending a Mail Session	241
More About the Inbox and Outbox	243
Sorting Your Mail	244
The Inbox Window Stores Transmitted Mail	244
The Outbox Window Stores Pending Mail	245
Creating and Sending Mail	246
Addressing a Message	246
Return Receipts and Priority Levels	249
Creating a Message	249
Sending a Message	252
Printing an Outbound Message	252
Saving a Message in a Separate Disk File	252
Saving an Unfinished Message	252
Working with Address Books	253
Adding Names to Your Personal Address Book	254
Seeing Details About an Addressee	255
Finding an Addressee in an Address Book	255
Switching Between Address Books	255
Creating Personal Groups	256
Reading and Responding to Your Mail	256
Icons Used to Categorize Messages	257
Reading Messages	257
Reading or Playing an Attachment	258
Printing, Saving, and Deleting Messages	258
Saving an Attachment as a Separate File	258
Replying to a Message	259
Forwarding a Message	259
Editing Received Mail	260
Working with Folders	260
Creating a New Folder	260
Private Versus Shared Folders	262
Creating Folders Within Folders	262
Deleting Folders	262
Moving and Copying Messages Between Folders	263
Navigating in the Folder Pane	263
Finding Messages	264
Backing Up and Restoring the Mail File	266
Working Off Line	267

Importing, Exporting, and Purging the Mail File	268
Exporting Messages	268
Importing Messages	270
Purging the Mail File	270
Changing Your Password	271
Chapter 9 Using Schedule+	273
Starting and Ending a Schedule+ Session	276
Ways to Avoid the Sign-In Screen	277
Quitting Schedule+	278
Changing Your Password	279
Using Schedule+ Off Line	279
Offline and Online Calendar Files	280
Transferring Calendar Files to and from a Portable Computer	281
Scheduling Appointments with the Appointment Book	281
Definite Appointments, Tentative Appointments, and Notes	282
Overlapping Entries	283
Navigating in the Appointment Book	284
Entering a New Appointment	285
Entering a New Recurring Appointment	289
Editing an Appointment	290
Moving an Appointment	291
Deleting an Appointment	291
Finding an Appointment	291
Scheduling Appointments and Meetings with the Planner	291
Scheduling an Appointment	293
Scheduling a Meeting	294
Managing Projects and Tasks with the Task List	298
Creating New Projects and Tasks	299
Editing Projects and Tasks	301
Assigning Tasks to Your Appointment Calendar	301
Marking a Task as Completed	302
Alternative Ways to View Your Task List	302
Controlling Others' Access to Your Schedule+ File	303
Having an Assistant Manage Your Schedule	304
Viewing Others' Schedule+ Files	305
Printing Your Appointments and Tasks	305
Exporting and Importing Schedule+ Files	306

Table of Contents

Exporting	307
Importing	307
Archiving Your Schedule+ File	308
PART 3: Security and Administration	310
Chapter 10 Users, Passwords, Policies, Permissions, and Rights	313
An Overview of Windows NT Security	314
Permissions	315
Rights	315
User Accounts	316
Groups	317
Managing Groups	320
Creating a Group	321
Modifying a Group	322
Deleting a Group	322
Managing User Accounts	323
Creating a User Account	323
Managing User Account Properties	324
Deleting a User Account	328
Setting Account Policies	328
Setting User Rights Policies	330
Chapter 11 File Security with NTFS	333
Attaching Security to Files	334
Access Types and Permissions	336
Changing Permissions for a File or Directory	339
Taking Ownership of a File or Directory	342
Attaching Security to Directories	343
The User's View of Security	346
Security on New Files and Directories	347
Chapter 12 Auditing Security	349
About Auditing	350
Event Viewer	351
Auditing File and Directory Access	353
Auditing Access to Printers	357
Auditing Other User Activities	359

Chapter 13 Backing Up and Restoring Files	361
Backup Strategy	363
Backup Tactics	365
Backup Principles	366
Backup Methods	367
Security Considerations	373
Using Windows NT Backup	373
Starting Backup	373
Backing Up to Tape	376
Backing Up from the Command Line	382
Restoring from Tape	385
Using the Backup and Restore Commands	391
Using the Backup Command	392
Using the Restore Command	393
Backing Up with XCopy	394
PART 4: Running Applications	398
Chapter 14 Using Write	401
Starting Write	403
Selecting a Printer	404
Entering Text	405
Using Soft Hyphens	406
Editing Text	406
Using the Undo Command	407
Using the Keyboard to Move the Insertion Point	407
Selecting Text in a Write Document	409
Copying and Moving Text with the Clipboard	410
Using the Find Command	410
Including Wildcards in the Search Text	411
Including White-Space Characters in the Search Text	411
Specifying Search Options	412
Starting the Search	412
Repeating the Search	413
Using the Replace Command	413
Telling Write What to Change	413
Specifying Search Options	414
Specifying the Replacement Text	414

Table of Contents

Limiting the Replacement to a Selection	414
Replacing Automatically or Selectively	414
Applying Document Formatting	415
Specifying a Header	416
Specifying a Footer	417
Displaying a Ruler	417
Setting and Using Tabs	418
Setting the Starting Page Number	420
Setting Margins	420
Choosing Default Measurement Units	420
Applying Paragraph Formatting	420
Choosing Paragraph Alignment	421
Choosing Line Spacing	421
Setting Indents	421
Setting Hanging Indents	422
Selecting Default Paragraph Settings	422
Applying Character Formatting	423
Applying Typographic Styles	423
Reducing and Enlarging a Font	424
Choosing a Font and Point Size	425
Including Pictures in Write Documents	425
Repositioning a Picture	426
Resizing a Picture	427
Controlling a Pasted Object's Format	428
Linking and Embedding in Write	430
Moving and Sizing Linked or Embedded Objects	431
Activating, Playing, and Editing Linked or Embedded Objects	431
Linking and Embedding with the Insert Object Command	433
Modifying Links with the Links Command	433
Saving and Retrieving Files	434
Backing Up When You Save	434
Saving a Text File	435
Saving a Microsoft Word File	436
Opening a Text File	436
Opening a Microsoft Word File	437
Paginating and Printing a Write Document	438
If You Change Printers	439

Chapter 15 Using Terminal	441
A Typical Terminal Session	443
Creating a Settings File	445
Modem Commands	446
Terminal Preferences	447
Communications Parameters	451
Terminal Emulation	453
Assigning Strings of Characters to Function Keys	454
Assigning Special Codes to Function Keys	456
Phone Number	457
Options for Transferring Text	458
Options for Transferring Binary Files	460
Saving and Retrieving Settings Files	461
Initiating a Telephone Call	461
Answering a Call Initiated by the Remote System	462
Hanging Up the Telephone	463
Creating a Transcript of Your Communications Session	463
Timing a Communications Session	464
Inspecting and Selecting Text in Terminal's Buffer	464
Transmitting Data from the Clipboard or the Buffer	465
Sending and Receiving Files	465
Sending a Text File	466
Viewing a Text File	468
Receiving a Text File	468
Choosing a Protocol for Binary File Transfers	470
Sending a Binary File	470
Receiving a Binary File	471
Communicating Without Telephone Lines	472
Chapter 16 Using Paintbrush	473
Paintbrush and OLE	475
Starting Paintbrush	475
Other Cursor Shapes	477
The Size of the Picture	477
Seeing the Larger Picture	479
The View Picture Command	479
Removing the Toolbox, Line-Size Box, and Palette	479
Zooming Out to Get the Whole Picture	480

Table of Contents

Navigating on a Large Canvas	481
Precise Cursor Positioning	483
Working with the Mouse and Keyboard	484
Setting Up for a New Picture	485
Choosing a Background Color or Pattern	486
Establishing the Size and Shape of Your Picture	486
Choosing Color or Black and White	487
Installing Your New Canvas	487
Drawing Basics	488
Pasting Down an Object	489
Quick Fixes: Backspace and the Undo Command	489
Touching Up with the Backspace Key	489
Radical Surgery with the Undo Command	490
Exploring the Toolbox	491
Using Paintbrush's Drawing Tools	492
Using Paintbrush's Editing Tools	499
Working with Cutouts	504
Cutting or Copying a Cutout to the Clipboard	504
Copying a Cutout to a Disk File	505
Pasting a Cutout from the Clipboard	506
Pasting from a Disk File	506
Moving a Cutout	507
Copying a Cutout within a Picture	507
Sweeping a Cutout	507
Modifying a Cutout with the Shrink + Grow Command	508
Modifying a Cutout with the Tilt Command	511
Flipping a Cutout Horizontally or Vertically	512
Reversing the Colors of a Cutout	513
Working with Large Cutouts	513
Fine-Tuning Your Image with Zoom In	515
Working with Custom Color/Pattern Palettes	516
Creating a New Color or Pattern	517
Saving and Retrieving Custom Palettes	518
Saving and Opening Paintbrush Files	518
File Format Options	519
Opening a Paintbrush File	520
Printing a Paintbrush Image	521
Draft or Proof Quality	522

Whole or Partial Printout	522
Number of Copies	522
Resolution and Scaling	523
Chapter 17 Using the Desktop Accessories	525
Clock	528
Calculator	529
Entering Numbers and Symbols into Calculator	530
Cutting and Pasting with Calculator	532
Using the Standard Calculator	533
Using the Scientific Calculator	535
Notepad	541
Opening and Saving Files	541
Turning Word Wrap On or Off	542
Using Notepad's Time-and-Date Stamp	542
Using the Undo Command	544
Using the Clipboard with Notepad	544
Searching for Text in Notepad	544
Notepad's Printing Commands	545
Using Drag and Drop with Notepad and File Manager	547
Cardfile	547
Cardfile's Display	548
Starting a New Card	550
Duplicating Cards	550
Changing a Card's Index Line	550
Navigating in Cardfile	551
Searching for Cardfile Text	552
Editing Cards	552
Using Pictures	552
Linking and Embedding	554
Using Paste to Embed a Graphic	554
Embedding an Object with the Insert Object Command	556
Linking an Object with Paste Link	556
Controlling the Format of a Graphic Object with Paste Special	558
Using Cardfile to Dial the Phone	559
Saving, Loading, and Merging Cardfile Files	561
Printing Cardfile Information	562

Table of Contents

Character Map	562
Fonts and Character Sets	564
The Symbol Font	566
Sound Recorder	566
Editing Sound Files	568
Chat	569
Dialing	570
Answering the Phone	570
Hanging Up	571
Options	571
Chapter 18 Working from the Command Prompt	573
Starting a Command Prompt Session	576
Ending a Command Prompt Session	577
Controlling the Command Prompt Window	579
Copying and Pasting	580
Setting the Display Mode	581
Customizing the Window's Appearance	581
Using the Command Prompt	585
Getting Help	585
Editing the Command Line	588
Running All Kinds of Programs	590
Launching Programs	595
Understanding File Systems and Filenames	597
Converting a Drive to NTFS	598
Transferring Files Between NTFS and MS-DOS	599
Using Wildcards	600
Using Command Symbols	601
The Redirection Symbols	602
The Pipe Symbol	605
The Command Combination Symbols	606
The Escape Symbol	608
Using Windows NT Commands	608
The Dir Command	608
The Del Command	610
The Rmdir (RD) Command	611

The Move and Ren Commands	611
The More Command	612
The At Command	612
The Find and Findstr Commands	615
The XCopy Command	616
Using Network Commands	617
Using Network Names	617
Getting Help	618
Connecting to Shared Devices	619
Browsing Network Resources	621
Other Network Commands	622
Chapter 19 Customizing Command Prompt Sessions and Character-Based Programs	627
Using Environment Variables	629
Setting and Using Environment Variables	630
Using System Environment Variables	632
Setting Standard Environment Variables	633
Other Environment Variables	636
Using Doskey Macros	637
Defining Macros	637
Managing Macros	638
Using Parameters in Macros	640
Using Symbols in Macros	640
Sample Macros	642
Using Batch Files	644
Batch File Basics	645
Batch Command Summary	645
Anatomy of a Batch File	647
PushD and PopD	653
SetLocal and EndLocal	654
Customizing Your Configuration	656
Initializing Environment Variables	657
Initializing Command Prompt Sessions	660
Using Logon Batch Files	662
Setting the MS-DOS Configuration	664
Using TSR Programs and MS-DOS Shells	667
Using Program Information Files	670

PART 5: Maintaining Your System	676
Chapter 20 Managing Disks	679
Using Disk Administrator	680
Who Can Use Disk Administrator, When, and For What	681
Customizing the Display	686
Managing Disk Partitions	687
Primary and Extended Partitions	687
Creating a Primary Partition	690
Formatting a New Partition	692
Assigning or Changing a Volume Label	694
Marking the Active Partition on an x86-Based System	694
Creating an Extended Partition	695
Deleting a Partition	696
Logical Drives	697
Working with Volume Sets	702
Creating a Volume Set	704
Extending a Volume Set	705
Deleting a Volume Set	706
Working with Stripes and Mirrors	706
Stripe Sets Versus Volume Sets	707
Creating a Stripe Set	708
Deleting a Stripe Set	709
Saving and Restoring Disk Configurations	709
Breaking Up a Mirror Set	711
Chapter 21 Monitoring System Performance	713
What Do You Monitor?	715
Monitoring System Activities with Event Viewer	716
Event Logs	718
Viewing a Log	719
Managing Logs	723
Monitoring System Use with Server	728
Monitoring Users	729
Monitoring Shared Resources	730
Controlling Resource Use	731
Sending Alerts	732

Checking from the Command Prompt	733
Making Your Intentions Clear	737
Monitoring System Efficiency with Performance Monitor	738
Objects and Counters	740
Starting Performance Monitor	741
Charting Performance	741
The View Through Other Windows	751
Logs	751
Reports	757
Alerts	758
Reusing View Settings and Your Workspace	759
Chapter 22 Using the Windows NT Setup Program	761
Using Setup and Its Relatives	764
Changing System Settings	766
Using Setup to Create Program Items	769
Removing Optional Components from Your System	772
Adding and Removing SCSI Adapters and Tape Drives	774
Deleting User Profiles	776
A Note About Logging Off and Shutting Down	777
<i>Index</i>	779

Introduction

The shipping of Microsoft Windows NT 3.1, in August 1993, marked the beginning of a new era in microcomputing.

Windows 3.1 and Windows for Workgroups, the two current MS-DOS-based versions of Windows, represented the acme of 1980s sophistication, allowing users to run powerful applications in an easy-to-learn, easy-to-use graphical multitasking environment. But Windows and Windows for Workgroups were 16-bit extensions to an 8-bit, single-tasking operating system that, in its very first incarnation, had been aptly nicknamed QDOS—for *quick and dirty operating system*.

Windows 3.1 and Windows for Workgroups brought MS-DOS to levels of power and convenience that were undreamed of even in the mid-1980s. But they could not adequately support the passage of line-of-business applications from mainframes and minicomputers to desktop networks. This dominant trend of the 1990s demanded 32-bit power and performance, better security, built-in networking support, and above all greater robustness and fault tolerance. To meet these needs, Microsoft developed Windows NT.

Windows NT's major design features include the following:

- **Preemptive multitasking.** Earlier versions of Windows supported a non-preemptive form of multitasking, in which the performance of the system depended on the good behavior and cooperation of each running application. Applications shared processor time by periodically “yielding the floor” to the next application in line. If an application refused to yield, there was little the operating system could do about it.

Windows NT, in contrast, is a preemptive multitasking environment. Because the operating system is always in control, applications share processing resources more efficiently, and a “bad app” can never bring the entire system down.

- **Built-in networking support.** Unlike most earlier microcomputer operating systems, Windows NT was designed from the ground up with networking in mind. As a result, facilities for sharing files, devices, and data objects are completely integrated into the Windows NT user interface. Administrators can centrally manage and monitor enterprise-wide networks. And, perhaps most important, the operating system provides the means for client-server applications to distribute their work across multiple computer systems.
- **Security.** Windows NT meets the United States government’s Class C2 security specification, which means that the owner of a resource (a file, directory, printer, or shared data object, for example) can maintain control over access to that resource. You can specify multiple permission levels for resources, granting particular users or groups of users the appropriate level of access for each resource. And the operating system can detect who has successfully or unsuccessfully accessed any resource.
- **Multithreading.** Windows NT supports *multithreading*, allowing appropriately designed applications to multitask their own processes. With a multithreading spreadsheet, for example, you might be able to recalculate one worksheet file while printing a second and loading a third into memory.
- **Support for symmetric multiprocessing.** Windows NT supports computers that incorporate multiple processors. Such systems will become common as more and more minicomputer and mainframe applications are redesigned for desktop networks. By assigning separate threads to separate processors, Windows NT can deliver superior performance for compute-intensive applications.
- **Support for a wide range of computing platforms.** When it shipped, Windows NT supported the Intel x86 line of microprocessors (80386, 80486, and Pentium), as well as two RISC (reduced instruction set) platforms: Digital Equipment Corporation’s Alpha and the MIPS R4000. The bulk of the 3.5

million lines of code in Windows NT are written in high-level programming languages (C and C++), with only a small portion encoded in machine-specific assembly language. Because these hardware-specific portions are isolated in a “hardware abstraction layer” (HAL), porting Windows NT to other computing platforms will be relatively easy. In the near future you can expect to see versions of Windows NT running on a number of additional systems.

- **The ability to run applications written for other operating systems.** Experience has shown that a new operating system cannot succeed unless it runs programs written for earlier systems. Windows NT incorporates subsystems for “Windows 16” (Windows 3.1 and Windows for Workgroups), MS-DOS, character-mode OS/2, and POSIX. With very few exceptions, you can count on being able to run all Windows-based applications under Windows NT, whether or not they were written specifically for Windows NT. MS-DOS-based programs, character-mode programs for OS/2, and POSIX-compliant UNIX-based applications should also run “out of the box” under Windows NT.
- **Support for multiple file systems.** In addition to supporting applications written for earlier operating systems, Windows NT also supports those systems’ methods of organizing files on disk. You can format hard disks under Windows NT in any of three file systems: NTFS, FAT, and HPFS. NTFS is the file system designed specifically for Windows NT. The benefits of NTFS include long filenames and the ability to control and monitor access to particular files. (Without NTFS, you can control access to directories, but you can’t set separate permission levels for individual files within directories.) FAT, which stands for *file allocation table*, is the file system used by MS-DOS and earlier versions of Windows. Use FAT if you want to share directories with computers running MS-DOS or MS-DOS-based versions of Windows. HPFS, the *High Performance File System*, is the native file system of OS/2; you might want to use HPFS if you share resources with other systems running OS/2.
- **A familiar user interface.** If you’re one of the millions of users who already work under another version of Windows, you’ll appreciate the fact that Windows NT looks and feels almost exactly like the environment you

already know. Because the essential details of organizing files, starting and switching between programs, navigating through menus and dialog boxes, and customizing the working environment are practically the same under Windows NT as under Windows 3.1 or Windows for Workgroups, you can get started immediately and do productive work from the first day. Windows NT has advanced features not found in earlier versions, but you can get acquainted with them as you go, and this book can serve as your guide.

About This Book

This book has five parts. The first part, Chapters 1 through 5, introduces you to the Windows NT user interface. Even if you're thoroughly familiar with Windows 3.1 or Windows for Workgroups, you might want to scan through these chapters, because a few details are new in Windows NT. Program Manager, for example, now supports two kinds of program groups, and Control Panel includes some utilities that were not present in earlier versions.

Part 2, Chapters 6 through 9, addresses networking issues. Chapter 6 provides an overview of the networking features in the desktop and Advanced Server versions of Windows NT. Chapter 7 describes the steps involved in creating print servers and using shared printers (as well as unshared ones). Chapter 8 and Chapter 9 describe Mail and Schedule+, the two "groupware" programs shipped with Windows NT.

Part 3, Chapters 10 through 14, is called "Security and Administration." Here you'll learn about passwords, permissions, and rights, the file-specific security features available with NTFS, how to audit users' access to shared resources, how to manage user accounts, and how to use the tape backup program provided with Windows NT.

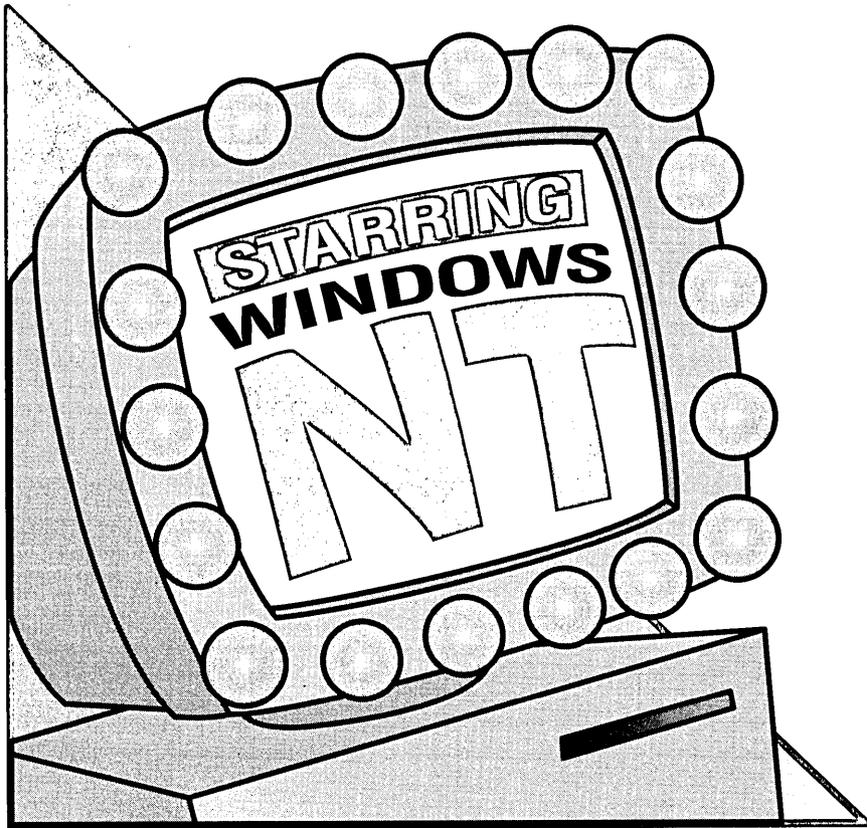
Part 4, "Using Applications," includes some material that will be familiar to users of earlier Windows versions, and some that will not be familiar. Write, Terminal, Paintbrush, and the desktop accessories (Clock, Calculator, Notepad, and so on) are nearly the same as their predecessors. (One important change: Notepad can now read and edit files greater than 64 KB.) But even if you're a Windows 3.1 veteran, don't skip this part entirely. Chapters 19 and 20 describe the powerful Windows NT command-prompt utility. The command prompt provides an alternative way to launch programs. More important, you can use it to run programs at particular times of day and to create batch files and logon scripts.

Finally, Part 5 includes three chapters that cover maintenance and system-management issues. Here we describe how to use the Windows NT Disk Manager and Performance Monitor programs, as well as how to use the Setup program to update equipment settings.

Welcome to Windows NT!

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Introducing
Windows NT

Chapter 1	Getting Acquainted with Windows NT	3
Chapter 2	Managing Programs with Program Manager	55
Chapter 3	Managing Files, Directories, and Disks with File Manager	77
Chapter 4	Customizing Windows NT with Control Panel	123
Chapter 5	Exchanging Information: The Clipboard, ClipBook Viewer, and OLE	167

Getting Acquainted with Windows NT

Starting and Ending a Windows NT Session	5
Type Ctrl+Alt+Del and introduce yourself.	
Starting and Ending Programs	8
A double-click in Program Manager, and you're ready to get to work.	
Switching Between Programs	9
Press Alt+Tab or summon the Task List.	
Working with Windows	11
Windows come in two flavors—application windows and document windows. Both share a set of common landmarks.	
Working with Menus and Dialog Boxes	16
Belly up to the menu bar, and enter into a dialog.	
Using Scroll Bars	25
Scroll bars let you move quickly through documents of any size.	

Creating, Opening, and Saving Files	27
You'll see similar dialog boxes—and use similar techniques—for working with files in most applications for Windows.	
Entering and Editing Text in Documents	32
The basic maneuvers are the same in almost all Windows-based programs that use text.	
Working with Graphics	37
A few generalizations can be made about manipulating graphic images.	
Working with Fonts	40
A little knowledge about typography will help you generate documents that make an impact.	
Getting Help	45
Windows NT comes with a superb hypertext Help system.	



This chapter introduces the Windows NT user interface. We'll look at the procedures for starting and ending a Windows NT session, starting and ending programs, switching between programs, opening and saving documents, and so on. We'll also take a brief tour through menu bars, tool bars, icons, buttons, and dialog boxes—the features you'll be relying on every day as you use Windows NT.

Starting and Ending a Windows NT Session

To start a Windows NT session on a computer that's turned off, first be sure there's no disk in drive A, and then turn on the system. In a moment or three, you'll be in Windows NT.

If your computer has been set up to run two different operating systems—Windows NT and MS-DOS, for example—you'll arrive first at the flex-boot screen. You'll see the names of the available operating systems and a countdown timer. If you do nothing, Windows NT will start when the countdown expires. To avoid the countdown delay, be sure Windows NT is highlighted (move the highlight with the direction keys if necessary), and then press Enter.

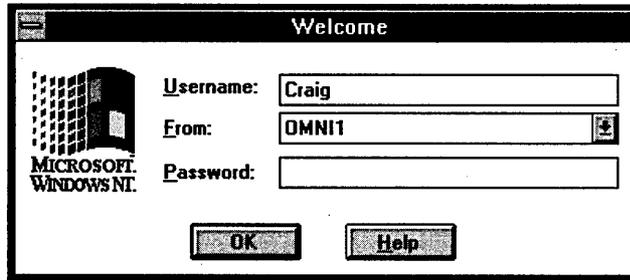
If your system is set up to run both Windows NT and MS-DOS, and it's currently running MS-DOS, you can switch to Windows NT by pressing Ctrl+Alt+Del or pressing your computer's hardware reset button. (Be sure all your MS-DOS work is saved before you do this!) In a moment, you'll be at the flex-boot screen.

Logging On

When Windows NT is ready, it displays a welcome message and invites you to log on. You do that by pressing Ctrl+Alt+Del. If you're accustomed to using MS-DOS (or Windows 3.1 or Windows for Workgroups), you may have some initial reservations about pressing Ctrl+Alt+Del. Not to worry—you'll never lose work in Windows NT by pressing Ctrl+Alt+Del. Rather than resetting your entire machine (as it does in MS-DOS) or terminating the



current application (as it does in Windows 3.1 and Windows for Workgroups), Ctrl+Alt+Del invokes a component of Windows NT's security system, allowing you to do such things as log on or off. When you press this key combination at startup, you arrive at the logon screen, which looks like this:



To get past this sentry, you need to provide three pieces of information—your user account name, the name of your computer or domain, and your password. The first two are filled out with the entries last used, so if you were the last person to use Windows NT on this machine, all you need to do is type your password and click OK.

After you've identified yourself, Windows NT completes the logon process by restoring your personal working environment, including your Program Manager setup, your choice of wallpaper and screen colors, your mouse and keyboard option settings, your home directory and local path, and any network-drive connections you've established. For more information about restoring network-drive connections at startup, see "Maintaining Connections Between Sessions," page 106.

If a *logon script* has been associated with your user account, the commands in that script are executed. A logon script is like an AUTOEXEC batch file in the MS-DOS world—a program that's run automatically on startup. Your system administrator might have created one for you, or you can create one yourself. For more information, see "Using Logon Batch Files," page 662.



Locking, Logging Off, and Shutting Down

Windows NT provides three different ways to end or suspend a working session.

- *Locking* the system protects your privacy while you're away from your machine. It also prevents other users (except ones with administrative privileges) from taking over your workstation while you're away. To lock your system, press Ctrl+Alt+Del and click the button marked Lock Workstation. Windows NT displays the Windows NT startup logo (so no one can see what you were working on), along with a message indicating when and by whom the system was locked.

While your system is locked, programs keep on running. Screen savers save, for example, and macros go on executing. Locking simply shuts other users out, preventing them from seeing what's going on or otherwise interacting with Windows NT.

To unlock a locked system, press Ctrl+Alt+Del again and type your password.

- *Logging off* ends your session with Windows NT but keeps the computer running. This is a good choice if someone else will be using the system after you. You'll also want to log off, as opposed to shutting down, when you are sharing any of your workstation's directories or local printers with other users on the network. Such resources continue to be available after you log off.

To log off, press Ctrl+Alt+Del and click the Logoff button. (You can also log off by choosing the Logoff command on Program Manager's File menu.) Windows NT asks you to confirm that you want to end your session. Then it closes each running application, after first polling to see if there are any objections to the logoff. If you have unsaved work in any program, that program gives you the opportunity to save before it closes. If you happen to be running a program that cannot be safely terminated at that moment (for example, because it's busy writing to disk), you'll see a different message, inviting you to log off later.



- ▣ *Shutting down* your system means turning it off, rendering all local resources unavailable to other users on the network. The only safe way to do this is by means of the Shutdown command. *Never simply turn off your computer.* You'll find the Shutdown command in two places—in the set of buttons that appears when you press Ctrl+Alt+Del, and on Program Manager's File menu.

When you choose the Shutdown command, Windows NT closes all running applications, just as it does when you log off. Then it performs various other housekeeping chores, and finally it displays a message saying that it's safe to turn off the power. It is most important that you do not interrupt this process. Don't power down or hit the hardware reset button until you get the safe-to-quit message.

Starting and Ending Programs

Unless your user account has a logon script that takes you elsewhere, the logon process leaves you in the Windows shell program called Program Manager. (For more information about Program Manager, see Chapter 2, "Managing Programs with Program Manager," page 55. For now, just note that this is the place from which you normally start your applications.)

In the typical Windows setup, each installed program has one or more icons in Program Manager. Double-clicking the program's icon starts the program.

To quit a running program, you can look for an Exit command (in most cases you'll find one on the program's File menu), or you can double-click the Control-menu box, which is the broad horizontal bar in the upper left corner of the program's window.

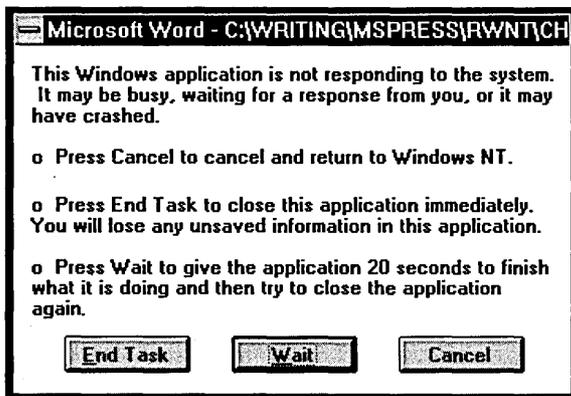
Killing a Bad Application

As long as there are programs and programmers, there will also be bugs. If an application stops responding, you'll need a way to put it out of its misery and restore order to your system. In Windows 3.1 or Windows for Workgroups, you do this by pressing Ctrl+Alt+Del to perform a "local reboot."



In Windows NT, the approved mercy-killing method is the End Task button in Task List. For more information about Task List, see “Using Task List,” page 10.

When you terminate a program in this manner, you might see a message similar to the following:



As the message says, terminating a program with Task List causes you to lose any unsaved work in that program. It's a good idea, therefore, to try the Wait button first.

Switching Between Programs

Windows NT is a multitasking system, so you can run as many programs at once as memory permits. You can also run multiple copies of certain programs. Some programs permit this; others do not.

Windows NT offers several ways to switch between running programs. If the program you want to switch to is visible, simply click anywhere in its window. If it's not visible, you can switch by holding down the Alt key and pressing Tab. Each time you press Tab, Windows displays the name of the “next program in line.” When you get to the one you want, release the Alt key.



PART 1: Introducing Windows NT

If you don't see program names in the center of your screen when you press Alt+Tab, you can make them appear by going to the Desktop section of Control Panel and selecting Fast "Alt+Tab" Switching. For more information, see "Changing the Behavior of Alt+Tab," page 147.



KEYBOARD TIP: If you accidentally Alt+Tab past the program you're trying to switch to, continue holding down the Alt key, and then hold down the Shift key and press Tab again. Shift+Alt+Tab works exactly like Alt+Tab, except that it cycles through your programs in the opposite order.

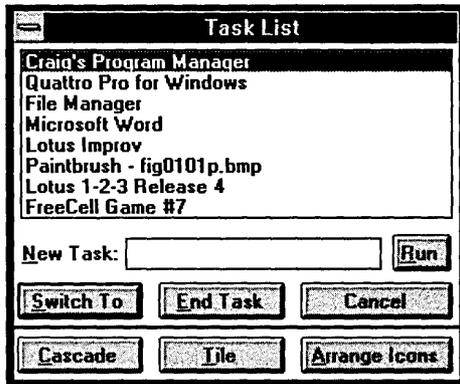


KEYBOARD TIP: When you switch from one program to another with Alt+Tab, Windows puts the program you switched away from at the top of the stack. A single Alt+Tab will then take you back to that program. This provides an efficient way to toggle back and forth between two programs.

Using Task List

Pressing Ctrl+Esc summons a handy tool called Task List, shown on the next page. Task list may be the quickest way to switch programs when you have several programs running at once. You can switch by double-clicking the name of the program you want to switch to, or clicking that name once and then clicking the Switch To button.

Task List has some other handy buttons in addition to Switch To. The End Task button terminates your program. The Cascade and Tile buttons arrange windows so that you can move between them more easily with the mouse. And the Arrange Icons button tidies up programs whose windows you have "minimized" (reduced to icons).



WINDOWS TIP: Task List's Tile button is useful even when you have only one open window. If you tile that lone open window, Task List makes it as large as it can be without obscuring the icons at the bottom of your desktop.

Working with Windows

All applications for Windows run within rectangular frames called windows. Here are some important features common to all windows:

Borders. The four edges that define the perimeter of the window are called *borders*.

Title bar. Directly below the top border of the window is a region that includes the window's name. This part of the window is called the *title bar*.

Control-menu box. Just to the left of the title bar is a little box with a big dash inside. This is the *Control-menu box*.

Sizing buttons. In the upper right corner of the window is a pair of arrows—one pointing down, the other pointing up. These are called *sizing buttons*. They're used to *minimize* and *maximize* the window, respectively.



Menu bar. Directly below the title bar is the *menu bar*. The menu bar provides access to most of an application's commands.

Work area. The inside of a window is called the *work area*, or *workspace*.

Maximizing, Minimizing, and Restoring

Whenever you start a program, Windows chooses a size and a position for the program's window. That size and position depend on what else you have on your desktop and probably won't be the same each time you start the program. In most cases, the window will fill something less than your entire screen.

When you want to focus all your attention on a particular program, you'll probably want to devote as much screen space as possible to that application. You can do so by *maximizing* the application's window. Here are two ways to maximize a window:

- If you have a mouse, click the window's maximize button—the upward-pointing arrow in the upper right corner of the window.
- If you don't have a mouse or you prefer to use the keyboard, press Alt, Spacebar, X.

When you maximize a program, the button in the upper right corner of the window is replaced by a *restore button*—a double-headed arrow pointing up and down. Clicking the restore button returns a window to its pre-maximized size.



MOUSE TIP: You can also maximize or restore a window by double-clicking its title bar.

When you want to keep a program running but get it out of your way, you can click the downward arrow to *minimize* it. Your window then collapses into an icon at or near the lower edge of your screen.



Each Windows-based application you use has its own distinctive icon, so you can see at a glance what minimized applications you have on your desktop. (And just in case you forget what a program's icon looks like, Windows displays the program's name under the icon.)

To return a minimized program to its former size, double-click the icon. (With the keyboard, press Alt, Spacebar, R.) This action is also called *restoring*.



MOUSE TIP: If a menu pops up out of the icon when you double-click it, it's probably because you moved the mouse slightly between the two clicks. Double-clicking takes a little practice. You can restore the window from this menu by clicking the word *Restore*.

Moving and Sizing Windows

In addition to maximizing, minimizing, and restoring windows, you can also move them around on your desktop and expand or contract their borders.

To move a window with the mouse, drag its title bar. That is, put the mouse pointer anywhere on the title bar, press and hold the primary mouse button, move the mouse in the direction you want the window to move, and then release the mouse button. The window simply follows your mouse.

NOTE: The left mouse button is normally the *primary* mouse button. You can make the right button the primary button by going to the Mouse section of Control Panel. For more information, see "Customizing Your Mouse or Other Pointing Device," page 142.

To move a window with the keyboard, start by pressing Alt, Spacebar, M. Then use any of the four direction keys to move your window. When you get the window where you want it, press Enter.

To cancel a move, press Esc before releasing the mouse button or pressing Enter. The window remains where it was before you began the move.



WINDOWS TIP: You can move a minimized window the same way you move an open one. That is, you can drag its icon around with the mouse or you can press Alt, Spacebar, M and use direction keys to relocate the icon. It can be helpful to move icons if you have several minimized applications on your desktop at the same time and their labels overlap one another.

To change the size of a window, move one or more of the window's borders inward or outward. Moving a border inward contracts the window, and moving it outward expands the window.

To change the size of a window with the mouse, simply position the pointer on the border you want to adjust. The mouse pointer changes from a single-headed arrow to a double-headed one. Press and hold the primary mouse button, move the border as you please, and then release the button.

You can move two adjacent borders at once by positioning the mouse pointer in the corner where those borders meet.

To change a window's size with the keyboard, start by pressing Alt, Spacebar, S. A four-headed pointer appears in the center of the window. Use one of the direction keys to move that pointer to the border whose position you want to adjust. Then use the direction keys to adjust the border. When you're happy with the border's position, press Enter.

To cancel a sizing operation, press Esc before releasing the mouse button or pressing Enter.

Application Windows and Document Windows

Windows come in two broad categories, called *application windows* and *document windows*. Programs run within application windows. Programs that allow you to work with two or more documents at once (some programs permit this, others do not) display documents within document windows. The following illustration shows two open document windows and several minimized document windows—all within an application window.



Application window

The screenshot shows the Lotus Improv application window with a menu bar (File, Edit, Create, Worksheet, Tools, Window, Help) and a toolbar. Two document windows are open:

- Account - Summary - ACCTREC**: A table with columns for Company and Acct Tot.

	Company	Acct Tot
Account1	ABC Inc	\$650
Account2	Acme Services	\$962
Account3	Benney's Bicycles	\$938
Account4	Crown Beverages	\$550
Account5	Pet Supply Depot	\$1,188
Account6	Sundog Sports	\$508
Total		\$4,796
- Customer - Terms - ACCTREC**: A table with columns for Company, Class, and Discount.

	Company	Class	Discount
T&C1	ABC Inc	A	2.0%
T&C2	ABC Inc	B	5.0%
T&C3	Acme Services	A	2.0%
T&C4	Acme Services	B	1.0%
T&C5	Benney's Bicycles	A	2.0%
T&C6	Crown Beverages	A	2.0%
T&C7	Pet Supply Depot	A	2.0%
T&C8	Sundog Sports	A	2.0%

At the bottom of the application window, a taskbar shows several minimized document windows as icons with labels: Query - Terms by Customer - ACCTREC, Query - Status by Account - ACCTREC, Query - Late Summary - ACCTREC, Query - Complete - ACCTREC, Invoices - Data Entry - ACCTREC, and Invoices - Aging Information. A label 'Minimized document windows' points to this taskbar.

Manipulating Document Windows

Document windows have a lot in common with application windows. Like application windows, document windows can be maximized. To maximize a document window with the mouse, click its maximize button or double-click its title bar. To maximize a document window with the keyboard, press Alt, hyphen, X.

To restore a maximized document window with the mouse, click its restore button. To restore a maximized document window with the keyboard, press Alt, hyphen, R.

If a document window can be minimized (most can), you'll find a minimize button in its upper right corner. Click that button, or press Alt, hyphen, N to turn the document window into an icon. Double-click the icon, or press Alt, hyphen, R to restore the icon to an open document window.

Document windows can be moved and sized in the same way that application windows can, but they must stay within the confines of their



application windows. The mouse procedures for moving and sizing are exactly the same as those for moving and sizing application windows. The keyboard procedures begin with Alt, hyphen, M (for moving) and Alt, hyphen, S (for sizing).

Working with Menus and Dialog Boxes

One of the big advantages of working with applications for Windows is that they all use the same basic methods for entering commands. In virtually all applications for Windows, commands are chosen from *drop-down menus*—sets of options that emerge from a menu bar at the top of the application window. When a program needs additional information from you before it can carry out your command, it presents a *dialog box*—a smaller window with places for you to fill in blanks or choose between preset options. These devices behave in a consistent and predictable way in all applications for Windows.

The Control Menu and the Menu Bar

The two main elements of a Windows-based application's menu system are the *Control menu* and the *menu bar*. The Control menu emerges from the Control-menu box—the large dash at the left side of the title bar. The menu bar is the row of command words directly below the title bar.

The Control menu provides a set of generic commands common to all applications. With a few exceptions, each program's Control menu includes the same commands.

The menu bar includes commands specific to the particular window's application. Each word on the menu bar opens a drop-down menu of related commands. For example, an application's File menu includes commands for opening and saving document files, the Edit menu has commands for changing the contents of a document, and so on.

Choosing Commands with the Mouse

To access the menu system with the mouse, simply click the desired word in the menu bar. To open the File menu, for example, click the word *File*.



To open the Control menu, click the Control-menu box. To choose a command from a drop-down menu, click the mouse again on the command you want.

To get out of the menu system without choosing a command, click the mouse anywhere outside the drop-down menu.

Choosing Commands with the Keyboard

To choose any command with the keyboard, begin by pressing the Alt key. When you do that, Windows highlights the first command on the menu bar, like this:



At this point, you can move around the menu bar by pressing the Left and Right direction keys. Pressing the Right direction key in the illustration above, for example, highlights the word *Disk*. Pressing it again moves the highlight to the word *Tree*, and so on. If you press the Right direction key with the highlight on *Help*, the highlight moves to the Control-menu box. From there it moves to the document window's Control-menu box (see "Document Control Menus," page 20), then back to *File*, and the cycle repeats.



KEYBOARD TIP: You can also access the menu system of any application for Windows by pressing F10. Certain applications provide other access keys as well; in Microsoft Excel and Quattro Pro for Windows, for example, you can reach the menu system by pressing the slash key (/).

Pressing either the Up or Down direction key opens the drop-down menu associated with the highlighted menu-bar word. In the preceding illustration, for example, you could press the Down key to open the File menu.



A more direct way to open a particular drop-down menu is to press the underlined letter of the menu you want. For example, to open the Options menu in File Manager, do the following:

1. Press Alt to access the menu system.
2. Press O (the underlined letter for the Options menu).

To open the Control menu, press Alt followed by Spacebar. (Think of the Control-menu box as a picture of a Spacebar, and you'll never have trouble remembering this key combination.)

After you've opened a drop-down menu, you can choose a command in either of the following ways:

- Use the Up and Down direction keys to highlight the command you want, and then press Enter.
- Press the underlined letter of the command you want.

To get out of the menu system without choosing a command, press Alt or F10 again. Or press Esc. (In some applications, you might need to press Esc twice—once to get out of a drop-down menu and a second time to leave the menu bar itself.)

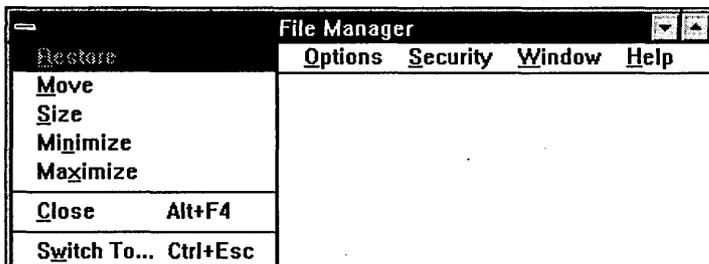
Keyboard Shortcuts

Some menu commands have *keyboard shortcuts* assigned to them. These are single keystrokes or simple keystroke combinations that execute a command directly. For example, Shift+F5 and Shift+F4 are keyboard shortcuts for the Cascade and Tile Vertically commands on File Manager's Window menu.

Keyboard shortcuts, when available, are usually the quickest way to choose a command, because you don't have to open a drop-down menu to use them. (And Windows doesn't have to redraw the screen to display the menu.)

What's on the Control Menu

As mentioned before, the Control menu is a standard item on all applications for Windows. Typically, it looks like the following illustration.



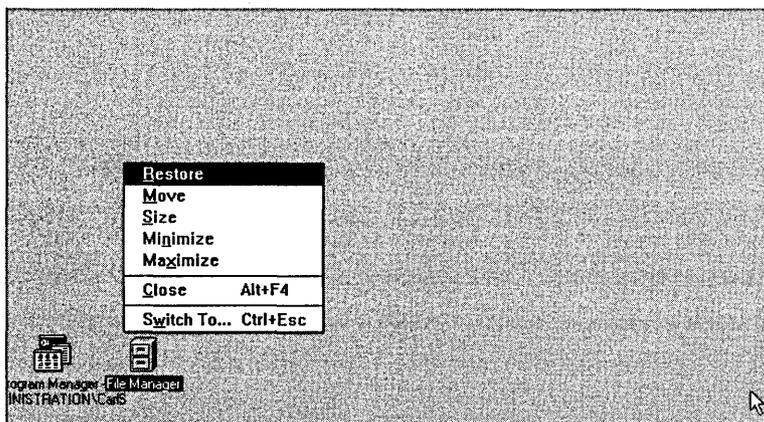
The Control menu includes commands for maximizing, minimizing, restoring, sizing, moving, and closing a window. It also includes a command (Switch To) that invokes Task List.

Accessing the Control Menu on a Minimized Application

You can access a minimized application's Control menu in either of two ways:

- ▣ Click the application's icon once with the mouse.
- ▣ Use Alt+Esc to select the application's icon, and then press Alt, Spacebar.

The Control menu pops up from the icon, as shown in the following illustration of a minimized File Manager.





Document Control Menus

Document windows do not have menu bars, but they do have abbreviated Control menus. You can access a document window's Control menu by clicking the little bar in the upper left corner of the window (the document Control-menu box) or by pressing Alt, hyphen.



KEYBOARD TIP: You'll find it easier to remember how to access the Control menu if you notice the difference in the Control-menu-box icons: The longer horizontal bar in the application window's Control-menu box suggests a Spacebar, whereas the shorter bar in the document window's Control-menu box looks more like a hyphen.

Commands That Bring Up Dialog Boxes

The ellipsis (...) is a punctuation symbol signifying an incomplete command. In a Windows menu, an ellipsis following a command name means that the command brings up a *dialog box*. A dialog box is a device used by Windows to get more information from you.

The Ins and Outs of Dialog Boxes

Dialog boxes come in all sizes and shapes. Some are simple, others quite complex. But nearly all dialog boxes have the following components:

- ▣ One or more places for you to enter information or choose options
- ▣ One or more command buttons

Most dialog boxes have a command button that you click after you've filled out the dialog box to your satisfaction and another that you click if you want to back out of the dialog box without making an entry. In many cases, these buttons are marked OK and Cancel, respectively. But you might also see verbs such as "Save" or "Accept" for the OK button and "Escape" for the Cancel button.



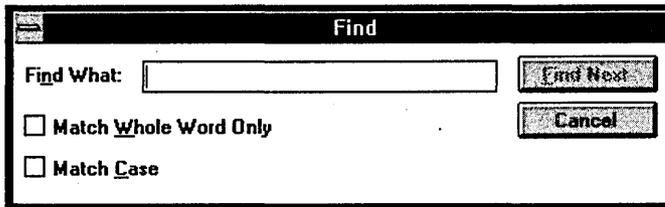
In rare cases, you might find dialog boxes in which the Cancel button has been omitted (probably to conserve space or memory). In such dialog boxes, you can generally press either Esc or Alt+F4 to back out without making an entry.

Other Dialog Box Elements

In the section of a dialog box where you enter information or select options, you'll encounter the following kinds of elements:

- ▣ Text boxes
- ▣ List boxes
- ▣ Drop-down list boxes
- ▣ Option buttons
- ▣ Check boxes

A *text box* is a place for you to type something. The big rectangle next to the words Find What in the following illustration is an example of a text box.



Note that the term *text* here doesn't mean words only, as opposed to numbers. In some text boxes, you will be expected to enter numbers—or perhaps both words and numbers.

Occasionally you might find a text box that already has text in it. Such text is called a *default entry*, or *default value*. A default entry is an entry proposed by your application. If you're satisfied with that entry, you can simply leave the text box alone to accept it.

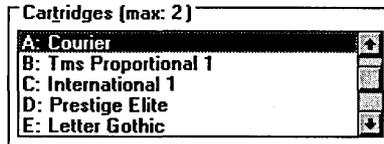
To fill out a text box, click in the box. You'll then see a flashing vertical line, which is called an *insertion point*. If the text box is empty, the insertion point appears at the left side of the box. If the box already contains text,



PART 1: Introducing Windows NT

the insertion point is located at the spot where you clicked the mouse. In either case, the insertion point marks the spot where the characters you type will appear.

A *list box* presents a set of options in the form of a list, like this:



Typically, the options in a list box are mutually exclusive, but they might not always be. In the printer cartridge list shown above, for example, you can select zero, one, or two cartridges.

If the list contains more items than can be displayed at once in the list box, you will find a *scroll bar* at the right side of the list box. (The example above includes a scroll bar.) You can move through the list one item at a time by clicking the arrows at the top and bottom of the scroll bar. For more information about scroll bars, see "Using Scroll Bars," page 25. You can also move through a list box by pressing the Up and Down direction keys, PgUp, or PgDn.



KEYBOARD TIP: Another way to move quickly through a list box is to press the first letter of the item you want to move to. Pressing F, for example, takes you directly to the first item beginning with F. If you're already on an item starting with F, pressing F takes you to the next item beginning with that letter—and so on. This technique works in all Windows list boxes and works with numbers as well as letters. It's usually the most efficient way to navigate in a large list.

To select an item in a list box with the mouse, simply click the item you want. To select with the keyboard, use direction keys or any other method to move the highlight to the item you want.



In list boxes where you're allowed to select more than one item, the technique for making a multiple selection varies somewhat from application to application. Consult the documentation for the program you're using if you're not sure how to proceed.

A *drop-down list box* is an ordinary list box displayed in a more compact space. The following illustration shows four drop-down list boxes.

Resolution:	75 dots per inch	
Paper Size:	Letter 8 1/2 x 11 in	
Paper Source:	Upper Tray	
Memory:	512KB	

You can recognize a drop-down list box by the underlined arrow on the right. Click that arrow (or press Alt+Down), and an ordinary-looking list box unfolds, like this:

Resolution:	75 dots per inch	
Paper Size:	300 dots per inch 150 dots per inch	
Paper Source:	75 dots per inch	
Memory:	512KB	



KEYBOARD TIP: You can use the first-letter method of navigating through a drop-down list box without first opening the list box.

Option buttons (sometimes called *radio buttons*) present a set of mutually exclusive options. For example, the following pair of option buttons lets you choose between portrait and landscape orientation on a LaserJet printer.

Orientation	
	<input checked="" type="radio"/> Portrait
	<input type="radio"/> Landscape



PART 1: Introducing Windows NT

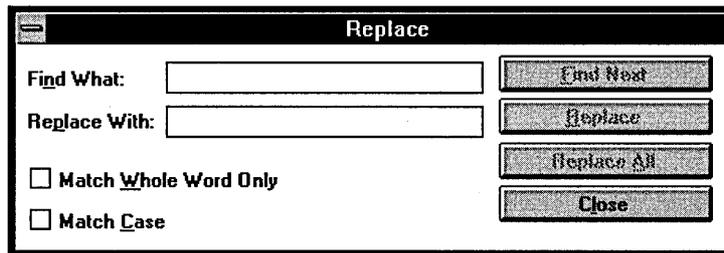
The distinguishing feature of a set of option buttons is the circle next to each option name. Option buttons always come in groups of two or more. One option in each group—the currently selected option—has a darkened circle. Option buttons get their nickname because they work like station-selector buttons on a car radio.

To select an option button, simply click the item you want to select. Usually, you don't have to click in the circle itself; clicking anywhere on the associated text also works.

To select an option button with the keyboard, look for an underlined letter in the text associated with the option you want. Then hold down the Alt key and press that letter. To select Portrait orientation in the preceding illustration, for example, press Alt+P.

If the option you want doesn't have an underlined letter, press the Tab key until one of the options in the group is encircled by a dotted line. Then press the direction keys until the item you want has the darkened circle.

A *check box* is a ballot with two choices—yes and no. Check-box items come either in groups or one at a time and are marked by squares instead of circles. The following example includes two check-box items.



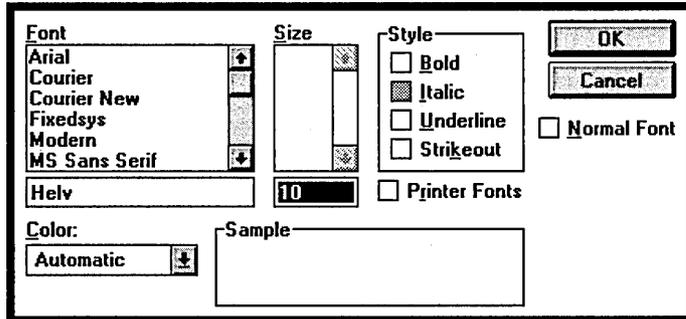
An *X* in the box means that you accept the option indicated by the associated text. An empty box means that you reject that option.

To select (put an *X* in) a check box, click the box or the associated text. To remove the *X*, click again.

To select a check box with the keyboard (or deselect one that's currently selected), look for an underlined letter in the associated text. Hold down the Alt key and press that letter. If the text has no underlined character, press Tab until the option is encircled. Then press Spacebar.



Some check boxes have three states—checked, unchecked, and gray. Usually, a gray check box means that a certain condition applies to some of a selection, but not all of it. For example, in the following illustration, some of the selected cells in a Microsoft Excel worksheet have been formatted as italic. The rest of the cells are in normal type. In the Format Font dialog box, therefore, the Italic check box is gray.



If a Dialog Box Gets in the Way

Many, though not all, dialog boxes appear in windows with title bars and Control menus. Like ordinary application and document windows, such dialog boxes can be moved. You usually can't change their size, however. Moving a dialog box is sometimes useful; you might need to see what lies beneath it.

If the dialog box has a Control menu, you can use it as an alternative way to back out of the box without making an entry. Simply double-click the Control-menu box. Or press Alt, Spacebar and choose the Close command from the Control menu.

Using Scroll Bars

If a document or dialog box is too long to be displayed completely within the confines of a window, Windows adds a *vertical scroll bar* to the right side of the window. If the material is too wide to be displayed entirely, Windows adds a *horizontal scroll bar*. If it's too long and too wide, Windows adds both kinds of scroll bars. The following illustration shows a window with vertical and horizontal scroll bars.



PART 1: Introducing Windows NT

DJIA	DJUA	NASDAQ	Call/Put	S&P Prem	P.F.	Tick								
3293.28	217.64	557.57	1.27	0.63	-7	+549								
3324.08	218.08	564.75	1.27	0.74	+13	+435								
3330.56	218.64	567.80	1.26	0.76	+14	+128								
3337.31	219.02	570.22	1.28	0.64	+13	+211								
3358.39	220.58	575.21	1.33	0.60	+26	+632								
3345.42	220.89	575.47	1.37	0.58	+15	+346								
3361.63	220.77	576.19	1.39	0.57	+18	+482								
3331.64	220.08	570.52	1.37	0.42	+2	+543								
BDI-DTC	NLC	LI-NY	LI-DTC	Fed Fnd	90d TB	M1								
-95	4.99	+20	-4	3.72%	3.23%									
-95	4.66	+25	+1	3.45%	3.21%									

Vertical scroll bar

Horizontal scroll bar

Scroll bars provide an easy way to navigate through a document with the mouse. They also indicate your current position relative to the length or width of the document.

Notice the square boxes in the scroll bars shown in the illustration above. In the vertical scroll bar, the box is about a tenth of the way down the length of the bar. This means that the text you're looking at is about ten percent of the way into the document. Similarly, the position of the box in the horizontal scroll bar tells you that the block of text you're looking at starts at a position about a fifth of the way across the page.

You have several ways to scroll with a scroll bar:

- ❑ To move up or down a line at a time, simply click the arrow at either end of the vertical scroll bar. To move side to side a character at a time, click the arrow at either end of the horizontal scroll bar.
- ❑ To move several lines (or several characters) at once, click an arrow and hold down the mouse button. When you arrive where you want to be, release the mouse button.
- ❑ To move by a larger increment (approximately one windowful), click the mouse in the scroll bar itself. To move up, click above the box in the vertical scroll bar; to move down, click below the box. To move left, click to the left of the box in the horizontal scroll bar; to move right, click to the right of the box.
- ❑ To move to a specific location, drag the box. To move directly to the last lines in the document, for example, drag the box to the bottom of the vertical scroll bar.



Scrolling with the Keyboard

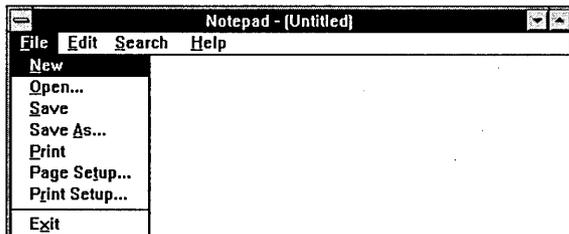
In most applications, you can scroll the contents of a document one line at a time by pressing the Up and Down direction keys when you reach the edge of the window. To scroll by larger increments, use PgUp and PgDn. In most applications that work with text, you can jump directly to the end of the document by pressing Ctrl+End or to the beginning of the document by pressing Ctrl+Home.

Creating, Opening, and Saving Files

Nearly all Windows-based applications use a similar set of procedures for creating a new file, loading an existing file from disk into memory, and saving a file to disk. We'll look at those procedures now, using Notepad as an example.

The File Menu

Because file operations are such a basic and indispensable part of working with applications, nearly every Windows-based program puts its File menu on the left side of the menu bar where it's easy to find. Notepad's File menu looks like this:



Notepad's File menu is typical of many Windows-based programs. It has three basic command groups: a set of commands for moving files between disk and memory (New, Open, Save, and Save As), a group of commands for printing (Print, Page Setup, and Print Setup), and an Exit command.

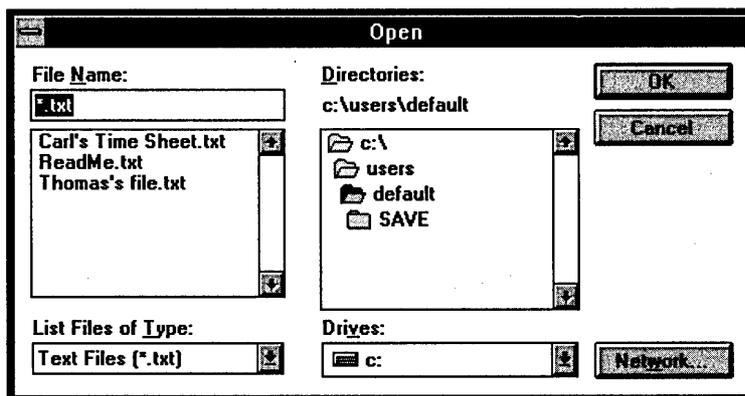


Creating a New File

The New command, in Notepad and many other Windows-based applications, allows you to create a brand new document. In programs that use document windows, New generally opens a new, blank document window. In programs (such as Notepad) that don't use document windows, New erases any document currently in memory and presents you with an empty window in which to create a new document. If you haven't saved the document currently in memory, your program warns you—and gives you an opportunity to save—before removing the current document.

Loading an Existing File from Disk into Memory

To load an existing file from disk into memory, use the File menu's Open command. Your program presents a dialog box something like this:



In addition to the usual command buttons, this dialog box has a File Name text box and four list boxes. Let's take a quick tour.

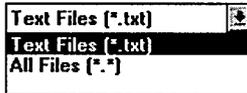
The File Name text box is a place where you can type the name of the file you want to load—if you happen to know its name and don't mind typing. If you prefer, you can select the name of your file from the accompanying list box.

In most programs, the File Name text box starts out by displaying a *wildcard specification*—an asterisk followed by a period, followed by a three-letter filename extension. In the illustration above, Notepad's dialog box displays the specification *.txt, because the *default filename extension*



for Notepad (the extension the program uses if you don't tell it to do otherwise) is TXT. If your program's dialog box includes a list box labeled List Files of Type (or something similar), you might be able to use this list box to change the wildcard specification. Opening the file-type list box in Notepad, for example, reveals the following choices:

List Files of Type:



If you want to open a file with an extension other than TXT, click the All Files entry. The dialog box then lists all files in the current directory. The options available in the file-type list box vary from program to program. Some programs, such as Notepad, offer you a choice of the program's "native" file type (TXT, in this case) or files of any extension. Other programs, such as Paintbrush, have several native file types and so offer a larger assortment of file-type choices.



WINDOWS TIP: Some programs allow you to enter two or more wildcard specifications, separated by semicolons, in the File Name text box. For example, if you type **.TXT;*.INI* in Notepad's File Name text box, the accompanying file list includes files with either extension. If the program you're working with does not support this option, it simply ignores the second and subsequent wildcard specifications.

When the file you want to open is in the files list box, you can open it in any of the following ways:

- Double-click the filename.
- Click once on the filename. Then, with the filename highlighted, click the OK button.



- Press the Tab key until you see a dotted line around the first name in the file list. Use the Up and Down direction keys to highlight the name of the file you want. Then press Enter.



KEYBOARD TIP: To open the first file in the file list, press Tab until the dotted line appears around that filename. Press Spacebar to highlight the name, and then press Enter.

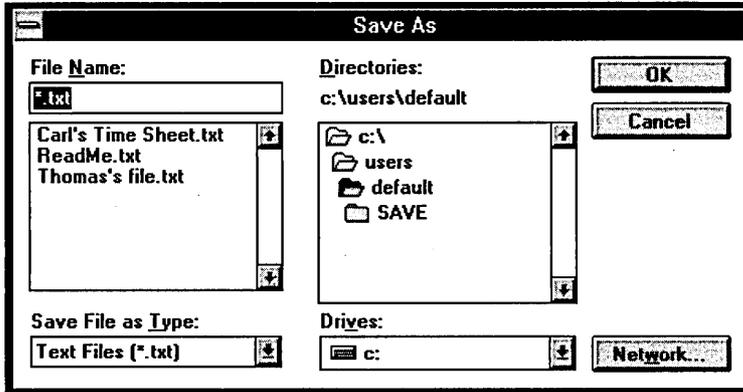
If the file you want to open is not stored in the current directory, you can use the Directories list box to change directories. In the illustration on page 28, for example, the current directory is C:\USERS\DEFAULT, and the dialog box lists all TXT files in that directory. To open a file in the SAVE directory, a subdirectory of C:\USERS\DEFAULT, double-click SAVE in the Directories list box. The file list then presents the names of all TXT files in C:\USERS\DEFAULT\SAVE. To open a file in the root directory, double-click the entry at the top of the Directories list, C:\.

If the file you want to open is not stored on the current disk drive, use the Drives list at the bottom of the dialog box. You'll find all your local drives listed here (complete with volume labels, if any), along with all connected network drives. After switching drives, you can pick the appropriate directory from the Directories list and the file from the File Name list.

Saving a File for the First Time

To save a file that you've just created—a file that's never been saved on disk before—use the File menu's Save or Save As command. It doesn't matter which you choose; either way, you get a dialog box similar to the illustration on the next page.

This dialog box looks like the File Open dialog box, except that all of the filenames in the list box on the left are grayed out. This is how Windows tells you what filenames are already in use. Type a name for your new file, and click OK or press Enter. (If you type the name of an existing file, Windows presents a warning message and asks you to confirm that you want to overwrite the existing file.)



MOUSE TIP: If you want to replace an existing file with the document in memory, click the file's name to put the name in the File Name text box.

After you've saved a file, most Windows-based applications display the name of your file in the title bar of the file's document window (if the program uses document windows) or in the title bar of the application itself. Until the file has been saved that first time, programs typically display the word (*Untitled*) in their title bars.

Resaving a File

After you save a file at least once, you can save it again simply by choosing the file menu's Save command. You won't see a dialog box when you do this, because Windows already knows the name of the file.

Saving a File Under a New Name

To save a file on disk under a new name, use the File menu's Save As command. You'll see the current name highlighted in the Save As dialog box. Simply type the new name for your file, and press Enter (or click OK).



WINDOWS TIP: When you use the Save As command to give a file a new name, the version of the file that you saved most recently under the old name remains on disk.

Entering and Editing Text in Documents

Unless you happen to be concerned only with visual images, you will probably spend much of your time in Windows entering and editing text. This is true whether your primary application is word processing, financial planning, database management, project management, or communications. Even though Windows is a graphical environment and uses your computer's graphics display modes, the information you work with consists primarily of letters and numbers—in other words, text.

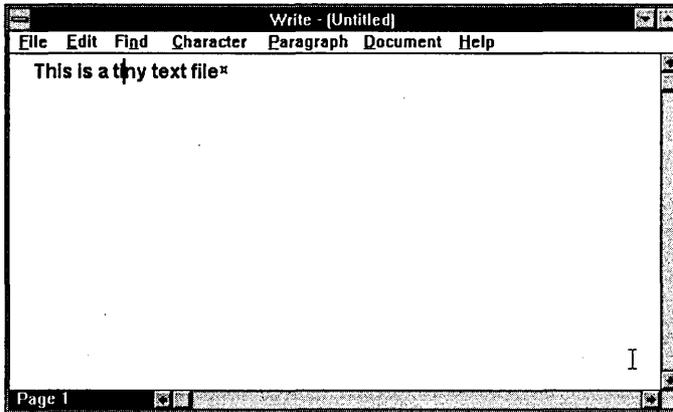
Fortunately, a basic set of concepts and procedures applies to text in most applications for Windows.

The Insertion Point

The flashing vertical line that you see whenever you work with text in an application for Windows is called the *insertion point*. It's analogous to the cursor in a character-based word processing program. The insertion point indicates where the next character you type will appear.

There's one difference between the insertion point and the cursor used in most MS-DOS-based programs: The insertion point is always positioned *between* two characters, *before* the first character in a block, or *after* the last character in a block. It never appears directly under a character. That's because characters are always *inserted* at the insertion point; they don't overwrite existing text.

In the following illustration, for example, the insertion point is located between the *i* and the *n* in the word *tiny*.



To replace existing text with new characters that you type, Windows uses a different concept, called *selection*. We'll talk more about selection in a moment.

The I-Beam

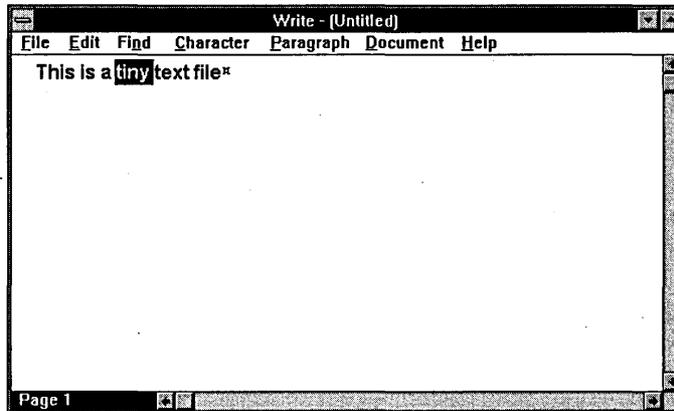
When you work with text, Windows changes your mouse pointer from an arrow to something that looks like a lanky capital *I*. The pointer is then usually called an *I-beam*. In the illustration above, you can see the I-beam near the lower right corner of the window.

The I-beam provides a way to relocate the insertion point. In the tiny text file above, for example, if you want to move the insertion point to the beginning of the line, simply use the mouse to position the I-beam before the capital *T*, and then click. (You can also use the keyboard to move the insertion point, as we'll see in a moment.)

When you're typing text, you might sometimes find the I-beam distracting. If that happens, simply use the mouse to move the I-beam out of your way. It doesn't matter where you put it.

The Selection

To *select* something in Windows means to highlight it—with the keyboard or the mouse. In the illustration on the next page, for example, the word *tiny* has been selected.



The object that you select is called the *selection*.

You might select a block of text for any of several reasons:

- ❑ To apply a formatting change to the entire block (In the illustration above, for example, if you choose Write's Underline command after selecting the word *tiny*, the entire word is underlined.)
- ❑ To *copy*, *cut*, or *delete* the entire block
- ❑ To replace the entire block

Notice that there's no insertion point in the illustration above. The insertion point disappears when you make a selection, because the next character you type *replaces* the entire selection.

Positioning the Insertion Point

As mentioned before, the easiest way to move the insertion point is with the mouse. Simply put the I-beam wherever you want the insertion point, and then click.

You can also use the keyboard. The following keystroke combinations apply to most Windows-based applications that work with text.

- ❑ The Right and Left direction keys move the insertion point forward or backward a character at a time. Ctrl+Right and Ctrl+Left move it forward or backward a word at a time.



- End moves the insertion point to the end of the line. Home moves it to the beginning of the line.
- The Up and Down direction keys move the insertion point up or down a line at a time.
- PgUp and PgDn move up or down a windowful at a time.
- Ctrl+End moves to the end of the document. Ctrl+Home moves to the beginning of the document.

Some applications use additional keystroke combinations for moving the insertion point. In Microsoft Word for Windows, for example, pressing Ctrl+Down takes you to the first word in the next paragraph, and Ctrl+Up takes you to the beginning of the previous paragraph.

Selecting Text

To select text with the mouse, put the I-beam at one end of the block you want to select. Then hold down the mouse button, move to the other end, and release the mouse button. In other words, simply drag the mouse across the text you want to select. You can select a word by double-clicking anywhere in it.

To select text with the keyboard, first put the insertion point at one end of the block you want to select. Then hold down the Shift key and *extend* the selection to the other end of the block. The same keystrokes you use to move the insertion point extend the selection.

For example, to select three characters within a word, put the insertion point before the first character, and then hold down the Shift key while pressing the Right direction key three times. To select an entire word, position the insertion point to the left of the word, hold down the Shift key, and press Ctrl+Right. To select from the insertion point position to the end of the line, hold down the Shift key and press End—and so on.

Some programs implement additional keyboard and mouse procedures for selecting text. In Write, for example, if you position the mouse pointer to the left of a line of text and then click, the entire line is selected. If you position the mouse pointer to the left of a line, hold down the Ctrl key and then click, Write selects the entire document.



Erasing Characters

To erase a few characters of text, put the insertion point where you want to make the erasure. Then use the Backspace or Del key to make your corrections. Backspace deletes characters to the left of the insertion point; Del removes characters to the right of the insertion point.

Erasing Blocks of Text

To erase a block of text, first select the block. Then do one of the following:

- ▣ Press Del or Backspace.
- ▣ Choose the Edit menu's Delete or Clear command (if your application's menu has such a command).
- ▣ Choose the Edit menu's Cut command.

Pressing Del or Backspace removes the selected text. Choosing Delete or Clear from the Edit menu does exactly the same thing. Choosing the Cut command, however, does something quite different. It removes the text from your document but stores it in an area of memory called the Clipboard. After the selection has been stored on the Clipboard, you can *paste* it somewhere else—either within the same or another document (even in a document created by a different application).

Undoing a Deletion

Many applications include an Undo command on their Edit menus. This command gives you the opportunity to change your mind about a deletion. The Undo command usually can reverse only your most recent edit, however. So, for example, if you delete a line of text, and then apply a formatting command to a different block of text, you won't be able to use the Undo command to reverse your deletion; at this point the Undo command is poised to undo the formatting change, not the deletion.



Copying and Moving Text

The Clipboard makes it easy to copy or move text from one place to another. Follow these steps:

1. Select the text you want to move or copy.
2. To move, choose the Edit menu's Cut command. To copy, choose the Edit menu's Copy command.
3. Move the insertion point to the place where you want to move or copy your text.
4. Choose the Edit menu's Paste command.

This simple procedure can be used to move or copy text from one place to another in the same document, from one document to another created by the same application, or from one application to an entirely different application.

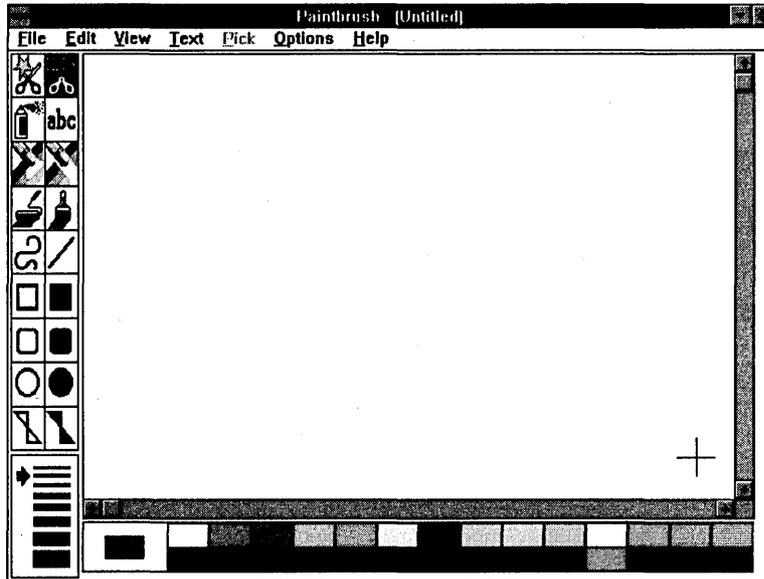
For more information about using the Clipboard, see Chapter 5, "Exchanging Information: The Clipboard, ClipBook Viewer, and OLE," page 167.

Working with Graphics

A few generalizations can be made about entering and editing material in graphics documents.

First, most graphics programs provide a set of *tools* for adding objects to an image or editing existing objects. Typically, the tool set is presented as an icon *toolbox* alongside or below the program's work area. In the illustration on the next page, which shows the desktop accessory Paintbrush with a blank canvas, the toolbox is the set of icons to the left of the canvas.

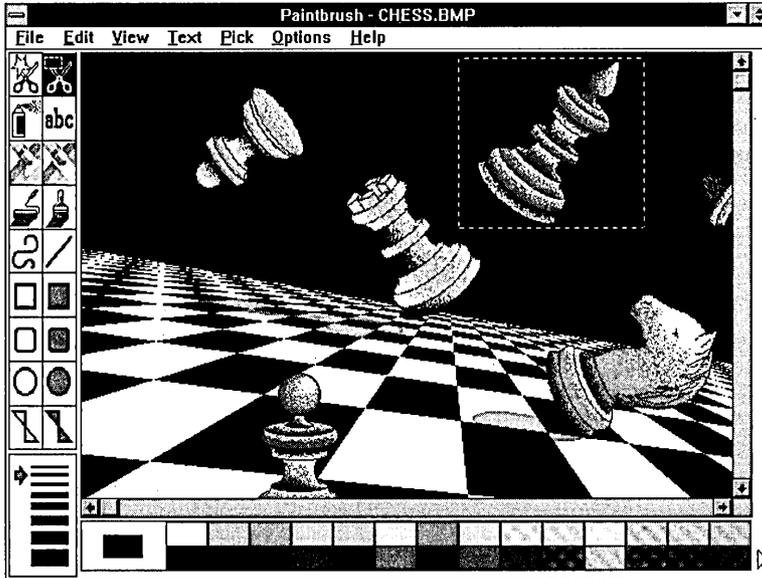
The icon with the diagonal line, about halfway down the toolbox, is a *line tool* and allows you to add straight lines to the drawing. The rectangles, rounded rectangles, and circles below the line tool allow you to create various kinds of shapes, and so on. You choose a tool from the toolbox by clicking its icon or using the keyboard's Tab and direction keys.



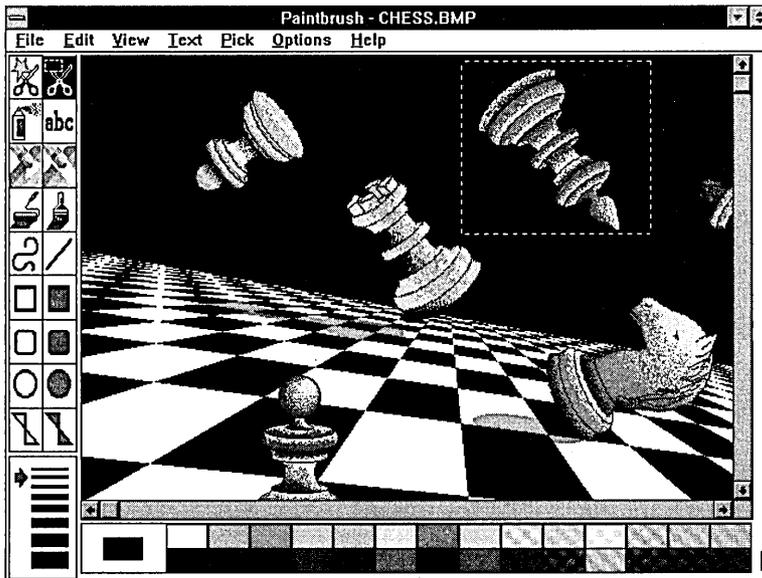
Notice the big cross in the lower right corner of the work area. That's the graphics equivalent of a text window's I-beam. You move the cross with the mouse to tell the program where you want to position a new object or modify an existing one. (Graphics programs commonly use other pointer shapes in addition to the cross. The shape of the pointer typically varies with the kind of graphics tool you're using.)

Graphics programs, like text programs, employ the concept of the selection. In Paintbrush, for example, you can select a rectangular portion of an image by using the *pick* tool—the scissors with the rectangle in the upper right corner of the toolbox. In the illustration at the top of the next page, a chessman has been selected (it's enclosed in the dotted rectangle), and that portion of the image can now be cut or copied to the Windows Clipboard.

A graphic image cut or copied to the Clipboard can be pasted into a different part of the same image, into another graphic image, or into a text document (provided the text application is able to accept images). The desktop accessory Write is an example of a text program that can handle graphics pasted from the Clipboard. (For more information about using graphics in Write, see "Including Pictures in Write Documents," page 425.)



When a portion of an image has been selected, it can be manipulated in various ways, just as selected text can be formatted in a text document. Here, for example, the selected chessman has been turned on its head.





For more information about Paintbrush, see Chapter 16, “Using Paintbrush,” page 473.

Working with Fonts

Windows offers the ability to print documents in a variety of typefaces and styles. Even with inexpensive dot-matrix printers, many Windows-based applications make it easy for you to generate reports, letters, and memos whose impact is enhanced by the power of typography. Understanding the basics of font terminology and technology will help you get the most out of your work in Windows NT.

Terminology

A *font* is a complete set of characters in one size and one typeface. For example, all the letters, numbers, punctuation marks, and other symbols available in 12-point Courier New bold italic constitute one font. The same set of characters in another size constitutes another font.

Fonts are identified by their size, typeface family, weight, and style. In the name “12-point Courier New bold italic,” for example, 12-point is the size, Courier New is the typeface family, bold is the weight, and italic is the style. When the weight is “normal” and the style is “roman,” these terms are usually omitted.

Font Size

A font’s size is usually measured in points and expressed as a “point size.” A *point* is a printer’s measurement, equal to 1/12 of a *pica*, or approximately 1/72 of an inch. A font’s point size is approximately the distance in points from the top of its highest character to the bottom of its lowest character. (This definition applies to a font’s printed size only. On screen, point size has no absolute significance at all, because of the differences in screen size. For example, a 10-point font on a 16-inch screen might be larger than a 12-point font on a 14-inch screen.)

Point size is a rough measure of a font’s height but says nothing about width. Many font families come in *compressed* and *expanded* variants, as well as normal widths.



Style and Weight

The most common *style* variants for fonts are roman and italic. Roman characters are the “normal” kind, with straight up-and-down strokes predominating. Italic characters, which are forward slanting and often more rounded, are used for emphasis, for titles of books, and so on.

The term *weight* refers to the thickness of a font’s strokes. The most common weights are normal (also called regular) and bold, but some font families also include other weights, such as thin, light, heavy, ultra, and black.

Serif and Sans Serif Fonts

Most fonts fall into one of two categories—*serif* or *sans serif*. Serif fonts have fine lines that finish off the main strokes—for example, at the bottom of a capital *T* and the ends of the *T*’s crossbar. These “finishing strokes,” called serifs, are absent in sans serif fonts. Serif fonts, such as Times New Roman, are generally considered more suitable for conventional text, such as that in a newspaper or book. Sans serif fonts, such as Helvetica and Arial, have a more modern appearance and are often used in headlines, tabular material (such as spreadsheet reports), and advertising.

Monospaced and Proportionally Spaced Fonts

Fonts in which every character takes up the same amount of space are called *monospaced*. Fonts in which some characters (such as *m* and *w*) are wider than others (*i* and *t*, for example) are described as *proportionally spaced*. Proportionally spaced fonts produce a more typeset appearance and are generally considered easier to read. Monospaced fonts are often preferred for such things as legal documents, which have traditionally been produced on typewriters.

Arial and Times New Roman are examples of proportionally spaced fonts. The most commonly used monospaced font is Courier.

Note that although the widths of letters in a proportionally spaced font vary, the widths of numerals are usually all the same—so that numbers can be aligned in tables.

Scalable and Nonscalable Fonts

Fonts can be described as being either *scalable* or *nonscalable*. Scalable fonts are fonts that can be used at any number of different point sizes.



Nonscalable fonts are designed for use at particular sizes; enlarging or reducing them generally produces unattractive distortions (serrated diagonal lines, for example).

Nonscalable fonts are sometimes described as *bit-mapped fonts*. That's because the form in which they're stored on your hard disk (or in a printer cartridge) records the relative position of each dot comprising each character. For example, a capital *I* might be stored as a column of twelve dots plus two six-dot crossbars. To generate a character from a bit-mapped font, your video or printing hardware simply reproduces the bit map at the desired location.

Most scalable fonts are stored as outlines; such fonts, therefore, are often called *outline fonts*. An outline is a mathematical description of each character in the font. Before characters from an outline font are rendered on your screen or printer, font-management software converts them to bit maps, using a process called *scan conversion*. To avoid jagged lines and other distortions in the final rendering, particularly at smaller point sizes, the font-management software also employs *hints*—algorithms that modify the scan-conversion process to produce optimal-looking characters.

Because outline fonts are stored as mathematical descriptions rather than as fully realized bit maps, they can be scaled to a wide range of point sizes. They can also be slanted, rotated, compressed, extended, inverted, and otherwise manipulated. Their *metrics* (character-width specifications) can also be modified as needed to produce kerned or letterspaced typography. The one small disadvantage of outline fonts is that the scan-conversion process takes a modest amount of processing time. The first time you use an outline font at a given point size, therefore, you might encounter a slight delay while your system performs the calculation required to convert the font's outline into the appropriate set of bit maps. After the bit maps have been rendered, however, they're stored in an area of memory called a *cache*. When you need to reuse the font, Windows simply grabs the bit maps out of cache memory, thereby avoiding the original calculation delay.

Fonts Supplied with Windows NT

Incorporated into Windows NT is a scalable font technology called TrueType. Along with this font-management technology, Windows NT includes five TrueType typeface families—Arial, Times New Roman, Courier New,



Symbol, and Wingdings. Arial is a sans serif typeface that's similar to Helvetica. Times New Roman is a serif face similar to Times Roman. Courier New is a monospaced serif face, and Symbol is a serif face consisting of the Greek alphabet plus a few mathematical and phonetic symbols. Wingdings is a collection of icons, symbols, and "dingbat" characters that you can use to enliven your documents. The TrueType typefaces included with Windows are each available in four styles—roman, italic, bold, and bold italic.

In addition to the five TrueType families, Windows NT also includes three *stroke* fonts, called Modern, Roman, and Script, and three sets of bit-mapped fonts—MS Serif, MS Sans Serif, and Courier.

Like outline fonts, stroke fonts are scalable. But they're based on a simpler scaling technology and produce much less satisfactory results. Their single virtue is that they produce characters consisting only of straight lines and hence can be used on non-raster output devices (devices that do not operate by positioning dots on an output medium) such as plotters. Because stroke-font characters consist only of straight lines, such fonts are also commonly called *vector* fonts.

The bit-mapped fonts are provided for compatibility with earlier versions of Windows. (MS Sans Serif was previously known as Helv, and MS Serif is the former Tms Rmn.) They're available only in certain point sizes, and you can't use them with laser printers.

Along with this assortment of font resources, you might find additional fonts available to you, courtesy of particular applications that you have installed. If you use Microsoft Word for Windows, for example, you will likely see a TrueType font named Fences listed in Word's Format Character dialog box. This font, used by Word's equation editor, becomes part of your Windows system automatically when you install Word. Other applications similarly install other fonts for their own use; typically, these fonts become available to any of your Windows-based applications.

Additional Font Resources

A number of type vendors provide fonts and font-management systems compatible with Windows NT. Adobe's Adobe Type Manager (ATM) for example, supports PostScript Type 1 fonts, an alternative to TrueType scalable fonts.



TrueType font packages sold for the MS-DOS versions of Windows (Windows 3.1 and Windows for Workgroups) should work without conversion in Windows NT. So should TrueType fonts designed for the Macintosh.

Your Printer's Own Font Resources

In addition to the fonts that Windows supplies and any additional fonts that you install in Windows, you can take advantage of any of your printer's internal font resources. Your printer driver tells Windows which fonts the printer provides, and those fonts appear in the Font dialog boxes used by your applications.

When you use your printer's own fonts, Windows doesn't have to download font information (or turn each page of your document into a bit map—a time-consuming process), so printing is likely to be quicker. In exchange for this speed increase, however, you might have to sacrifice some degree of correspondence between the appearance of your document on screen and its appearance on paper.

When you format a document with an internal printer font, Windows displays the same font on screen—if it can. For example, if you're printing to an HP LaserJet III (or a compatible PCL-5 laser printer) and you have installed Hewlett-Packard's Intellifont software, Intellifont generates screen fonts that match your printer's internal fonts.

If Windows does not have a screen font to match the printer font you select, it gives you the closest match that it can. For example, if you choose the Courier font that's built into your LaserJet Series II, Windows formats your text on screen with its own TrueType Courier font (Courier New). If you select your PostScript printer's Avant Garde font (and you have not installed Adobe Type Manager and the Avant Garde screen font), Windows uses the nearest TrueType equivalent (Arial) on screen. Both are sans serif fonts.

Even if the screen font used by Windows doesn't exactly match the printer font you select, Windows-based applications attempt to show you where your lines will break on the printed page. The correspondence of line endings on screen to line endings on paper might not always be perfect, however, and some applications do a better job of this than others. If precise text positioning is critical, it's always best to avoid printer fonts that don't have equivalent screen fonts.



Getting Help

Most applications for Windows include a Help menu as the rightmost command on the menu bar. Any time you're unsure how a feature or command works, you can pull down the Help menu and find useful information.

The Windows help facility is a hypertext system, which means that it lets you jump easily from one topic to another while keeping track of the path you follow. The system includes a Search command to help you find exactly the topic you're looking for, a Bookmark command with which you can flag topics of particular interest, an Annotate feature that lets you add your own comments to the built-in help text, a Copy command that lets you replicate important help messages in Notepad or your word processor, and a Print command to convey screen text onto paper.

Help appears in a full-fledged application window, complete with its own menu bar. You can maximize it and minimize it the same way you can any other application for Windows. The help window belongs to an application called WINHELPEXE. The text inside the window is a document file with the extension HLP. If you want to switch to a different program's help text, you can do so by using WINHELP's File Open command and selecting another HLP file.



WINDOWS TIP: While you're learning a new application, you might want to keep its help text available on your desktop. You can use Alt+Tab to switch quickly back and forth between the program and its help window. Alternatively, by choosing the Always On Top command from the help window's own Help menu, you can ensure that the help text remains visible no matter what you do within your application.



In many help screens, some of the text appears in a contrasting color and underlined. These *keywords* indicate topics about which the help facility has additional information to offer. To get that additional information, double-click the keyword.



KEYBOARD TIP: To see at a glance which keywords are available in the current help window, hold down the Ctrl key and Tab key.



KEYBOARD TIP: If you don't have a mouse, you can use the Tab key to skip from keyword to keyword. To get information about a topic, select its keyword and then press Enter.

Keywords with Dotted Underscores

Keywords underscored by a dotted line are defined terms, as opposed to major topics. Clicking a defined term pops up a definition window without changing the underlying screen. When you finish reading the definition, you can remove the definition window by clicking the mouse again.



KEYBOARD TIP: To pop up a definition window with the keyboard, press Tab to select the underscored term. Then press Enter. To remove the definition window, press Enter again.

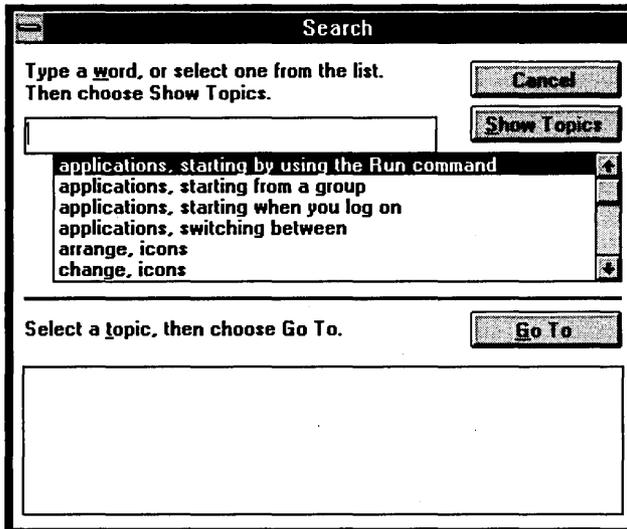
Some programs' help files include a Glossary button. Clicking this button gets you a listing of all defined terms in the help text.



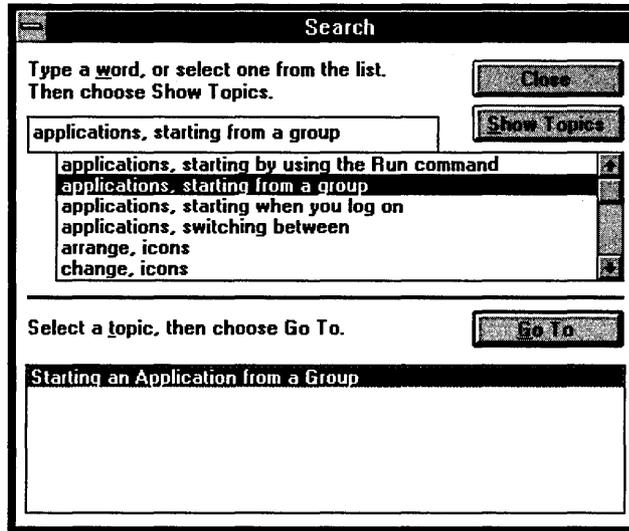
Finding Particular Topics with the Search Command

Scanning through a help document's table of contents is one way to find particular topics in which you're interested. You can redisplay the table of contents at any time by clicking the Contents button (or by reinvoking the Help Contents command in your application).

Another way to find a particular topic is to click the Search button or press Alt+S. When you do this, you see a display similar to the following illustration.



The upper list box in this dialog box lists the concepts and commands described by all the various topics in the current help document. When you select a concept and click the Show Topics button, the bottom list box reveals the names of all topics that discuss the selected concept. In Program Manager's help document, for example, if you select "applications, starting from a group" and click the Show Topics button (or press Enter), a topic appears in the lower list box, as shown on the next page.



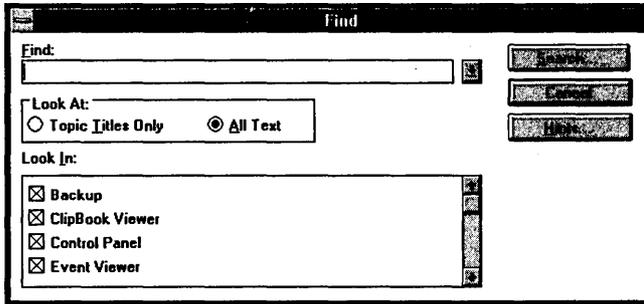
To read a topic, select its name in the lower list box, and click Go To (or press Enter).



KEYBOARD TIP: A quick way to move directly to a concept in the Search command's upper list box is simply to begin typing in the text box. As you type, Windows searches through the list and displays those concepts beginning with the letters you have typed.

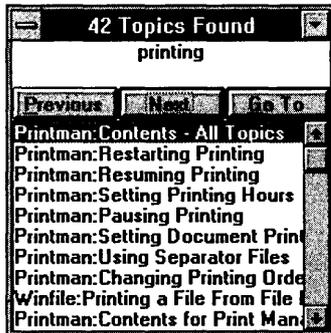
Searching for Help Topics Across Multiple Applications

The Windows NT help engine also includes a facility that lets you search for topics from multiple help documents. To see how this feature works, pull down Program Manager's Help menu, choose Contents, and then click the button marked Find. The following dialog box appears.



On the Find line, type the topic you're interested in. In the Look At section, tell the system whether you want it to search help topic titles only or the full topic text. In the Look In section, select the check box for each application you want the help facility to search. Then click the Search button.

In a moment, a "browser" box appears, listing all the available topics. Here's an example of what the browser box might look like:



Now you can use the Go To, Next, and Previous buttons to read any topic that interests you.



WINDOWS TIP: The Find command can also perform "proximity" searches. For details, click Find, and then click Hints.



Retracing Your Steps

A hazard of using some hypertext-style information systems is that you can lose your way while exploring the web of interrelated topics. You might want to reread the screen you looked at moments ago, but not remember how to get back to it.

Fortunately, the Windows help system keeps track of every move you make. You can retrace your steps at any time, simply by clicking the Back command button or pressing Alt+B.

You can also use the History button to revisit a topic you read earlier without tracing through all the intervening steps. Clicking History (or pressing Alt+T) presents a list of the topics you've displayed in the current Windows session.

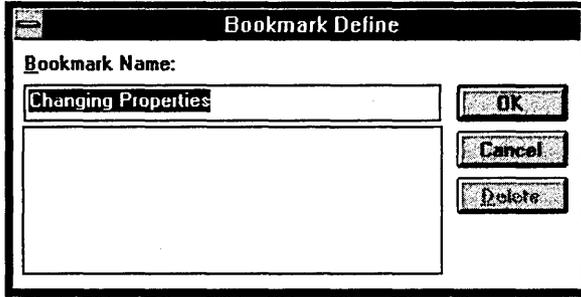
Both the Back command and the History command can take you from the current help document to a document you've read earlier in the current Windows session.

Using the Browse Buttons

Some help documents include a pair of arrow buttons, one pointing left, the other pointing right. These buttons provide "browse" services for the current document, moving you between logically related topics. When you're first learning a new application for Windows, check to see if its help document includes these browse buttons. They can offer an excellent way to learn about your new program's features.

Setting Bookmarks

The Back and History commands are useful for revisiting topics you've read during the current working session, but they won't help you relocate information you found useful three days ago. If you want to have certain topics at your fingertips at all times, you might want to flag them with a bookmark. To do this, first display the topic. Then pull down the Bookmark menu, and choose Define. You'll see a dialog box like the one shown on the next page.



The top part of this dialog box displays the name of the topic you're looking at. The bottom part lists any bookmarks you've previously defined in the current help document.

To define the bookmark, click OK or press Enter. If you want, you can change the name of the bookmark before clicking OK.

After you define a bookmark, the name of that bookmark appears on the Bookmark menu, with a number next to it—like this:



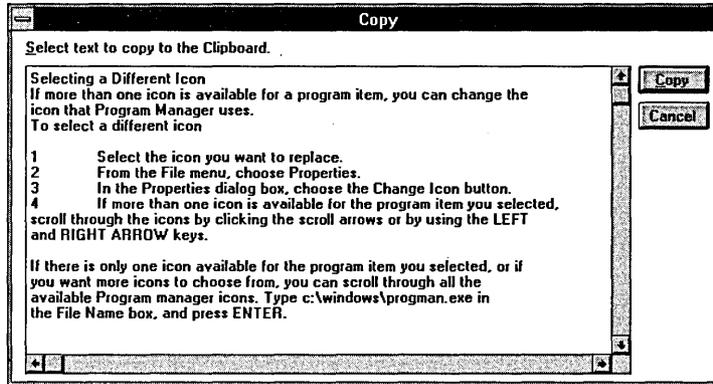
To find your way back to the flagged topic, simply pull down the Bookmark menu and choose the appropriate item.

Printing Help Topics

The Print Topic command, on the File menu, does just that—it prints the current help topic on the default printer. To print on a different installed printer, first choose the File menu's Print Setup command, and then select the printer you want to use from the list that appears.

Copying Information from the Help System

To copy some information from a help document into another application, first display the information you want to copy. Then choose the Edit menu's Copy command. You'll see a dialog box similar to the one shown on the next page.

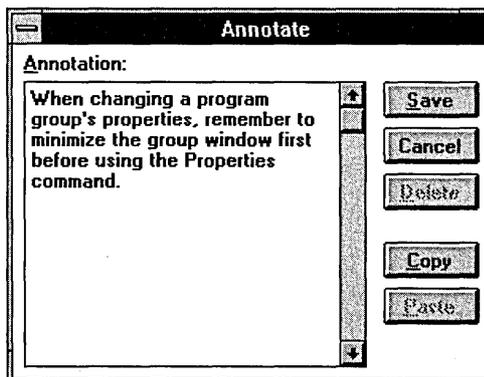


The dialog box displays the entire text of the current help topic. To copy the entire topic, simply click the Copy button. To copy a portion of the topic, select the part you want to copy, and then click the Copy button.

The Copy button transfers a copy of the selected text to the Windows Clipboard. To move the information into another application, simply use that application's Paste command.

Using the Annotate Command to Add Your Own Help Messages

The Edit menu's Annotate command allows you to add your own text to a help document. To annotate a help topic, first display that topic. Then pull down the Edit menu and choose Annotate. The dialog box that appears has a large area in which you can type your comments. Here's how it might look with an annotation for the Change Properties topic:





After you fill out the Annotation dialog box and click Save or press Alt+S, a paper-clip icon appears to the left of the annotated topic.

To reread your annotation, click the paper clip—or tab to it and press Enter.

Getting Help on Help

Because the help facility is an application in its own right, it has its own help document. You can get help on using Help in either of two ways:

- ▣ Within any application that uses the help facility—Program Manager, for example—pull down the Help menu and choose How To Use Help.
- ▣ Within the help facility itself, pull down the Help menu and choose How To Use Help. (Pressing F1 is the keyboard shortcut.)

Either way you access it, the help facility appears with a document called WINHELP.HLP.



Managing Programs with Program Manager

- | | |
|---|-----------|
| Program Groups and Program Items | 57 |
| Program items are launchpads for applications. Program groups are windows containing sets of related program items. | |
| Working with Group Windows and Icons | 59 |
| Program Manager has handy commands for tiling and cascading group windows. | |
| Personal and Common Program Groups | 61 |
| Personal groups are for your eyes only. Common groups are for everyone. | |
| Customizing Program Groups | 62 |
| Windows NT provides a few groups to get you started. You'll want to make more of your own. | |

Customizing Program Items for Your Applications **64**

You can move and copy items between groups with simple drag-and-drop maneuvers.

Starting Programs with the Run Command **75**

The quickest way to start a program is to double-click its program item. But sometimes the Run command is handier.

The Minimize on Use Command **76**

This handy command gets Program Manager out of the way when you launch a new application.

Saving Settings **76**

There are two ways to preserve the layout of your program groups.

F

or most users, a Windows NT session starts and ends in Program Manager. The logon process ordinarily leaves you in Program Manager (it does so unless your account has a logon script that takes you elsewhere), and when quitting time comes, you probably use the Shutdown or Logoff command on Program Manager's File menu.

In addition to starting and ending Windows sessions, Program Manager serves two vital purposes: It gives you a simple way to start applications, and it makes it easy for you to organize your programs and documents into logical working groups.

Program Groups and Program Items

Program Manager's application window contains one or more document windows called *program groups*. Each program group contains icons called *program items*. (See the illustration on the next page.) You start a program from Program Manager by selecting its program item and pressing Enter—or, more simply, by double-clicking the program item. You can select a program item either by using the direction keys or by clicking it.

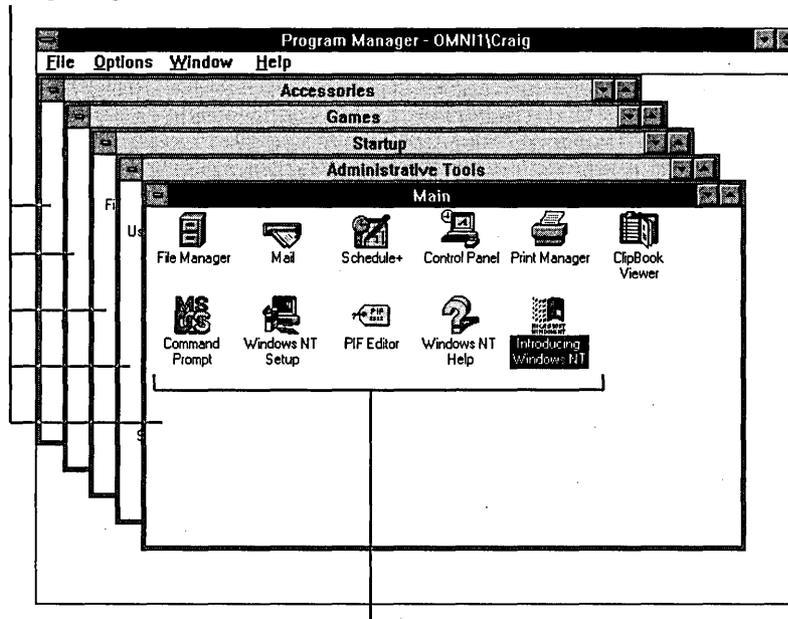


KEYBOARD TIP: You can also select a program item in the active window by typing the first letter of its name. This navigation method works the same way in a program-group window as it does in any Windows list box.

A program item can be *associated* with one or more specific document files, so that the program automatically loads the specified documents into memory when you start the program. For example, if you frequently use the spreadsheet application Microsoft Excel with two worksheets named EAST.XLS and WEST.XLS, you can create a program item to start Microsoft Excel with both worksheets already in place. Or if you have a half dozen worksheets you use more often than any others, you can create separate program items for the combination of Microsoft Excel and each of those worksheets.



Program groups



Program items

Program Manager is extremely malleable; you can set it up in whatever manner best serves your working style, and you can easily modify your setup as your needs change. Program Manager lets you organize your applications and documents in logical groups. These groups have nothing to do with the directory structure on your hard disk. (To reorganize your files as they're stored on your hard disk, use File Manager. For more information about File Manager, see Chapter 3, "Managing Files, Directories, and Disks with File Manager," page 77.)

Program Groups Created When You Install Windows

When you install Windows, the Windows Setup program creates several program groups for you. It puts program items for certain essential Windows programs—including Control Panel, File Manager, Print Manager, ClipBook Viewer, and Setup itself—in a program group called Main. For Minesweeper, Solitaire, and FreeCell, Setup creates a group called Games. And



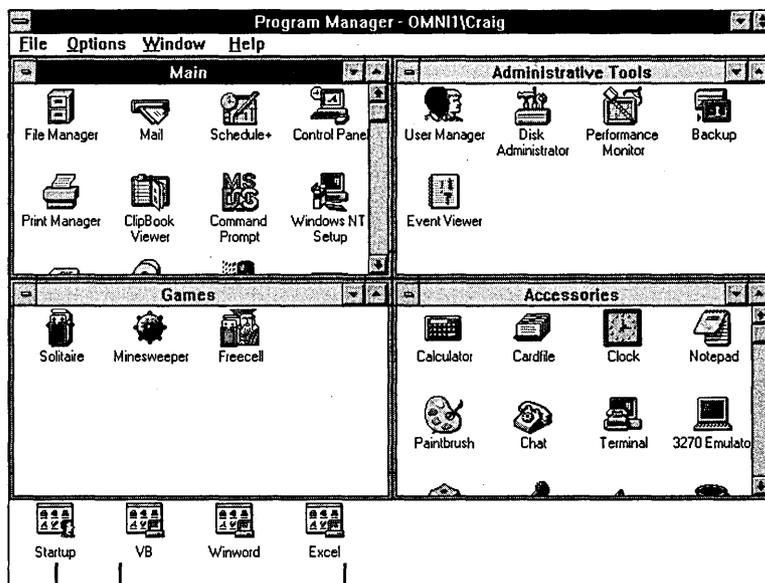
it lumps together the Windows desktop accessory programs—Notepad, Write, Terminal, Calculator, and so on—in a group called Accessories. Setup also creates an Administrative Tools group and a group called Startup.

Using the Startup Program Group

A program group with the name Startup gets special treatment from Program Manager. Any program items in this group are automatically launched at the beginning of every Windows session. Items for which you've checked the Run Minimized box are launched as icons (see "Starting a Program Item as an Icon," page 69); the others are launched as open windows.

Working with Group Windows and Icons

Program-group windows, shown below, are ordinary document windows in all respects except one.



Personal group

Common groups

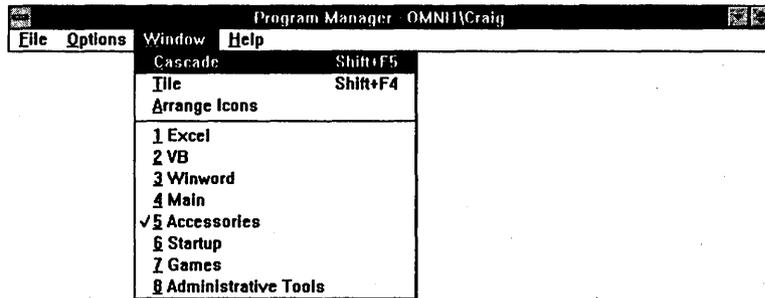


They can be maximized, moved, sized, restored, and minimized, but you can't close them. (If you double-click a program group's Control-menu box, Program Manager minimizes the group window.) When program groups are minimized, their icons all look alike, except for the identifying text beneath them.

Minimizing program groups that you're not using lets you focus on the ones you are.

Using the Window Menu

The Window menu, shown below, has a command for each program group, so you can activate any group window by choosing the appropriate command.



You can also use the Window menu to cascade or tile all or some of your program-group windows. The Cascade and Tile commands affect open windows only, so you can minimize the groups you don't currently need and tile the rest, as shown on the previous page.



WINDOWS TIP: Choosing the Tile command with only one program group open makes that group as large as it can be without covering the other groups' icons.



Arranging Program Items

With the mouse, you can drag program items from one place to another within a program group. For example, if you use particular programs more often than others, you can put their icons in the upper left corner of the program-group window. If you have several icons for the same program (each associated with a different document file), you can put them all together—and so on.

Getting icons lined up neatly with the mouse can be a trial, however, so Program Manager's Options menu includes a command called Auto Arrange. If this command is selected (that is, if a check mark appears beside it), Windows automatically keeps your icons in orderly rows any time you rearrange them. If you elect not to use the Auto Arrange command, you can still tidy up the current program group at any time by using the Arrange Icons command on the Window menu.

The Arrange Icons command is also useful for straightening up the icons that represent closed program groups. If your program-group icons get out of line, simply select any one of them, pull down the Window menu, and choose Arrange Icons.

Personal and Common Program Groups

Program Manager uses two kinds of program groups, called *personal groups* and *common groups*. Personal groups belong to particular user accounts, whereas common groups belong to all accounts. Thus, personal groups that you create (or that were created for you by Setup or by your system administrator) appear only when you are logged onto Windows NT. When someone else logs on at your workstation, that person sees his or her personal groups, not yours. Common program groups, on the other hand, are seen by all users of your workstation.

You can distinguish between a personal group and a common group by looking at its title bar or its icon. The title bars of common groups include the word *common*. The title bars of personal groups show only the group's name. The icons for common groups include a computer; the icons for personal groups include a face. (See the figure on page 59.)



WINDOWS TIP: If, while logged on as a member of the Administrators or Power Users group, you install programs written for earlier versions of Windows, those programs are likely to create new common program groups for themselves. If you prefer not to share the new groups with other users, you'll want to create new personal groups, move the items from the common groups to the personal groups, and then delete the common groups.

To create or delete common program groups, your user account must belong to either the Administrators or Power Users group. If you are not a member of either group, you can copy program items from common groups into personal groups, but you can't modify the common groups. For more information about the Administrators and Power Users groups, see "Groups," page 317.

Customizing Program Groups

You're not limited to using the program groups created by the Setup program. You can add new groups, rename groups, or delete groups to suit your needs.

Creating New Program Groups

The steps to create a new program group are as follows:

1. Choose the New command from the File menu.
2. In the dialog box that appears, choose Personal Program Group or Common Program Group. (The latter option is grayed out if your account does not have the authority to create common program groups.)
3. In the next dialog box, type the name you want to appear in the title bar of your new group.
4. Click OK.



WINDOWS TIP: When you first install Windows, Program Manager is organized by application type. Accessories furnished with Windows are in one group, other applications in another, and so on. Other organizational schemes are possible and might serve your needs better. For example, you can create program groups for each broad category of your work. If you're primarily a spreadsheet user, you can create a group called Budgeting, another called Forecasting, and so on. If you're self-employed, you can create a separate group for each of your clients. The possibilities are endless.

Renaming Program Groups

To rename a program group, follow these steps:

1. Minimize the program-group window you want to rename.
2. Click the group's icon.
The Control menu for the program-group window pops up. You can ignore it.
3. Choose the Properties command from the File menu.
The Program Group Properties dialog box appears.
4. Enter a new name in the Description text box, and click OK.



KEYBOARD TIP: To rename a program group with the keyboard, first minimize the program group's window. Then press Ctrl+Tab or Ctrl+F6 until the group's icon is highlighted. Then choose the File menu's Properties command, and fill out the dialog box.



Deleting Program Groups

To delete a program group:

1. Minimize the program-group window you want to delete.
2. Click the group's icon.
The Control menu for the program-group window pops up. You can ignore it.
3. Choose the Delete command from the File menu.
Windows presents a confirmation prompt.
4. Click OK to confirm the deletion.

Be careful when deleting program groups. When you delete the group, you delete all the program items inside as well. You won't delete any files on disk when you delete a program group, but if you take out the wrong group by mistake, you have to rebuild it from scratch.

Customizing Program Items for Your Applications

It's easy to modify program groups and program items as your needs and preferences change. You can rearrange the furniture at any time with a few simple mouse actions.

Moving Program Items Between Program Groups

The easiest way to move program items is by dragging with the mouse. Alternatively, you can use the File menu's Move command.

For example, suppose you use the Windows Terminal program often, but you seldom use Write, Notepad, or any of the other desktop accessories included in your Windows package. In this circumstance, you might prefer to move the Terminal icon from your Accessories group (which you rarely use) to your Applications group.

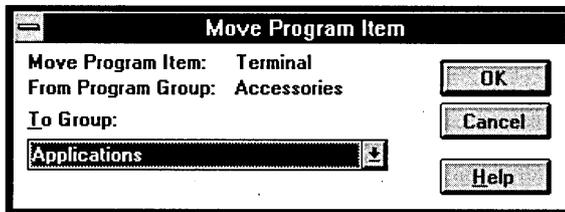


To move Terminal with the mouse, you would proceed as follows:

1. Set up Program Manager so that your Accessories and Applications windows are both open. (One easy way to do this is to minimize all your other program groups and then use the Tile command.)
2. Put the mouse pointer on the Terminal icon.
3. Hold down the mouse button and drag Terminal to the Applications group.
4. Release the mouse button.

If you prefer working with the keyboard, you can perform the move as follows:

1. Make Accessories the active program group.
2. Press T to select the Terminal icon.
3. Press Alt, F, M to choose the File menu's Move command. Program Manager presents the dialog box shown below.



4. Press Alt+Down to open the drop-down list box, and then use the Down direction key to select Applications.
5. Press Enter.

Copying Program Items

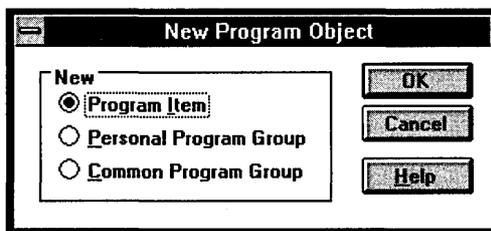
Copying a program item is as easy as moving it. With the mouse, simply hold down the Ctrl key while you drag the item from one window to another. With the keyboard, select the item you want to move. Then press Alt, F, C to choose the File menu's Copy command. This command works exactly like the Move command described in the preceding section.



WINDOWS TIP: You can copy a program item within a program group as well as between program groups. You might want to create several copies of an application's item within the same window, and then modify some of them to associate different document files with the application. For more information, see "Changing a Program Item's Properties," page 73.

Creating New Program Items

To add a new program item, begin by activating the group window in which you want the new item to reside. (It must be a group for which your account has permission to add a program item.) Then pull down the File menu and choose New. Program Manager presents the following dialog box.



MOUSE TIP: You can also get to the New Program dialog box by holding down the Alt key and double-clicking in a blank area of the program group to which you want to add the new item.

The default option is Program Item, so all you need to do is click OK, or press Enter. You see the following dialog box.



Program Item Properties

Description: **OK**

Command Line: **Cancel**

Working Directory: **B**rowse...

Shortcut Key: **C**hange Icon...

Run Minimized **H**elp

The information you supply in this dialog box constitutes your program item's *properties*. Only one property is mandatory—the Command Line. If you leave the other areas of the dialog box blank, you can always come back later and fill them out—or change them. For more information, see “Changing a Program Item’s Properties,” page 73.

Describing a New Program Item

In the Description text box, type whatever you want to appear beneath the new program-item icon. Windows NT wraps long descriptions onto two or three lines if necessary, so you don’t need to be terse. The description text will appear beneath the icon in Program Manager—but not beneath the icon that the application displays when minimized. (There’s at least one exception to this rule, however. For more information, see “Changing Program Manager’s Title-Bar Text,” page 70.)

You can enter up to 40 characters in the Description text box. If you leave the box blank, Program Manager supplies a description for you.



WINDOWS TIP: If you don’t want any text to appear beneath your program item, type a space on the Description line.



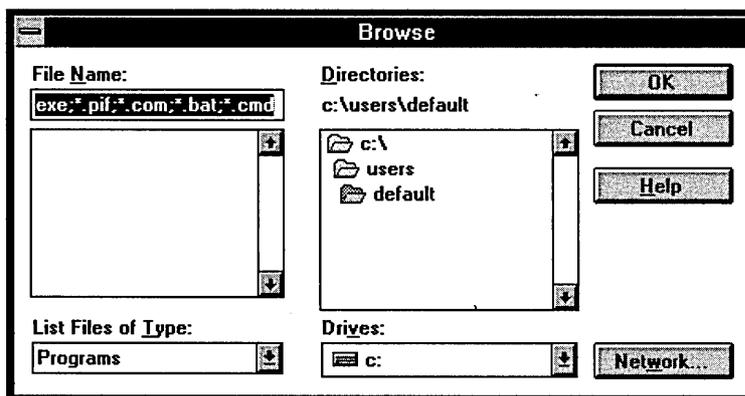
Specifying the Command Line

The Command Line text box is where you tell Program Manager what you want it to do when you launch your new program item. You must supply something in this part of the dialog box; the OK button will be grayed out until you do.

To launch a program by itself, without a particular document file, simply enter the name of that program's executable file. For example, suppose you want to create an item that launches the Wizzy Word Processor from WizzyWare, Inc. If the executable file for this program is named WZ.EXE and you've stored it in your Windows directory, you would type *wz.exe* in the Command Line text box.

If the executable file is not stored in your Windows directory but is stored in a directory included in your system's Path environment variable, you can omit the path in the Command Line text box. It's a good idea to type the complete path, however. That way, Windows will always be able to start your program, even if you subsequently change the Path variable.

If you don't know which directory your program's executable file is stored in, if you aren't sure how to spell its name, or you just don't feel like typing, you can call on the Browse button for help. Click Browse, and Program Manager presents a dialog box like the one shown below.



When you select a filename and click OK, you'll be returned to the Program Item Properties dialog box with your command line in place.



Specifying a Working Directory

The Working Directory text box gives you the opportunity to make a particular directory current when Windows starts your program. You might want to fill out this line if you expect to use documents stored in a particular directory. For example, you can create a program item tailored to working with files stored in your C:\PERSONAL directory by entering *c:\personal* in the Working Directory text box.

Starting a Program Item as an Icon

If you want your program item to be launched as a minimized window, put a check in the Run Minimized box. This option is particularly handy for program items launched via the Startup program group.

Assigning a Shortcut Key

A shortcut key lets you switch easily to the program or document launched by your new program item. For example, if you assign Ctrl+Alt+W and Ctrl+Alt+S as shortcuts for your word processor and spreadsheet, respectively, you can switch between those programs quickly and easily by pressing the appropriate key combinations.

A shortcut key also makes it a little easier to launch your program item. As long as Program Manager itself is the active window and at least one of your program groups is open (it can be any group; it doesn't have to be the one that contains the item you want to launch), you can launch a program item by pressing its shortcut key. So if you use a lot of program groups and have trouble remembering which one contains which programs, try assigning shortcut keys and memorizing them instead!

Program Manager allows you to assign any of the following combinations as a shortcut key: Ctrl+Alt+*Key*, Ctrl+Shift+*Key*, Shift+Alt+*Key*, or Ctrl+Shift+Alt+*Key*, where *Key* can be anything other than Esc, Backspace, Enter, Tab, Del, Shift, Alt, or Ctrl. To assign a shortcut key, simply move the insertion point to the Shortcut Key text box, and press the key combination you want.

When you close the Program Item Properties dialog box, Program Manager checks to be sure you haven't assigned your new item a shortcut key that's already in use. If you have, you'll see a warning message, and you'll have an opportunity to choose a different shortcut. "Overbooking" your shortcut keys is legal but inadvisable.



Using Shortcut Keys to Switch Between Applications

Program Manager's shortcut keys are designed as conveniences for launching programs—saving you the trouble of opening group windows and hunting for program items. In some cases, however, you can also use a Program Manager shortcut key to switch to a program that's already running. For example, if you assign Ctrl+Alt+F to the File Manager program, then any time File Manager is running, you can switch from any application to File Manager by pressing Ctrl+Alt+F.

Not all programs work like File Manager, however. For example, if you assign a shortcut key to Write or Paintbrush, pressing that shortcut key from within another application (Terminal, for example) has no effect at all, whereas pressing the shortcut key again from within Program Manager launches a second copy of Write or Paintbrush.

In general, if a program permits multiple copies of itself to be open, shortcut keys serve as launchers only, not as switchers. If a program does not allow multiple copies, you might be able to use its shortcut key as a quick-switch command. You will need to experiment to see how your own programs behave.

Using a Shortcut Key to Switch to Program Manager

An undocumented technique makes it easy to switch directly to Program Manager by means of a shortcut key. Simply create a program item for Program Manager (the executable file is PROGMAN.EXE, and you don't need to specify a directory path for it), put the item in your Startup program group, and assign it a shortcut key the same way you would any other program item. The logon process ignores the Startup group's request to run Program Manager (because a copy of Program Manager will already be running) but records the shortcut key anyway.

Changing Program Manager's Title-Bar Text

Oddly enough, if you create a Startup group item for Program Manager, you can also change the text that appears in Program Manager's title bar (as well as under the icon when Program Manager is minimized). Program Manager's title bar normally includes both your computer name and the



name of your user account. If you'd rather see something plainer, such as John's Program Manager (or just Program Manager), simply type your preferred text on the Description line of the New Program Item dialog box.

Creating Program Items with File Manager

If you have a mouse, you can create new program items by opening File Manager and dragging filenames from one of File Manager's windows to a Program Manager program group. For more information about creating items this way, see "Using File Manager to Create Program Items," page 121.

Creating Program Items with the Setup Program

When you first install Windows, the Setup program creates program items for the applications that it recognizes on your hard disk (if you select the Set Up Applications option). If you choose to bypass this step or if you've added new programs to your system since you installed Windows, you might want to rerun Setup and let it search your hard disk again.

You can rerun Setup whenever you please. Simply double-click its icon in the Main program group. For more information about Setup, see "Using Setup to Create Program Items," page 769.

Creating Program Items to Launch Documents

Windows maintains a list of *associations* between document filename types and the applications in which the documents are created. It knows, for example, that files with the extensions WRI and TRM belong to Write and Terminal, respectively. Any filename whose extension is included on the associations list can be launched directly from a program item.

For example, let's say you use Terminal once or twice a day to log onto MCI Mail, a public electronic mail service. You've created a Terminal document, called MCIMAIL.TRM, that specifies the MCI Mail telephone number, the communications settings you use to dial this service, your password, and so on. (For more information about Terminal, see Chapter 15, "Using Terminal," page 441.)



PART 1: Introducing Windows NT

Because you regularly use the same application (Terminal) with the same document (MCIMAIL.TRM), you can make your life a little easier by connecting the two in a single program item. It's easy to do:

1. Activate the Accessories program group (or whichever program group you want your MCI Mail item to reside in).
2. Open the File menu, choose New, choose Program Item, and press Enter.
3. In the Description text box, type the text you want to appear under the MCI Mail icon.
4. In the Command Line text box, type *mcimail.trm*.
5. Fill out the remainder of the dialog box as appropriate, and then click OK.

Program Manager adds your MCI Mail program item to the Accessories program group.

If you're not sure whether an association exists for the type of document you want to launch, go ahead and create the program item on the assumption that it does. If you're mistaken, you'll get a polite error message. Click OK to return to the Program Item Properties dialog box. Then amend the Command Line entry to include the name of your program as well as the document file you want to launch.

For example, suppose you attempt to create a program item for a document called REPORT.WZ, created by your Wizzy Word Processor. If the extension WZ hasn't been associated with WZ.EXE, Program Manager responds with an error message. Click OK to acknowledge the message, and then change the Command Line text box to read

```
wz.exe report.wz
```

To add to or change the associations list, you can use File Manager's Associate command. For more information about associations, see "Associating Documents with Programs," page 97.



WINDOWS TIP: If your Windows-based application can work with two or more documents at once, you can create program items that launch multiple documents. To do this, specify the name of the executable file (even if an association exists for the type of document you want to launch), followed by the name of each document. Separate the names with space characters. For example, to load Microsoft Excel with the worksheets EAST.XLS and WEST.XLS, create a program item with the following command line:

```
c:\excel\excel.exe east.xls west.xls
```

Changing a Program Item's Properties

The File menu's Properties command lets you change the properties associated with a program item. You might want to do this for any of several reasons: because you've moved a program's executable file to a new directory, because you want an item to launch a different document file, because you want to change the descriptive text that appears under the item's icon, or because you want to change the icon itself. Whatever your reason, choosing the Properties command takes you back to the same dialog box you filled out when you created the item, allowing you to make the appropriate modifications.



WINDOWS TIP: You can also get to the Properties dialog box by selecting an icon and pressing Alt+Enter. Or you can hold down the Alt key and double-click the item.

Changing a Program Item's Icon

Ordinarily, when you create a new program item, Program Manager uses the same icon that the application itself uses when minimized. But if the program happens to use other icons for other purposes, you can select one

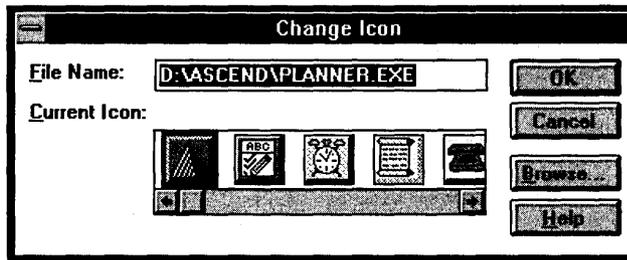


of those other icons for your program item instead. For example, the time-management program Ascend uses the following symbol as its main icon—the one that appears at the bottom of the screen when you minimize Ascend.



But it also uses numerous other icons as shortcuts for various commands within Ascend. You can select any one of the program's many icons to represent Ascend in your program group.

To change the icon assigned to a program item, invoke the Properties dialog box, as described above. Then click the Change Icon button. You'll see a dialog box similar to the following:



Select the icon you want to use (use the scroll bar to bring additional icons into view if necessary), and then click OK twice—once to return to the Properties dialog box, a second time to return to Program Manager.

Using Another Program's Icons

The dialog box that appears when you click Change Icon includes a File Name text box. The default entry in this box is the name of the program whose item you're modifying. By entering a different filename here, you can appropriate an icon from another program.

You can also link a program item to an icon that is not part of an executable file—for example, to an icon that you create yourself with an icon-editor program. Many public bulletin boards and online information services (such as the WINSHARE forum on the CompuServe Information Service) have public-domain or shareware icons available for downloading.



Such icons may be stored in stand-alone files (common extensions are ICN and ICO) or in icon-library files. Simply specify the name of the file containing the icons in the Change Icon dialog box, and then select an icon from the scrollable display.

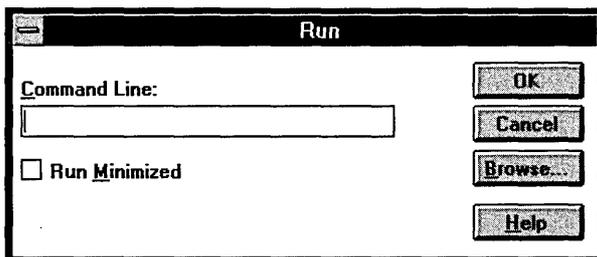
Deleting Program Items

Because program items take up a fair amount of space in your program-group windows, it's a good idea to delete them when they're no longer needed. To delete a program item:

1. Activate the program group containing the item you want to delete.
2. Select the item by clicking it or highlighting it with the direction keys.
3. Press Del, or pull down the File menu and choose Delete.
4. Click Yes in response to the confirmation prompt.

Starting Programs with the Run Command

Program items are the most convenient way to start programs that you use frequently. When you want to run a program only once—for example, the installation program for a new software package—you'll probably find it simpler to use the File menu's Run command. When you choose this command, Program Manager presents the following dialog box.



Enter the name of your program in the Command Line text box. Check the Run Minimized box if you want the program to start as an icon instead



of an open window. (You might want to do this if your program doesn't require input from you or if you're not planning to work with the program immediately.) Then click OK.

If your program is not stored in the current directory or in a directory included in your Path environment variable, be sure to include the full path specification in the dialog box.

Finding Files with the Browse Button

If you need some help filling out the Command Line text box, click the Browse button. You'll see the dialog box pictured on page 68. When you select a filename in the Browse dialog box and click OK, Windows takes you back to the Run dialog box, with the selected name in place. All you need to do then is click OK one more time to run your program.

The Minimize on Use Command

After you've used Program Manager to start a program, it's nice to have Program Manager out of the way (unless you immediately need to launch another program). If you choose the Minimize on Use command from the Options menu, Program Manager automatically reduces itself to an icon each time you launch a program.

Saving Settings

The Options menu includes two commands for saving the layout of your program groups. If you choose Save Settings on Exit, Program Manager will do just that—record window positions every time you log off. This adds a moment or two to the logoff process but ensures that Program Manager starts each session looking the way it did when you quit the previous session.

If you're like many users, however, you might always want Program Manager to start off looking a particular way, no matter how you rearrange the windows during the course of a session. If that's the case, you should deselect the Save Settings on Exit command. When you get your program groups arranged the way that best suits you (and the way you want them to appear at the start of your next session), choose Save Settings Now.

Managing Files, Directories, and Disks with File Manager

- | | |
|---|-----------|
| Exploring File Manager's Display | 80 |
| Each directory window in File Manager can be divided into two panes—
one for a directory tree and one to list files. | |
| Changing the Drive Display | 83 |
| Click a drive icon or press Ctrl plus a drive letter. | |
| Navigating Through a Directory Tree | 84 |
| The keyboard is often the quickest way. | |
| Changing the Size of Tree and Directory Panes | 85 |
| If the split is not equitable, drag the split bar. | |
| Customizing the Contents of Directory Panes | 86 |
| What you see is what you want; use the View menu to express your
wants. | |

Updating Directory Windows	91
Use the Refresh command or press F5 to update the display with the latest changes.	
Opening New Directory Windows	91
Double-click a drive icon to keep the current window and open a new one.	
Customizing the Toolbar	93
There's a tool for every menu command. Put the ones you use most often on the toolbar.	
Starting Programs from File Manager	95
Program Manager is not the only way to start programs.	
Associating Documents with Programs	97
An association lets you start a program by launching a document.	
Printing Documents from File Manager	99
Drag a file icon and drop it on the printer.	
Using Drag and Drop to Embed Packaged Objects	100
A simple mouse maneuver lets you stuff one document inside another.	
Sharing Directories with Other Users on the Network	100
You can turn your hard disk into a file server ...	
Connecting to Remote Directories	103
...or open a window onto someone else's hard disk.	
Working with Files and Directories	106
File Manager is a housekeeper for your hard disk ...	
Formatting, Copying, and Labeling Disks	120
...and for your floppies as well.	
Using File Manager to Create Program Items	121
Drag a File Manager icon to a Program Manager group.	

Like Program Manager, File Manager can be used to launch programs and documents. As a launcher, File Manager's principal virtue is that it shows you the directory and file structure of your disks—both local and network—as opposed to the more task-oriented structure encouraged by Program Manager. Thus it's a great tool for opening files when you already have a pretty good idea where those files are stored. For example, if you work regularly with 10 or 20 documents, you might find it more convenient to launch those documents directly from File Manager, rather than creating individual Program Manager icons for each one. Provided the files have been properly associated with their parent programs (the programs in which they were created), you can simply double-click a file icon and that file will appear within its parent application.

File Manager is a great deal more than a file opener and program starter, however. As its name implies, it's designed to help you take care of disk-oriented housekeeping chores. Here are some of the things you can do with File Manager:

- ▣ Copy, move, delete, or rename files
- ▣ Associate files with applications
- ▣ Search for files on local or remote hard disks
- ▣ Assign files to be “read only,” so they can't easily be changed or deleted
- ▣ Print files without starting the application in which they were created
- ▣ Create, delete, or rename directories
- ▣ Copy entire directories
- ▣ Format floppy disks
- ▣ Copy floppy disks



- ▣ Assign volume labels to hard disks or floppy disks
- ▣ Connect to or disconnect from directories shared by other users on your network
- ▣ Share local directories, so that other network users can access them
- ▣ Set security controls for directories and files on disks that use the Windows NT file system (NTFS)

We'll look at most of these topics in this chapter. For information about managing security on NTFS volumes, see Chapter 11, "File Security with NTFS," page 333.

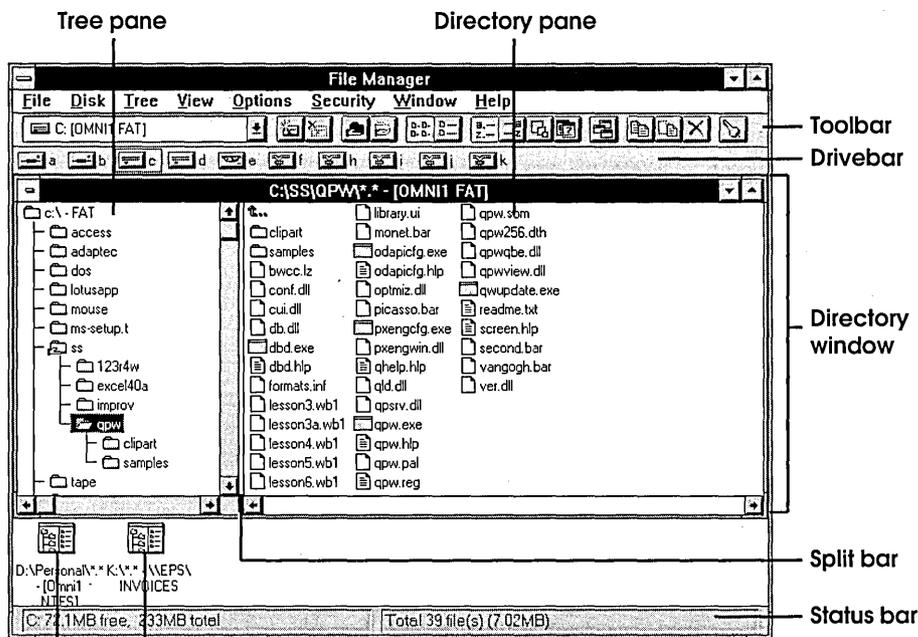


WINDOWS TIP: Because File Manager is such a rich and versatile program, you might want to create a program item for it in your Startup program group. You can do this by copying the icon from your Main program group. Or, if you don't find an icon for it there, use Program Manager's File New command to create one. Specify WINFILE.EXE as the command line.

Exploring File Manager's Display

The figure on the next page shows various elements of File Manager's display.

Just below the menu bar is File Manager's *toolbar*—a set of icon shortcuts for menu commands. The toolbar is customizable (for more information, see "Customizing the Toolbar," page 93), and icons are available for all of File Manager's menu commands. Below the toolbar is the *drivebar*, which displays icons for all local drives and all network drives to which you have connected. Drive types are distinguished by their icons. In the figure, A and B are floppy drives, C and D are local hard disks, E is a CD-ROM drive, and F through K are network directories.



Minimized directory windows



MOUSE TIP: To learn what a toolbar icon does, point to it and hold down the mouse button. While the button is down, you'll see a description of the icon in the status bar. When you're finished reading the description, move the mouse off the toolbar, and then release the mouse button.

Below the drivebar, you might see one or more *directory windows*. These are conventional document windows, just like the ones you use in Program Manager. Unlike program groups, however, each directory window can be split into two *panes*. The *tree pane*, on the left, shows the directory structure of the current drive. The *directory pane*, on the right, shows the contents of the current directory. You can adjust the relative size of the panes by dragging the *split bar*.



PART 1: Introducing Windows NT

At the bottom of File Manager's display is the *status bar*, which provides information about the amount of free space available on the current drive or information about the file or files that are selected plus the total size of a directory's contents.



WINDOWS TIP: Commands on the Options menu let you turn the toolbar, drivebar, and status bar on or off. You can make more room on screen for your directory windows by suppressing the display of these bars.

Icons Used in Directory Windows

Folder icons, in both tree panes and directory panes, denote directories. A hand under a directory's folder icon indicates that the directory has been shared (made available to other network users). In the figure on page 81, C:\SS is a shared directory.

An open folder indicates the current directory but says nothing about whether the directory has subdirectories. To make the tree pane indicate the presence or absence of subdirectories, choose the Indicate Expandable Branches command from the Tree menu. File Manager then displays a plus sign within the folder of any directory that includes subdirectories. (Your tree pane might take a little longer to display with this option on, which is why File Manager leaves it off by default.)

At the top of a directory pane, you might see an upward-pointing arrow with two dots next to it. This is your "go-back" icon; it represents the current directory's parent directory.

File Manager uses the following symbols to distinguish file types:



The rectangle with the stripe across the top represents an executable, or program, file. These are files with the extensions BAT, COM, EXE, or PIF.



The dog-eared page symbol with horizontal lines across it represents a document file. A “document” in this context means a data file that is associated with an application. You can launch a document by double-clicking its icon. Looking at a File Manager directory window won’t tell you which programs your documents are associated with, but the Associate command supplies that information. It also allows you to change associations or create new ones. For more information about the Associate command, see “Associating Documents with Programs,” page 97.

The dog-eared page symbol *without* horizontal lines represents an unassociated data file. Trying to launch one of these will get you an error message.

A page symbol with an exclamation point inside represents a file that has either the hidden attribute, the system attribute, or both. These attributes are generally assigned to files that are critical to the functioning of your system. Because deleting or altering such files is likely to have disastrous consequences, File Manager doesn’t ordinarily include them in its directory displays. You can override this default and display hidden and system files by choosing the View menu’s By File Type command. For more information, see “Filtering the File Listing,” page 90.

Changing the Drive Display

Click once on a drivebar icon to make the current window display a different drive. Double-click to open a new window for the selected drive.

For example, to change the display in the figure on page 81 from C: to D:, click the D icon. If you want to see two windows—one for C and one for D—double-click the D icon. (You can tile the two windows using the Window menu.)

You can also change the drive display by opening the drop-down list at the left side of the toolbar, by choosing the Disk menu’s Select Drive command, or by holding down the Ctrl key and pressing a letter key. For example, to switch to D:, you can press Ctrl+D. You’ll find this last method particularly handy if you’ve turned off the drivebar display.



WINDOWS TIP: Because the drop-down list at the left side of the drivebar lists the volume labels associated with each available disk drive, you might find it the easiest way to switch to a network drive—particularly if you don't remember which of several drive letters has been assigned to which server.

Navigating Through a Directory Tree

To change the contents of the directory pane, select the appropriate entry in the tree pane. You can move about the tree pane quickly with the mouse, either by clicking the folder icon or name of the directory you're interested in, or by scrolling with the scroll bars and then clicking. But often you'll find it even quicker to use the keyboard. Directories that share the same level in the tree are always listed alphabetically, and you can move between them the same way you move in any other Windows list: by pressing the first letter of the directory name you want to move to.

The first time you use File Manager, the tree pane shows the current disk's structure to two levels of detail. That is, you'll see the root directory and all of the root's immediate subdirectories. To "open" a directory so that its own subdirectories are visible, you can either double-click that directory or move to it with the keyboard and then press Enter. (Repeat this process to close the directory and hide the names of its subdirectories.)

File Manager's Tree menu also has a set of commands to help you manage the level of detail shown in the tree pane.

Use Expand One Level or press the plus key to reveal the immediate subdirectories of the current directory. Use Expand Branch or press the asterisk key to reveal *all* subdirectories of the current directory. Use Collapse Branch or press the minus key to hide subdirectories of the current directory. And, if you want to see your entire directory tree, press Ctrl+asterisk or choose Expand All. Be aware that if your disk is large, you might need to wait a few moments for File Manager to build its full tree display.



WINDOWS TIP: If you choose the Expand All command and get tired of waiting for File Manager to create its full tree display, press the Esc key or click one of the drive icons. File Manager interrupts its directory scan and displays as much of the tree as it has built to that point. The message “Incomplete directory tree displayed” appears in the status bar.



KEYBOARD TIP: To get from anywhere in the tree to the root directory one level at a time, press the Left direction key or Backspace repeatedly. To get directly to the root, press Home.

Changing the Size of Tree and Directory Panes

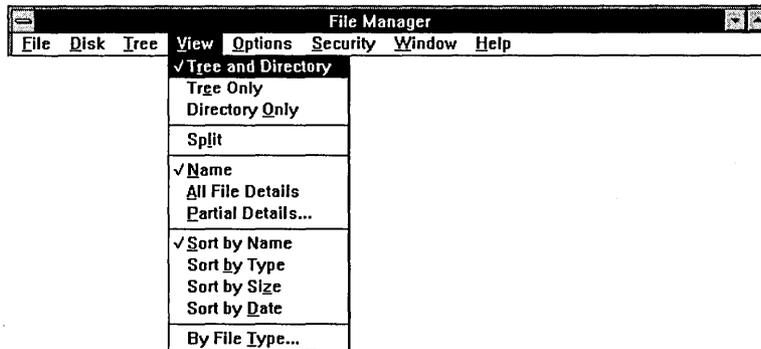
The first time you run File Manager, the program divides the screen real estate roughly equally between the tree pane and the directory pane. You might prefer to have a narrower tree pane and a wider directory pane. To adjust pane size with the mouse, put the pointer over the *split bar*—the narrow vertical bar to the right of the tree pane’s vertical scroll bar (see the illustration on page 81). When the mouse is positioned correctly, the pointer changes to a two-headed arrow. Now drag the split bar to the left to widen the directory pane or to the right to widen the tree pane.

To adjust pane size with the keyboard, choose the View menu’s Split command. A dark vertical bar appears within your document window. Use the Left and Right direction keys to reposition this split bar, and then press Enter.



Displaying One Pane at a Time

By dragging the split bar all the way to the left or right side of the document window, you can get rid of either pane altogether. This way, you can concentrate entirely on the file contents of a directory or the directory structure of a disk. You can also use the commands in the top section of the View menu to eliminate one pane or the other.



To restore the two-pane setup, revisit the View menu and choose the Tree and Directory command.

Customizing the Contents of Directory Panes

A directory pane normally lists all of a directory's subdirectories and files except those that have either the hidden or system attribute. Subdirectories appear at the top of the list, followed by filenames, and both parts of the list are alphabetized. Normally, you see only the names of the files and subdirectories, not their sizes, dates, times, or attributes.

But you can customize a directory pane in a number of ways. With commands on the View menu, you can:

- Change the information included in the list
- Change the order of the list
- Filter the list, so that only particular kinds of files appear



Using a command on the Options menu, you can also change the font that File Manager uses to list your files.



WINDOWS TIP: File Manager's customizing options affect only the current document window. If you want to change the appearance of all windows, close all but one. The changes you make to that window will then be inherited by any windows you subsequently open.

Changing the Information in the File Listing

Each entry in a directory pane ordinarily includes only an icon and a name. This arrangement allows you to see the largest possible number of files and subdirectories without having to scroll. For some directory windows, though, you might want a little more information. To see all the details about the files in a directory pane, activate it and choose the View menu's All File Details command.

In addition to the icon and filename, the detailed directory listing shows the size of each file, the date and time it was last modified, and the presence of any attributes. If you are using the NT file system (NTFS) it shows both the "long" NTFS name and an MS-DOS filename that's a contraction of the long name. (For more information about filenames, see "NTFS Filenames," page 88.)



WINDOWS TIP: If you want detailed information about a particular file but don't need it for the whole directory, it's simplest to select the file and look in the status bar, where the file's size is displayed along with the date and time of the most recent save. For additional information about the selected file, press Alt+Enter. That invokes the Properties dialog box, which displays the file's size, date and time of most recent save, attributes (if any), version number, and copyright information.



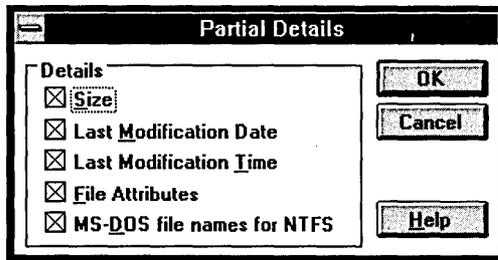
NTFS Filenames

One of the advantages of using the Windows NT “native” file system, NTFS, is that you can use long names for files and directories. NTFS allows names of up to 256 characters—a 23-fold improvement over the paltry 11 permitted by the MS-DOS (FAT) file system! NTFS filenames can also include various characters not allowed in FAT filenames: spaces, multiple periods, commas, square brackets, semicolons, equal signs, and plus signs. (You can also include both uppercase and lowercase letters in your long filenames, and your choice of case will be preserved for display purposes. Internally, however, Windows NT ignores case variants, just as MS-DOS does.)

You can use long filenames without fear of making your files inaccessible to older applications or older operating systems. Windows NT simply stores two versions of each NTFS filename—the one you supply and another one that’s “MS-DOS legal.” The alternative name is built from the first six characters of the long name, followed by a tilde, a numeral, a period, and the first three characters that follow the last period in your long name. So, for example, the short counterpart for the long name *Accounts Receivable.XLS* might be *ACCOUN~1.XLS*.

You can see both versions of your filenames by choosing the Partial Details command on File Manager’s View menu and selecting the fifth check box.

In addition to the names-only and full-details displays, File Manager offers several in-between options. To see your choices, pull down the View menu again, and choose the Partial Details command. File Manager responds with the following dialog box.



You can select any combination of the five check boxes.

Changing the Sort Order

The four Sort By commands near the bottom of the View menu let you change the order in which items appear in directory windows. The default order is by name. At times you might find it more convenient to group files by type—that is, by their extensions. For example, suppose you're looking at a spreadsheet directory that contains a large number of program and worksheet files mixed together. If the document files all have the same extension (as they do with most spreadsheet programs), you might find it easier to locate particular files if you sort the directory by type.

Sorting by size is convenient when you copy files from a hard disk to a floppy disk. The first thing you might want to know under these circumstances is whether any of your files are too large to fit on the floppy. If you sort by size, the largest files appear first in the list. (You might also want to include the file-size information in the listing.)

If you back up files manually at the end of each day using File Manager's Copy command, you might want to choose the Sort By Date command. That way, the files you worked with most recently appear at the top of your directory window and you can tell at a glance which ones you need to back up.

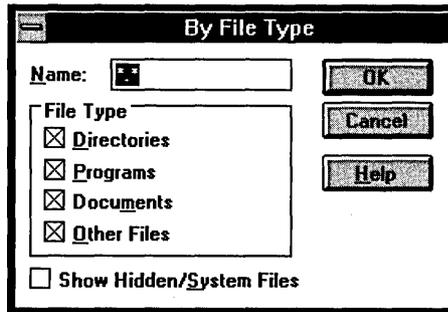
NOTE: The Backup program furnished with Windows NT provides a better alternative for backing up your files. For more information about this program, see Chapter 13, "Backing Up and Restoring Files," page 361.



Filtering the File Listing

Looking for a specific file in a directory containing many files can be difficult and time consuming, especially when you're not sure about the file's name. To make the task simpler, you can "filter" the pane so that it displays only particular kinds of files.

To do this, pull down the View menu and choose By File Type. File Manager presents the following set of choices.



To use this dialog box, start by selecting the check boxes for the types of files you're interested in. If you want to see only program files, for example, deselect everything but Programs. Then, if you need to refine the filter, you can change the wildcard specification in the text box. For example, if you want to see only program files that begin with the letter S, you can type `S*.*` in the text box. (To restore the default filter, `*.*`, simply erase the current filter.)

Changing File Manager's Font

The Font command, on File Manager's Options menu, lets you change the typeface and style used in File Manager's current window. You might find this command useful if you want to see more filenames without scrolling; just choose a smaller point size or a narrower font.



Updating Directory Windows

When you use File Manager with floppy disks, be aware that your tree and directory panes are not automatically updated when you switch disks. For example, suppose you are looking at the tree and directory panes for the floppy disk in drive A. If you put a new disk in drive A, neither pane will be correct. File Manager will still display information about the disk that *was* in drive A.

To update a window after changing a floppy disk, select the window and press F5. (Or use the Window menu's Refresh command.)

Depending on your network's capabilities, you might also need to use the Refresh command to update the information displayed for a directory on a network file server.

Opening New Directory Windows

When you're working with two directories or drives at once—for example, when you're copying files between a hard disk and a floppy—you'll find it convenient to display each directory or drive in its own document window. File Manager lets you open as many document windows as you please, and it has commands to organize them neatly on your screen.

To look at two different directories in the same drive, choose the Window menu's New Window command. Initially, the contents of the new window will be the same as the one you were just working with. Use the techniques described earlier in this chapter to change the new window's contents.

To open a new window for a different drive, double-click the appropriate drivebar icon.

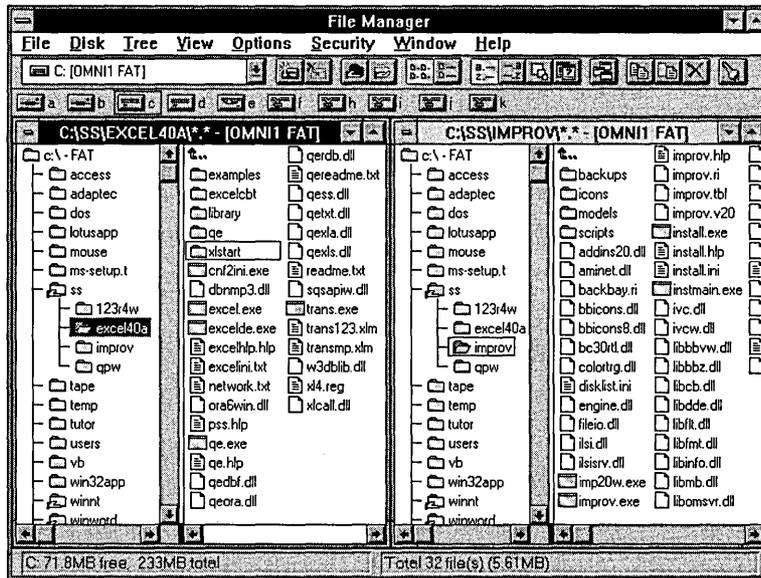
To remove a document window, double-click its Control-menu box, or select it and press Ctrl+F4. Note that you cannot remove *all* of File Manager's windows. The program insists on keeping at least one open at all times. You can, however, minimize any or all windows.



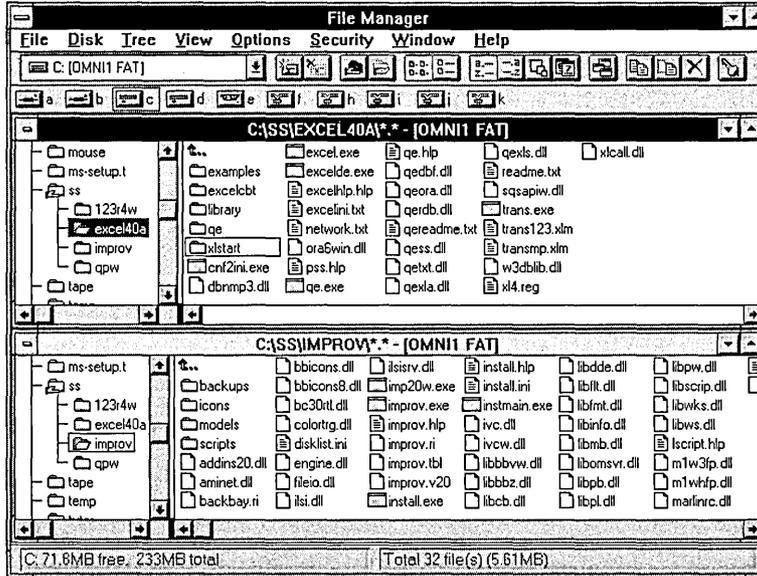
Organizing Directory Windows

File Manager's directory windows can be moved, sized, tiled, and cascaded, exactly as Program Manager's group windows can. You'll find that a tiled display of two File Manager windows often makes it easier to copy or move files between disks or directories.

You can tile directory windows in either of two ways—horizontally or vertically. To split the screen space vertically, choose the Tile Vertically command from the Window menu or press Shift+F4. Your screen looks something like this:



To split the screen space horizontally, pull down the Window menu and choose Tile Horizontally. The result looks like the figure on the next page.



You can switch between these two tiling modes at any time.



WINDOWS TIP: When you tile windows, File Manager avoids covering any minimized document windows. To get the maximum screen space for your directories, therefore, close any windows you're not working with, rather than minimize them.

Customizing the Toolbar

File Manager's default toolbar includes icons for the commands Microsoft thinks you are most likely to use. But you can change the layout and content of the toolbar to suit your own needs. For example, if you never use the Permissions tool (the last tool on the right on the default toolbar), you may as well remove it from the bar and add a tool for a command that you do use. The only element of the toolbar that's fixed is the drop-down list on the left side. You can't remove, relocate, or resize this drop-down.



MOUSE TIP: The default toolbar is designed for a standard (640×480) VGA display. If you use a Super VGA or other high-resolution display driver, the default arrangement leaves plenty of room on the right side for additional tools. Don't let valuable screen real estate go to waste! Fill out the toolbar with icons for the commands you use most often.

Repositioning and Removing Tools

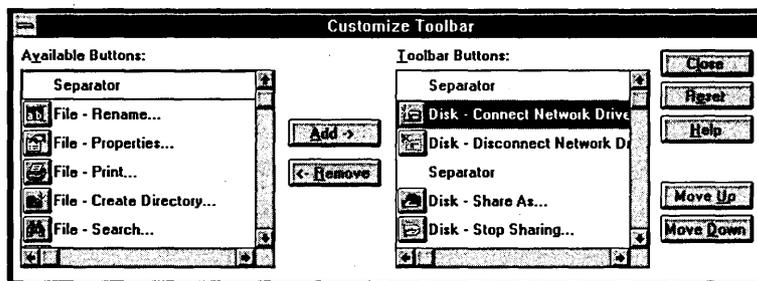
To reposition a tool on the current toolbar, hold down the Shift key and drag the tool. For example, if you want the “open new window” tool (the fifth tool from the right on the default toolbar) to be next to the drop-down drive list, hold down the Shift key and drag that tool to the left.

Note that you can use this dragging technique to tighten the spacing between tools. The default toolbar includes spaces to separate groups of functionally related tools. The “connect to network drive” and “disconnect from network drive” tools, for example, are separated from the “share directory” and “stop sharing directory” tools. These separators might be helpful initially. But when you know what each tool does, you might prefer to move the tools closer together to make room for additional tools. You can do this by holding down the Shift key and dragging a tool until it touches its neighbor.

To remove a tool, hold down the Shift key and drag it off the toolbar.

Adding Tools and Resetting the Default Toolbar

To add a tool to the toolbar, pull down the Options menu and choose the Customize Toolbar command, or simply double-click the background area of the toolbar. File Manager presents the following dialog box.



The list box on the left presents all the available tool icons not currently on the toolbar. The box on the right lists the tools currently on the toolbar in left-to-right order. To add a tool, select it in the left list box and click Add. File Manager adds the tool to the list on the right, positioning it directly above (which means to the left) of whichever tool is currently selected in the Toolbar Buttons list. If that's not where you want it to go, use the Move Up and Move Down buttons to reposition it. Or close the dialog box and Shift+drag the new tool where you want it to go.

To restore the toolbar to its original layout, click Reset in the Customize Toolbar dialog box.

Starting Programs from File Manager

To start a program from File Manager, open a window for the directory in which the program's executable file resides. Then do one of the following:

- ❑ Double-click the name of the executable file.
- ❑ Use the keyboard or mouse to select the name of the executable file. Then press Enter.
- ❑ Pull down the File menu, and then choose Run. Fill out the dialog box with the name of the program's executable file.



WINDOWS TIP: Why would you ever want to use File Run, when double-clicking is so much simpler? Because File Run lets you specify a command-line parameter along with the name of your program.

Using Drag and Drop to Launch a Document File

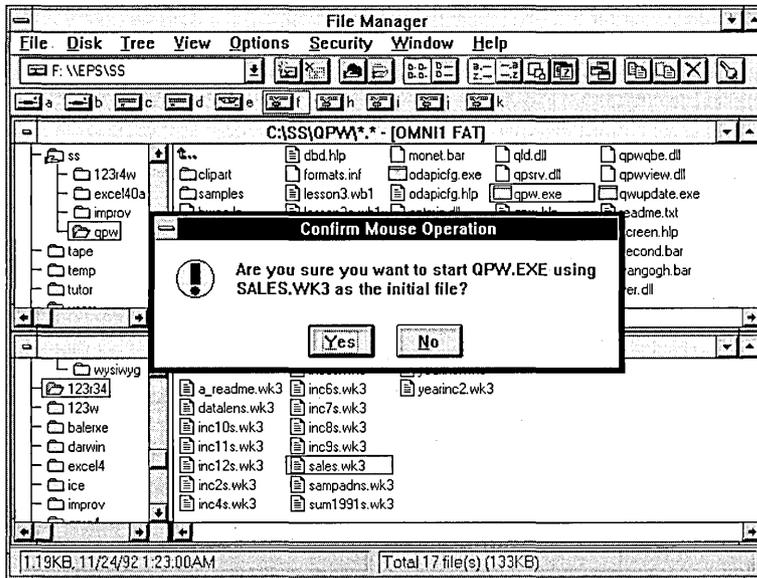
You can start a Windows program with a particular document in place by dragging the document's icon onto the program's icon. For example, suppose you want to run Quattro Pro for Windows and open a Lotus 1-2-3 file. The Lotus file is not associated with Quattro Pro for Windows, so you can't simply double-click its icon. Instead, you can do the following:

1. If QPW.EXE and your 1-2-3 file are stored in different directories, display two File Manager windows—one for QPW and one for the 1-2-3 file.
2. Click the icon for your 1-2-3 file to select it. Drag it to your Quattro Pro directory window and drop it on the icon for QPW.EXE.

When you bring your document-file icon into position above the executable file's icon, File Manager draws a rectangle around the latter, telling you that you've reached the "drop zone" and it's okay to release the mouse button. At that point, depending on how you've set File Manager's confirmation options (for more information about these options, see "Confirmation Options," page 106), you might see the prompt shown in the figure on the next page.

Click OK, and your 1-2-3 file will appear within Quattro Pro.

Note that if you drop a document icon onto a directory or drive icon, File Manager thinks you want to move or copy your file, rather than launch it. In this case, you might see a different confirmation prompt.



MOUSE TIP: You can also launch a document by dragging its icon onto a running application. If Notepad is already running, for example, you can drag a text-file icon and drop it onto Notepad's title bar or into Notepad's window. If Notepad is minimized, you can drop the file icon onto Notepad's icon.

Associating Documents with Programs

A file that is associated with an application can be launched directly from File Manager. Double-click any file with the extension TXT, for example, and that file appears within Notepad—provided that TXT files have been associated with NOTEPAD.EXE. An application can be associated with one or more file types, but each file type can be associated with only one application.



PART 1: Introducing Windows NT

The Windows NT Setup program automatically creates file associations for Cardfile, the Windows help system (WINHELPEXE), Media Player, Paintbrush, the registry editor (REGEDIT.EXE), Sound Recorder, Terminal, Notepad, and Write. The installation programs for many Windows-based applications also automatically create the appropriate associations for you. If you install Microsoft Excel, for example, you will not need to take any additional steps to create associations for the files that Excel uses.

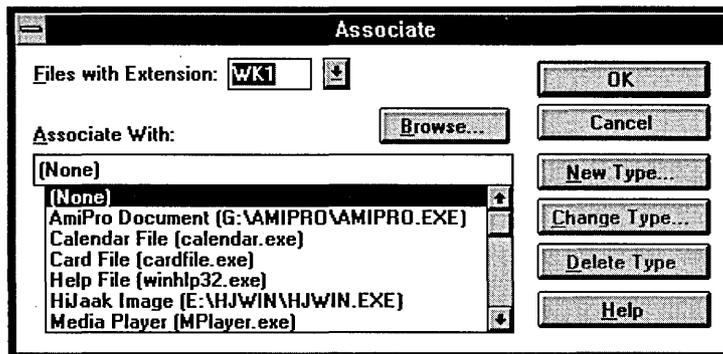
You might, however, need to create associations for older Windows-based applications that were designed without the Windows association feature in mind. You might also occasionally want to change or delete an existing association.

To create, modify, or delete an association, first select any file with the extension you want to associate. Then pull down the File menu, choose Associate, and fill out the dialog box.

For example, let's assume that you used to do your spreadsheet work in Lotus 1-2-3 Release 2.2, and you've recently converted to Quattro Pro for Windows. Your hard disk has hundreds of files with the extension WK1, and because QPW can read these files without a translation step, you'd like to associate the WK1 extension with QPW.EXE. Here's how to do it:

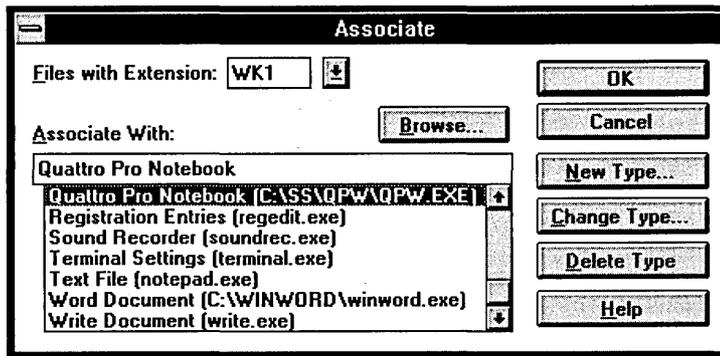
1. Open a File Manager directory window for one of your 1-2-3 data directories.
2. Select any file with the extension WK1.
3. Choose the Associate command on the File menu.

The following dialog box appears, showing that WK1 files are currently associated with (None).





4. Scroll through the Associate With list until you find an entry for Quattro Pro for Windows.



5. Click OK.

Chances are you'll find an entry in the Associate With list for the program you want to connect with. If you don't, all is not lost. Click Browse, and then navigate through the files and directories in the Browse dialog box until you find the name of your program's executable file. Select that file, click OK, and Windows NT creates the desired association.

Changing or deleting an association is as easy as creating one. Select a file with the extension in question, use the Associate command, and then change or remove whatever appears in the Associate With text box. When you are finished, click OK.

Printing Documents from File Manager

Most data files that are associated with applications can be printed directly from File Manager. You can do this in either of two ways:

- ▣ By dragging filenames from a File Manager window to the Print Manager icon (or the open Print Manager window)
- ▣ By selecting one or more files in a File Manager window and choosing the File menu's Print command



Either way, File Manager launches the document's associated program and uses the program's print command to print the document on the current default printer.

Using Drag and Drop to Embed Packaged Objects

A *packaged object* is an iconic representation of a data object, such as a graphic image or a sound annotation. The data so encapsulated must originate in a program that supports object linking and embedding (OLE) as a server application, and it must be embedded in a program that supports OLE as a client application.

File Manager provides a drag-and-drop shortcut technique for embedding packaged objects. If you drag the icon for a file created by an OLE server and drop it in an OLE client's application window, Windows embeds the file as a packaged object. For example, if you want to embed the graphic image CHITZ.BMP in a Write document, you can do the following:

1. Display Write and File Manager in tiled windows.
2. Scroll the File Manager window so the icon for CHITZ.BMP is visible.
3. Drag the icon for CHITZ.BMP and drop it in the Write window.

Note that the Write window must be open for this to work. If you drop the BMP file onto a minimized Write icon, Write thinks you want to import CHITZ.BMP as a text file.

For more information about OLE and packaged objects, see "Making Connections with OLE," page 184, and "Embedding Packages," page 187.

Sharing Directories with Other Users on the Network

To make a directory on your hard disk available to other users on your network, select that directory in a File Manager window and choose the Disk menu's Share As command (or click its toolbar shortcut—the icon that shows a folder in an outstretched hand). File Manager presents the New Share dialog box, as shown in the following illustration.



New Share

Share Name:

Path:

Comment:

User Limit:

Unlimited

Allow Users

OK

Cancel

Permissions...

Help

NOTE: You must run the Server service on your computer before you can share directories. If you get an error message indicating that the Server service is not running, start Control Panel and double-click the Services icon. In the list of services that appears, select Server and click the Start button. (For more information about Control Panel, see Chapter 4, “Customizing Windows NT with Control Panel,” page 123.)

A shared directory is identified by its *share name* and path. By default, Windows NT uses the directory name as the share name, but you can modify that. For example, if you think your directory name would appear cryptic to another user, you might want to provide a more intuitive share name. To do this, type the name you want to use on the top line of the New Share dialog box. You can use up to 12 characters in the share name.

NOTE: If you plan to share directories with users of Windows for Workgroups or other MS-DOS-based operating systems, you must limit your share names to 8 characters plus an optional 3-character extension. If you share a directory on an NTFS volume, you might need to modify the default share name, regardless of who you intend to share with. If the directory name has more than 12 characters, Windows NT proposes it as the default share name but rejects the name when you click OK.



In addition to a share name and path, you can also attach a comment to a shared directory. Users will see this comment when they connect to your directory. You might use the comment field to describe the directory's contents or list any security restrictions associated with the directory.

By default, any number of users can connect to a shared directory simultaneously. If this unlimited availability presents a problem (for example, if your system becomes unresponsive because it's spending too much time acting as a file server), you can specify a maximum number of simultaneous users. You can do this by clicking the Allow option button and using the "spinner" arrows to indicate how many users you're willing to tolerate.

The default permissions level for shared directories is Full Control to Everyone. You can modify this default in several ways. You might, for example, want to give everyone Read access only, instead of Full Control. Or you might want to grant Full Control to particular users and No Access to everyone else. To change the permissions level for your share, click the Permissions button.

For more information about setting permissions, see "Attaching Security to Files," page 334.

NOTE: Sharing a directory means sharing all files within that directory, including all subdirectories. If the directory is on an NTFS volume, however, you may restrict access to particular files and subdirectories. For information about setting permissions on NTFS volumes, see Chapter 11, "File Security with NTFS," page 333.

When You No Longer Want to Share

If you decide to stop sharing a directory, choose the Disk menu's Stop Sharing command. Select the directory or directories in the list that appears and click OK. To select multiple directories, hold down the Ctrl key while you click.

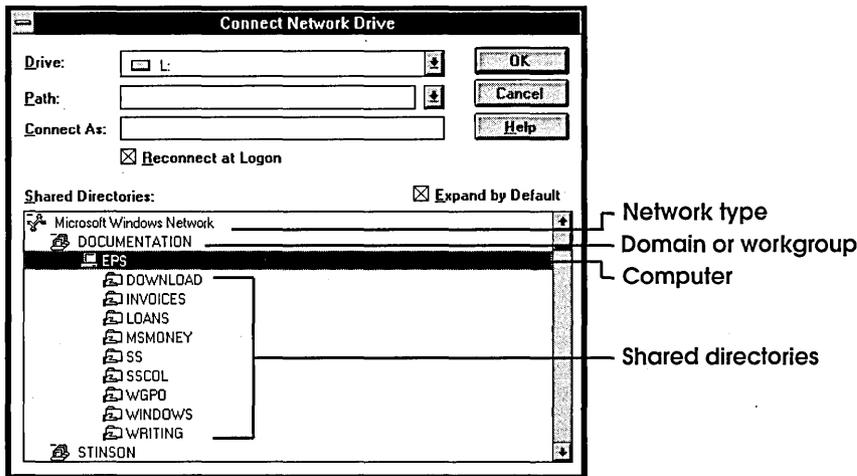
For reasons of security and efficiency, it's a good idea to cancel your shares as soon as they're no longer needed. You can tell which directories are currently being shared by looking at their icons in File Manager's tree and directory panes. The shared directories are the ones with the hands under their folders.



Connecting to Remote Directories

To access a directory on another network computer—either a dedicated file server or another workstation in your workgroup—use the Disk menu’s Connect Network Drive command or its toolbar shortcut. The toolbar shortcut for this command is the one that looks like a drive icon with sunshine on its shoulder.

File Manager displays the Connect Network Drive dialog box, which looks like this:



When you fill out this dialog box and click OK, File Manager displays the selected drive in a new directory window, adds a drive letter representing the connected directory to the drivebar, and adds both the drive letter and the full path of the connected directory to the drop-down list on the left side of the toolbar. At this point you can work with the remote directory’s files the same way you would with any files on your local hard disks.

Choosing a Drive Letter

In the top line of the Connect Network Drive dialog box, Windows NT proposes a drive letter for connected directory. All unused letters from A to Z are available. The first unused letter is the default choice, but you can



select a different letter if the default doesn't suit you, or you can choose no letter at all (the no-letter option is at the bottom of the drop-down list, just after Z).



WINDOWS TIP: If you work with several remote directories at once, you might want to choose drive letters that have mnemonic significance—such as P for Payables and I for Inventory.

Using the Browser and the Path Line

If your network consists entirely of computers running Windows NT or Windows for Workgroups, you should be able to find the directory you want by browsing through the tree diagram in the lower half of the dialog box. This tree works like the diagrams in File Manager's tree panes. You can collapse or expand any elements in the tree to see more or less detail. The figure on page 103 shows some of the symbols you might see in the browser's network tree. On your system, the browser might look quite different, depending on the kind of network you're connected to.

If the directory is one that you've used before, you can probably find it by clicking on the drop-down arrow on the right side of the Path text box. This opens a drop-down list of the dozen most recently used remote directories.

You can also specify a remote directory by typing its network path directly into the Path text box. To do this, type two backslashes followed by the name of a computer. Do not include any hierarchical levels above the computer name, such as a workgroup or domain name. Then type one backslash, followed by the share name of the directory you're interested in.

For example, suppose you want to connect to a directory that is shared under the share name HIGH, located on a server named ROCKY MOUNTAIN. To specify this in the Path text box, type:

```
\\ROCKY MOUNTAIN\HIGH
```



WINDOWS TIP: Unless you're fond of typing, you'll probably find it easier to select directories from the browser, rather than by typing full path entries. But the Path line can be a valuable shortcut to a particular section of the browser. For example, suppose you know that you have a server named ROCKY MOUNTAIN somewhere on the network, but you're having trouble finding it in the tree diagram. Type `\\rocky mountain` on the Path line and press Enter, and the relevant section of the network hierarchy appears in the browser. Then you can scan the list of ROCKY MOUNTAIN's shared directories to select the one you want.



WINDOWS TIP: You might not need to use File Manager to access network directories. Nearly all of Microsoft's applications for Windows, and many from other vendors as well, use a common set of dialog boxes for opening and saving files. Clicking the Network button in these dialog boxes has exactly the same effect as using File Manager's Connect Network Drive command. Even if your applications don't use the common dialogs, check to see if the dialogs they do use provide direct access to the network.

Connecting to Root Directories

To connect to a shared root directory on a Windows NT workstation, you must be logged on with a user account that has administrative privileges. Without administrative status, however, you can connect to shared root directories of non-Windows NT machines (machines running Windows for Workgroups, for example).



Maintaining Connections Between Sessions

If you expect to use a remote directory repeatedly over a period of time, you'll probably want to select the Reconnect at Logon check box. That way, Windows NT restores the connection at the beginning of each work session.

Windows NT maintains a separate list of recurring connections for each user account. Thus, if another user logs onto your workstation, the system will restore that user's directory connections, not yours.

Breaking Connections

It's a good idea to disconnect from network drives that you no longer need. To do this, use the Disk menu's Disconnect Network Drive command or its toolbar shortcut. The toolbar shortcut for this command is the one that looks like a phantom drive icon with a big X on its shoulder.

Working with Files and Directories

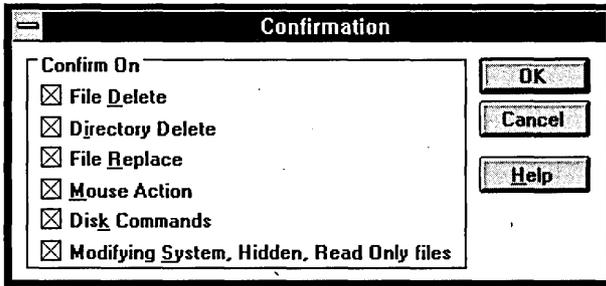
In addition to starting programs, associating files with programs, sharing directories with other users, and making and breaking network connections, File Manager lets you perform all kinds of housekeeping operations on files. You can move and copy files from one directory to another by dragging their icons with the mouse. And you can delete files by highlighting file-names and pressing the Del key or clicking the Delete tool.

You can also use File-menu commands or toolbar icons to move, copy, and delete files. Additional commands on the File menu let you rename files, print files, and change file attributes.

You can perform these chores on individual files or on groups of files, as you choose.

Confirmation Options

Before experimenting with the techniques for manipulating files, you might want to acquaint yourself with the Confirmation command on the Options menu. That command brings up the following dialog box.



It's a good idea to keep all options in this dialog box checked at all times. That way, File Manager warns you if you're about to do anything that might accidentally delete or overwrite data that you need. While you're learning to use File Manager's various drag-and-drop options, it's a particularly good idea to leave the Mouse Action confirmation setting checked.

Selecting Files with the Mouse or Keyboard

Most of the file operations described on the next several pages require that you first select one or more filenames, and then choose a command. Selecting one filename is straightforward: Simply click the mouse on the filename entry in a directory window, or use the keyboard to move the highlight to the filename. Selecting more than one filename at once is also easy, and File Manager gives you several ways to do it.

To select a group of contiguous filenames with the mouse, do this:

1. Click the first filename in the group.
2. Hold down the Shift key.
3. Click the last filename in the group.

To deselect the group, click the mouse anywhere else in the directory pane, without pressing the Shift key.

To select a group of contiguous filenames with the keyboard, do this:

1. Move the highlight to the first filename in the group.
2. Hold down the Shift key.
3. Move the highlight to the last filename in the group.



To deselect the group, use the cursor keys to move the highlight somewhere else. You can also deselect the group by pressing backslash (\).

To select a group of noncontiguous filenames with the mouse, do this:

1. Click the first filename.
2. Hold down the Ctrl key while you click each additional filename you want to select.

To deselect the group, click the mouse anywhere else in the directory pane, without pressing the Ctrl key.

To select noncontiguous filenames with the keyboard, do this:

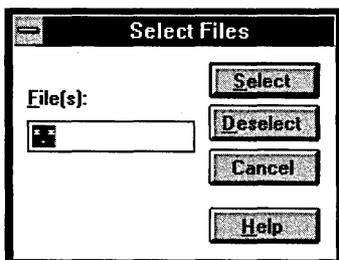
1. Move the highlight to the first filename you want to select.
2. Press Shift+F8.
3. Use the direction keys to move the dotted rectangle to the next item you want to select.
4. Press Spacebar to select that item.
5. Repeat steps 3 and 4 until you have selected all items.

To deselect the group, press Shift+F8 again, and then use the cursor keys to move the highlight somewhere else. You can also deselect the group by pressing backslash.

To select all files in a directory window, press slash (/).

Selecting Files with the Select Files Command

You can also use the Select Files command, on the File menu, to select all files that meet a wildcard specification. When you choose this command, File Manager presents the following dialog box.





Clicking **Select** *adds* all files that meet the wildcard specification to the current selection. Clicking **Deselect** does the opposite—it removes the specified group of files from the current selection.

Be aware that the **Select Files** command does not replace the current selection with the wildcard group. Thus, for example, if the current selection is a file named MYFILE.BAK, and you want to select all files with the extension BMP, you might want to do the following:

1. Choose the **Select Files** command.
2. With the wildcard specification set to `*.*`, click **Deselect**.
3. In the **File(s)** text box, type `*.BMP`.
4. Click **Select**.
5. Click **Close**.

Step 2 clears the current selection. If you omit this, your selection will consist of all BMP files *plus* MYFILE.BAK.



WINDOWS TIP: The status bar shows the size of the current selection—both the number of files and the number of bytes. When you're copying a lot of files from one disk to another, glance at this information to be sure your selection isn't too large to fit on the target disk.

Moving and Copying Files by Dragging Icons

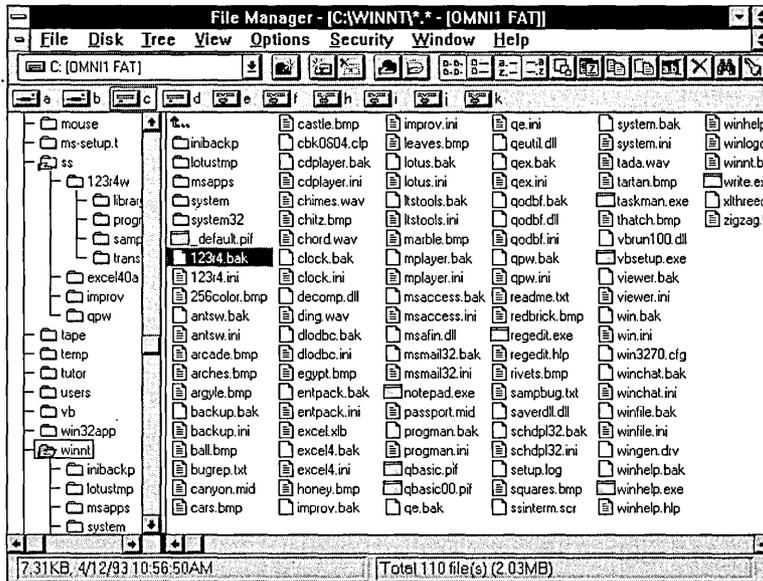
Although File Manager includes menu commands for moving and copying files, you might want to ignore them if you have a mouse. The simplest way to move and copy is simply to drag icons from one place to another. You can drag and drop one file at a time or in bunches, and you can drag from one directory to another on the same disk or between disks.



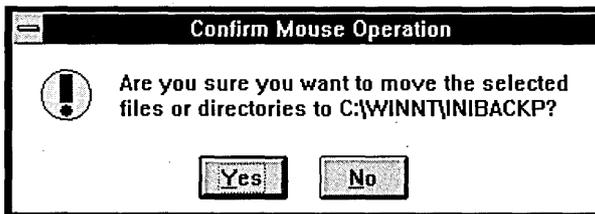
Remember these principles when dragging File Manager icons:

- ▣ To move files, drag from one directory to another. To move files from one drive to another, hold down the Shift key as you drag. (Without the Shift key, File Manager interprets a drag between drives as a copy request, whether or not you hold down the Ctrl key.)
- ▣ To copy files, hold down the Ctrl key as you drag.
- ▣ The icon that File Manager displays while you drag is “document-shaped” (it looks like a page with a dog-eared corner), regardless of the kind of file(s) you’re dragging.
- ▣ If your drag-and-drop operation is going to perform a copy, File Manager displays a plus sign in the drag icon. If it’s going to perform a move, the plus sign is not displayed.
- ▣ When moving or copying, it’s safest to drop files onto directory icons. If you drop them onto an executable file’s icon, File Manager thinks you want to run the executable file. (For more information, see “Using Drag and Drop to Launch a Document File,” page 96.)
- ▣ When you drop file icons onto a drivebar icon, File Manager copies the files into the current directory of the target drive. If you’re not sure what that current directory is, it’s a good idea to open a directory window and drop your files there—instead of dropping them onto the drive icon.
- ▣ If you leave the Mouse Action confirmation setting on, File Manager will always tell you what you’re about to do—so you needn’t worry about misplacing files. (For more information, see “Confirmation Options,” page 106.)

Now let’s look at a few examples. First, suppose your WINNT directory looks like the figure on the next page.



If you want to move the file 123R4.BAK to the INIBACKP subdirectory of C:\WINNT, you can do so by dragging 123R4.BAK either to the INIBACKP icon in the tree pane or to the INIBACKP icon near the top of the directory pane. In either case, you will see the following prompt.



Click Yes to forge ahead or No to retreat.

Now suppose you want to copy all files with the extension BAK to the root directory of your C drive. The surest way to proceed is to use the Select Files command to build a selection consisting of all files that meet the wildcard specification *.BAK. (For more information, see “Selecting Files with the Select Files Command,” page 108.) Next hold down the Ctrl key while you grab any one of the selected files with the mouse. Continue to



hold down the Ctrl key, drag the selection to the upward-arrow icon at the top of your directory pane, release the mouse button and Ctrl key, and then reply to the confirmation prompt.

Because the current directory in this case is immediately subordinate to the root directory, there's an icon for the root in the directory pane. Dropping your selection there saves you the trouble of scrolling the root directory into view in the tree pane. If you were two levels below the root, however, you'd have to drag from the directory pane to the tree pane. (In this case, you might find it easier to use the File menu's Move command or its toolbar equivalent.)

Note that you cannot copy the selection to the root directory by dropping it onto the C-drive icon at the top of the document window. If you do that, File Manager thinks you want to copy your files into the current directory of drive C, which also happens to be the source directory for your selection. Copying files into the same directory without giving those files new names generates an error message.

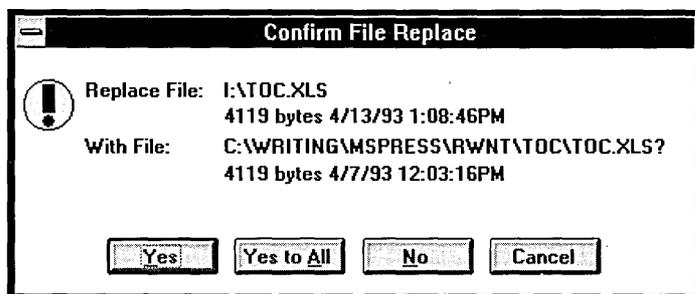
Finally, suppose you want to copy all of your BMP files to the root directory of a floppy disk in drive A. First select *.BMP, following the Select Files procedure described earlier. Then be sure a disk is in drive A and drag your selection to the A-drive icon. You don't need to hold down Ctrl in this case (although you can), because File Manager treats all transfers between disks as copies, not moves. When you see the confirmation prompt, verify that the current directory on A is the root (it will be, unless you've recently been working in a subdirectory on that disk), and then click Yes.

If the Target Disk Is Full

If you try to copy 2 MB of files onto a 1.44-MB floppy disk, File Manager copies as many files as it can. Then it displays a message stating that the target disk is full. To continue copying the rest of the files, simply insert a fresh disk and click OK.

If a File Already Exists on the Target Disk

If you try to move or copy a file into a directory where a file of the same name already exists, File Manager presents a prompt similar to the following.



Click Yes to proceed or Cancel to bail out. If you are copying or moving a multiple selection, you can also click Yes to All—in which case you won't see this prompt again. Or you can click Yes or No for each file that already exists on the target drive or directory.

Note that this prompt does not appear if you deselect the File Replace option in the Confirmation dialog box. For more information, see “Confirmation Options,” page 106.

Moving and Copying Entire Directories

You can move and copy entire directories in either of two ways—by selecting and dragging all files in a directory pane or by dragging a directory icon. If you select and drag all the files in a directory, File Manager simply moves or copies the files. If you drag a directory icon, File Manager creates a new subdirectory in the target directory.

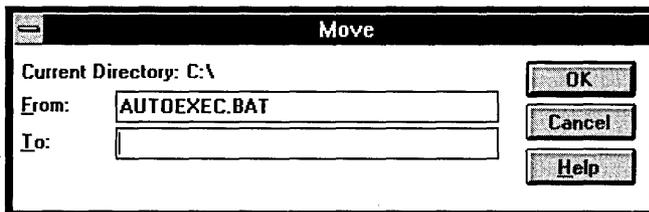
For example, suppose you want to store a backup copy of each file in C:\EXCEL\BUDGET in the root directory of the floppy disk in drive B. To do that, select everything in the directory pane for the BUDGET directory, and then drag to the B-drive icon. Now suppose instead that you want to create a directory named BUDGET on drive B and back up your budgeting files to that new directory. The simplest way to do this is to drag the directory icon for C:\EXCEL\BUDGET from the tree pane to the B-drive icon. File Manager responds by creating the directory B:\BUDGET and then copying all of C:\EXCEL\BUDGET's contents to this new directory.

Moving and Copying with Menu Commands

If you use Windows without a mouse, or if you simply prefer working with the keyboard, you can take advantage of two convenient keyboard shortcuts



for performing moves and copies. The F7 and F8 keys invoke the File menu's Move and Copy commands, respectively. With either command, you'll see a dialog box similar to the following.



File Manager fills the top box with the current selection. Your job is to fill out the bottom box and click OK.

If the current selection is a multiple selection, the Move or Copy dialog box lists each selected file, with a space between each filename. You can edit particular filenames out of this list (or add new names) if you wish.



WINDOWS TIP: You can rename a file at the same time that you copy or move it. Simply use the File menu's Copy or Move command, and supply a new name in the To text box.

Deleting Files and Directories

To delete one or more files or directories, select what you want to delete, and then press the Del key (or choose the File menu's Delete command). Unless you have turned off the File Delete and Directory Delete options in the Confirmation dialog box, you'll be asked to confirm your intentions.

Unlike MS-DOS, File Manager allows you to delete a directory that is not empty. When you do that, though, you'll get two or more confirmation prompts—one for the directory and another for each of the directory's files. You can bypass most of the file confirmations by clicking Yes to All.

WARNING: Be careful with deletions if you turn confirmation prompts off! In particular, be aware that if you have deselected the File Delete and Directory Delete options in the Confirmation



dialog box and you delete a directory, everything in that directory—including all subdirectories and all files stored in all subdirectories—will automatically be expunged from your hard disk. If you're not comfortable with that level of automation, leave the Confirmation check boxes checked.

Renaming Files and Directories

To rename a file or directory, select its icon, choose the File menu's Rename command, and then complete the dialog box.



WINDOWS TIP: With the help of “wildcard” characters, you can rename a group of files with a single command. For example, suppose you have a number of files with the extension NTS scattered about your hard disk. To make these files “launchable” in Notepad, you can associate the extension NTS with NOTEPAD.EXE. Or you can change all those NTS extensions to TXT. To do the latter, you can use File Manager's File Search command to put all the NTS files in a single window. Then select all files in that window and choose Rename from the File menu. On the To line of the Rename dialog box, specify *.TXT.

Creating New Directories

The File menu's Create Directory command creates a new subdirectory in whichever directory is currently selected. The easiest way to use this command is to start by selecting the new parent in the tree pane. For example, to create a new directory directly subordinate to the root directory, activate the tree pane and press Home to move to the root. Then choose the File menu's Create Directory command and fill out the dialog box.



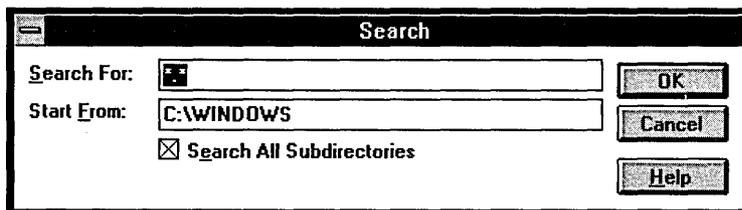
Searching for Files

The File menu includes a handy Search command that can help you locate files that have gone astray. You can search for a particular file or all files that match a wildcard specification, and you can search an entire disk, a particular branch of the directory tree, or a particular directory.

The Search command is useful in the following situations:

- ▣ When you know you have a file somewhere on your hard disk, but you can't remember where
- ▣ When you think you have several versions of the same file scattered in different directories, and you need to figure out which is the most recent version

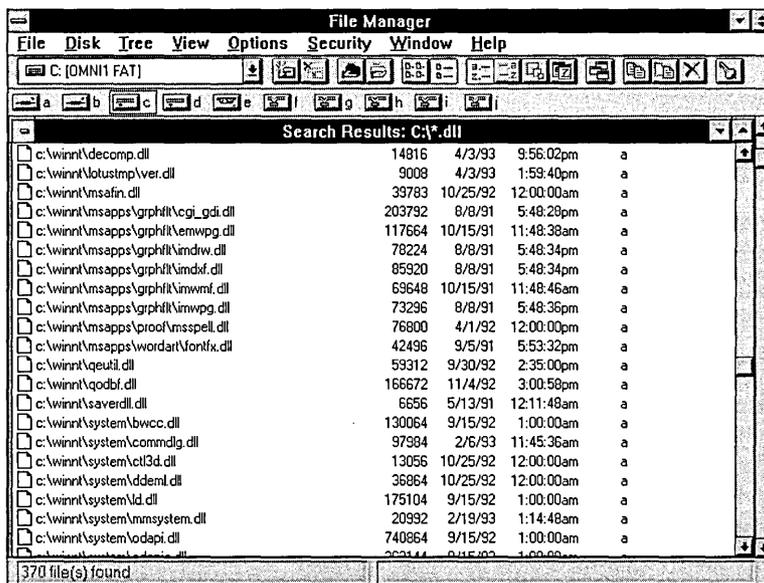
When you choose the File menu's Search command, File Manager presents the following dialog box.



File Manager searches for all files meeting the specification in the top text box, beginning at the directory-tree branch specified in the lower text box. If you leave the check box selected, all subdirectories of the directory named in the lower text box will be included in the search.

The Search command presents its results in a special window titled Search Results. The figure on the next page shows how a Search Results window might look if you asked File Manager to find all the DLL files on your C drive. Note that the status bar tells you how many files were found.

If you need more information about the found files—their sizes and save dates, for example—you can take advantage of commands on the View menu. See “Customizing the Contents of Directory Panes,” page 86.



You can use the filename entries in the Search Results window the same way you use filenames in a directory pane. For example, you can double-click a program name to start that program; select a group of files to be copied, moved, or renamed; and so on. Unfortunately, you cannot sort the Search Results window by filename. File Manager insists on displaying the results in directory order.



WINDOWS TIP: Unlike earlier versions of File Manager, the Windows NT version, while it is searching, shows you the number of instances of your search target as it finds them. You can click Cancel to stop the search at any time, and the Search Results window displays all the files located before you cancelled. Thus, if you're looking for a particular needle in a large hard-drive haystack, you don't have to wait until File Manager has combed through the whole haystack. You can click Cancel as soon as the "Matches Found" counter reads 1.



Changing File Attributes

Attributes are markers that file systems employ to identify certain characteristics of files. In the current versions of the MS-DOS (FAT) and Windows NT (NTFS) file systems, files can have any combination of the following attributes—or none of them:

- A Archive
- H Hidden
- R Read only
- S System

The *archive* attribute indicates that a file has been modified since it was last backed up. Each time you create a new file or change an old one, the file system assigns the archive attribute to that file. Commercial backup programs (and Windows NT's own tape backup program) typically remove the archive attribute when they back up a file. If you change the file after backing it up, the file again gets the archive attribute so your backup program can recognize it as needing to be backed up again. For more information about the archive attribute and its use in backup operations, see "Backup Methods," page 367.

A few programs use the *hidden* and *system* attributes (either, but typically both) to mark important files that must not be modified or deleted. In the root directory of your boot disk, for example, you might have hidden/system files named BOOT.INI, BOOTSECT.DOS, IO.SYS, MSDOS.SYS, NTDETECT.COM, and NTLDR. Some of these files are critical components of your operating environment; hence, they have both the hidden and system attributes.

Hidden and system files do not appear in File Manager directory windows unless you choose the View menu's By File Type command and select the check box marked Show Hidden/System Files.

You can load a file with the *read-only* attribute into a program, but you can't save it unless you first rename it. Programs that are designed for use on local area networks commonly employ the read-only attribute as a way of letting several people access the same file at once. With such programs, the first user to open a file typically gets both read and save privileges,



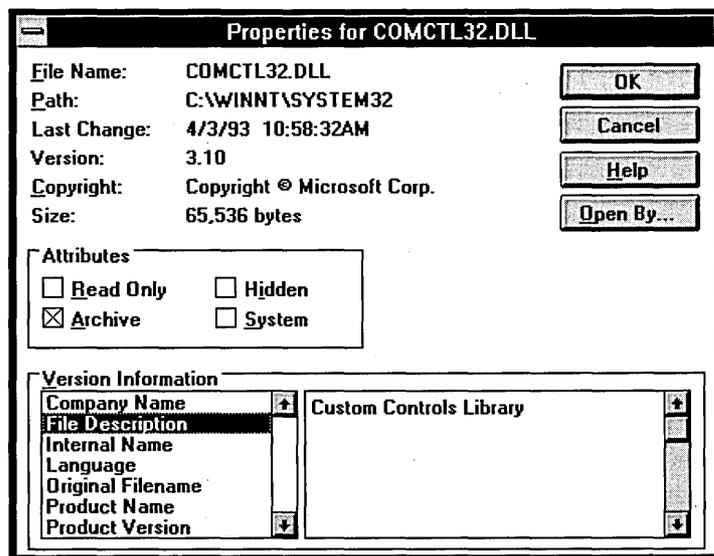
but subsequent users must access files in read-only fashion. As soon as the file has been opened by the first user, the program assigns it the read-only attribute.

In many contexts, the read-only attribute not only prevents a file from being altered, but it also keeps it from being deleted. For example, the MS-DOS ERASE and DEL commands refuse to delete files that are marked read only. File Manager lets you delete read-only files, but only if you answer Yes in a confirmation dialog box.

To change the attributes associated with one or more files, select the filename(s) and choose the File menu's Properties command. Or hold down the Alt key while you double-click the filename. Then select the check box for each attribute you want to assign and click OK.

Reading Version and Copyright Information

The Properties dialog box might also include useful information about a file's version number and copyright. Here, for example, is the properties display for a file called COMCTL32.DLL:



The fourth and fifth lines of this display tell you that this file came from Microsoft and is in revision 3.1. The list box at the bottom provides additional



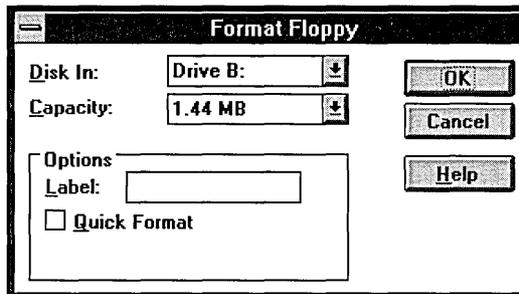
details about the nature and purpose of the file. Software vendors can put whatever information they think is important in this lower section of the Properties dialog box.

Formatting, Copying, and Labeling Disks

Commands on File Manager's Disk menu allow you to format, copy, and assign volume labels to disks.

Formatting a Floppy Disk

To format a floppy disk, insert the disk, choose the Disk menu's Format Floppy command, and fill out the following dialog box.



First choose the drive containing the disk you want to format—if your system has more than one floppy disk drive. After you choose the drive, the Capacity drop-down list box shows the formatting options available for the specified drive. In the illustration above, for example, drive B is a 1.44-MB, 3.5-inch drive, so the Capacity list box offers choices of 720 KB and 1.44 MB.

NOTE: The Capacity options are determined by your disk drive, not the disk you put in the drive. If you choose a high-density formatting option for a double-density floppy disk, you might see an error message shortly after File Manager begins formatting. At this point, you'll have the option of replacing the disk with a high-density disk or switching to a double-density format.



If you choose a quick format, File Manager formats the disk but doesn't bother checking for bad sectors.

Finally, you can assign a volume label to your floppy disk by filling out the Label text box. (If you decline this opportunity, you can assign a label later, using the Label Disk command.)

NOTE: File Manager doesn't let you format a hard disk. To format a hard disk, you must open a command prompt window and use the Format command. For more information, see Chapter 19, "Working from the Command Prompt," page 627.

Duplicating a Floppy Disk

The Disk menu's Copy Disk command allows you to make a duplicate of a floppy disk. Source and destination disks must be of the same size and density (for example, both 3.5-inch high-density or both 5.25-inch double-density). This command is equivalent to the command prompt's DiskCopy command.

Adding a Volume Label to a Hard Disk or Floppy Disk

The Disk menu's Label Disk command lets you assign a *volume label*, or name, to a hard disk or floppy disk. A volume label helps you keep track of what kind of information a disk contains. File Manager displays the volume label at the top of a disk's directory pane.

Using File Manager to Create Program Items

With the mouse, you can use File Manager to create program items in Program Manager. Here's how:

1. Be sure that both Program Manager and File Manager are open and visible on your desktop.
2. In File Manager, open a directory pane for the directory containing the program you want to add to Program Manager.



PART 1: Introducing Windows NT

3. In Program Manager, be sure the program group to which you want to add the program item is open and visible.
4. Drag the icon for your program's executable file from File Manager into Program Manager.

That's all there is to it. Program Manager displays a new icon for the selected program. You can double-click that icon at any time to start your program.

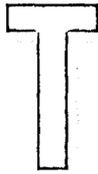


MOUSE TIP: If you drag an icon for an associated document file from File Manager into Program Manager, you get a new program item that launches the document's associated application and loads the document.

Customizing Windows NT with Control Panel

- | | |
|---|------------|
| Starting Control Panel | 128 |
| Control Panel presents a windowful of applets. | |
| Changing Desktop Colors or Patterns | 128 |
| Beautify your desktop with custom color schemes. | |
| Adding and Deleting Fonts | 138 |
| Fonts add impact to documents, but having too many on board can slow down your system. Use the Fonts applet to expand and contract your font library as needed. | |
| Configuring Serial Ports | 140 |
| Set baud rate and other communications parameters with the Ports applet. | |
| Customizing Your Mouse or Other Pointing Device | 142 |
| You can use the Mouse applet to swap primary and secondary mouse buttons. | |

Customizing Your Desktop	144
The Desktop applet lets you add wallpaper, choose a screen saver, change icon spacing, and more.	
Adjusting the Keyboard Repeat Rate	152
Slow it down or speed it up.	
Setting Country-Specific Options	153
The International applet controls the way your system displays dates, times, and numbers.	
Changing Operating System Parameters	156
You can use the System applet to change the default startup operating system, among other things.	
Setting the Date and Time	161
If you move to a new time zone, you'll need the Date/Time applet.	
Using Alternative Mouse Pointers	162
Check out the Windows NT animated cursors.	
Mapping Sound Files to System Events	162
Put an end to Mac Envy.	
Installing Drivers	163
Got a new sound board? Install its driver with the Driver applet.	
Modifying Private INI Files	164
Some of your applications might store settings in private initialization files.	



This chapter introduces Control Panel, the Windows utility that lets you tailor your system to suit your needs and tastes. You can use Control Panel to change the appearance of your electronic desktop, adjust the sensitivity of your mouse or the repeat rate of your keyboard, set your computer's clock and calendar, install printer drivers, configure serial ports, and do other similar tasks.

Control Panel is organized as a set of "applets"—miniature applications designed to do specific tasks, such as changing the appearance of your desktop.

NOTE: A few of Control Panel's applets are not discussed in this chapter. For information about the Printers applet—which actually invokes the Print Manager application—see Chapter 7, "Printing," page 211. For information about the Network applet, see "Changing Network Settings," page 210. For information about the Server applet, see "Monitoring System Use with Server," page 728.

The changes that you make to your system using Control Panel are recorded in a system database called the *registry*. The registry stores much of the configuration information about your Windows NT system, including most of the information that previous versions of Windows recorded in various initialization files—WIN.INI, SYSTEM.INI, CONTROL.INI, PROGRAM.MAN.INI, and so on. The registry consolidates this information into a single, secure location.

On a Windows NT Advanced Server network, the registry facilitates centralized system administration. It also enables users with domain accounts to log on anywhere within their domain and be greeted by their own personalized working environment. For more information about Windows NT Advanced Server, see "Two Levels of Networking Support," page 201, and "Servers and Domains," page 206.

The registry also eliminates the need for private initialization files—INI files that store configuration information for individual applications. Programs written for Windows NT should store their configuration data in the appropriate sections of the registry. Applications written for earlier versions



PART 1: Introducing Windows NT

of Windows will probably continue to use their private INI files, however, so we'll conclude this chapter by looking at the way those INI files are structured and the general procedure for editing them.

As shown in Table 4-1, some of the configuration decisions you make in Control Panel, such as your choice of wallpaper, affect only your own user account. Others—such as the date and time settings—affect everyone who logs on at your workstation.

Choices of the latter kind are subject to security restrictions. Depending on how your account is set up, therefore, you might receive error messages when you try to make some of the changes described in this chapter. For information about account setup, see “Managing User Accounts,” page 323.

Applet	For More Information, See
 Color*	“Changing Desktop Colors or Patterns,” page 128
 Fonts	“Adding and Deleting Fonts,” page 138
 Ports	“Configuring Serial Ports,” page 140
 Mouse*	“Customizing Your Mouse or Other Pointing Device,” page 142
 Desktop*	“Customizing Your Desktop,” page 144
 Keyboard*	“Adjusting the Keyboard Repeat Rate,” page 152
 Printers	Chapter 7, “Printing,” page 211

TABLE 4-1.
Control Panel applets.

(continued)



TABLE 4-1. *continued*

Applet	For More Information, See
 International*	"Setting Country-Specific Options," page 153
 System	"Changing Operating System Parameters," page 156, and "Initializing Environment Variables," page 657
 Date/Time	"Setting the Date and Time," page 161
 Network	"Changing Network Settings," page 210
 Server	"Monitoring System Use with Server," page 728
 Services	"The At Command," page 612, "Starting and Stopping Services" and "Configuring Service Startup" in online help
 Devices	"Starting and Stopping Devices" and "Configuring Device Startup" in online help
 Cursors*	"Using Alternative Mouse Pointers," page 162
 Sound*	"Mapping Sound Files to System Events," page 162
 MIDI Mapper	"Creating a MIDI Setup" and "Selecting a MIDI Setup" in online help
 Drivers	"Installing Drivers," page 163
 UPS	"Configuring the Uninterruptible Power Supply (UPS)" in online help

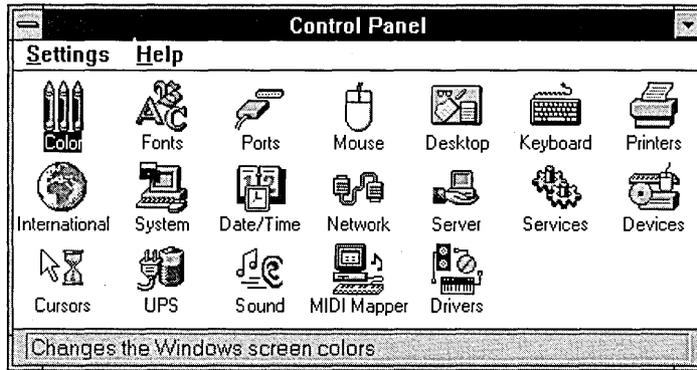
* Changes that you make in these applets affect only your own user account.



Starting Control Panel

To start Control Panel, double-click its icon in the Main program group of Program Manager. To start it from File Manager, double-click the name CONTROL.EXE in the directory window of the directory containing your Windows files.

Control Panel offers a window full of icons.



NOTE: Your own screen might not look exactly like this one. Because Control Panel is designed to be extensible, your screen might include icons for additional applets. Or some of the applets shown here might have been removed from your system.

Each icon launches a particular Control Panel applet. If you work without a mouse, you can use the direction keys to move among icons, or you can ignore the icons and choose equivalent commands from the Settings menu.

Changing Desktop Colors or Patterns

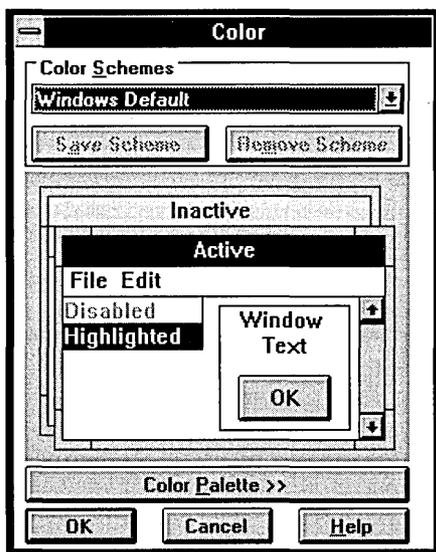
When you first install Windows NT, it uses a color scheme called Windows Default. It's a fine color scheme, but you can also choose from a number of alternative schemes. And if you don't like any of the color schemes



offered, you can design your own. You can assign a color (or a pattern, if you're working with a monochrome display) to each of 21 different screen elements, and then name and save the arrangement you create. You can design as many custom color schemes as you want, adding each to the menu of color schemes that Windows supplies. As mood or necessity dictates, you can switch from one scheme to another by choosing from a simple drop-down list.

Changes made in Control Panel's Color applet affect only the current user account.

To change colors, double-click Control Panel's Color icon, or choose Color from the Settings menu. Windows presents the following dialog box.

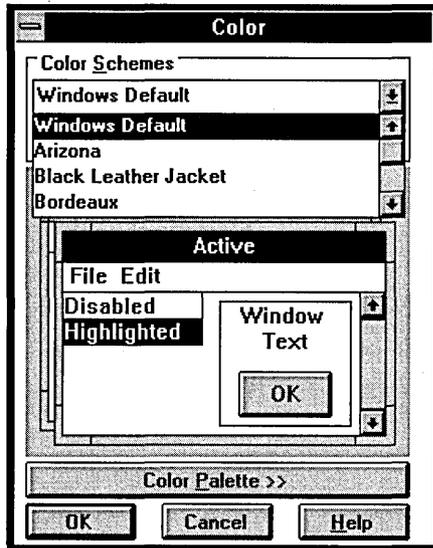


The illustration shows the Windows Default color scheme as you would see it in VGA resolution. If you're using a different display resolution, your screen will look different. But the basic elements will be the same.



Choosing from the List of Color Schemes

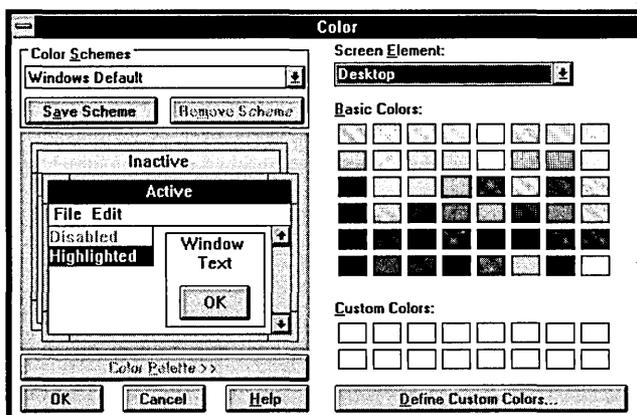
To see what the built-in color schemes are called and what they look like, click the downward arrow near the upper right corner of the dialog box. The drop-down list unfolds, revealing the first four color-scheme options, as shown in the following illustration.



Now use the Down direction key to step through the list box. As you highlight the name of each color scheme, Windows displays a sample of that scheme in the lower part of the dialog box. You can apply any color scheme to your Windows environment by highlighting its name and clicking OK in the lower left corner of the window.

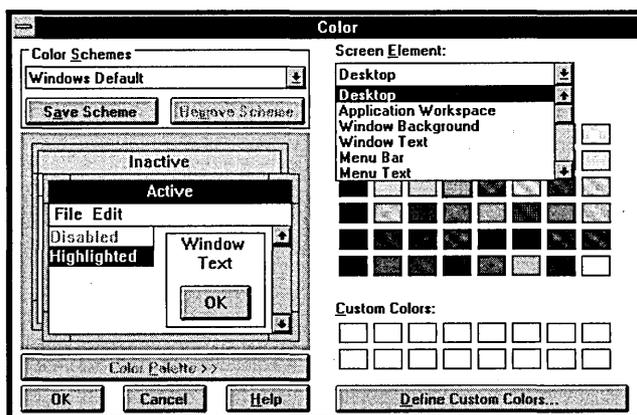
Creating Your Own Color Scheme

If you'd rather create your own color scheme, click Color Palette. Windows expands the dialog box.



Another drop-down list, called Screen Element, now appears on the right side of the dialog box with a set of color options below it. As the illustration above shows, you might see as many as 48 colors with a color display. With a monochrome display, you see 16 monochromatic patterns, ranging in density from pure black to pure white.

Click the downward arrow to open the Screen Element drop-down list box. This list shows the names of the 21 screen elements to which you can assign colors.



Each screen element in this list is represented in the sample desktop on the left side of the dialog box. If you have a mouse, the simplest way to change the color of a screen element is to click the screen element in the



PART 1: Introducing Windows NT

sample desktop. When you do this, the name of the screen element you click is selected in the drop-down list on the right side of the dialog box. With the screen element selected, click the color you want to assign. Then check the sample desktop to see if you're satisfied with the new color assignment.

For example, suppose you want to change the active title bar so that it shows yellow text on a solid red background. Click in the title bar labeled *Active* (anywhere except directly on the word *Active*), and then click the first sample in the second row of the Basic Colors palette. That assigns the solid red color to the active title bar. Next click the word *Active*, and then click the second color in the second row.



MOUSE TIP: Successive clicks on the OK button in the sample desktop cycle the screen-element selection from Button Face through Button Shadow, Button Text, and Button Highlight. Similarly, clicking the word *Highlighted* in the sample desktop toggles the selection between Highlight and Highlighted Text. To see which element you've selected, check the drop-down list on the right side of the dialog box.

If you don't have a mouse, here's how you can change screen colors:

1. If the Screen Element list box isn't highlighted, press Alt+E to highlight it.
2. Use the direction keys to highlight the name of the screen element you want to change.
3. Press Tab to get to the color palette.
4. Use the direction keys to move from color to color in the palette.
5. When you get to a color that you want to assign, press Spacebar to select it.
6. Press Shift+Tab to move back to the list box.



7. Repeat steps 2 through 6 until you've assigned all the colors you want to assign.
8. Press Enter to return to Control Panel, or follow the instructions below for naming and saving your new color scheme.

Feel free to experiment with color combinations. The built-in color schemes always look the same, no matter what changes you make in Control Panel. If you turn your Windows desktop into something gruesome, you can always restore order by reinstating one of the built-in color schemes.



WINDOWS TIP: It's possible to make your menus invisible by setting Menu Text and Menu Bar to the same color. If you make this mistake, here's one way to recover: If Control Panel is still running, press Alt+Tab until it becomes the current application. (If Control Panel isn't running, press Alt+Tab until Program Manager is the active application. Then press Alt, F, R to choose the Run command. Type *control* and press Enter to get to Control Panel.) Then press Alt, S, C to choose the Colors command on the Settings menu. When the Colors dialog box appears, reinstate one of the built-in color schemes.

A Few Limitations

Here are some additional points to note about setting colors in Control Panel:

- ▣ Some applications set their own colors, overriding the choices you make in Color Panel. Solitaire and FreeCell, for example, use a "Las Vegas" green background, no matter what selection you make for the Application Workspace screen element.
- ▣ You cannot assign a new color to the text that Windows uses to label minimized icons. Windows uses either black or white for this text, depending on the color of your desktop.



- Some of Control Panel's colors are *dithered* (blended from two or more solid colors). If you assign a dithered color to any text element, Windows substitutes a solid color of its choice.



WINDOWS TIP: If you switch from a 256-color display driver to a 16-color driver—or vice versa—you might find that some of your color choices look quite different. This is particularly likely to happen when dithered colors are assigned to text elements. A color scheme that looks fine in one resolution might not look good in another. The simplest way to deal with this phenomenon is to name your color schemes and switch to a different one when you change resolutions.

Saving a Color Scheme

When you assign new colors and press Enter or click OK, Windows records your selections as an unnamed color scheme (the information is registered in the Color Schemes section of the registry). Do not be concerned if the Color Schemes list box still displays the name of a built-in scheme when you click OK. The next time you return to this dialog box, the Color Schemes entry will be blank (indicating that you're using an unnamed color scheme), and the built-in scheme that was there when you saved will still be intact.

If you hit upon a color scheme that pleases your eye, it's best to name it before you save it. That way, you'll be able to switch back and forth between your own color scheme and one of those supplied by Windows—or between several of your own making.

To save a named color scheme, simply click the Save Scheme button and supply a name. Windows adds the name to the bottom of the Color Schemes list box.

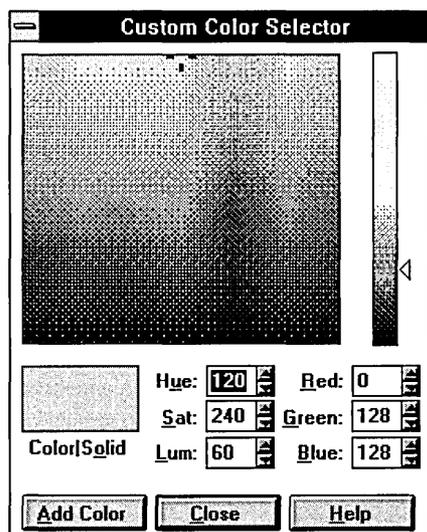
If you tire of your named color scheme, you can easily remove it. Simply select its name, and then click the Remove Scheme button.



Customizing the Color Palette

Windows lets you add up to 16 custom colors—colors that you define yourself by mixing red, green, and blue elements—to the 16 gray shades or 48 colors of the basic palette.

To define a custom color, start by clicking the Define Custom Colors button. Windows opens the Custom Color Selector.



If you have a mouse, you can specify a custom color by dragging the selection pointers for the two color scales—the big square one and the vertical bar. If you don't have a mouse, you can enter numbers for either or both of the two scales in the boxes at the lower right corner of the Custom Color Selector.

To set a custom color with the mouse, you adjust the position of two pointers—the cross-hair in the big square grid and the arrowhead to the right of the vertical scale. For every possible position of those pointers, Windows displays a sample of the selected color in the two boxes at the lower left corner of the Color Selector.

Why two sample boxes? Because your system isn't capable of displaying every possible combination of the three color parameters. (For more information about color parameters, see "How Colors are Defined," below.)



Windows uses dithering to approximate the colors that your system can't display directly. The sample box on the left (the one marked *Color*) displays the dithered color; the one on the right (marked *Solid*) displays a closely related color that your system can display without dithering.

How Colors Are Defined

Colors in Windows NT are recorded as a combination of three parameters: hue, saturation, and luminosity. Roughly speaking, the basic quality of a color—its redness, blueness, or whatever—is defined by its *hue*. The purity of a color is defined by its *saturation*; a lower saturation value means more gray is mixed in. The brightness or dullness of a color is defined by its *luminosity*.

Hue, saturation, and luminosity are the parameters that Windows uses internally, but your video display hardware lives by a different set of numbers. Images on a color monitor are formed by a combination of dots, or *pixels*. (A pixel is the smallest dot that can be displayed on your screen.) To make each pixel visible, a beam of electrons is fired at three tiny spots of phosphor—one red, one green, and one blue. The result is three points of distinctly colored light so close together that they're perceived as a single light source. The apparent color of that light source is determined by the relative intensities of its red, green, and blue components.

Every combination of hue, saturation, and luminosity, therefore, is translated by Windows into varying levels of energy directed at those spots of red, green, and blue phosphor.

Thus there are two boxes in the lower right corner of the Custom Color Selector—one for the parameters used by Windows, the other for the relative red, green, and blue intensities. You can define a custom color by modifying the numbers in either box.



Experimenting with Color

The vertical scale on the right controls luminosity (brightness). As you move its pointer higher, the color becomes lighter. Putting the pointer at the top of the scale creates pure white, no matter where the cross-hair pointer may be in the grid; putting the pointer at the bottom of the luminosity scale produces jet black.

The square grid controls hue and saturation. Moving the cross-hair from side to side changes the hue; moving it higher increases the saturation.

To see the range of “pure” colors available, start by putting the luminosity pointer about halfway up the vertical scale. Then put the cross-hair at the upper left corner of the square grid. This combination gives you a fully saturated red of medium luminosity. Now slowly drag the cross-hair across the top of the grid; as you do so, you’ll move from red through yellow, green, blue, violet, and back to red again. (Alternatively, you can click the upward arrow in the Hue box to step the Hue parameter from 0 to 239.)

To see the effect of luminosity on color, double-click the Solid sample box or press Alt+O. This moves the cross-hair to the nearest position where you see a pure color in both sample boxes. Then move the luminosity pointer up and down the scale (or click the arrows in the Lum box).

To see the effect of saturation, put the luminosity pointer back in the middle of the scale and drag the cross-hair straight up and down in the square grid (or click the arrows next to the Sat box).

Adding Custom Colors to Your Palette

When you find a color you like, you can add it to your Custom Color palette by clicking Add Color. (If you prefer to add the solid color, double-click the solid box or press Alt+O first.) Windows adds the color to the first available Custom Color box. If you want to add it to a specific box in your custom palette (for example, if you want to replace a custom color), select that box with the mouse before clicking Add Color.

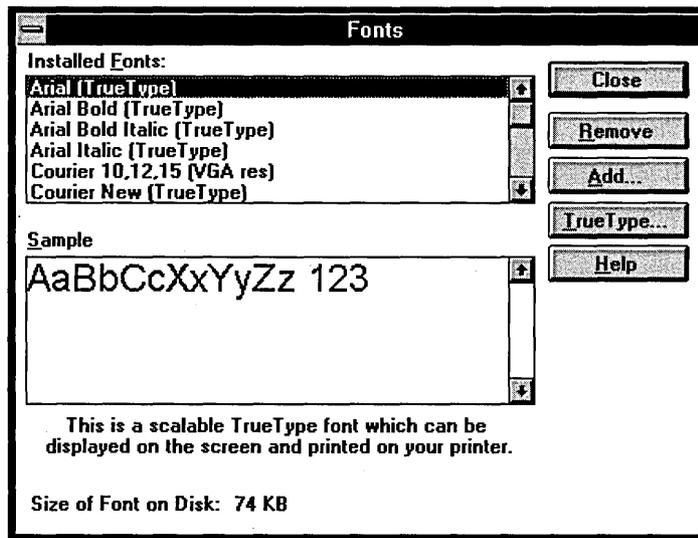
When you’ve filled out the custom palette to your satisfaction, click Close. Now you can assign your custom colors to the screen elements exactly as you did the basic colors.



Adding and Deleting Fonts

The Fonts applet provides you with a way to look at samples of all fonts installed in your Windows system. Changes made in Control Panel's Fonts applet affect all user accounts on the current workstation.

When you run Control Panel and double-click the Fonts icon, you see a display similar to this:



In the upper part of this dialog box, you'll see a list of all your installed fonts. Note that this list includes only those fonts that Windows can display on screen. Fonts that are built into your printer (such as the Lineprinter font on a Hewlett-Packard LaserJet) do not appear on the list unless you have also installed equivalent screen fonts.

As you select each name in the installed-font list, Windows displays a sample in the lower part of the dialog box. With TrueType and stroke fonts, you see only one point size; with bit-mapped fonts, you see a sample of each size available on your system. The bit-mapped fonts are identified in the font list by the available point sizes and the resolution of your display driver; in the figure above, for example, "Courier 10,12,15 (VGA res)" denotes a bit-mapped font in VGA resolution, available in point sizes of 10, 12, and 15.

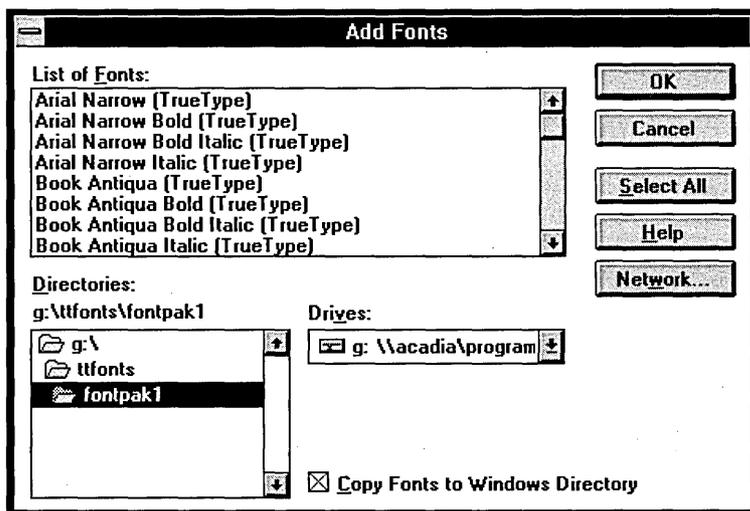


For more information about fonts, font terminology, and the types of fonts you can use with Windows NT, see “Working with Fonts,” page 40.

Adding Fonts

You can also use the Fonts section of Control Panel to install new fonts. You might not need to do this with commercial font packages, because such packages typically include their own installation routines. With public-domain or shareware fonts, or other fonts that don't include installation programs, you can invoke Control Panel's Fonts section and select the Add button. You can also use this command to restore native Windows fonts that you previously deleted.

The Font applet's Add button displays a dialog box like this:



Select the directory that contains your font files. Then select one or more files in the Fonts list and click OK. (Or, if you want to install all the fonts in the selected directory, click Select All and then click OK.)

These steps copy the selected font files to the SYSTEM32 subdirectory of your WINNT directory and make the appropriate modifications to the registry. If you do not have enough space on your hard disk to store the selected font files, you can skip the file-copying part of this process by deselecting the Copy Fonts to Windows Directory option. Windows then



retrieves font information from your source directory (presumably a network drive) as needed. You must, of course, ensure that the specified directory is always available.

Deleting Fonts

If you're running low on disk space, or if you find you never use certain fonts, you can take advantage of the Font applet's Remove button. When you select a font name and click this button, Windows modifies the registry to make the selected font unavailable. The font file itself is not deleted from your hard disk unless you check the Delete Font File from Disk check box.

NOTE: Windows uses MS Sans Serif for many of its dialog boxes. Therefore, you should not delete this font, even if you never use it in your applications.

The technique just described can be used to delete only the fonts that are actually installed in your Windows system. Fonts that are generated by a font-management application, such as Adobe Type Manager, do not appear in Control Panel's font listing. To remove such fonts from your hard disk, consult the documentation that came with your font-management software.

Configuring Serial Ports

To *configure* a serial port means to tell Windows how you want information transferred through the port to your peripheral device. Windows NT supports up to 256 serial ports, named COM1 through COM256. For each port, you can set five basic communications parameters:

- Baud rate
- Data bits
- Parity
- Stop bits
- Flow control

Changes that you make in Control Panel's Ports applet affect all user accounts on the current workstation.



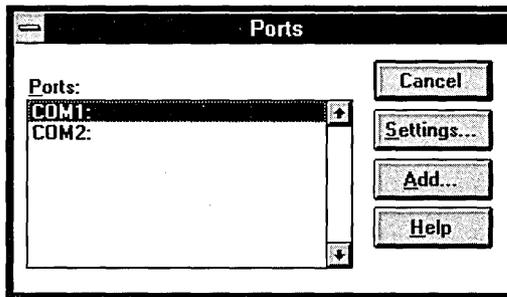
Baud rate refers to the speed at which data flows through the port. Baud rate is also sometimes expressed as *bits per second* (bps).

Data bits and *stop bits* refer to the way in which characters are “framed” as they’re sent through the serial port. A character consists of data bits (usually seven or eight), which are sent one at a time (serially). Stop bits mark the beginning and end of each character.

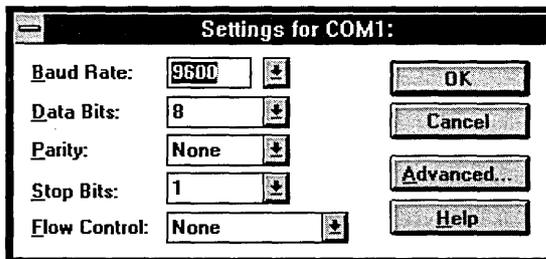
Parity is a form of error checking employed by certain peripheral devices. If used, it comes in four “flavors”: *even*, *odd*, *mark*, and *space*.

Flow control refers to the way your computer and the external device let each other know they’re ready (or not ready) to communicate. Flow control is also often referred to as *handshaking*.

To set basic communications parameters for a serial port, double-click the Ports icon in Control Panel or pull down the Settings menu and choose Ports. Windows displays the following dialog box.



Select the name of the port you want to configure, and then click Settings (or press Alt+S). Windows presents the Settings dialog box for the selected port, as shown below.





To determine the proper settings for your serial ports, consult the documentation for the devices you're using.

The Advanced button in the Settings dialog box produces an additional dialog box that you can use to change a serial port's base address or interrupt (IRQ). You won't ordinarily need to do this, however, and you *shouldn't* change either setting unless you know what you're doing.



WINDOWS TIP: The communications settings you assign with Control Panel become the defaults for your serial ports. You can override these defaults temporarily with communications programs such as Terminal. Thus, if you use your modem to communicate with several different services, each requiring different parameters, you don't have to return to Control Panel each time you switch services. For more information about changing these settings in Terminal, see "Communications Parameters," page 451.

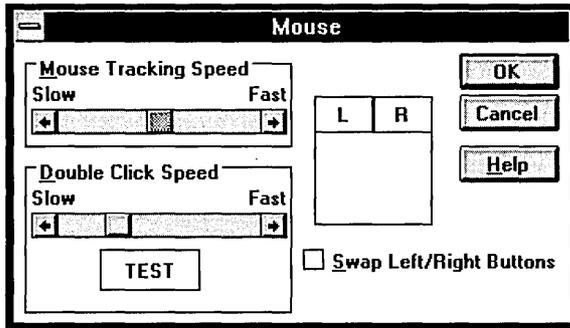
Customizing Your Mouse or Other Pointing Device

Control Panel's Mouse applet lets you tailor the behavior of your mouse or other pointing device to suit your personal tastes. The options available depend on what kind of device you're using, but for most pointing devices you can adjust the tracking and double-click speeds, and you can swap the functionality of the left and right mouse buttons. You might find it handy to swap mouse button functions if you're left-handed, so you can put the mouse on the left side of your keyboard and still use your index finger for most mouse commands.

Changes made in Control Panel's Mouse applet affect only the current user account.



To make mouse adjustments, double-click Control Panel's Mouse icon or pull down the Settings menu and choose Mouse. If you're using a Microsoft Mouse, you'll see a dialog box similar to this:



The term *tracking speed* refers to the relationship between movement of the mouse on your desktop and movement of the pointer on screen. With a faster tracking speed, it takes less mouse movement to move the pointer.

If you often find your mouse pointer overshooting its target as you select commands or objects in Windows, you'll probably find it helpful to decrease the tracking speed. On the other hand, if you find yourself "rowing"—picking up the mouse, bringing it back through the air, and then sliding it over the desktop again merely to get the pointer from one side of the screen to the other—try increasing the tracking speed.

To decrease the tracking speed, click the arrow on the left side of the Mouse Tracking Speed scroll bar. To increase it, click the arrow on the right side. Alternatively, you can drag the box in either direction in the scroll bar.



MOUSE TIP: Windows gives you immediate feedback about changes you make to the mouse tracking speed. That way you can tell whether you've made the right adjustment before you click OK to return to Control Panel. If you regret a change you make, you can click the Cancel button to restore your former setting.



The double-click speed specifies the time interval within which two mouse clicks are interpreted as a double-click. You can adjust this parameter the same way you adjust tracking speed—by clicking the arrow at either end of the Double Click Speed scroll bar or by dragging the box within the scroll bar.

To test the double-click speed you set, try double-clicking the box labeled TEST. If your two clicks are read as a double-click, the box changes from light to dark or from dark to light.

To swap the functionality of your mouse buttons, check the Swap Left/Right Buttons check box. Windows confirms the change by reversing the letters *L* and *R* in the diagram above the check box.

Note that if you swap the button functions and then change your mind, you must click the check box with the *right* mouse button to undo the swap.

Customizing Your Desktop

The *desktop* is the background area of your Windows screen that lies outside any window or icon. Control Panel's Desktop section has a number of options that affect the appearance and behavior of your desktop.

- ▣ The Pattern option lets you cover your desktop with a repeating dot pattern—one you create yourself or one that Windows supplies. Doing this is somewhat like throwing a tweed tablecloth over your screen; just the ticket, perhaps, if you get bored with solid colors or grays.
- ▣ For a more pictorial backdrop, you can add “wallpaper” to your desktop. The wallpaper can be a small image repeated as many times as necessary to fill the screen (in the manner of true wallpaper), a single image centered on the desktop, or a single image that covers the entire screen.
- ▣ To protect your screen while your machine is idle, you can install a *screen saver*. Windows supplies several screen savers to choose from. If you've installed a third-party screen saver on your system, you might be able to use Control Panel to switch between the built-in savers and your third-party saver.

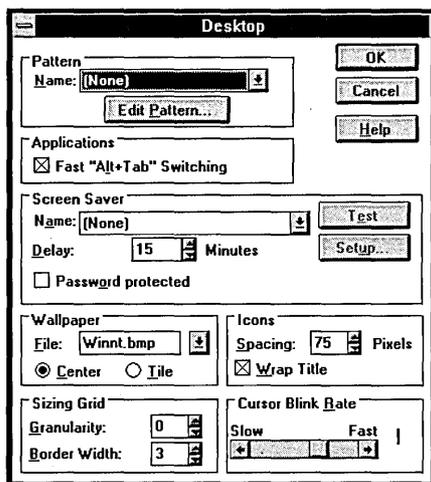


- ▣ A check box in the Desktop dialog box lets you specify whether you want long icon labels to be displayed on two or more lines. (This option is normally turned on.)
- ▣ The Granularity option lets you control the positions of objects on your desktop by activating an invisible set of grid lines. With grid lines active, windows automatically align on the nearest grid line.

Also included in the Desktop applet are commands for increasing or decreasing the cursor-blink speed, for setting the width of your icons, and for adjusting the thickness of window borders.

Changes made in Control Panel's Desktop applet affect only the current user account.

To customize your desktop, double-click Control Panel's Desktop icon, or pull down the Settings menu and choose Desktop. The following dialog box appears.

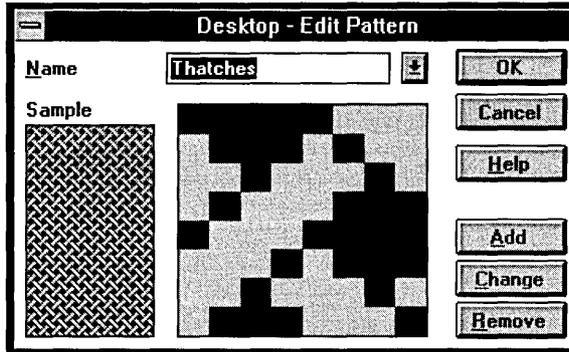


Setting a Background Pattern

To apply a background pattern to your desktop, click the downward arrow in the Pattern box, select one of the patterns listed, and click OK. If you want to look at the available patterns without applying any of them, click Edit Pattern. When the Edit Pattern dialog box appears, press the Down



direction key to step through the list and see a sample of each pattern. The following illustration, for example, shows what the Thatches pattern looks like.



If you find a pattern to your taste, you can apply it to the desktop by clicking OK in the Edit Pattern dialog box, and again in the Desktop dialog box.

Editing a Background Pattern

The big square in the center of the Edit Pattern dialog box represents the “cell” from which the selected background pattern is made. The cell is an eight-by-eight grid of dots; each dot is either dark or light. You can edit the background pattern by changing one or more dots from light to dark or dark to light. To do that, click the mouse on whichever dots you want to change. (There is no keyboard equivalent for this procedure.)

As you make changes to the dot pattern in the cell, you can see the effect of those changes in the Sample box on the left. When you’re satisfied with your editing, click Change to save the revised pattern. Then click OK to select it.

Adding a New Background Pattern

The easiest way to create a new background pattern is to edit an existing one (as explained above) and give it a new name by replacing the text in the Name text box (in the Edit Pattern dialog box). Windows grays out the Change button and activates the Add button. Click Add, and your new



pattern joins the list of existing patterns. You can then apply it to your desktop by clicking OK in the Edit Pattern dialog box and again in the Desktop dialog box.

Changing the Behavior of Alt+Tab

Ordinarily, when you switch between Windows programs by pressing Alt+Tab, Windows displays a box in the center of your screen that shows the name and icon of the program you're about to switch to. This method of telling you where you're going is called "Fast 'Alt+Tab' Switching." If you prefer, Windows can display the window borders and title bar of each program as you press Alt+Tab.

Most users find navigating between programs a lot easier with fast Alt+Tabbing. But if you prefer the alternative style, open Control Panel's Desktop applet and deselect the Fast "Alt+Tab" Switching check box.

Choosing a Screen Saver

Cathode-ray-tube (CRT) displays used by desktop computers create images by firing electron beams at phosphor-coated screens. If the same picture or text remains on a screen for a long period of time, the phosphor coating can be damaged, leaving a faint but permanent image on the screen. Screen savers reduce this hazard by monitoring screen activity. Whenever your screen remains unchanged for a specified length of time, the screen saver puts its own constantly varying image on the screen. As soon as you press a key or (with most savers) move the mouse, the screen saver restores the original image.

That's the ostensible purpose of a screen saver, at any rate. In truth, with current display technology, the probability that you'll ruin your CRT with a burned-in image is pretty remote. But screen savers have other virtues, as well. They're fun to watch, and they're one way to prevent others in your office from prying while you're away from your machine. Many screen savers have "save now" and password options. The save-now option lets you display the saver pattern on demand, either by pressing a certain keyboard combination or by moving the mouse to a particular corner of the screen. The password option ensures that only you are able to restore



PART 1: Introducing Windows NT

the original image. If your screen saver has these features, you can display the saver image any time you walk away from your computer and be reasonably confident that no one will invade your privacy in your absence.



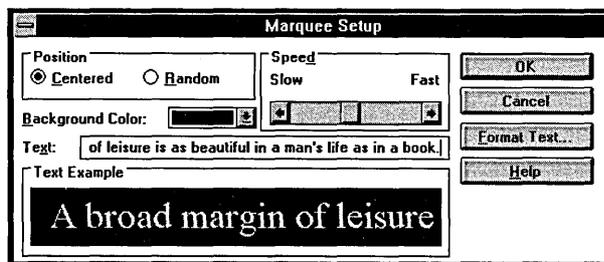
WINDOWS TIP: Another way to prevent snooping is to press Ctrl+Alt+Del and then lock your workstation. See “Locking, Logging Off, and Shutting Down,” page 7.

Using Control Panel's Desktop applet, you can choose from several screen savers supplied with Windows. If you use a third-party screen-saver program, you might find its choices in the Screen Saver drop-down list, alongside the Windows-supplied choices.

The default screen saver is None. The Name list also includes a choice called Default Screen Saver, which simply blanks the screen with no pattern displayed.

Below the screen-saver name list, you'll find a setting called Delay. This specifies the length of idle time the saver will wait before going into action. You can increase or decrease this amount by clicking the arrows or typing in a new number.

To the right of the Name list and the Delay time, you'll find command buttons labeled Test and Setup. The Test button lets you see the appearance of a saver without committing to it. The Setup button lets you assign options specific to the current saver. These options can significantly vary the appearance of a saver. For example, the Marquee Display saver displays a moving line of text on your screen. Its Setup options allow you to specify the font, color, speed, position, and content of the text.





WINDOWS TIP: Do not assign a screen saver in Control Panel if a third-party screen saver is already running.

Wallpapering Your Desktop

If you want to drape your desktop with something livelier than a simple dot pattern, try the wallpaper option. This option lets you display a picture as a backdrop to everything you do in Windows.

To try out the various wallpaper selections at your disposal, open the Control Panel's Desktop applet, and then click the downward arrow in the Wallpaper box. In the list box that unfolds, you'll find the name of every file in your WINNT directory that has the extension BMP. To wallpaper your desktop, select a filename and click OK. To remove the wallpaper, follow the same procedure, but select (None) from the drop-down list.



WINDOWS TIP: The File drop-down list shows only the BMP files in your WINNT directory, but you can specify any RLE or BMP file in any directory (local or remote) by typing the drive, directory, and filename in the Wallpaper File box.

Some wallpaper files produce a single image that covers your entire desktop. Others produce smaller images that can either be displayed once—typically in the center of the desktop—or repeated as many times as necessary to fill the screen. If you want the image to appear only once, select the Center option button; otherwise, select Tile.

Using Wallpaper to Customize Your Desktop

You can personalize the appearance of your Windows system by designing your own custom wallpaper. Any image recorded in the Windows bitmap (BMP) format can serve as a backdrop for your desktop. Store the file in your WINNT directory and its name will appear in the Wallpaper list box.



WINDOWS TIP: You can create BMP files using drawing commands in Paintbrush. For information about Paintbrush, see Chapter 16, “Using Paintbrush,” page 473.

You can also use a scanner to produce images such as photographs and company logos, provided your scanner software can save the image as a BMP file.



WINDOWS TIP: Many public bulletin-board systems (BBS's) have wallpaper images that you can download. The WINSHARE forum on CompuServe is a particularly good place to find public-domain wallpaper files.

Wallpaper and Display Resolution

A bit-mapped image, such as a BMP file, specifies the relative position of each pixel in the image. A BMP file that fills a standard 640×480 VGA screen specifies 307,200 (640 multiplied by 480) pixels. Such an image will not fill a higher-resolution screen, such as an 800×600 or 1024×768 Super VGA. Instead, the image appears smaller and is centered on the display. Conversely, an image designed to fill an 800×600 or 1024×768 display overflows a standard VGA screen. The upper left corner of the image appears in the upper left corner of your screen, but areas on the right and at the lower edges of the image are not displayed at all.

It's a good idea to check the resolution of an image before downloading it from a bulletin-board service. The resolution is usually provided as part of the description of the image.



Controlling the Appearance of Icons and Their Labels

By default, Windows NT wraps long icon labels—the text beneath icons in Program Manager and on the desktop—onto two or more lines. If you'd rather have your labels all on one line, open Control Panel's Desktop applet and deselect the Wrap Title check box.

If you find that your program-item icons are crowded together too tightly in Program Manager's windows, you might want to increase the number in the Icon Spacing box. The icon-spacing value specifies the width of each icon, and determines how closely together icons are positioned at the bottom of your desktop when you minimize windows or use Task List's Arrange Icons command.

The Icon Spacing value sets the icon width in pixels. (The width of the pixel depends on your screen's resolution; the higher the resolution, the smaller the pixel.) The largest value allowed is 512; the smallest depends on screen resolution. On a VGA screen, the minimum is 32 pixels. At this setting, your icons will stand shoulder-to-shoulder.

Turning on the Size-and-Position Grid

The Granularity value in the Sizing Grid section of the Desktop dialog box controls the spacing of an invisible set of grid lines on your desktop. These grid lines help you control the position and alignment of windows (but not icons) on your desktop. With Sizing Grid turned on, a window automatically snaps into place along the nearest horizontal and vertical grid lines whenever you size or move the window.

You can set the granularity to any number from 0 through 49. Setting it to 0 turns the grid off. A higher granularity value creates a coarser grid with fewer available positions for windows. You can see how this works by setting the granularity to 25 and clicking OK. After you do that, try clicking the mouse on Control Panel's title bar and dragging Control Panel around the desktop. On a standard VGA screen with the granularity set at 25, only six possible positions exist for the Control Panel window.

Unless you're using a high-resolution display or you have a special need for a coarse grid, you'll probably want to keep the granularity set somewhere between 0 and 5.



Setting Border Width

The Border Width option in the Sizing Grid section of the Desktop dialog box allows you to increase or decrease the thickness of the borders of all sizable windows. (A few programs, such as the game Minesweeper, appear in windows of fixed size that also have fixed-width window borders.)

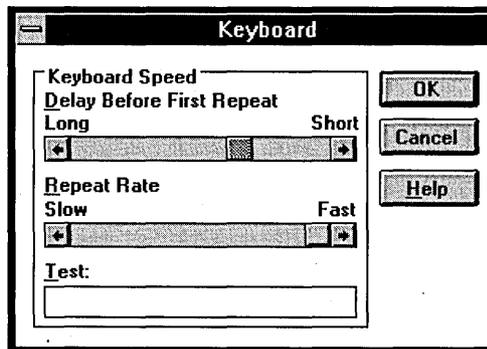
Thicker borders can make it a little easier to size windows with the mouse. On the other hand, they waste screen space. You can set the border width from an anorexic 1 through an obese 50.

Setting the Cursor Blink Rate

If the rate at which the Windows cursor blinks seems too fast or too slow for your taste, open Control Panel's Desktop applet and experiment with the Cursor Blink Rate scroll bar. The vertical line that appears next to this scroll bar shows the cursor blink rate before you make any changes. When you make changes with the scroll bar, the blinking line shows the new cursor blink rate.

Adjusting the Keyboard Repeat Rate

Control Panel's Keyboard applet allows you to modify the "typematic" behavior of your keyboard. When you double-click the Keyboard icon, Control Panel presents this dialog box:



Whenever you hold down the key for a character, Windows waits for a moment, and then begins repeating the character. The upper scroll bar in



this dialog box lets you change the length of time Windows waits before repeating. The lower scroll bar lets you change the repeat speed.

To test a new setting before clicking OK, tab to the Test line, and then hold down any alphabetic or numeric key. The character you press will appear in the Test box, so you can judge whether the delay and repeat rate are satisfactory.

Changes made in Control Panel's Keyboard applet affect only the current user account.

Setting Country-Specific Options

Control Panel's International applet lets you tailor your system for use in different countries. The International applet allows you to choose which currency symbol you want to use (and whether it appears in front of or behind numbers), the date and time format, which measurement system to use, and so on.

Changes made in the International applet affect only the current user account.

If you work in the United States, Windows is probably already set up with the country-specific settings that you need. Even so, you might find this section of Control Panel useful if you travel with your computer or if you need to correspond with overseas business associates. Most Windows-based applications automatically base their display of dates, times, and currency symbols on the settings in the Control Panel's International applet.



WINDOWS TIP: If a Windows-based application does not seem to be conforming to your current international settings, it's probably because you started that application before making your changes in Control Panel. Try closing and restarting the application.

To change Windows' international settings, double-click Control Panel's International icon or pull down the Settings menu and choose International. You'll see a dialog box like the one shown on the next page.



PART 1: Introducing Windows NT

The screenshot shows the 'International' dialog box with the following settings:

Country:	United States	OK
Language:	English (American)	Cancel
Keyboard Layout:	US	Help
Measurement:	English	
List Separator:	.	
Date Format		Currency Format
10/19/93 <input type="button" value="Change..."/>		\$1.22 <input type="button" value="Change..."/>
Tuesday, October 19, 1993		-\$1.22 <input type="button" value="Change..."/>
Time Format		Number Format
12:31:09 PM <input type="button" value="Change..."/>		1,234.22 <input type="button" value="Change..."/>

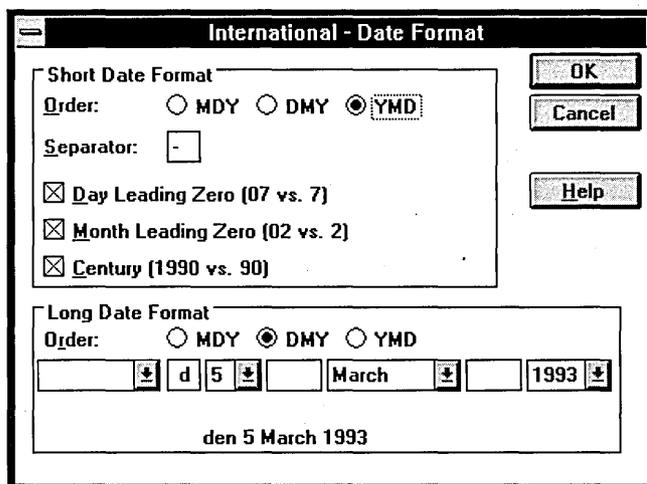
The easiest way to work with this dialog box is to start with the Country drop-down list. Click the downward arrow to open the list, and then pick the country whose settings you want to adopt. For example, if you're going to be working in Sweden, select Sweden in the Country list. Control Panel then adjusts the settings in the Measurement, Date Format, Time Format, Currency Format, and Number Format sections of the dialog box, like this:

The screenshot shows the 'International' dialog box with the following settings:

Country:	Sweden	OK
Language:	English (American)	Cancel
Keyboard Layout:	US	Help
Measurement:	Metric	
List Separator:	:	
Date Format		Currency Format
1993-10-19 <input type="button" value="Change..."/>		1,22 kr <input type="button" value="Change..."/>
den 19 October 1993		-1,22 kr <input type="button" value="Change..."/>
Time Format		Number Format
12.32.49 <input type="button" value="Change..."/>		1 234,22 <input type="button" value="Change..."/>



Normally, these settings will be correct for the country you choose. But if you need to make adjustments, you can click the appropriate Change button in the bottom section of the dialog box. Each Change button brings up its own separate dialog box. Here, for example, is what you see if you ask to change the date format:



Control Panel does not automatically change the Language and Keyboard Layout settings when you modify the Country setting. Choose a different Language if you need to perform a language-specific task, such as sorting or case conversion.

Choose a different Keyboard Layout if you want to type accented characters directly from the keyboard.



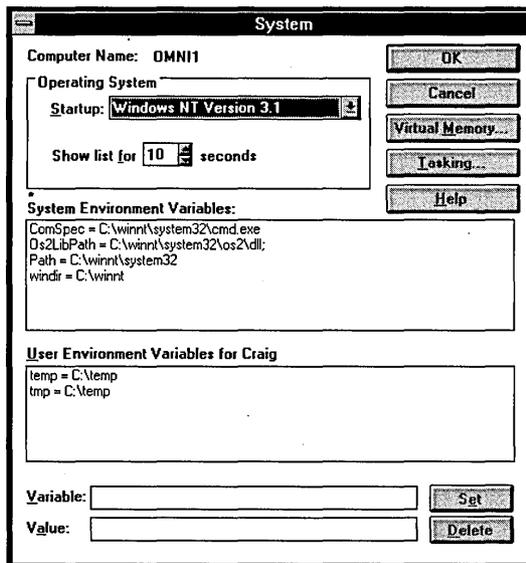
KEYBOARD TIP: You can type accented characters with any keyboard using the Alt key and the numeric keypad or using Character Map. For more information about using Character Map, see "Character Map," page 562.



NOTE: If you change either the Language or the Keyboard Layout setting, Windows might ask you to insert one of your original distribution disks so that it can get the information file for your language or keyboard.

Changing Operating System Parameters

Control Panel's System applet, shown below, allows you to customize the Windows NT flex-boot apparatus, change the size and/or location of your paging (swap) file, and change the relative priority that Windows NT gives to the foreground application.





NOTE: Control Panel's System applet also lets you specify environment variables for the current user account. For more information, see "Environment Variables," page 629.

Changing the Default Operating System and Startup Delay

The drop-down list at the top of the System applet's dialog box shows the names of all installed operating systems recognized by the Windows NT flex-boot facility. The system named at the top of the list is the default operating system for your computer—the one that runs automatically on startup after the designated startup delay has elapsed. The delay time appears directly below the drop-down list, in the box labeled "Show list for." In the figure, the default operating system is "Windows NT Version 3.1," and the startup delay is 10 seconds.

To change the default operating system, open the Startup drop-down list and choose from the systems listed. To change the startup delay, click the appropriate spinner arrow. You can reduce the delay to 0, but even if you almost never use an alternative operating system, it would be prudent to leave at least a small delay so that you can always return to Windows NT. For example, if you set the delay to 0 and change the default system, you cannot return to Windows NT.

Adding Another Operating System to the Flex-Boot List

The flex-boot facility can recognize more than two operating systems, provided that only one system requires startup files to be stored in the root directory of the boot disk. Both MS-DOS and OS/2 require that certain files be kept in the root directory. Therefore, you cannot flex-boot Windows NT, MS-DOS, *and* OS/2. You can, however, flex-boot Windows NT, MS-DOS *or* OS/2, and additional systems that are not root-based.



To add an operating system on an Intel-architecture computer (one that uses an 80386, 80486, or Pentium microprocessor), first install the new operating system. Then edit the file BOOT.INI, which is stored in your root directory. That file will look something like the following illustration.

```
Notepad - BOOT.INI
File Edit Search Help
[boot loader]
timeout=10
default=multi(0)disk(0)rdisk(0)partition(1)\winnt

[operating systems]
multi(0)disk(0)rdisk(0)partition(1)\winnt="Windows NT Version 3.1"
c:\="MS-DOS"
```

Using a nonformatting editor (such as Notepad), add an entry for your new operating system under the heading Operating System. To the left of the equal sign, specify the path for the new system's files. Enter the text you want to appear in the startup list to the right of the equal sign.

NOTE: Your BOOT.INI file might be assigned system and read-only attributes. If so, you'll need to do the following to edit it: From File Manager's View menu, choose By File Type, and then select the Show Hidden/System Files check box. Make a backup copy of the file. Then use the File Properties command to remove the read-only attribute.

If you're using a RISC-based computer, you can add a new operating system simply by running the appropriate ARC setup program. Windows NT will automatically detect the new system and add it to the flex-boot list.

Changing the Size or Location of Your Paging File

A paging file is a large disk file used for *virtual memory*—that is, an extension of your computer's random access memory (RAM). When RAM gets close to full, Windows NT automatically moves some information to the paging



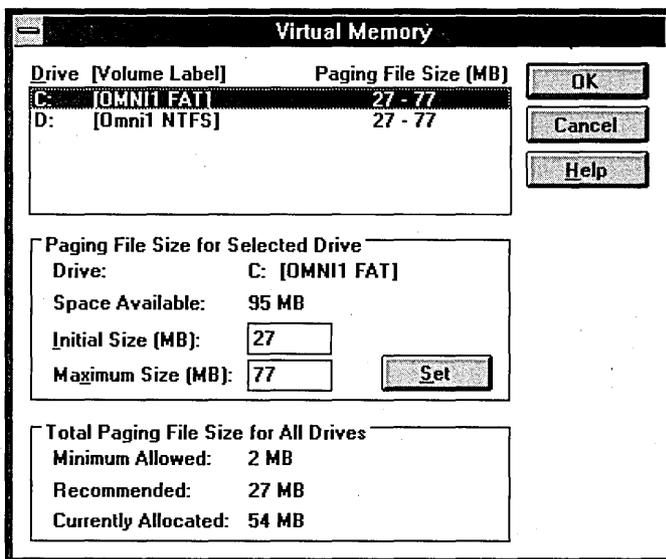
file to make room in memory for new data. When the contents of the paging file are needed again, Windows NT brings back what it needs, possibly swapping something else out of RAM in the process. This whole process goes on automatically and, for the most part, unnoticeably. (In earlier versions of Windows, the paging file is called a *swap file*.)

Earlier versions of Windows offer two kinds of swap files, permanent and temporary. Windows NT uses only one kind of paging file. The file is permanent, in the sense that it is not deleted when you end a Windows NT session. But, like a temporary swap file in Windows 3.1, the Windows NT paging file can change size during a session. When you set up the paging file (or when the Windows NT Setup program does it for you), you specify an initial size and a maximum size. Windows NT begins by using the initial size and can expand the file to the maximum size, as the need arises. (It always uses at least 2 MB, regardless of the initial and maximum settings.) The file, called PAGEFILE.SYS, is stored in the root directory of your boot disk, and cannot be deleted while Windows NT is running. If you delete it while running a different operating system, Windows NT creates a new one at your next startup.

Unlike earlier versions of Windows, Windows NT allows you to create multiple paging files—one per local hard disk. If you have more than one local disk and room to spare, you might be able to improve the performance of your system by adding another paging file. The performance improvement will be most noticeable if your system has only 8 or 12 MB of RAM, or if you run a large number of sizable applications at once.

To change the size or location of your paging file, or to add new paging files, your user account must be a member of the Administrators local group. If you are not authorized to change these parameters, you can see the settings that are currently in effect, but you cannot edit them.

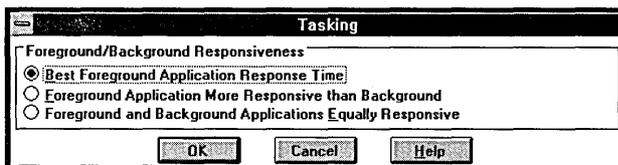
To change or inspect the paging-file settings, click the Virtual Memory button in Control Panel's System applet. You'll see a display similar to the one shown on the next page.



To change or add a paging file, select a drive letter at the top of this dialog box. Then specify initial and maximum values and click Set. You must shut down and restart your system for your changes to take effect.

Changing the Foreground/Background Tasking Balance

By default, Windows NT divides your computer's processing time between the foreground application (the one you're currently working in) and all other running programs so that the foreground program gets maximum priority. Your other programs continue to run, but they get a smaller portion of your computer's processing time. You'll probably want to keep your system set this way if you need to interact with the foreground application. Windows NT gives you two other priority options, however, as shown in the following illustration.





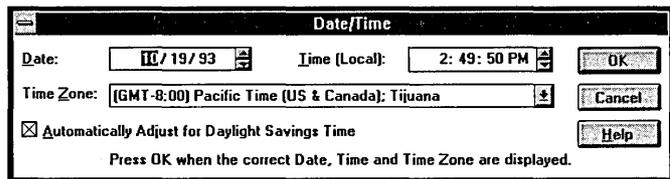
To arrive at these options, click the Tasking button in Control Panel's System applet. Your settings here affect only your own user account.

Setting the Date and Time

Control Panel provides a simple way to adjust your system date and time settings. You'll find this feature handy if you transport your computer into a new time zone.

Changes to the system date and time settings affect all users on your workstation.

To set the date or time, double-click Control Panel's Date/Time icon or pull down the Settings menu and choose Date/Time. Provided your account is authorized to change the system date and time, you'll see the following dialog box.



To change a date or time setting with the keyboard, press Tab until the number you want to change is highlighted. Then type a new number. In the illustration above, for example, you can change the date to 10/20/93 by tabbing once (to highlight 19) and typing the number 20.

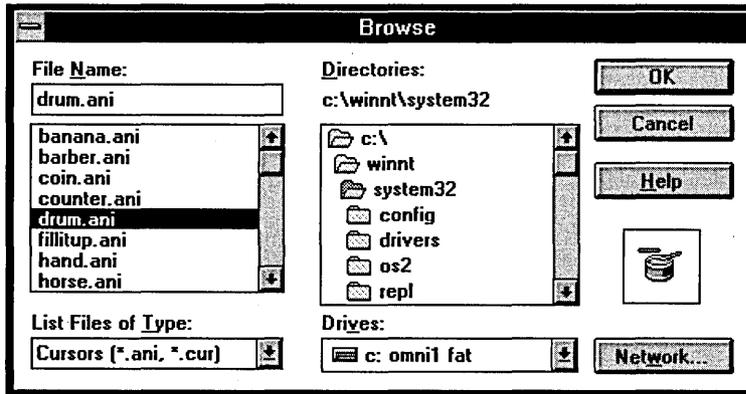
To change a date or time setting with the mouse, click the number you want to increase or decrease. Then click the upward or downward arrow to the right of the number.

If you want Windows NT to adjust your computer's clock automatically when your locality switches to or from daylight savings time, first select the appropriate time zone in the Time Zone drop-down list. Then select the Automatically Adjust for Daylight Savings Time check box.



Using Alternative Mouse Pointers

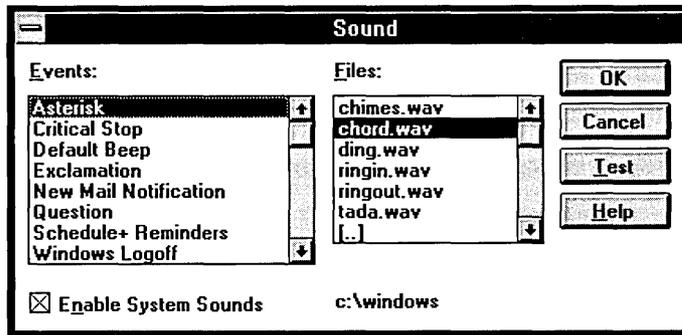
Should you tire of the pedestrian arrow and hourglass, check out Control Panel's Cursors applet. There you'll find an assortment of replacements (many of them animated) for each of the standard Windows mouse pointers. To see what's available, select one of the standard pointer shapes, and then click Browse. A dialog box similar to the following will appear.



The files with the extension ANI are animated pointers. You might also see some nonanimated options with the extension CUR. When you select any cursor filename, a preview appears in the lower right corner of the dialog box.

Mapping Sound Files to System Events

If your computer is equipped with a sound board and you have installed the correct driver for it, you can set up Windows to respond to various events with sound files (files with the extension WAV) instead of its normal beep. When you open the Sound applet, Windows lists the available events in the following dialog box.



Alongside the Events list is a listing of all WAV files in your Windows directory. To hear what any of these files sounds like, select a filename and click the Test button. (This button is grayed out if you have not installed an appropriate audio driver.) To map a system event to a WAV file, select the event in the list on the left and the filename in the list on the right.

Turning Off the Sound

Windows normally sounds a warning beep or plays the sound file mapped to the default beep when you try to do something it deems inappropriate. In the unlikely event that you've never been so rewarded, you can experience this signal for yourself as follows:

1. Double-click Control Manager's Sound icon, or pull down the Settings menu and choose Sound.
2. After the dialog box appears, click the mouse anywhere in the Control Panel window, outside the dialog box.

If you find the beep or sound file annoying, deselect the Enable System Sounds check box in the Sound dialog box.

Installing Drivers

If you add a new peripheral to your computer, such as a sound board or a video player, you might need to install a new driver as well. You can do that with Control Panel's Drivers applet.

To add a new driver, double-click Control Panel's Drivers icon. Then click Add, choose a driver from the list that appears, and follow the prompts.



If the driver you need does not appear in the list, select the item labeled Unlisted or Updated Driver. Windows then prompts you to insert a disk with the unlisted driver in drive A.

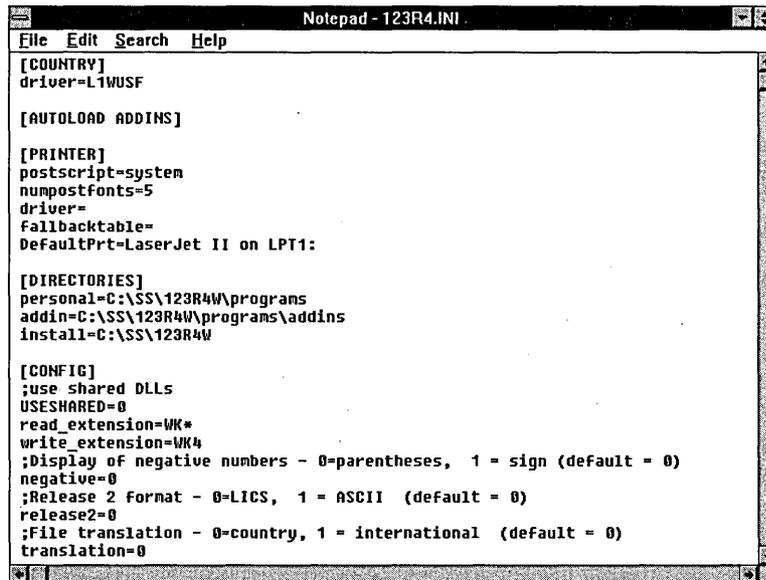
If the driver you install offers configuration options, the Setup button in the Drivers dialog box is enabled (not grayed out). Click that button and fill out the dialog box that appears.

Modifying Private INI Files

Although the registry is designed to record configuration information for individual applications as well as for your system as a whole, some programs will undoubtedly continue to rely on their own initialization files. You might occasionally find it necessary to change a program's configuration by editing its INI file. Fortunately, almost all INI files are similarly structured, and editing an INI file is neither difficult nor dangerous—provided you first make a backup copy of the file.

How INI Files Are Structured

Here's what the beginning of a typical INI file looks like:

A screenshot of a Notepad window titled "Notepad - 123R4.INI". The window contains the following text:

```
File Edit Search Help
[ COUNTRY ]
driver=L1WUSF

[ AUTOLOAD ADDINS ]

[ PRINTER ]
postscript=system
numpostfonts=5
driver=
Fallbacktable=
DefaultPrt=LaserJet II on LPT1:

[ DIRECTORIES ]
personal=C:\SS\123R4\programs
addin=C:\SS\123R4\programs\addins
install=C:\SS\123R4\

[ CONFIG ]
;use shared DLLs
USESARED=0
read_extension=WK*
write_extension=WK4
;Display of negative numbers - 0=parentheses, 1 = sign (default = 0)
negative=0
;Release 2 format - 0=LICS, 1 = ASCII (default = 0)
release2=0
;File translation - 0=country, 1 = international (default = 0)
translation=0
```



The file has several sections, each headed by a word enclosed in brackets. The first section in the file illustrated above is called [COUNTRY]. The second is [AUTOLOAD ADDINS], the third [PRINTER], and so on. Under each bracketed heading, you'll find a number of lines beginning with a single word (it may be a compound word such as *numpostfonts*) and an equal sign. These are called *keywords*. Each keyword controls some aspect of the way your application functions. On the right side of each equal sign are values that are assigned to the keyword.

If nothing appears to the right of an equal sign, that means that your program has assigned a default value to the keyword. If a keyword itself (or a whole section of keywords) doesn't appear in the file, its absence also means that a default value has been assigned.

The order in which the sections appear is not critical. Nor is the order in which keywords appear within a section.

How to Edit an INI File

The two principles to remember when changing the contents of any INI file are:

- ▣ Make a backup copy of the file before you begin.
- ▣ Do not use a "formatting" editor.

Copying the file before you start gives you a way to recover if you make a mistake. A formatting editor is one that adds formatting information to the file—information about fonts, page dimensions, indents, and so on; most word processors fall into this category. Such information will almost certainly corrupt your INI file.



WINDOWS TIP: By default, Windows NT associates INI files with NOTEPAD.EXE, which is fine because Notepad makes a perfectly suitable INI-file editor. For more information, see "Notepad," page 541.



Inexpensive shareware editors are also available (on CompuServe or local bulletin-board systems) that add some handy bells and whistles—such as the ability to sort INI-file headings.

Editing the WIN.INI and SYSTEM.INI Files

Although Windows NT itself does not use the WIN.INI or SYSTEM.INI files, you might have applications written for older versions of Windows that depend on entries in these files. Should you need to edit WIN.INI or SYSTEM.INI, you can do so by using the program Sysedit. If you don't have a program item for this program, choose Program Manager's File Run command and type *sysedit*. (You can also type this in a command prompt window.)

Sysedit is a Notepad-like editor that works with only four specific files: WIN.INI, SYSTEM.INI, AUTOEXEC.BAT, and CONFIG.SYS. The program offers one convenience missing in Notepad: It automatically makes backups of its files before saving your edited versions. The backups have the extension SYD.

Exchanging Information: The Clipboard, ClipBook Viewer, and OLE

- | | |
|--|------------|
| Using the Clipboard with Applications for Windows | 169 |
| Cut and Paste work the same way everywhere ... | |
| Using the Clipboard with Non-Windows-Based Applications | 171 |
| ... except in programs for MS-DOS, where they work <i>almost</i> the same way. | |
| Using ClipBook Viewer | 174 |
| The ClipBook Viewer lets you build a scrapbook of shared data. | |

Making Connections with OLE

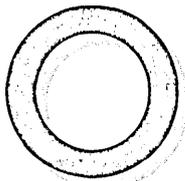
184

OLE is the automated way to build compound documents.

Embedding Packages

187

An icon may be worth a thousand words, tones, or pixels.



One of the primary benefits of working in Windows is the ability to transfer information quickly and easily between programs. Windows NT offers two means of sharing information across applications: the Clipboard, and object linking and embedding (OLE). These features, along with the ClipBook Viewer application, are the subject of this chapter. At the end of the chapter, we'll also look at a utility called Object Packager that lets you embed an iconic representation of a data object.

Using the Clipboard with Applications for Windows

The procedures for using the Clipboard are essentially the same in all programs for Windows—including programs written expressly for Windows NT and programs written for MS-DOS-based versions of Windows. The basic steps are as follows:

1. Select the information you want to move or copy.
2. Choose the program's Cut command if you want to move the information, or the Copy command if you want to copy it.
3. Switch to the program that you're going to copy or move the information to.
4. Position the insertion point or cursor at the place where you want the information to go.
5. Choose the receiving program's Paste command.

For example, if you want to copy the range A1:G10 from a Microsoft Excel worksheet into a note you are writing in Notepad, you start by activating Excel and selecting cells A1:G10. Then you choose the Copy command from Excel's Edit menu.

At this point, Windows puts a copy of the Excel information in an area of memory known as the Clipboard.

Next you make Notepad the current window, position the insertion point in your note where you want the table to appear, and choose the Paste command from Notepad's Edit menu.

After a copy operation, such as the one just described, the Clipboard's contents remain unchanged. This means that after you put something on



the Clipboard, you can paste it as many times as you like—into several different places within the same document or into several different documents. Generally speaking, the Clipboard retains its contents until you replace them with something else or unless you explicitly delete them with ClipBook Viewer. (There are a few exceptions. Microsoft Excel, for example, erases the Clipboard after you paste data and then perform other commands.)

The Copy, Cut, and Paste Commands

Almost all Windows applications that work with user data have an Edit menu with Copy, Cut, and Paste commands. The three commands behave in a predictable and consistent way in almost all programs. Copy puts selected information on the Clipboard without removing it from the source document. Cut puts the information on the Clipboard and at the same time deletes it from the source document. Paste puts a copy of the Clipboard's contents into the destination document without emptying the Clipboard. (Once again, Microsoft Excel is an exception. When you use Excel's Cut command, the selected information remains in place on the worksheet until you use Paste. If you change your mind and don't paste, Excel leaves your cut data in place on the worksheet.)

Many programs also have Delete or Clear commands on their Edit menus. These commands differ from Cut in that they simply remove data from the current application without putting a copy of the data on the Clipboard.

Copying a Full Screen or Window

Windows has commands for copying a windowful or an entire screenful of information to the Clipboard all at once. These commands are particularly useful when you're transferring information from an MS-DOS-based program. (For more information, see "Using the Clipboard with Non-Windows-Based Applications," page 171.) But you might also find them useful when your source program is a Windows-based application.

To transfer a snapshot of the current *window* to the Clipboard, you press Alt+PrtSc. (On some keyboards, the PrtSc key is labeled Print Screen.) To transfer a snapshot of the current *screen* to the Clipboard, you press PrtSc (without Alt).



KEYBOARD TIP: With some older keyboards, where PrtSc shares the asterisk key, you must press Shift+PrtSc to transfer a snapshot of the screen.

These commands transfer a *graphic image* (a bit map) of the current window or screen to the Clipboard. What you see on screen when you take the snapshot is exactly what goes onto the Clipboard and exactly what you can subsequently paste into another program. Any information beyond the confines of the current screen or window is not transferred.

Using the Clipboard with Non-Windows-Based Applications

The procedures for using the Clipboard with non-Windows-based programs (that is, programs for MS-DOS, OS/2, or POSIX, as well as character-based programs for Windows NT) are nearly the same as those just described for Windows-based programs. There are two significant restrictions:

- ❑ You can *copy* data from a non-Windows-based program to the Clipboard, but you can't cut.
- ❑ To transfer a graphic image of an MS-DOS-based program to the Clipboard using PrtSc or Alt+PrtSc, you must run the MS-DOS-based program in a window. (If your program is running full-screen, press Alt+Enter to display it in a window.)

NOTE: If you press PrtSc or Alt+PrtSc while running an MS-DOS-based program full-screen, Windows transfers the contents of the screen to the Clipboard as text, rather than as a graphic image.

For more information about running non-Windows-based programs under Windows NT, see "Running All Kinds of Programs," page 590.



Copying a Text or Graphics Block to the Clipboard

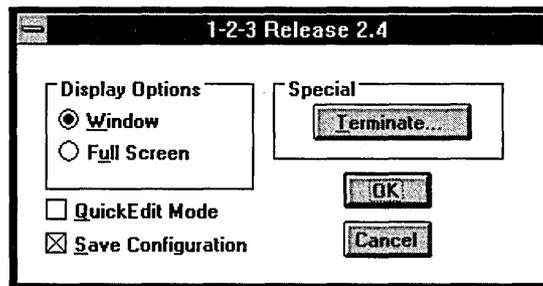
The simplest way to copy a block of text or graphics from a non-Windows-based program to the Clipboard is as follows:

1. Display the non-Windows-based program in a window. (Press Alt+Enter if necessary.)

NOTE: If your MS-DOS-based program is running in graphics mode, the word *Frozen* appears on its title bar when you display it in a window. This is not a problem; it merely means that Windows NT suspends execution of the program while it's windowed. After you copy your data to the Clipboard, you can press Alt+Enter to resume execution of the program.

2. Select the text or graphics you want by dragging the mouse, as you would in a Windows-based program.

If dragging the mouse doesn't highlight the block, pull down the program's Control menu and choose Settings. You'll see a dialog box like this:



Select QuickEdit Mode and click OK.

3. Press Enter or click the secondary (right, by default) mouse button.

QuickEdit mode makes your mouse available for selecting text or graphics at the expense of making it unavailable for executing commands in your non-Windows-based program. If you need the mouse for choosing



menu commands, activating cells in a spreadsheet, or otherwise interacting with the non-Windows-based application, revisit the Control menu, choose Settings, and deselect QuickEdit Mode.

Alternatively, if you prefer not to use QuickEdit mode, you can select data in a non-Windows-based program by choosing the Control menu's Edit command, and then choosing Mark. After you choose Mark, the mouse will be available for selection, exactly as it is in QuickEdit mode. The Control menu's Edit Mark command, in effect, selects QuickEdit mode for only one mouse selection, and then restores the mouse's previous function.

NOTE: If your mouse pointer disappears when you display your non-Windows-based program in a window, press Alt+Spacebar to open the program's Control menu. Then choose Display Mouse Pointer.

Pasting Information into a Non-Windows-Based Program

To paste the Clipboard's contents into a non-Windows-based program, do the following:

1. Display the program in a window. (Press Alt+Enter if necessary.)
2. Position the cursor where you want the data to be pasted.
3. Click the secondary mouse button. Or, choose the Control menu's Edit command, and then choose Paste.

You can also paste into a minimized non-Windows-based program. The results are exactly the same; the Clipboard's contents arrive at the current cursor location in the minimized program.

Be aware of the following issues when pasting into non-Windows-based programs:

- The non-Windows-based program must be able to accept the type of data stored on the Clipboard. Most non-Windows-based programs can accept text only. If you copied graphics to the Clipboard, the Paste command will still be available (because Windows does not know the capabilities of your non-Windows-based programs), but the paste will have no effect.



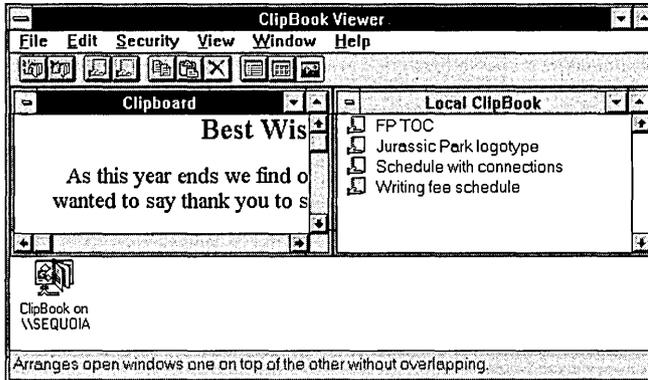
- ▣ When you paste text from the Clipboard into a non-Windows-based program, the Clipboard adds a carriage return and line feed to the end of each text line as it appeared in the original document, even if those line endings were originally created by word wrap rather than by pressing Enter. That means that text pasted into a non-Windows-based word processor might have extra “hard” carriage returns and might need to be reformatted.
- ▣ If you paste a column of numbers into a non-Windows-based spreadsheet, those numbers will all arrive in the same cell (with each line replacing its predecessor) unless your spreadsheet is one that moves the cell selector on Enter. If this feature is optional in your spreadsheet, you might want to activate it before pasting numbers from the Clipboard.
- ▣ If your non-Windows-based program drops characters pasted from the Clipboard, you might need to create a PIF (program information file) for it and deselect the “Allow Fast Paste” option. For information about creating and using program information files, see “Using Program Information Files,” page 670.

Using ClipBook Viewer

The ClipBook Viewer application performs four valuable services:

- ▣ It lets you see the current contents of the Clipboard and provides a list of the formats in which the current Clipboard contents are stored.
- ▣ It gives you a way to save Clipboard objects for easy reuse.
- ▣ It provides commands for sharing local Clipboard objects with other network users.
- ▣ It provides commands for connecting to Clipboard objects created by other users.

ClipBook Viewer’s program file is called CLIPBRD.EXE. Unless you’ve moved it, you’ll find its program-item icon in your Main program group. When you launch ClipBook Viewer, you’ll see something like the following.



This illustration shows the ClipBook Viewer with two open windows—the Clipboard window and the Local ClipBook. These windows can be sized, moved, and minimized, exactly like directory windows in File Manager. And just as in File Manager, you can use commands on the Window menu to switch between windows or arrange the windows neatly on your screen.

The Clipboard window shows the current contents of the Clipboard. What you see here is what you can paste into an application. The Local ClipBook is a scrapbook for data that you want to keep—either because you want to reuse it or because you want to make it available to other users on your network.

In addition to the Clipboard and the Local ClipBook, the illustration above also shows one remote ClipBook in a minimized window. The remote ClipBook holds items in another user's Local ClipBook—items that the other user has chosen to share.

Your own ClipBook Viewer will include at least the Clipboard and Local ClipBook windows. You may also have one or more remote ClipBooks.

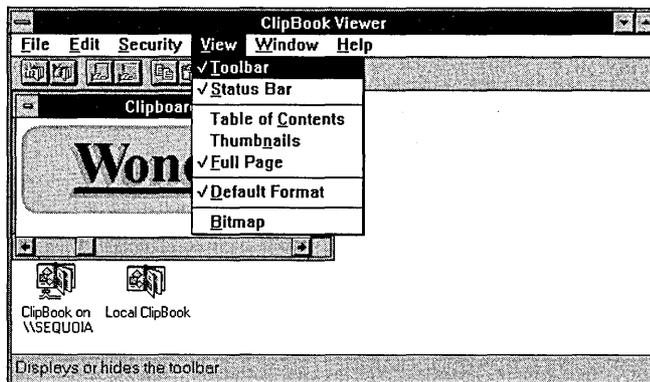


Viewing the Clipboard's Contents

When you cut or copy information from an application to the Clipboard, the application transfers the information in as many formats as it can. Paintbrush, for example, normally supplies an image to the Clipboard in both *bit-mapped* and *picture* formats. Microsoft Word for Windows copies a block of text in several text formats. Microsoft Excel puts worksheet data on the Clipboard in an assortment of formats, including some that allow the data to be exported to other spreadsheet programs. (See Table 5-1 on page 178.)

This multiple-format arrangement allows an application to receive pasted data in whichever format best suits it. For example, the fact that a block of cells from a Microsoft Excel worksheet arrives on the Clipboard in both graphics and text formats means that you can paste it into Notepad, a program that accepts only text, as well as into programs that accept only graphic material.

To see which formats your Clipboard data is using, activate the Clipboard window and open the View menu. The names of the available formats appear in the bottom segment of this menu. Depending on what kind of information you've put on the Clipboard, your View menu might look rather simple, like this:





Or it can be impressively complex:

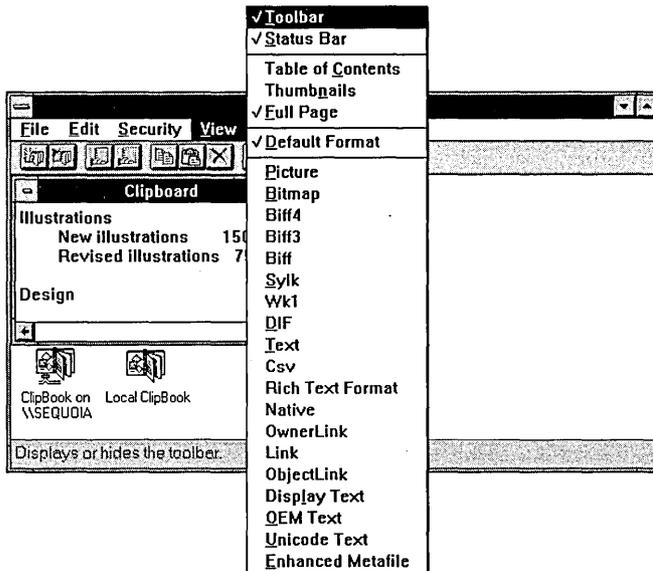


Table 5-1 on the next page lists a few of the terms you might encounter on ClipBook Viewer's View menu.

You can change the appearance of the Clipboard contents by selecting any of the Display-menu names that appear in dark type. (Grayed-out names represent formats that the Clipboard is currently using but that ClipBook Viewer is incapable of displaying.) To return the viewer to its default display, choose Default Format.

It's important to recognize that changing the format displayed in ClipBook Viewer's window has no bearing on the format that will be pasted into a receiving application. If you use the receiving program's Paste command, the program requests a particular format from the Clipboard, regardless of what happens to be displayed in the viewer. Some applications include a Paste Special command, however, in addition to the ordinary Paste command. This command lets you choose which of several formats to paste. ClipBook Viewer's Display menu, in this case, can help you make the choice by showing you which formats are there and what they look like.



View-menu Term	Description
Text	Unformatted character information (without style attributes, such as boldface and italics), using the ANSI standard character set (the one used by all Windows-based programs).
OEM Text	Unformatted character information, using the "extended ASCII" character set (the character set used by MS-DOS-based programs). If you paste text data into an MS-DOS-based program, Windows supplies it in OEM-text format.
Rich Text Format	A text format that uses embedded codes to store style information, such as boldface and italics. Microsoft Excel, Microsoft Word for Windows, and a growing number of other programs support the rich text format.
Bitmap	A graphic format in which each pixel in an image is represented by one or more data bits. Unlike a picture or metafile, bit-mapped data is specific for a given output device. If you display a bit map on a device with different resolution or color capability than the one on which it was created, you're not likely to be pleased with the result. Also, although bit-mapped images can be resized or reshaped, this process generally introduces gross distortions.
Picture	A graphic format in which image elements are stored as a sequence of commands. An image in picture format can be reproduced without gross distortion at different sizes or shapes, as well as on different kinds of output devices. But a bit-mapped image might display more quickly, because it doesn't have to be recreated from programmatic instructions. An image in picture format is also sometimes called a metafile (although the terms are not precisely equivalent).

TABLE 5-1.
Some common Clipboard formats.

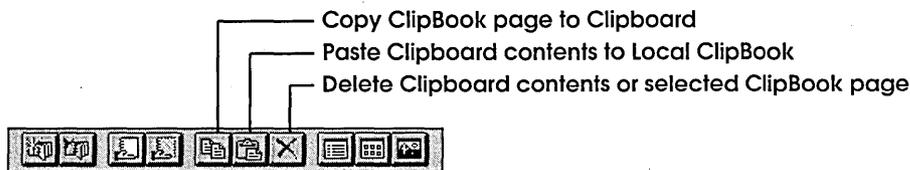
(continued)

TABLE 5-1. *continued*

View-menu term	Description
DIB	A device-independent bit map. This is a newer bit-mapped format (introduced with OS/2 version 1.1) that eliminates some (but not all) of the device-specificity of the standard bit-mapped format by including information about the color palette and resolution of the originating device.
BIFF, BIFF3, CSV, DIF, Syk, Wk1	Formats used for the exchange of spreadsheet or database information.
Link, OwnerLink, ObjectLink	Formats used to establish OLE links between documents.
Unicode Text	A 16-bit text-encoding format that allows for both Latin and non-Latin alphanumeric characters, plus an assortment of commercial, mathematical, and scientific symbols.

Saving Clipboard Objects in Your Local ClipBook

To save the current Clipboard contents as a page in your Local ClipBook, use the Edit menu's Paste command, type Ctrl+V, or click the Paste icon on the toolbar. The Paste icon is the middle icon in the toolbar's third group:



The dialog box that appears prompts you for a page name and asks if you want to share the item with other users. If you choose to share the item at this point, you'll see a new dialog box with some additional options. For information about sharing options, see "Sharing Clipboard Data," page 181.



Items pasted into your Local ClipBook are called *pages* and are listed alphabetically by the names you give them. On disk, they're stored in separate files, each beginning with the letters CLP, followed by a random number and the extension CLP.

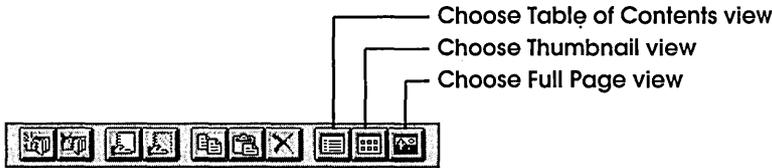


WINDOWS TIP: The CLP files created by Local ClipBook pages preserve all of the information currently on the Clipboard. Because the Clipboard often stores the data in multiple formats, CLP files tend to be rather large—particularly if the information they contain is graphic. If disk space is at a premium, use ClipBook pages judiciously, and delete pages when you no longer need them. To delete a ClipBook page, select it and press the Del key.

NOTE: The Save As command, on ClipBook Viewer's File menu, also preserves the current Clipboard contents as a CLP file but does not create a new ClipBook page. This command is provided for compatibility with earlier versions of Windows. Unless your Local ClipBook is so crowded that you're having trouble finding pages, there's no reason to use this command instead of creating a ClipBook page.

Viewing the Contents of Your Local ClipBook

ClipBook Viewer can display the contents of your Local ClipBook (and any remote ClipBooks to which you are connected) in three ways: in an alphabetical listing by page title, as a set of thumbnail sketches, or in a fully rendered presentation. An example of the alphabetical listing, called Table of Contents view, is shown in the illustration on page 175. To switch to a different view, use the commands at the bottom of the View menu or the three rightmost tools on the toolbar.





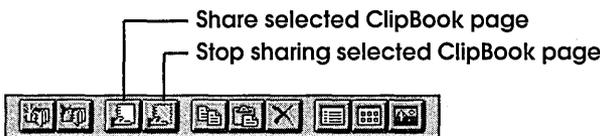
MOUSE TIP: You can toggle the fully rendered display (Full Page view) of a ClipBook page by double-clicking the page.

Reusing Pages from Your Local ClipBook

To reuse data that you've pasted into a Local ClipBook page, select the page you want and choose the Edit menu's Copy command or click the Copy tool. The selected page remains in your ClipBook, but a copy of it appears in the Clipboard window. You can then paste it into your spreadsheet, word processor, or other application.

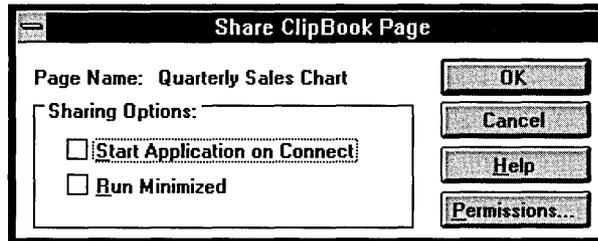
Sharing Clipboard Data

To make your Clipboard data available to other users on your network, you must first Paste the data into your Local ClipBook, and then choose the Share command from the File menu. If you know you're going to be sharing the Clipboard information, you can accomplish both of these steps at the same time. When you choose the Edit menu's Paste command (or click the Paste tool) to transfer the data to the Local ClipBook, you can simply select the Share Item Now check box. Alternatively, if you have already created the ClipBook page and didn't choose to share it at the time you created it, you can select the page and then choose the File menu's Share command (or click the Share tool—the third tool on ClipBook Viewer's toolbar).





When you choose the Share command, ClipBook Viewer presents the following dialog box.



Setting Permissions

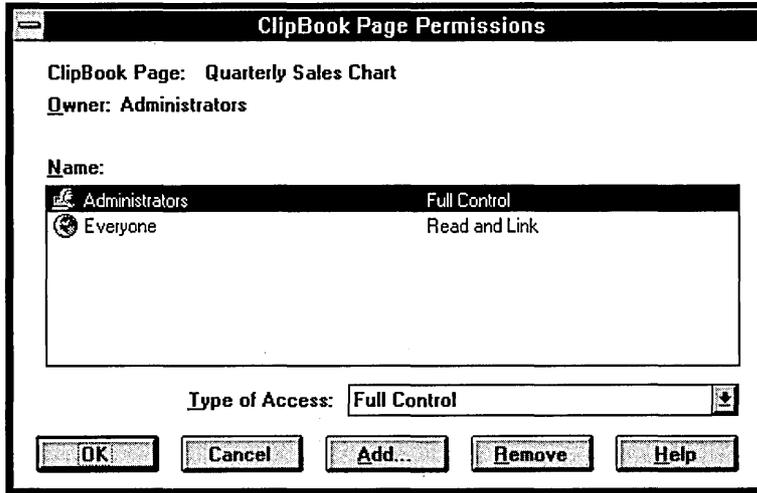
By default, the person who shares a ClipBook page (the “owner”) has Full Control over that page. If you’re the owner, you can modify it, stop sharing it, or delete it. Everyone else, by default, has “Read and Link” privileges. That means that others can paste or paste-link the data, but they can’t change it or delete it from the pool of shared ClipBook pages.

To alter these permission levels for a particular user or group of users, do either of the following:

- ▣ In the Share ClipBook Page dialog box (shown in the previous figure), click the Permissions button.
- ▣ Select a page in your local ClipBook and choose the Permissions command on the Security menu.

Either way, you’ll see a dialog box similar to the one shown on the next page. In the Name list box, select the name of the user or group for whom you want to change permissions. Then open the Type of Access drop-down and select the permission level you want. The privileges associated with those permission levels are shown in Table 5-2.

If you want to change permissions for a user or group not listed in the top of the dialog box, click the Add button. You will then arrive at the Add Users and Groups dialog box. For information about using this dialog box, see “Setting User Rights Policies,” page 330.



Permission level	Privileges
No Access	ClipBook data is unavailable
Read	<ul style="list-style-type: none"> ▣ View the page in ClipBook Viewer ▣ Paste (embed) the contents of the page into another application
Read and Link	Everything allowed by Read permission, plus: <ul style="list-style-type: none"> ▣ Establish a link to the page from another application
Change	Everything allowed by Read and Link permission, plus: <ul style="list-style-type: none"> ▣ Update the source document of a linked object (unless the source document is on another computer) ▣ Update the link to the source document ▣ Delete the page from the ClipBook
Full Control	Everything allowed by Change permission, plus: <ul style="list-style-type: none"> ▣ Set permissions for the page ▣ Take ownership of the page

TABLE 5-2.
Permission levels for shared ClipBook pages.



Connecting to Other Users' ClipBook Pages

To connect to another user's Local ClipBook, click the leftmost icon on ClipBook Viewer's toolbar, or pull down the File menu and choose Connect. In the dialog box that appears, select the name of the computer whose Local ClipBook you want to use and click OK. ClipBook Viewer rewards you with another ClipBook window, identified by the network path of the remote workstation, containing all ClipBook pages shared by the remote user. To paste a remote ClipBook page into one of your applications, copy the page from the remote ClipBook onto your Clipboard, and then paste it into the application.

Making Connections with OLE

OLE, or object linking and embedding, is a protocol for connecting documents dynamically. As its name implies, OLE provides two distinct services. When you *link* a source document to a destination document, the destination document can be updated automatically any time the source document changes. When you *embed* data from a source document in a destination document, the destination document doesn't change if the source is updated. But you can double-click the embedded data to edit that data in the context of its source application. For example, if you embed a Paintbrush image in a Write document, double-clicking the image in Write invokes Paintbrush, allowing you to edit the picture and send the new version back to Write.

To link with OLE, the basic steps are as follows:

1. Copy data from an OLE-supporting program to the Clipboard.
2. Use the Paste Link command in another OLE-supporting program.

To embed, follow the same procedure but use the Paste command instead of Paste Link.



To link data stored on another network workstation, follow these steps:

1. Use ClipBook Viewer to connect to that workstation's Local ClipBook. (See "Connecting to Other Users' ClipBook Pages," page 184.)
2. Copy the page you want to link from the remote ClipBook to your Clipboard.
3. Use your application's Paste Link command.

To embed remote data, follow the same procedure but use the Paste command instead of Paste Link.

In order to use OLE, both the application in which the data was created and the application receiving the data must support OLE. In addition, the program that supplies the data must support OLE as a *server application*, and the program that receives the data must support OLE as a *client application*.

Some programs support OLE in only one mode. Paintbrush, for example, can act only as an OLE server. Write and Cardfile can act only as OLE clients. Other programs support OLE in both modes. To find out if an application supports OLE, consult the program's documentation.

OLE is an extension of DDE (dynamic data exchange), Microsoft's original protocol for interprocess communication under Windows. From the user's perspective, linking with OLE offers one large advantage over linking with DDE—namely, the ability to launch the server application directly from the client document. You do not have to remember where your data came from. (There are other improvements under the hood, as well.) Certain hazards that plagued DDE users in earlier versions of Windows still apply, however. If you rename or relocate a server document, you must repair or abandon any links in client documents. Most OLE client applications include commands to assist you with this.

Linking Versus Embedding

Use linking rather than embedding when the source data is likely to change over time and you need to have it updated automatically in the client document. You should also use linking when you use the same data in many client documents; you can ensure consistency by linking each client document to a single server.



The chief advantages of using embedding over linking are permanence and portability. Because the embedded data actually resides in the client application, you don't have to worry about renaming or moving the data's source. Obviously, you'll want to choose embedding over linking if you're going to send your client document to an off-site colleague who doesn't have access to your files.

Here is a summary of the differences between linking and embedding:

- ❑ When you link, the linked data is stored only in the server document. Although you see the linked data in the client document, the client document records only the visual appearance of the data, plus pointers to the server document.

When you embed, a copy of the embedded data is stored in the client document.

- ❑ When you link, any changes made to the linked data in the server document are reflected in the client document—either immediately (if you've established an automatic link) or on request (if the link is manual).

When you embed, changes in the server document have no effect on the client document.

- ❑ Linked data must have been saved at least once in a disk file.
- ❑ When you double-click a linked *object* (a data item paste-linked from an OLE server) in a client application, Windows launches a normal copy of the server application, loads the file containing the object, and selects the linked data. Changes you make in the server are then reflected in the client immediately or on request, according to the mode of the link.

When you double-click an embedded object, Windows launches a special copy of the server application (one with a modified title bar and File menu), loads the file containing the object, and selects the linked data. Changes you make in the server application are not reflected in the client until you use the server application's Update command; you'll generally find that command on the File



menu. Alternatively, you can update the client document by quitting the server application and answering an update prompt affirmatively.

- ▣ A linked object in one OLE client document may be linked to other OLE client documents.

To edit linked or embedded data, follow these steps:

1. Double-click the linked or embedded object.
2. Make the changes in the server application.
3. Use Update to send the changes back to the client document.

For examples of linking and embedding procedures in Write and Cardfile, see “Linking and Embedding in Write,” page 430, and “Linking and Embedding,” page 554.

Embedding Packages

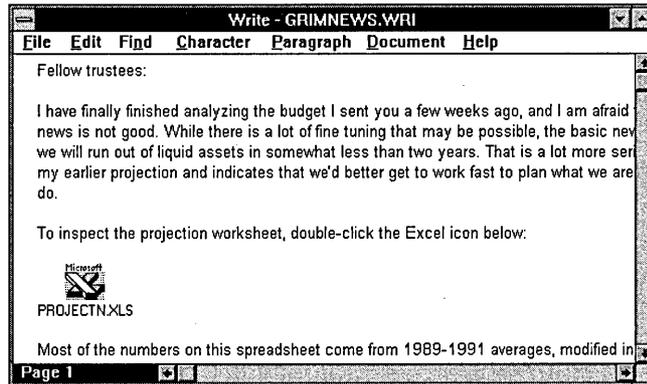
Windows includes a facility called *packaging* that lets you do the following:

- ▣ Embed an iconic representation of an object in an OLE client document. The object can be any text, graphic, sound, video, or other data that originates in an OLE server application.
- ▣ Embed an iconic representation of an entire file in an OLE client document. The file can be a data file or an executable file and does not have to originate in an OLE server application.
- ▣ Embed a Windows command line, attached to an icon, in an OLE client document.

In all cases, the embedded object is called a *package* or *package object*. The package is always embedded in the client document, although the *contents of the package* may be either an embedded object or a linked object. If the package contains embedded data, then embedding the package stores an encapsulated copy of the data object in the client document. If the package contains linked data, embedding the package stores pointers to the package’s source. (See “Linking Versus Embedding,” page 185.)



Regardless of what the package contains, what you see after embedding the package is an icon. The illustration below shows how a Write document with an embedded package might look.



After you embed a package, you can *play* it by double-clicking it or choosing a menu command. Playing a packaged data object (a portion of a file) provides a convenient way to inspect or edit that object. Playing a packaged file is equivalent to choosing File Manager or Program Manager's File Run command and typing the name of the file. The same is true of playing a packaged command line; for example, if you package the command line TODOLIST.TXT, then playing the package invokes Notepad with a copy of your to-do list in place (assuming that TXT files are associated with NOTEPAD.EXE).

To assist you in embedding packages, Windows NT includes a utility called Object Packager. This program's executable file is PACKGR32.EXE, and you'll probably find a program-item icon for it in your Accessories group.

Why Use Packages?

At this point you might be wondering why you would want to bother embedding a package when you could instead embed or link a data object directly. One reason is compactness. In the previous figure, the embedded



package represents a large range of cells in a Microsoft Excel worksheet. While this worksheet presumably supports the argument you're making in your Write document, a full visual representation of the worksheet would be distracting. By encapsulating supporting data in packages, you can create a kind of footnoting system. Interested readers can summon supporting materials, while others can skip over the icons without losing the continuity of the main text.

A second reason for using packages is that they're not limited to data that originates in OLE server applications. If you encapsulate an entire file in a package, as opposed to a block of data, that file can come from any program.

Embedding a Packaged Object or File

The general procedure for embedding a packaged data object or file is as follows:

1. Put the data or file you want to package on the Clipboard.
2. Use Object Packager to create your package.
3. Use Object Packager to customize the package's icon or label.
4. Use Object Packager's Copy Package command to copy the package to the Clipboard.
5. Use the client application's Paste command to embed the package.

For information about packaging a command line, see "Embedding a Packaged Command Line," page 192.)

If you're packaging an entire file and you're content to use the default text and icon for your package, you can bypass Object Packager. For more information, see "Packaging Files—the Direct Route," page 194.

Putting the Data on the Clipboard

If you're going to package an entire file, start by selecting that file in a File Manager directory window. (For information about using File Manager, see "Working with Files and Directories," page 106.) Then use the Copy to Clipboard command on File Manager's File menu (or press F9, its keyboard shortcut).

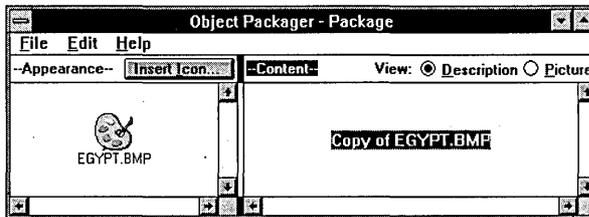


If the data you want to package is only a portion of a file, select the data in the usual way, and then use the Edit menu's Copy command to put the data on the Clipboard. Remember, however, that in this case the data must originate in an OLE server application.

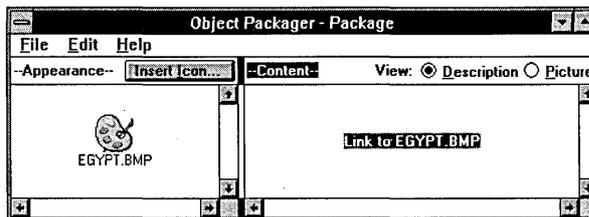
Creating the Package

After the data you want to package is on the Clipboard, the next step is to run Object Packager. (If Object Packager is already running, activate it and choose its File New command.) Object Packager presents two work spaces—an Appearance pane on the left and a Content pane on the right. To create a new package, first activate the Content pane by clicking there or pressing Tab until *Content* is highlighted. Then choose either Paste or Paste Link from Object Packager's Edit menu.

If you choose Paste, the package will contain a copy of the data or file on the Clipboard. Object Packager's display will look something like this (in this example, the packaged data is a Paintbrush file):



If you choose Paste Link, the package will contain only a link to the source data, not the data itself. Object Packager's display will then look something like this:





If you're not sure whether you want the package to contain embedded data or a link, see "Linking Versus Embedding," page 185.

Using Object Packager to Customize the Package

By default, Object Packager uses a standard application icon to represent the packaged data. And, as you can see in the preceding two illustrations, it describes the data with either the filename or a standard object description.

To change the icon associated with a package, click the Insert Icon button. Object Packager presents the standard Windows change-icon dialog box—the same one you see if you use Program Manager's Properties command and choose Change Icon. For more information about this dialog box, see "Changing a Program Item's Icon," page 73.

To change the descriptive text associated with a package, activate the Appearance pane and choose the Edit menu's Label command. Type your new text in the dialog box, and then click OK.

Copying the Package to the Clipboard

When the package is all wrapped up and ready to go, it's time to put it on the loading dock—which, as usual, is the Windows Clipboard. Pull down the Edit menu and choose the Copy Package command (not the Copy command).

Embedding the Package

The final step is to activate the client application and choose the Paste command. (If your client program is Cardfile, be sure to put Cardfile in Picture mode first. Cardfile does not accept any kind of embedded data in Text mode.)

After you paste the package, your client document displays the same icon and text you saw in Object Packager's Appearance pane. You can now play or edit your embedded package. (See "Playing and Editing Embedded Packages," page 193.)



Embedding a Packaged Command Line

To embed a packaged command line, follow these steps:

1. Start Object Packager. (If Object Packager is already running, activate it and choose the New command from the File menu.)
2. Choose the Command Line command from the Edit menu.
3. In the dialog box, type the command line you want to package and then click OK.

The command line can be any legal Windows command line—such as the name of an executable file or the name of a document file. When you embed this command line and play it from your client application, Windows behaves as though you entered it at the Windows NT command prompt or used Program Manager's File Run command.

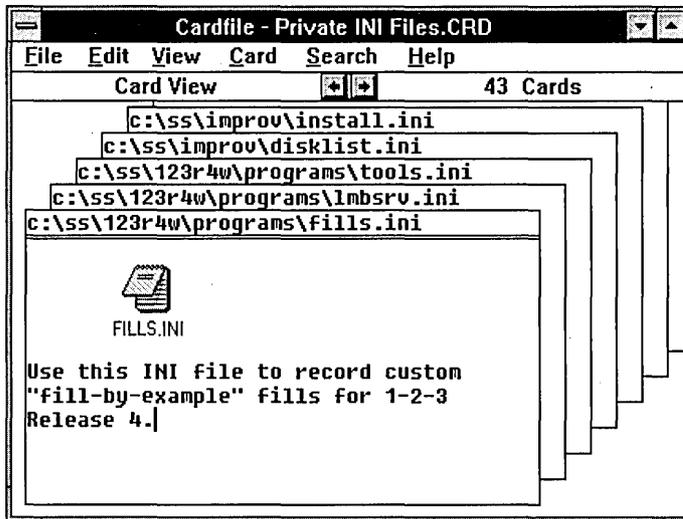
4. Customize the package's appearance and descriptive text. (See "Using Object Packager to Customize the Package," page 191.)

You'll probably want to click Insert Icon and choose an icon for your packaged command line.

5. Choose the Copy Package command from the Edit menu.
6. Activate your client application, move the insertion point to the appropriate location, and choose the client application's Paste command.

The illustration on the next page shows a Cardfile card with a command line embedded as a package. The command line, which is not visible, reads `c:\ss\123r4w\programs\fills.ini`. Double-clicking the icon, or the line of descriptive text beneath, runs Notepad with the FILLS.INI file.

Although it would be possible to package the entire file FILLS.INI and embed that in Cardfile, there would be no advantage to doing so (and it would add unnecessary bulk to the Cardfile file). To get to the INI file quickly, an embedded command line is more efficient.



Playing and Editing Embedded Packages

Playing an embedded package invokes the source application for the packaged data, allowing you to read the data—or hear it or watch it, as the case may be. *Editing* the package invokes Object Packager, allowing you to change the package's appearance or descriptive text.

More specifically, this is what happens when you play a package:

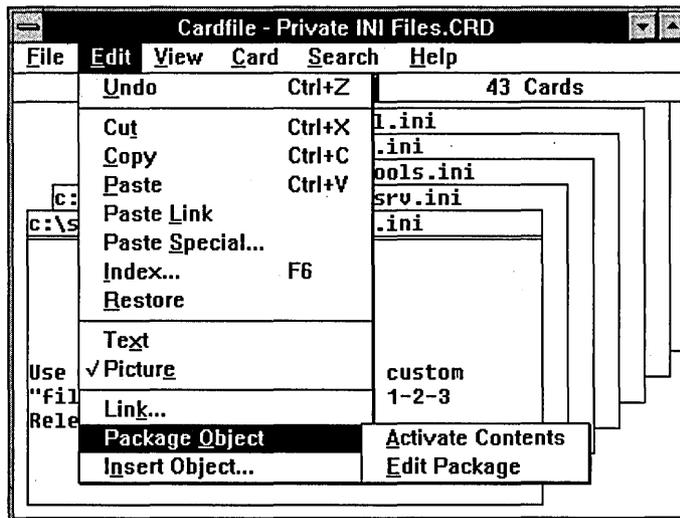
- ❑ If the package contains embedded data that originated in an OLE server application, Windows invokes a modified copy of the server application, with the data in place. You can then edit your data and send changes back to the client document by choosing the server application's Update command.
- ❑ If the package contains an embedded file that did not originate in an OLE server application, Windows invokes a normal copy of the source application (the program in which the file was created) with



a *temporary copy* of your packaged file. (The application's title bar displays a filename beginning with a tilde (~).) If you edit the file and use the application's Save command, Windows updates the contents of the package but does not change the original disk file.

- ▣ If the package contains a linked file, Windows invokes the source application, with the packaged file in place.

To play a package, you can double-click it in the client application or select it and use the client application's Activate Contents (or Play) command. To edit the package, select it and use the client application's Edit Package command. In most OLE client programs, you can get to the Activate Contents and Edit Package commands by first choosing an Edit-menu command called Package Object. Cardfile, for example, produces the following cascading menu when you choose Package Object.



Packaging Files—the Direct Route

If you plan to package an entire file (not a data object), you can bypass Object Packager with the following shortcuts:

- ▣ If you want your package to contain an embedded file, you can drag the filename from a File Manager window and drop it into

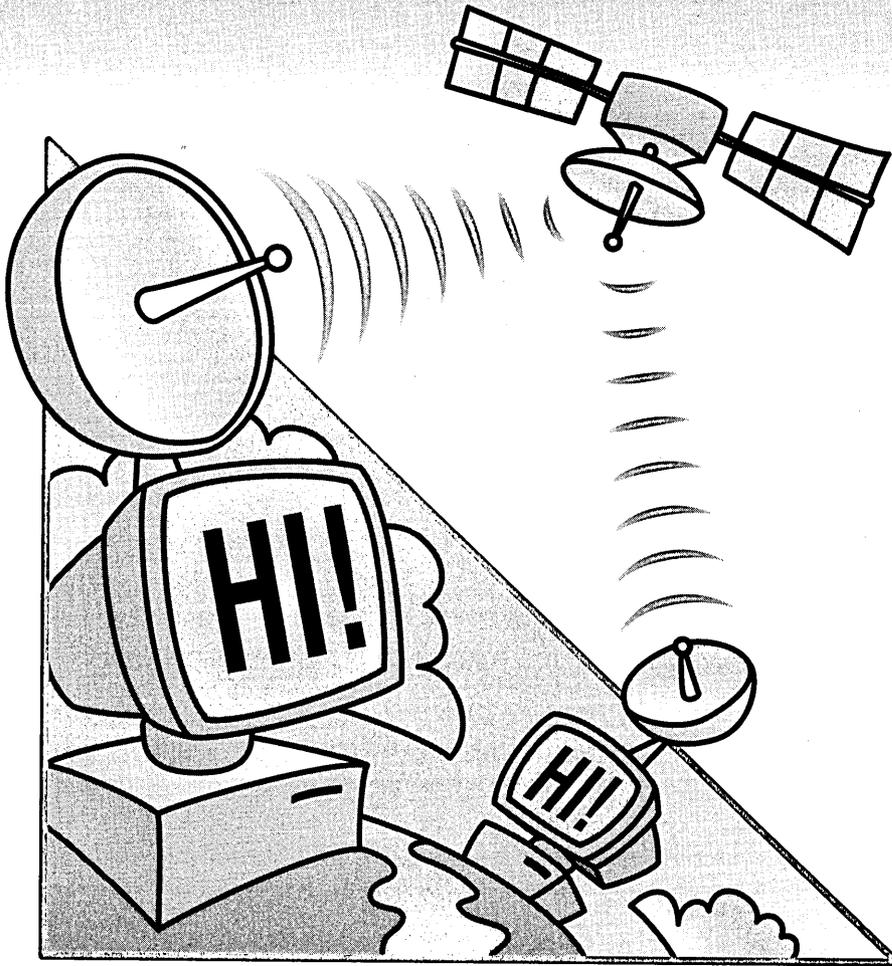


your client application. Or you can use File Manager's Copy to Clipboard command, and then use your client program's Paste command.

- If you want your package to contain a linked file, you can select the filename in File Manager, copy the file to the Clipboard, and then use your client program's Paste Link command.

Note that dragging the file from File Manager to your client program *always* creates a package containing an embedded file.

PART
2



Networking with Windows NT

Chapter 6	An Overview of Networking with Windows NT	199
Chapter 7	Printing	211
Chapter 8	Using Mail	235
Chapter 9	Using Schedule+	273



An Overview of Networking with Windows NT

Two Levels of Networking Support	201
Windows NT comes in two variants, a desktop version and Windows NT Advanced Server. The desktop version supports peer-to-peer networking only, whereas Advanced Server provides enterprise-wide networking.	
The Workgroup	202
The workgroup is the nuclear family in a peer-to-peer network.	
Servers and Domains	206
In an Advanced Server network, clusters of dedicated servers are organized into units called domains.	
Monitoring Use of Shared Resources	209
Control Panel's Server applet can tell you who's doing what with your local resources.	

Changing Network Settings

210

Control Panel's Network applet lets you change the hardware and software components of your network.



indows NT was designed from the ground up to be a networking operating system. In most other networking environments, the networking functionality is superimposed on a single-user-oriented operating system. In Windows NT, networking features are fully integrated with every other aspect of the system.

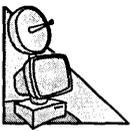
The networking aspects of Windows NT were designed to meet the following goals, among others:

- ▣ Allow Windows NT workstations to coexist peacefully on networks with non-Windows machines
- ▣ Allow Windows NT workstations to access non-Windows servers (such as servers running Novell NetWare or Microsoft LAN Manager), as well as servers running Windows NT
- ▣ Allow for development of distributed (client-server) applications
- ▣ Allow for easy addition of new software and hardware networking components

Two Levels of Networking Support

Windows NT comes in two versions—one called simply Windows NT (sometimes referred to as the *desktop version* of Windows NT), the other called Windows NT Advanced Server. These two products provide distinct levels of networking services. Windows NT supports peer-to-peer networking, a form of connectivity in which all members of the network have essentially equal status. Windows NT Advanced Server supports larger networks organized around servers and domains.

Peer-to-peer networks are ideal for small organizations or department-level units within larger organizations. In a peer-to-peer network, each workstation can share its own resources—file directories, local printers, and ClipBook pages—with any other workstation on the network. And each workstation, provided it has the appropriate permissions, can make use of directories, printers, and ClipBook pages shared by any other workstation on the network. In other words, each workstation can act as both server and client to any other workstation.



Peer-to-peer networks are inexpensive to set up and maintain, because they do not require dedicated hardware or dedicated support personnel. Their relative informality, moreover, makes them an excellent choice for smaller companies that are moving into networked computing for the first time.

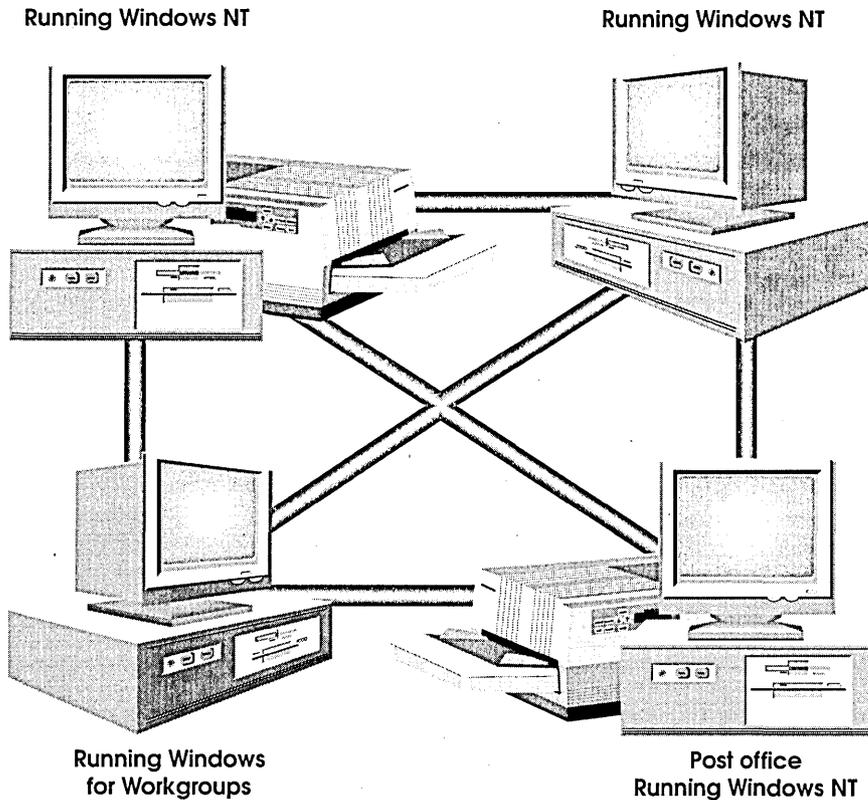
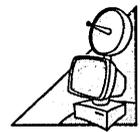
Networks built around Windows NT Advanced Server offer many advantages of interest to larger organizations:

- The ability to administer user accounts and permissions centrally
- The ability to organize a large network into clusters of servers, called *domains*
- The ability to create domain accounts, so that users can log onto any workstation in the domain with the same password
- Advanced fault-tolerance features, enabling the network to continue operating even if a critical hardware component goes down
- The ability to connect with Macintosh computers and LAN Manager servers, as well as other Windows workstations
- The ability to act as a 3270 gateway to IBM minicomputers and mainframes (This requires an additional software component, SNA Services for Windows NT.)

Because of its additional complexity, an Advanced Server network requires a considerable amount of dedicated hardware, as well as administrative personnel.

The Workgroup

The basic structural unit in a network of users running the desktop version of Windows NT is the *workgroup*. (See diagram on the next page.) A workgroup is simply a named collection of networked users functioning as peers. It can include computers running Windows for Workgroups as well as computers running Windows NT. Within the workgroup, each workstation is identified by its *computer name*. This is the name that appears on the middle line of the logon screen when you begin a Windows NT session.



Sharing Resources

As a member of a workgroup, you can share your own directories, printers, and ClipBook pages with anyone else on your network.

- ❑ To share a directory, open File Manager, select the directory, and choose the Share As command. (For more information about sharing a directory, see “Sharing Directories with Other Users on the Network,” page 100.)
- ❑ To share a printer, open Print Manager by double-clicking its icon in Program Manager or by opening Control Panel’s Printers applet. Then select the window for the printer you want to share, choose the Printer menu’s Properties command, and select the check box labeled “Share this printer on the network.” (For more information, see “Sharing a Printer,” page 227.)



- ▣ To share a page in your local ClipBook, open ClipBook Viewer, make the local ClipBook the active window, select the page you want to share, and then choose the File menu's Share command. (For more information, see "Sharing Clipboard Data," page 181.)

Connecting to Shared Resources

You can also connect to resources shared by other users, provided those users have granted permission to your account.

- ▣ To connect to a directory on another user's system, use the Connect Network Drive command on File Manager's Disk menu. (For more information, see "Connecting to Remote Directories," page 103.)
- ▣ To connect to a printer attached to another user's computer, use the Connect to Printer command on Print Manager's Printer menu. (For more information, see "Connecting to a Shared Printer," page 229.)
- ▣ To connect to a page in another user's local ClipBook, use the Connect command on ClipBook Viewer's File menu. (For more information, see "Connecting to Other Users' ClipBook Pages," page 184.)

In all cases, when you connect to a remote resource, Windows NT presents a network browser dialog box. The computer whose resource you want to use is identified in this box by its computer name. If you don't see the computer or printer name you're looking for, simply type it in the Path text box, preceded by two backslashes, like this:

`\\computername`

Windows NT then connects immediately, or displays the relevant section of the network hierarchy, allowing you to see the names of resources that have been shared by this computer.

Reaching Beyond the Workgroup

Your network might include more than one workgroup. That is, your computer might be physically connected to workstations that are not part of your own workgroup. You can connect to resources shared by workstations in other workgroups, but you might not see the names of the computers



you're looking for in the network browser dialog boxes. Again, the simplest way to find the computer or printer you want is to type its name directly into the Path text box, preceded by a pair of backslashes.

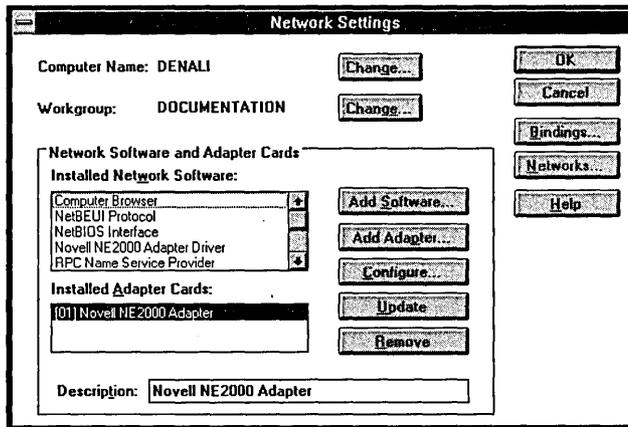
One thing you cannot do with computers belonging to other workgroups is share Mail messages or Schedule+ information. The versions of Mail and Schedule+ shipped with the desktop version of Windows NT operate only within a single workgroup. If you're in Workgroup A and want to send mail to a user in Workgroup B, you must leave Workgroup A and join Workgroup B. And you must have a Mail account on Workgroup B's post office.

Joining a New Workgroup or Changing the Name of Your Current Workgroup

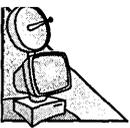
To switch from one workgroup to another, or to change the name of your current workgroup, follow these steps:

1. Start Control Panel and double-click the Network applet.

A dialog box similar to the following appears.



2. Click the Change button to the right of your current workgroup name.
3. Type the name of the workgroup you want to join (or a new name for your current workgroup), and then click OK.



Windows NT displays a message welcoming you to the new workgroup. After you close the Network applet, you must shut down your system and restart it for your changes to take effect.

NOTE: You must be logged on as a member of the Administrators group to change your workgroup name. For more information, see Chapter 10, "Users, Passwords, Policies, Permissions, and Rights," page 313.

Changing Your Computer Name

The Network Settings dialog box, shown in the previous illustration, also allows you to change the name associated with your workstation. To switch to a different computer name, click the Change button next to your current computer name, and supply a new name.

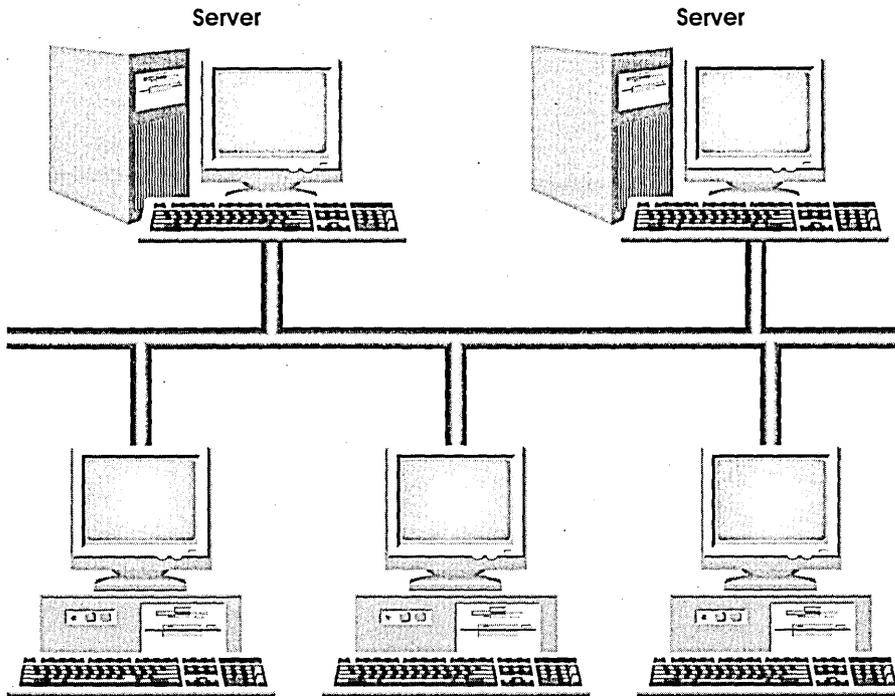
NOTE: You must be logged on as a member of the Administrators group to change your computer name.

Logging onto a Different Computer in Your Workgroup

User accounts in Windows NT workgroups are local to the computer. Therefore, if you want to work at more than one machine in your workgroup, you must have a separate user account for each computer you use. A person with administrative privileges on a computer can create a new user account with the User Manager program. For information about User Manager, see "Creating a User Account," page 323.

Servers and Domains

In an Advanced Server network, workstations are connected to dedicated servers, and named collections of servers may be grouped into domains. (See diagram on the next page.) This method of organization allows for centralized network administration and enables Windows NT to serve as an enterprise-wide network operating system.



If your administrator has created a domain user account for you, you can log onto any workstation in your domain. Simply type your user name, domain name, and password in the logon screen, and Windows NT will recognize you and recreate your working environment.

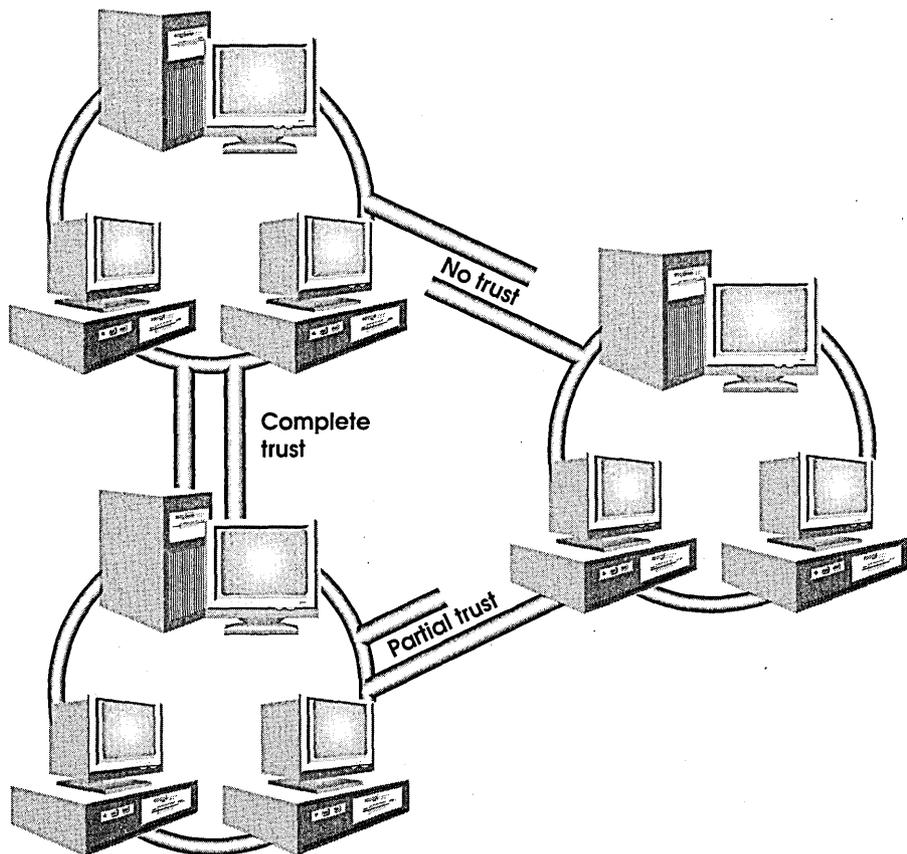
Sharing Resources

On a server-oriented network, such as that provided by Windows NT Advanced Server, shared directories are normally kept on dedicated server machines, and shared printers are commonly attached to dedicated print servers. There is nothing to prevent you from sharing your own local resources with others, however, exactly as you would on a peer-to-peer network. Simply follow the steps described earlier in this chapter to make your own directories, printers, or ClipBook pages available to other users.



Trust Relationships Between Domains

Windows NT Advanced Server allows users in separate domains to share resources with one another by means of *trust relationships*. (See diagram below.) If Domain A and Domain B have established a complete trust with one another, a user in Domain A may log onto any server in Domain B and access that server's resources. Similarly, a user in Domain B may use resources stored on any of Domain A's servers.

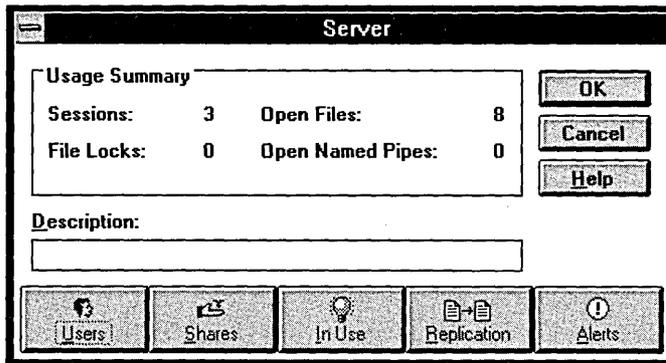




A trust relationship may be either bidirectional or unidirectional. In a bidirectional trust, a user in either domain has access to the other domain. In a unidirectional trust, servers in the trusting domain are available to users in the trusted domain, but not vice versa.

Monitoring Use of Shared Resources

One of the potential disadvantages of peer-to-peer networking is that your own computer might have to do double duty—as a workstation for you and as a server for your workgroup-mates. If many users happen to be accessing files on your system at the same time, you might experience significant performance degradation. At such times, you might find it helpful to know who's doing what with your shared resources. Control Panel's Server applet, shown below, can provide this information.



The Server applet's initial screen, depicted here, tells you how many users (sessions) are currently accessing your system and how many files they have opened. The buttons along the bottom of the window provide additional details.

For more information about monitoring resource use, see "Monitoring System Use with Server," page 728.



Changing Network Settings

If you are logged on as a member of the Administrators group, you can use Control Panel's Network applet to change the hardware and software components of your network. When you double-click the Network icon, you'll see a display similar to the one shown on page 205.

To add a new software component, such as a new transport protocol, to your network, click the Add Software button. To add a new network adapter, click Add Adapter. To configure an already-installed element of your network software, double-click its name in the Installed Network Software list, or select the name and click the Configure button.

Printing

- | | |
|---|------------|
| Introducing Print Manager | 214 |
| <p>Print Manager is a one-stop shop for everything related to printing. Use it to install new printers, change printer priorities, connect to print queues, share printers with other users, and more.</p> | |
| Creating a New Logical Printer | 216 |
| <p>A logical printer is a group of settings applied to some physical printing device. You can create many logical printers for the same physical machine, each to accommodate different printing needs.</p> | |
| Changing a Printer's Properties | 228 |
| <p>The Properties command lets you inspect and change a logical printer's settings.</p> | |
| Creating Custom Forms for Your Print Server | 228 |
| <p>A form is a named combination of margin and paper-size settings. The most commonly used forms are supplied by your printer driver. You can supplement these with forms of your own.</p> | |
| Connecting to a Shared Printer | 229 |
| <p>The Connect to Printer command puts you on line with the network printer of your choice.</p> | |

Managing Documents in a Print Queue

230

If you have permission, you can change the priority of any print job in the queue.

Setting Permissions for Printers

234

The Windows NT security system provides for four levels of printing permissions. If you have Full Control for a printer, you can modify the access levels for other users.



When it comes to translating your work from the computer screen to the printed page, Windows NT provides an unprecedented wealth of support. The operating system's printing features let you (or your system administrator) do the following things, among others:

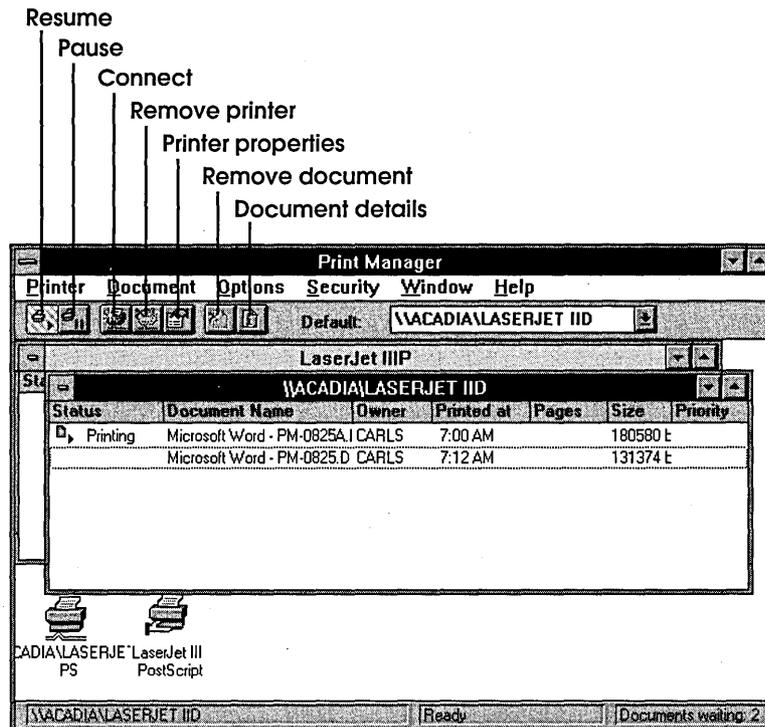
- ▣ Print in the background to any local or shared network printer
- ▣ Examine the print queues for any local or shared network printer, so that you can choose the printer that's likely to get your job done soonest
- ▣ Control the position of documents in print queues, or remove documents from queues
- ▣ Bypass the print spooler and print directly to a hardware port if the need arises
- ▣ Create multiple *logical printers* for any physical output device, assigning different characteristics to each logical printer
- ▣ Assign priority levels to various logical printers, in effect creating high- and low-priority variants of the same physical output device
- ▣ Specify a range of operating hours for any logical printer, so that, for example, low-priority work or especially time-consuming jobs can be held until off-peak hours
- ▣ Create printer pools—groups of physical output devices represented by a single logical printer
- ▣ Assign different groups of users different privilege levels for particular logical printers
- ▣ Create custom *separator pages* that are automatically printed before each print job to identify the originator of the printed document, the date and time the document was printed, and various other significant details
- ▣ Use separator pages supplied by Windows NT to switch a PCL/PostScript printer from one page-description language to the other
- ▣ Create custom forms to do such things as allow extra top margins for letterheads

In this chapter, we'll explore these and other features.



Introducing Print Manager

Print Manager is a multipurpose program that lets you create and configure logical printers, share printers with other network users, connect to shared network printers, inspect and manage print queues, and administer printers across the network. Its visual design, as shown below, somewhat resembles those of File Manager and ClipBook Viewer.



Each printer attached to your own computer and each network printer with which you've connected is represented by a separate window. Inside each printer window, Print Manager displays the printer's current queue of print jobs. Menu commands allow you to create and modify logical printers, manage documents in the current printer's queue, set options for Print Manager's own display and behavior, assign different permission levels for



the current printer to various groups of users, and switch between printer windows. Below the menu bar is a toolbar that provides quick mouse access to commonly used menu commands.



MOUSE TIP: To change the width of any column in a printer window, move your mouse pointer to the right side of the column heading. The pointer will change to a two-headed arrow. Now drag the column divider to the left or right.

WARNING: It's possible to drag a column divider all the way to the left so that the column disappears completely. If this fate befalls you, you can recover in either of two ways:

You can deselect the Save Settings on Exit command (on the Options menu), close Print Manager, and then restart it. Print Manager discards your changes when it closes, and restores the previously saved window layout when it restarts.

By carefully maneuvering the mouse pointer, you can grab the column divider for the missing column. Point at the column divider and move the mouse to the right. When the mouse pointer changes from the two-headed arrow back to a normal arrow pointer, move *slightly* to the left—just until the pointer again becomes a two-headed arrow. Now you can drag the column divider to the width you want.

Changing the Default Printer

The *default printer* is the printer to which your output will be sent unless you specify otherwise. Most applications make it easy to route output to a non-default printer. Typically, you'll find a command such as Print Setup or Choose Printer on your application's File menu. To change the default itself, use the drop-down list at the right side of Print Manager's toolbar.



WINDOWS TIP: In earlier versions of Windows, a Control Panel applet is used for installing and configuring printers, whereas Print Manager is used for managing print queues. These functions have been merged in the Windows NT Print Manager. For familiarity's sake, Control Panel still includes a Printers icon, but double-clicking that icon simply invokes Print Manager.

Setting Print Manager Options

Print Manager's Options menu is short and to the point. You can use it to suppress display of the toolbar or the status line (the line at the bottom of the screen). And you can use its Save Settings on Exit command to ensure that whatever arrangement of windows you have at quitting time appears at the start of your next session. If you want to see a particular window setup each time you use Print Manager and you don't want to restore that setup manually at the end of a session, do the following:

1. Set up your windows in your preferred arrangement.
2. With the Save Settings on Exit command checked, quit Print Manager.
3. Restart Print Manager and deselect the Save Settings on Exit command.

Creating a New Logical Printer

A *logical printer* is a constellation of settings applied to a particular output device or pool of output devices. These settings may include the following:

- ▣ The name of the printer
- ▣ The *printer driver*—a software component that enables Windows NT to translate output into the language used by your physical printer



- ❑ Various driver-specific options, including which paper tray to use, the name of the form assigned to that tray, the amount of memory internal to the printer, any font cartridges or soft fonts in use, and so on
- ❑ An optional description that will appear in the browser box when network users connect to the printer
- ❑ The physical port or ports to which output should be sent
- ❑ A share name and location description (if the printer is to be shared) that will appear in the network browser box
- ❑ The printer's hours of availability
- ❑ The name of a separator file, if one is to be used
- ❑ A priority number for the printer
- ❑ Certain other defaults, such as portrait or landscape orientation
- ❑ The length of time Print Manager should wait before notifying you in case of an error



WINDOWS TIP: When creating logical printers, think of how your physical printer will typically be used. For example, you will probably have both rush jobs and low-priority jobs to print. You can increase the efficiency of your printing setup by creating separate logical printers for the high- and low-priority work. If you also have certain jobs that are particularly time consuming and never need to be seen until the following morning, create a separate logical printer for those jobs and restrict the printer's availability to the hours between your office's closing and opening times.

NOTE: To create a logical printer on a Windows NT workstation, you need to be logged on as a member of the Administrators or Power Users group for that workstation. To create a logical printer on a Windows NT Advanced Server, you must be logged



PART 2: Networking with Windows NT

on as a member of the Administrators, Server Operators, or Print Operators group. For more information about these groups, see "Groups," page 317.

NOTE: You need to create a logical printer only when you are installing a printer that is attached directly to your computer or to the network. If you want to print to a printer that is already shared on the network (that is, one that is attached to another workstation), add it to the list of printers in Print Manager by connecting to it. For more information, see "Connecting to a Shared Printer," page 229.

When you choose a printer by using an application's Print Setup (or equivalent) command, or when you select the default printer in the drop-down list at the right side of Print Manager's toolbar, each logical printer you have created appears as a separate device, even though two or more may be attached to the same output machine.

To create a logical printer, start by choosing the Create Printer command on Print Manager's Printer menu. You'll see a dialog box similar to the following.

Create Printer

Printer Name:

Driver: Adobe LaserJet II Cartridge v52.3

Description:

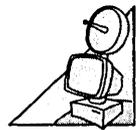
Print to: LPT1:

Share this printer on the network

Share Name:

Location:

OK
Cancel
Setup...
Details...
Settings...
Help



On the top line of this dialog box, supply a name for the printer. The name you choose can have as many as 32 characters and will appear in the network browser box when other users connect to this printer (if you share the printer).

Choosing a Printer Driver

A *printer driver* is a software component that enables Windows NT to convert a generic description of your output into machine-specific language. The driver also tells your applications which built-in and downloaded fonts are present, and which additional options are available on your printer. This information enables your application (if it's a WYSIWYG application) to display your document in a form that closely resembles the ultimate printed appearance, as well as to offer you a meaningful set of formatting options.

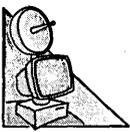
To choose a printer driver, click the downward arrow at the right side of the Driver line, and choose from the drop-down list that unfolds. If the driver you choose doesn't already reside on your local hard disk, Print Manager prompts you for a media source—a distribution diskette, CD-ROM, or network drive.

What to Do If Windows NT Doesn't Support Your Printer

As you'll see by scrolling through the driver list, Windows NT supports a large number of printers. If yours is not on the list, however, you might be able to obtain a Windows NT driver from your printer vendor. If you have such a driver, choose Other (the last item in the driver list) and follow the prompt to direct Print Manager to the diskette or directory where your vendor's driver can be found.

If Windows NT doesn't support your printer, and your vendor can't supply you with a driver, check your printer documentation to see if the printer can emulate a supported printer. For example, if you have an unsupported dot-matrix printer that includes an IBM Proprinter-emulation mode, set up the printer to operate in that mode and install the IBM Proprinter driver.

NOTE: You must use a printer driver designed for Windows NT. Windows 3.1 and Windows for Workgroups drivers will not work correctly under Windows NT.



WINDOWS TIP: Printer vendors often update their printer drivers. To get the maximum functionality from your printer, be sure you're using the latest version of the driver. To update the driver for a printer you've already installed, select the printer's window in Print Manager and choose the Properties command. To find out about driver availability, contact your printer vendor or Microsoft Product Support Services.

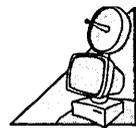
Determining Which Workstations Need a Printer Driver

In most cases, if all users of a given printer will be at Windows NT workstations, only one copy of the driver needs to be installed. This copy resides on the hard disk of the *print server*—the computer to which the physical printer is attached. The driver is then copied across the network to particular applications as needed.

For example, suppose you begin a session in Microsoft Word for Windows, and your default printer is attached to a remote print server. Word for Windows requests a copy of the driver and stores it in your own machine's random access memory for the duration of your session—or until you change the default printer. Word needs the copy of the driver to determine which formatting options it should present and to initiate the printing process. But it does not require a stored copy on the local hard disk.

However, *x86*-based systems and systems that use RISC processors require different printer driver versions. Therefore, if your print server is *x86*-based and one or more of your client workstations is RISC-based (or vice versa), you need multiple copies of your printer driver. You can store the alternative versions of the driver on either the print server or the client machine.

Also, if you plan to access network printers from non-Windows NT workstations, those workstations need their own locally stored printer driver versions. For example, if a Windows for Workgroups user needs access to a Hewlett-Packard LaserJet attached to a Windows NT print server, a copy of the appropriate Windows for Workgroups LaserJet driver must be installed on the Windows for Workgroups computer.



Specifying a Port for Your Printer

Before your logical printer can print, you must direct it to an output port connected to your physical printer. You do this on the Print to line in the Create Printer dialog box. You can either type the name of a port or select from the drop-down list.

The following kinds of ports appear in the drop-down list:

- ▣ LPT*n*:
- ▣ COM*n*:
- ▣ FILE:
- ▣ Remote print-share names
- ▣ Network printer addresses

LPT1: through LPT3: represent parallel ports numbers one through three on the local computer. COM1: through COM4: represent the local computer's first four serial ports. If you choose a serial port, you can use the Settings button to specify communications parameters for the port.

You can add more serial ports by using the Ports applet in Control Panel. For more information about serial port setup, see “Configuring Serial Ports,” page 140.

Printing to a Disk File

To send your output to a disk file, choose FILE: as your print destination. Windows NT will prompt for a filename when you print. You can copy the resulting disk file to a physical printer at a later time by using the command prompt. For example, if you have a physical printer attached to LPT1:, you can copy a print file to that printer by typing the following at the command prompt:

```
C:\>copy filename lpt1:
```

The print-to-file option is also useful if the machine on which you ultimately intend to print is not attached to your network—for example, if you plan to use a service bureau to generate high-resolution PostScript output. For more information about using the command prompt, see Chapter 18, “Working from the Command Prompt,” page 573.



The Remote Print Share Options

If all your print servers are machines running Windows NT or Windows NT Advanced Server, there is no value in choosing a remote print share in the Print to drop-down list. Doing so simply creates a redundant entry in your network printer browser boxes. (To print to a remote printer, use Print Manager's Connect to Printer command; for more information, see "Connecting to a Shared Printer," page 229.) You may, however, want to connect to a remote print share if the device in question is shared by a non-Windows NT computer.

Printing to a Network-Interface Printer

A *network-interface printer* is one that interfaces with the network by means of its own network adapter card, rather than via a print server's printer port. Because a network-interface printer is seen by the network as simply another network workstation, rather than as a particular workstation's peripheral device, the network-interface printer does not have to be physically adjacent to a print server. The Hewlett-Packard LaserJet IIIsi is an example of a network-interface printer.

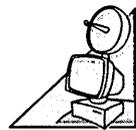
To print to a network-interface printer, you must have the Data Link Control protocol installed. This protocol is supplied with Windows NT. If it's not already installed, you can install it as follows:

1. Run Control Panel and double-click the Network icon.
2. Click the Add Software button.
3. Select DLC Protocol and click Continue.
4. Insert the appropriate distribution diskette in a floppy drive, or specify a CD-ROM or network directory where Windows NT can find the DLC files.
5. Follow the prompt to restart your computer.

After you have the DLC protocol installed, run a self-test on the physical printer to determine its network address. Then choose Network Printer in the Print to drop-down list and specify the appropriate network address.

Printing Directly to a Port

By default, Windows NT creates a *spool file* for your print job, and then feeds the spool file to the physical printer in the background while you go



on with other tasks. That's usually a great benefit, because it lets you get back to work before the job is printed and it lets you control the priority of the print job.

At times, however, you might want to bypass the print spooler and send your job directly to the printer. You can do this by following these steps:

1. Click Details in the Create Printer dialog box.
2. Select the Print Directly to Ports check box in the Printer Details dialog box.

You might get your printout somewhat more quickly by printing directly to the port, but you will have to wait until the printer has finished the job before you can do any other work in the application from which you're printing. This option is not available when a printer is shared to ensure that two users don't attempt to print simultaneously.

Setting the Available Hours for Your Logical Printer

To restrict the available hours for your logical printer, click the Details button in the Create Printer dialog box. You'll see a new dialog box similar to the following.

The screenshot shows a dialog box titled "Printer Details - LaserJet IIIIP". It contains the following elements:

- Available From:** 12:00 AM (with a calendar icon)
- To:** 12:00 AM (with a calendar icon)
- Separator File:** An empty text field with a browse button (...).
- Print to Additional Ports:** A list box containing LPT2, LPT3, COM1, COM2, and COM3. Below the list is a "Delete Port" button.
- Priority:** A spin box set to 1.
- Print Processor:** A dropdown menu set to "winprint".
- Default Datatype:** A dropdown menu set to "RAW".
- Print Directly to Ports:** An unchecked checkbox.
- Buttons:** OK, Cancel, Job Defaults..., and Help.



Click the spinner arrows in the From and To boxes to set the operating hours for your printer. As you send work to a time-restricted printer, Print Manager stacks the jobs in the printer's queue; it begins feeding them to the printer at the appointed starting time.

NOTE: You can also specify printing hours for individual documents in a print queue. For more information, see "Changing the Printing Hours for a Particular Document," page 233.

Using Separator Pages

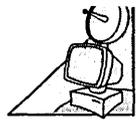
A separator page is like the cover sheet for a fax transmission. It separates one print job from the next and can be used to identify the person who sent the print job, the time it was sent, and other details. Separator pages can also include codes to do such things as switch a printer from the PCL page-description language to PostScript, or vice versa.

Windows NT is shipped with three separator files, which you can use ready-made or customize. The supplied files are described in Table 7-1.

All of these files are normally stored in your `\WINNT\SYSTEM32` directory. To specify a separator file, click the Details button in the Create Printer dialog box. Then either type a name on the Separator File line or click the ellipsis button and use the file browser to locate your file.

Filename	Description
PSLANMAN.SEP	A separator page for use with PostScript printers. Prints the account name and "Microsoft LAN Manager" on the separator page.
PCL.SEP	A separator page that switches some PostScript printers to PCL.
PSCRIPT.SEP	A blank separator page that switches some PCL printers to PostScript.

TABLE 7-1.
Separator pages included with Windows NT.



Creating Your Own Separator Pages

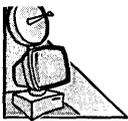
Separator pages are encoded in plain text files with the extension SEP. You can create your own separator pages either by modifying the ones supplied with Windows NT or by typing codes into a new plain-text document and saving that document in your \WINNT\SYSTEM32 directory. Be sure to use Notepad or another plain-text editor to create or modify your SEP files.

The full set of codes that you can use in your separator pages is listed in Table 7-2. Note that each separator file should start with the @ character on a line by itself and end with the characters @E.

Code	Description
@N	Prints the user name of the person who submitted the print job.
@I	Prints the job number.
@D	Prints the date, in the date format specified by Control Panel's International applet.
@T	Prints the time, in the time format specified by Control Panel's International applet.
@L	Prints all characters following @L—until the next @ code.
@F <i>pathname</i>	Prints the contents of the file specified by <i>pathname</i> .
@H <i>nnn</i>	Sends a printer-specific control code. For example, @H015 sends the ASCII code 015 to your printer.
@W <i>nnn</i>	Sets the maximum width of the separator page to the decimal value specified by <i>nnn</i> . Any characters beyond this width are truncated. (The default width is 80; the maximum is 256.)
@B@S	Prints in single-width block characters.
@B@M	Prints in double-width block characters.
@U	Turns off block-character printing.
@ <i>n</i>	Skips <i>n</i> lines. (<i>n</i> can be 0 through 9.)
@E	Ejects the current page from the printer.

TABLE 7-2.

Codes for separator page files.



Creating a Printer Pool

You can attach your logical printer to more than one physical device. Doing so creates a *printer pool*. When output is spooled to a printer pool, Print Manager uses the first available device in the pool.

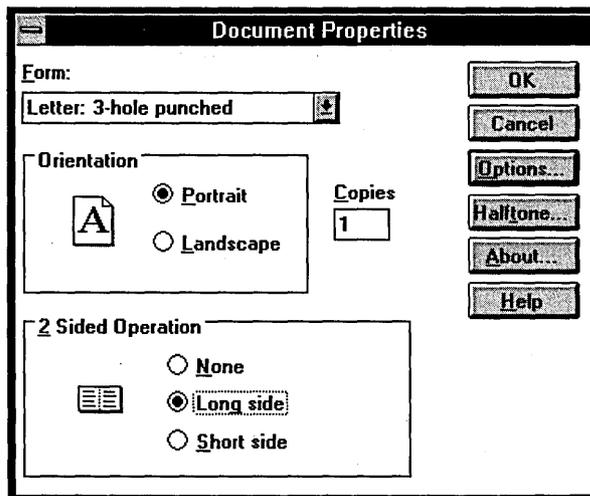
To create a printer pool for your logical printer, do the following:

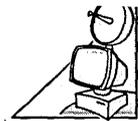
1. Connect your printer to an output port via the Print to drop-down list.
2. In the Create Printer dialog box, click the Details button.
3. In the Printer Details dialog box, select ports in the Print to Additional Ports list.

Your pool comprises the printers attached to each selected port.

Setting Job Defaults

Within the Printer Details dialog box, you'll find a button labeled Job Defaults. Click here to set additional options that indicate the way you normally print documents. The available options depend on your printer driver. The following illustration shows some of the options offered by the Hewlett-Packard LaserJet IIID.





You can, of course, override the job defaults at any time by selecting options in your applications' Printer Setup (or equivalent) dialog boxes.

Setting a Priority Level for Your Logical Printer

The Priority spinner in the Printer Details dialog box is useful when you connect two or more logical printers to the same output device. When Windows NT receives requests for the same device from several logical printers, it gives first access to the logical printer with the highest priority number.



WINDOWS TIP: If you share a local printer with other network users, you can ensure that your own jobs print ahead of the network traffic by creating a separate logical printer and assigning it a priority number of 99—the highest priority.

NOTE: You can also set priority levels for individual documents in a print queue. For more information, see "Changing the Priority of a Particular Document," page 232.

Sharing a Printer

To make your logical printer available to other users on the network, select the Share check box near the bottom of the Create Printer dialog box. Windows NT automatically creates an eight-character share name based on what you've supplied on the Printer Name line. The eight-character share name allows users of MS-DOS and MS-DOS-based versions of Windows to access the printer. If you're not concerned about making the printer available to MS-DOS users, you can specify a longer share name.

On the bottom line of the dialog box, you have the option of describing the location of this printer. Users will see the location in the network browser box when they connect to the printer.



Changing a Printer's Properties

After you have created a printer, you may occasionally need to change some of its settings. To do that, simply select the printer window in Print Manager and choose the Properties command from the Printer menu. (Or click the fifth icon from the left on the toolbar.)

Setting Driver-Specific Options

Click the Setup button in the Printer Properties dialog to set options specific to your printer driver. In the dialog box that appears, click the Help button to get information about the choices available for your driver.

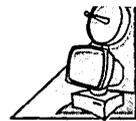
Creating Custom Forms for Your Print Server

A form is a named combination of margin and paper-size settings. Windows NT comes supplied with a number of standard forms. To see the names of these forms and assign particular forms to particular paper trays, select the printer window for the printer whose forms you want to manage, choose the Printer menu's Properties command, and then click the Setup button.

You can also create your own custom forms, as follows:

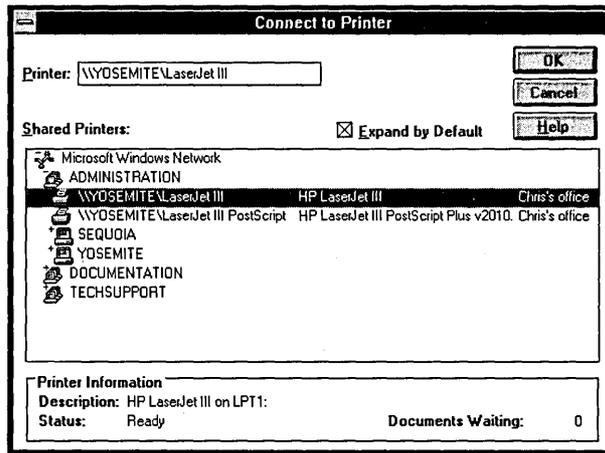
1. Choose the Printer menu's Forms command.
2. Enter a name for your custom form on the Name line.
3. Select either metric or English units.
4. Enter the margin and paper-size settings for your new form.

Form definitions are stored on the print server and are available to any printer attached to that server.



Connecting to a Shared Printer

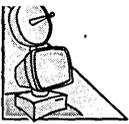
To connect to a shared printer, choose the Connect to Printer command from Print Manager's Print menu, or click the third icon from the left on the toolbar. Print Manager presents the network browser box, shown in the following illustration. Double-click the name of a printer, or type the complete network path of a shared printer on the Printer line.



Note that when you select a printer in the network hierarchy, Print Manager shows the status of that printer (whether it's printing, paused, off line, or idle) and the number of jobs currently in its queue. Thus, you can use the browser to determine which printers are most likely to handle your job quickly.



WINDOWS TIP: You can also get to the network printer browser box from most applications for Windows NT. Look for a Printer Setup or equivalent command, and click the Network button in the dialog box that appears. In most cases, that takes you to the network browser, where you can pick the most suitable printer for your job.



Managing Documents in a Print Queue

By opening the window for any logical printer, you can see at a glance which jobs are queued up for that printer. And using commands on Print Manager's Document menu, you can manipulate the documents in a queue in a variety of ways. In particular, you can do the following:

- ▣ Pause and resume the entire queue
- ▣ Pause and resume individual documents in the queue
- ▣ Restart printing of a document (print it again from the beginning)
- ▣ Change the order of documents in the queue
- ▣ Remove individual documents from the queue
- ▣ Purge the entire queue
- ▣ Change the priority of any document in the queue
- ▣ Change the printing hours of any document in the queue
- ▣ For any document in the queue, specify who should be notified when the document has been printed

To perform any of these operations, you must have the appropriate level of permissions. By default, Windows NT allows you to change the properties of documents that you've originated yourself. To make changes to other users' documents, you need either Manage Documents or Full Control permission. For more information about permissions in Print Manager, see "Setting Permissions for Printers," page 234.

Pausing and Resuming

To pause an entire print queue, select the appropriate printer window and then be sure that you haven't selected any document in the window. If a document is highlighted, press Spacebar or click the document with the right mouse button to deselect that document. Finally, click the Pause tool (the second icon on the toolbar) or choose the Printer menu's Pause command.



To pause a particular document, select the document and click the Pause tool or choose the Pause command. Pausing the current document is equivalent to pausing the entire queue, but pausing other documents simply allows Print Manager to work around those documents.



MOUSE TIP: When you point to the Pause tool and click, the status line at the bottom of Print Manager tells you whether your action is about to pause a particular document or the entire print queue. If that's not the action you want, move the mouse pointer away from the Pause tool before you release the mouse button.

To resume a paused printer, select the printer window (without selecting a document) and choose the Printer menu's Resume command or click the first tool on the toolbar. To resume a particular document, select the document and choose Resume or click the first tool on the toolbar.

To pause and resume a printer, you must have Full Control permission for that printer. To pause and resume a document owned by someone else, you must have Manage Documents or Full Control permission for the current printer.

Restarting a Document

If you notice that the current document needs to be printed again from the beginning—perhaps because it didn't begin at the top of a page or because a page got mangled in the printer—you don't need to go back to your application and reissue the print command. Simply correct the problem at the printer, select the document in the print queue, and choose the Document menu's Restart command.

To restart a document that you don't own, you must have Manage Documents or Full Control access.



Changing the Order of Documents in a Print Queue

To move a document up or down within a print queue, simply select the document and drag it to its new position. To do this with the keyboard, select the document and press Ctrl+Up or Ctrl+Down.

To rearrange the order of a print queue, you must have Full Control access for the printer in question.

Removing Documents from a Print Queue

To remove a document from a print queue, select the document and click the Remove Document tool—the sixth icon from the left on Print Manager's toolbar. Or select the document and choose the Document menu's Remove Document command.

WARNING: Pressing the Del key with a print job selected also removes that document from the print queue. Because Print Manager provides no Undo command, you should be careful at the keyboard when working with print queues.

To remove a document that you do not own, you must have Manage Documents or Full Control access for the current printer.

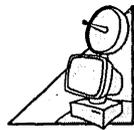
Removing All Documents from a Print Queue

To remove all documents from a print queue, select the window for the queue and choose the Printer menu's Purge Printer command. A confirmation prompt protects you from accidental use of this command.

To purge a printer, you must have Full Control access for that printer.

Changing the Priority of a Particular Document

To change the priority of an individual document, select that document and choose the Document menu's Details command or click the seventh icon from the left on the toolbar. You'll see a dialog box similar to the following.



Document Details	
Document Title: TimeSheet Professional: printing	<input type="button" value="OK"/>
Status:	Pages: 1 <input type="button" value="Cancel"/>
Size: 13634	Owner: CarlS <input type="button" value="Help"/>
Printed On: LaserJet III	Notify: <input type="text" value="CarlS"/>
Printed At: 9:57 AM	Priority: <input type="text" value="1"/>
Processor: winprint	Start Time: <input type="text" value="12:00 AM"/>
Datatype: RAW	Until Time: <input type="text" value="12:00 AM"/>

Use the Priority spinner to modify the document's priority. Jobs with a higher priority number print before jobs with lower priority numbers. Changing priority for one of your own documents is a way of pushing to the front of the line. Without Manage Documents or Full Control access, you can't do this by dragging members of the queue.

To modify the priority of a document you don't own, you must have Manage Documents or Full Control access for the current printer.

Changing the Printing Hours for a Particular Document

To change a document's printing hours, select the document and choose the Document menu's Details command or click the seventh icon from the left on the toolbar. In the Details window, use the Start Time and Until Time spinners to restrict the document to a particular range of hours.

To change the printing hours for a document you don't own, you must have Manage Documents or Full Control access for the current printer.

Telling Print Manager Whom to Notify

Print Manager normally notifies the owner of a print job when the job is completed by popping up a window over the foreground application. You can turn off the notification or stipulate that some other person be notified by selecting the document and choosing the Document menu's Details command (or its toolbar equivalent). Type the name of the person to notify in the Notify box.

To change the Notify setting for a document you don't own, you must have Manage Documents or Full Control access for the current printer.



Setting Permissions for Printers

Normally, all users on a network are allowed access to shared printers, but not all users can manage documents in a queue (other than those they own) or modify the properties associated with a printer. You can change the permissions assigned to a printer by selecting the printer window and using the Security menu's Permissions command.

You must have Full Control access for a printer to change that printer's permissions. For more information about permissions in general, see "An Overview of Windows NT Security," page 314.

Four permission levels are available for printers: No Access, Print, Manage Documents, and Full Control. The privileges associated with those permission levels are shown in Table 7-3.

By default, Administrators and Power Users have Full Control on a Windows NT workstation. On a Windows NT Advanced Server, Administrators, Print Operators, and Server Operators have Full Control by default. All others have Print access by default.

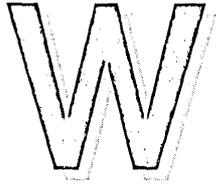
Permission level	Privileges
No Access	Cannot connect to printer or manipulate its queue
Print	<ul style="list-style-type: none">▣ Print documents▣ Control properties of owned documents▣ Pause, restart, and remove owned documents
Manage Documents	Everything allowed by Print Permission, plus: <ul style="list-style-type: none">▣ Pause, restart, move, and remove queued documents
Full Control	Everything allowed by Manage Documents, plus: <ul style="list-style-type: none">▣ Share printer▣ Change printer properties▣ Remove printer▣ Change printer permissions

TABLE 7-3.
Permission levels for shared printers.

Using Mail

- | | |
|---|------------|
| Mail in a Nutshell | 237 |
| Mail is a store-and-forward messaging system in which one computer, called the mail server, plays post office. | |
| Signing into Mail for the First Time | 239 |
| There's a little paperwork to do on your first visit. | |
| Starting and Ending a Mail Session | 241 |
| Unlike most applications for Windows, Mail has two distinct Quit commands. | |
| More About the Inbox and Outbox | 243 |
| The Inbox is for transmitted mail, both sent and received. The Outbox stores messages pending delivery to the post office. | |
| Creating and Sending Mail | 246 |
| Press Ctrl+N to open a Send Note window. This is where you can create your message. | |
| Working with Address Books | 253 |
| Mail creates two address books for you, a global list and a personal list. If you work off line, you'll need to use your personal address book. | |

Creating Personal Groups	256
When you need to send messages to the same group again and again, assign a name to the group.	
Reading and Responding to Your Mail	256
Press Ctrl+G to get your mail. In addition to reading the incoming messages, you can print them, save them, delete them, forward them, edit them, and reply to them.	
Working with Folders	260
Private folders help you organize your own message file. Shared folders can serve as a post office bulletin board.	
Finding Messages	264
What's lost can be found—using Mail's handy search utility.	
Backing Up and Restoring the Mail File	266
Mail puts your entire collection of messages in a single file. You'd do well to back it up regularly.	
Working Off Line	267
You can read and compose messages while you're away.	
Importing, Exporting, and Purging the Mail File	268
The Import and Export commands make it easy to transfer mail to your portable computer. You can also use the Export command to winnow out your message file.	
Changing Your Password	271
It's not a bad idea to change your password now and then.	



indows NT includes a slightly scaled-down version of a separately sold product called Microsoft Mail version 3.2. The full-scale product is an enterprise-wide electronic mail (e-mail) program that also includes facilities for exchanging messages with public e-mail systems such as MCI Mail. The version bundled with Windows NT is restricted to use within individual workgroups.

Fortunately, the two versions share an identical user interface. So whether you're working with the Windows NT version of Mail or the complete Microsoft Mail, you can use this chapter as a guide to the most important features of your mail system.

Mail in a Nutshell

Mail is a store-and-forward messaging system—somewhat like the postal service, except that the mail gets picked up and delivered more often and more quickly (and no holidays are observed). When you send a message to one colleague or a group of colleagues, that message is first transferred across the network from your computer to the hard disk of another computer that is designated as the post office. Later—usually, not much later—your colleague's computer checks in with the post office and retrieves your message, along with any others that happen to be waiting there for him or her.

By default, each computer running Mail visits the post office every 10 minutes. With each visit, any outbound messages are dropped off and all inbound messages are collected. This happens in the background, of course, but if Mail finds messages for you it notifies you by sounding a chime and flashing the Mail icon. (If you want, you can use the Mail menu's Options command to turn off either mode of notification.)

The 10-minute interval between trips to the post office represents a tradeoff. You don't get instantaneous service, but your system doesn't waste a lot of energy trotting back and forth to the post office. You can modify the default interval to suit your needs, and you can force an immediate delivery and pickup at any time.



Changing the Delivery Interval

To change the frequency with which Mail picks up messages:

1. Choose the Options command from the Mail menu.
2. Change the number in the Check for New Mail box.

To Get Immediate Delivery and Pickup

To get immediate postal service, pull down the View menu and choose New Messages. This command can be used to force an immediate delivery of outgoing messages to the post office, whether or not there's any new mail waiting for you at the post office.



WINDOWS TIP: For truly immediate communication, you're better off using the telephone. Or, if your recipient is already on the phone, try the Chat program, which lets you communicate by typing (in effect) directly onto each other's screens. For more information about Chat, see "Chat," page 569.

Important Features of Mail

Mail includes a great many features that make electronic messaging easy and convenient:

- ▣ Personal and global address books ensure addressing accuracy.
- ▣ Outbound messages can be stamped "high priority" to get recipients' attention, and return receipts can be requested.
- ▣ Messages can include embedded data or have attached binary files. This means you can send formatted documents such as spreadsheets as easily as you can send text.
- ▣ Both received and sent mail can be organized into folders and subfolders, and folders can be either private or shared.
- ▣ A search command makes it easy to locate a message in any folder.



- Messages are stored on disk in a compressed format to conserve space.
- An “offline” mode lets you read and compose messages while you’re not connected to your network. Thus you can easily create mail on the road, and then send the mail as soon as you return to the office.
- Import and export commands facilitate the transfer of message folders between your desktop and portable computers.
- By adding date criteria to your export and import commands, you can purge your message file of messages you no longer need.
- Mail provides “hooks” that other applications can use. For example, Schedule+ uses Mail to send meeting queries and notifications to other users on your network. For more information about Schedule+, see Chapter 9, “Using Schedule+,” page 273. You can also create custom message forms (for example, “while-you-were-out” forms for phone messages, or forms for recording customer queries or complaints) that can be sent to the appropriate persons with the help of Mail’s transport services.

We’ll look at most of these features in this chapter.

Signing into Mail for the First Time

Before you can use Mail, there must be a post office on your network and you must have an account at that post office. The account is akin to a box at a traditional post office, except that you use a password instead of a key to open it.

We’ll assume that a system administrator or someone else responsible for the mail system on your network has already set up a post office. That person might also have created an account for you. But if that isn’t the case, you can easily create one for yourself. In any event, the first time you use Mail, you must do the following:

1. Find out from your administrator or other responsible person what the network path to the post office is.
2. Double-click the Mail icon in Program Manager.



3. In the Welcome screen that appears, select Connect to an existing post office.
4. In the dialog box that appears next, type the network path of your post office and click OK.
5. In the next dialog box, answer Yes if you already have an account. Then type your password. If you don't have an account yet, answer No and follow the steps described below to create your account.

After your account is in place and your own copy of Mail knows where its post office is, the sign-in process is simpler. (For more information, see "Starting and Ending a Mail Session," page 241.)

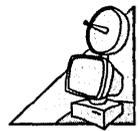
Creating Your Mail Account

To create a mail account, answer No in step 5, above. You'll see the following dialog box.

Enter Your Account Details	
Name:	<input type="text"/>
Mailbox:	<input type="text" value="CraigS"/>
Password:	<input type="text" value="PASSWORD"/>
Phone #1:	<input type="text"/>
Phone #2:	<input type="text"/>
Office:	<input type="text"/>
Department:	<input type="text"/>
Notes:	<input type="text"/>
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	

Fill out the dialog box as follows:

1. In the Name field, type your name as you want it to appear in the system address book. You can type up to 30 characters. The name you type will appear in the global address book that's made available to each user in your mail system. Users address mail to you by typing



this name or (more commonly) pointing to the name in their address books. The default for the Name field is the user name you entered when you installed Windows NT.

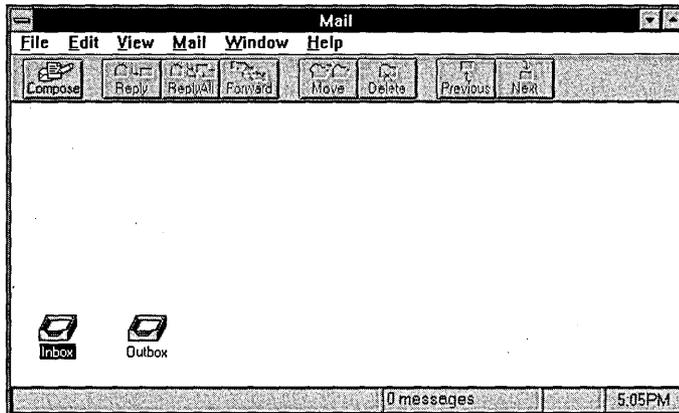
2. In the Mailbox field, type a short version of your name—or an alias if you prefer. The limit is 10 characters. Mail uses this version of your name internally to identify your mailbox, and you use it to sign into Mail.
3. In the Password field, type a password of no more than 8 characters. You can use your Windows NT logon password if you want, or you can choose a different one. (Unlike your Windows NT password, however, the Mail password is not case-sensitive.)
4. Fill out the remaining fields or leave them blank, as you choose. These fields are optional. The information you enter here appears in other users' global address books.
5. Click OK.

Starting and Ending a Mail Session

To start a Mail session after you set up your account, double-click the Mail icon in Program Manager. You'll see a simple sign-in screen in which you are asked to enter your mailbox name and your password. After you click OK, Mail opens a channel to the post office and presents its application window, shown in the illustration on the next page. (If Mail can't find the computer on which your post office is located, it asks if you want to work off line. For more information, see "Working Off Line," page 267.)

As you can see, Mail's initial display presents the usual menu bar and toolbar, plus two iconized windows, called Inbox and Outbox. Clicking either icon opens the associated window. We'll look at these windows in a moment.

Unlike most other applications for Windows, Mail has two distinct quitting commands. One is called Exit; the other is called Exit and Sign Out. If you exit with Exit, the mail transport service is still available to other applications (such as Schedule+) that rely on this service. If you choose Exit and Sign Out, the entire mail apparatus shuts down.

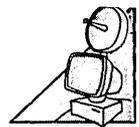


If you use Schedule+ or another Mail-dependent application, you might want to quit with Exit, rather than Exit and Sign Out. If you don't sign out, however, Mail does not ask for your password the next time you double-click the Mail icon in Program Manager. That means someone else could walk up to your computer and read your mail. To ensure privacy when you're away from your machine, use Exit and Sign Out.

Double-clicking the Control-menu box or pressing Alt+F4 performs a simple exit—not a full exit and sign out.

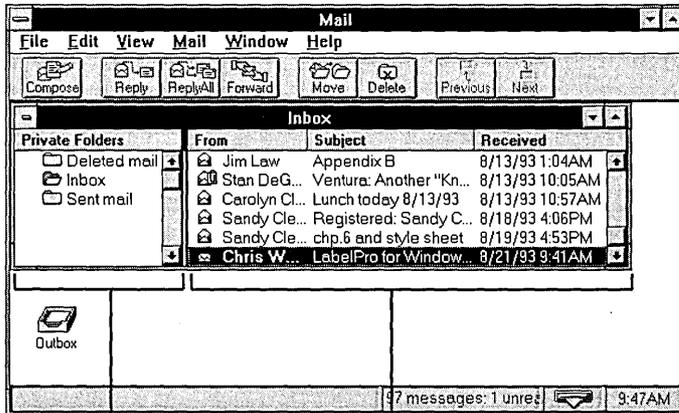


WINDOWS TIP: If you add your mailbox name to the command line with which you start Mail, you won't need to type it when you sign in. To add this information, hold down the Alt key and double-click the Mail icon in Program Manager. Then, after MSMAIL32.EXE, type a space followed by your mailbox name. If you're not concerned about privacy, you can add another space followed by your password. With both the mailbox name and the password on the command line, Mail skips the sign-in screen altogether.



More About the Inbox and Outbox

The following illustration shows how Mail might look with the Inbox window opened.



Folder pane

Message pane

Like a directory window in File Manager, Mail's Inbox window consists of two panes. On the left is a folder pane, on the right is a message pane. The message pane consists of three columns, labeled From, Subject, and Received. You can change the way this window space is distributed as follows:

- ▣ To change the width of either pane, drag the dividing line between the panes.
- ▣ To change the width of any column in the message pane, position the mouse pointer on the divider line to the right of that column heading. When the mouse pointer changes to a two-headed arrow, drag the divider line.



MOUSE TIP: You can hide a message-pane column by dragging its divider line far enough to the left. To restore a hidden column, position the mouse pointer on the divider line for the column heading to the left of the hidden column. Drag that line to the right, and the hidden column will reappear.

Sorting Your Mail

The column headings in the message pane also serve as sort buttons. To sort by any of the three categories—From, Subject, or Received—simply click the heading you want to sort by. To reverse the sort order (for example, to display the most recent message first instead of last), hold Ctrl while you click the heading.

The View menu also offers sorting commands, and by pulling down this menu you can see how the messages are currently sorted. The sorting option in use gets a check mark.

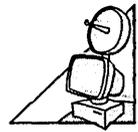


WINDOWS TIP: You can open multiple copies of your inbox window and use different sorting orders in each window. To open a second copy of the current window, choose the Window menu's New Window command.

The Inbox Window Stores Transmitted Mail

We've been calling this window the inbox window, but a more accurate name might be "transmitted mail" window. The purpose of this window is to store all messages—both sent and received—that have already been handled by the post office.

As you'll note in the figure on page 243, one of the folders in the folder pane is itself named Inbox. Your new mail always arrives in this folder. Like



the other two folders shown in the figure, Sent Mail and Deleted Mail, the Inbox folder is a standard part of your mail system. You can create additional folders for organizing your mail, but you can't delete or rename any of these three standard folders.



WINDOWS TIP: Copies of mail that you send are automatically retained for your records in the Sent Mail folder. If you don't want these copies, choose the Options command on the Mail menu and deselect the first check box.

When Inbox is the active folder, the inbox window's title bar reads *Inbox* and the window's minimized icon looks like a desk tray. If you activate a different folder (by double-clicking it in the folder pane), the title bar changes accordingly, and the minimized icon changes to look like a folder instead of a tray.

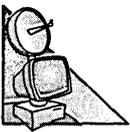


KEYBOARD TIP: You can activate the Inbox folder of your inbox window at any time by pressing Ctrl+G.

The Outbox Window Stores Pending Mail

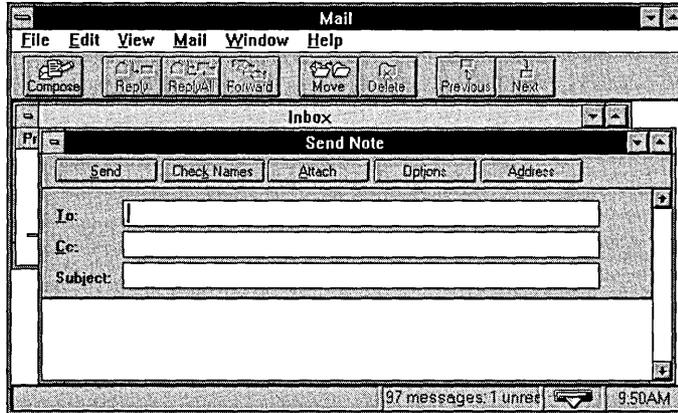
The purpose of that other window, the one called *Outbox*, is to store pending messages—messages you have composed that are still awaiting pickup. If you work off line, your outbox can grow quite large. While you're on line, the outbox will probably be empty most of the time, because Mail dispatches its contents at regular intervals.

Unlike the inbox window, the outbox window does not include a folder pane.



Creating and Sending Mail

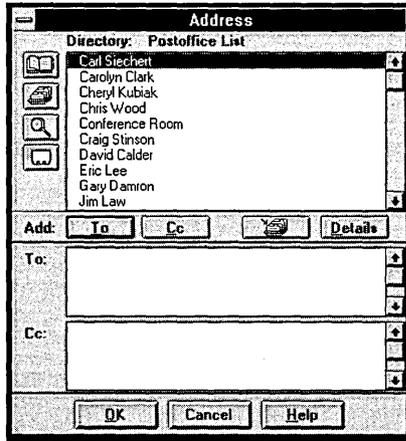
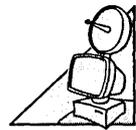
To create a new message, start by pressing Ctrl+N or clicking the Compose icon, the first icon on Mail's toolbar. Mail presents a Send Note window, which looks like this:



In the top portion of this window, you enter the names of your addressees, the names of those to whom you want a courtesy copy sent, and a subject heading for your message. The large space at the bottom of the window is where you type your message.

Addressing a Message

You can include as many names as you please on both the To and Cc lines. One easy way to supply this information is by picking names from an address book. To do this, start by clicking the Address button at the top of the Send Note window. Mail responds by displaying the Postoffice List—a list of all mailboxes at your post office. A sample Postoffice List is shown in the following illustration.



The Postoffice List is one of two standard address books created for you by Mail. The other is your personal address book. Depending on the complexity of your company's mail system, you might have additional global address books as well.

The Postoffice List includes everyone with an account at your post office. Your personal address book can include any subset of the Postoffice List—or all members of the Postoffice List, if you prefer. For more information about creating and using address books, see “Working with Address Books,” page 253.



WINDOWS TIP: Global address books, such as the Postoffice List, are stored at your post office and are available only when you're working on line. Your personal address book is stored on your own computer and is always available. If you plan to compose mail off line, be sure that your personal address book includes all the addresses you're likely to need.



To add a name from the Postoffice List to the To line of your message, select the name and click the To button. To add a name to the Cc line, select it and click Cc. To put multiple names on either line, hold down the Ctrl key while you select each name, and then click To or Cc. Or you can simply select the first name, click the button, select the second, click the button again, and so on. Perhaps the easiest way to add names is to select them and then drag them to the To box or the Cc box. Mail separates the names on each address line with semicolons.

Addressing a Message by Hand

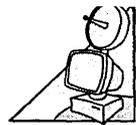
You can also address a message by typing the names of your recipients in the Send Note window's To and Cc boxes, using semicolons to separate multiple recipients. If you're not sure how an addressee's name is spelled, simply type a portion of the name. When you finish your message and click Send, Mail checks your address lines against all available address books. If what you've typed is sufficient to uniquely identify your addressees, Mail finishes the typing for you. If not, Mail presents a list of candidate addressees and lets you choose with your mouse.



WINDOWS TIP: You can also use the Check Names button to fill out an addressee's name before you send your message. Type a portion of the name, and then click Check Names or press Alt+K.



WINDOWS TIP: If you frequently send messages to the same group of recipients, you might want to define those recipients as a "personal group." Then you can simply select the group name from your personal address book. For more information about personal groups, see "Creating Personal Groups," page 256.



Return Receipts and Priority Levels

To request a return receipt or set a priority level for your message, click the Options button in the Send Note window, and then fill out the dialog box that appears. If you request a receipt, a confirmation message will arrive in your inbox indicating the time that your recipient read (that is, opened) your message.

Mail lets you assign one of three priority levels to messages—low, normal, and high. Normal priority is the default and requires no action on your part. You can use high priority to increase the likelihood that your recipient will read your note in the near future. Or you can use low priority as a courtesy to recipients who receive a large volume of mail. The high-priority and low-priority messages will be identified as such in your recipient's inbox (see “Icons Used to Categorize Messages,” page 257), allowing him or her to attend to more important mail first.

Creating a Message

In the bottom portion of the Send Note window, you can type a message of any length. Don't worry about putting in carriage returns to break lines; Mail does that for you as you reach the right side of the window. Other than word wrap, copy, cut, and paste, however, Mail's editing features are limited.



WINDOWS TIP: Mail ordinarily displays messages—those you receive as well as those you type—in MS Sans Serif, a proportionally spaced sans serif font. You can use the View menu's Change Font command to switch the entire text of the current message to a monospaced typewriter-like font. This alternative font might be preferable for messages that contain figures aligned in columns. The font you select—proportionally spaced or monospaced—becomes part of the message, so that font also appears on your recipient's display.



Fortunately, Mail easily accepts any kind of data created in other applications. For example, you can add graphics to a message as easily as text. Simply copy an image from its source application to the Windows NT Clipboard, and then paste it into your message.

Inserting Text from a File

If you plan to mail a body of text that already exists in another application, you can copy it to the Clipboard and paste it into your message. If the text is stored on disk, however, you might find it easier to use the Edit menu's Insert from File command. When you choose this command, Mail presents a file-browser dialog box. Select the file you want and click OK.

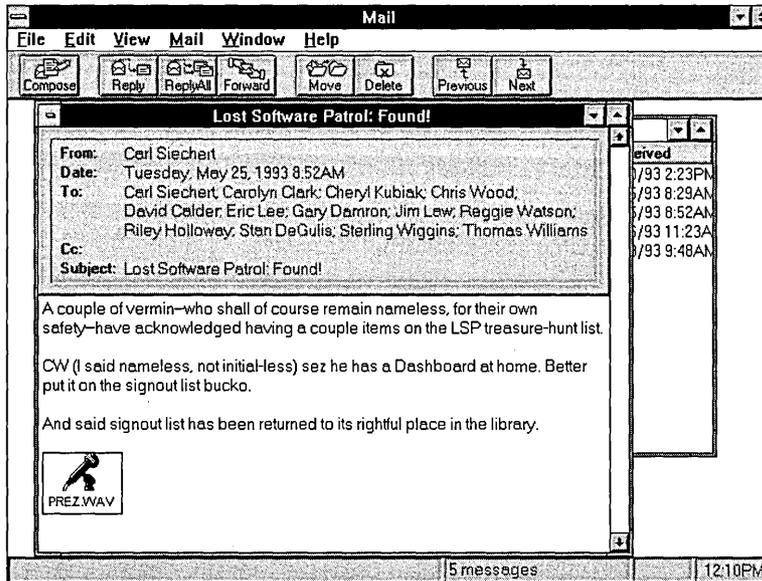
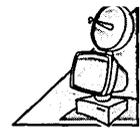
The Insert from File command is designed for plain text only. Any formatting information is lost when you insert the file into Mail, and nontext data appears as illegible characters. You can send nontext information by *attaching* a file, as opposed to inserting it.

Attaching a File

To attach a file, click the Attach button at the top of the Send Note window. A file-browser dialog box appears, from which you can select as many files as you care to attach. Select the first file, click the Attach button, select the second, click Attach, and so on. Click the Close button when you are finished selecting files. The following figure shows an example of a message with a file named PREZ.WAV attached.



MOUSE TIP: You can also attach a file by dragging an icon from File Manager into your Send Note window. Or you can drag a File Manager icon into Mail's Outbox window. Mail then opens a Send Note window for you.



As you can see, the attachment is displayed as an icon, and it appears at the point where you perform the attachment. If you've used Object Packager, you will recognize that the attachment is an embedded package. (For more information about Object Packager, see "Embedding Packages," page 187.) The recipient of your message simply double-clicks the package to read the attached file (or listen to the sound file, play the video file, or whatever the case may be).

Because the attached file is stored within your recipient's mail file (a file with the extension MMF that stores all received mail), you don't need to worry that your recipient might already have an identically named file. To view or play the attachment, however, your recipient must have a copy of the attachment's native application.

Embedding an Object

Attachments embed entire files. You can also embed a portion of a file (an *object*), provided that the file originates in a program that supports object



linking and embedding as a server. (For more information, see “Making Connections with OLE,” page 184.) To embed an object, copy the object to the Clipboard and paste it into your Mail message. If the data on the Clipboard comes from an OLE server application, Mail pastes it as an embedded object. Your recipient will then be able to double-click the object to activate it in its native application.

Sending a Message

When your message is ready, click the Send button. Mail checks any addressee names that it hasn't already confirmed (confirmed names are underlined) and moves your message to the outbox, from which it will travel to the post office at the next pickup time. Before it's picked up, you can edit it by double-clicking it in the Outbox window. Or you can delete it by selecting it in the Outbox window and clicking the Delete button (or pressing Del).

Printing an Outbound Message

If you like to keep printed records of the mail you send, select the message and then choose the File menu's Print command at any time—before you send the message, after you send it but before it's picked up (while the message is still in the Outbox), or from your Sent Mail folder after the mail has been picked up.

Saving a Message in a Separate Disk File

Mail normally keeps all your messages—those you receive and those you retain in the Sent Mail folder—in a single compressed file. You can't access this file directly. If you want to preserve a message in a separate disk file, choose the File menu's Save As command. You can do this while you're composing a message or by first selecting the message in a folder.

Saving an Unfinished Message

You can save an unfinished message for completion at a later time. Simply double-click the Control-menu box in the Send Note window or press Ctrl+F4. Mail asks if you want to save the message. If you answer yes, the



message will be stored in your Inbox folder. When you're ready to continue working on it, double-click it there and you'll be back in the Send Note window again.



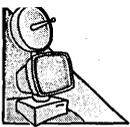
WINDOWS TIP: Mail won't let you send a message that has unconfirmed addressee names. If you're working off line and your personal address books don't include an addressee you need, press Ctrl+F4 to save the message in your Inbox. Later, when you're on line, you can access the global address book to finish addressing your message.



WINDOWS TIP: If you periodically send a particular message—a monthly report, perhaps—to the same group of people, you can create a template. Address your message, fill in whatever parts of the message are constant, and then press Ctrl+F4. When it comes time to send the message, drag it to the outbox, and Mail opens it in a Send Note window. Complete the message and click Send. If you have several templates, you might want to create a separate folder for them.

Working with Address Books

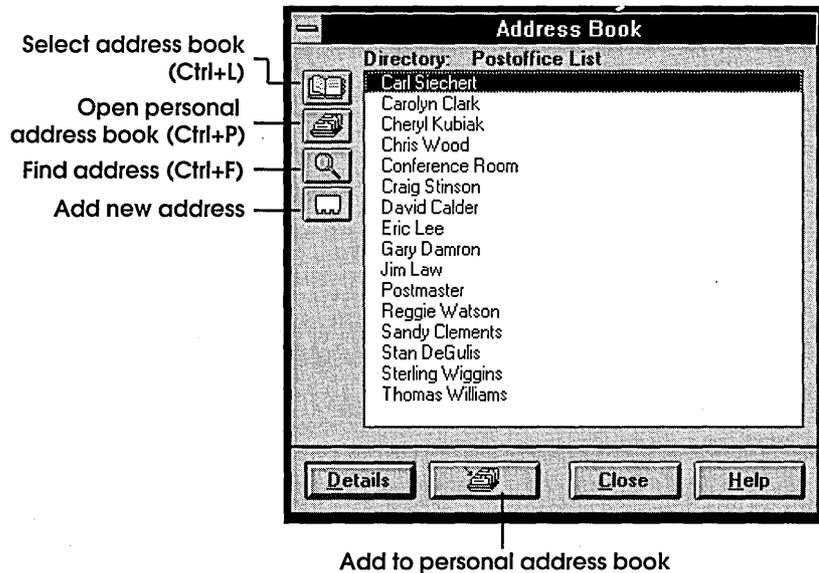
Mail automatically creates two address books for you—the Postoffice List, which is a global list of all users with accounts at your post office, and a personal list. A typical Postoffice List is shown in the figure on page 247. The Postoffice List is stored on the mail server and is available only when you work on line. Your personal list is stored on your computer and is always available. It can contain any subset of the Postoffice List—or the entire list.



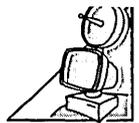
Adding Names to Your Personal Address Book

By default, Mail automatically puts the names of any users to whom you send mail in your personal list. (You can disable this feature by choosing the Mail menu's Options command and deselecting the third check box.) So, in the normal course of events, without any effort on your part, your personal address book lists the users with whom you actually exchange mail. To add other names to your personal address book, do the following:

1. Choose the Address Book command on Mail's Mail menu to open the Address Book dialog box, shown below.



2. If Mail does not display the Postoffice List, click the open book icon near the upper left corner of the Address Book display. Select Postoffice List from the menu of available address books and click OK.
3. In the Postoffice List, select the names of the users you want to add to your personal address book.
4. Press Ctrl+A or click the second icon on the button bar at the bottom of the dialog box—the button that looks like an index-card file with an arrow pointing to it.



Seeing Details About an Addressee

To see all the information recorded at the post office about an addressee, select that addressee's name (in any address book) and click the Details button. You can do this at any time, including while you're addressing a note.



WINDOWS TIP: If you access the Details window from your personal address book, the window includes a space for a short comment. You can type whatever you like about the addressee here and be assured that your comments will be for your own eyes only.

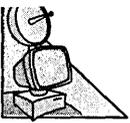
Finding an Addressee in an Address Book

If your address book is large or your memory is frail, it can be a challenge to find a particular person in the list. The Name Finder command can help you out. To locate a user or group of users, press Ctrl+F or click the icon that looks like a magnifying glass, and then fill out the Name Finder dialog box.

NOTE: The Name Finder doesn't work like the Search command in your word processor. It searches only from the beginning of each word in each name. For example, typing *ch* as your search string turns up Chausson, Cherubini, and Chopin, but not Bach, Offenbach, or Tchaikovsky.

Switching Between Address Books

To switch from any address book to your personal address book, press Ctrl+P or click the icon that looks like an index-card file. To switch to any other address book, press Ctrl+L or click the icon that looks like an open book. Then select from the menu of available address books.



Creating Personal Groups

A *personal group* is a collection of addressees gathered under a single name. If you find yourself regularly sending messages to the same group of recipients, you might want to assemble those recipients into a personal group. Addressing your mail to the group saves you the trouble of entering the recipients individually and ensures that no intended recipient is inadvertently left off the mailing list.

To create a personal group:

1. Pull down the Mail menu and choose Personal Groups.
2. Click the New button, type the name you want to use for your group, and click Create.

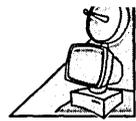
Mail presents the Postoffice list if you're working on line or your personal address book if you're working off line.

3. Select the name of the first member of your personal group, and then click Add. Repeat this process until your group is complete. (Alternatively, you can hold down Ctrl while you select all the members of your group, and then click Add.)
4. When you're finished populating your group, click OK.

The name of your new group appears in boldface characters in your personal address book. To address mail to the group, select the group name in the same way you would select the name of any individual in your address book. Alternatively, you can type the group name in the To or Cc box.

Reading and Responding to Your Mail

Incoming messages always appear in your Inbox folder. To open that folder, press Ctrl+G, double-click the word *Inbox* in your folder pane, or choose the Open Inbox command from the View menu. If the inbox window is minimized, you'll need to restore or maximize it after opening the Inbox folder.



KEYBOARD TIP: No, there really isn't any good reason for Mail's use of Ctrl+G as a shortcut for Open Inbox. Think of it as *Get* mail. Or *Go* grab the Mail. Or maybe *Gosh*, I wonder if I have mail.

Icons Used to Categorize Messages

In your Inbox folder as well as all other folders, Mail uses the following icons to categorize messages:

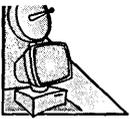
Icon	Message Type
	Unopened message
	Opened message
	Unsent message
	High-priority message
	Low-priority message
	Message with one or more attached files

Unread messages are also identified by boldface type.

Reading Messages

To read a message, double-click its Inbox entry, or select the entry and press Enter. When you are finished reading, press Ctrl+F4 or double-click the message window's Control-menu box to return to the Inbox.

If you're reading a group of messages, you can save time by not returning to the Inbox between messages. Simply click the Next or Previous buttons on the toolbar to move sequentially through the list.



Reading or Playing an Attachment

If your message has an attached file, that attachment will be represented by an icon. To view or play the file represented by the icon, double-click it. Or select it and choose the Edit menu's Edit Attached File Object command.

Printing, Saving, and Deleting Messages

You can print any message from either the Inbox or the message window. Simply pull down the File menu and choose Print. The Print command prints the selected messages in the active window.

By default, all messages sent and received are preserved in a single compressed-format file, which uses your mailbox name and an MMF extension as its filename. You do not need to take any action to keep your mail. If you want to save a message as a separate file, select the message header in the inbox window or display the text of the message. Then choose the File menu's Save As command and supply a filename.

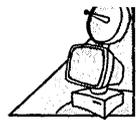
When you save a message this way, Mail appends the extension TXT to your file, unless you specify a different extension. If you accept the default, you'll be able to double-click the filename in a File Manager window and display your message in Notepad.

To delete a message, select it and click the Delete button (or press the Del key). Deleted messages are transferred first to your Deleted mail folder, so Mail does not present a confirmation prompt. If you delete a message from your Deleted mail folder, the message is gone for good—but you still don't get a confirmation prompt.

By default, your Deleted mail folder is cleaned out whenever you quit Mail. If you would rather keep the deleted mail and purge the folder periodically yourself, choose the Mail menu's Options command and deselect the check box labeled Empty Deleted Mail folder when exiting.

Saving an Attachment as a Separate File

Attachments are normally saved in your MMF file, along with messages. To save the attachment separately, select its icon in the message and choose the File menu's Save Attachment command.



Replying to a Message

To reply to a message, click either the Reply or ReplyAll button on Mail's toolbar and type your reply. If you click Reply, your response goes only to the sender. If you click ReplyAll, everyone named on both the To and Cc lines of the original message also receives a copy of your response.



WINDOWS TIP: When you need to reply to a message or take some action based on its content, but you aren't ready to do so yet, you'll find it handy to minimize the message. Click the message window's minimize button, and Mail collapses your message into a distinctive icon and displays the subject header beneath the icon. Later, when you're finished with the message, you can close the icon or drag it to the appropriate folder.

By default, the text of the original message is included at the end of your reply.



KEYBOARD TIP: If you don't have the toolbar displayed, you can choose either the Reply or the Reply to All command from the Mail menu. The keyboard shortcuts for Reply and Reply to All are Ctrl+R and Ctrl+A.

Forwarding a Message

To forward a message, select it and click the Forward button. Mail presents a window almost exactly like the Send Note window. The subject header for the original message appears on the Subject line (preceded by the abbreviation *FW:* to indicate a forwarded message) but you can change that if you want. You can also add whatever you want to the body of the message itself—before it, within it, or after it.



KEYBOARD TIP: The keyboard shortcut for Forward is Ctrl+F, or you can choose the Forward command from the Mail menu.

Editing Received Mail

You might occasionally need to edit mail you receive—for example, if you want to print a version of a message so that others can read it, while omitting or modifying certain details from the message. You can edit a received message exactly as you would edit outgoing mail. When you close the message window, Mail asks if you want to save your changes. If you reply affirmatively, the next time you read the message you'll find an asterisk on the From line—to remind you that the message has been edited.

Working with Folders

As you send and receive Mail, your Inbox and Sent Mail folders will soon accumulate a sizable volume of messages. To maintain order, you'll want to create new folders to organize your messages. You can create as many folders as you like, and you can create folders within folders.

You might want to create separate folders for each person with whom you regularly exchange mail. Or you can create folders organized by project. If you're unsure about how to structure your folders, bear in mind that you can copy messages into multiple folders—so it's easy to keep folders organized by project as well as by person.

Creating a New Folder

To create a new folder:

1. Choose the New Folder command from the File menu. Mail displays a simple dialog box.



New Folder

Name:

Type

Private

Shared

OK

Cancel

Options >>

Help

- Supply a name for the folder, and then click Options. Mail presents a more complex dialog box.

New Folder

Name:

Type

Private

Shared

Options >>

Help

Level

Top Level Folder

Subfolder Of:

Deleted mail

Inbox

Sent mail

Templates

Other Users Can

Read Write Delete

Comment:

- Fill out the Options dialog box and click OK.



WINDOWS TIP: By default, Mail makes your new folder a private subfolder of whatever folder is currently selected. If that's what you want, you can skip the Options screen.



Private Versus Shared Folders

Private folders are stored on your own computer and are accessible only to you. Shared folders are stored on the mail server and can be seen by anyone with an account at your post office. Shared folders can be used as a kind of post office bulletin board. Private folders are for organizing your own messages.

If you select the Shared button in the New Folder dialog box, the three check boxes in the group labeled Other Users Can become available. The default settings for these check boxes allow other users to read and write messages but not delete them. That means that others can read existing messages and add new ones, but only the post office administrator can delete messages in the shared folder.

NOTE: If you leave the Delete check box unselected, not even you will be able to delete the folder. To delete a shared folder, the person who created the folder must first choose Folder Properties from the File menu and select the Delete check box.

Accessing Shared Folders

To see your shared folders, click the button labeled Private Folders at the top of your folder pane (see page 243). This button toggles your inbox window between private-folder display and shared-folder display (provided you have shared folders).

Creating Folders Within Folders

To create a folder within a folder, select Subfolder Of in the New Folder options dialog box. Then select the name of the folder in which you want to create the subfolder, and click OK.

Deleting Folders

To delete a folder, highlight it in the folder pane and press the Del key. Mail warns you that deleting the folder also deletes all of the folder's messages, and prompts you for confirmation.



Moving and Copying Messages Between Folders

The simplest way to move or copy a message from one folder to another is with drag and drop. Follow these steps:

1. Activate the folder in which the message is currently stored. (See “Navigating in the Folder Pane,” below.)
2. In the message pane, select the header for the message you want to move.
3. Be sure the folder to which you want to move the message is visible in the folder pane.
4. To move the message, drag the header and drop it onto the appropriate folder name in the folder pane. To copy the message, hold down the Ctrl key while you drag and drop.

If you prefer, you can also select a message header and choose the File menu’s Move or Copy command.



MOUSE TIP: To move a group of messages at once, select the entire group and then drag and drop.

Navigating in the Folder Pane

In the folder pane, the active folder is indicated by an open folder icon. All other folders are shown closed. A plus sign next to a folder means that the folder can be opened to reveal one or more subfolders; a minus sign means that the folder can be collapsed to hide its subfolders.

Simply highlighting a folder does not make it the active (open) folder. To open a folder, double-click its name in the folder pane. Or use the direction keys to select the folder name, and then press Enter.

To open a folder and reveal the names of its subfolders, double-click the folder’s plus sign. To collapse a folder and hide the names of its subfolders, double-click the minus sign.



MOUSE TIP: Navigating in the folder pane is like navigating in a File Manager directory pane—almost. The difference is that to expand an entry in the folder pane, you must click the plus sign (clicking the name won't do), and you must click only once (a subsequent click collapses the folder). To expand an entry in a File Manager directory pane, you double-click the directory name.

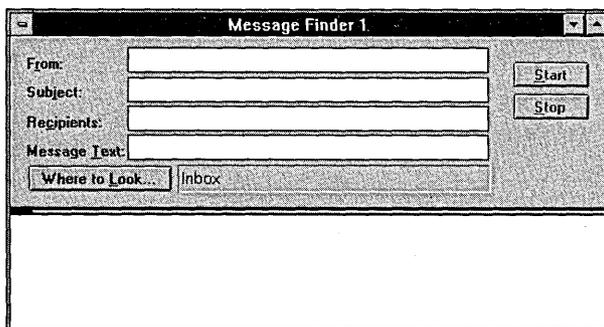


KEYBOARD TIP: To expand a folder-pane entry with the keyboard, select it and press the Plus key. To collapse an entry, select it and press the Minus key.

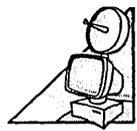
Finding Messages

Finding a particular message or group of messages when your inbox contains hundreds or thousands of them can be a challenge. Fortunately, Mail includes a handy search utility, called Message Finder. To use this tool:

1. Choose Message Finder from the File menu. Mail presents the following screen.

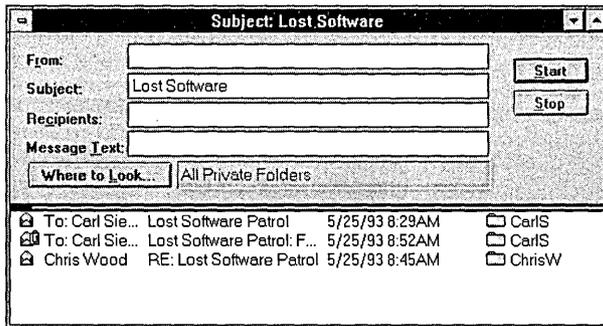


2. Fill out the top portion of the window with your search criteria.



3. Click Where to Look and tell Message Finder whether you want to search all folders or a particular folder. Click OK to return to the criteria screen.
4. Click Start.

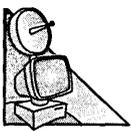
Message Finder presents its findings in the lower portion of the window, as shown in the following illustration.



The results portion of Message Finder's window displays the names of the folders in which the found messages are stored. You can go there and read the messages, or you can open them in Message Finder's window. To keep the findings handy on your desktop, minimize the window.



WINDOWS TIP: You can use Message Finder to automatically scan for incoming messages that meet certain criteria. For example, you might want to know when a message from your boss arrives. To do so, open a Message Finder window, type your boss's name on the From line, and select Inbox in the Where to Look dialog box. When you minimize the Message Finder window, its icon is a folder with a magnifying glass. When a new message from your boss arrives in your Inbox, the icon changes to show an envelope peeking out of the folder.



MOUSE TIP: You can forward a found message simply by dragging it from Message Finder's window to the Out-box. Mail presents a Send Note screen, allowing you to specify addressees and make any desired comments or edits to the message.

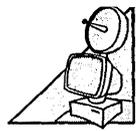
Backing Up and Restoring the Mail File

Mail keeps all your messages, as well as your folder structure, in a single file with an MMF filename extension. Because corruption or accidental deletion of that file would wipe out your entire collection of messages, it's wise to back up that file from time to time. You can use the Windows NT tape-backup program (for more information, see Chapter 13, "Backing Up and Restoring Files," page 361), or you can use Mail's own Backup command. To back up from within Mail:

1. Choose the Backup command from the Mail menu.
2. Supply the name and path for your backup file.

If anything happens to your original file, you'll see an error message when you start Mail, followed by a file-browser where Mail asks you to direct it to your mail file. At that point you can supply the name and path of your backup copy.

If you direct Mail to the backup copy in this manner, Mail asks if you want to "convert" the backup file. Converting in this context simply means making the backup file your primary mail file. Answer yes if your original mail really is lost or corrupt.



Under some circumstances, you might want Mail to use the backup file temporarily, even when the original file is not missing or damaged. For example, if you have deleted messages since you last backed up, it's possible to open the backup file to reread those messages. You can do that as follows:

1. Rename or move your mail message file. Normally the message file is stored in your Windows directory, and its filename consists of your mail user name and an MMF extension.
2. Start Mail.
3. When Mail says it can't find your mail file, direct it to the backup copy, but do not convert the file.

When you open a backup copy without converting it, Mail lets you read, print, and delete messages, as well as move and copy them within the folder tree. But you won't be allowed to send and receive new messages.

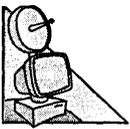
Working Off Line

To use Mail when you're not connected to your network, simply start Mail in the normal manner. You'll see an error message indicating that the mail server (the machine that houses the post office) is unavailable. After you acknowledge that message, Mail asks if you want to work off line. Answer yes, and you'll be in Mail.

While working off line, you can't do any of the following:

- ❑ Access the Postoffice list
- ❑ Send or receive messages
- ❑ Access or create shared folders
- ❑ Change your password

But you can read messages you've already received, compose replies and new messages, print messages, move and copy messages within your folder structure, and so on. As soon as you return to the office or reconnect to the network, you can disgorge any messages that you've collected in your outbox and pick up whatever's waiting for you at the post office.



Importing, Exporting, and Purging the Mail File

If you take a portable computer on the road and plan to work with your mail file off line, you'll need a way to transfer the current mail file from your desktop computer to your road machine. The File menu's Export Folder and Import Folder commands take care of that need. Use Export Folder to transfer one or more folders to a new disk file. Use Import Folder to merge those selected folders into the copy of the mail file that you use on your traveling computer.

Both the Export Folder and Import Folder commands let you specify a date filter, so you can easily transfer only the most recent messages. Because your entire mail file is likely to be quite large, you'll find this option particularly handy if your road machine doesn't have a large hard disk.



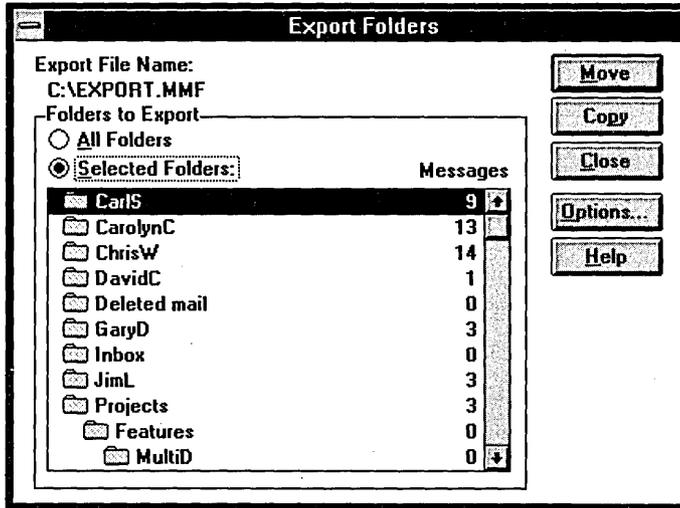
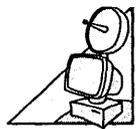
WINDOWS TIP: The Export Folder command always exports a copy of your current personal address book, so there is no separate command to export the address book.

Exporting Messages

To export messages:

1. Choose the File menu's Export Folder command.
2. Specify a name and path for your export file.

If the file doesn't exist, Mail asks you to confirm that you want to create it. Then you'll see a dialog box similar to the following.



3. If you want to transfer only certain folders, select those folders. Otherwise, select the All Folders option button.

To select a group of contiguous folders, select the first member of the group and then hold down the Shift key while you select the last. To select folders that aren't contiguous, hold down the Ctrl key while you select each desired folder.

4. If you want to transfer only those messages that fall within a particular date range, click the Options button and specify the date range. Click OK to leave the Options dialog box.
5. Click Copy to transfer the selected messages to your export file.

As you can see, this screen also gives you the option of moving messages out of your mail file—in effect, purging the file. We'll discuss that option in a moment.



Importing Messages

To import messages:

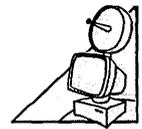
1. Choose the File menu's Import Folder command.
2. Specify the path and name for your import file.
3. Indicate whether you want to import all folders or only particular ones. If you want to limit the import to messages created or modified within a particular date range, click the Options button and specify the dates.
4. Click Copy to transfer the selected messages.

Purging the Mail File

The Export Folder command's second vital function (besides giving you a way to take messages on the road) is to provide a way to prune the mail file—to purge it of messages you no longer need. You can get rid of messages one by one (select the message and press Del) or folder by folder (select the folder and press Del). But a simpler and more effective way to keep the file trim is to use Export Folder and specify a date range. To get rid of all messages received or modified prior to September 1, 1993, for example, do the following:

1. Choose the Export Folder command.
2. Specify a filename—such as PURG0993.MMF.
3. Choose All Folders and click the Options button.
4. In the date spinner labeled To, enter 9/1/93. Then click OK.
5. Click the Move button.

Mail removes the specified messages to your export file. For record-keeping purposes, you can retain this file on your hard disk or transfer it to a server or some other medium.



Changing Your Password

To change your Mail sign-in password, choose the Mail menu's Change Password command. You'll be asked to specify your current password and the new password, and then to type the new password a second time to confirm its spelling.

Because your password is stored at the post office, you must be working on line to change the password.

If you forget your password, the post office administrator can assign a new one for you.

Using Schedule+

- Starting and Ending a Schedule+ Session** 276
- If Mail is already running, you can skip the Schedule+ sign-in screen. When it's time to quit, you can choose between two commands.
- Changing Your Password** 279
- If an administrator has set up your account and assigned you a password, you'll probably want to create your own password to ensure privacy.
- Using Schedule+ Off Line** 279
- While you're away, you can still keep track of tasks and appointments.
- Scheduling Appointments with the Appointment Book** 281
- Use the appointment book to enter time-specific commitments and notes that pertain to particular days. You can designate appointments as definite or tentative.
- Scheduling Appointments and Meetings with the Planner** 291
- The planner shows a map of your commitments for at least two weeks. It can also show when others are busy or free.
- Managing Projects and Tasks with the Task List** 298
- The task list can help you keep track of obligations that are not tied to specific times of the day.

Controlling Others' Access to Your Schedule+ File **303**

By default, others in your workgroup can see when you're busy and when you're free, but they don't get to see the details. You can change the viewing privileges for any user or all users.

Viewing Others' Schedule+ Files **305**

If you've been granted permission, you can open another user's file and read it as though it were your own.

Printing Your Appointments and Tasks **305**

Schedule+ can put your agenda on paper in a variety of attractive formats.

Exporting and Importing Schedule+ Files **306**

When you take your schedule on the road, you'll need the Export and Import commands.

Archiving Your Schedule+ File **308**

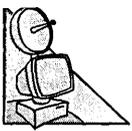
Don't let your history eat your hard disk.



chedule+ is a calendar-management program with a decidedly social orientation. You can use it to keep track of your own appointments, projects, and tasks, as well as for planning meetings with coworkers. When you need to set up a meeting, you can ask Schedule+ to consult your own schedule as well as those of all other prospective attendees and find time slots when everyone is free. Then, because Schedule+ is designed to work hand-in-hand with Mail, you can send a meeting invitation to each attendee via e-mail, and each attendee can send back a note indicating acceptance, regret, or tentative acceptance.

Additional capabilities of Schedule+ include the following:

- ▣ The program can be used both off line and on line. If you're not concerned about scheduling group activities or coordinating your agenda with those of other workers, you can set up Schedule+ so that it always runs off line.
- ▣ Schedule+ is designed to track both time-specific events (appointments) and general to-do items (tasks). Tasks can be assigned priority levels and categorized within project headings.
- ▣ Appointments can be either singular or recurring. For example, you can schedule a meeting to occur on the third Friday of every month.
- ▣ Schedule+ can automatically remind you of appointments at a specified time interval before each appointment. You can use this feature for some, all, or none of your appointments.
- ▣ The planner in Schedule+ displays your schedule graphically, showing committed and uncommitted times as well as times with tentative commitments. When planning group activities, you can view a merged display showing others' commitments as well as your own.
- ▣ If your system administrator sets up an account for a resource, such as a conference room or a piece of display equipment, Schedule+ can track the commitments and availability of that resource, just as it tracks people's schedules.



- ▣ You can make your calendar visible to all others in your workgroup, to certain workgroup members only, or to no one. And even if your schedule is visible, you can designate particular appointments as “private”—for your eyes only.
- ▣ You can set up Schedule+ so that an assistant manages your calendar and all messages concerning meetings are either copied to your assistant or sent only to your assistant.
- ▣ Schedule+ can print your calendar in a variety of attractive formats.



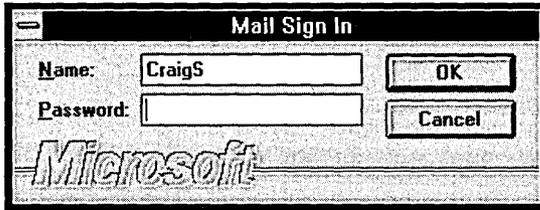
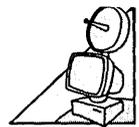
WINDOWS TIP: If you have used earlier versions of Windows, you might notice that the desktop accessory called Calendar is not included with Windows NT. It has been replaced by Schedule+. If you already have agenda files created with Calendar, you can import them into Schedule+. For more information, see “Importing,” page 307.

Starting and Ending a Schedule+ Session

Schedule+ uses your Mail account name to identify your schedule file, and it requires you to enter your Mail password when you begin a session. You must therefore have a Mail account before you can use Schedule+, even if you intend to use the program off line. (For more information about setting up a Mail account, see “Signing into Mail for the First Time,” page 239.)

When you launch Schedule+, the program first connects to your mail server. If you’re working away from the network, you’ll see a message indicating that the server cannot be found and asking if you want to work off line. Answering “yes” begins an offline Schedule+ session. Answering “no” terminates the program.

After the mail server is found or you agree to work off line, you see the following sign-in screen.



Type your Mail password (not your Windows NT password, unless the two happen to be identical) and you're ready to work in Schedule+.

Ways to Avoid the Sign-In Screen

You can skip the Schedule+ sign-in screen in either of two ways:

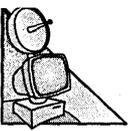
- ❑ By launching Mail first
- ❑ By including your Mail account name and your password in the command line used to launch Schedule+

Schedule+ and Mail use the same sentry to check your identity and password. If either program is running, the other lets you in without asking for ID.

You can automate the Schedule+ logon process in the same way that you can with Mail—by adding your mailbox name and password to the command line. You can do this as follows:

1. Hold down the Alt key and double-click the Schedule+ icon in Program Manager.
2. In the Command Line text box of the Properties dialog box, add a space after the word *SCHDPL32.EXE*. Then type your mailbox name, another space, and then your password.
3. Click OK.

WARNING: Don't add your mailbox name and password to the Schedule+ command line unless you're absolutely unconcerned about the privacy of both your mail and your calendar. When Schedule+ is running, anyone can start Mail at your machine without knowing your password. Throwing away the lock to either program makes both accessible to all comers.



Quitting Schedule+

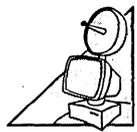
Like Mail, Schedule+ has two quitting commands. One is Exit, the other is Exit and Sign Out. Pressing Alt+F4 or double-clicking the Control-menu box is equivalent to choosing Exit. To exit and sign out, you must use the command at the bottom of the File menu.

Here are some differences between the two commands:

- ▣ If you choose Exit, the visible parts of Schedule+ disappear, but Schedule+ continues to issue reminders for appointments (if you have asked for reminders).
- ▣ If you choose Exit, you can get back into Schedule+ directly by double-clicking the Schedule+ icon in Program Manager; you won't be asked to sign in again.
- ▣ Choosing Exit and Sign Out makes your schedule unavailable to other users. If you intend to share your schedule so that others can plan group activities with your commitments in mind, you should use Exit—not Exit and Sign Out.
- ▣ Choosing Exit and Sign Out closes Mail as well as the entire Schedule+ program.

In short, it's advisable to stick with the Exit command. Use Exit and Sign Out only if you must free up as much memory as possible for use by other programs, or if you plan to leave your workstation unattended and you're concerned about privacy.

NOTE: If you start Schedule+ and later use the Exit command to quit, the operating system still considers your calendar files to be in use. If a system administrator needs to manipulate those files with File Manager or commands entered at the Windows NT command prompt, you should exit and sign out.



Changing Your Password

If a system administrator has set up your Schedule+ file, you will probably want to change the password to ensure your privacy. You can do so as follows:

1. Choose the Options menu's Change Password command.
2. Type your old password.
3. Type your new password.
4. Type your new password again.

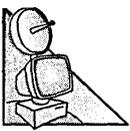
NOTE: It's best to do this while you're working on line. If you're off line at the time you change your password, the new password will work only for offline sessions and the next time you begin an online session, Schedule+ will require the password used by your Mail account.

Using Schedule+ Off Line

If your network's mail server is available when you start Schedule+, the program normally connects to the mail server, allowing you to work on line. In online mode you can use Schedule+ to arrange meetings with other users or to make reservations for shared resources, such as conference rooms and display equipment.

Like Mail, Schedule+ can also be used off line. Here are some circumstances under which you might want to work off line:

- ▣ When you aren't concerned with anyone's schedule but your own
- ▣ When your mail server or your network is down for maintenance
- ▣ When you're working away from the office



If you truly don't need Schedule+'s group-scheduling features, you might find that you get somewhat better performance working off line. Be aware, though, that while you are working off line you cannot schedule meetings with other users, and others cannot view your schedule.

While you're working on line, you can switch to offline mode at any time by choosing the File menu's Work Offline command. If you want to resume working on line, go back to the File menu and choose Work Online.

To set up Schedule+ so that its normal working mode is offline, do the following:

1. Choose General Options from the Options menu.
2. Select the Startup Offline check box.

You might want to do this if you are working on a portable computer. That way you won't have to wait at the beginning of each session while Schedule+ attempts in vain to locate your mail server.

Offline and Online Calendar Files

Schedule+ maintains two copies of your data. One is stored on your local hard disk in a file whose name consists of your mailbox name plus the extension CAL. The other is stored on your mail server under a random name plus the extension CAL. When other users check your schedule for the purpose of arranging meetings, they see data from the server file. When you work off line, you use the local file.

Schedule+ keeps the two files synchronized by merging data whenever you begin or end an online session. It also copies data from the server file to your local file in the background while you work on line.

If you do a lot of work off line, you might experience a delay at the beginning of your next online session. This is normal and unavoidable. Schedule+ must copy all changes from your local file to your server file before it can let you begin working on line.

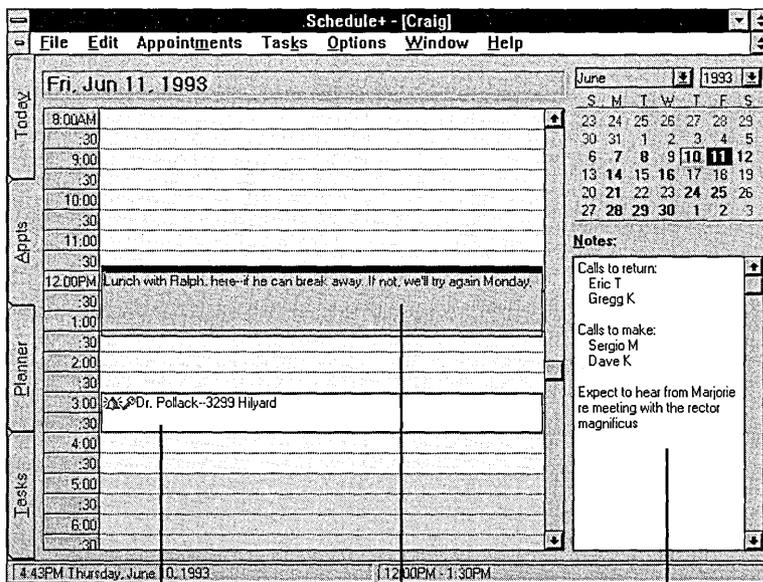


Transferring Calendar Files to and from a Portable Computer

Schedule+ provides Import and Export commands that enable you to copy your calendar to your laptop when you go on the road, and to merge your road work back into your desktop machine when you return. For more information about these commands, see “Exporting and Importing Schedule+ Files,” page 306.

Scheduling Appointments with the Appointment Book

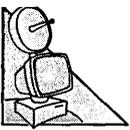
A Schedule+ session begins with the appointment book open to today's date. The appointment book, shown in the following illustration, is the electronic equivalent of a desktop appointment calendar. You can use it to enter time-specific commitments or other notes that pertain to particular days.



Appointment

Tentative appointment

Notes



From the appointment book, you can switch to Schedule+'s other two views, the planner and the task list, by clicking the tabs that appear along the left side of the window:

- ❑ Click Tasks or press Alt+T to get to the task list.
- ❑ Click Planner or press Alt+P to get to the planner.
- ❑ Click Appts or press Alt+A to return to the appointment book.
- ❑ Click Today or press Alt+Y to return to the appointment book and reset the appointment book to today's date.

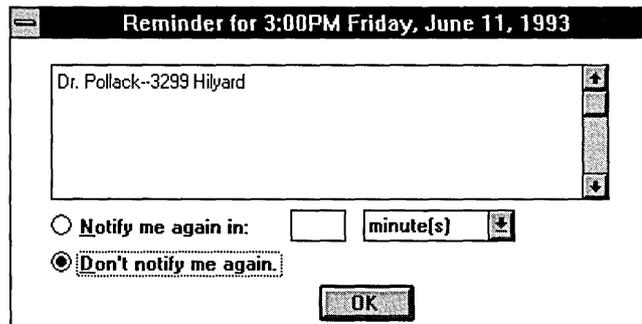
For more information about the planner, see "Scheduling Appointments and Meetings with the Planner," page 291.

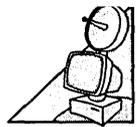
Definite Appointments, Tentative Appointments, and Notes

The illustration on page 281 shows two types of appointments plus a group of notes. The entry for Dr. Pollack, which occupies the 3:00–4:00 time slot, is definite. The lunch date with Ralph, which occupies the 12:00–1:30 time slot, is tentative. Schedule+ uses a white background to display definite appointments and a gray background for tentative appointments.

Two symbols appear beside the text for the appointment with Dr. Pollack:

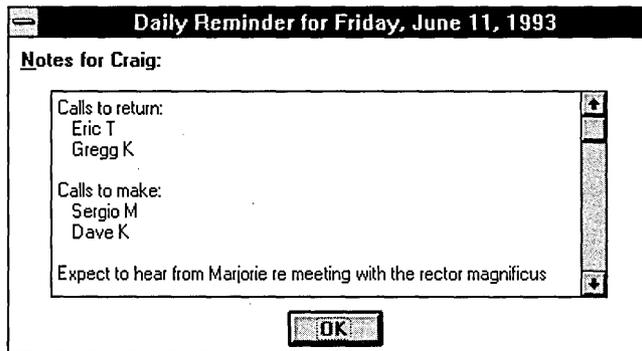
- ❑ The ringing bell icon indicates that a reminder has been set for this appointment. Schedule+ will beep and display a message box at a specified time interval prior to the appointment time.





- ▣ The key indicates that this appointment has been designated *private*. Other users looking at this schedule will see the lunch date with Ralph but not the doctor's appointment. (For information about permitting others to view your appointment book, see "Controlling Others' Access to Your Schedule+ File," page 303.)

The entries in the Notes box are floating reminders for the day, attached to no particular time. When Schedule+ is started on this day, these reminders appear in a special reminder box, much like the appointment reminder.



If you don't want this reminder, choose the Options menu's General Options command and deselect the Set Reminders for Notes check box.



WINDOWS TIP: You can also suppress all reminders during a session by choosing the File menu's Turn Off Reminders command.

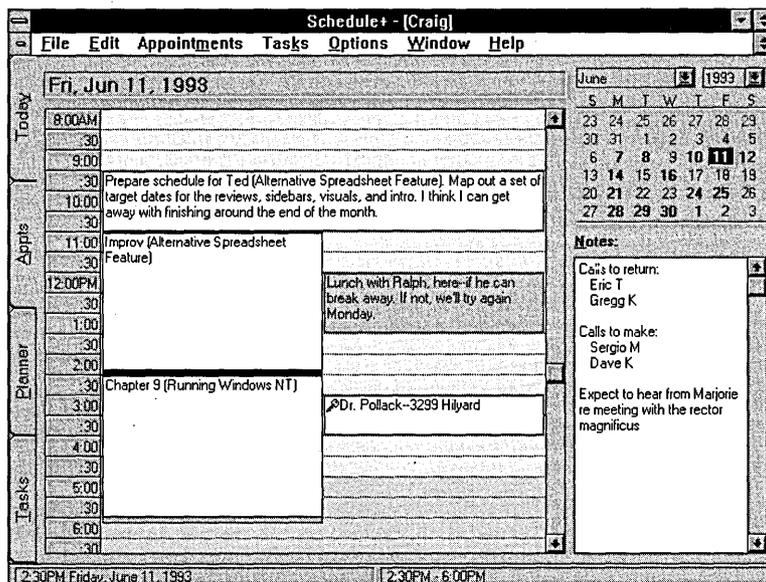
Overlapping Entries

If two or more appointments share a common time interval, Schedule+ displays them side by side, as the illustration on the next page shows.

Normally you won't book overlapping appointments. But you might want to use the appointment book to indicate which tasks you expect to work on at particular times of the day. With Schedule+, you can assign tasks to time periods and still schedule appointments within those periods, as the



illustration below shows. As we'll see later in this chapter, you can create entries such as these directly from Schedule+'s Task List. For more information, see "Assigning Tasks to Your Appointment Calendar," page 301.



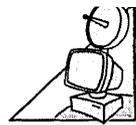
Navigating in the Appointment Book

To move between dates in the appointment book, click the calendar in the upper right corner of the window. To move to a different month or year, use the drop-down lists at the top of the calendar.

Alternatively, you can go directly to any date by pressing Ctrl+G or by choosing the Edit menu's Go To Date command and manipulating the date spinner that appears. You can also press Alt and a direction key to move to a different day, or Shift+Alt and a direction key to move to a different month.



KEYBOARD TIP: If you choose General Options from the Options menu and then select the Show Week Numbers in the Calendar check box, the Edit menu sprouts a new command: Go To Week. You can use its keyboard shortcut, Ctrl+W, to move quickly to any week.



KEYBOARD TIP: While the day of the week is highlighted in Schedule+'s date spinners, pressing the first letter of a weekday takes you to the next occurrence of that weekday. You can use this feature to move quickly through the calendar by weeks. For example, if the spinner is showing Mon 6/21/93, with Mon highlighted, pressing M takes you to 6/28/93. Pressing M again goes to 7/5/93—and so on.

Entering a New Appointment

To enter a new appointment, start by doing one of the following:

- ▣ Double-click the starting time slot for the appointment.
- ▣ Type Ctrl+N.
- ▣ Choose the Appointment menu's New Appointment command.

Whichever method you use, you'll arrive at a dialog box similar to the following.

Appointment

When

Start: 12:30 PM Mon 6/14/93 Choose Time...

End: 2:30 PM Mon 6/14/93 Tentative

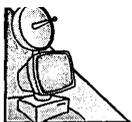
Description:

Set Reminder for 15 minute(s) Beforehand

Private

OK Cancel Invite...

NOTE: The Invite button appears only if you are working on line.



Type a description (of any length) in the description box, use the spinners to set the appointment's date, starting time, and ending time, and fill out the remaining check boxes as needed.

Setting the Starting and Ending Times

To modify the date and times, you can do any of the following:

- ❑ Click the up or down spinner arrows to modify the date and time settings.
- ❑ Click the appropriate element, and then use the Up or Down direction keys to adjust the selected number. For example, to change the starting time in the figure above from 12 to 1, click the number *12* and then press the Up direction key.
- ❑ Tab to the appropriate section of the dialog box, use the Left and Right direction keys to select the element you want to change, and then use the Up or Down direction keys to adjust the selected number. For example, to change the starting date from Mon 6/14/93 to Wed 7/14/93, press Tab until the starting date section is highlighted, press the Right direction key to select the number *6*, and then press the Up direction key to change *6* to *7*.



KEYBOARD TIP: The Up and Down direction keys move time settings by 15-minute intervals. If you want to change the time by some other amount, simply type the time you want.



KEYBOARD TIP: You can also create an appointment-book entry simply by navigating to the appointment's starting time and date and pressing Enter. Schedule+ blocks out a blank half-hour, public, non-tentative entry with your current default reminder settings. An insertion point appears inside this entry, allowing you to type a description.



MOUSE TIP: Manipulating the time spinners is not the only way to set the starting and ending times for your appointment. You can also change the times by dragging the boundaries of the appointment entry after it appears in your appointment book. When you drag the lower boundary, Schedule+ moves only the ending time. When you drag the upper boundary, both the starting and ending times are moved.

Making the Appointment Tentative

To mark your appointment as tentative, select the Tentative check box. Schedule+ displays your appointment on a gray background. Tentative appointments do not appear as busy times when other users view your schedule.

Setting a Reminder

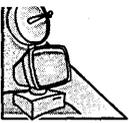
By default, Schedule+ issues a reminder 15 minutes before your appointment's start time. If you don't want the reminder, deselect the Set Reminder check box. If you want to be reminded at some other interval, type the appropriate number and select a time unit from the drop-down list. You can choose minutes, hours, days, weeks—or months!

To change the default reminder setting, choose the General Options command from the Options menu.

Using the Planner to Choose a Time

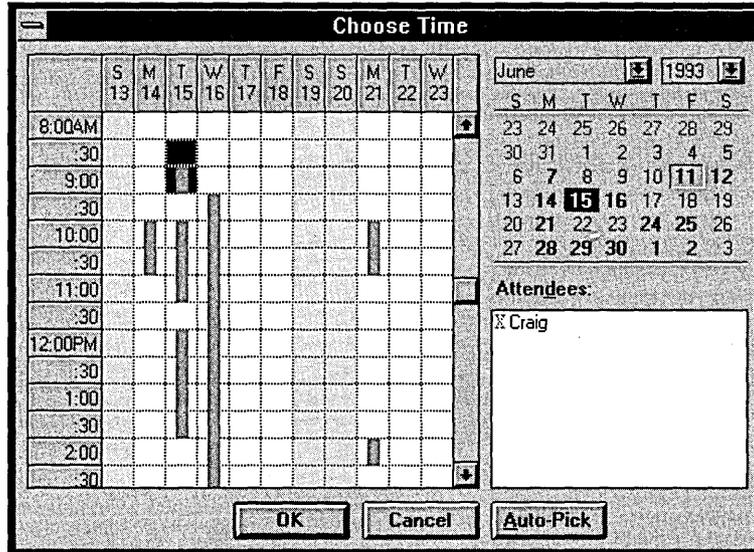
Suppose you want to set a one-hour appointment but you're not sure when you have that much free time. The Planner can help you find the first available time slot:

1. Type Ctrl+N or use some other method to open the Appointment Dialog box.
2. Set the Start and End spinners for a one-hour interval. Don't worry about which times you select; just set the interval to one hour.



3. Click the Choose Time button.

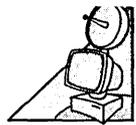
Schedule+ displays a small version of the planner, as shown below.



The narrow bars in this window represent times that are already booked. The wide bar (shown extending from 8:30 to 9:30 in the figure above) represents the time you just entered via the spinners. That time is irrelevant for the moment.

4. If you see a free time slot and want to use it, simply drag your mouse across it and click OK. To have Schedule+ automatically pick the first available slot of the appropriate duration, click the Auto-Pick button.

The Auto-Pick button chooses only from times that fall within your normal work days and working hours, as defined in the General Options dialog box. To get to that dialog box, choose General Options from the Options menu.



Inviting Others to Your Appointment

To invite others to your appointment, click the Invite button in the Appointment dialog box. For more information about that option, see “Scheduling a Meeting,” page 294.

Entering a New Recurring Appointment

To create an appointment entry that recurs at some regular interval, start by choosing the Appointment menu’s New Recurring Appointment command (or pressing Ctrl+R). You’ll see a dialog box similar to the one shown on page 285. As you’ll see in the top section of this dialog box, Schedule+ initially assumes that your appointment is to recur weekly. To choose a different interval, click the Change button, which takes you to this dialog box:

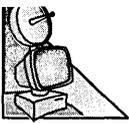
The screenshot shows the 'Change Recurrence' dialog box. It has a title bar with the text 'Change Recurrence'. Inside, there are several sections:

- This Occurs:** A group box containing five radio buttons: Daily, Weekly (selected), Bi-Weekly, Monthly, and Yearly.
- Every Week On:** A group box containing seven checkboxes: Sun, Mon, Tue (checked), Wed, Thu, Fri, and Sat.
- Text:** Below the checkboxes, it says 'The first occurrence will be 6/15/93.'
- Duration:** A section with two rows. The first row has 'Starts' followed by a date spinner set to 'Tue 6 /15/93'. The second row has 'Ends' followed by a date spinner set to 'Wed 6 /15/94'. Below these are two radio buttons: 'No End Date' (selected) and another unlabeled one.
- Buttons:** At the bottom right, there are two buttons: 'OK' and 'Cancel'.

Here you can choose from several recurrence patterns, including every day, every weekday, every other week, every month on a particular day of the month, every month on the *n*th occurrence of a particular weekday, and so on. You can also use the spinners at the bottom of the dialog box to set a starting date and ending date for your recurrence pattern.



WINDOWS TIP: If a particular instance of a recurring appointment is canceled or postponed, you can delete or move that event without affecting the remaining instances. Simply select the appointment and press Ctrl+D to delete it, or double-click and edit it to move it to different date or time.



Using Copy and Paste to Create Irregularly Recurring Appointments

What if your recurring event doesn't fall into the available patterns? In that event, do the following:

1. Create the first instance of your recurring event, using the simple appointment dialog box shown on page 285.
2. After clicking OK to leave the dialog box, select the entry in your appointment book and choose the Copy Appt command from the Edit menu.
3. Navigate to the starting date and time for the next occurrence, and choose Paste from the Edit menu.
4. Repeat step 3 for each subsequent occurrence.

For information about navigating in the appointment book, see "Navigating in the Appointment Book," page 284.

Editing an Appointment

To edit an appointment, double-click it. That puts you back in the Appointment dialog box, where you can change the description, dates, times, or any of the option settings.

Alternatively, if you need to change only the description, click once on the entry and make your changes without going into the dialog box.



KEYBOARD TIP: You can use the Tab key to move from one appointment to the next on the current day. For simple edits of a day's appointments, therefore, it is often quicker to Tab to each appointment and type, rather than going into the Appointment dialog box.



Moving an Appointment

To move an appointment, you can do either of the following:

- ▣ Drag the top border of the appointment-book entry.
- ▣ Select the appointment and choose the Edit menu's Move Appt command. (The keyboard shortcut is Ctrl+O.)

You'll need to use the latter technique when you want to move an appointment to a different date.

Deleting an Appointment

To delete an appointment, select it and choose the Edit menu's Delete Appt command or type its shortcut, Ctrl+D.

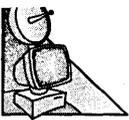
Finding an Appointment

Can't remember when you agreed to have lunch with Jill? Choose the Edit menu's Find command. The command offers options for searching forward, backward, and across the entire universe of your appointment book. The Find command looks in the appointment-book descriptions for the text you specify in the Search For box.

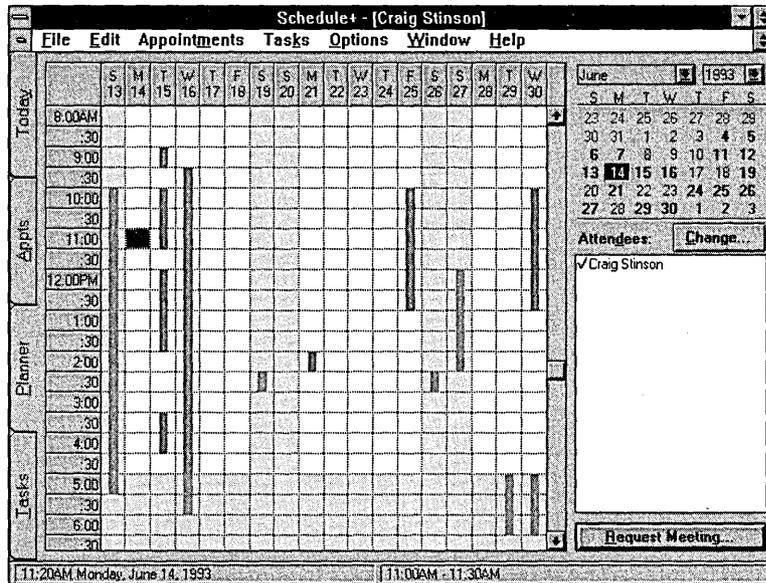
Scheduling Appointments and Meetings with the Planner

In Schedule+'s appointment book, you look at one day at a time and one user at a time. In the planner, you can see a whole range of dates at once. If you use the planner's group-scheduling features, the planner can even show you a diagrammatic representation of many users' agendas.

To get to the planner from the appointment book or the task list, click the Planner tab at the side of the window or press Alt+P. The figure on the next page shows how the planner might look with only one user's schedule.



PART 2: Networking with Windows NT



WINDOWS TIP: In standard VGA (640×480) resolution, with the planner window maximized, Schedule+ can show commitments for about two and a half weeks. You can expand this range by switching to a higher-resolution display. In 800×600 Super VGA, for example, the planner can show you nearly four weeks at once.

Notice the following points of interest:

- ❑ The dark vertical lines are “busy bars”; they indicate times when the current user (the one whose name appears in the planner’s title bar) has commitments. These lines are blue by default. If you prefer another color, visit the Options menu’s Display command.
- ❑ The solid block (11:00 A.M. on Monday, June 14, in the illustration) indicates the currently selected time.



- ▣ The calendar in the upper right corner is identical to the one used by the appointment book. If you have a mouse, you can navigate to other dates with this calendar. If you don't have a mouse, you can use the Edit menu's Go To Date command, or hold down the Alt key and press a direction key.
- ▣ Normal working hours are drawn in white; weekends and "after hours" are drawn in gray. If your normal hours are not 8:00 A.M. to 5:00 P.M., you'll want to customize Schedule+ via the Options menu's General Options command.
- ▣ The Attendees box, in the lower right corner of the window, lists the names of all users whose schedules are currently displayed in the planner.
- ▣ A check mark next to a user's name in the Attendees box means that the user in question is free at the currently selected time. An X beside a user's name means that the user is busy at the currently selected time.

Scheduling an Appointment

If you're using Schedule+ off line, the Schedule Meeting button in the lower right corner of the planner window is replaced by a New Appointment button. You can book an appointment from here as follows:

1. Use your mouse to "paint" the date and time of your appointment.
2. Click the New Appointment button.

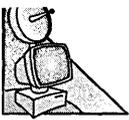
Schedule+ displays the Appointment dialog box with the date, starting time, and ending time already filled out.

If you're working on line, you won't have a New Appointment button, but you can still book an appointment from the planner, as follows:

1. Double-click the starting time and date for your appointment.

Schedule+ returns you to the appointment book, with the selected date and time current.

2. Double-click again to get to the Appointment dialog box.



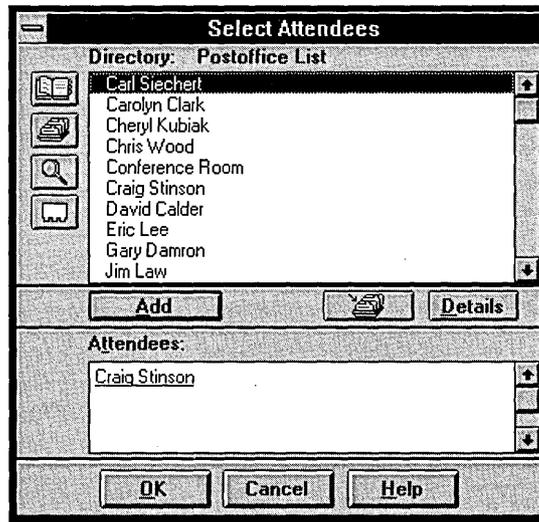
Scheduling a Meeting

Perhaps the principal virtue of the planner is that it allows you to see a merged display showing not only your own time commitments, but also those of your colleagues. This feature can greatly streamline the task of scheduling meetings.

NOTE: You must be working on line to schedule a meeting.

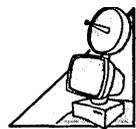
To schedule a meeting from the planner display, begin as follows:

1. Click the Change button at the right side of the planner window.
Schedule+ displays the Select Attendees dialog box.



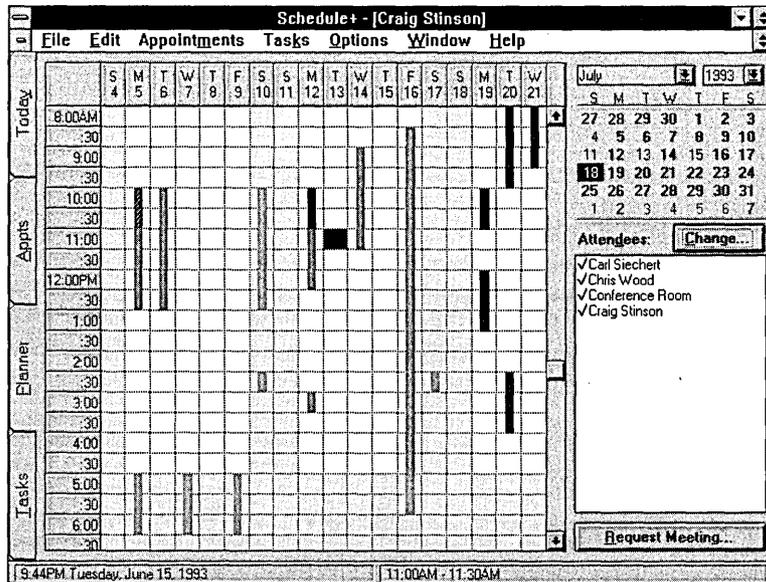
In the top portion of this dialog box, you'll find the Postoffice list—the main address book used by Mail. (For information about working with Mail's address books, see "Working with Address Books," page 253.) You can use this address book or switch to a different one, using the same commands that you use in Mail.

2. Select the names of the people you want at your meeting, and then click Add. (You can select them one at a time, or you can hold down



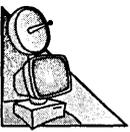
the Ctrl key while you select the whole lot.) When the Attendees section of the dialog box includes the names of everyone who should attend, click OK.

Schedule+'s planner now displays the busy times of all your attendees, as the following figure shows.



As you read this display, keep in mind the following:

- ❑ Your own busy bars are the dark blue ones (unless you used the Display command to choose a different color).
- ❑ Your colleagues' busy times are displayed in dark grey.
- ❑ A striped bar indicates a time when both you and at least one other user are busy.
- ❑ An X next to an attendee's name means that the person is busy at the currently selected time.
- ❑ If an attendee's name is dimmed, that means that Schedule+ was unable to check that person's schedule.



Determining Who's Busy When

When you try to arrange a meeting, normally all you care about is finding a time when everybody's free. But on some occasions, you might look at the composite planner display and wonder which of your colleagues is responsible for some particular gray busy bar. You can figure that out by selecting the bar in question with your mouse. An *X* appears beside the names of those users who are busy at the selected hour.

You can also alter the planner display so that it shows only the busy times of one or more particular users. You do that by a process of elimination. Click the name of any attendee, and Schedule+ removes that attendee's busy times from the planner. Click the attendee's name a second time to restore the display.

Requesting a Meeting

When you find a suitable time for your event, highlight the time with the mouse and click Request Meeting. Schedule+ responds with the Send Request form, as shown in the following illustration.

The screenshot shows a dialog box titled "Send Request". At the top, there are "Send" and "Cancel" buttons. Below the buttons, the "To:" field contains "Carl Siechert; Chris Wood; Conference Room". The "Subject:" field contains "Review of Chapters 1-8". The "When:" field contains "Wed, Jul 14, 1993, 1:00PM - 3:00PM". There is a checked checkbox labeled "Ask for Responses". The main text area contains the message: "Can we get together tomorrow afternoon for a couple of hours to talk about the first eight chapters?" followed by "Thanks!" and "Craig".

The Send Request form is a special type of Mail message. Like the standard Message dialog box (see "Creating a Message," page 249), it includes an area for the names of addressees and an area for your message.



Schedule+ fills out the addressee section with the names of those listed in the planner's Attendees box. In the message area, you can write a description of the meeting. When you're ready, click the Send button.

After you click Send, Schedule+ displays an alert box indicating that the meeting was successfully booked—even though your fellow attendees haven't yet read your request. An entry appears in your appointment book, flagged as a meeting by means of a handshake icon.

Where Schedule+ Messages Go

When you send a message request from Schedule+, that message appears in two places on your recipients' desks: in their Mail inboxes and in Schedule+'s Messages window. Your recipients can read and respond to the message in either program. Deleting the message in either program removes it from both. Responses to your meeting requests, similarly, arrive in both Mail and Schedule+. To view your messages in Schedule+, pull down the Window menu and choose Messages.

NOTE: The Messages window is not available when you work off line.

Letting Schedule+ Pick a Meeting Time for You

If you don't want to pick a meeting time yourself, you can let Schedule+ do it for you:

1. In the planner, click the Change button and select the names of all your attendees.
2. After Schedule+ has updated the planner to show the composite schedule for the selected attendees, use your mouse to select the span of time you require for your meeting. For example, if your meeting will last two hours, drag the mouse across four half-hour time blocks. (With the keyboard, hold down Shift and press the Down direction key to extend the time selector.)
3. Choose Auto-Pick from the Appointments menu.

Schedule+ finds the first working-hour time period after your selection in which all attendees are free for the requisite time interval.



Rescheduling a Meeting

If you need to reschedule a meeting, proceed as follows:

1. Display your appointment book and double-click the meeting entry. (Or select the entry and choose Edit Appt from the Edit menu.)
You will see a modified version of the Appointment dialog box, in which the names of your attendees are listed alongside a description of the appointment.
2. To find another time when your attendees are available, click the Choose Time button.
3. Change the date and time of your meeting, as needed, and then click the Invite button.

Schedule+ presents a new message form, in which you can explain the reason for rescheduling and ask your attendees to confirm their availability.

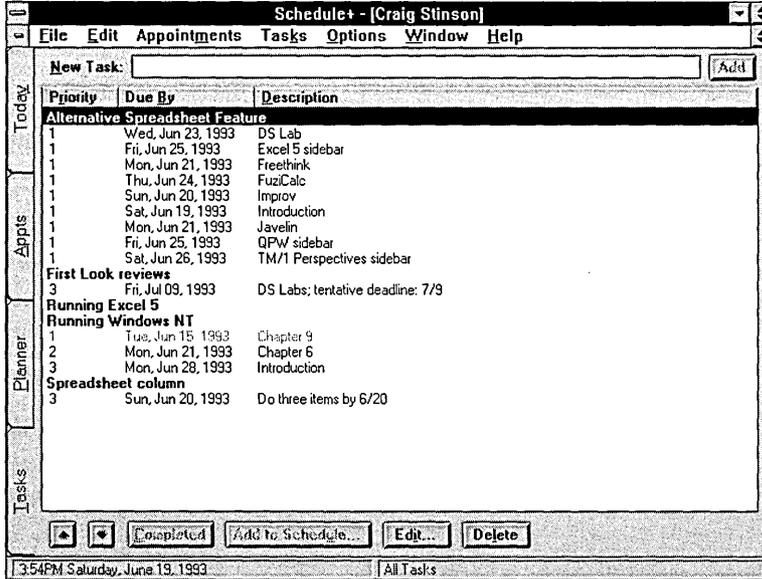
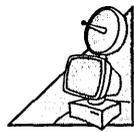
Canceling a Meeting

If you need to cancel a meeting, Schedule+ can send out cancellation notices:

1. Display your appointment book and select the meeting entry.
2. Choose Delete Appt from the Edit menu.
3. Answer Yes if you want to notify the attendees.

Managing Projects and Tasks with the Task List

The task list provides a simple means of tracking items on your to-do list that aren't tied to specific times in your appointment book. To view the task list, click the Tasks tab (or press Alt +T). You can organize your list into two hierarchical levels, called *projects* and *tasks*, as shown in the following illustration, or you can list tasks without putting them into project categories. Each task can be assigned a due date and a priority level, and you can sort the list by priority, due date, or description.



Creating New Projects and Tasks

To create a new project:

1. Choose the New Project command from the Task menu.
2. Supply a name for the project.
3. Select the Private check box if you don't want the project to be visible to others who can view your Schedule+ file.

Private projects are indicated by a key icon next to the project name; any tasks subordinate to the project heading are also automatically made private.

To create a new task:

1. Select the heading for the project to which the task belongs (or any task under that heading).
2. Choose the New Task command from the Tasks menu (or press Ctrl+T).

Schedule+ presents the Task dialog box.



Task

Description:

Project: ▾

Due Date: None By ▾

Start Work: ▾ Before Due Set Reminder

Priority: ▾ Private

3. Fill out the dialog box as needed, and click OK.

Alternatively, you can select the appropriate project heading, and then type a description of your task on the New Task line at the top of the task list window. Schedule+ then creates a task using default options. You can modify these options by editing the task entry. For information about editing the task entry, see “Editing Projects and Tasks,” page 301.

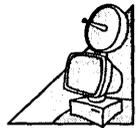
Creating Recurring Tasks

Tasks, like appointments, can be singular or recurring. To create a recurring task, choose New Recurring Task from the Tasks menu. Your options for creating a recurring task are the same as those for a recurring appointment. For information, see “Entering a New Recurring Appointment,” page 289.

Creating Tasks Without Projects

After you’ve created your first project heading, it might seem impossible to enter a new task that doesn’t belong to a project category. But you can, as follows:

1. Press Ctrl+T to create a new task.
2. In the dialog box, click the drop-down arrow to the right of the Project line.
3. Choose <None>, the first entry in the Project drop-down list.



WINDOWS TIP: You can create a new project at the same time that you create or edit a task. In the Task dialog box, type a new project name on the Project line instead of selecting an existing project from the drop-down list.

Editing Projects and Tasks

To edit a project or task, select it and press Ctrl+E, or double-click it. Either way, you'll be back in the dialog box that you used to create the project or task heading. Make your edits and click OK.



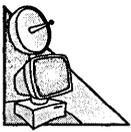
MOUSE TIP: If you need only to adjust a task's priority, select the task and then click the up and down arrows in the lower left corner of the task list window. Priority settings range from 1 (highest priority) through 9 and then A through Z.

Assigning Tasks to Your Appointment Calendar

Although the items on your to-do list are, by definition, not tied to specific times on the calendar, you might still want to block out times in your appointment book to devote to certain tasks. You can do this quite easily, as follows:

1. Select a task entry.
2. Click Add to Schedule.
3. In the mini-planner window that appears, select the time you want to devote to this task. Then click OK.

Schedule+ creates an entry in your appointment book, identified by the task description and its project heading. You can edit this entry (adding details to the description, for example) as you would any other appointment-book entry.



While selecting a time in the mini-planner window, remember that you are not restricted to selecting “free” times. If you pick a time that’s already marked by a busy bar, Schedule+ merely creates an overlapping entry in your appointment book.



WINDOWS TIP: If you expect your colleagues to use Schedule+’s meeting-scheduling features, you might want to avoid assigning tasks to large time blocks on your appointment calendar. (Then again, you might *not* want to avoid this!) Such blocks appear to your coworkers as times when you are unavailable for meetings.

Marking a Task as Completed

To mark a task as finished, simply select it and click the Completed button. Schedule+ removes the item from your task list and posts a note in today’s appointment book indicating that the task was finished.

Alternative Ways to View Your Task List

To change the order in which your tasks are sorted within each project heading, click one of the three heading buttons near the top of the window: Priority, Due By, or Description. Normally, all sorts are in ascending order. To reverse the sort order, hold the Ctrl key while you click the appropriate heading button.

To display only those tasks that are due today or already overdue, choose the Show Active Tasks command from the Tasks menu. To restore the full display, return to the Tasks menu and choose Show All Tasks.

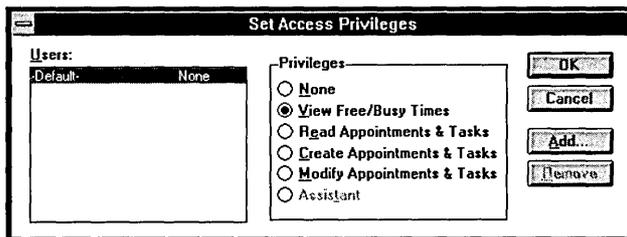
To remove the project headers from the task list display, choose the View by Project command from the Tasks menu. (Or press Ctrl+Shift+V.) Schedule+ retains the information about which projects your tasks belong to, but suppresses the display of these headings. This allows you to sort tasks strictly by priority, due date, or description without regard to project grouping. To restore the full display, choose the View by Project command a second time to deselect it.



Controlling Others' Access to Your Schedule+ File

By default, other users in your workgroup are allowed to see what times you are busy and free, but they're not allowed to read the details of your appointment book or task list, nor can they change any part of your Schedule+ file. This default privilege level helps your coworkers avoid requesting your presence at meetings when you have conflicting commitments, yet still protects your privacy.

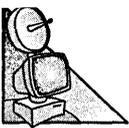
You can change the privilege level for particular users, or you can change the default privilege level. To do either, start by choosing Set Access Privileges from the Options menu. (You must be on line to do this.) Schedule+ presents the following dialog box.



The last option in this dialog box, Assistant, is not available at first because you cannot make Assistant privileges the default for all users. The other five options represent ascending degrees of permission. At the low end of the scale, the None option completely bars access to your Schedule+ data. At the high end, Modify Appointments & Tasks permits users to do everything with your Schedule+ file that you yourself can do.

To change the default access privileges, do the following:

1. In the Users section of the dialog box, select Default.
2. In the Privileges section of the dialog box, select the new default access privilege.
3. Click OK.



To change the access privileges for a particular user or group of users, follow these steps:

1. Click the Add button.
Schedule+ displays the familiar post office list.
2. Select the name of one or more users (hold down the Ctrl key while clicking to select more than one), and then click the Add button.
The names of the selected users now appear in the Users list.
3. In the Users section of the dialog box, select the names of the users whose access privileges you want to change.
4. In the Privileges section of the dialog box, select the new access privilege.
5. Click OK.

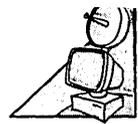
Having an Assistant Manage Your Schedule

To allow someone else to manage your Schedule+ file, proceed as follows:

1. Choose the Set Access Privileges command from the Options menu.
(You must be working on line when you do this.)
2. Click the Add button in the Set Access Privileges dialog box.
3. Select the name of your Assistant, click Add, and then click OK.
4. Select your assistant's name in the Users list, select the Assistant button in the Privileges list, and then click OK.

Meeting invitations sent to you will then be copied to your assistant, and your assistant will be able to respond, as well as issue new invitations, in your name.

You can have only one assistant at a time. If you want to allow more than one person to manage your schedule, assign the Modify Appointments & Tasks privilege to each additional person. The only difference between this privilege and the Assistant privilege is that you have the option of automatically directing messages to your designated assistant.



Redirecting All Messages to Your Assistant

If you want Schedule+ message traffic to go only to your assistant, follow these steps:

1. Choose the General Options command from the Options menu.
2. Select the check box labeled Send Meeting Messages Only to my Assistant.

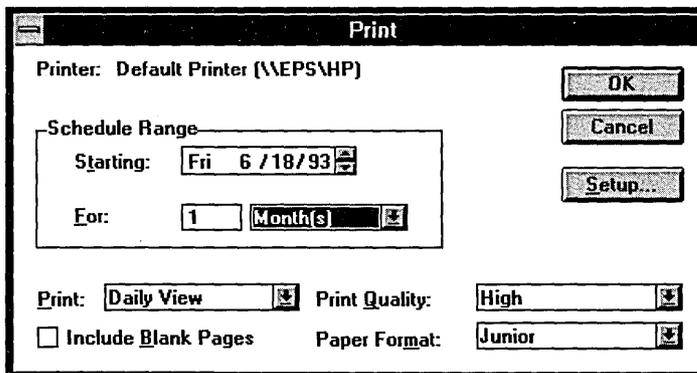
This option is available only while you're working on line and only if you have already designated someone to be your assistant.

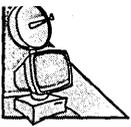
Viewing Others' Schedule+ Files

To see another user's Schedule+ file, choose the File menu's Open Other's Appt. Book command. Then select one or more names in the post office list and click OK. Provided the others in question have granted you at least the Read Appointments & Tasks privilege, Schedule+ opens a new document window for each selected user. You can switch between document windows with the help of the Window menu.

Printing Your Appointments and Tasks

To print some or all of your Schedule+ file, choose the Print command from the File menu. You'll see a dialog box similar to the following.





Select options as desired, and click OK.

Schedule+ offers five content options, each of them available in three sizes. The options, which are accessed via the Print drop-down list, are:

- ▣ Daily View
- ▣ Weekly View
- ▣ Monthly View
- ▣ Text View
- ▣ Tasks

The size options, available via the Paper Format drop-down, are Standard, Junior, and Pocket. Standard is the largest, and Pocket is the smallest.

The Daily View printout reproduces each day of your appointment book just as you see it on screen. Weekly View and Monthly View provide more compressed reports, truncating long text descriptions as necessary. Text View is handy when you want to see a lot of information in a small space; it simply lists your commitments by date and time, without attempting to mimic a calendar. Task List is the only choice that focuses on your projects and tasks.

Note that if you choose Weekly View or Monthly View, Schedule+ prints your appointments beginning at the first day of the Starting Date's week or month. For example, if you set Starting Date to 6/20/93 and choose Monthly View for one month, Schedule+ prints appointments from June 1 through June 30.

Exporting and Importing Schedule+ Files

If you plan to take your Schedule+ file on the road, you'll need a way to transfer it from your desktop computer to your laptop. The File menu's Export Appointments and Import Appointments commands provide a means to do this. Simply export your calendar to a file on a floppy disk, and then import that file into the version of Schedule+ stored on your road machine. When you return, you can reverse these steps to update your desktop computer.



You can also use the Export Appointments command to transfer Schedule+ files from the program's native format to text that is suitable for importing into a word processor. And you can use the Import Appointments command to transfer data from the Windows 3.1 Calendar and WordPerfect Office programs into Schedule+.

Exporting

To export your Schedule+ file, choose the File menu's Export Appointments command. The following dialog box appears.



Specify a date range if you don't want to export your entire file, and choose Text in the File Format drop-down if you intend to incorporate your schedule into a word processing document.

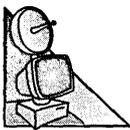
NOTE: The option to export a specific date range in the native Schedule+ format is available only if you are working on line.

Although the command is called Export Appointments, your projects, tasks, and notes will also be exported. Deselect the Include Daily Notes check box if you want to leave your notes behind.

After you fill out this dialog box, Schedule+ asks you to specify a name and path for the exported file. Both the export command and the import command use SCH as a default filename extension.

Importing

To import a calendar file into Schedule+, choose the File menu's Import Appointments command. You'll be asked to specify a filename and format.



The available formats are Schedule+, Windows Calendar (the Calendar accessory shipped with earlier versions of Windows), and WordPerfect Office. Schedule+ merges the specified import file with your current Schedule+ file.

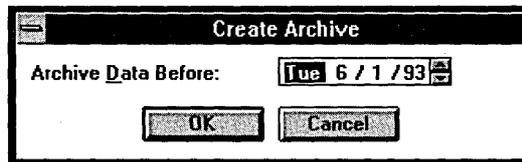
Before beginning this process, however, the program asks how you want it to handle duplicate and conflicting appointments. Duplicate appointments are those that exist in identical form in both the import and the current file. Conflicting appointments are appointments in the import file with times that overlap appointments in the current file.

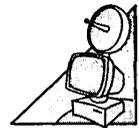
In most cases, you'll want to select the option button labeled Do Not Add Duplicate Appointments. If you make a mistake here and wind up with a file full of duplicate entries, you'll need to go through the pages of your appointment book and delete the duplicates (by selecting each one and pressing Ctrl+D).

If you put a check in the box labeled Ask About Conflicting Appointments, Schedule+ stops each time it sees a time overlap and asks for instructions. This slows down the import process considerably, but you might want to use this option if you're importing a set of records from the Windows Calendar or WordPerfect Office program. In this case, what may look to Schedule+ like overlapping appointments may actually be duplicates expressed in a different fashion.

Archiving Your Schedule+ File

The longer you use Schedule+, the bigger your file will grow and the longer it will take to load at the start of every session. You can control this growth with periodic use of the File menu's Create Archive command. This command presents the following simple dialog box.





Select a date and click OK. Schedule+ prompts for a filename and path, and then purges your calendar of all records prior to the selected date. If you ever need to see the purged information again, choose the Open Archive command and select the appropriate filename.

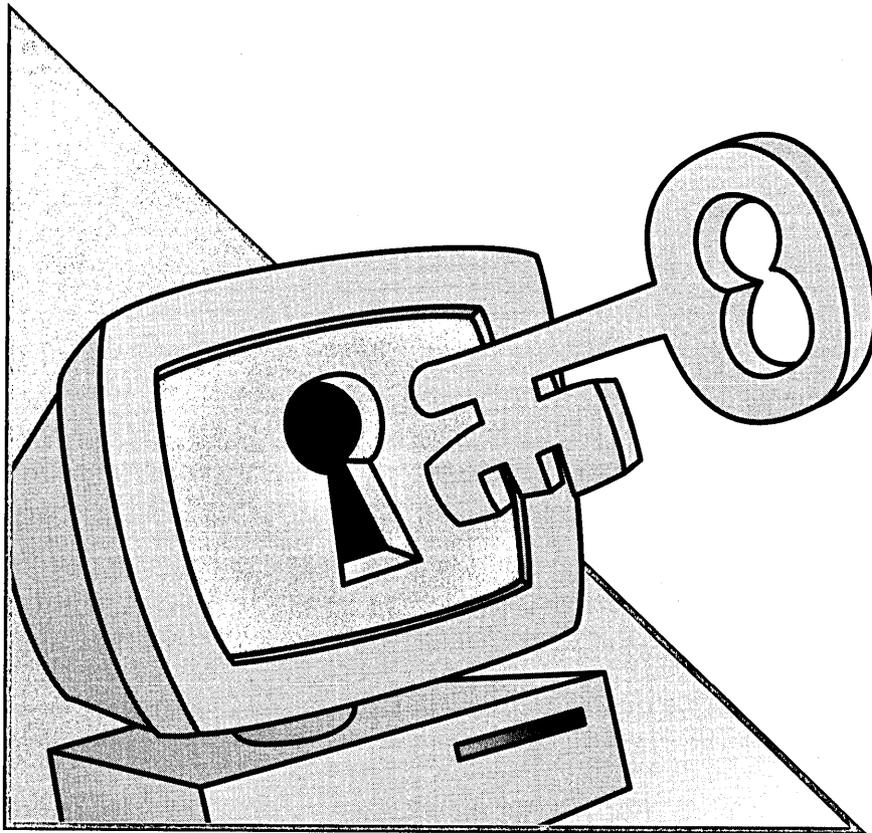


WINDOWS TIP: If you expect to need your archive files again, be sure to make the archive dates recognizable in the archive filenames. This will be easy to do if you archive to an NTFS directory. For example, you could name an NTFS archive Third Quarter 1993.ARC.

NOTE: Because archived records cannot be merged back into the current calendar file, you will be asked for confirmation before Schedule+ begins the archive process. If you reopen an archive with the Open Archive command, Schedule+ creates a new calendar document under the archive name. You can then use the Window menu to switch between your current calendar and the reopened archive.

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3



Security and Administration

Chapter 10	Users, Passwords, Policies, Permissions, and Rights	313
Chapter 11	File Security with NTFS	333
Chapter 12	Auditing Security	349
Chapter 13	Backing Up and Restoring Files	361



Users, Passwords, Policies, Permissions, and Rights

An Overview of Windows NT Security	314
Permissions, rights, user accounts, and groups form the basis of Windows NT security.	
Managing Groups	320
Managing users by grouping together people with common access requirements can make system administration a snap.	
Managing User Accounts	323
The User Manager lets you add, remove, and appropriately empower users on your system.	
Setting Account Policies	328
Account policies set the rules for creating and using passwords.	
Setting User Rights Policies	330
You can grant and revoke system privileges to users and groups.	



indows NT offers the ability to let several users share a single computer, as well as share resources such as directories or printers over a local area network.

These ideas aren't new, but Windows NT gives you a remarkable degree of control over system resources—assuming that you have the proper rights, that is. For example, you can keep stored data away from prying eyes by locking certain users out of the files or directories where the data resides. Windows NT also lets you control and monitor access to system resources, as well as restrict certain users from performing particular system activities.

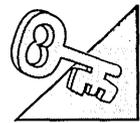
This chapter explains how security is implemented in Windows NT and how you can administer access to the resources on your system. We'll also examine the permissions and rights that can be assigned to users and groups of users.

NOTE: Many of the procedures described in this chapter can be performed only by a system administrator (that is, someone who logs on as a member of the Administrators group), but the concepts can also be useful if you are simply trying to use a shared resource.

An Overview of Windows NT Security

Windows NT implements *discretionary* security. In this approach to security, each resource that is subject to access control, such as a file on an NTFS partition or a printer, is assigned an owner. (You become the owner when you create such a resource, or when ownership is transferred to you.) The owner of a resource has discretion over who can and cannot access the resource. The owner must explicitly grant other users access; otherwise, they have no access to the resource. Some resources, however, might have default security settings based on their owner or their location. For example, a file assumes certain security settings based on the directory in which it was created.

The backbone of Windows NT security is the ability to identify a user uniquely. Each user is identified by a name—a username—when logging onto a Windows NT computer. Each username is protected by a password.



Windows NT manages security by associating each system resource with an *access control list*, or *ACL*. The owner of the resource determines which users are on the list. When a user tries to access a system resource, Windows NT checks the resource's ACL to see if the user has access. An unauthorized user is denied access to the resource, and the operation that the user attempted fails.

Windows NT enforces security at all times. This security cannot be disabled or circumvented.

Permissions

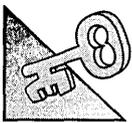
Although controlling access to a system resource might seem simple, Windows NT takes a very comprehensive approach. Each user is assigned a number of *permissions* that secure access to certain files and directories. Windows NT allows a system administrator to precisely control which operations the user can perform on the particular file or directory. Permissions are also assigned to system resources.

For example, you may have files that need to be maintained as read-only. A system administrator can assign permissions to the files so that all users are allowed to read the files, but no users are allowed to modify them. (For information about assigning these permissions and controlling a user's access, see Chapter 11, "File Security with NTFS," page 333. In this chapter, we'll concentrate on managing the users and groups of users that are affected by these permissions.)

Rights

Rights are another level of security; they control what a user can do with the computer after logging on. Rights are associated with accounts; accounts are said to have the right to perform certain actions. Windows NT allows system administrator accounts the greatest freedom—that is, complete control over the system. Typical user accounts have only a few rights, which keeps the system secure and stable; only a few trusted users are given accounts with complete control.

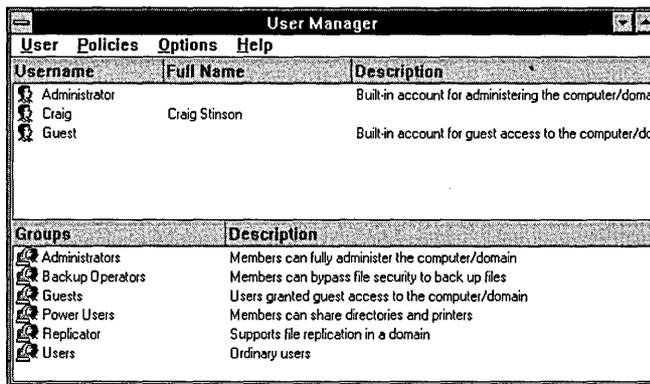
The easiest way to manage rights is to rely on the predefined groups installed with Windows NT, which assign default rights to users with accounts in those groups. To give a user more or fewer rights, a system administrator can move the account to a different predefined group. A finer



degree of control over rights can be exercised with the help of User Manager's User Rights Policy dialog box. (For information about this option, see "Setting User Rights Policies," page 330.) Later in this chapter, we'll discuss the rights afforded to particular groups of users, and examine how those groups are maintained. But first, let's explore user accounts using the User Manager application.

User Accounts

User accounts are created, changed, and maintained with User Manager, an application that comes with Windows NT and is installed in Program Manager's Administrative Tools program group by default. When you launch User Manager, you see the User Manager window, similar to the one shown in the following illustration.



The top part of the window lists the user accounts on the system. User Manager shows the username and full name for every account on the system; if there are many accounts, the scroll bar allows you to scroll through the entire list. The username is the name the user types in when he or she logs on. The full name is the user's full name, which identifies the user when the short username is insufficient.

Some accounts are special. The Administrator account belongs to the system administrator and is always present on the system. This account has full rights over the entire system; it can create other user accounts, and is generally responsible for managing the system. Many system features and rights are off limits to accounts other than Administrator (or a user who is



a member of the Administrators group). For example, most of User Manager's features are disabled when the current user is not Administrator or a member of the Administrators group. For more information about the Administrators group, see "Administrators," page 318.



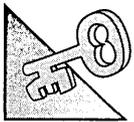
WINDOWS TIP: Even if you decide not to take advantage of the security features of Windows NT, you can benefit from creating a nonadministrative user account for yourself for day-to-day use. When you use this account, you will not run the risk of accidentally altering a system configuration setting. When you need to change the features or setup of your system, you can log on using the Administrator account.

The Guest account is special as well. It gives users who might not otherwise have access to the system a way to log on. The Guest account is intended for infrequent users of the system. Using this account, a guest can access the system in a very limited manner; he or she is prevented from altering the system or viewing any restricted information. Choices made by the system administrator determine the level of access afforded to the Guest account.

Groups

The bottom part of the User Manager window shows the *groups* that the system recognizes. Groups provide a system administrator with a way to assign the same access rights to a group of user accounts. For example, if everyone in the accounting department needs access to the PAYABLE directory, you can create a group called Accounting and grant the entire group access to the PAYABLE directory. All of the user accounts that belong to employees in the accounting department can then be added to the Accounting group. These users will automatically have access to the PAYABLE directory because they are members of the Accounting group.

Note that each user account can be a member of more than one group—or no groups at all. For more information about group memberships, see "Assigning Group Memberships," page 326.



The system has several predefined, standard groups, which bear some examination. The standard groups include Administrators, Power Users, Users, Guests, Backup Operators, and Replicator.

Administrators

The Administrators group is the most powerful group, because its members have more control over the system than any other group of users. The Administrators group, by default, contains the built-in Administrator account. If you add other user accounts to the Administrators group, they automatically receive the privileges reserved for system administrators.

Although members of the Administrators group have complete control, a user can create a file that members of the Administrators group cannot access. The file security in NTFS allows users to explicitly deny any user, including system administrators, access to a given file. A system administrator can gain control of the file by taking ownership of it, but this action generates an entry in the system log (when file-access logging is turned on), and the operation cannot be undone. For more information about file security, see Chapter 11, "File Security with NTFS," page 333.

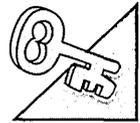
Power Users

The Power Users group is intended for users who need many of the privileges of the Administrators group, such as setting the system time or creating common program groups, but it restricts those users from the most potent capabilities. Power Users cannot take ownership of files or manage the security and auditing logs, for example.

Users and Domain Users

The Users group is a catch-all group. Except for the built-in Administrator, Guest, and initial user accounts, all accounts are members of the Users group. The Users group provides base-level access to the system. Ideally, the great majority of users on a system are members of this group and no other.

The Users group is joined by the Domain Users global group when a Windows NT computer participates in a Windows NT Advanced Server domain. This means that anyone accessing your system over the network



from a domain enjoys the same rights on the system as users in your local domain. You can prevent Windows NT from adding the Domain Users group to the Users group by explicitly removing the group using User Manager's group-editing capabilities. For information about deleting a group member, see "Modifying a Group," page 322.

Guests

The built-in Guest account is automatically a member of the Guests group. Users who log on infrequently are also good candidates for the Guests group. Permissions granted to regular, well-known users of the system—who are probably members of the Users group—can be withheld from members of the Guests group to limit their access and to improve security.

Backup Operators

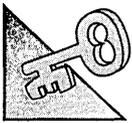
Members of the Backup Operators group have the right to back up and restore directories and files. Backup operators also have access to the Backup application. For information about Backup, see Chapter 13, "Backing Up and Restoring Files," page 361.

Replicator

The Replicator group is a special group that should contain only one member: the domain user account that uses the system's Directory Replicator service. (The Directory Replicator service duplicates a set of directories from a server.) Although you can add normal users to this group, you should refrain from doing so because the group is intended strictly for automated maintenance of directories.

System Groups

Windows NT manages four special groups for the system. These groups are not normally displayed in selection lists of groups, although they are often displayed in lists of groups or users that own a right. You'll see the group names (shown in Table 10-1 on the next page), for example, in the User Rights Policy dialog box. For more information, see "Setting User Rights Policies," page 330.



Group	Members
Everyone	This group contains anyone using the computer. This includes both local and remote users—the group contains the Interactive and Network groups. Members of this group can access the network, connect to the computer's shared directories, and use the computer's printers.
Interactive	A subset of the Everyone group containing members who are interactive, local users.
Network	A subset of the Everyone group containing members who are users from another computer and are accessing the computer through the network.
Creator Owner	This group contains any user who has created or owns a system resource, such as a document sent to the printer, a file or a directory, or a printer.

TABLE 10-1.
System groups.

Managing Groups

By examining the needs of the users who will be accessing your system, you can probably identify users who have common access requirements. These users should all be placed in a single group. This way, as time goes on, their accounts can be conveniently maintained and managed. You should not create so many groups that you cannot easily decide where to place a given user. However, you should feel free to create enough groups so that you can conveniently manage all of the users on your system.

You will probably find that rights for some system activities need to be granted to large numbers of people. If you are working with a group of software developers, for example, you will almost certainly want to create a group for them. That group should be allowed to debug applications, start and stop services, and perhaps view the system log. If you are working with a group of lawyers, bankers, or accountants, or any other group of people with very strict security needs, you will want to carefully isolate resources between groups.



Creating a Group

To create a group:

1. Choose the New Local Group command from User Manager's User menu. User Manager presents the New Local Group dialog box.

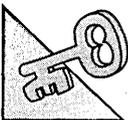
The 'New Local Group' dialog box contains the following elements:

- Group Name:** A text input field.
- Description:** A text input field.
- Members:** A list box containing the name 'Craig' with a small icon to its left.
- Buttons:** 'OK', 'Cancel', 'Help', 'Show Full Names', 'Add...', and 'Remove'.

2. In the Group Name text box, type a name for the group.
3. In the Description text box, type a description of the group. Try to use a concise and meaningful description for the group; that way, everyone on the system will know the group's purpose.
4. Click Add. The Add Users and Groups dialog box appears.

The 'Add Users and Groups' dialog box contains the following elements:

- List Names From:** A dropdown menu showing 'DOMAIN1'.
- Names:** A list box containing three entries:
 - Administrator Built-in account for administering the computer/dom
 - Craig (Craig Stinson)
 - Guest Built-in account for guest access to the computer/d
- Buttons:** 'Add', 'Members...', and 'Search...'.
- Add Names:** A text input field with a vertical scroll bar on its right side.
- Bottom Buttons:** 'OK', 'Cancel', and 'Help'.



5. In the Add Names box, type the usernames of the users you want added to the group. Separate the usernames with semicolons. Alternatively, you can select the usernames in the Names list box, and then click Add.
6. Click OK in the Add Users and Groups and the New Local Group dialog boxes.

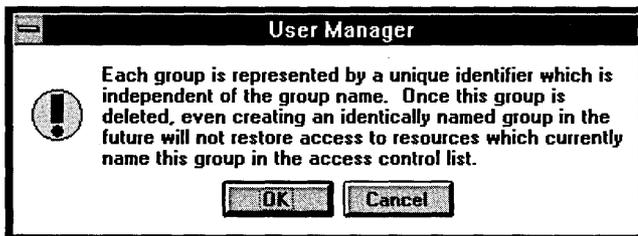
Modifying a Group

You can change a group's name, description, or membership by selecting the group in the User Manager window and choosing Properties from the User menu. You'll see the Local Group Properties dialog box, which—aside from its name—is identical to the New Local Group dialog box shown above. You can then change any of the settings made when the group was created.

Deleting a Group

To delete a group:

1. In the bottom part of the User Manager window, select the name of the group you want to delete.
2. Choose the Delete command from the User menu or press the Del key. User Manager presents a dialog box that warns you of the consequences of deleting a group. Click OK.



3. User Manager presents a dialog box that asks you to confirm the deletion. You can click Yes to delete the group or click No to cancel the deletion.



Take a deep breath and think carefully before deleting a group! It is frustrating to recreate all of the rights and memberships that most groups contain.

Managing User Accounts

A system administrator or a member of the Administrators group uses User Manager to create and delete user accounts and to manage account properties such as password requirements, group memberships, and account logon scripts.

Creating a User Account

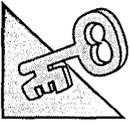
To create a new user account, you must be logged on as a member of either the Administrators group or the Power Users group.

1. Choose the New User command from User Manager's User menu. User Manager presents the New User dialog box.

The screenshot shows a dialog box titled "New User". It contains the following elements:

- Text input fields for: Username, Full Name, Description, Password, and Confirm Password.
- Buttons: OK, Cancel, and Help.
- Checkboxes:
 - User Must Change Password at Next Logon
 - User Cannot Change Password
 - Password Never Expires
 - Account Disabled
- Buttons at the bottom: Groups and Profile.

2. In the Username text box, type the username of the user for whom the account is being created. (Each user must have a unique username.)
3. In the Full Name text box, type the full name of the user. (This entry is optional.)



4. In the Description text box, type a description of the account. (This entry is also optional.) The description can be used to record more detailed information about the user. For example, some system administrators might include the department that employs the user, or the user's telephone number or extension.
5. In the Password and the Confirm Password text boxes, type the user's temporary password. (The password is typed twice to ensure that it is entered correctly.) Remember that passwords are case-sensitive.
6. Select the appropriate check boxes. It's a good idea to select the User Must Change Password at Next Logon check box so that the user will be prompted to change the password when he or she first logs on.
7. Click OK.

For information about the other choices in the New User dialog box—the Groups and Profile buttons—see “Managing User Account Properties,” below.

You can also create a new account by copying an existing account. In this case, you will be prompted for a new name for the new account. The Copy command on the User menu presents the Copy Of dialog box, in which you can establish different user properties. (Follow steps 2 through 7 above.)

Managing User Account Properties

Each user account has a small amount of basic information associated with it, including the user's full name, a brief description of the user, and whether the account is disabled. This information can be altered by a member of the Administrators group. If you double-click a username in the top section of the User Manager window, or if you select a username and choose the Properties command from the User menu, User Manager displays the User Properties dialog box, as shown on the next page.



The screenshot shows a dialog box titled "User Properties". It contains the following fields and controls:

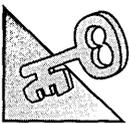
- Username: Craig
- Full Name: Craig Stinson
- Description: (empty text box)
- Password: (masked with asterisks)
- Confirm Password: (masked with asterisks)
- Four checkboxes:
 - User Must Change Password at Next Logon
 - User Cannot Change Password
 - Password Never Expires
 - Account Disabled
- Buttons at the bottom left: Groups, Profile
- Buttons at the bottom right: OK, Cancel, Help

This dialog box shows information about an account belonging to Craig Stinson. The account's password is represented by a row of asterisks. A system administrator can change the account's password using this dialog box but cannot learn what the password is without altering it. The User Properties dialog box also allows a system administrator to set several password options.

If you select the first check box, the user is forced to change the password the next time he or she logs on. This is convenient when you first create an account or after you reset a user's password. A system administrator can select the User Cannot Change Password check box to prevent a user from changing the password. This option is useful for an account that is shared by several users, such as the Guest account; no user can assume exclusive access to the account by changing the account's password.

Account passwords normally expire after a period of time that is set using User Manager's Account Policy dialog box. (For information about this dialog box, see "Setting Account Policies," page 328.) To prevent an account's password from expiring, select the Password Never Expires check box.

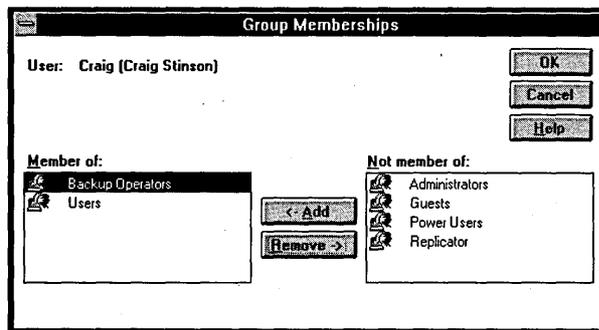
A system administrator can disable an account by selecting the Account Disabled check box. A user who tries to log onto a disabled account is told



to contact the system administrator because the account has been disabled. This option conveniently lets a system administrator disable an account temporarily without having to delete and later re-create the account and all its associated properties.

Assigning Group Memberships

Click Groups in the User Properties dialog box to determine which groups the user belongs to. The resulting Group Memberships dialog box, shown below, also allows a system administrator to add the user to or remove the user from any group.



This dialog box shows that the user Craig Stinson is in the Backup Operators group as well as the Users group. To remove Craig from the Backup Operators group, select that group name in the Member of list box and then click Remove. To add Craig to a group, select the group name in the Not member of list box and click Add. The list boxes are updated to show the groups to which the user does and does not belong.

Using Logon Scripts and Setting a Home Directory

The User Environment Profile dialog box allows a system administrator to alter each user's environment individually. To do so, click Profile in the User Properties dialog box. The User Environment Profile dialog box appears, similar to the one shown on the next page.



User: Craig (Craig Stinson) [OK] [Cancel] [Help]

Logon Script Name: []

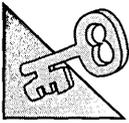
Home Directory

Local Path: []

Connect [Z:] To []

The User Environment Profile dialog box allows you to set up a logon script for a user account, as well as define a home directory for a user account. The Logon Script Name identifies a batch file or an executable program that is run automatically when the user logs on. Bear in mind that the batch file or executable program is executed *every* time the user logs on. You will probably want to keep the batch file short, or provide the user with an option to skip the logon script. You can specify a full pathname in the Logon Script Name text box, or you can specify a filename in the default logon script path, which is C:\WINNT\SYSTEM32\REPL\IMPORT\SCRIPTS. The user's access rights for the file must include read and execute privileges.

The Home Directory group box allows you to specify a home directory for the user. This directory is the current directory when the user logs on, and is the default directory for the File Save and File Open dialog boxes in applications that don't set their own default path. Most administrators create one home directory in the \USERS directory for each user. Users should be made the owners of their own home directories so that they can maintain security on their own directory and share files with other users. If you want to place a user's home directory on the local computer, type the pathname to the directory in the Local Path text box. If you want to place a user's home directory on another computer, select the Connect option button, select a drive letter from the drop-down list, and type the network path in the To text box (\\OMNI1\USERS\CRAIGS, for example). The user must

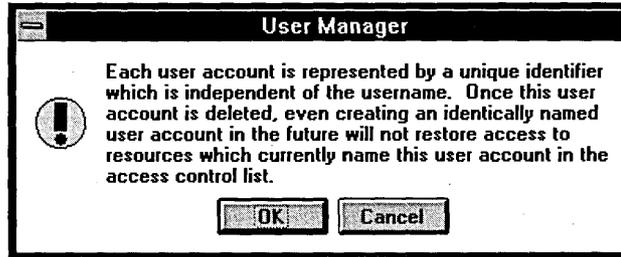


have permission to connect to the other computer and read the directory in question. Otherwise, Windows NT fails to make that directory current for the user.

Deleting a User Account

To delete a user account:

1. In the top part of the User Manager window, select the username of the account you want to delete.
2. Choose the Delete command from the User menu or press the Del key. User Manager presents a dialog box that warns you of the consequences of deleting a user account. Click OK.

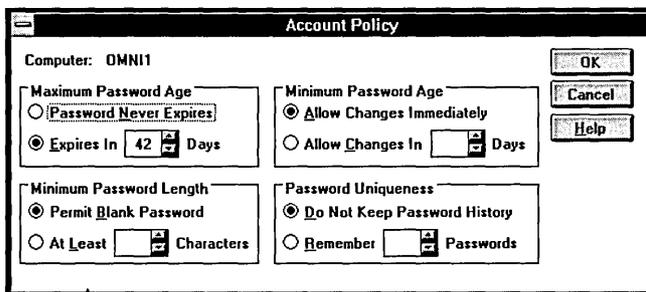
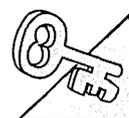


3. User Manager presents a dialog box that asks you to confirm the deletion. Click Yes to delete the user account or click No to cancel the deletion.

When you delete a user account, the account is removed from any groups to which the user belonged. If the user owned any system resources, those are marked as being owned by a deleted account. A system administrator can take ownership of the resources and assume responsibility for managing them from that point onward.

Setting Account Policies

A system administrator can set certain policies regarding passwords and accounts. To do so, choose the Account command from User Manager's Policies menu. You'll see the Account Policy dialog box, similar to the one shown on the next page.



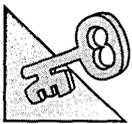
The Account Policy dialog box is divided into four group boxes: Maximum Password Age, Minimum Password Age, Minimum Password Length, and Password Uniqueness.

The Maximum Password Age settings dictate how long a password remains valid before it expires. Select the Password Never Expires option box if you want passwords to remain valid indefinitely; otherwise, select the Expires In option button and type the number of days an account password will remain valid.

The Minimum Password Age settings let a system administrator set the amount of time a password must be used before the user is allowed to change it. Select the Allow Changes Immediately option button to specify that a password can be changed at any time; otherwise select the Allow Changes In option button and type the number of days that must pass before a user is allowed to change the password. This can help prevent users from changing passwords excessively, which often results in a user forgetting the password and then pestering a system administrator for help in resetting the password.

The Minimum Password Length setting forces users to have passwords that are longer than or equal to a certain number of characters. Select the Permit Blank Passwords option button to remove this limit; otherwise, select the At Least option button and type the minimum password length. This forces users to provide a password that is more secure, because longer passwords are generally harder to guess.

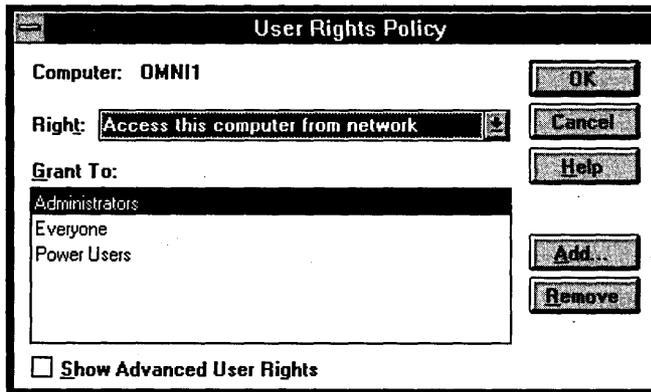
The Password Uniqueness setting can be used to force users to pick a password that they haven't used recently, rather than reusing an old one. When a password expires, many users avoid the hassle of remembering a new password by alternating between two passwords, thereby reusing the



same passwords over and over again. This compromises security. To avoid this problem, a system administrator can select the Remember Passwords option button and specify the number of most recently used passwords to be remembered by Windows NT. When the user changes his or her password with this option in effect, the system compares the new password to the list of remembered passwords. If there is a match, the new password is deemed unacceptable and the user is not allowed to make the change.

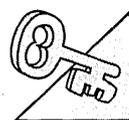
Setting User Rights Policies

Each user and each member of a group has a list of rights associated with his or her account. Choose the User Rights command from User Manager's Policies menu to change these rights. The User Rights Policy dialog box appears, similar to the one shown here:



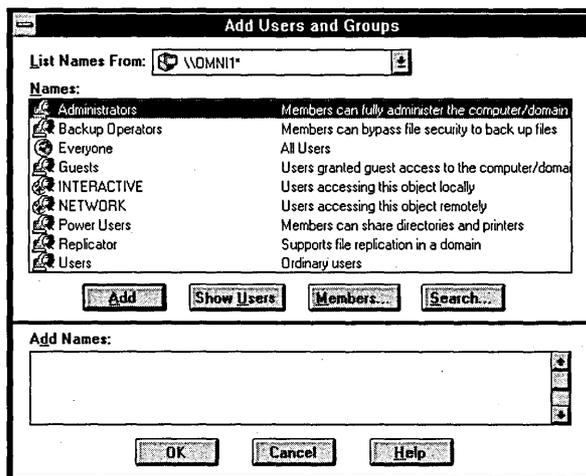
This dialog box allows you to see which users and which groups of users have a given right. To do so, select a right from the Right drop-down list box. The right selected in the drop-down list in this example has been granted to the groups Everyone, Administrators, and Power Users. To remove a right from a given group or user, select the user or group in the Grant To list box and click Remove. This revokes the right from the user or group and updates the list box accordingly.

Only the basic system rights are initially available in the drop-down list of rights. To see a complete list of rights, select the Show Advanced User



Rights check box. This adds the advanced system rights to the list. The drop-down list of rights is then more crowded, but it contains all manageable system rights.

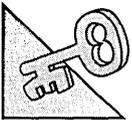
To grant a right to a user or group, click Add. The Add Users and Groups dialog box appears, as shown below. This dialog box is very common in Windows NT security applications.



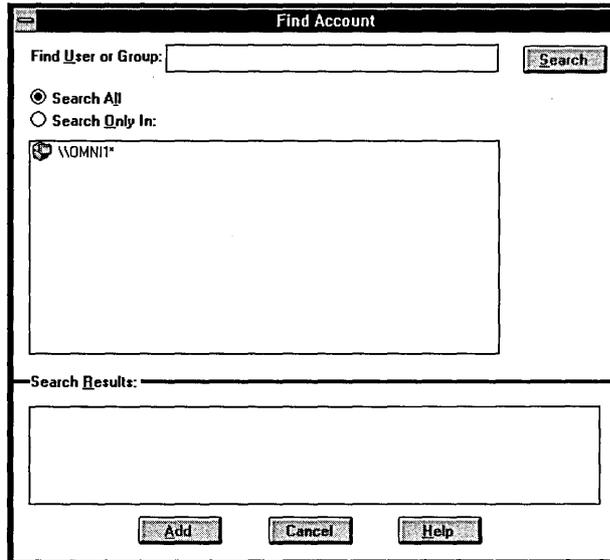
The Add Users and Groups dialog box lets you build a list of users and groups by selecting them from the Names list box and clicking Add to move the users or groups to the Add Names list in the bottom part of the dialog box. To remove a user or group from the Add Names list, highlight the name of the user or group you want to remove and press the Del key. You can also use the Ctrl+C and Ctrl+V keystrokes to copy and paste names, or you can even type names into the list.

Initially, the Names list box contains only the names of groups. However, you can request that usernames be shown by clicking Show Users. The usernames are added to the list, and you can add them to the Add Names list.

If you manage a system that is frequently accessed via the network, you might be interested in adding users and groups from other domains. To do so, select a domain in the List Names From drop-down list box; the Names list is updated to show the users and groups in that domain.



You can expedite your search for a user by clicking Search. The Find Account dialog box appears, similar to the one shown here:



The Find Account dialog box allows you to search in all domains or only selected ones, and you can match accounts based on partial names. In the Find User or Group text box, type the username or group you want to find and click Search. The Search Results list box at the bottom of the Find Account dialog box lists all of the matching accounts. Click Add to close the Find Account dialog box and bring the found names back to the Add Names list in the Add Users And Groups dialog box.

When you are done building your list of names to add, click OK to close the Add Users and Groups dialog box and to bring the names back to the list of users and groups in the User Rights Policy dialog box. Click OK to grant the selected right to the users and groups in the list.

File Security with NTFS

- Attaching Security to Files** 334
- File Manager's Security menu has commands that let you set permissions for files on NTFS volumes. You can control who can access files, and you can specify exactly what they can do with those files.
- Attaching Security to Directories** 343
- When you change permissions for a directory, you also change the permissions for files within the directory.
- The User's View of Security** 346
- Here's what you'll see when you haven't been granted appropriate permission for a file or directory.
- Security on New Files and Directories** 347
- New files and directories inherit the permissions associated with the directory in which they are created.

W

indows NT provides the ability to secure access to many shared resources. Probably the most obvious and important securable shared resource is the file system. You can set up your Windows NT system so that you have complete control over any user's ability to read, write, create, or modify your shared resources, regardless of which file system you use—FAT, NTFS, or HPFS. Windows NT can also manage security for local users of your files and directories, but only for one file system—NTFS.

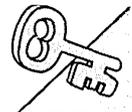
This chapter discusses how to use Windows NT to manage security of your NTFS files and directories. We'll examine the security measures that File Manager provides, and take a look at the different permissions you can apply to files and directories.

Attaching Security to Files

The Windows NT file system, called NTFS, stores a great deal of information about each file. Other file systems you might be familiar with, such as a FAT partition under MS-DOS, store information such as the file's name, size, and last modification date and time. In addition to storing all of this information, NTFS also manages an *access control list*, or *ACL*, which defines the type of access that users have to the files and directories on the system. Every file and directory stored on an NTFS partition has an ACL associated with it. For more information about ACLs, see "An Overview of Windows NT Security," page 314.

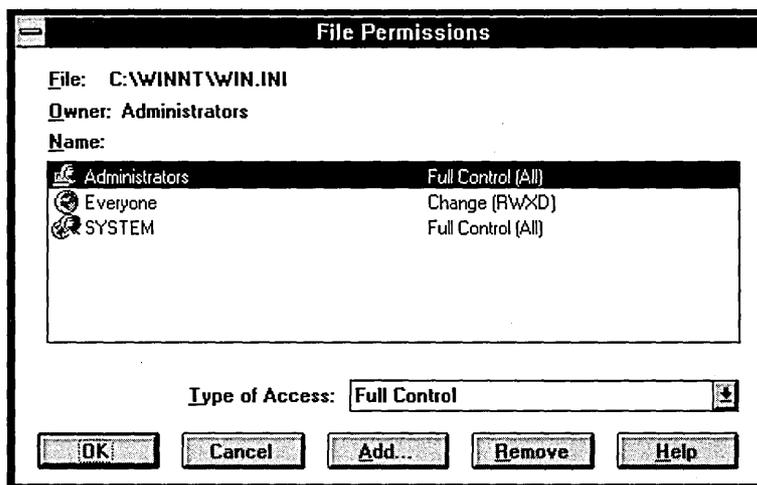
NTFS file security is managed using File Manager's Security menu commands—Permissions, Auditing, and Owner. We discuss the Permissions and Owner commands in this chapter. For information about the Auditing command, see Chapter 12, "Auditing Security," page 349.

The commands on File Manager's Security menu are disabled when they are not appropriate. If File Manager's currently active window is not an NTFS partition, for example, the commands on the Security menu are



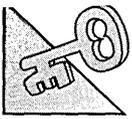
disabled because security is implemented only for NTFS partitions. Some or all of the Security menu commands might also be disabled for a selected file or directory if you are not the owner of the file or directory, and the owner has not assigned you access privileges.

When you select a file in File Manager and choose the Permissions command from the Security menu, a File Permissions dialog box appears, similar to the one shown below.



If you are not the file's owner, you might be warned that you are only allowed to view—but not change—the permissions for the file. In this case, the Add and Remove buttons in the File Permissions dialog box are disabled.

You use this dialog box to view and change a user's access to a file. In this example, the dialog box shows that the selected file, WIN.INI in the WINNT directory on drive C, is owned by the Administrators group. The Name list box shows that the file's ACL has three entries—one for the Administrators group, one for the Everyone group, and one for a special user called SYSTEM. (SYSTEM is not really a user; it is the Windows NT



operating system itself.) The right side of the Name list box displays the type of access each user or group has to the selected file. In this example, the Administrators group has Full Control access and the Everyone group has Change access.

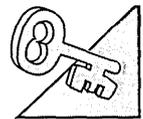
Access Types and Permissions

You can think of the access types listed in the Name list box as shorthand for specific combinations of permissions. In this example, the letters *RWXD* after the Change access type indicate the specific permissions. Table 11-1 shows the individual permissions and their abbreviations.

Abbreviation	Permission	Description
R	Read	Allows the user to view the contents of the file
W	Write	Allows the user to change the contents of the file
X	Execute	Allows the user to run the file—which is useful only if the file is an executable file, such as an EXE file or a BAT file
D	Delete	Allows the user to delete the file
P	Change permissions	Allows the user to modify the permissions associated with the file
O	Take ownership	Allows the user to assume ownership of the file

TABLE 11-1.
File permissions.

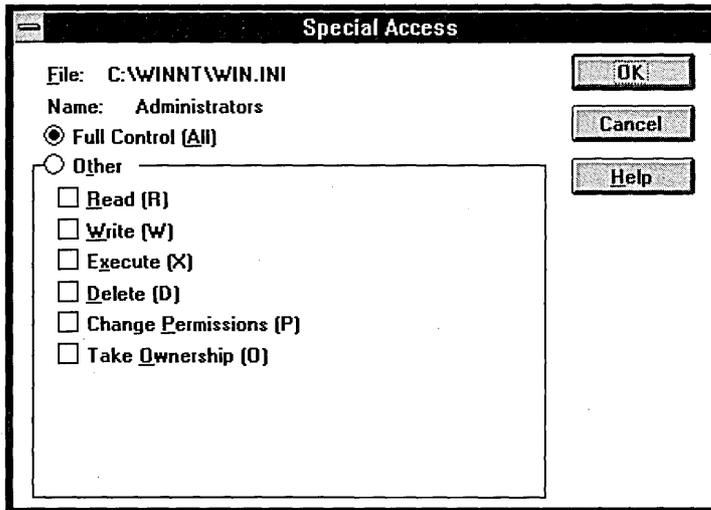
There are four predefined access types. Table 11-2 shows the individual permissions that each access type includes.

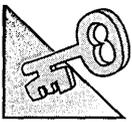


Type of Access	Associated Permissions
No Access	None
Read	Read and Execute (RX)
Change	Read, Write, Execute, and Delete (RWXD)
Full Control	All

TABLE 11-2.
Predefined access types.

For many situations, the predefined access types do not provide enough control over the access that a user or group has to a file. For example, you might want a user to be able to display a file's permissions, which requires Read, Write or Execute permission for the file. But you might not want to give the user Change access because Change includes all of these permissions plus Delete. To accommodate such situations, you can assign permissions individually. To do this, select the username or group whose access privileges you want to modify in the Name list box, and then select Special Access from the Type of Access drop-down list. File Manager displays the Special Access dialog box, similar to the one shown below.





To give the user or group full control over the file, select the Full Control option button. Otherwise, select the Other option button and select the check boxes associated with the permissions you want the user or group to have. Click OK to save the changes or click Cancel to close the dialog box without saving the changes.

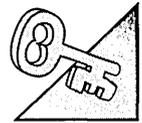
How Conflicts Are Resolved

User groups provide an easy way to assign and revoke access to files and directories for many users. However, the effects of adding and removing permissions to a group are sometimes problematic. The most obvious problem involves granting access to a group when a group member's access privileges have been explicitly revoked. (For more information about user groups, see "Managing Groups," page 320.)

When making security changes, it is important to understand that permissions are cumulative. Therefore, you should always review a group's membership to be sure you are not granting a permission to someone who should not have that permission. For example, let's examine a scenario involving two users: Anthony, a member of the Human Resources group, and Melinda, a member of the Accounting group. Anthony has Read permission for the JANUARY.XLS file in the PAYROLL directory. Melinda has Change access to this file.

If Delete permission for the file is given to the Human Resources group, Anthony receives that permission because he is a member of the Human Resources group. Because permissions are cumulative, Anthony continues to have Read permission for the file, but also gains Delete permission.

The No Access access type is an exception to the cumulative rule. It overrides all other permissions, regardless of how the No Access access type or the individual permissions were assigned. If the Human Resources group, for example, is given No Access to the file, Anthony is denied access to the file—even if you explicitly give him Full Control access.

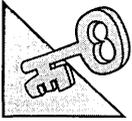


WINDOWS TIP: Because permissions are cumulative, you must devise your security management strategy with some care. Perhaps the simplest approach is to rely on groups for all security settings, rather than making settings and modifications for individual users. Instead of approaching the problem as granting access to users for particular files, think of granting access to groups. Do this only once—and then add and remove users from the groups.

In our example, the Accounting group should have Change access to the accounting files. Because Melinda works in Accounting, she is a member of the Accounting group and has all of the same permissions as her coworkers. However, there might be another group of users with greater access to the accounting files—perhaps called Accounting Supervisors. This group has Full Control access to all accounting files. If Melinda is promoted to a management position, her new access needs can be addressed by moving her from the Accounting group to the Accounting Supervisors group. If her access is modified directly, she might not automatically receive all of the permissions she needs. Furthermore, in a large organization, explicitly managing permissions for individual users can become very tedious.

Changing Permissions for a File or Directory

Although it is easiest to administer file access privileges by adding users to groups that have certain file permissions, one or more users might need access privileges not given to any group. In this case, you need to explicitly change a user's permissions. In other situations, you might want to update the permissions for an entire group.



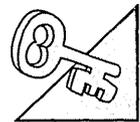
You can alter a user's or a group's access privileges to a file or directory by doing the following:

1. Use File Manager to select the drive that contains the file or directory.
2. Select the file or directory.
3. Choose the Permissions command from the Security menu.
4. When the File Permissions dialog box shown on page 335 appears, select the user or group (in the Name list box) whose access privileges you want to change.
5. Select the new access type from the Type of Access drop-down list. Or, if you want to give the user or group a special combination of permissions, select Special Access from the Type of Access drop-down list. This opens the Special Access dialog box, shown on page 337, where you can select individual permissions.
6. If you've used the Special Access dialog box, click OK to return to the File Permissions dialog box.
7. If you need to make changes to the permissions for other users or groups, return to step 4. Otherwise, click OK in the File Permissions dialog box to save the changes you've made.



WINDOWS TIP: Remember that you can select more than one file in File Manager. If you do this before choosing the Permissions command, the changes you make affect all of the selected files.

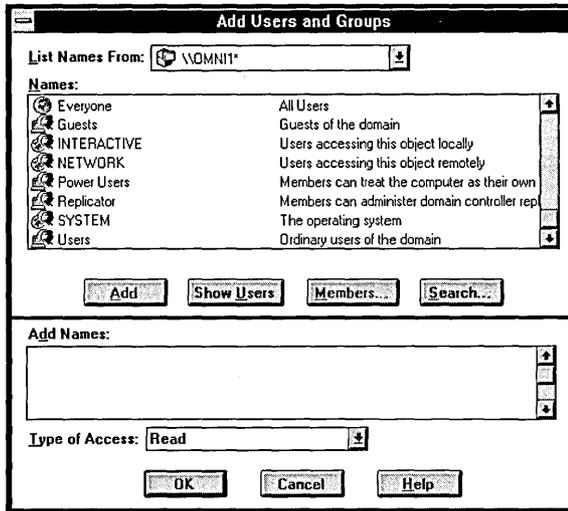
Take care when changing the access privileges of groups. Before proceeding, you might want to first determine who is in the group, as described in the next section.



Adding a User or Group

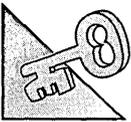
If the user or group whose access privileges you want to change is not listed in the Name list in the File Permissions dialog box, follow these steps:

1. Click Add in the File Permissions dialog box to bring up the Add Users and Groups dialog box, shown below.



2. Select the group you want to add. Click Show Users if you want to add a user. You can hold down the Ctrl key and select more than one username or group name.
3. Click Add. The names you selected are added to the Add Names list in the bottom part of the dialog box. You can directly edit this list by typing in usernames and group names separated by semicolons, or by deleting usernames or group names.
4. If you need to add more usernames or group names, return to step 2. Otherwise, click OK to close the dialog box and return to the File Permissions dialog box.

If you have a large number of users or groups, you can find users or groups by clicking Search in the Add Users and Groups dialog box. This opens the Find Account dialog box, which allows you to search for users more easily.



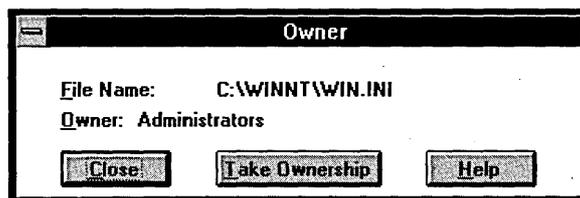
When you want to see which users belong to a particular group, select the group in the Names list in the Add Users and Groups dialog box and click Members. This opens the Local Group Membership dialog box, which allows you to select the names of users to be added, or to simply view the names of users in the group.

Taking Ownership of a File or Directory

It is sometimes necessary for a system administrator to take ownership of a file or a directory. For example, if a user who owns a file will no longer be responsible for its maintenance, a system administrator can take ownership of the file before granting ownership to another user; another user can also take ownership of the file directly.

In order to take ownership of a file or directory, you must have Take Ownership permission for the file or directory. To take ownership of a file or directory, follow these steps:

1. In File Manager, select the drive that contains the file or directory.
2. Select the file or directory you want.
3. Choose the Owner command from File Manager's Security menu. The Owner dialog box appears, as shown below.



4. Click Take Ownership.

Remember that a file can have only one owner. If you take ownership of a file, you take the ownership away from another user. However, it is also possible for a group to own a file. In that case, all members of the group have Creator/Owner access to the file.



WINDOWS TIP: To see who owns a file, select the file in File Manager and choose the Owner command from the Security menu. Close the Owner dialog box without clicking Take Ownership.

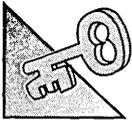
Remember that the user who creates a file or directory is the owner of that file or directory (until ownership is taken by someone else). Although every member of the Administrators group has the power to take ownership of the file or directory, the owner always has the final say on who has access to the file.

Attaching Security to Directories

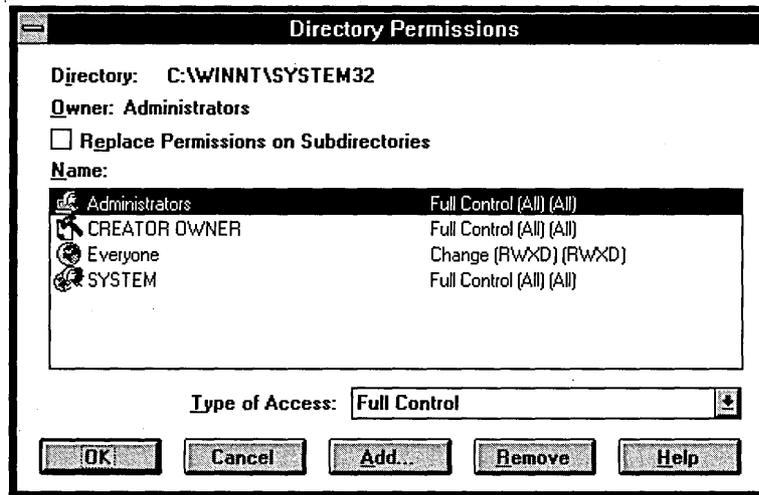
Throughout this chapter, we've talked about setting permissions for files and directories. Although the effects of setting permissions for files and directories is mostly the same, there are some important differences.

Most importantly, when you change the permissions for users' access to a directory, you also change the permissions for the files within the directory. However, permissions for the directory's subdirectories and the files in the subdirectories are not changed, unless you explicitly request that the changes you make to the directory's permissions be propagated to those subdirectories and files.

Because changes to a directory's permissions might change the permissions associated with a particular file, the Name list box in the Directory Permissions dialog box, shown on the next page, displays two different groups of permissions. The permissions in the first group are the permissions for the directory; the permissions in the second group are permissions for the files in the directory. Note the Replace Permissions on Subdirectories check box. Select this check box if you want your changes to be propagated to all of the directory's subdirectories and the files in those subdirectories.

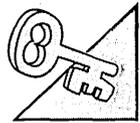


PART 3: Security and Administration

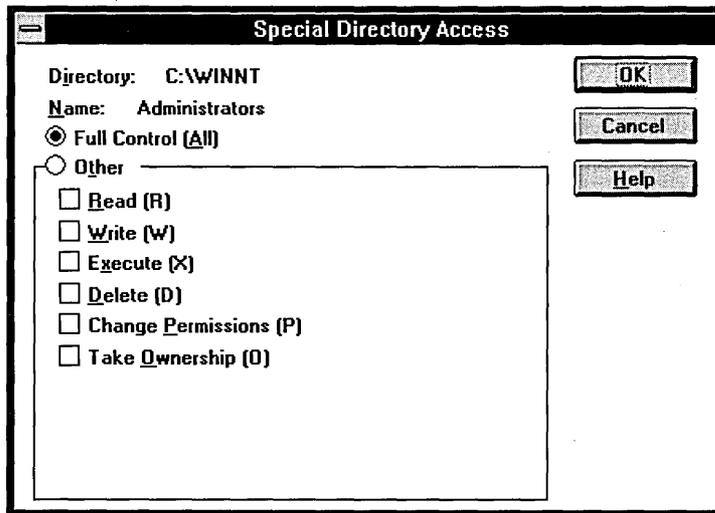


The table below shows the different access types and permissions that are predefined by Windows NT. The major difference between this list and the list of the file access types and permissions (Table 11-2 on page 337) is that directories can be secured against reading. If a user does not have Read permission for a directory, he or she cannot see the files within that directory. (The user might see subdirectories, however, if the user has Read permission for the subdirectories.) Windows NT security is very stringent in this respect. Not only can a user be denied access to files, he or she can be prevented from even knowing what files are in a directory.

Type of Access	Associated Directory Permissions	Associated File Permissions
No Access	None	None
List	Read and Execute	Not Specified
Read	Read and Execute	Read and Execute
Add	Write and Execute	Not Specified
Add & Read	Read, Write, and Execute	Read and Execute
Change	Read, Write, Execute, and Delete	Read, Write, Execute, and Delete
Full Control	All	All



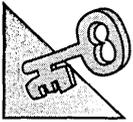
The Type of Access drop-down list in the Directory Permissions dialog box has two additional options. One is Special File Access and the other is Special Directory Access. The Special File Access option works in the same manner as the Special File Access option in the File Permissions dialog box. Selecting it brings up the Special File Access dialog box, which allows you to customize the permissions assigned to the files in the selected directory. The Special Directory Access option brings up the Special Directory Access dialog box, shown below. This dialog box is nearly identical to the Special Access dialog box, but instead of modifying the permissions for the files in the selected directory, it modifies permissions for the directory itself.



As in the Special File Access dialog box, select the Full Control option button to give the user full control over the selected directory. Or select the Other option button and select the appropriate permissions check boxes to specify exactly which permissions you want to grant to the user.

To change the permissions for a directory, follow these steps:

1. Select the directory in File Manager.
2. Choose the Permissions command from File Manager's Security menu. (If that command is disabled, you have selected a directory



that cannot be protected. This might be because the directory is on a drive that is not an NTFS partition, or you might not own the directory.) The Directory Permissions dialog box appears.

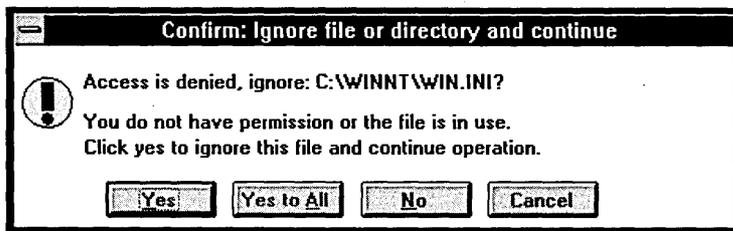
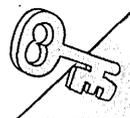
3. Select a user or group in the Name list box. If you want to add a new user to the list, click Add. This opens the Add Users and Groups dialog box, which lets you add users to the Name list box in the Directory Permissions dialog box. For more information about adding a user or group, see “Adding a User or Group,” page 341.
4. Select the access type you want to set for the user or group in the Type of Access drop-down list. If you want to set up custom access for the directory, select Special Directory Access or Special File Access, as appropriate.
5. If you need to make changes for more users, repeat these instructions starting with step 3. Otherwise, click OK to save the changes or click Cancel to close the dialog box without saving the changes.

Click Remove to remove the currently selected user or group in the Name list box. This resets the user's or group's access to No Access. Remember that if the user or group is not specifically given access to a file or directory, that person or group does not have access.

The User's View of Security

We've discussed the different features that are available to system administrators and file owners for setting file permissions. Now let's now look at the way everyday system users are affected by security.

When a user attempts to perform an operation on a secured file, Windows NT checks the file's access control list. If the ACL allows access, the user's request is granted. However, if the user does not have access privileges to the file, the request is denied. The exact error message the user gets depends on which application is running. For example, an attempt to delete a protected file in File Manager results in a dialog box message similar to the one shown on the next page.



File Manager detects that the file cannot be deleted by the current user, and offers to ignore the error and continue operation. If the user clicks Yes, the file isn't deleted, but the requested operation continues for any other selected files. If the user clicks No, the operation is discontinued.

Attempting to delete the same file at a command prompt results in an error message similar to this:

```
C:\winnt>erase win.ini
Access is denied.
```

If the user's command was to delete several files, the system displays an error message for each restricted file and deletes selected files that are not restricted.

Security on New Files and Directories

So far, our discussion of security has dealt with security settings on existing files and directories. To complete your understanding of Windows NT file security, you should understand how security affects newly created files and directories.

The rule is very simple: New files and directories assume the permissions associated with the directory in which they are created. For example, if you create a file in a directory to which the Accounting department has Change access and the Human Resources department has Full Control access, the Accounting department has Change access and the Human Resources department has Full Control access to the newly created file.

Auditing Security

About Auditing **350**

Windows NT can monitor successful and unsuccessful accesses to any system resource.

Auditing File and Directory Access **353**

Using File Manager to set up auditing of directories and files can make you aware of unauthorized attempts to access your data.

Auditing Access to Printers **357**

Setting up audits for your printers lets you keep an eye on their usage.

Auditing Other User Activities **359**

Using the User Manager to set up auditing for user activities is the final step in making your system's security completely airtight.

W

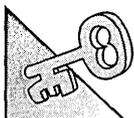
hile Windows NT provides system administrators with the ability to control the security of files and other system resources by setting permissions and rights, it is often helpful to have a method of actively monitoring use of the system. For example, if users repeatedly attempt to log on with improper passwords, it might be an indication that unauthorized users are trying to gain access to the system. Or, repeated failures at accessing a directory or file might indicate that some software was incorrectly installed or that security for the file was improperly set up.

To this end, Windows NT provides the ability to *audit* security by recording attempts at accessing system resources. In this chapter, we examine the various auditing tools at the disposal of a system administrator or resource owner. We examine their purpose and use, and explain what information they supply when used properly.

About Auditing

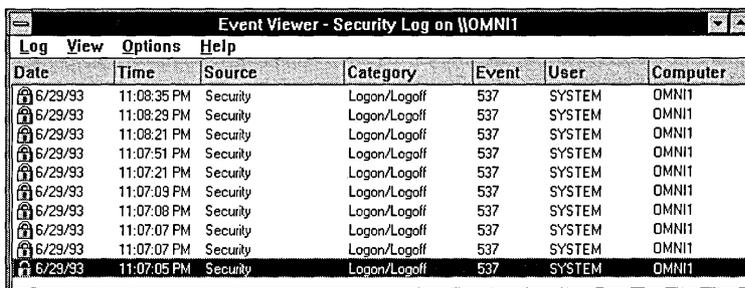
When a user attempts to access a system resource, Windows NT checks the resource's access control list to determine whether the user should be allowed access. This is the essence of Windows NT security.

If auditing of events is enabled, you can also request that Windows NT audit access to a given resource. (For information about enabling auditing of events, see "Auditing Other User Activities," page 359.) Windows NT will record (in a file called a log) any attempts to access a given resource. You might want to request that Windows NT record all failed print jobs on a given printer, for example, or record all failed file-read requests for a certain directory. Windows NT stores this information in the security log, one of the three system-wide logs that Windows NT manages. Windows NT also manages a system log, which records events that are generated by components of Windows NT, such as display or network drivers, and an application log, which records events generated by applications. For example, a database application might generate events when it detects a corrupt file or a corrupt index.



PART 3: Security and Administration

Because this chapter deals with security, we'll concentrate on the security log. (For more information about Event Viewer and other logs, see "Monitoring System Activities with Event Viewer," page 716.) If you select the security log by choosing the Security command from the Log menu, Event Viewer's window changes, as shown here:



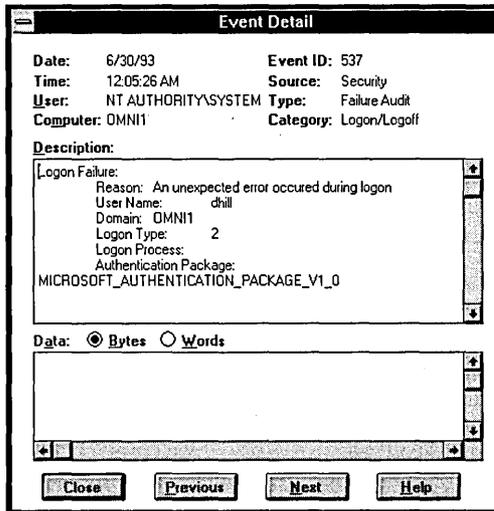
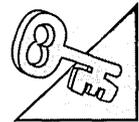
Date	Time	Source	Category	Event	User	Computer
6/29/93	11:08:35 PM	Security	Logon/Logoff	537	SYSTEM	OMN11
6/29/93	11:08:29 PM	Security	Logon/Logoff	537	SYSTEM	OMN11
6/29/93	11:08:21 PM	Security	Logon/Logoff	537	SYSTEM	OMN11
6/29/93	11:07:51 PM	Security	Logon/Logoff	537	SYSTEM	OMN11
6/29/93	11:07:21 PM	Security	Logon/Logoff	537	SYSTEM	OMN11
6/29/93	11:07:09 PM	Security	Logon/Logoff	537	SYSTEM	OMN11
6/29/93	11:07:08 PM	Security	Logon/Logoff	537	SYSTEM	OMN11
6/29/93	11:07:07 PM	Security	Logon/Logoff	537	SYSTEM	OMN11
6/29/93	11:07:07 PM	Security	Logon/Logoff	537	SYSTEM	OMN11
6/29/93	11:07:05 PM	Security	Logon/Logoff	537	SYSTEM	OMN11

This example seems to indicate that an unauthorized user has been attempting to gain access to the system. By examining the dates and times, you can see a close relationship between all of the security logon/logoff events—they happened within a few minutes of each other. By contrast, the events in the first illustration on page 351 were widely and randomly spaced, suggesting that they were the result of normal system operation. (For information about the icons in the security log, see "Viewing a Log," page 719.)

If you want more information about an item in the log, select the item and choose the Detail command from Event Viewer's View menu. The Event Detail dialog box appears, similar to the one shown on the next page.

It appears that someone has tried to log onto DHILL's account. You can examine other entries in the log using the Detail command, by selecting the item and pressing the Enter key, or by double-clicking the item.

If you were viewing a system event or an application event, the bottom list box in the Event Detail dialog box would provide pertinent binary (hexadecimal) information about the device, command, record, or file that caused the event. The data that can be shown in this list box is very specific to the type of event recorded. For more information about this binary data and an example, see "Taking a Closer Look," page 720.

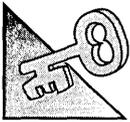


By carefully examining all of the events, you might be able to find a pattern in the attempts to gain access to the system. You can take measures to tighten up security, such as warning users to change their passwords, and monitoring the security log more closely.

In addition to letting you view a log and event details as described here, Event Viewer has some powerful features that let you dictate the way the system maintains event logs. For information about Event Viewer's other features, see "Monitoring System Activities with Event Viewer," page 716.

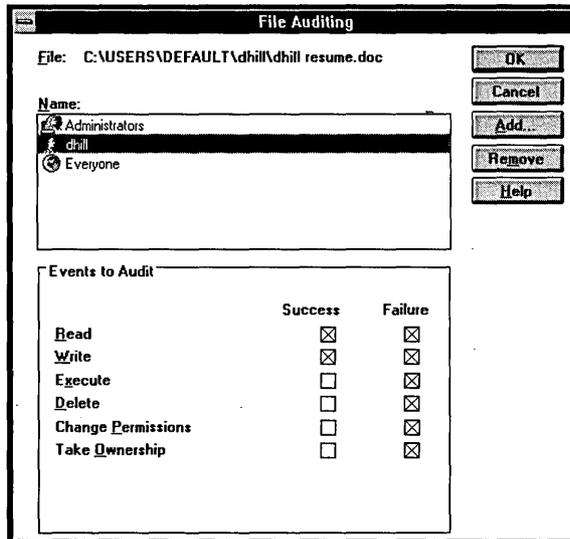
Auditing File and Directory Access

You can use the Windows NT File Manager to request that Windows NT audit certain files or directories in your system. While this is a useful technique for monitoring access to your system, you should be careful when auditing busy directories or files—and be particularly careful about auditing successful accesses. Each time a user successfully completes an operation on the file or directory, the system writes a record to the security event log to reflect the access.

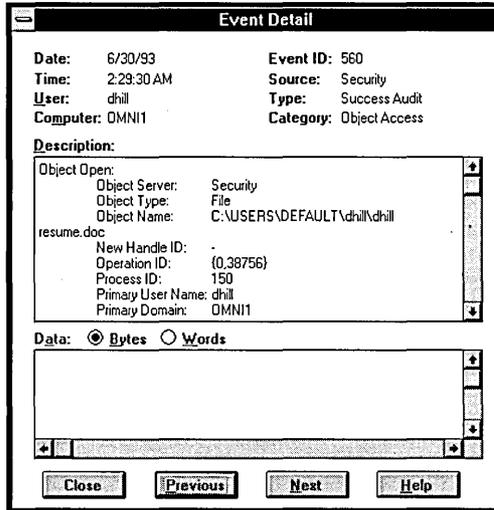
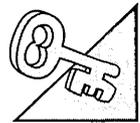


WINDOWS TIP: Avoid auditing too many successful events. The overhead incurred by continually writing event records to the security log can severely degrade system performance.

The Windows NT File Manager allows only members of the Administrators group to audit files and directories. Windows NT can audit a variety of events, and can audit different events for different users. To audit a file, select the file in File Manager and choose Auditing from the Security menu. The File Auditing dialog box appears, similar to the one shown below.



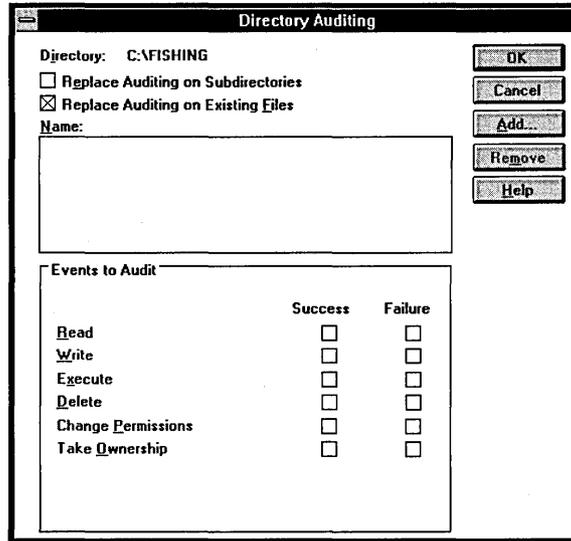
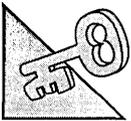
If an event's Success check box is selected, Windows NT generates a security log record containing (among other things) the time and date of each each successful attempt at the event by the specified user or group for the specified file. Similarly, if an event's Failure check box is selected, Windows NT generates a security log record each time the specified user or group unsuccessfully attempts the event for the specified file. The Event Detail dialog box shown on the next page shows a record of a successful event in the security log.



NOTE: File auditing cannot occur unless the auditing of events is enabled using User Manager's Audit Policy dialog box. (Security checks still occur when the auditing of events is disabled.) Note that the auditing of successful events and failed events can be enabled or disabled independently. For more information about User Manager's Audit Policy feature, see "Auditing Other User Activities," page 359.

To audit file or directory access by a user or a group, take these steps:

1. Use File Manager to select the file or directory whose access you want to audit. Remember that you can select more than one file or more than one directory.
2. Choose the Auditing command from File Manager's Security menu. The File Auditing dialog box or the Directory Auditing dialog box (shown on the next page) appears, depending on whether you selected a file or a directory.



3. In the Directory Auditing dialog box, you'll find the Replace Auditing on Subdirectories and Replace Auditing on Existing Files check boxes. Select the Replace Auditing on Subdirectories check box to have your auditing selections replace the existing auditing selections (if any) for all subdirectories of the selected directory and all files in the subdirectories.

The Replace Auditing on Existing Files check box is selected by default, which means that your auditing selections will replace existing auditing selections (if any) only for the selected directory and its files. Deselect the Replace Auditing on Existing Files check box to have your auditing selections apply to the selected directory, but not to its files.

4. Select the username or group whose access to the file or directory you want to audit, and then select the appropriate check boxes in the Events to Audit group box. If you don't see the username or group whose access you want to audit, click Add and follow the procedure for adding usernames and groups to the Names list box described in "Setting User Rights Policies," page 330.
5. Click OK.

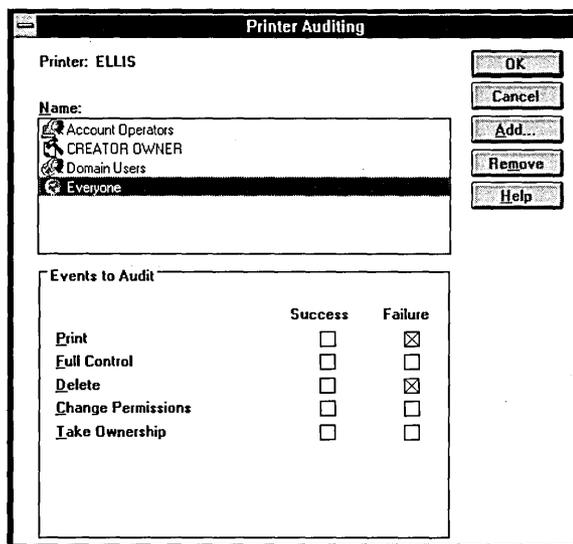


Auditing Access to Printers

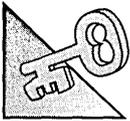
Windows NT allows the owner of a printer to both set and audit access to the printer. All of the printer security features are managed through the Windows NT Print Manager.

Members of the Administrators group can enable the auditing of printer access by following these steps:

1. Select the printer's window or icon in Print Manager.
2. Choose the Auditing command from Print Manager's Security menu. The Printer Auditing dialog box appears, as shown below.

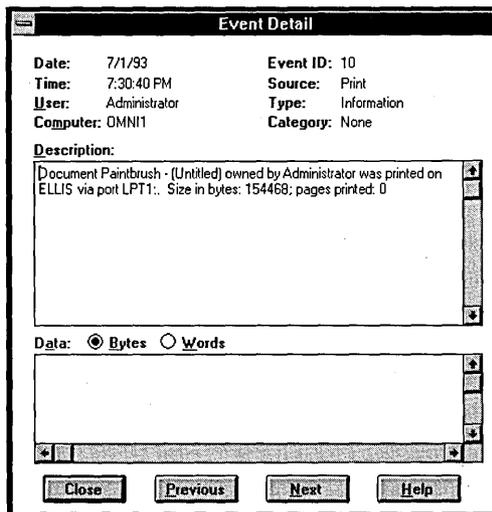


3. In the Name list box, select the username or group you want to audit. If you don't see the username or group whose access you want to audit, click Add and follow the procedure for adding usernames and groups to the Names list box described in "Setting User Rights Policies," page 330.

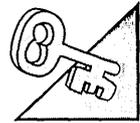


4. Select the events to audit by selecting check boxes. It is often useful to audit unsuccessful print jobs and deletions from the print queue, because these events can indicate a problem with the printer or difficulty in using the printer.
5. Click OK.

When Windows NT logs a printer event such as successful printing or deletion from the print queue, the event record is written to the system log. Security events, such as attempts to access a printer for which an account does not have access rights, result in an event record being written to the security log. A successful deletion of a print job generates a record in the system log that is similar to the one shown here in the Event Viewer's Event Detail dialog box.

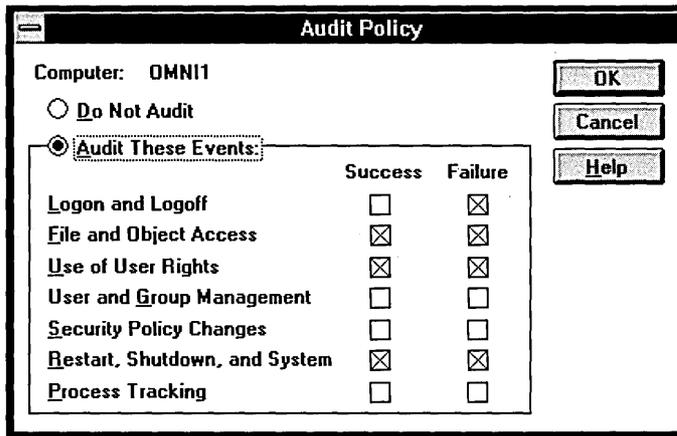


NOTE: Printer auditing does not occur unless the auditing of events is enabled using User Manager's Audit Policy dialog box. (Security checks still occur when the auditing of events is disabled.) Note that the auditing of successful events and failed events can be enabled or disabled independently. For information about User Manager's Audit Policy feature, see the next section.



Auditing Other User Activities

While Windows NT offers auditing of access to files and printers via File Manager and Print Manager, respectively, the system also provides the ability to audit other activities, such as logon and logoff events, and requests to shut down or restart the system. These features are provided by User Manager. If you choose the Audit command from User Manager's Policies menu, the Audit Policy dialog box appears, similar to the one shown below.



When these events are audited, they generate records in the security log and the system log. Note that the Auditing Policy dialog box controls auditing for almost all of the system. To audit an event, you must be sure that the corresponding check box is selected in this dialog box.



Backing Up and Restoring Files

Backup Strategy **363**

The job always goes easier if you use the right tool. You might choose a backup tool depending on the amount of data you have, who else shares the data, and what backup hardware you have on your machine.

Backup Tactics **365**

No matter which tools you choose, backups follow a few simple principles. Once you understand how backups work, you can decide whether to use normal, incremental, differential, copy, or dated backups.

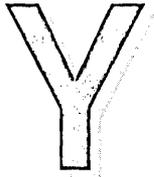
Using Windows NT Backup **373**

The Windows NT Backup program is designed to be the workhorse for backing up large amounts of data to a tape drive. You can use it interactively, or you can launch automated backups from the command line.

Using the Backup and Restore Commands **391**

Nobody wants to back up a large hard disk to floppy disks, but if you're only backing up a directory or two and you don't have a tape drive, the Backup command still has enough power for the job.

Like a Swiss army knife, the XCopy utility has something for everybody. Its backup capabilities might be just what you need for small, specialized backup jobs.



ou don't have to use computers long to know the frustration of losing data. It happens to everyone. Windows NT can't save you from the silly little mistakes that everyone makes occasionally, but it does provide tools to back up recent copies of data easily, reliably, and preferably automatically.

Because Windows NT is targeted at powerful computers with large hard disks in a corporate environment, backup is no longer merely a good idea, as it is with MS-DOS; it is a requirement. Furthermore, the built-in networking features of Windows NT make it easy to design corporate backup strategies in which administrators back up local machines periodically with no intervention by local users. Automatic backup doesn't always get you off the hook, however. You might still need to do some local backup tasks.

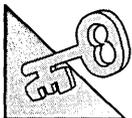
The other side of backup is restoring. Ironically, making regular backups seems to reduce the likelihood that you'll ever need to restore. According to the Unnecessary Backup Addendum to Murphy's Law, you never need to restore until you forget to back up.

This chapter tells how to lessen the likelihood that disaster will strike you, and when it does, how to make it as painless as possible.

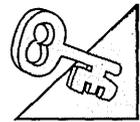
Backup Strategy

The built-in networking and security features of Windows NT change the way you need to think about backup. You won't necessarily follow the same procedures you do with MS-DOS or Windows 3.1, even if your MS-DOS computer is networked. We'll talk about this subject in two parts: strategy and tactics. By strategy we mean the tools and devices you use. By tactics we mean how often you back up, how much you back up, and where you store your data. Here are a few scenarios to get you thinking about strategies:

- ▣ You have a tape drive installed on your computer. You use Windows NT Backup to periodically back up your data to tapes. This is a pretty traditional method, and it works fine with Windows NT. The only problem is that you need a tape drive and tapes for every computer. There ought to be a better way in a networked system.



- ❑ You don't have a tape drive, so you periodically back up your data to floppy disks using the MS-DOS backup utilities (BACKUP.EXE and RESTORE.EXE). This is how people used to back up when hard disks were small and tape drives were rare and expensive, and some people still do it that way. It's tedious to keep feeding your machine floppy disks, but if that's all you have. . . . Windows NT provides versions of BACKUP.EXE and RESTORE.EXE, but you'll probably find them inadequate except for saving a few small directories. For one thing, RESTORE.EXE works correctly only with the MS-DOS file system (also called the FAT file system). We'll talk more later about the problems of restoring an NTFS drive with the MS-DOS backup utilities.
- ❑ A key part of your job involves working on files that you share with others. The files are located on a network server or on another user's disk. Someone else (probably the network administrator or the owner of the disk) takes care of backing up the files. In other words, backup isn't your problem. This is great, but no doubt you have some personal files that you keep on your own disk. You still need to back them up. Or maybe the shared files are on your disk and other people are counting on you to preserve their data.
- ❑ You and other people working on your project use a source control program that automatically coordinates new versions of data files. The program keeps a master copy of the data files on a network server, where they are periodically backed up by the network administrator. You have local copies of data files on your disk, which you have checked out from the server to make changes. If your local copy gets damaged or destroyed, you can restore from the master copy. You might still have some personal files that need to be backed up, however, and you might want to back up your local copies of the data files.
- ❑ You have a limited amount of data you need to back up—perhaps because your important work is stored on a network server or you use a source control program. You ask your network administrator to assign you some backup space on another network server so you can periodically copy your work to the other network server's drive, which is backed up by the network administrator. Your



network administrator will probably be reluctant to assign large amounts of network server disk space for this purpose. Server disk space is an expensive commodity, usually reserved for files needed by more than one person.

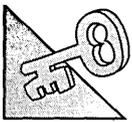
- Your network administrator asks you to create an account for him or her and put that account in the Backup Operators group for your machine. You tell the administrator which directories you need backed up regularly, and he or she writes a batch file that automatically logs onto your computer every morning at 2 A.M. and backs up those directories to an administrator's tape drive. You might even be assigned a machine with Windows NT preinstalled and everything set up for automatic backup. The backup problem is out of your hands.

The key point of all except the first two scenarios is that someone other than you takes care of getting your key data onto a backup tape. You can't beat that. Many Windows NT users will find themselves in that circumstance. Built-in networking makes corporate solutions to backup the most efficient way to protect data. However, you might not be so fortunate. If you need to back up some or all of your data, the rest of this chapter describes several ways to do so.

Backup Tactics

Over the years, backup tactics and principles have evolved. These principles apply no matter what backup tools or media you use. Windows NT Backup supports five common backup methods—normal, incremental, differential, copy, and dated. You can perform the same operations with other tools, such as the Backup and Restore commands, the XCopy command, or backup programs from other vendors.

Choosing backup tactics involves evaluating tradeoffs between safety on the one hand, and time and media space on the other. If safety were your only concern, you could backup your entire hard disk every hour on the hour. But you wouldn't have any time to work, and you'd spend a fortune on backup tapes or disks. If spending minimal time and money on backups were your only concern, you might back up only a few crucial files once a month. Common sense tells you there must be a happy medium.



Old Backup Tools

Back in the old days before Windows NT, competition in the backup software field was hot and heavy. The MS-DOS Backup and Restore utilities weren't flexible, fast, or reliable enough for business use, so several software publishers fought it out, matching and exceeding each other's new features with each release. Eventually even Microsoft got into the act, providing powerful new tools with MS-DOS version 6.

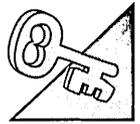
If you're used to backing up to floppy disks instead of a tape drive, you might want to use one of these familiar backup tools instead of the new Windows NT Backup, which works only with a tape drive. For example, if you have flex boot with MS-DOS 6, you might have the bright idea of using the character-based program MSBACKUP.EXE or the Windows-based program MWBACKUP.EXE from a Windows NT command prompt. Unfortunately, you can't. To work efficiently, these backup programs are designed to bypass the operating system and directly access the computer's hardware. Windows NT doesn't permit this because any program that bypasses the operating system can bypass security. Therefore, many powerful backup tools for the MS-DOS environment will not work with Windows NT.

However, the companies with experience in backup technology will undoubtedly develop new backup tools for Windows NT. Of course, their new programs will need a lot of great features to compete with Windows NT Backup, which has one major competitive advantage: It's free.

Backup Principles

Keep the following simple principles in mind when designing your backup procedures:

- Exclude program files from backups. They never change (except for program updates). Back them up once when you purchase them. Keep programs in separate directories from data so you can easily exclude them from backups.



- ▣ When the time required to recreate lost files exceeds the time required to back them up, it's time to back up.
- ▣ Configuration files change rarely, and are usually easy to reconstruct. Back them up informally when you make major changes.
- ▣ Focus on data files. These files often change regularly, the changes are hard to track, the files are difficult to reconstruct, and the data in the files can be very valuable.
- ▣ Don't store your backups near the originals. If your office burns down, you'll probably lose both.

Backup Methods

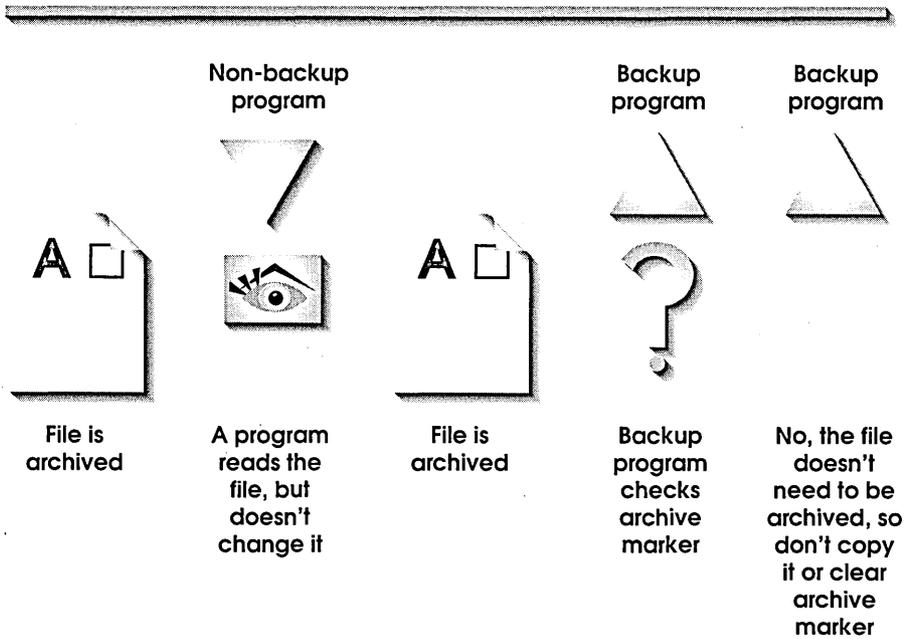
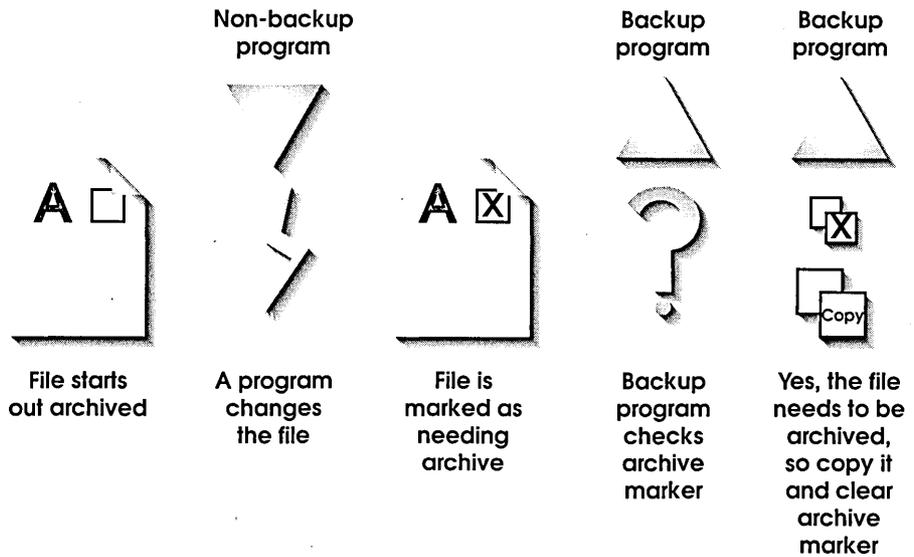
Most operating systems, including Windows NT, maintain an archive bit for each file. You don't have to understand what a bit is—just think of it as an archive check mark for a file on your disk. (We'll call the archive check mark an *archive marker*.) Every file is either marked as needing to be archived (backed up), or it isn't marked. This one tiny piece of data is the key variable in most backup methods.

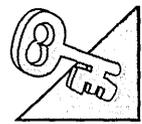
For purposes of this discussion, there are two kinds of applications—backup programs and other programs. Whenever a non-backup program modifies a file, it marks the file as needing to be archived (by setting the archive marker), indicating that the file has changed since the last archive. The operating system takes care of this; you don't have to worry about it. When the backup program sees a file with an archive marker during a backup, it backs up the file and clears the archive marker. Next time it sees the file, the archive marker is gone (unless you've modified the file again) and the backup program knows that it doesn't have to back up the file. (Technically, any program can be written to clear the archive marker on a file, but by convention only backup programs do so. Backup schemes would fail if non-backup programs violated this rule.)

With this background in mind, let's look at the different kinds of backups.



Operations on Archive Markers

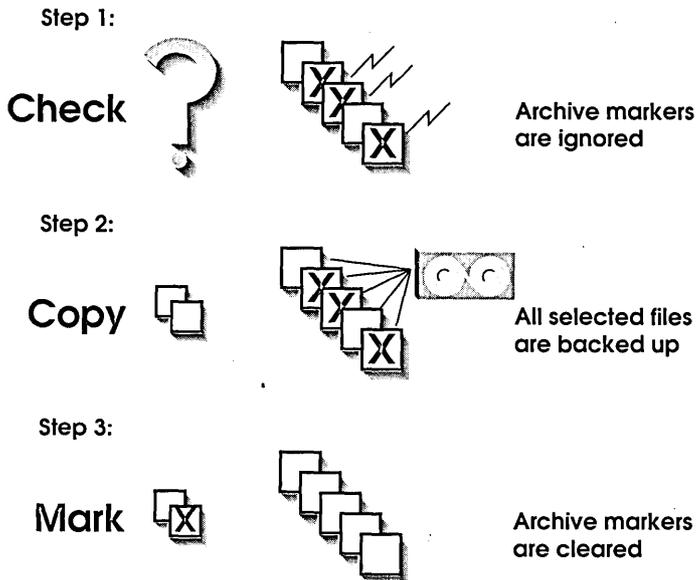




Normal Backups

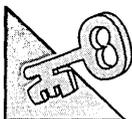
A normal backup simply copies all of the selected files and clears any archive markers. It doesn't pay any attention to which files have an archive marker. The normal backup method is generally used with the incremental and differential backup methods described in the next two sections. You do a normal backup on a long cycle—say, once a week. You do incremental or differential backups on a short cycle—probably daily. This will become clear when we discuss the other backup methods.

Normal Backups



Incremental Backups

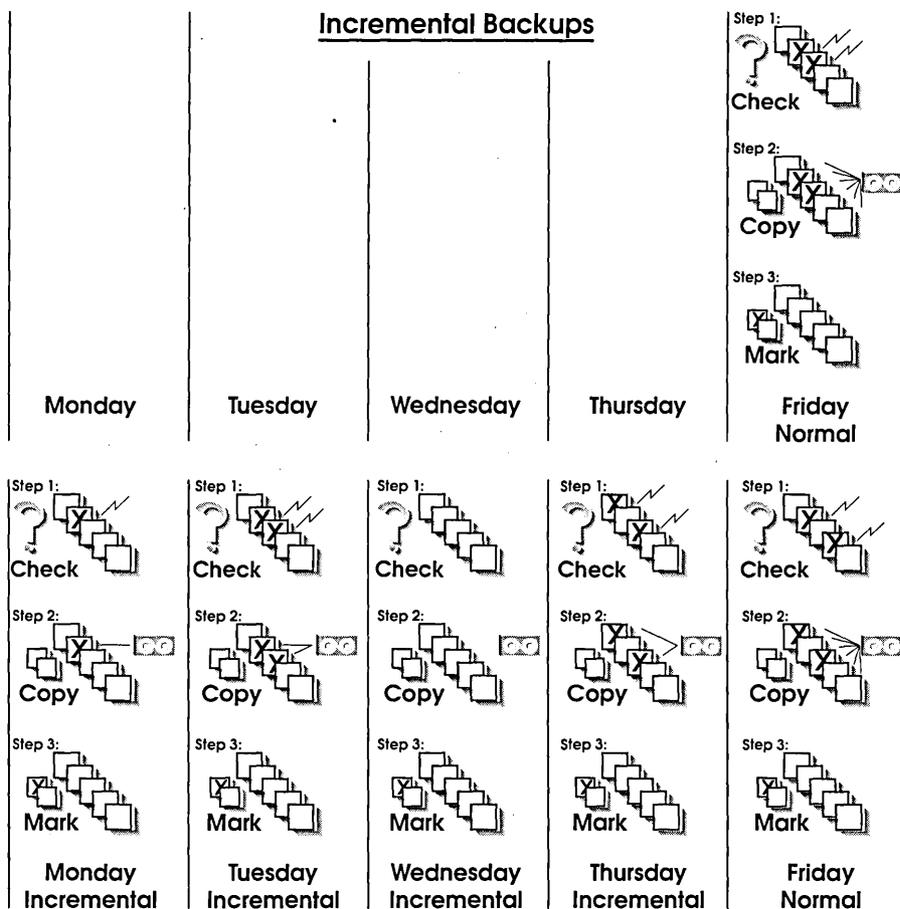
An incremental backup copies only files whose archive markers are set. It then clears the archive markers. The backup disk or tape contains only the files changed since the previous backup. For example, you might do a normal backup every Friday night and an incremental backup every other night of the week. Monday night's backup would contain all of the files that changed on Monday, Tuesday night's backup would have Tuesday's changes, and so on. If the file CHANGE.DAT changes every day of the week,

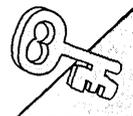


PART 3: Security and Administration

there would be a separate copy of it in each incremental backup. But if the file SAME.DAT changes only on Monday, it would be saved only in Monday's backup.

Now, using these backup tactics, let's assume that disaster strikes on Friday afternoon. To restore your week's work, you first restore last Friday's normal backup. Then you restore the incremental backups for each weekday in order. You want the last copy of CHANGE.DAT to overwrite earlier copies, but you still have to restore each day's backup because files that changed on only one day (such as SAME.DAT) exist only on one backup. If you need to restore Wednesday's version of CHANGE.DAT, it's available on Wednesday's backup.

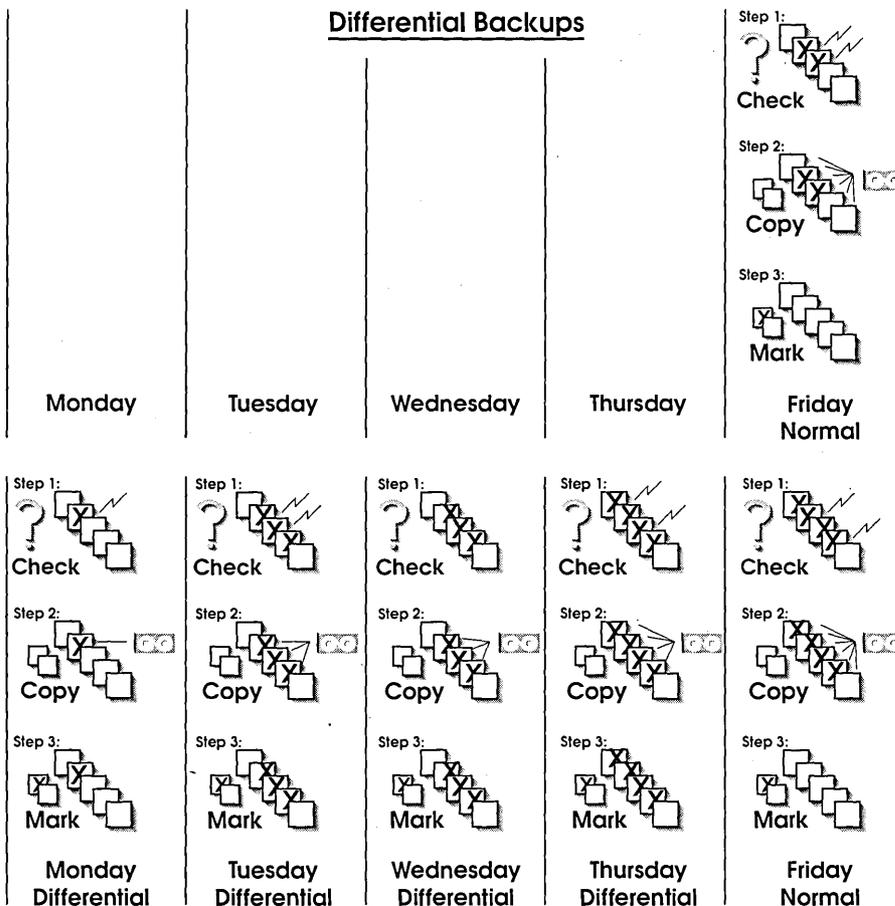


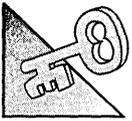


The advantage of incremental backups is that they are secure, don't take long to do, and use less storage space than other methods. The disadvantage is that if something goes wrong, restoring can be tedious.

Differential Backups

A differential backup copies only files whose archive markers are set, but it doesn't clear the archive markers. After the backup, the archive marker for every selected file that changed since the last normal backup is still set, and the backup disk or tape contains only the files that changed since the last normal backup. You might do a normal backup every Friday night and a differential backup every other night of the week. Monday night's backup





would contain all of the files that changed on Monday, Tuesday night's backup would contain all of the files that changed on Monday and Tuesday, and so on. If the file SAME.DAT changed only on Monday, there would still be a separate copy of it in each differential backup.

Using these backup tactics, let's again assume that disaster strikes on Friday afternoon. To restore your week's work, you restore last Friday's backup, and then this Thursday's backup. You don't have to worry about the backups in between those days. You can still get Wednesday's version of CHANGE.DAT from Wednesday's backup if you need it.

The advantage of differential backups is that they are secure and easy to restore. However, they do take longer than incremental backups and consume extra storage space with duplicate versions of files.

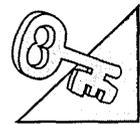
Copy Backups

A copy backup simply copies all of the selected files and ignores their archive markers. The archive markers of the backed up files are the same as the unchanged archive markers of the files on the source disk. You can use the copy method to move files to another disk or to do occasional backups of program files. You can also use this method to do a special back-up of certain files without disturbing your normal backup routine. It's exactly the same as copying files with the Copy command.

Dated Backups

A dated backup ignores archive markers and instead checks for files created or changed on or after a given date. A daily backup is a form of dated backup that simply copies any files with the current date and ignores all others. An update backup compares dates on the source and the destination version of each file and only copies if the source file is newer than the destination file. You can use a dated backup to copy all files that were changed today or this week on your business machine to a disk and take them to your home machine.

Windows NT Backup supports daily backups. The MS-DOS Backup and XCopy commands support dated backups based on any date. The XCopy command also supports update backups.



Security Considerations

If you are backing up your own disk, you need sufficient privileges to copy all of the files. You might need a different set of privileges to restore your disk, because this involves writing and potentially changing files. Furthermore, you might need different privileges to back up or restore an NTFS drive, because its file permissions can be more flexible and varied. Generally, you need to log on as a member of either the Administrators or Backup Operators group. Better yet, you can log on as an administrator and set up an At command that does your backups automatically at a scheduled time. For more information about the At command, see “The At Command,” page 612. For information about how to create accounts that are members of the Administrators and the Backup Operators groups, see “Creating a User Account,” page 323.

If someone else (usually a network administrator) backs up all or part of your system, you might need to give that person the appropriate privileges on your machine. In most cases, the administrator will take care of this directly or will give you instructions for setting up the proper accounts.

Using Windows NT Backup

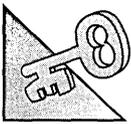
Windows NT Backup is a program designed to make backing up to a tape drive quick and painless. You simply select what you want to back up, and then click a Backup button that brings up a dialog box where you select the kind of backup you want. Restoring files is just as easy. Backup can also be used from the command line or in a batch file if you want to automate the whole process.

Starting Backup

To start Backup, double-click the Backup icon or type the following in a command prompt window:

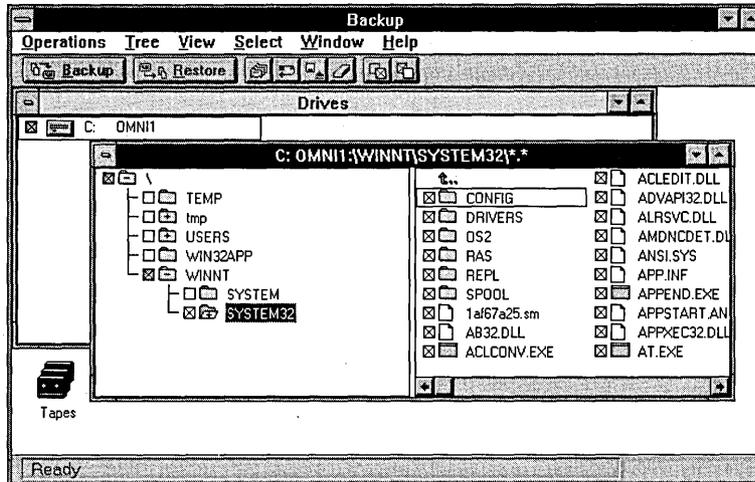
```
C:\>start ntbackup
```

When you start Backup, one of two things happens. If you don't have a tape drive installed or if it is turned off or otherwise unavailable, you get a message saying that no tape drive is detected. This might surprise you if you expected Backup to work with floppy disks or network drives. It



doesn't. For information about backing up to media other than tape, see "Using the Backup and Restore Commands," page 391, and "Backing Up with XCopy," page 394.

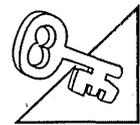
If your tape drive is ready for action, you see a Backup window similar to this:



You can do most common backup tasks from Backup's main window without using menus. Backup has menus, but most of them duplicate operations that are easier to select from the toolbar or from the Drives and Tapes windows. Table 13-1 on the next page describes some of the elements in Backup's main window.

Although you can do most backup tasks from the toolbar, you'll find a few less common operations on menus.

- ❑ To format a tape, choose Format Tape from the Operations menu. If your tape drive uses preformatted tapes, this command is inactive.
- ❑ If you have multiple tape drives, choose Hardware Setup from the Operations menu to select the tape drive you want.
- ❑ If the drive window does not show all existing drives, choose Refresh from the Window menu. For example, if you connect to a



network drive in File Manager or from a command prompt window while Backup is running, you need to use the Refresh command to make Backup recognize the new drive.

Backup Element	Description
Backup button	Used to back up files and directories to a tape. It brings up a dialog box where you can set backup options and perform a backup. The button is closely linked to the Drives window, where you specify the files and directories to be backed up.
Drives window	Used to select the drive or drives to be backed up. You can expand any drive to display and select specific files and directories. If this window is inactive, the Backup button is also inactive.
File selection window	Used to select files and directories on a drive. (When expanded, the Tapes window also has a file selection window.)
Restore button	Used to restore files and directories from a tape. It is closely linked to the Tapes window. It brings up a dialog box where you can set options and perform a restore.
Tapes window	Used to select the tape be restored. You can expand any tape to display and select specific files and directories. If this window is inactive, the Restore button is also inactive.
Catalog button Retension Tape button	Loads the catalog of backup sets from a tape. Eliminates loose spots on the tape by fast forwarding to the end of the tape and then rewinding. On tape drives that do not require this command, the button is inactive. If the button is active on your machine, check the manufacturer's instructions on how often to use this command.

TABLE 13-1.

Backup window elements.

(continued)

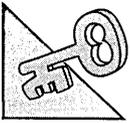


TABLE 13-1. *continued*

Backup Element	Description
Eject Tape button	Rewinds the tape. Some tape drives automatically eject the tape; others require manual ejection.
Erase Tape button	Erases the tape. A warning and confirmation box comes up before the deed is done. Be sure you want to erase the tape before clicking OK.
Check button	Marks all selected items in the current window (Tape, file selection, or Drives) as checked. Because each file and directory in the window has a check box, you'll probably find it more convenient to check items directly in the window. However, this button might be convenient if you want to select multiple items in the window and then check them all at once.
Uncheck button	Marks all selected items in the current window (Tape, file selection, or Drives) as unchecked.

Backing Up to Tape

Backing up is a simple process with a few complications. Follow these steps:

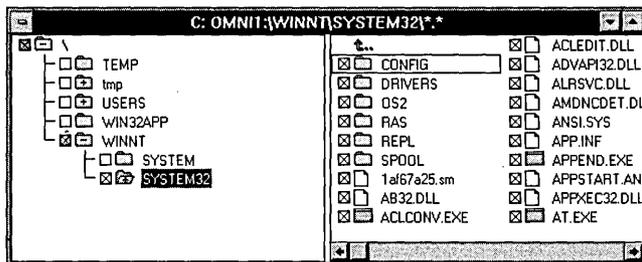
1. If the Drives window is closed, double-click the Drives icon to open the window.
2. Select the drives you want in the Drives window by clicking the check box to the left of each drive. If you want to back up specific files or directories on a drive, double-click the drive's icon to open a file selection window, where you can select individual files and directories. Selecting files and directories is explained in the next section.
3. When you have selected the files you want backed up, click the Backup button. A Backup Information dialog box appears. Fill in the fields in this dialog box as explained in the section titled "The Backup Information Dialog Box," page 378. Click OK.



4. Watch the Backup Status dialog box to follow the progress of the backup. You can click Abort at any time to terminate the backup. More likely, you'll want to go to another window and work on something else while Backup slaves away in the background.
5. When the backup finishes, eject the tape if appropriate and label it. Store the tape in a safe place (preferably in another building).

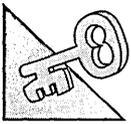
Selecting Files and Directories

If you've used File Manager, you'll soon feel right at home using the Drives window and the file selection window to select the files and directories you want to back up. There are a few differences, however, as you can see in the following figure.



The key feature to notice is that every drive, directory, and file has a check box you can click to indicate that you want the item backed up. Fortunately, you don't have to click every file to back up the entire drive. Selection works at several levels for maximum efficiency and convenience.

1. To select all of the files on the drive, click the check box next to the drive's icon in the Drives window. If you don't want to back up the entire drive, double-click the drive's icon to open a file selection window that displays the files and directories on the drive.
2. To select all of the files in a directory, click the check box next to the directory's folder icon. If you don't want to back up all of the files in the directory, double-click the directory's icon to expand the directory. Expanding works the same here as in File Manager. The left side of the file selection window shows the directory icons in a tree format. The right side of the file selection window shows all of



the files and directories at the current level. You can use the View menu to change the appearance of the file selection window—you can display full file details, change the relative size of left and right panes, even eliminate the Tree or Directory view.

3. To select a file, click the check box next to the file's icon. You can also select groups of files, and then click the Check button on the toolbar to check them. The easiest way to select a group of contiguous files is to click the first one and then drag down to the last one. (You can't use this handy technique in File Manager because File Manager reserves dragging for moving and copying.) You can also select contiguous files by clicking the first file and then holding down the Shift key while selecting the last file, or you can select non-contiguous files by holding down the Control key while clicking.

Usually, it is easier to display the appropriate directory, and then check the items you want to back up, but you can also do it the other way around. You can check everything at a high level (maybe even the whole disk), and then display individual directories and uncheck the items you want to exclude from the backup. When some items in a disk or directory are checked but others are not, the check box for the disk or directory is checked but is gray to indicate partial selection.

Checking a file or directory does not in itself ensure that the file will be backed up. Everything is subject to security limitations. Regardless of your selections, you can back up a file only if you have permission to read the file.

The Backup Information Dialog Box

After you've selected the files you want to back up, click the Backup button on the toolbar. (You can also choose Backup from the Operations menu.) The following dialog box appears.



Backup Information

Current Tape: Tape created on 7/22/93
 Creation Date: 7/22/93 3:26:26 PM
 Owner: OMNI1\Administrator
 Tape Name:

Verify After Backup Backup Registry

Restrict Access to Owner or Administrator

Operation
 Append
 Replace

Backup Set Information (1 of 1 sets)
 Drive Name: C: OMNI1
 Description:
 Backup Type: Normal

Log Information
 Log File:
 Full Detail Summary Only Don't Log

Table 13-2 describes each field in the dialog box.

Field Name	Description
Current Tape	Shows the name of the tape (if any).
Creation Date	Shows the time and date that the tape was created (not the time of the current backup).
Owner	Displays the account name of the person who created the first backup set on the tape.
Tape Name	If the operation is Replace, you can type in a new name of up to 50 characters for the tape. If the operation is Append, this field is disabled, and the name created by the last Replace operation is displayed in the Current Tape field.
Operation	The Replace operation creates a new backup set, overwriting any existing backup on the tape. The Append operation adds the current backup set at the end of the last backup set on the tape. Append is disabled on blank tapes.

TABLE 13-2.

Backup Information dialog box fields.

(continued)

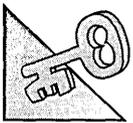
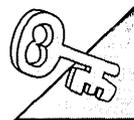


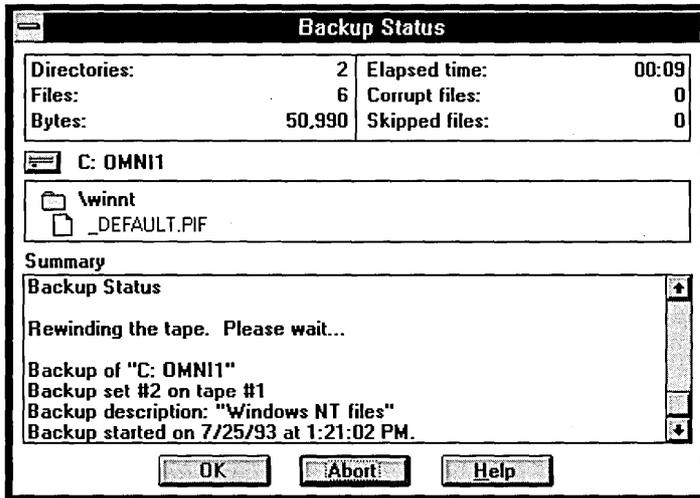
TABLE 13-2. *continued*

Field Name	Description
Verify After Backup	Confirms a backup by comparing the files on the drive and the files on the tape after the backup is completed.
Backup Registry	Backs up the Windows NT registry (configuration) files.
Restrict Access to Owner or Administrator	Restricts access to the person who created (and therefore owns) the tape. You can't restore to a computer other than the one you backed up from. Members of the Administrators and Backup Operators groups can override these restrictions. You can use this field only with the Replace operation.
Backup Set Information	This group of controls has a scroll bar if the data to be backed up is from more than one drive. The Drive Name changes for each drive and you can set the Description and Backup Type differently for each drive.
Drive Name	Displays the letter and the label or network name of the selected drive.
Description	You can fill in a description of up to 50 characters for the backup set on each drive.
Backup Type	Determines which files will be backed up and how their archive bits will be set. For information about archive bits and different types of backup, see "Backup Methods," page 367.
Log Information	This group of controls determines what data, if any, will be written to the backup log file. Summary Only logs only major events such as starting the backup and failing to open a file. Full Detail logs everything, including each file and directory name.
Log File	Determines the name of the file to which the log is written. You can type in a name or click the button to select a file.



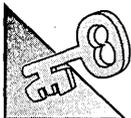
The Backup Status Dialog Box

When you've filled out the Backup Information dialog box, click OK. If the operation is Replace on a nonblank tape, you'll see a message box asking if you really want to wipe out existing data. If you confirm that you do, the disk light flickers, the tape whirs, and the backup starts. The following Backup Status dialog box appears as the work continues.



Events, directories, files, and bytes fly by along with seconds, minutes, and hours. During the backup, the OK button is inactive but the Abort button is active in case you want to quit. If you click Abort, the current file will be completed if less than one megabyte remains to be backed up. Otherwise, a message box lets you choose whether to continue or to stop and record the file as corrupted. If you reach the end of the tape before finishing, an Insert New Tape dialog box appears, prompting you to insert a new tape.

When the backup finishes, the OK button in the Backup Status dialog box becomes active (and the Abort button becomes inactive). The final line in the Summary box tells whether the backup was completed. You can scroll through the Summary box to inspect the events of the backup. The Summary box contains the same information that is written to the log file.



Backing Up from the Command Line

The Windows NT interface makes the Backup program easy to learn and fun to use. However, after you've backed up the same drive with the same commands 30 times in 30 days, you might be ready for a shortcut. Fortunately, the Backup program also works as a command-line utility. You can automate your backups with a batch file or the At command, as described at the end of this section.

When you run Backup from the command line, it runs in a window; but instead of waiting for mouse and keyboard input, it performs the actions you specified on the command line. You'll see buttons pushed and status displayed as if a ghost has taken over your machine. When it's all over, Backup terminates.

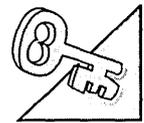
Backup's program name is NTBACKUP.EXE. To use it from the command line, use the following syntax:

```
NTBackup Backup [pathnames [options]]
```

"Backup" is required as the first argument. *Pathnames* takes the place of information entered in the Drives and file selection windows. You can include entire drives or directories, or individual files. Of course, it's not as convenient or flexible as checking the items you want in a dialog box, but you generally don't need complex backup selections. If you run out of space for pathnames on the command line, you can use multiple Backup commands.



WINDOWS TIP: You might think you can use NTBackup to restore by specifying Restore instead of Backup as the first argument on the command line. You can't. But, as a practical matter, restoring from the command line doesn't make much sense. You shouldn't have to restore very often; and when you do, the operation will be different each time.



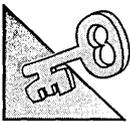
Options takes the place of entries in the Backup Information dialog box. Most check boxes in the dialog box have a corresponding command-line option. Usually, absence of the option is equivalent to leaving the check box unchecked. Although some options indicate that you need to use quotation marks around text or question marks, the quotation marks are actually optional. You can choose any option by spelling out its full name or by typing the first letter of the option. Table 13-3 on the next page shows command-line options and the corresponding dialog-box fields.



WINDOWS TIP: You might think that because Windows NT is a multitasking operating system, you can do a backup in the background while you do other tasks. It's true that your computer and operating system do a fine job of multitasking, but your hard disk doesn't. If you try to run another application that requires a lot of disk access during a backup, you'll see performance grind to a halt. You'll be more satisfied if you use the *At* command to launch your disk backups at midnight while you're out of the office. However, if you really need to work during a backup, you can minimize the visual and disk interference using the *Start* command's */MIN* and */LOW* options command, as in this example:

```
C:\>start /min /low ntbackup backup c:\
```

The *Start* command runs the program in a separate window so that you can continue working at the command prompt while Backup works. The */MIN* option runs the program minimized (as an icon). If you can't control the output, you don't need the distraction of seeing it. The */LOW* option runs the program at the lowest priority. Whatever you choose to do, the foreground task gets first crack at machine resources; Backup runs only when you're not doing anything else. For more information about the *Start* command, see "Launching Programs," page 595.

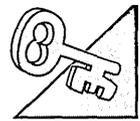


Option	Dialog Box Field	Action
/A[ppend]	Operation	If you use this option, the backup set is appended to the current tape. Otherwise the backup set replaces all previous contents of the tape.
/D[escription] "text"	Description	If you use this option, Backup stores <i>text</i> as the description of the backup set.
/E[xceptions]	Log Information	If you use this option in combination with the /L option, a simple log file with events only is created. If you do not use the /E option, the log file shows the name of each file and directory. The /E option is ignored if you do not use the /L option.
/L[ogfile] "filename"	Log File	If you use this option, a log file named <i>filename</i> is created. Otherwise no log file is created.
/R[estrict]	Restrict Access to Owner or Administrator	If you use this option, Backup restricts access to the person who created the tape or members of the Administrators or Backup Operators groups. The option is ignored if you do not use the /A option.
/T[ype] <i>type</i>	Backup Type	The <i>type</i> can be Normal, Copy, Incremental, Differential, or Daily. If you do not use the /T option, Normal is assumed.
/V[erify]	Verify After Backup	If you use this option, all items are verified by comparing the disk version with the tape version.

TABLE 13-3.

Command-line equivalents for Backup Information dialog box fields.

You might want to experiment with the command-line syntax before putting commands into batch files that are run automatically. When you run Backup interactively, it displays warnings and gives you a chance to change.



your mind if you do something dangerous. When you run it from the command line, Backup assumes that you know what you're doing. Be sure that you do.

Here are some batch-file examples of Backup commands. We'll call the first example NORMALC.BAT:

```
@echo off
cd %temp%
ntbackup backup C: /d Normal /l N.LOG
```

This batch file creates a new backup set (overwriting any existing backup set) and does a normal backup of the C drive.

We'll call this example INCRMNTC.BAT:

```
@echo off
cd %temp%
ntbackup backup C: /a /t incremental /d Incremental /l I.LOG
```

This batch file does an incremental backup of the C drive, appending the backup set to any existing backup sets.

Now let's assume that you want to do a normal backup every Friday night at 11:30 P.M. after everyone has gone home, and incremental backups Monday through Thursday at 11:30 P.M. Use the At command to call the appropriate batch file.

```
C:\>at 23:30 /every:F "normalc"
C:\>at 23:30 /every:M,T,W,Th "incrmntc"
```

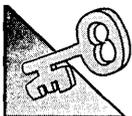
You must have appropriate security privileges to run the At command. After you set everything up, you can forget it—except you must be sure that the tape drive has a tape with enough space for the backup every weeknight.

For information about batch files, see “Using Batch Files,” page 644.

For more information about the At command, see “The At Command,” page 612.

Restoring from Tape

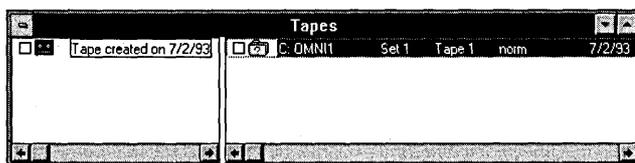
Restoring with Backup works the opposite of backing up. When you make backups, Backup automatically maintains catalogs of all the backup sets and the files in each set. When you restore, it's not quite so automatic. You need



to understand a little about how cataloging works. Each tape has a catalog of backup sets. Each backup set also has its own catalog of files. If a backup set spans more than one tape, the set catalog is on the last tape.

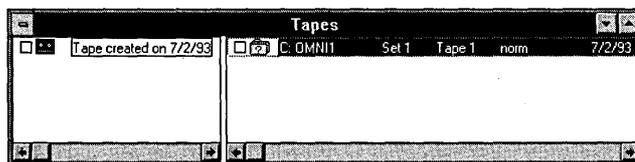
With that in mind, let's look at the steps for restoring data:

1. Select the tape you want to restore from and insert it in the tape drive.
2. If the Tapes window is closed, double-click the Tapes icon to open the window. Backup displays the first backup set on the tape in the Tapes window.



Notice the question mark on the folder icon for the backup set. This indicates that the catalog of files in the set has not yet been loaded. At this point you can't tell from the display whether there is only one backup set on the tape or whether the catalog of backup sets has not been loaded.

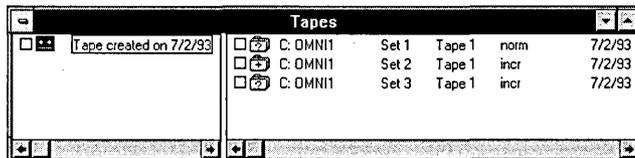
3. Load the catalog of backup sets by clicking the Catalog button on the toolbar or by double-clicking the Tape icon on the left side of the Tapes window. The Catalog Status dialog box appears while the drive loads the catalog of backup sets. When finished, all of the backup sets are displayed, each with a question mark in its folder icon because no file catalogs have been loaded.



4. In the Tapes window, select the backup set you want by clicking the check box to the left of the folder icon. If you want to back up



only certain files or directories, double-click the desired folder icon. In order to display the file selection window, Backup must first load the file catalog. A status dialog box with an Abort button appears while the file catalog is read. When finished, the question mark in the folder icon changes to a plus sign and the file selection window for the backup set appears.

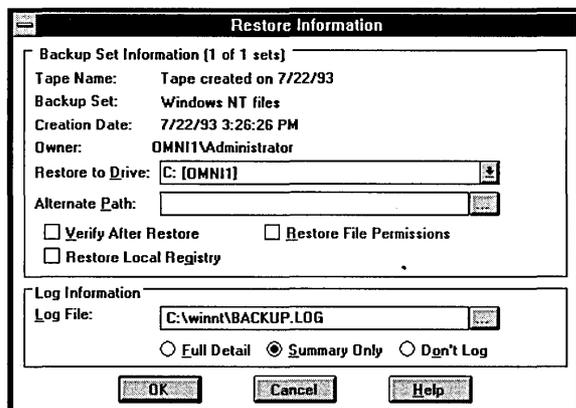


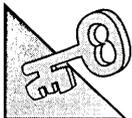
File selection works the same for restoring as for backing up.

- When you have selected the files you want, click the Restore button. A Restore Information dialog box appears. Enter the appropriate options, as explained in the next section. Click OK.
- Watch the Restore Status dialog box to see the restore operation's progress. You can click Abort if you made a mistake.

The Restore Information Dialog Box

The Restore Information dialog box looks like this:



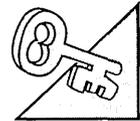


Looks a lot like the Backup Information dialog box, doesn't it? We'll look at the fields more briefly this time because you're already familiar with most of them from the Backup Information dialog box. See Table 13-4.

Field Name	Description
Backup Set Information	This group of options has a scroll bar if you selected files from more than one backup set. The fields in the Backup Set Information group can have different entries for each backup set. Fill in all of the fields for the first backup set, then scroll to the next and fill in the fields, and so on.
Tape Name	Displays the name given to the tape when it was created.
Backup Set	Displays the name (if any) given to the current backup set when it was created.
Creation Date	Shows the time and date that the backup set was created.
Owner	Displays the account name of the person who created the backup set.
Restore to Drive	Provides a drop-down list with all available drives. Select the one to be restored to. The default is to restore to the drive from which the backup set was created. You can set this field separately for each backup set.
Alternate Path	If you want to restore to a different path than you backed up to, type the path here or use the Browse button to select a path. Normally you should leave this field blank to restore the original path. You can set this field separately for each backup set.
Verify After Restore	Confirms the restore by comparing the files on the tape and on the drive.

TABLE 13-4.
Restore Information dialog box fields.

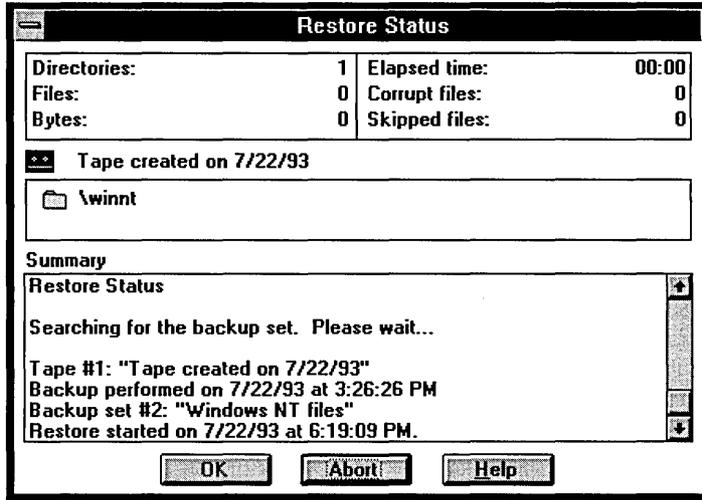
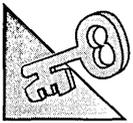
(continued)

TABLE 13-4. *continued*

Field Name	Description
Restore Local Registry	Restores the Windows NT registry (configuration) files. This field is inactive if the registry wasn't backed up in the selected backup set, or if the target drive isn't an NTFS drive.
Restore File Permissions	Restores the file permissions of each file. If this check box is not selected, the restored files inherit the permissions of the directory they are restored to. If you are restoring the files to the directory they were backed up from, this is no problem, but it can be significant if you are restoring to a different drive or if you have changed permissions since the backup was done. This field is inactive if the drive being restored to is a FAT or HPFS drive, because file permissions do not exist with these file systems.
Log Information	This group of controls determines what data (if any) will be written to the backup log file. Summary Only logs major events such as starting the restore operation and failing to open a file. Full Detail logs everything, including each file and directory name.
Log File	Determines the name of the file to which the log is written. You can type in a name or use the Browse button.

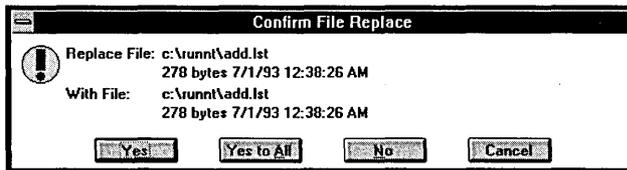
The Restore Status Dialog Box

When you've filled out all of the appropriate fields in the Restore Information dialog box, click OK. The Restore Status dialog box, shown on the next page, appears during the restore operation.

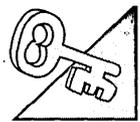


During the restore operation, the OK button is inactive and the Abort button is active in case you want to quit. If you abort, the current file will be completed if less than one megabyte remains to be restored. Otherwise, a message box lets you choose whether to continue or stop.

If a file to be restored already exists on the drive, this dialog box appears to allow you to confirm the replacement:



When the restore operation finishes, the OK button becomes active and the Abort button becomes inactive. You can scroll through the Summary box to inspect the events of the restore operation. The Summary box contains the same information that is written to the log file.



Partial and Incomplete Catalogs

If a backup operation spans several tapes, you must insert the last tape to load the catalog. But what if the last tape is missing? You can still build a partial catalog. You might also need to build a partial catalog if you want to restore from a tape that was not created by Windows NT Backup. If the tape has the Microsoft/Maynard Tape Format (MTF), you can still read it, although you might have to build a catalog.

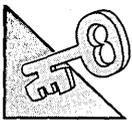
To build a catalog, follow these steps:

1. Insert the tape into the tape drive.
2. Double-click the Tapes icon to open the Tapes window if necessary.
3. Click the Catalog button on the toolbar, or double-click the Tape icon. The Catalog Status dialog box appears. Backup scans the entire tape to identify all of the backup sets, and then scans the tape again to identify the contents of each backup set. It might take a while to get all of the information and build the necessary catalogs.

Using the Backup and Restore Commands

The MS-DOS operating system provides backup and restore utilities for doing backups to floppy disks. For compatibility, Windows NT provides the same tools, although they are not a crucial part of the Windows NT backup philosophy. Backing up to floppy disks is not a practical option for most people running Windows NT.

Floppy disk backup made sense when hard disks were typically smaller than about 60 MB. You wouldn't look forward to backing up your system onto 40 floppy disks, but it wasn't unthinkable. These days, the Windows NT system files alone wouldn't fit on those 40 disks. Imagine backing up a 200-MB hard disk onto 140 floppy disks. True, you don't normally back up the whole disk—only the crucial data files. That's the context in which the Backup and Restore commands can still be useful.



Let's say you don't have a tape drive and you have a directory of personal files that you don't want anyone, not even the system administrator, to see. Assume that these files will fit on two or three floppy disks. It's not unreasonable to use the Backup command in this situation, but only if the files are on a FAT (MS-DOS file system) disk or follow the MS-DOS filename conventions. If you try to use the Backup command on files that have long filenames, the files are saved on disk with the short MS-DOS versions of the names. (For information about long and short filenames, see "Understanding File Systems and Filenames," page 597.) When you use the Restore command, you restore the files, but they have different filenames than they started out with. For instance, if you back up the file `VerySecretStuff.Dat`, you restore a file with a name something like `VERYSE~1.DAT`. You can get around the problem by saving a list of long filenames in the directory you are backing up. If you are backing up the `PERSONAL` directory for example, use this command to create the list of long filenames:

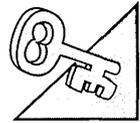
```
C:\>dir /s /x personal > personal\file.lst
```

After you restore, use this list to rename the files to their original long filenames. This can be very tedious, but if avoiding tedium were your only goal, you wouldn't be backing up to floppy disks in the first place.

The Backup command works by compressing all of the data in the source files and writing it into two files—`BACKUP.00x` and `CONTROL.00x`—on each floppy disk. The *x* represents the number of the floppy disk. Restore works by decompressing the data on the floppy disks and copying it back to the source disk. You must feed the disks back to Restore in the same order that you created them with the Backup command. Be sure that you label the disks carefully so you know the order in which to insert them when restoring. Backup and Restore both prompt you when you need to insert a new floppy disk.

Using the Backup Command

By default, the Backup command does a normal backup. (For more information about the different types of backups, see "Backup Methods," page 367.) Use the `/S` option to back up the directory tree, including any subdirectories. For example, use the following command to do a normal backup of the `PERSONAL` directory and all of its subdirectories to drive A and create a log file showing the actions.



```
C:\>backup personal a: /s /l:friday.log
```

You can do an incremental backup using the /M option. For example, you can use the previous command to do a normal backup on Friday night, and a command like the following to do an incremental backup on other weeknights:

```
C:\>backup personal a: /s /m /a /l:monday.log
```

This command backs up only files that have changed since the last normal backup. The /A option appends the differential backup to the last disk of the current backup instead of overwriting all previous files to create a new backup. If you want to keep each differential backup on separate disks, don't use the /A option.

The Backup command does not support differential backups, but you can do dated backups. The following command backs up every file that has changed since Christmas Day, 1993:

```
C:\>backup personal a: /s /d:12/25/93 /l:backup.log
```

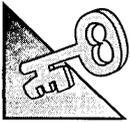
Use the /? option for details about the more obscure options for the Backup command.

Using the Restore Command

The Restore command works about the same as the Backup command, except backwards. You can restore an entire directory or a single file. Here's the command to restore the PERSONAL directory shown in earlier examples:

```
C:\>restore a: personal\ /s
```

Assume that you created a normal backup on Friday night and an incremental backup on other weeknights. You used the /A option to append each incremental backup to the same set of disks. Then disaster strikes on Friday afternoon. The command above first restores the files from the normal backup, and then overwrites each file that changed throughout the week with a new copy. If a file changed every day, five copies are overwritten. If you kept each incremental backup on separate backup disks, you need to first restore from the normal backup disks, and then restore from each day's incremental backup disks in order.



You can restore the incremental files for a particular day using the /B and the /A options. For example, to restore the files backed up on July 27, 1994, use the following command:

```
C:\>restore a: personal\ /s /a:7-27-94 /b:7-27-94
```

Notice that you must use both the /A and the /B options to limit the restore operation to files from a particular day. Use the /M option to restore only the files that changed since the last normal backup. For example:

```
C:\>restore a: personal\ /s /m
```

You can also restore a single file:

```
C:\>restore a: personal\jones.dat /s
```

Use the /? option to get details about other Restore options.

Backing Up with XCopy

Among its many and varied uses, the XCopy command can be used to back up files to disk. Whether you really want to do this is another question. If you have two hard disks, you can back up from one to another, but is that really how you want to use your precious disk space? And is your data really safe? You might want to back up to a network server, but chances are the network administrator won't consider that a very good use of resources. If you have lots of spare time, you can back up to floppy disks, but in that case the Backup command is probably a better option because it compresses files. Nevertheless, the day might come when, for reasons of your own, you want to back up some data (probably not very much) to another disk. When that day comes, XCopy will be ready.

Perhaps the most common backup with XCopy is the copy backup. You overwrite the old files every time you back up without worrying about keeping multiple versions. However, you can also do normal, incremental, differential, and dated backups. For more information about different kinds of backups, see "Backup Methods," page 367.



To do a copy backup with XCopy, use a command line similar to this:

```
C:\>xcopy mail m:\mail /e /i /h
```

Everything gets copied regardless of its date or archive status. The /E option in the example creates a duplicate tree on the destination drive with all subdirectories, including empty ones. The /I option prevents unnecessary prompts that ask if the destination is a file or directory. In the backup context, you always want a directory. The /H option copies hidden and system files. Of course, you must have appropriate privileges to copy anything, hidden or not.

A normal backup is a little harder to do. The XCopy command doesn't have a way to copy a group of files and clear their archive markers. However, you can use XCopy to copy them, and then use the Attrib command to clear their archive markers:

```
C:\>xcopy mail m:\mail /e /i /h
C:\>attrib -a mail\*. * /s
```

The -A argument of the Attrib command removes the archive attribute from all files in the MAIL directory. The /S option says to do this throughout the whole directory tree. Alternatively, you can set all of the archive markers, and then use XCopy with the /M option to copy all archived files and clear their archive markers.

```
C:\>attrib +a mail\*. * /s
C:\>xcopy mail m:\mail /e /i /h /m
```

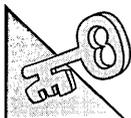
In this case the +A argument adds the archive attribute.

To do an incremental backup, use the /M option:

```
C:\>xcopy mail m:\mail /e /i /h /m
```

Only the files that changed since the last normal backup are copied. They are marked as archived so that they won't be backed up again until they change or until the next normal backup.

To do a differential backup, use the /A option instead of /M. Only the files that changed since the last normal backup are copied, but they are not marked as archived. Thus they will be backed up again at each differential



backup until the next normal backup. This doesn't make any sense if you are overwriting each backup with the next. The option is available in case you want to use XCopy to make differential backups to floppy disks or to separate directories on a hard disk. The Backup command doesn't support differential backups, so you can use XCopy if you really want this method. Here is a command to do a differential backup to floppy disks:

```
C:\>xcopy mail a: /e /i /h /a /n
```

The /N option copies long filenames on the source disk to shortened filenames on the destination disk. You need this if you want to back up an NTFS disk to floppy disks, and it doesn't do any harm if the source disk doesn't have long filenames. XCopy prompts you to insert a new disk whenever you run out of space on the current floppy disk.

To do a dated backup, use the /D option:

```
C:\>xcopy mail m:\mail /e /i /h /d:7/1/93
```

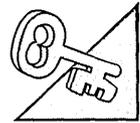
This copies all of the files with dates on or before July 1, 1993. If you use the /D option without a date, the source and the destination date of each file are compared. If the destination version is older or doesn't exist, the file is copied.



WINDOWS TIP: You can use Doskey macros to create XCopy commands for the different kinds of backup. Use Notepad or another editor to create a file named XBACKUP.MAC that contains the commands shown in the listing on the next page. Then load the macros with the following command:

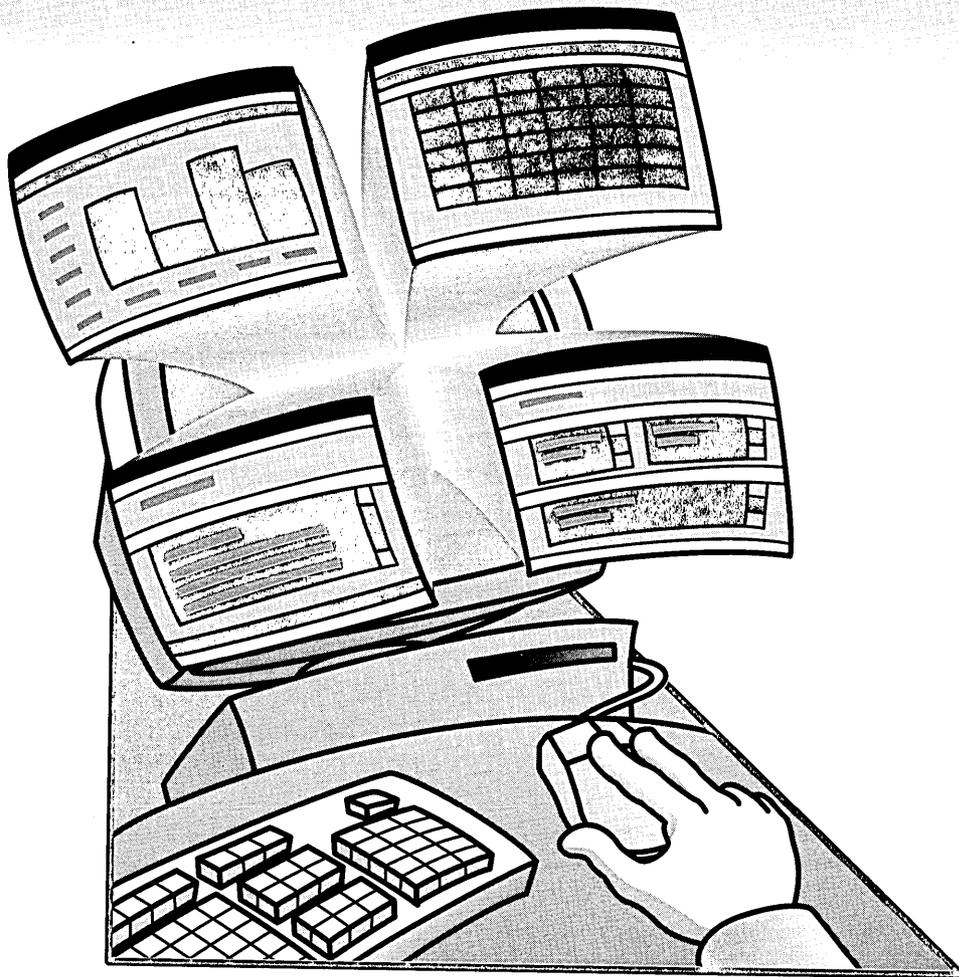
```
C:\>doskey /macrofile=xbackup.mac
```

You don't need to know how the macros work to start using them. For more information about Doskey, see "Using Doskey Macros," page 637.



```
:= Copy backup; syntax: BackCopy src dst
BackCopy=xcopy /e /i /h $1 $2
:= Normal backup; syntax: BackNorm src dst
BackNorm=xcopy /e /i /h $1 $2 & attrib -a $1\*. * /s
:= Incremental backup; syntax: BackIncr src dst
BackIncr=xcopy /e /i /h /m $1 $2
:= Differential backup; syntax: BackDiff src dst
BackDiff=xcopy /e /i /h /a $1 $2
:= Dated backup; syntax: BackDate src dst date
BackDate=xcopy /e /i /h $1 $2 /d:$3
:= Update backup; syntax: BackUpdate src dst
BackUpdate=xcopy /e /i /h /d $1 $2
:=
```

PART
4



Running Applications

Chapter 14	Using Write	401
Chapter 15	Using Terminal	441
Chapter 16	Using Paintbrush	473
Chapter 17	Using the Desktop Accessories	525
Chapter 18	Working from the Command Prompt	573
Chapter 19	Customizing Command Prompt Sessions and Character-Based Programs	627

Using Write

Starting Write	403
Double-click the pen to get a blank sheet of paper.	
Selecting a Printer	404
Be sure of your printer selection before you begin creating a document.	
Entering Text	405
Simply type, and let Write worry about the line endings. Enter soft hyphens if you want words to break at the right margin.	
Editing Text	406
It's easy to insert, replace, and delete text.	
Using the Undo Command	407
Undo can erase many kinds of mistakes, from inadvertant deletions to formatting changes that you don't like.	
Using the Keyboard to Move the Insertion Point	407
Write includes a large set of keyboard shortcuts to simplify navigation.	
Selecting Text in a Write Document	409
There are also mouse shortcuts for selecting the current word, line, or paragraph.	

Copying and Moving Text with the Clipboard	410
Use Copy, Cut, and Paste to rearrange your document.	
Using the Find Command	410
In addition to searching for text, you can look for white space, tab characters, paragraph endings, or page breaks.	
Using the Replace Command	413
You can apply the Replace command to an entire document or to the current selection.	
Applying Document Formatting	415
The Document menu lets you specify or change headers, footers, tab settings, page numbering, and other details.	
Applying Paragraph Formatting	420
Use the Paragraph menu to specify alignment, indentation, and line spacing. Apply your preferences to one paragraph or to consecutive paragraphs.	
Applying Character Formatting	423
Fonts are the province of the Character menu. You can change the size or style of type.	
Including Pictures in Write Documents	425
Make your point graphically by adding pictures to your Write documents. After you paste a picture, you can reposition or resize it.	
Controlling a Pasted Object's Format	428
The Paste Special command lets you choose between available formats.	
Linking and Embedding in Write	430
You can embed objects from other programs in Write documents, or embed Write documents in other programs.	
Saving and Retrieving Files	434
You can ask Write to back up your document every time you save. You can also save your file as plain text or as a Microsoft Word file.	
Paginating and Printing a Write Document	438
To control where page breaks occur, use the File Repaginate command.	
If You Change Printers	439
Line breaks and fonts might change if you switch to a different printer.	



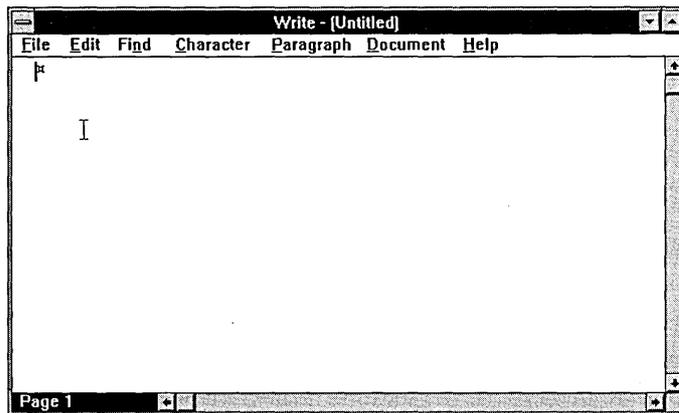
This chapter introduces Write, the word processor that comes with Windows NT. Write lets you create highly formatted documents that can include pictures as well as text. You can format individual paragraphs to be flush left, flush right, centered, or justified, and you can choose from three line-spacing options. Documents can be printed with multiline headers or footers that can include automatic page numbering. Write also supports object linking and embedding as a client application.

Even if you eventually move to a more powerful word processor, such as Microsoft Word for Windows, Ami Pro, or WordPerfect for Windows, you will find working in Write a valuable introduction to word processing in a graphical environment. And, of course, the documents you create in Write can be transferred by way of the Clipboard to many other Windows-based applications.

Starting Write

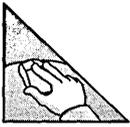
To start Write, double-click its program-item icon. You'll find it in the Accessories program group (unless you have moved it to another group).

Write's opening display looks like this:



You'll see the following symbols as you work in Write:

Insertion point. The flashing vertical line is the *insertion point*. It indicates the place where your next character will appear.



End mark. The small object to the right of the insertion point in the preceding illustration is the *end mark*. As its name suggests, the end mark appears beside the last character in your document; when you create a new Write document, the end mark appears right next to the insertion point.

I-beam. The I-shaped pointer below and to the right of the end mark in the illustration is the *I-beam*. Your mouse pointer becomes an I-beam when you work in a Write document. The I-beam allows you to relocate the insertion point. If you don't have a mouse, you won't see an I-beam, but you'll be able to move the insertion point with the keyboard.

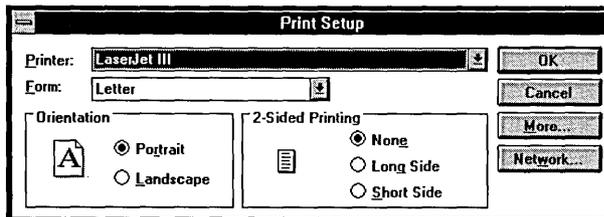
On the right and bottom edges of your Write window, you'll find scroll bars. And in the lower left corner, Write displays the current page number. Don't be disconcerted if the page number remains at 1 while you create a lengthy document. As soon as you print or repaginate your document, the page numbers will be reported accurately.

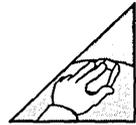
(If you have used Write already, you might see a "ruler" at the top of your window. For information about the ruler, see "Displaying a Ruler," page 417.)

Selecting a Printer

The first Write command you should acquaint yourself with is Print Setup, on the File menu. Write adjusts its screen display and its Fonts dialog box to reflect the currently selected printer, so whenever you start a new document, be sure that Write is set up for the printer you want to use.

The Print Setup command presents the following dialog box.





When you start Write, the program is always set to use the current default printer (as specified in Print Manager). To use a different printer, click the Printer drop-down list box and choose from the list. Write automatically adjusts the dialog box to display the paper size and paper source options available for the printer you select. Be sure those options are set as you want them, click OK, and you're ready to get to work.



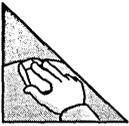
WINDOWS TIP: Be sure that your printer is set for the correct orientation—portrait or landscape. Write adjusts the dimensions of the document you're working on to reflect the printer's orientation setting. In portrait orientation on letter-size paper, the default text area is 6 inches wide; in landscape orientation, it's 8.5 inches wide. (With some printers, your font options also depend on your printer's orientation setting.)

You can change printers after you begin working on a Write document. Later in this chapter, we'll see how such a change affects your document.

Entering Text

To enter text in Write, simply type. As you type, Write adjusts your document's line lengths to match the way they will appear when printed, based on the printed width of each character. When your text reaches the right margin, Write starts a new line for you. You don't have to press the Enter key until you come to the end of a paragraph. If a word is too long to fit entirely on one line, Write moves the entire word to the next line.

If you want a blank line between paragraphs, press Enter twice at the end of each paragraph. If you want each paragraph to start with an indent, you can simply press the Tab key at the beginning of each new paragraph. Or you can use the Indents command, on the Paragraph menu, to automatically indent the first line a specified distance. For more information about the Indents command, see "Setting Indents," page 421.



Using Soft Hyphens

Write does not ordinarily hyphenate words at the right margin. If you want Write to hyphenate, you must insert *soft hyphens* wherever hyphenation is acceptable. To enter a soft hyphen, type Ctrl+Shift+hyphen. Unlike a normal hyphen, a soft hyphen is ignored unless it occurs at the end of a line.

For example, suppose you're nearing the right margin and the next word in your document is *mononucleosis*. When you type that word, Write moves the entire word down to the next line, leaving your document with a very ragged right edge. You might want to go back and insert a soft hyphen after the second *o* (or at some other appropriate hyphenation point). If the portion of your word to the left of the soft hyphen fits on the previous line, Write moves it back.

Soft hyphens remain invisible unless Write actually uses them to divide words.

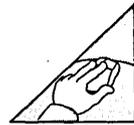
Editing Text

To insert text into existing text, simply position the insertion point where you want the new material to go. You never have to concern yourself with an "insert" or "overstrike" command, as you do in many character-based word processors.

To replace existing text with new text, start by selecting the text you want to replace using either the mouse or the keyboard. (We'll review how to select text in a moment.) Then type; the text you selected disappears, and the new text you type takes its place.

To erase a small amount of text, position the insertion point either before or after the text you want to erase. Then press Backspace to erase text to the left of the insertion point, or Del to erase text to the right of the insertion point.

To erase a large amount of text, start by selecting the text. Then press the Del key. If you want to delete a block of text but preserve it on the Clipboard, select the text and then use the Edit menu's Cut command or press Ctrl+X, which is the keyboard shortcut for the Cut command. Keeping the deleted text on the Clipboard gives you the option of putting it back where it was if you change your mind, or reusing it in another location.



Using the Undo Command

Write's Edit menu includes a versatile and valuable Undo command. Undo enables you to recover from many kind of accidents: inadvertent deletions, overtyping, formatting changes that don't produce the desired effect, and even search-and-replace operations that you immediately regret. The Undo menu item is *dynamic*—that is, it changes to indicate the action it's able to undo at any given moment. For example, after you make a formatting change, the Undo menu item appears as Undo Formatting. After you make an editing change, such as a deletion, it appears as Undo Editing.



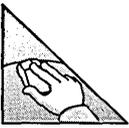
KEYBOARD TIP: The keyboard shortcut for the Undo command is Ctrl+Z.

Using the Keyboard to Move the Insertion Point

For information about moving the insertion point in Write documents, see “Entering and Editing Text in Documents,” page 32. In addition to the techniques described there, Write uses the 5 key on the numeric keypad as a “Go To” key. For example, you can press the 5 key followed by the Down direction key to move to the next paragraph, or you can press 5 followed by the Up direction key to move to the previous paragraph.

NOTE: The Go To key does not work when your keyboard is in its Num Lock state. If pressing Go To puts a 5 in your document, erase the 5, press the Num Lock key, and then try again.

The keystrokes used by Write for moving the insertion point are summarized in Table 14-1 on the next page. Note that the Go To, PgDn and Go To, PgUp keystroke combinations do not function until a document has been printed or paginated. (For information about printing, see “Paginating and Printing a Write Document,” page 438.)



Keystroke(s)	Moves the Insertion Point
Right	To the next character
Left	To the previous character
Down	To the next line
Up	To the previous line
Ctrl+Right	To the next word
Ctrl+Left	To the previous word
Ctrl+Down	To the previous word
Ctrl+Down	To the next line (and scrolls the window)
Ctrl+Up	To the previous line (and scrolls the window)
PgDn	Down one windowful
PgUp	Up one windowful
Ctrl+PgDn	To the last line in the current window
Ctrl+PgUp	To the first line in the current window
Home	To the first character in the current line
End	To the last character in the current line
Ctrl+Home	To the first character in the document
Ctrl+End	To the end mark of the document
Go To, Right	To the beginning of the next sentence
Go To, Left	To the beginning of the previous sentence
Go To, Down	To the beginning of the next paragraph
Go To, Up	To the beginning of the previous paragraph
Go To, PgDn	To the beginning of the next page
Go To, PgUp	To the beginning of the previous page

TABLE 14-1.
Navigation keystrokes in Write.



KEYBOARD TIP: Don't use Tab, Spacebar, or Backspace when all you want to do is move the insertion point. The Tab key and Spacebar add blank space to the content of your document, and the Backspace key erases the character to the left of the insertion point.



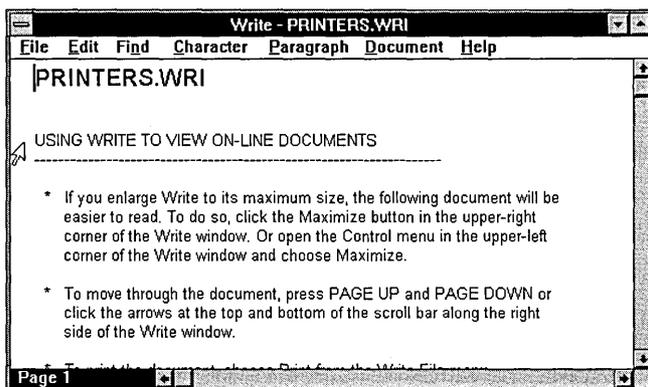
NOTE: Keystrokes that move the insertion point to a previous location, such as Go To, Left (which moves to the beginning of the previous sentence), have a two-step action. The first time you press Go To, Left, the insertion point moves to the beginning of the current sentence. Press the keys again to move the insertion point to the beginning of the previous sentence.

Selecting Text in a Write Document

Write uses the same techniques for selecting text that were described in Chapter 1. (For information about these techniques, see “Entering and Editing Text in Documents,” page 32.) You can do either of the following:

- ▣ Use the mouse to position the I-beam at one end of the area you want to select, press and hold down the primary mouse button, drag the I-beam to the other end of the area to be selected, and then release the mouse button.
- ▣ Put the insertion point at one end of the area you want to select, press and hold down either Shift key, navigate to the other end of the area to be selected, and then release the Shift key.

Write also allows you to use the mouse to quickly select the current line, the current paragraph, or the entire document. To select any of these items, start by positioning the mouse pointer in the area to the left of your text. You'll see the mouse pointer change from an I-beam to an arrow pointing “northeast.”





Now you can do any of the following:

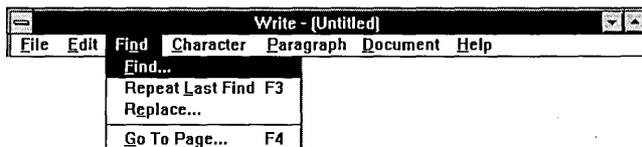
- ▣ Click once to select the current line
- ▣ Double-click to select the current paragraph
- ▣ Hold down the Ctrl key and click once to select the entire document

Copying and Moving Text with the Clipboard

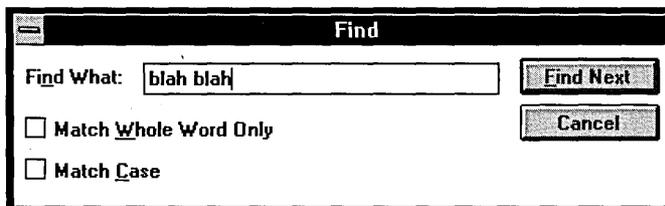
You can use the Clipboard techniques described in Chapter 5 to copy or move text from one place to another within a Write document, from one Write document to another, or from a Write document to a document created in a different application. For more information, see “Using the Clipboard with Applications for Windows,” page 169.

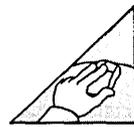
Using the Find Command

Write’s Find menu offers a handy set of commands for finding and changing text. The Find menu looks like this:



The Find command on the Find menu helps you locate a particular combination of letters or words. You type the text you’re looking for in the Find What text box of the dialog box shown below.





You can enter up to 255 characters in the Find What box.

Including Wildcards in the Search Text

If you include a question mark in your search text, Write interprets it as a *wildcard* that can stand for any single character. For example, if your search string looks like this:

?ray

Write will find *bray*, *Cray*, *fray*, *gray*, *pray*, *tray*, and *ray*. (Write finds *ray* because the space before it matches the wildcard.)

To search for an actual question mark in your document, specify the search text like this:

^?

To type the caret character on a keyboard with the standard U.S. layout, press Shift+6.

Including White-Space Characters in the Search Text

Write lets you search for particular kinds of “white space,” such as tab characters or paragraph endings. The following codes are recognized by Write’s Find command:

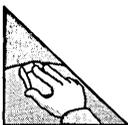
^w	Any kind of space—a space between words, a tab character, a paragraph ending, or a manual page break
^t	A tab character
^p	A paragraph ending
^d	A manual page break (Manual page breaks are discussed later in this chapter.)

So, for example, if you want to find all examples of the word *agenda* (followed by a period) that fall at the end of a paragraph, you can specify the following as your search text:

agenda.^p

To search for a caret character, specify the search text like this:

^^



Specifying Search Options

Before beginning the search, you can select either or both of the check-box options in the Find dialog box.

If you check Match Whole Word Only, Write ignores any instances of your search text that are not complete words. For example, if you search for *graphic* with the Whole Word option selected, Write ignores the words *graphical*, *graphics*, and *typographic*.

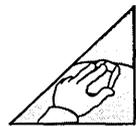
If you check Match Case, Write finds only those examples of your search text that have the same capitalization as the search text in the Find What text box.

Starting the Search

After you fill out the Find What text box and choose your search options, start the search by clicking the Find Next button, by pressing Enter, or by pressing Alt+F. Write searches in the forward direction, starting at the current position of the insertion point. If Write reaches the end of your document without finding the search text, it continues the search starting at the top of the document.

As soon as Write finds the search text, it selects the text and stops searching, but leaves the Find dialog box on screen. At this point, you have several options:

- ▣ If Write has found what you're looking for and you don't want to do any more searching, you can remove the dialog box by pressing Esc or Alt+F4, or by clicking the dialog box's Cancel button.
- ▣ If you want to search for the next occurrence of the same search text, you can restart the search by clicking Find Next, by pressing Enter, or by pressing Alt+F.
- ▣ If you want to search for different text or use different search options, you can fill out the dialog box again and then restart the search.



Repeating the Search

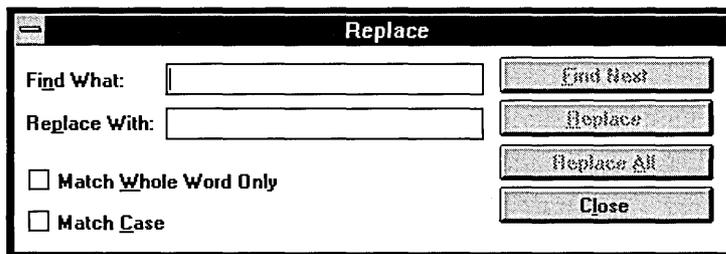
If you want to resume working on your document but think you might need to search for the same text again later, you can do either of the following:

- ▣ Move the Find dialog box to a position on your screen where it won't be in your way. Then click outside the dialog box or press Alt+F6 to return to your document. When you want to repeat the search, click the Find Next button again or press Alt+F6 to return to the Find dialog box, and then press Enter or Alt+F.
- ▣ Remove the dialog box by pressing Esc or Alt+F4. When you want to repeat the search, press F3 or open the Find menu and choose Repeat Last Find.

Using the Replace Command

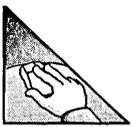
The Find menu's Replace command lets you replace one set of characters or words with another. You can confirm each change, or you can have Write change every occurrence of the search text automatically. You can apply the command to the entire document or to the current selection only.

When you choose the Replace command, Write presents the following dialog box.



Telling Write What to Change

To specify the text you want to change, fill out the Find What text box. You can enter up to 255 characters in the Find What box, including wildcards



and white-space characters. For information about specifying these characters, see “Including Wildcards in the Search Text,” page 411, and “Including White-Space Characters in the Search Text,” page 411.

Specifying Search Options

The Match Whole Word Only and Match Case check boxes work exactly the same way for the Replace command as they do for the Find command. For information about these check boxes, see “Specifying Search Options,” page 412.

Specifying the Replacement Text

To specify the replacement text, fill out the Replace With text box.

A question mark in the Replace With text box does not function as a wildcard, as it does in the Find What box, but you can use the four white-space codes—`^w`, `^t`, `^p`, and `^d`. (For information about the white-space codes, see “Including White-Space Characters in the Search Text,” page 411.) For example, if you want to remove the blank line between paragraphs, you can specify `^p^p` as the search text and `^p` as the replacement text.

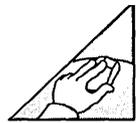
Limiting the Replacement to a Selection

If you select an area of text before you choose the Find menu’s Replace command, Write makes the specified replacement only within the selection. If no text is selected when you choose the Replace command, Write makes the replacement throughout the entire document, starting with the current position of the insertion point. When it gets to the end of the document, it continues at the beginning.

Replacing Automatically or Selectively

After you fill out the Replace dialog box, you can start the Replace operation in either of two ways:

- ❑ To replace all occurrences of the search text automatically, click Replace All. (If you selected an area of text before choosing the Replace command, click Replace Selection.)
- ❑ To have Write pause for confirmation before making each change, click Find Next.



If you click Find Next, Write stops as soon as it finds your search text. At that point you can do any of the following:

- ▣ If you do *not* want Write to change this occurrence of the search text, click Find Next.
- ▣ If you want Write to change this occurrence and continue searching for further occurrences, click Replace, and then click Find Next.
- ▣ If you want Write to change all occurrences, click Replace All (or Replace Selection).
- ▣ To stop the Replace operation without making any further changes, press Esc or Alt+F4, click the dialog box's Close button, press Alt+F6, or click anywhere outside the Replace dialog box.

If you press Alt+F6 or click outside the dialog box, the Replace dialog box remains on screen. You can use it again at any time by pressing Alt+F6 again or clicking within the dialog box.

Applying Document Formatting

Write arranges its formatting commands on three menus: Document, Paragraph, and Character. This section describes the commands on the Document menu. For information about the Paragraph menu, see “Applying Paragraph Formatting,” page 420. For information about the Character menu, see “Applying Character Formatting,” page 423.

Commands on the Document menu apply to the whole document. You use these commands to:

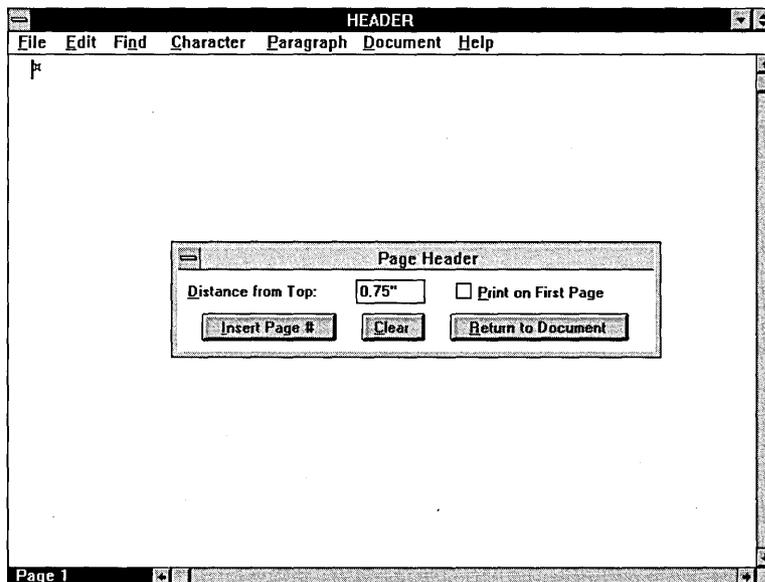
- ▣ Specify a header or footer that prints at the top or bottom of each page
- ▣ Display or remove a ruler at the top of your document
- ▣ Define tab stops
- ▣ Tell Write to begin numbering pages at a number other than 1
- ▣ Specify left, right, top, and bottom margins
- ▣ Specify inches or centimeters as Write's default measurement unit



Specifying a Header

A *header* is one or more lines of text printed at the top of each page. Each Write document can have one header, which can include page numbers.

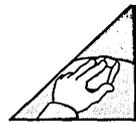
To specify a header, choose the Header command on Write's Document menu. The Page Header dialog box appears on your screen.



Notice that behind the dialog box, you now see a window titled Header. This window looks like an ordinary window for creating a Write document. You see an insertion point, an end mark, and an I-beam if you're using a mouse.

Type your header text in this window exactly as you would type ordinary document text. You can use any of Write's formatting commands as you type. Don't type any page numbers, though; we'll see how to add page numbers in a moment.

When you finish typing your header text, you're ready to select the options in the Page Header dialog box. If you want to include a page number in your header, put the insertion point where you want the number to appear before you go to the dialog box. Then click the mouse inside the dialog box or press Alt+F6.



The Distance From Top setting in the dialog box indicates the amount of space that Write will leave between the top of your header and the top edge of each page. The default is 0.75 inch; you can specify a different value.

The Print On First Page check box indicates whether or not your header will appear on page one. The default is no; put a check in the box if you want a header on the first page.

To add page numbers to your header, click Insert Page #, or press Alt+I. The marker (*page*) will appear in your header at the insertion point. When your document prints, Write replaces the marker with the appropriate page numbers. Page numbering begins at 1 unless you specify a different starting number in the Page Layout dialog box, which we'll come to in a moment.

When you're satisfied with your header, click the Return To Document button. To start over and create a new header, click Clear.

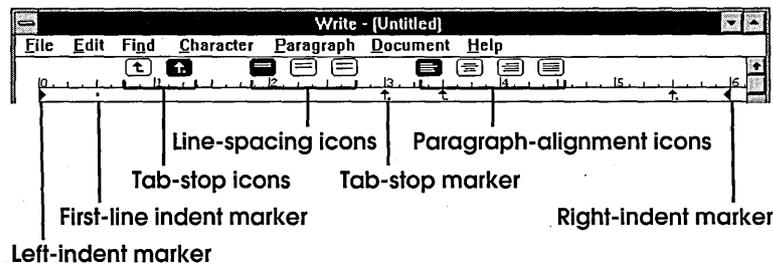
Specifying a Footer

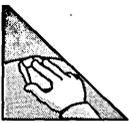
A *footer* is one or more lines of text printed at the bottom of each page. Each Write document can have one footer, which can include a page number.

The procedure for specifying a footer is exactly the same as for specifying a header, except you begin by choosing Footer from the Document menu. For more information, see the preceding section.

Displaying a Ruler

To display a ruler at the top of the document, pull down the Document menu and choose Ruler On. The ruler looks like this:





As you move through a document, the ruler shows you the line spacing, paragraph-alignment style, indents, and tab stops that are currently in effect. It also gives you a simple way to change any of these settings with the mouse.

The ruler has three groups of icons, directly above the inch (or centimeter) markings. The two icons in the leftmost group provide mouse shortcuts for setting ordinary and decimal tab stops. (For information about setting tabs, see “Setting and Using Tabs,” page 418.) The three icons in the middle group indicate the current line spacing and provide a mouse shortcut for changing the line spacing. (For information about setting line spacing, see “Choosing Line Spacing,” page 421.) The four icons in the rightmost group show the current paragraph alignment and provide a mouse shortcut for changing it. (For information about setting paragraph alignment, see “Choosing Paragraph Alignment,” page 421.)

Three markers on the ruler itself show the current position of the left and right margins and first-line indents. They also provide a convenient way to change indent settings with the mouse; simply drag the marker to the desired location. (For information about setting indents, see “Setting Indents,” page 421.)

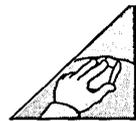
Setting and Using Tabs

Write offers two kinds of tabs: *ordinary* and *decimal*. An ordinary tab left aligns text at the tab position. Decimal tabs align the decimal points in a column of numbers at the tab position, with the whole-number and fractional portions of the numbers to the left and right of the tab.

By default, Write has ordinary tabs every 0.5 inch. You can replace these default tabs with up to 12 tabs of your own (positioned wherever you like) by filling out a dialog box or by using the ruler’s tab icons. When you set your own tabs, Write erases the default 0.5-inch tabs to the left of your tabs, but leaves in place the 0.5-inch tabs to the right of your rightmost tab.

Tabs in Write apply to an entire document; you can’t have different tabs for different paragraphs.

To set tabs using the dialog box, open the Document menu and choose Tabs. The dialog box looks like the one shown in the following illustration.



In the wide boxes labeled Positions, specify the distance of each tab from the left margin. Write assumes that you mean inches if the page layout measurements are set to inches, or centimeters if the page layout measurements are set to centimeters. (For information about setting page layout measurements, see “Choosing Default Measurement Units,” page 420.) You can override the default unit of measurement by including the units in the boxes. For example, you can enter a tab such as 5.08 cm. Write converts the measurements you enter to the default unit when you click OK.

To set a decimal tab, click the Decimal check box below the tab position box. Write assumes that all tabs are ordinary unless the associated Decimal box is checked.

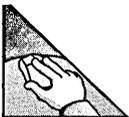
To remove a tab, open the Tabs dialog box, select the tab you want to remove, and press the Del key. To remove all tabs, open the Tabs dialog box and click Clear All.

To set tabs using the ruler’s tab icons, first display the ruler. (For information, see “Displaying a Ruler,” page 417.) Then do the following:

1. Click the icon for the type of tab you want: Click the icon with the bent arrow for an ordinary tab; click the icon with the straight arrow and the decimal point for a decimal tab.
2. Position the tip of the mouse pointer directly below the ruler position where you want the tab, and then click. A bent arrow or straight arrow appears on the ruler to mark the new tab position. (For more information, see “Displaying a Ruler,” page 417.)

To change a tab’s position, drag the tab marker along the ruler.

To remove a tab using the ruler, drag the tab marker away from the ruler and release the mouse button.



Setting the Starting Page Number

Write normally numbers pages starting at 1. If you want to use a different starting number, choose the Document menu's Page Layout command. Enter the new number you want in the Start Page Numbers At box in the Page Layout dialog box.

Setting Margins

Write's default top and bottom margins are 1 inch. The default left and right margins are 1.25 inches. To change any of these settings, choose the Document menu's Page Layout command and enter the new margins in the Margins boxes in the Page Layout dialog box.

Margins apply to the entire document. If you want to offset a particular paragraph a different amount from the edges of the paper, apply an indent to that paragraph. (For information about indents, see "Setting Indents," page 421.)

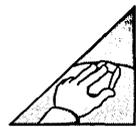
Choosing Default Measurement Units

Write measures indents, margins, and tab positions in inches, unless you have changed your Windows Measurement setting to Metric using Control Panel's International applet. (For information about the International applet, see "Setting Country-Specific Options," page 153.) Regardless of your Windows measurement setting, you can switch Write's measurement from inches to centimeters—or vice versa—by choosing the Page Layout command from Write's Document menu, and then selecting inch or cm in the lower left corner of the Page Layout dialog box.

Applying Paragraph Formatting

Commands on the Paragraph menu apply to individual paragraphs or selected consecutive paragraphs. You can use these commands to:

- Set left, centered, right, or justified paragraph alignment
- Choose single-space, 1½-space, or double-space line spacing
- Apply indents



To apply a paragraph formatting command to new text, position the insertion point where you're about to type, and choose a formatting command. To apply a format to an existing paragraph, position the insertion point anywhere in the paragraph, and then choose a formatting command. To apply a format to a group of paragraphs, first select some text in each paragraph, and then choose a formatting command.

Choosing Paragraph Alignment

Write offers four paragraph alignments:

- ▣ Left (left margin straight, right margin ragged)
- ▣ Centered (both margins ragged, each line—including the last line of each paragraph—centered between the margins)
- ▣ Right (left margin ragged, right margin straight)
- ▣ Justified (both margins straight)

You can apply any of these options either from the Paragraph menu or by clicking one of the ruler's paragraph-alignment icons.

Choosing Line Spacing

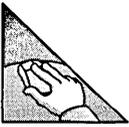
Write offers three line-spacing options: single, 1½, and double. You can apply one of these options either from the Paragraph menu or by clicking one of the ruler's line-spacing icons.

Setting Indents

You can use three kinds of indents in a Write document:

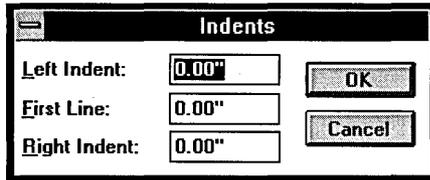
- ▣ An indent from the left margin that applies to all lines in a paragraph
- ▣ An indent from the right margin that applies to all lines in a paragraph
- ▣ An indent from the left margin that applies only to the first line in a paragraph

The last of these options can be used to set up automatic paragraph indenting or to create paragraphs with hanging indents. See “Setting Hanging Indents,” on the next page.



Like tabs, indents can be set using either a dialog box or the ruler.

To set indents using a dialog box, choose the Paragraph menu's Indents command. The Indents dialog box looks like this:



Simply fill out the boxes for the indents you want and click OK.

On the ruler, the right-pointing triangle marks the position of the left indent; it is at 0 if no left indent is in effect. The left-pointing triangle marks the position of the right indent; if no right indent is in effect, it indicates the position of the right margin. The first-line indent is indicated by a dot; if no first-line indent is in effect, the dot and the left-indent triangle are superimposed.

To apply or change an indent setting using the ruler, drag the appropriate symbol to the ruler position you want.

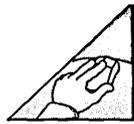
Setting Hanging Indents

A paragraph has a *hanging indent* when all of its lines except the first are indented. Hanging indents are useful for such things as bulleted or numbered lists. To set up a hanging indent, specify a positive left indent and a negative first-line indent. For example, if you set a left indent of 2 inches and a first-line indent of -2 inches, all lines except the first will start two inches from the left margin. The first line will start at the left margin.

Selecting Default Paragraph Settings

You might have noticed one more command on the Paragraph menu: Normal. This command provides a shortcut for returning to Write's default paragraph settings. The default settings are:

- ▣ Left paragraph alignment
- ▣ Single line spacing
- ▣ No indents



Applying Character Formatting

Commands on the Character menu apply to individual characters or selections of characters. You can use these commands to:

- Apply typographic styles such as boldface, italic, underlining, superscript, and subscript
- Select fonts and point sizes

To apply character formatting commands to new text, position the insertion point where you're about to type, and choose a formatting command. The command is applied to all new text that you type, but not to existing text. To apply a character formatting command to existing text, first select the text to which you want to apply the command, and then choose a formatting command. The command is applied only to the selected text.

Applying Typographic Styles

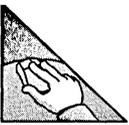
Write's style options include Bold, Italic, Underline, Superscript, and Subscript. Commands for all five are located on the Character menu. You can use these styles singly or in combination (except Superscript and Subscript, which cannot be used together). Write displays a check mark next to each style option currently in effect.

To remove all style options from the current selection or from text you're about to type, choose the Character menu's Regular command.



KEYBOARD TIP: You can press Ctrl+B, Ctrl+I, and Ctrl+U as keyboard shortcuts for bold, italic, and underline, respectively. The shortcut for the Regular command is F5.

NOTE: Unfortunately, although Write is aware of most of your printer's capabilities and limitations, it won't warn you if you apply a style command that's not available on your printer. For example, if you're using a Hewlett-Packard LaserJet with a font



cartridge that includes 14-point Helvetica in roman but not italic, Write still lets you format text in 14-point Helvetica italic. It appears italic on screen, but prints in roman. You might want to experiment to be sure you know your printer's capabilities before creating formatted documents in Write.

Reducing and Enlarging a Font

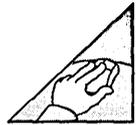
The most precise way to change a font's point size is to choose the Fonts command and select a size from the Size list box. As a shortcut for some circumstances, Write provides the Reduce Font and Enlarge Font commands on the Character menu.

The Reduce Font and Enlarge Font commands allow you to change the size of selected text through a predefined set of point sizes. The point-size sequence, which is the same for all fonts, is as follows:

4 6 8 10 12 14 18 24 30 36 48
72 127

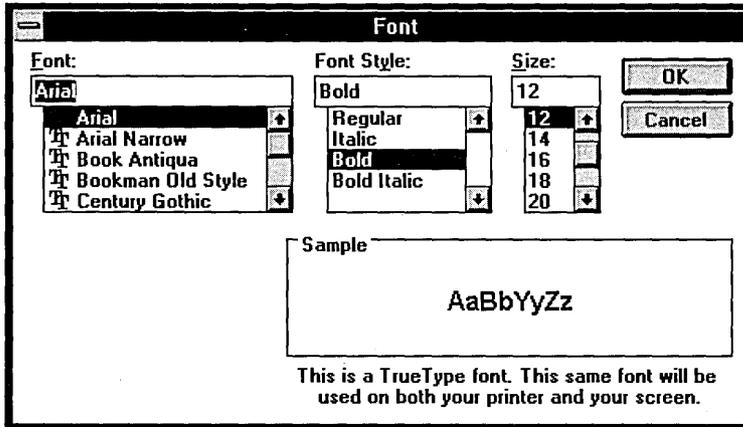
Each time you choose the Reduce Font or Enlarge Font command, the point size of the selected text decreases or increases to the next size in the sequence.

Some of these sizes might not be available for particular typefaces on your printer. Therefore, exercise some caution when using the Reduce Font and Enlarge Font commands.



Choosing a Font and Point Size

To apply a font in a particular point size, pull down the Character menu and choose the Fonts command. The Fonts dialog box shows you the typefaces and point-size options available on your printer. The dialog box looks like this:



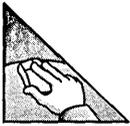
Fill in or choose a font and a point size, and click OK. To specify a point size that doesn't appear in the list box, type a number in the Size box.

For more information about fonts, see "Working with Fonts," page 40.

Including Pictures in Write Documents

Write documents can include pictures as well as text. To incorporate a picture in a Write document, do the following:

1. Create the picture in a Windows-based graphics program, such as Paintbrush (or load a picture file from a disk into a program such as Paintbrush).
2. In the graphics program, select the area of the picture you want to use in your Write document.



3. Use the graphics program's Copy or Cut command to put the picture on the Windows Clipboard.
4. In your Write document, move the insertion point to the place where you want the picture to appear.
5. Choose the Paste command from Write's Edit menu to insert the picture.

If your graphics program puts the picture on the Clipboard in more than one format, Write's Paste Special command, on the Edit menu, will also be available. Use this command to choose between the available formats. (For more information, see "Controlling a Pasted Object's Format," page 428.)

Repositioning a Picture

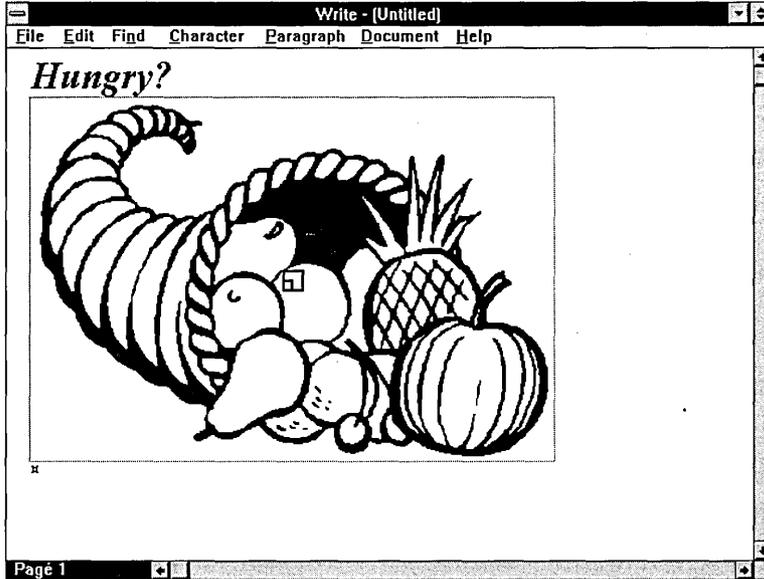
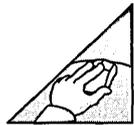
When you first paste a picture into a Write document, the picture is aligned with the left margin. You can center the picture or align it with the right margin using Write's Paragraph menu, as follows:

1. Select the picture by clicking it or by using the direction keys.
2. Open the Paragraph menu and choose Centered or Right.

You can also adjust the horizontal position of a picture with the Edit menu's Move Picture command. When you select your picture and choose this command, Write puts a square cursor in the center of the picture, as shown in the illustration on the next page.

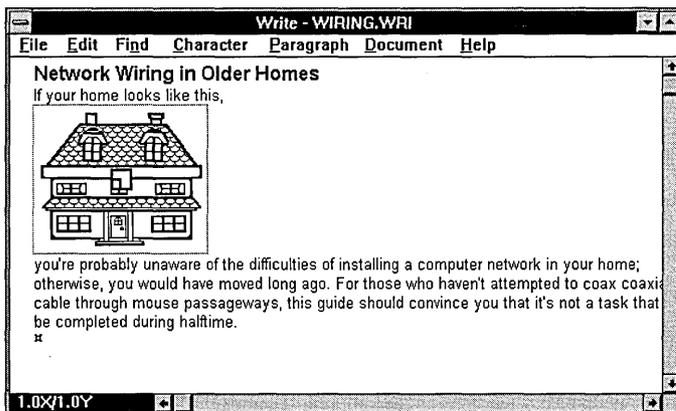
Use the Right and Left direction keys to relocate your picture, and then press Enter. If you change your mind about the move, press Esc before pressing Enter to cancel the move.

To move your picture with the mouse, simply move the mouse left or right. When the outline is where you want your picture, click the primary mouse button.



Resizing a Picture

You can also change the size of a picture after pasting it into Write. To do this, select the picture and choose the Edit menu's Size Picture command. Like the Move Picture command, Size Picture puts a square cursor in the center of the picture. But unlike the Move Picture command, it displays sizing information in the lower left corner of the Write window (where the current page number is usually displayed).





You can size your picture with the mouse, the direction keys, or both. The mouse can be quicker, but the keyboard can be more effective for precise adjustments.

To size the picture using the mouse, move the mouse pointer. When you're satisfied with the new size, press the primary mouse button.

To size the picture using the direction keys, first move the square cursor to the edge of the picture you want to move. For example, if you want to stretch or compress the picture from the right edge, start by pressing the Right direction key. Then use Right, Left, or both to adjust the right edge of the picture.

If you want to adjust two adjacent sides at once, move the cursor to the corner where the two sides meet.

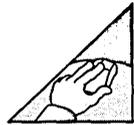
When you're satisfied with the new size of your picture, press Enter.



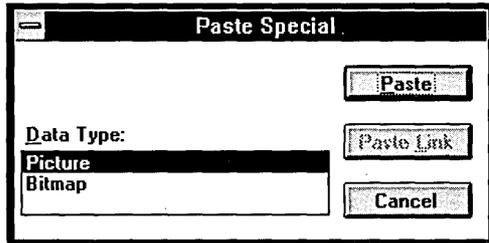
WINDOWS TIP: The X and Y numbers in the lower left corner of the window indicate the picture's current size relative to its size when you first imported it into Write. If you make the picture wider, the X value increases; if you make it taller, the Y number increases. To avoid distorting the shapes of the objects depicted in your image, it's best to modify the X and Y dimensions evenly. On the other hand, if you want to create funhouse-mirror effects, you can change one dimension more than the other.

Controlling a Pasted Object's Format

Sometimes when you copy an object to the Clipboard, the source program puts the object on the Clipboard in more than one format. For example, it might store a picture on the Clipboard in both *picture* format and *bit-mapped* format. (For more information about data formats and the Clipboard, see "Viewing the Clipboard's Contents," page 176.) Whenever the object to be pasted is available in more than one format, Write enables the Paste Special command, allowing you to choose which format to use.



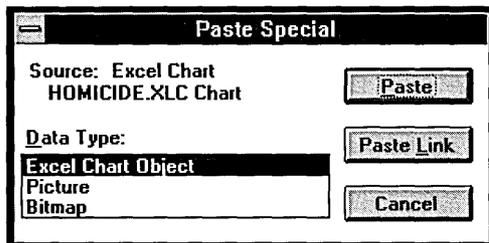
For example, here is how the Paste Special dialog box looks when an object is available in both picture and bit-mapped formats:



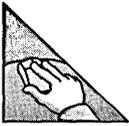
Select the format you prefer, and click Paste.

Usually, Write's Paste command chooses the best format for you automatically. For example, when the available formats are picture and bit-mapped, it chooses picture, which usually gives you more satisfactory results. (In particular, because the picture format is not tied to the resolution of a specific output device, it usually gives you a much better printed image than the bit-mapped format.) However, the Paste Special command allows you to override the default choice.

When the source program is an OLE server, Write's Paste command automatically embeds the object that is stored on the Clipboard. (See "Linking and Embedding in Write," below.) If you want your pasted object to be static, rather than an embedded object, use the Paste Special command instead of Paste. Paste Special's dialog box in this case looks like this:



Its position at the top of the Data Type list tells you that Write will embed this Excel Chart Object by default. Embedding the image doesn't add any more bulk to your file than pasting it as a static object, and it allows you to edit the image quickly and easily. (To change a static object, you'd



have to copy it back into your graphics package, delete it from your Write document, make your edits in the graphics program, and then recopy it into Write—a far more laborious process.) The Paste Special command, however, allows you to override Write's default procedure.

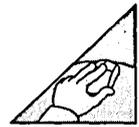
Linking and Embedding in Write

Write is capable of acting as an OLE client application. This means that you can store links to or embed the following kinds of data, among others, in your Write documents:

- ▣ Graphic images copied to the Clipboard from OLE server programs, such as Paintbrush or Ami Pro
- ▣ Charts or worksheet “pictures” copied from Microsoft Excel
- ▣ Sound annotations copied from the Windows Sound Recorder accessory
- ▣ Packages copied from the Windows Object Packager accessory

To link an object from the Clipboard, use Write's Paste Link command. To embed the object instead of linking it, choose the Paste command. If the object's source application is an OLE server, the object will automatically be embedded. (For more information about linking and embedding, the differences between the two, and the advantages and disadvantages of each, see “Linking Versus Embedding,” page 185.)

Alternatively, you can link or embed an object by choosing the Paste Special command. (For information about the Paste Special command, see “Controlling a Pasted Object's Format,” page 428.) If the object on the Clipboard came from an OLE server, the Paste Special dialog box indicates what type of object it is and which program it came from, as with the Excel Chart Object in the previous illustration. The first format in the Data Type list includes the word *object*. To store a link to the object's source, select the format you want to use and click Paste Link. To embed the object, select the first option and click Paste.



WINDOWS TIP: If the Paste Special dialog box indicates that the Clipboard's data came from an OLE server, but the Paste Link button is grayed out, that probably means the data has never been saved in the source application. To create a link to OLE server data, you must first have saved that data in a disk file.

Moving and Sizing Linked or Embedded Objects

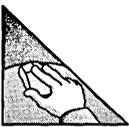
For display purposes, Write handles linked and embedded objects the same way it handles static graphic images. You can move and size such objects using the same procedures you use with static objects. For more information, see “Repositioning a Picture,” page 426, and “Resizing a Picture,” page 427.



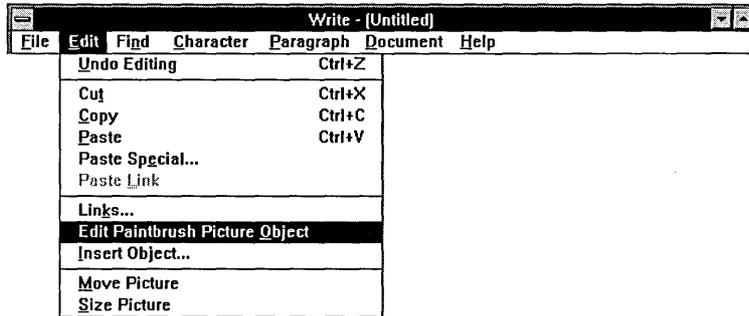
WINDOWS TIP: If you double-click an embedded object after changing its size in Write, the object appears for editing—at its original size—in the source application. When you update the Write document after making your edits, however, the image reappears at the modified size.

Activating, Playing, and Editing Linked or Embedded Objects

When you select an object in a Write document that was linked or embedded from an OLE server, the Object command on Write's Edit menu becomes available. It also changes to reflect the kind of object you select. The illustration on the next page, for example, shows how the Object command appears if you select a graphic embedded from Paintbrush.

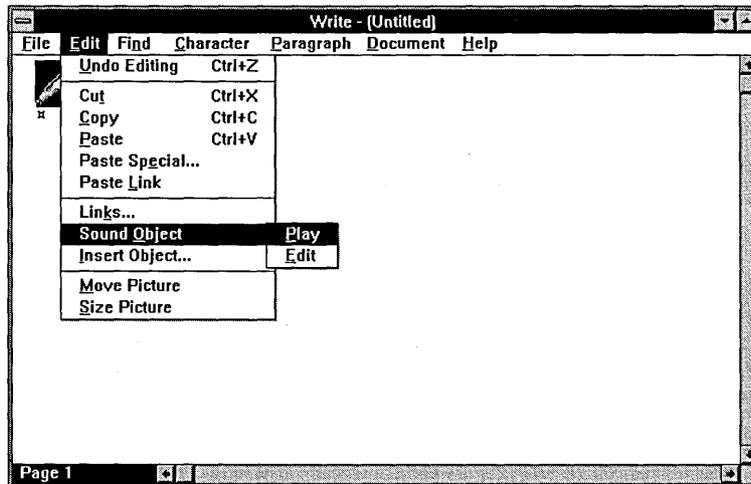


PART 4: Running Applications

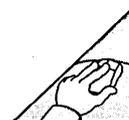


Choosing this command activates the object's source application—Paintbrush in this example—and allows you to edit the object. (A simpler way to edit an embedded image is to double-click it.)

If the linked or embedded object is a graphical representation of a non-graphical data type, such as a sound annotation or a package, the Object command presents a small submenu, like this:

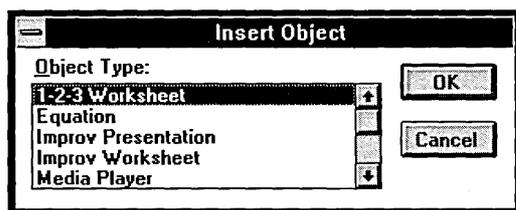


Choosing Play “renders” the object (by letting you hear the sound annotation, for example); choosing Edit invokes the object's source application. Double-clicking in this case is a shortcut for the Play command. If you want to edit the object, you have to use the menu command.



Linking and Embedding with the Insert Object Command

The Insert Object command on Write's Edit menu lets you initiate the linking or embedding process from within your Write document, instead of from within an object's source application. When you choose this command, Write presents in a dialog box all the “linkable” and “embeddable” object types listed in your Windows system's registration database.

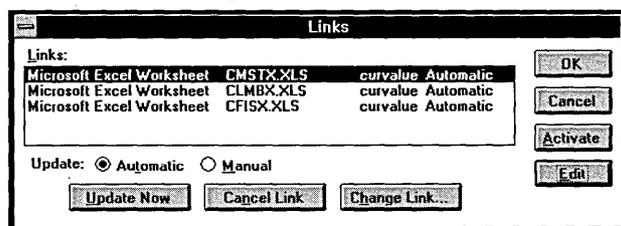


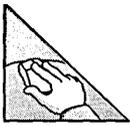
Choose the kind of object you want to link or embed, and click OK. Write activates the object type's source application, allowing you to create an object (or load one from a disk file).

Modifying Links with the Links Command

When you link an object, as opposed to embedding it, Write does not store the object in your file. Instead, it stores a “pointer” to the object's source—the name of the source application and the file in which the object is stored, for example. If you subsequently rename or move the object's source file, the stored link will no longer be valid. In that case, you can repair the link with the help of Write's Links command.

The Links command on Write's Edit menu lists all objects linked to the current Write document.





To change the source file for a link, select the link you want to modify, and click **Change Link**. Write presents a file-browser dialog box, allowing you to pick the file you need.

The **Links** command also allows you to change a link from automatic to manual, or vice versa. Links are always automatic by default, which means that any changes in the source data are reflected as soon as possible in your Write document. If you prefer to have them updated only on demand, choose the **Links** command, select the link you want to change, and then click **Manual**.

Saving and Retrieving Files

Write uses the same techniques for saving and retrieving files as most other Windows-based applications. (For more information about these procedures, see “Creating, Opening, and Saving Files,” page 27.) The following commands are on Write’s **File** menu:

- ▣ **Save**, to save the current file
- ▣ **Save As**, to save the current file under a new name or to choose different file-saving options
- ▣ **New**, to create a new file
- ▣ **Open**, to load an existing file from disk

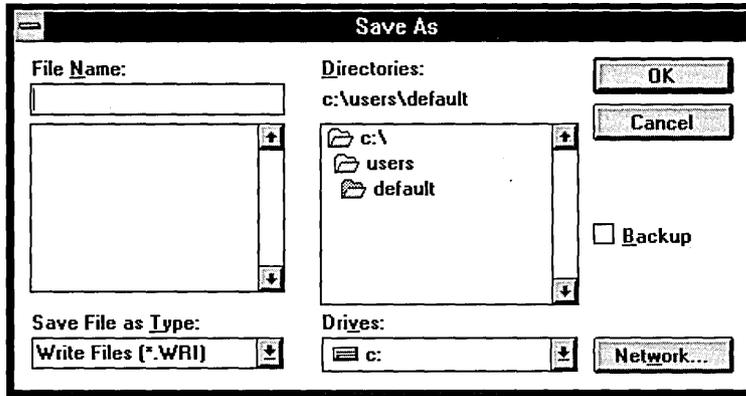
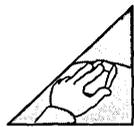
Write’s normal file extension is **WRI**. If you don’t specify an extension, Write automatically uses **WRI**. You can use a different extension—or no extension—if you want. To save a file with no extension, include a period at the end of its name.

Backing Up When You Save

When you save a file the first time, Write presents the **Save As** dialog box.

If you check the **Backup** box, Write preserves the previously saved version of the file each time you save. That way, if you regret the changes you made, you can return to the previous version.

Write’s backup files are saved with the extension **BKP**. To open a backup file, use the **File** menu’s **Open** command and specify your filename with the extension **BKP**.



Saving a Text File

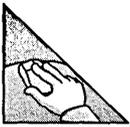
To save your file as plain (unformatted) text, choose Save As, and then open the Save File As Type drop-down list. In the list that unfolds, choose either Word For DOS/Txt Only or Text Files (*.TXT). Either way, Write saves the words in your file but removes all character, paragraph, and document formatting. Your file also loses any embedded or linked data and any pictures pasted in as static objects.

You might want to save your document as a text file under these conditions:

- ❑ If you need to transmit the document over a modem to a system that cannot accept a binary file transfer (For information about binary and text file transfers, see “Sending and Receiving Files,” page 465.)
- ❑ If you need to transfer your document into a non-Windows-based word processor that cannot read a formatted Write document



WINDOWS TIP: If you need to transfer a Write document into a Windows-based word processor that doesn't accept files with the extension WRI, use the Windows Clipboard.



Saving a Microsoft Word File

To save your Write document in a format that can be read by the MS-DOS-based version of Microsoft Word, choose Save As and open the Save File As Type drop-down list. Choose Word For DOS (*.DOC). All paragraph formatting and document formatting is preserved. Character formatting is preserved if your Word printer driver is the same as your Windows printer driver. If the printer drivers differ, Word makes appropriate font substitutions.

Any linked or embedded data and any pictures in your Write document are lost when you save the file in MS-DOS-based Microsoft Word format.

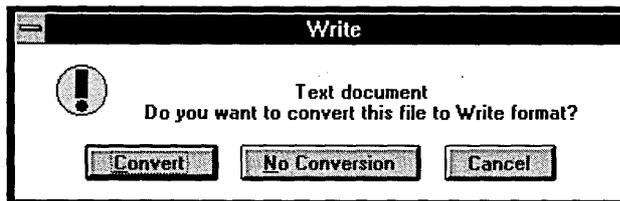
If you check the Backup box when saving a file in Microsoft Word format, the backup file is stored with Word's backup extension, BAK.

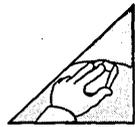
Opening a Text File

A text file is a file that contains text characters only, without formatting information. Examples include files created by Notepad or by the MS-DOS text editor, Edit. Most word processors, both Windows-based and non-Windows-based, include options for saving documents as text files.

You can use Write to read and edit text files. When you're finished working with such a file, you can save it again as a text file or convert it to a formatted Write file.

To open a text file, specify the name of the file in the Open dialog box. As soon as Write begins reading the file into memory, it recognizes that it's a text file, and you'll see the following dialog box.





You need to convert the file to Write's format only if both of the following are true:

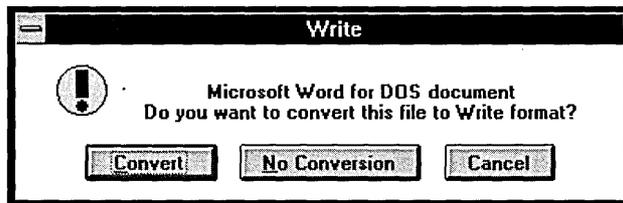
- ▣ Your text file contains special characters, such as accented letters; mathematical symbols; trademark, copyright, or registration symbols; or line-drawing characters.
- ▣ Your file was created in a non-Windows-based application.

If you do not convert a non-Windows text file that contains special characters, those characters might be incorrect when they appear in your Write window.

Opening a Microsoft Word File

Write can work with files created in the MS-DOS-based version of Microsoft Word. You don't need to convert your Word files to plain text before loading them into Write.

To open a Word file, specify the name of the file in the Open dialog box. As soon as Write begins reading the file into memory, it recognizes that it's a Word file and you'll see the following dialog box.



Click Convert to load the file or Cancel to abandon the whole idea.

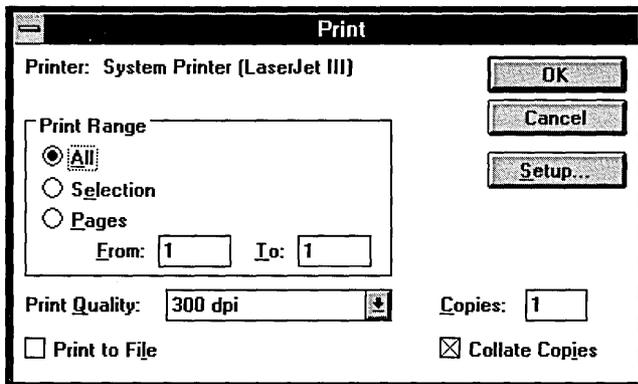
Paragraph and document formatting in your Word file are preserved in Write. Character formatting is preserved to the extent that your Windows printer driver supports it. If the driver you use in Windows is different from the driver you used when creating the Word file, some of your original font specifications might be lost.

Write does not translate Microsoft Word style sheets.



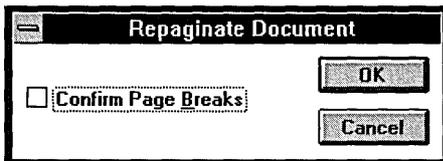
Paginating and Printing a Write Document

To print your Write document, pull down the File menu and choose Print. You'll see a dialog box like this:

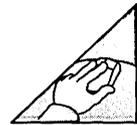


If you want more than one copy, change the number in the Copies box. If you want to print a selection of pages instead of the entire document, fill in the page numbers you want in the From and To boxes.

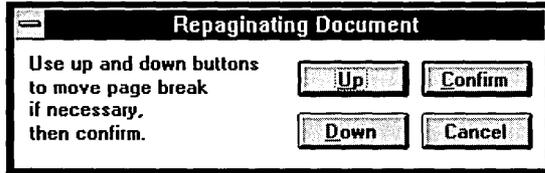
As it prints, Write decides where to put page breaks. If you want to know where those page breaks will be, or if you want to exert some control over where the pages will be broken, choose the File menu's Repaginate command before choosing Print. You'll see this dialog box:



If you want to be able to modify Write's page-break choices (for example, to avoid a page break between a heading and its associated text or in the middle of a table), put a check in the Confirm Page Breaks box



before clicking OK. With the Confirm option on, Write stops at each proposed page break and presents the following:



Click Up if you want to move the page break up. With each click, Write moves the proposed page break up one line.

Click Down if you have already moved the proposed page break up and you want to lower it again. (You can't move the page break any lower than Write's initial proposed location.)

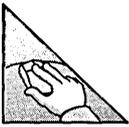
When you're satisfied with the location of the break, click Confirm. If you override Write's initial proposed location, a "manual" page break will be inserted into your document at the location you choose.

Manual page breaks are represented in your document by dotted lines. "Soft" page breaks—page breaks chosen by Write, not by you—are identified by a guillemet (») in the left margin.

If you edit your document and print it or repaginate it, the soft page breaks will probably appear in different locations. Your manual page breaks will remain where you put them, however. Therefore, if you edit a document that already contains manual page breaks, you might want to paginate it again before printing, to ensure that the manual page breaks you chose earlier are still appropriate.

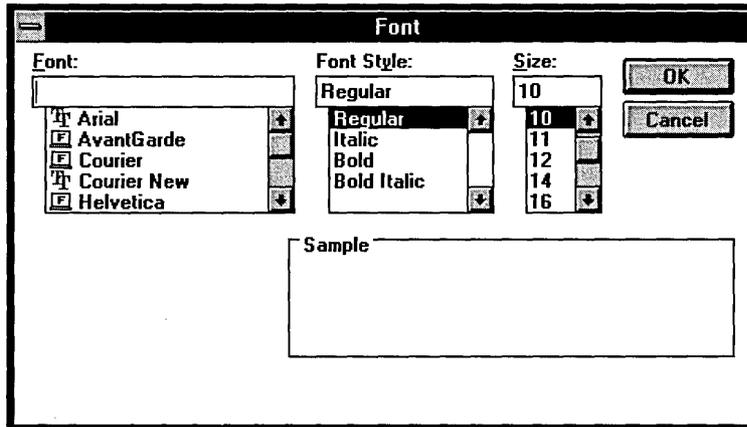
If You Change Printers

As mentioned earlier in this chapter, Write formats documents using the current printer driver. The selection of fonts and point sizes presented in the Fonts dialog box, as well as the locations of line and page breaks, all depend on the characteristics of the current printer. If, after creating a Write document, you switch to a different printer or switch between portrait and landscape orientations, your line breaks will almost certainly move, and the contents of the Fonts dialog box will change.



PART 4: Running Applications

If you select a block of text that was originally formatted with a font not available on the current printer, Write's Font dialog box will look something like this:



The Font box—and sometimes the Font Style and Size boxes—will be blank. If you print your document without assigning a different font to this text block, Write will print the block in the font that's closest in style to your original choice. If you return to the printer driver for which the document was originally formatted, your original font specifications will be restored.

Using Terminal

- | | |
|--|------------|
| A Typical Terminal Session | 443 |
| <p>Pull up a settings file and tell Terminal what to do. Use the Dial command, and then log onto the host computer or service.</p> | |
| Creating a Settings File | 445 |
| <p>A settings file stores all the information Terminal needs to connect to a particular user or service.</p> | |
| Initiating a Telephone Call | 461 |
| <p>Open the Phone menu and choose Dial.</p> | |
| Answering a Call Initiated by the Remote System | 462 |
| <p>A simple command to your modem makes it answer the phone after a specified number of rings.</p> | |
| Hanging Up the Telephone | 463 |
| <p>With some information services, you need to use Terminal's Hangup command even after you've logged off.</p> | |
| Creating a Transcript of Your Communications Session | 463 |
| <p>You can capture your session on disk or send a transcript to your printer.</p> | |
| Timing a Communications Session | 464 |
| <p>The timer can help you keep connect charges under control by showing how much time has elapsed.</p> | |

Inspecting and Selecting Text in Terminal's Buffer **464**

Text from the buffer can be copied, but not cut, to the Clipboard.

Transmitting Data from the Clipboard or the Buffer **465**

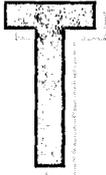
Press Ctrl+V to transmit Clipboard text.

Sending and Receiving Files **465**

You can send and receive text files or binary files. Terminal supports the XModem/CRC and Kermit error-checking protocols.

Communicating Without Telephone Lines **472**

With a null-modem cable, you can leave Ma Bell out of the loop.



terminal is a program that allows your computer to communicate with other computers. You can use it to do such things as retrieve data from a company mainframe, explore an online information service such as CompuServe, or send electronic mail (e-mail) over a public e-mail network such as MCI Mail.

To communicate with a remote computer using Terminal, you must have a modem attached to one of your computer's serial ports. The modem converts signals from your computer into a form that can be transmitted over telephone lines. The party with whom you're communicating must also have a modem to reconvert the telephone signals into the form understood by computers.

This chapter tells you how to use Terminal's features. You'll learn to set up a communications link, send and receive files, use Terminal's error-checking options, create printed transcripts of your communications sessions, and so on. You'll also find out how to save "settings" files that are tailored for the various computers and services you communicate with regularly.

A Typical Terminal Session

A typical communications session using Terminal goes something like this:

1. Start Terminal.
2. Load or create a "settings" file.

Before establishing a communications link, you must supply a number of "communications settings." These settings tell Terminal what number to dial, the speed to use for transmitting and receiving, what kind of parity (error checking) to use, and so on. Several of these settings might be different for each computer or service you connect with.

Usually, the service or host computer with which you're communicating will tell you what settings it requires, so it's not a problem if you don't understand all the technical details about each setting.

To save you the trouble of reentering settings each time you start a communications session, Terminal lets you create settings files.



These files store all the information Terminal needs to connect with a particular computer or service. So, for example, if you frequently get stock quotes or other news from the Dow Jones News/Retrieval service, you might create a settings file called DOWJONES.TRM. Any time you want to log onto Dow Jones, you can simply load DOWJONES.TRM into Terminal and you'll be ready to go.

3. Use the Dial command.

Terminal uses your modem's built-in dialing capability to establish a telephone connection with the remote computer. After a connection is established, whatever you type in Terminal's window is sent to the other computer. If the person or computer at the other end of the connection sends information back, it appears in Terminal's window as if someone behind the screen were typing.

You can continue to use Terminal's menu commands after you establish a connection with the other computer. Your interaction with Terminal's menu system is *not* transmitted.

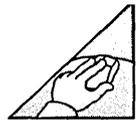
4. Log onto the host computer or service.

If you're communicating with a mainframe or an information service, you'll probably be required to enter your name and a password as soon as the connection is established. This process is called *logging on*. To simplify this and other routine procedures, Terminal lets you assign strings of characters to your keyboard's function keys. The function-key assignments are saved in your settings files, so you can have a different set of assignments for each service you use.

5. Interact with the party you're connected to.

Your interaction might consist of nothing more than simple messages typed at the keyboard. Or you might transmit a great deal of information at once by pasting it into Terminal from the Clipboard.

You can also exchange files with the host computer. Terminal lets you send and receive two kinds of files—text files and binary files. We'll see what the differences are and what procedures are used for file transfers later in this chapter.



WINDOWS TIP: If you're receiving or sending a lot of information, you might want to let Terminal do its work in the background while you focus your attention on a different application.

6. Log off the remote computer or service.
7. Use Terminal's Hangup command to break the telephone connection.

When you log off, the host computer might break the telephone connection itself. Terminal will not know that, however, so it's best to use the Hangup command regardless of what the other party does.

8. Quit Terminal.

If the telephone line is still open (or if Terminal thinks it is), Terminal prompts you to close the connection before quitting.

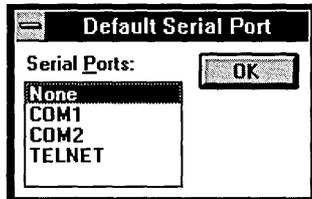
Creating a Settings File

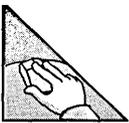
The procedure for creating a new settings file is as follows:

1. Start Terminal.

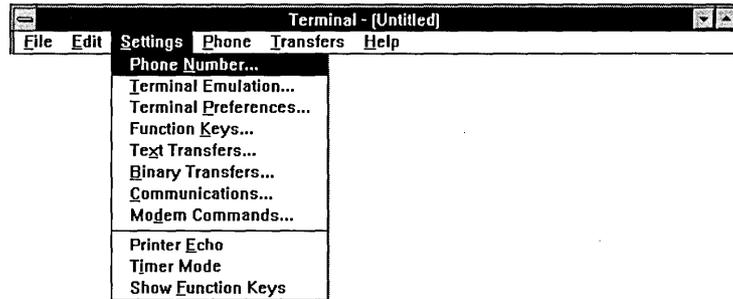
Double-click the Terminal icon in Program Manager. If it hasn't been moved, you'll find it in your Accessories program group.

NOTE: The first time you start Terminal, a Default Serial Port dialog box appears, as shown below. Simply select the port to which your modem is attached and click OK.





2. Select the appropriate options on Terminal's Settings menu.
The Settings menu looks like this:



The first eight commands on this menu all bring up dialog boxes. All of the choices you make in these dialog boxes are saved in your settings file. Each settings file can have a different arrangement of choices. (The bottom three commands are *toggles*—options that are either turned on or turned off. Your choices here are not recorded in your settings files.)

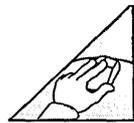
3. Pull down the File menu, choose Save As, and supply a name for the file. Terminal uses the extension TRM if you don't specify one.
We'll look at each of the Settings menu's many details now.

Modem Commands

We'll start with Modem Commands, because the settings you assign here should be appropriate for every settings file you create. The Modem Commands dialog box, shown on the next page, tells Terminal what signals it should send to your modem to originate a call, prepare to receive a call, dial the telephone, and hang up.

The dialog box is initially filled out with the settings required by a Hayes or Hayes-compatible modem. If your modem fits that description and your telephone system uses tone dialing, the default modem commands will be correct for all your settings files.

If your telephone uses pulse (rotary) dialing, change the Dial Prefix setting from ATDT to ATDP.



Commands	Prefix:	Suffix:
Dial:	ATDT	
Hangup:	+++	ATH
Binary IX:		
Binary BX:		
Originate:	ATQ0V1E1S0=0	

Modem Defaults

Hayes
 MultiTech
 TrailBlazer
 None

OK
Cancel

If you're using a MultiTech or TrailBlazer modem, click the appropriate option button under Modem Defaults. The settings in the rest of the dialog box will change appropriately.

If your modem conforms to none of the three supported standards—Hayes, MultiTech, or TrailBlazer—click None and consult your modem's documentation to fill out the rest of the dialog box.

Terminal Preferences

The Terminal Preferences dialog box, shown below, lets you specify about a dozen options, each of which has something to do with the way your system behaves while connected to another computer.

Terminal Preferences

Terminal Modes

Line Wrap
 Local Echo
 Sound

Columns

80 132

Terminal Font

Courier	15
Courier New	30
Fixedsys	45

Translations

IBM to ANSI

Show Scroll Bars Buffer Lines: 100

Use Function, Arrow, and Ctrl Keys for Windows

CR -> CR/LF
 Inbound
 Outbound

Cursor
 Block Underline
 Blink

OK
Cancel



Terminal Modes

The Terminal Modes section of the dialog box includes three check boxes: Line Wrap, Local Echo, and Sound.

Select the Line Wrap option if the host computer sends lines that are too long for your computer to display. With this option set, a long line will be “wrapped” to the next line on your screen, as it would in a word processing program.

If you’re connected to a remote computer but the characters you type do not appear on your screen, select the Local Echo check box. On the other hand, if every character you type appears twice on your screen, deselect this check box.

If the Sound check box is selected, your system will beep if the remote system sends a “bell” character (Ctrl+G). Unless you object to the sound, it’s probably best to leave this option selected.

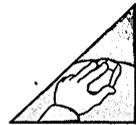
Translate CR to CR/LF

The CR→CR/LF options govern how line endings (carriage returns) are handled by your computer and the remote computer. If everything sent by the host computer appears on a single line on your screen, select the Inbound box. If the party you’re communicating with complains that everything on his or her system is displayed on one line, select the Outbound box.

Obviously, if you’re communicating with an information service, a bulletin board, an electronic mail service, or some other unattended system, there won’t be anyone on the other end of the line to complain to you. But if you’re not communicating successfully with the remote system, try selecting the Outbound box to see if that helps.

80 or 132 Columns

If your screen can display 132 characters on a line, and if the system you’re communicating with sends more than 80 characters per line, select the 132 button in the Columns section of the dialog box. Otherwise, accept the default setting of 80 columns.



Cursor Shape and Blink

You can choose between two cursor shapes: block and underline. You can also decide whether or not you want the cursor to blink. You might want to experiment to see which cursor style you like best.

Terminal Typeface and Size

Terminal can display your communications session in any monospaced font installed on your system. Like the cursor choice, your decision about typeface and size is strictly a matter of taste. The font you pick has no effect on what you send to the remote computer.

For more information about fonts, see “Working with Fonts,” page 40.

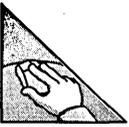
Translations

The Translations setting is used for communicating with a computer in another country. It allows the data you send to be formatted in the character set used by the host computer. Retain the default setting, None, if you’re communicating within your own country.

Buffer Size

A *buffer* is an area of memory used to store something temporarily. While you’re connected to another computer, everything you send and receive is stored in a buffer and displayed in Terminal’s window. The buffer gives you a way to review what you send and receive, without capturing the “conversation” in a disk file or generating a printed transcript. As long as the buffer’s capacity has not been exceeded, you can scroll up and down in the Terminal window to reread everything that has passed back and forth over the telephone line. (There is one exception: Binary files that you send or receive are not recorded in the buffer.) You can also select any text stored in the buffer and copy it to the Clipboard. To do so, use the Edit menu’s Copy command, as you would in most other Windows applications. (For information about the Clipboard, see “Using the Clipboard with Applications for Windows,” page 169.)

When the buffer reaches its capacity, each new line replaces the oldest line already in the buffer. For example, if the buffer size is set at 100 lines, when the 101st line arrives, the first line is discarded.



You can set the buffer size at anywhere from 25 to 399 lines. If you have plenty of memory, reserve a full 399 lines; if memory is scarce, choose a smaller size. If you don't have enough memory for the buffer size you request, Terminal gives you as much as it can.



WINDOWS TIP: The buffer is convenient because it lets you reread material that has scrolled off your screen. But if you want a complete record of your communications session, consider sending a copy of it to your printer or recording it in a text file. For information about printing or recording to a text file, see “Creating a Transcript of Your Communications Session,” page 463.

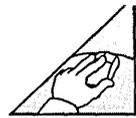
Scroll Bars

Terminal normally displays scroll bars to help you read lines that have disappeared off the top of Terminal's window or that extend beyond the right edge. You can get rid of the scroll bars by deselecting the Show Scroll Bars check box. Doing so increases the size of Terminal's window slightly.

Special Keys

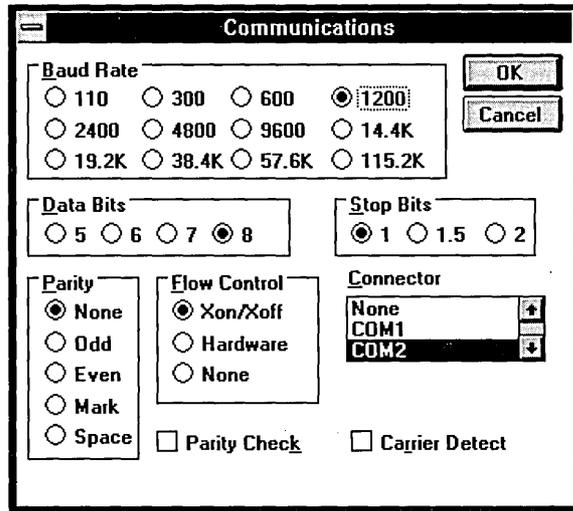
By default, Terminal is set so that codes generated by the function keys, Ctrl+key combinations, the direction keys, PgUp, PgDn, Home, and End are not transmitted to the remote computer. You can change this setting by selecting the check box labeled Use Function, Arrow, and Ctrl Keys for Windows. You might find it convenient to select this check box, for example, if you frequently need to send a Ctrl+C to the service you're communicating with.

Note that certain function keys and Ctrl+key combinations are processed by Windows (rather than being transmitted) regardless of the state of this check box. For example, whichever way the check box is set, the F1 key still invokes the Help system, F10 gets you to the menu bar, Ctrl+Esc summons Task List, and keyboard shortcuts defined in Program Manager continue to perform as usual.



Communications Parameters

The settings in the Communications dialog box govern the way your data is sent over the telephone line. For communication to be successful, most of the settings in this dialog box must be identical to those of the system you're communicating with.



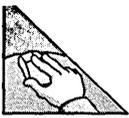
Connector

In the Connector list box, select the serial port to which your modem is attached. If you select None, Terminal uses the first available port, and begins its search with COM1.

NOTE: For information about communicating directly with another computer using a null-modem cable, see "Communicating Without Telephone Lines," page 472.

Baud Rate

Baud rate is the speed, in bits per second, at which information is transmitted and received. The speeds most commonly used are 14400 baud, 9600 baud, 2400 baud, and 1200 baud.



Data Bits, Stop Bits, and Parity

In a typical asynchronous communications link (the kind used by Terminal), each character transmitted consists of seven or eight bits of data, followed by one stop bit. The stop bit is used as a timing signal to tell the receiving computer where one character ends and another begins. Some older systems use fewer than seven data bits and more than one stop bit, but such systems are now rare.

Systems that use seven (or fewer) data bits might also employ an error-checking method called *parity*. Different systems use different types of parity checking—hence the Odd, Even, Mark, and Space options in the Parity section of this dialog box.

The most common arrangement of these parameters for use with mainframe computers and online information services is 7-E-1, which means seven data bits, even parity, and one stop bit. Public bulletin-board systems (BBS's) most commonly use 8-N-1, or eight data bits, no parity (None), and one stop bit.

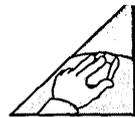
Parity Check

The check box marked Parity Check tells Terminal what to do if you're using a parity setting other than None and a parity error is detected. If you select this box, Terminal displays a question mark in place of any incorrectly received character. Otherwise, Terminal displays whatever character it receives, even if it is incorrect.

Flow Control

When information sent by the remote computer fills Terminal's buffer to capacity, Terminal has to tell the remote system to pause momentarily before sending any more characters. Otherwise, incoming data will be lost. When Terminal is ready to receive again, it sends another signal to the remote computer. A similar pair of signals is used by the remote computer to control the flow of data being sent by Terminal.

These “pause” and “resume” signals are known as *handshaking*. The particular method of handshaking is determined by the Flow Control setting.



Terminal's default choice, Xon/Xoff, is the method most commonly used today. A few older systems still use hardware handshaking. If you're not sure which method is used by the system you're going to communicate with, try Xon/Xoff.

If the remote system has no handshaking capability, choose None.



WINDOWS TIP: If characters you transmit are being lost by the remote system, regardless of your Flow Control choice, you can try sending one character at a time or one line at a time. For more information, see "Options for Transferring Text," page 458.

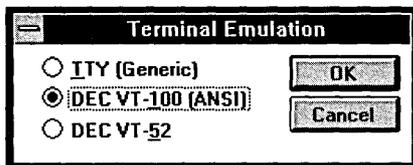
Carrier Detect

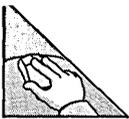
If you select the Carrier Detect box, Terminal relies on a hardware signal from your modem to determine whether you've established a connection with the remote computer. This option is normally off; if you're having trouble connecting, try turning it on.

Terminal Emulation

The Terminal Emulation setting determines how your screen behaves when it receives "formatting" information (such as commands to position the cursor or to erase characters) from the system with which you're communicating. It also determines which characters are sent to the remote computer when you press function keys, direction keys, and so on.

When you choose the Terminal Emulation command, you see the following dialog box.





With the default setting, shown here, Terminal makes your keyboard and screen behave like a VT-100 terminal from Digital Equipment Corporation (DEC). This is a popular standard, and many mainframe computers and online information services base their interaction with you on the assumption that you're either using or emulating this terminal. Therefore, it's best to try this setting first if you're not sure what's required.

Alternatively, you can make your system emulate a DEC VT-52 terminal or a TTY ("dumb") terminal. A TTY terminal recognizes no formatting codes except Carriage Return, Line Feed, Tab, and Backspace.

Assigning Strings of Characters to Function Keys

Terminal's Function Keys command lets you create as many as 32 miniature macros to perform routine typing chores. The command is called Function Keys because each macro you create is executed with the combination of Ctr+Alt plus one of the first eight function keys (F1 through F8). You can also display the names of your macros at the bottom of the screen and execute them by clicking the mouse.

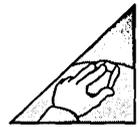
When you choose the Settings menu's Function Keys command, you see the following dialog box.

Key Name:	Command:
F1:	
F2:	
F3:	
F4:	
F5:	
F6:	
F7:	
F8:	

OK
Cancel

Key Level
 1 2
 3 4

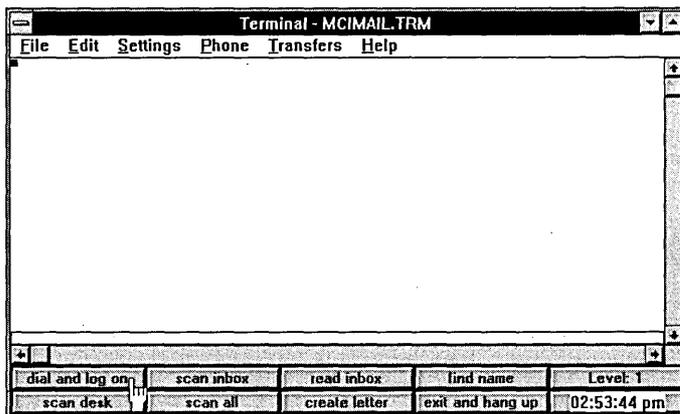
Keys Visible



In the boxes on the left, under the heading Key Name, you can assign a name for each key you want to use. In the boxes on the right, under the heading Command, enter the keystrokes you want the macro to type for you. You can enter up to 41 characters for each function key.

If you need more than eight function-key assignments, you can switch to a different “level” by clicking one of the numbers in the Key Level box. With each new level, you get a fresh set of macro slots.

If you select the Keys Visible check box, Terminal displays the names of your function-key assignments—eight at a time—in the buttons below the horizontal scroll bar. You can also display the function-key assignments by choosing Show Function Keys from the Settings menu. Here’s how your Terminal window might look, for example, if you assign some of the most common MCI Mail commands to function keys:



The function-key assignments are shown starting with F1 in the upper left corner of the group of buttons (“dial and log on” in the illustration above). Below F1 is F2, to the right of F1 is F3, and so on.

When you position the mouse pointer over one of these function-key buttons, it changes from an arrow to a hand, as shown in the illustration above. You can then execute the character sequence assigned to that function by clicking its button. You can switch between the four function-key levels by clicking the button marked Level, on the right side of the function-key display.



If you don't have a mouse, you can execute function-key character sequences by holding down the Ctrl and Alt keys while pressing the desired function key. To use the keyboard to switch to a different function-key level, you can go back to the Function Keys dialog box and select a different Key Level. But there's a better way: You can assign a level-switch code to one of the function keys at each level, as described in the next section.

Assigning Special Codes to Function Keys

In addition to ordinary characters, you can assign control characters and a few commands to your function keys. Table 15-1 lists the available commands and their effects.

So, for example, to dial and log onto an information service, you can use a function-key assignment like this:

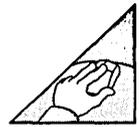
```
^C^M^$D02name^M^$D02password^M
```

This sequence starts by dialing whatever number you entered in the Phone Number dialog box. When the remote computer answers, your computer sends a Return character (sending Ctrl+M is equivalent to pressing the Enter key; the character sent is called Return).

Code	Effect
^A through ^Z	Sends Ctrl plus the associated letter. To send Ctrl+M, for example, enter ^M.
^\$C	Dials the telephone. This is a shortcut for the Phone menu's Dial command. It dials the number entered in the Phone Number dialog box.
^\$H	Hangs up the telephone. This is a shortcut for the Phone menu's Hangup command.
^\$B	Sends a 117-millisecond break code.
^\$Dnn	Pauses for <i>nn</i> seconds. Two digits are required; use a leading 0 for numbers less than 10.
^\$L1 through ^\$L4	Switches function-key levels. To switch to level 2, for example, use ^\$L2.

TABLE 15-1.

Special codes available for function-key assignments.



Your system then pauses for two seconds, allowing the remote computer to respond to the Return character. After the two-second delay, your system sends your name, followed by another Return character. After another two-second delay, your system sends your password followed by one more Return character.

You might have to experiment with a sequence like this to get the timing right; the amount of delay needed depends on the responsiveness of the remote computer. Note, however, that you do not need to include a delay to allow your own system to dial or the remote system to answer. After reading the dialing code (^\$C), Terminal does not send the next characters in the sequence until connection with the remote computer is established.



WINDOWS TIP: If you don't have a mouse and you're using all four function-key levels, you'll probably want to reserve one assignment at each level (F8, perhaps) as a level-switcher key. Assign ^\$L2 to that key at level 1, ^\$L3 at level 2, and so on.

Suppressing the Function-Key Display

If you're not using the function keys, or if you temporarily need to see as many lines of Terminal's buffer as possible, you can suppress the function-key display by opening the Settings menu and choosing Hide Function Keys.

Phone Number

The Phone Number dialog box tells Terminal what number to dial. The dialog box looks like this:

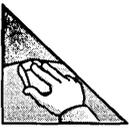
Phone Number

Dial:

Timeout If Not Connected In Seconds

Redial After Timing Out Signal When Connected

OK Cancel



You can enter the telephone number with parentheses and hyphens if you like. Terminal ignores these punctuation marks when it dials. You must include all the digits that need to be dialed, however. For example, if your number is in a different area code, be sure to include a 1—or whatever other prefix your long-distance carrier requires.

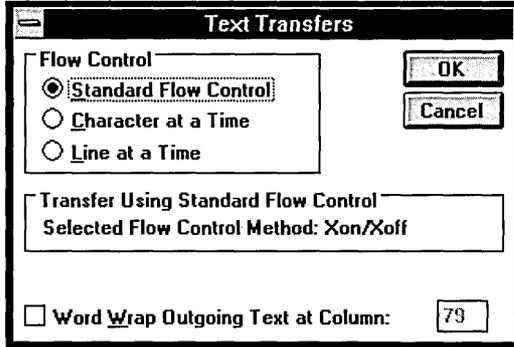
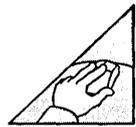
If you need to dial 9 or some other number to get an outside line, include that as well. And if you want the modem to pause after requesting the outside line (to allow time for the outside dial tone to sound), include one or more commas in the dialing sequence. Each comma causes a delay of about two seconds. For example, to have your modem dial 9, wait four seconds, and then dial 555-0971, enter the following in the Phone Number dialog box:

```
9,,555-0971
```

The Phone Number dialog box provides three options in addition to the phone number. The Timeout If Not Connected In box tells Terminal how long to wait before giving up if no one answers the phone. The default value, 30 seconds, is also the minimum value Terminal will accept. If you check the Redial After Timing Out check box, Terminal tries again if no one answers the phone. The interval between retries is the same as the Timeout If Not Connected value. To interrupt the retry sequence at any time, click Cancel. A check in the Signal When Connected box tells Terminal to beep when someone answers the phone. It's a good idea to check this box. That way, if you switch to a different program while Terminal dials, the beep tells you when to switch back.

Options for Transferring Text

The standard Xon/Xoff flow control system usually ensures that all characters you send are received by the remote system. (For information about Xon/Xoff, see “Flow Control,” page 452.) If you find that the remote system is losing characters with standard flow control, you can break lines into shorter lengths, or you can elect to transfer one line at a time or one character at a time by choosing the Settings menu's Text Transfers command. The Text Transfers dialog box looks like the one shown on the next page.

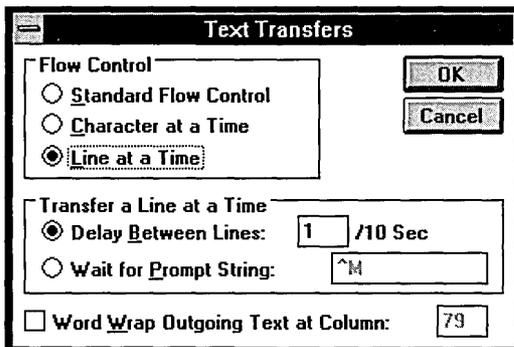


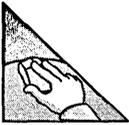
Breaking Lines with Word Wrap

The remote system might be losing characters because the lines you're sending are too long. You can have Terminal automatically “break” lines at a specified column position (on screen) by selecting the Word Wrap Outgoing Text at Column check box. The default word-wrap column is 79, because most screens display 80-character lines. To send shorter lines, enter a smaller number for the word-wrap column.

Transferring a Line at a Time

If the Word Wrap option doesn't solve your problem, try choosing Line at a Time. Transmission will be slower, but it might enable the remote system to process all your data. When you select Line at a Time, the dialog box changes to reveal two additional options, as shown below.

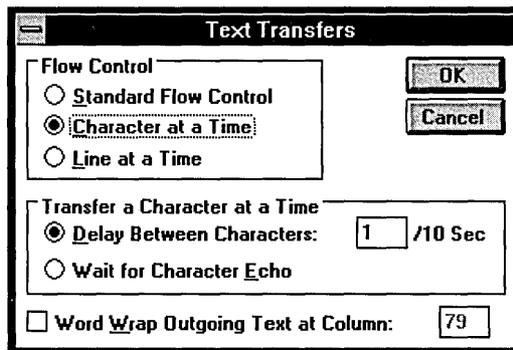




You can specify a timed delay between lines (in increments of a tenth of a second), or you can tell Terminal to pause after each line until it receives a specific character or string of characters from the remote system. If you choose the Wait for Prompt String option, the dialog box displays ^M (the Return character) as the default prompt string. That should work fine with systems that “echo” everything you send, as many systems do. If the remote system does not echo and a person is available on the other end of the line to interact with you, you can try a different prompt string, such as “OK.”

Transferring a Character at a Time

To slow down your transmission even further (increasing the likelihood that every character you send will be received), try the Character at a Time option. As with Line at a Time, there are two ways for this mode of transmission to proceed.

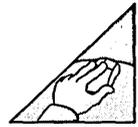


You can enter a timed delay between characters, in tenths of a second, or you can tell Terminal to wait for an echo (confirmation) of each character sent.

For more information about transmitting text, see “Transmitting Data from the Clipboard or the Buffer,” page 465, and “Sending and Receiving Files,” page 465.

Options for Transferring Binary Files

Terminal offers two error-checking methods (protocols) for transferring binary files—XModem/CRC and Kermit. The default choice is XModem/CRC. If you regularly use Kermit when communicating with a



particular remote system, choose the Settings menu's Binary Transfers command, and then choose Kermit in the dialog box. Your preference for Kermit will then be recorded in your settings file.

For more information about transferring binary files, see "Sending a Binary File," page 470, and "Receiving a Binary File," page 471.

Saving and Retrieving Settings Files

To save a settings file, use the File menu's Save or Save As command. These commands work exactly the same way in Terminal as they do in other Windows-based applications. Terminal uses the extension TRM unless you supply a different extension.

Note that the contents of Terminal's window are not saved in your settings file. Only the selections you make in the Settings menu's dialog boxes are saved.

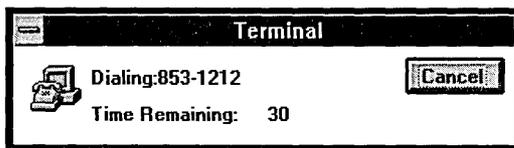
To retrieve an existing settings file, use the File menu's Open command. To begin creating a new settings file (thereby removing the current one from memory), use the File menu's New command.

Initiating a Telephone Call

To initiate a telephone call, load the settings file for the system you want to contact. Then open the Phone menu and choose Dial.

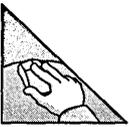
If you don't have a settings file for the system you want to call, choose the Dial command and Terminal will prompt you for the number to dial.

While Terminal is dialing, you see a display like this:



At the same time, the dialing command sent to your modem is displayed in Terminal's application window.

When the remote system answers, the message box disappears and your system beeps (if you selected the Signal When Connected check box



in the Phone Number dialog box). Depending on your modem and the baud rate you're using, you might also see a message in Terminal's window indicating that a connection has been established.

If a connection is not made with the remote system within the time specified in the Phone Number dialog box, Terminal hangs up. If the Redial After Timing Out option in the Phone Number dialog box has been selected, Terminal redials. You can stop this sequence at any time by clicking Cancel. For more information about the Phone Number dialog box, see "Phone Number," page 457.

Answering a Call Initiated by the Remote System

When someone at another computer is going to initiate a data link with your computer, you can put your modem in *auto-answer mode* so that the modem will answer the phone when it rings and establish the connection.

To put your modem in auto-answer mode, you must type your modem's auto-answer command in Terminal's window. To find out what to type, check your modem's documentation.

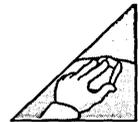
For example, if you're using a Hayes or Hayes-compatible modem, you type

```
ATS0=1
```

This character sequence sends a command to the modem, telling it to pick up the phone on the first ring. To have the modem pick up on a different ring, substitute a different number for the 1 in the command.

NOTE: Unlike most Windows NT commands, many modem commands are case-sensitive. You must type them exactly as they appear in your modem's documentation.

If your modem is not in auto-answer mode but you are working in Terminal when someone dials your telephone number, the word *RING* might appear on your screen. You can have your modem answer the call in this case by typing *ATA* and pressing Enter if you are using a Hayes or Hayes-compatible modem.



WINDOWS TIP: If you often use auto-answer mode, you can assign the command string to a function key. For a Hayes or Hayes-compatible modem, use the command string `ATSO=1^J^M`. (The `^J^M` characters are added so you don't have to press Enter.)

Hanging Up the Telephone

When you're through communicating, use whatever command the host computer requires to log off. Then pull down the Phone menu and choose Hangup.

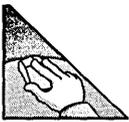
Creating a Transcript of Your Communications Session

You can create a transcript of some or all of your communications session in either of two ways. You can “echo” everything that's sent and received to your printer, or you can “capture” everything in a text file on disk.

To create a printed transcript, open the Settings menu and choose Printer Echo. A check mark will appear beside the Printer Echo menu command, and Print Manager will appear on your desktop.

To record your session in a text file, open the Transfers menu, choose Receive Text File, and fill out the dialog box. For more information about the Receive Text File options, see “Receiving a Text File,” page 468.

You can begin copying your session to the printer or a disk file at any time before or after you dial the telephone. And you can end the copy at any time, as well. To stop the printer echo, open the Settings menu and choose Printer Echo a second time. To stop capturing information in a text file, pull down the Transfers menu and choose Stop, or click the Stop button at the bottom of Terminal's window.



Timing a Communications Session

If you made your function-key assignments visible at the bottom of Terminal's window, in the lower right corner Terminal shows you either the current time of day or the number of minutes and seconds that have elapsed since the beginning of your most recent connection. The elapsed time can be particularly useful if you're connected to an information service that charges by the minute.

If you have a mouse, you can switch between time of day and elapsed time by clicking on the time window. If you don't have a mouse, choose Timer Mode from the Settings menu to switch the time display.

If the function-key assignments and the time window are not visible, open the Settings menu and choose Show Function Keys.

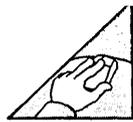
Inspecting and Selecting Text in Terminal's Buffer

Terminal stores text that is sent or received in a buffer. The entire contents of the buffer, including the portion of it that scrolled off the screen, are available to look at and use. As soon as the buffer is full, however, Terminal begins deleting the earliest lines in the buffer to make room for new material.

You can select text in the buffer the same way that you select text in other Windows-based applications—by dragging the mouse, or by positioning the insertion point and using the direction keys while holding down the Shift key.

In Terminal, selected text can be copied, but not cut, to the Clipboard. From there, you can paste the selection into a word processor, a spreadsheet, or other application.

A text selection cannot be deleted from the buffer. If you select a block and press the Del key, Terminal merely deselects the block. You can empty the entire buffer at once, however, by choosing the Edit menu's Clear Buffer command. You might want to do this after finishing one communications session and before beginning another—provided you no longer need the material in the buffer.



Transmitting Data from the Clipboard or the Buffer

Any text stored in the Windows Clipboard can be transmitted to a remote computer. Simply use the Edit menu's Paste command after establishing a connection with your party. The Clipboard's text appears in Terminal's window exactly as if you were typing it.

You can also transmit material stored in the buffer. Simply select it, and then choose the Edit menu's Send command. You might want to use this technique if you get a message from one party that you want to forward to another.

Sending and Receiving Files

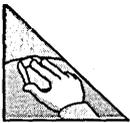
Commands on Terminal's Transfers menu allow you to send and receive two kinds of files: text files and binary files.

A *text file* is a file containing nothing but letters, numbers, punctuation symbols, and "control codes." (Control codes include functions such as carriage returns, line feeds, tabs, form feeds, and escape codes.) Examples of text files include the following:

- ▣ Any document created in Notepad or in a plain-text editor
- ▣ Any document created in a word processor and saved with a "text file," "text only," or "unformatted" option
- ▣ Any report formatted for the printer but redirected to a disk file (a Lotus PRN file, for example)
- ▣ A database file saved in a "comma-delimited," "comma-and-quote-delimited," or "fixed-length-record" format
- ▣ An MS-DOS batch file (a file with the extension BAT)

A *binary file* is any file that's not a text file. Examples include the following:

- ▣ An executable program file (one with the extension COM, EXE, or PIF)
- ▣ A program "overlay" file (such files often have the extension OVL)



- ❑ A “dynamic link library” file (one with the extension DLL)
- ❑ A formatted word processing document, such as the kind Write saves if you don’t use the “text only” option
- ❑ Any file containing graphics information
- ❑ Any file saved with a file-compression utility (one with the extension ZIP or ARC)

Text files are typically transmitted without any special error-checking protocol (other than parity, if you selected a parity-checking option in the Communications dialog box). This is not because errors are less likely to occur, but because they’re more easily detected. Usually, you can tell by the context whether a character has been transmitted incorrectly.



WINDOWS TIP: If you’re not sure whether a file is a text file, try loading it into Notepad. If you can read all of it in Notepad, it’s a text file.

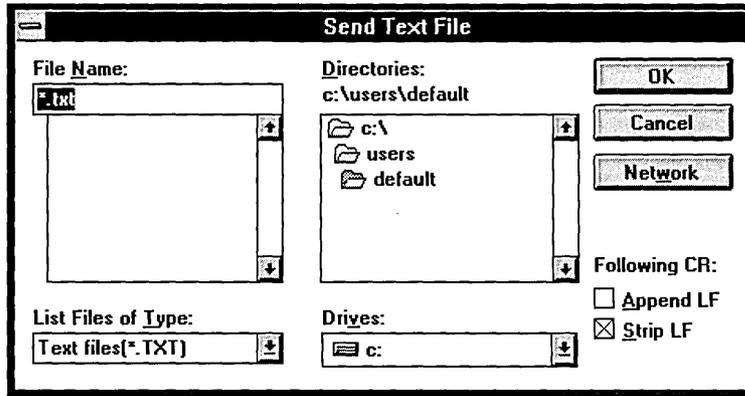
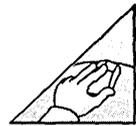
Binary files, on the other hand, are almost always sent and received with the help of some kind of error-checking routine because a transmission mistake in a binary file can be difficult to find and can have very serious consequences. For example, even a slight corruption in a program file can render it worthless. Terminal lets you choose between two protocols: XModem/CRC and Kermit.

Although it is not necessary, you can use one of Terminal’s error-checking protocols when sending or receiving a text file. To do so, follow the procedures for working with a binary file. You might want to do this if you’re using a “noisy” telephone line, for example.

Similarly, you can send or receive binary files without error checking by treating them as text files. This is not a good idea, however!

Sending a Text File

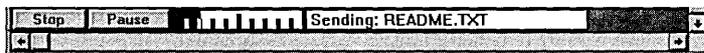
To send a text file, open the Transfers menu and choose Send Text File. You’ll see a dialog box like the one shown on the next page.



Specify the file you want to send, choose either of the options under Following CR, if appropriate, and click OK.

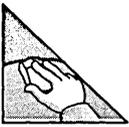
The Following CR options tell Terminal how to handle line endings in your file. If the remote system receives your file with extra space after each line (double spaced, for example, when your file is single spaced), select the Strip LF check box. (Strip LF is selected by default.) If everything arrives at the remote computer on a single line (or is single spaced when your file is double spaced), select the Append LF check box.

While your document is being sent, you'll see a display at the bottom of Terminal's window, like this:



On the left side of this display is a Stop button. Click this if you don't want to send any more of the file. Next to the Stop button is a Pause button. You can interrupt the transmission of your text file by clicking this button. When you click Pause, the button changes to Resume. If you don't have a mouse, use the Pause, Resume, and Stop commands on the Transfers menu to control your transfer.

The document bar, to the right of the Pause/Resume button, indicates how much of your file you've sent and how much remains. In the preceding illustration, for example, you can see that about 20 percent of the file has been transmitted.



The last element in this display shows the name of the file that Terminal is sending.

When all of your text file has been sent, Terminal removes the buttons, document bar, and filename from the screen.

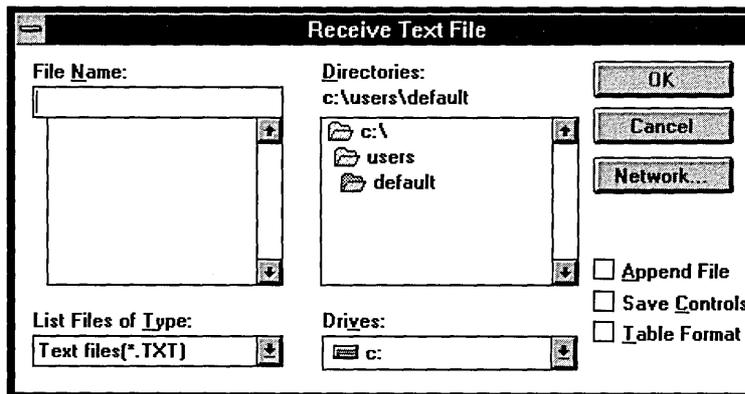
Viewing a Text File

Terminal includes a command that lets you inspect a file before you send it (or after you receive it). To inspect a file, open the Transfers menu, choose View Text File, and fill out the dialog box. Terminal scrolls your file into the buffer as if it were transmitting it, but nothing is sent.

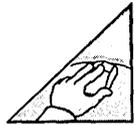
Receiving a Text File

Choosing Receive Text File puts Terminal in a “capture” mode, in which all characters passing through the buffer—those you send as well as those you receive—are copied to the specified file on your disk. Thus, you can use this command to receive text documents sent by a remote computer, and to transcribe all or part of a communications session.

To receive a text file, choose Receive Text File from the Transfers menu. You'll see the following dialog box.

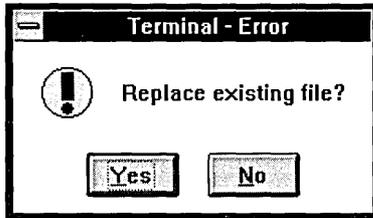


Specify the name of the file you want to receive, check any appropriate options, and click OK. You can choose all, some, or none of the following options: Append File, Save Controls, and Table Format.



Append File

Choose Append File if you want the incoming file to be *added* to an existing file on disk. If you do not select this box and you specify the name of a file that already exists, you'll see the following warning message.



If you click Yes, your new file will replace the existing file.

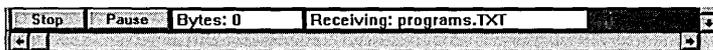
Save Controls

The Save Controls option, when selected, allows the receipt of control codes. Some applications include control codes for text formatting—even when you save a file as “text only.” If you do not select Save Controls, control codes other than Carriage Return and Line Feed are “stripped” from the file as it is received. When you’re receiving files that truly contain only text, the setting of this option has no effect.

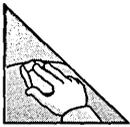
Table Format

If you select the Table Format option, Terminal replaces blocks of two or more spaces in the incoming file with tab characters. This option might enable you to create a neatly structured table from mainframe data in which numbers are separated by spaces instead of tabs.

While Terminal is receiving or capturing text to a disk file, you see a display at the bottom of the screen like this:



The Stop and Pause buttons allow you to terminate or interrupt the operation. When you select Pause, the button changes to Resume. If you don't have a mouse, you can use the Pause, Resume, and Stop commands on the Transfers menu to control the operation.



Use Stop when you have captured all the text you want. Otherwise, Terminal remains in capture mode until you quit Terminal.

Choosing a Protocol for Binary File Transfers

Terminal offers two error-detecting protocols for the transmission of binary files: XModem/CRC and Kermit. Select the protocol you want in the Binary Transfers dialog box (on the Settings menu).

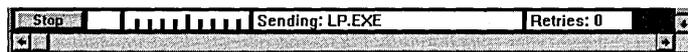
XModem/CRC is a faster protocol than Kermit, so you should select it if the system with which you're communicating supports it. Select Kermit if the remote system supports Kermit but not XModem/CRC.

Sending a Binary File

To send a binary file, open the Transfers menu, choose Send Binary File, and supply the name of your file in the Send Binary File dialog box. There are no other options.

Before file transmission can begin, the party with whom you're communicating must prepare his or her system to receive your file—using the same protocol that you are using. If you issue the Send Binary File command before the remote computer is ready, Terminal waits for a ready signal from the remote computer.

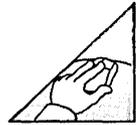
While the file transfer is in progress, you will not see any data move through the buffer, but you can track the progress of the transmission by looking at the display at the bottom of your window.



You can stop the transfer by clicking the Stop button (or choosing its equivalent on the Transfers menu), but you cannot pause a binary-file transfer.

Next to the Stop button, Terminal displays a document bar to show the progress of your file transfer. To the right of the document bar, you'll find the name of the file you're sending.

If any transmission errors are detected during the transfer, the block of data in which the error occurred is resent. The Retries number, to the right of your filename at the bottom of Terminal's window, indicates the



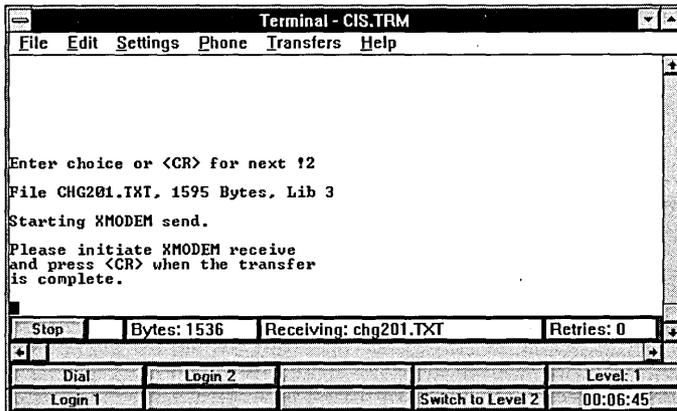
number of times Terminal has resent a block of data. If Terminal is unable to send or receive a block of data correctly after six consecutive retries, it notifies you that the file transfer has been aborted. Try again on a different telephone line or at a different time of day.

When the entire file has been sent, the buttons, document bar, filename, and retry counter disappear from your screen.

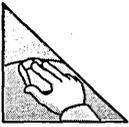
Receiving a Binary File

To receive a binary file, open the Transfers menu, choose Receive Binary File, and supply a name for the incoming file. There are no other options.

While the file is being received, you will not see any data moving through the buffer. You can track the progress of the file transmission by watching the byte counter in the display that appears at the bottom of your window.



This display looks and functions exactly like the one for a binary send, except that Terminal reports the number of bytes received instead of showing you a document bar. If you know the file's total size in bytes, you can use the counter to estimate how long the transmission will take.



Communicating Without Telephone Lines

You can use Terminal to transfer data directly from one computer to another without a modem. Here's how:

1. Connect the serial ports of the two computers with a null-modem cable.
2. Choose Communications from the Settings menu.
3. In the Communications dialog box, choose the Connector your null-modem cable is attached to and set the baud rate to 19200.
4. Be sure that all the options are the same on both computers.
5. Because your computers are directly connected, you won't need the Dial command. Use the rest of Terminal's commands and functions as if you were communicating over telephone lines.
6. If necessary, change the Local Echo or CR→CR/LF options in the Terminal Preferences dialog box so that you can see what you are typing.

Using Paintbrush

Paintbrush and OLE	475
You can embed Paintbrush images in other applications that support object linking and embedding.	
Starting Paintbrush	475
Paintbrush presents a blank canvas, a toolbox, and other features.	
Other Cursor Shapes	477
The cursor's shape depends on the particular drawing or editing tool you're using.	
The Size of the Picture	477
Your canvas can be as large as your desktop or as small as a postage stamp.	
Seeing the Larger Picture	479
Double-click the Pick tool for a full-screen view of your work. Or use the View Picture command or the Zoom Out command.	
Navigating on a Large Canvas	481
A set of keystroke commands can help you get around.	
Precise Cursor Positioning	483
When you need to be exact, choose the Cursor Position command.	

Working with the Mouse and Keyboard	484
Sometimes the keyboard is more convenient.	
Setting Up for a New Picture	485
Choose your canvas size and background color or pattern before using the New command.	
Drawing Basics	488
Each tool in the toolbox is specialized for a particular kind of drawing.	
Quick Fixes: Backspace and the Undo Command	489
Use Backspace for touchup and Undo for surgery.	
Exploring the Toolbox	491
The toolbox contains 18 handy tools for drawing and editing images.	
Working with Cutouts	504
Cutouts let you flip, skew, shrink, grow, tilt, sweep, and copy.	
Fine-Tuning Your Image with Zoom In	515
Zooming in lets you edit individual pixels.	
Working with Custom Color/Pattern Palettes	516
You can mix the paint yourself.	
Saving and Opening Paintbrush Files	518
Paintbrush lets you save and retrieve files in any of five file formats.	
Printing a Paintbrush Image	521
Adjust the margins, size, and output quality before you print.	

P

aintbrush is a program that lets you create and edit graphics images. You can use it to produce anything from simple text banners and line diagrams to complex works of art. You can start with a blank canvas, or you can modify a scanned image or an image imported from another Windows-based program, such as a chart from Microsoft Excel. Any graphics information that can be copied to the Clipboard as a bit map can be pasted into Paintbrush.

Paintbrush replaces Paint, the drawing program that was included in versions of Windows before 3.0. If you used Paint, you will appreciate the following improvements in Paintbrush:

- ❑ Images created in Paintbrush can be in color or in black and white.
- ❑ Paintbrush offers a more extensive set of drawing tools and editing commands than Paint.
- ❑ In addition to its default file format (BMP), Paintbrush reads and writes PCX files—a format that can be generated by many scanning programs and incorporated into a number of MS-DOS-based word processing programs (such as Microsoft Word and WordPerfect).

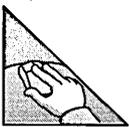
Images saved in Paint's file format (MSP) can be read into Paintbrush, but you can't save a Paintbrush image as a Paint file.

Paintbrush and OLE

The Windows NT version of Paintbrush supports object linking and embedding (OLE) as a server application. That means that pictures created or edited in Paintbrush can be embedded in documents created by OLE client applications, such as Write and Cardfile. For information about using embedded objects with OLE client applications, see "Linking and Embedding in Write," page 430, and "Linking and Embedding," page 554.

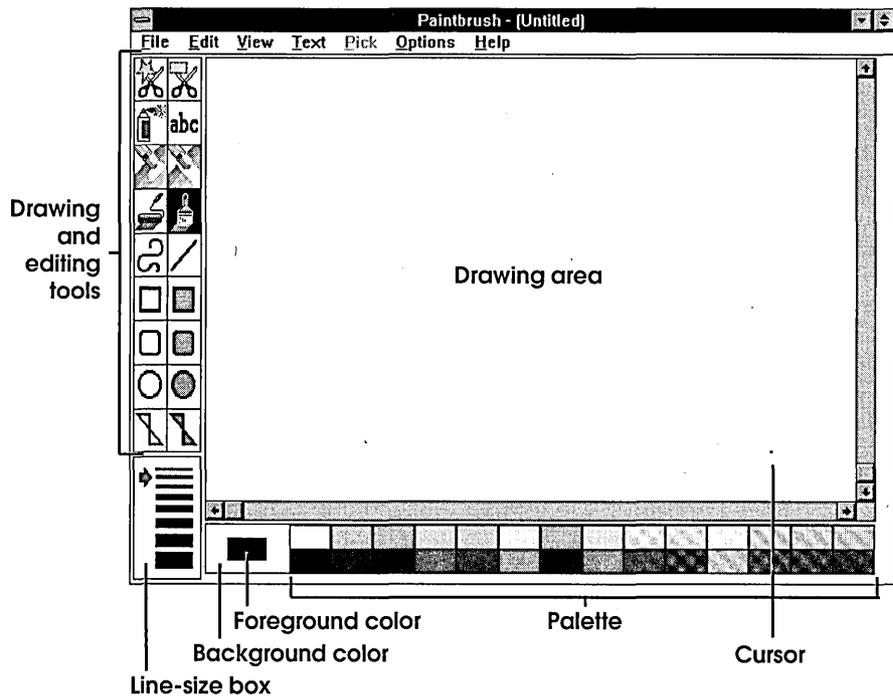
Starting Paintbrush

To get Paintbrush running, double-click its program-item icon. (It's in the Accessories program group, if you haven't moved it.) If you're using File Manager as your shell, double-click PBRUSH.EXE in your Windows directory.



PART 4: Running Applications

Paintbrush's opening screen looks like this:

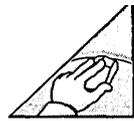


NOTE: This illustration, like all others in this chapter, is a black-and-white representation of a color VGA screen. On a color display you will see a palette of colors along the bottom of the window instead of the shades of gray shown here.

The blank area that makes up most of Paintbrush's window is the drawing area. The icons to the left of the drawing area are drawing and editing tools, which you use to draw and edit images in the drawing area.

Like an artist's palette, the color/pattern palette at the bottom of the window displays the available colors that you can apply to your canvas.

Immediately to the left of the color/pattern palette, Paintbrush displays the current foreground and background color selections. In the illustration above, Paintbrush's foreground color is black, and its background color is white.

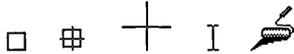


In the lower left corner of Paintbrush's window is the line-size box. The setting in the line-size box determines the thickness of the lines that Paintbrush draws.

The dot in the lower right corner of the drawing area is the cursor. Like the insertion point in a word processing program, the cursor indicates where your next drawing action will take place.

Other Cursor Shapes

The cursor's shape depends on the drawing or editing tool you're using. Paintbrush's default tool is the brush, and the cursor shape corresponding to that tool is the dot shown in the preceding illustration (you can make the dot appear bigger by choosing a broader brush). At other times during your work in Paintbrush, you will see the following cursor shapes:



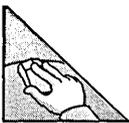
When you work with text in Paintbrush, the cursor is replaced by an insertion point and an I-beam exactly like the ones in Write and Notepad.

The Size of the Picture

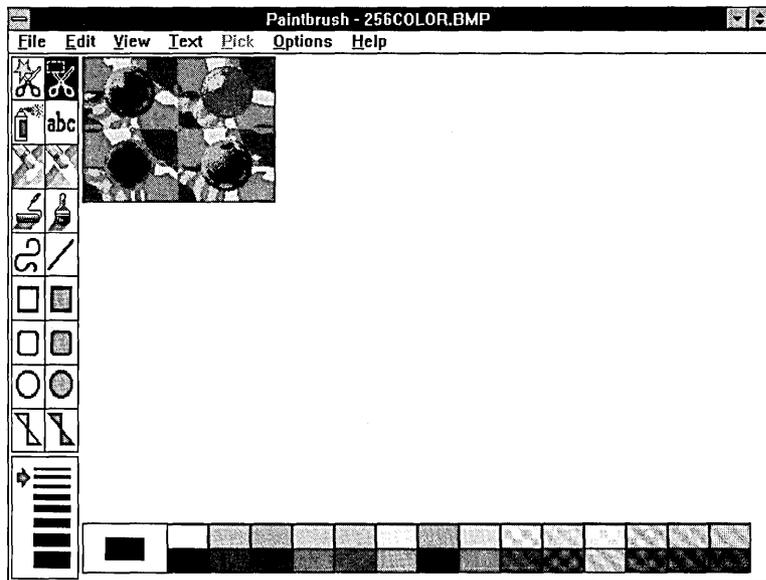
The actual size of your picture may be larger or smaller than what you see in Paintbrush's drawing-area window. When you first start Paintbrush, the program determines an optimum picture size, based on the type of display you're using and the amount of memory your computer has. But you can choose a larger or smaller canvas if you want.

The size of a picture is determined when you first begin to create the picture. You can't make a picture larger or smaller after you've begun. (You can enlarge or reduce selected sections of a picture, however.)

The illustration on the next page shows a picture that is much smaller than Paintbrush's drawing-area window.

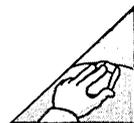


PART 4: Running Applications



And here's a picture that's considerably larger:





Seeing the Larger Picture

Paintbrush offers three ways to see more of a large picture. You can:

- ▣ Use the View Picture command.
- ▣ Remove the tools, line-size box, and palette.
- ▣ Use the Zoom Out command.

The View Picture Command

The View menu's View Picture command temporarily removes Paintbrush's toolbox, line-size box, palette, and scroll bars, leaving the maximum possible space for your picture. After you use this command, your very next keystroke or mouse click returns the display to its previous state, so you can't do any work with your picture in this mode. It's a useful command, though, when you want to see parts of your picture that lie just off-screen.



MOUSE TIP: As a mouse shortcut for the View Picture command, double-click the Pick tool—the scissors with the rectangle in the upper right corner of the toolbox.



KEYBOARD TIP: As a keyboard shortcut for the View Picture command, press Ctrl+P. Then press any key to return to the normal display.

Removing the Toolbox, Line-Size Box, and Palette

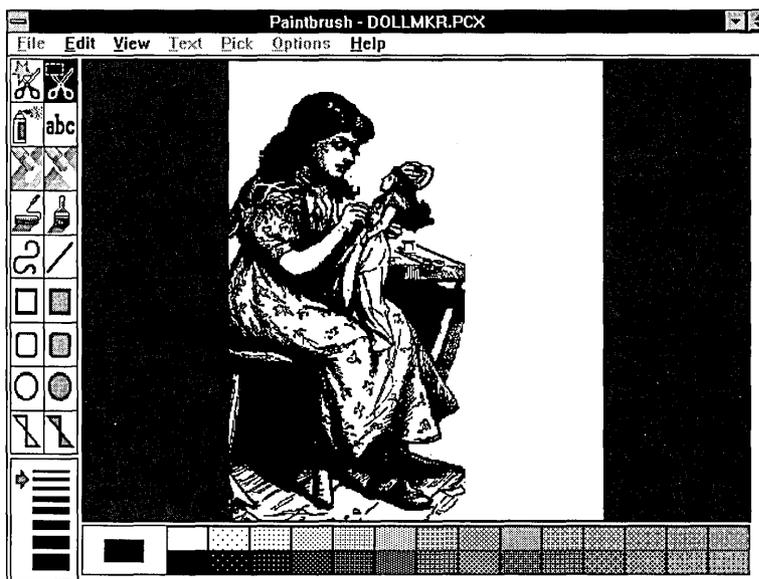
To work with the largest possible area of your picture, use the View menu's Tools and Line Size command and Palette command. Choosing Tools and Line Size extends the drawing-area window to the left edge of Paintbrush's application window. Choosing Palette extends the drawing-area window to the bottom of the application window.



Both commands are toggles. Choose Palette once, for example, to make the palette go away. Choose it again when you want to reuse the palette.

Zooming Out to Get the Whole Picture

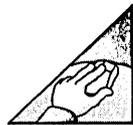
To see an entire large picture, use the View menu's Zoom Out command. Here's how the doll maker in the previous illustration looks after using the Zoom Out command:



When you zoom out, Paintbrush reduces your picture so that everything fits in the window—no matter how large the picture.

In addition to letting you see your entire picture, the Zoom Out command serves another valuable purpose: It allows you to select a larger area of your picture than would normally fit on the screen. For example, if you want to copy all of the doll maker from head to toe, you can zoom out, use the Pick tool to select the entire image, and then copy it to the Clipboard.

To return to Paintbrush's normal view after using the Zoom Out command, pull down the View menu again and choose Zoom In.



KEYBOARD TIP: Ctrl+N and Ctrl+O are keyboard shortcuts for Zoom In and Zoom Out, respectively. After you've zoomed out, Ctrl+N restores the normal display. A second Ctrl+N takes you to a closeup view. Similarly, after you've zoomed in, you can press Ctrl+O once to restore the normal view and a second time for the panoramic view.

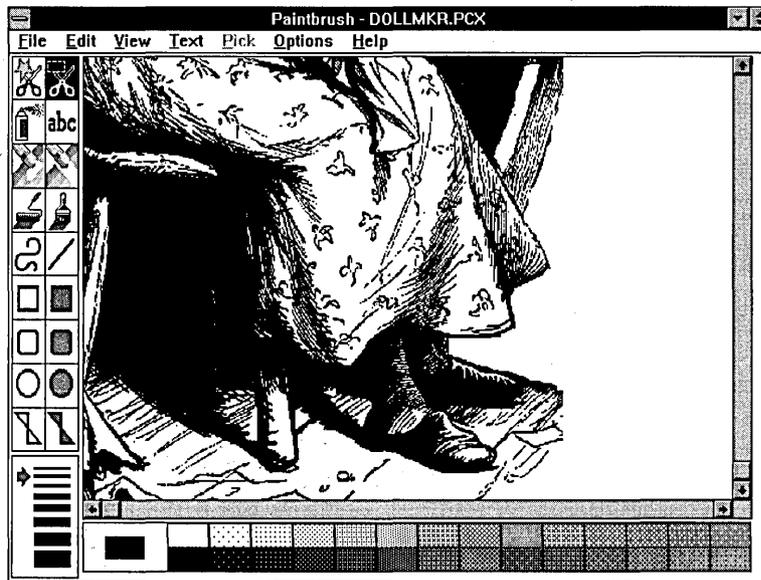
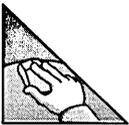


WINDOWS TIP: When you paste an image into Paintbrush, only the data that fits in the current drawing area is accepted. Anything that doesn't fit within that space is "clipped" from the pasted image. To paste an image larger than the size of your screen, therefore, do the following:

1. Choose the Image Attributes command from the Options menu to specify a canvas size large enough to accommodate the image you're about to paste.
2. Choose the View menu's Zoom Out command.
3. Paste the image.
4. Click anywhere outside the image area.
5. Choose the Zoom In command.

Navigating on a Large Canvas

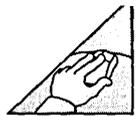
Paintbrush displays scroll bars whenever the picture is too big to fit in the drawing area. If you have a mouse, you can click the scroll bars to move the cursor to a different part of a large picture. For example, in the doll-maker graphic shown on page 478, a couple of clicks on the vertical scroll bar bring the doll maker's skirt and shoes into view, as shown on the next page.



If you don't have a mouse, you can scroll the window with the keystrokes listed in Table 16-1.

Keystroke	Effect
Shift+Right	Moves right one space
Shift+Left	Moves left one space
Shift+Down	Moves down one line
Shift+Up	Moves up one line
Shift+PgDn	Moves right one screen
Shift+PgUp	Moves left one screen
PgDn	Moves down one screen
PgUp	Moves up one screen
Home	Moves to the top of the picture
End	Moves to the bottom of the picture
Shift+Home	Moves to the left edge of the picture
Shift+End	Moves to the right edge of the picture

TABLE 16-1.
Navigation keystrokes in Paintbrush.

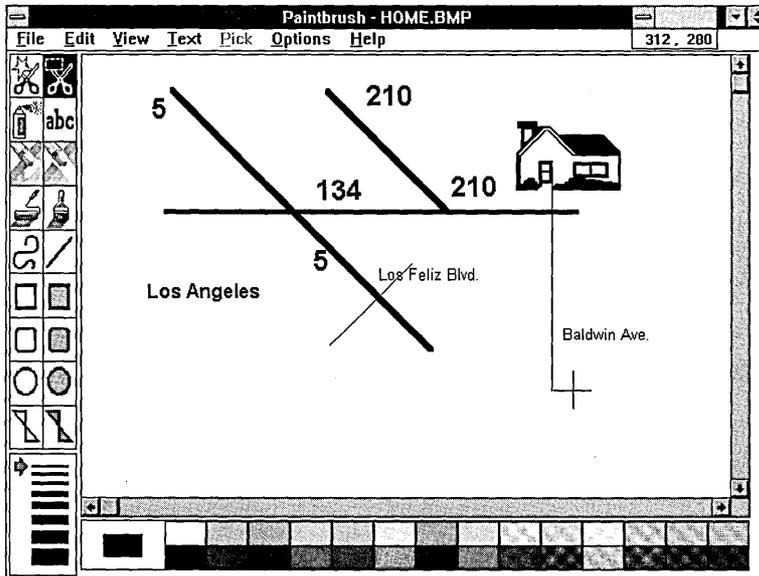


Precise Cursor Positioning

For certain kinds of work in Paintbrush, it's helpful to know precisely where the cursor is. For example, to draw two vertical lines of exactly the same length, you might find it convenient to know the distance from the beginning and end of the first line to the picture's edges. The View menu's Cursor Position command can provide the information you need.

When you choose Cursor Position, Paintbrush displays the x and y (horizontal and vertical) coordinates of the current cursor position in a small window near the upper right corner of the Paintbrush window.

In the following illustration, the center of the cross-hair cursor has x and y coordinates of 312 and 280, respectively. One tip of the cursor rests on the southern end of Baldwin Avenue. To add another street parallel to Baldwin extending the same distance south, you can maintain a y coordinate of 280 while moving the cursor the appropriate distance east or west of Baldwin. Then draw another straight vertical line at that new position.



The cursor position is reported by Paintbrush as an offset in *pixels* from the upper left corner of the picture. (A pixel is the smallest dot your



screen can display and the smallest increment by which you can move the cursor.) So, for example, the coordinate pair 312,280 represents a point 312 pixels to the right of and 280 pixels below the upper left corner of the picture. The 0,0 point is always the upper left corner of the picture, not the upper left corner of the drawing-area window.

As long as the Cursor Position display is on, Paintbrush updates your cursor coordinates as you move the cursor. If you get tired of looking at these constantly changing numbers, you can remove the display by pulling down the View menu and choosing Cursor Position again. Or you can double-click the Control-menu box in the corner of the cursor-position window.

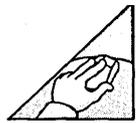
Working with the Mouse and Keyboard

You can do almost anything in Paintbrush with either the mouse or the keyboard. Generally, the mouse is easier to use, but for certain actions—such as positioning the cursor prior to drawing a line—you might want to use the keyboard. It's difficult to move the cursor a mere pixel or two with the mouse; on the other hand, it's tedious to draw a line halfway across the canvas by leaning on a direction key.

Paintbrush uses both left and right mouse buttons for commands. (If you use a three-button mouse, the middle button is inactive.) For example, to change the foreground color, you click on the palette using the left mouse button. To change the background color, you click with the right button.



MOUSE TIP: If you have used Control Panel to reverse the behavior of your mouse buttons, the term *left button* in this chapter always means *right button* to you—and vice versa.



Many drawing and editing procedures in Paintbrush involve clicking or dragging the mouse in the drawing area. If you don't have a mouse, you can carry out these same procedures using the keyboard equivalent shown in Table 16-2.

Mouse Action	Keyboard Equivalent
Click left button	Press Ins
Click right button	Press Del
Double-click left button	Press F9+Ins
Double-click right button	Press F9+Del
Drag, holding left button	Hold down Ins and use direction keys
Drag, holding right button	Hold down Del and use direction keys

TABLE 16-2.
Keyboard equivalents for mouse actions.

If you are working without a mouse, you can use the Tab key to move from the drawing area to the toolbox. Press Tab again to move to the line-size box, and press a third time to get to the color/pattern palette.

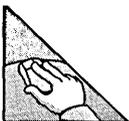
Setting Up for a New Picture

Before beginning a new picture, you have to prepare your canvas. In particular, you need to decide the following:

- ▣ The background color or pattern that will be used for your entire picture
- ▣ The size and shape of the picture
- ▣ Whether you want to work in color or in black and white

After you apply the first brush stroke to a new picture, you can't change any of these items.

NOTE: If your system uses a monochrome display, you can't create color pictures. You can load a color picture into Paintbrush, but Paintbrush changes it to black and white.



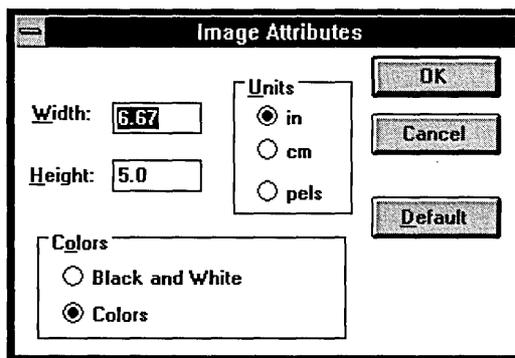
Choosing a Background Color or Pattern

Paintbrush always uses one color (or one black-and-white pattern) as a default background. You might think of this as the color of the canvas before you start to paint. You can change the background color in any part of the picture, but after you start a picture, you can't change the canvas as a whole.

To select a background color or pattern, put the cursor on the color or pattern of your choice in the color/pattern palette and click the right mouse button.

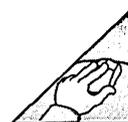
Establishing the Size and Shape of Your Picture

To specify the size and shape of your picture, choose Image Attributes from the Options menu. You'll see a dialog box like the one shown in the following illustration.



Specify the width and height you want for your picture, in whatever units you find most convenient to work with. You can select inches, centimeters, or pixels (abbreviated as *pels* in the dialog box).

To use the picture dimensions that Paintbrush considers optimum for your display and the amount of memory in your system, click Default.



Choosing Color or Black and White

The Options menu's Image Attributes command allows you to choose whether your image will be in color or in black and white. (If you're working at a monochrome display, the Colors option is grayed out.)

When making this choice, it's a good idea to consider the medium in which you're most likely to output your new image. Color is more interesting to work with than black and white, but if you're going to send your image to a black-and-white printer, you'll get better control of the final product by working in black and white.

NOTE: If the last picture you created was in color and you want your next one to be in black and white, proceed as follows: First select Black and White in the Image Attributes dialog box.

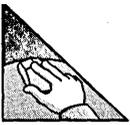
Choose a black-and-white background pattern, as described on the previous page, and then choose New on the File menu. Paintbrush performs a similar reduction if you open a 256-color bit map on a system that uses a 16-color display driver. The 256 colors of the original file are displayed in the nearest available 16 colors, and if you save the file to disk, Paintbrush saves it as a 16-color file.



MOUSE TIP: As a shortcut for the New command, you can double-click the Eraser tool, which is the third tool down on the right side of the toolbox—directly under the tool marked *abc*.

Installing Your New Canvas

After you make your dimension and color choices, click OK in the Image Attributes dialog box. Paintbrush then presents a new, blank canvas with the attributes you selected. (If you have an unsaved picture when you click OK, Paintbrush gives you a chance to save it before proceeding.)



Drawing Basics

After you set up your canvas as described in the previous section, you're ready to start drawing. In general terms, the process of putting an object on the canvas goes as follows:

1. Select a drawing tool.

Each drawing tool is specialized for a particular kind of object. To draw straight lines, for example, select the Line tool; to create a box, select one of the box tools—and so on. For information about the properties of the various tools, see “Exploring the Toolbox,” page 491.

To select a tool, click it.

2. Select a line width from the line-size box.

You can draw with lines from one to nine pixels wide. Simply click the width you want to use.

3. Select a foreground color or pattern.

To select a foreground color or pattern, use the mouse to point to the appropriate box in the color/pattern palette, and then click the left mouse button.

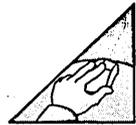
If you don't find the color or pattern you want on the palette, you can create it with the Edit Colors command. For information about this command, see “Working with Custom Color/Pattern Palettes,” page 516.

4. Select a background color or pattern.

Some tools use the background color as well as the foreground color. Others use the foreground color only. You only need to concern yourself with this step if the tool you're about to apply makes use of the background color.

To select a background color, use the mouse to point to the appropriate box in the palette, and then click the right mouse button.

5. Draw.



While you are drawing, before the new object is “pasted down,” you can touch it up by pressing Backspace or remove it altogether with the Edit menu’s Undo command. For more information, see “Quick Fixes: Backspace and the Undo command,” below.

6. When you’re satisfied with the new object, paste it down to make it a permanent part of your picture, as described below.

An object that has been pasted down can still be erased or edited, but it can’t be removed in one fell swoop with the Undo command or touched up with Backspace.

Pasting Down an Object

To paste down an object, do any of the following:

- ❑ Select another tool (or reselect the same one).
- ❑ Use any command on the View menu except Cursor Position.
- ❑ Scroll the picture.
- ❑ Change the size of the Paintbrush application window.
- ❑ Change the position of the Paintbrush application window.
- ❑ Switch to a different application.

As soon as you take any of these actions, the Undo command appears grayed out on the Edit menu.

Quick Fixes: Backspace and the Undo Command

Immediately after you draw a new line, circle, rectangle, or other object, Paintbrush gives you two easy ways to make adjustments to it. These quick-fix options—the Backspace key and the Undo command—become unavailable as soon as you paste down your new object.

Touching Up with the Backspace Key

When you press Backspace after drawing a new object, the cursor turns into a square with an X inside. This new cursor is a special-purpose eraser



that can rub out any part of your new object but has no effect on objects already pasted down. You'll find the Backspace eraser handy for such tasks as shortening lines that went farther than you intended.

To touch up an object before you paste it down, press Backspace. Then drag the eraser over any part of the new object that you want to remove.



WINDOWS TIP: You can change the width of the Backspace eraser by selecting a different line width in the line-size box. For very careful erasing, select the narrowest width.

Note that the Backspace key works differently when you're using the Text tool—the one marked *abc*. With that tool, Backspace erases the character to the left of the insertion point—exactly as it does in most word processing programs.

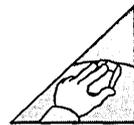


WINDOWS TIP: Be sure to paste down any object that you're satisfied with. That way, you won't inadvertently remove good work the next time you use Undo or the Backspace key. Remember, you can always use Paintbrush's other editing procedures to alter your pasted-down objects later.

Another good way to protect yourself against accidental erasures is to save your picture on disk at regular intervals. For information about Paintbrush's Save command, see "Saving and Opening Paintbrush Files," page 518.

Radical Surgery with the Undo Command

The Edit menu's Undo command wipes out everything you've added to your canvas since the last time you pasted down an object. Because some



of Paintbrush's drawing tools may not always give you exactly what you have in mind the very first time you use them, you're likely to find the Undo command invaluable.

Exploring the Toolbox

Paintbrush's toolbox includes the following 18 tools:



The Scissors tool selects an irregularly shaped *cutout*. (A cutout is a selection that can be cut, copied, moved, and manipulated in a number of ways. For more information about cutouts, see "Working with Cutouts," page 504.)



The Pick tool selects a rectangular cutout.



The Airbrush creates "spray-paint" effects.



The Text tool adds letters, numbers, and words in various typefaces, sizes, and styles.



The Color Eraser changes an object's foreground color.



The Eraser removes objects from a picture.



The Paint Roller fills enclosed shapes with the foreground color.



The Brush creates freehand shapes.



The Curve tool draws smooth curves.



The Line tool draws straight lines.



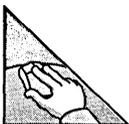
The Box tool creates unfilled rectangles.



The Filled Box tool creates rectangles filled with the foreground color.



The Rounded Box tool creates unfilled rectangles with rounded corners.



The Filled Rounded Box tool creates rectangles with rounded corners filled with the foreground color.



The Circle/Ellipse tool creates unfilled ellipses or circles.



The Filled Circle/Ellipse tool creates circles and ellipses filled with the foreground color.



The Polygon tool creates irregular closed shapes.



The Filled Polygon tool creates irregular closed shapes filled with the foreground color.

Think of the Scissors, the Pick, the Color Eraser, and the Eraser as editing tools, and the rest as drawing tools. We'll look at the drawing tools first; then we'll take up the editing tools.

Using Paintbrush's Drawing Tools

Paintbrush provides 14 drawing tools that let you create freehand images, lines, curves, and predefined shapes.

Drawing with Spray Paint: The Airbrush Tool

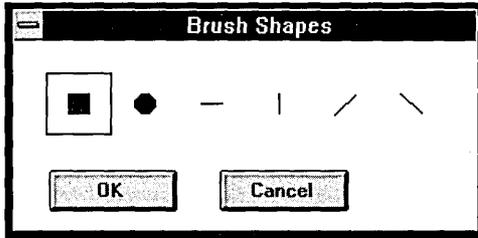
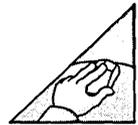
The Airbrush tool deposits a circular pattern of dots in the foreground color. To get a wide dot pattern, select a wide line in the line-size box; for a narrow pattern, select a narrow line.

To draw with the Airbrush, hold down the left mouse button and drag the mouse. The speed with which you move the mouse affects the density of the line; the more slowly you move, the denser the line you get.

Freehand Drawing: The Brush Tool

The Brush tool works somewhat like a normal paintbrush. To use the Brush, hold down the left mouse button and drag the mouse across the canvas. Paintbrush deposits the foreground color along the path of the Brush.

You can modify both the width and the shape of the Brush to get different kinds of brush strokes. To change the width, select one of the lines in the line-size box. To change the shape, open the Options menu and choose Brush Shapes. You'll see the following dialog box.



The default brush shape is the one on the left in the illustration. It produces strokes of even width in all directions. (The big square around the little square is not part of the brush shape; it merely indicates that the shape is currently selected.) If you're adept at calligraphy, try one of the diagonal shapes with a broad brush width; that combination will give you narrow strokes in the direction parallel to the Brush's own shape and broad strokes in the perpendicular direction.



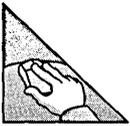
MOUSE TIP: As a shortcut for the Brush Shapes command, double-click the Brush tool icon (the fourth icon down on the right side of the toolbox).

To draw with the Brush, hold down the left mouse button and drag.

The Brush is primarily for freehand drawing. If you want straight lines, it's best to use the Line tool instead (unless you want to take advantage of one of the non-square brush shapes).

You can, however, draw perfectly straight horizontal and vertical lines with the Brush. To do that, hold down the Shift key as you draw. To get perfect right angles, do the following:

1. Hold down the Shift key.
2. Draw the horizontal or vertical leg of the right angle.
3. Move the cursor in the direction of the other leg of the right angle while still holding down the mouse button and the Shift key.
4. Release the Shift key before releasing the mouse button. A straight line appears between the cursor and the first line.



Straight Edges: The Line Tool

The Line tool creates straight lines in the foreground color. The current setting in the line-size box determines the width of the line.

To use the Line tool, put the cursor where you want the line to begin, press and hold down the left mouse button, move the cursor to the place where you want the line to end, and then release the mouse button.

Paintbrush always gives you the straightest, smoothest line possible on your display. For a perfect horizontal, vertical, or 45-degree diagonal line, hold down the Shift key as you draw.

Smooth Curves: The Curve Tool

The Curve tool lets you create a line with either one or two curves in it. Follow these steps:

1. Put the cursor where you want your curved line to begin.
2. Hold down the left mouse button and move the cursor to the place where you want the curved line to end. Release the mouse button.

At this point, you have a straight line.

3. Put the cursor near the part of the line that you want to bend. Hold down the left mouse button and move the cursor in the direction you want to bend the line.

Now you have a line with one curve.

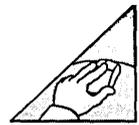
4. If you want to bend the line only once, click again without moving the cursor. If you want a second bend, repeat step 3.

It might take some practice to get accustomed to the behavior of the Curve tool. If your curve isn't shaping up the way you want it, click the right mouse button any time before finishing the second bend to remove the line and start over.

Like the Line, Brush, and Airbrush tools, the Curve tool does its work in the current foreground color. Your choice in the line-size box determines the width of the curved line.

Perfect Rectangles: The Box and Filled Box Tools

To create rectangles and squares, use either the Box tool or the Filled Box tool. The Box tool draws an open rectangle in the current foreground color.



The Filled Box draws a rectangle in the current background color and fills it with the current foreground color. The width of the rectangle's borders is determined by the line-size setting.

To use either tool, first put the cursor where you want one corner of your rectangle to be. Then hold down the left mouse button and drag the mouse toward the diagonally opposite corner. As you move the mouse, Paintbrush expands the rectangle. When you get to the place where you want the opposite corner, release the mouse button.

To draw a perfect square, hold down the Shift key as you drag the mouse.

Beveled Rectangles: The Rounded Box and Filled Rounded Box Tools

To draw open or filled rectangles with rounded corners, use the Rounded Box tool or Filled Rounded Box tool. These tools work exactly like their unrounded counterparts, described under the previous heading.

Circles and Ovals: The Circle/Ellipse and Filled Circle/Ellipse Tools

To create circles or ovals (ellipses), use the Circle/Ellipse tool or Filled Circle/Ellipse tool. The Circle/Ellipse tool draws a circle or ellipse in the current foreground color. The Filled Circle/Ellipse tool draws a circle or ellipse in the current background color, and fills it with the current foreground color.

To use either tool, first put the cursor where you want the corner of an imaginary rectangle that will contain your figure. Then hold down the left mouse button and drag the mouse to expand the figure. When the figure reaches the desired size, release the mouse button.

To draw a perfect circle, hold down the Shift key as you drag the mouse.

Irregular Closed Shapes: The Polygon and Filled Polygon Tools

To create any kind of closed shape other than a rectangle, square, circle, or ellipse, use the Polygon tool or the Filled Polygon tool. With these tools, you can draw as many straight line segments as you want. Each segment



begins where the last one ended. When you double-click the left mouse button, Paintbrush closes the figure by connecting the end of your last line segment with the beginning of your first.

You can create anything from simple triangles to complex shapes with overlapping lines. If you select the Polygon tool, Paintbrush draws the lines in the foreground color. If you select Filled Polygon, Paintbrush draws with the background color and fills the resulting figure with the foreground color. In either case, the width of the lines is determined by the current line-size setting.

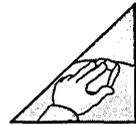
To draw with either polygon tool, follow these steps:

1. Put the cursor where you want your first line segment to begin.
2. Hold down the left mouse button, and drag the mouse to the end of the first line segment. Release the mouse button.
3. Move the cursor to the place where you want your next line segment to end, and click the left mouse button.
4. Repeat step 3 until you reach the end of the next-to-last line segment in your figure.
5. Double-click the left mouse button to close the figure.

For perfect horizontal, vertical, or 45-degree diagonal line segments, hold down the Shift key as you click the mouse button at the end of the segment.



MOUSE TIP: The right mouse button cancels any drawing made with the Line, Curve, Box, Filled Box, Rounded Box, Filled Rounded Box, Circle/Ellipse, Filled Circle/Ellipse, Polygon, and Filled Polygon tools—as long as the drawing action isn't completed. Therefore, for all except the Curve, Polygon, and Filled Polygon, you must click the right mouse button while still holding the left button to cancel the action.



Filling an Enclosed Shape: The Paint Roller Tool

The Paint Roller tool allows you to fill any enclosed portion of your picture with the current foreground color. When you select this tool, the cursor changes to look like this:



To use the Paint Roller, position the lower left tip of the cursor anywhere within the space you want to fill. Then click the left mouse button.

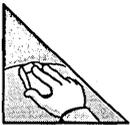
Note that if the space you want to fill has any gaps—even a gap of a single pixel—the rolled-on paint will leak through the gap. If that happens, wait until the roller has finished painting, use the Undo command, patch the leak, and try again. To patch a very small leak, you might want to use the Zoom In command. For information about this command, see “Fine-Tuning Your Image with Zoom In,” page 515.

Letters, Numbers, and Words: The Text Tool

Paintbrush’s Text tool is a special kind of implement. You don’t really draw with this tool; instead you select typefaces, styles, and point sizes, and then insert characters from the keyboard or the Clipboard. Nevertheless, after you’ve pasted down your text characters, they behave exactly like any other component of your Paintbrush image.

The general procedure for adding text to a Paintbrush picture is as follows:

1. Select the Text tool.
The cursor becomes an I-beam.
2. Select a typeface, font style, and point size.
3. Put the I-beam at the place where you want your text to begin, and then click the mouse.
An insertion point appears.
4. Type. If you want to enter text from the Clipboard, choose Edit Paste or use its keyboard shortcut, Ctrl+V.

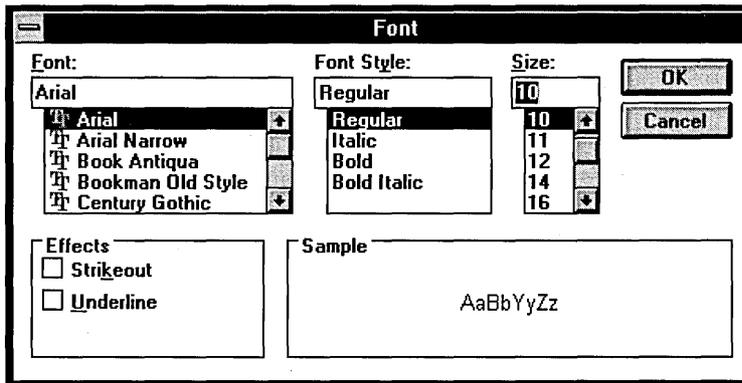


PART 4: Running Applications

5. Paste down the text you just typed. (For information about this, see “Pasting Down an Object,” page 489.) Or click the mouse to move the insertion point.

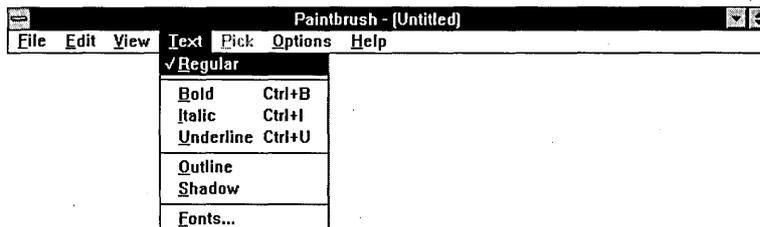
Until you paste down the text, you can change its typeface, size, or style. You can also erase it one character at a time by backspacing over it.

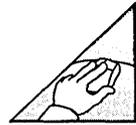
To select a font, open the Text menu and choose Fonts. The following dialog box appears.



You can select any typeface, style, and point size available on your system using the drop-down list boxes. For more information about fonts, see “Working with Fonts,” page 40.

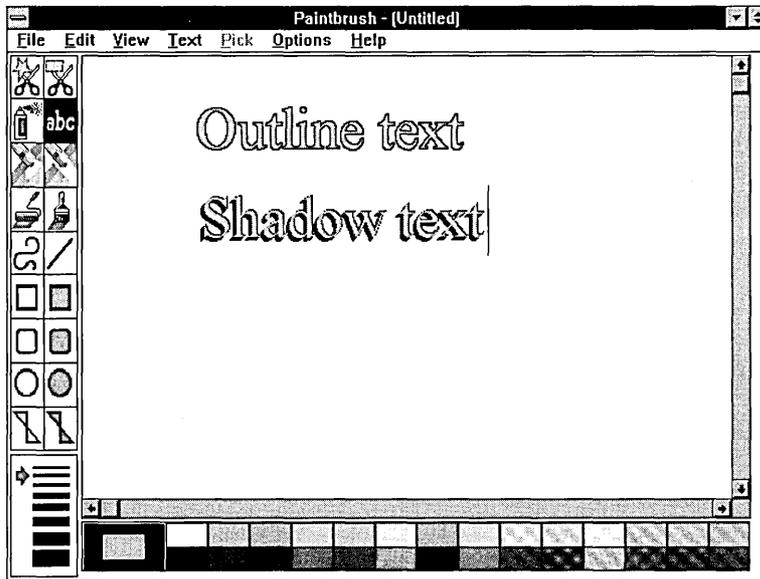
You can also choose Bold, Italic, Underline, Outline, and Shadow styles directly from the Text menu, shown below.





You can choose multiple styles from the Text menu to produce special effects such as Bold Italic or Italic Shadow Underline. (Paintbrush does not, however, allow you to combine Outline and Shadow styles.) If you choose a style and change your mind, choose it again to deselect it. To deselect all styles, choose Regular.

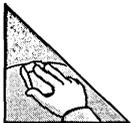
When you choose Outline, Paintbrush draws a border one pixel wide around each character using the current background color. When you choose Shadow, Paintbrush adds a drop shadow to the left of and below each character using the current background color. The following illustration shows examples of Outline text and Shadow text.



Using Paintbrush's Editing Tools

Changing Colors: The Eraser and the Color Eraser

Paintbrush's toolbox includes two tools for erasing objects: an Eraser tool and a Color Eraser tool. The Eraser "erases" objects of any color; the Color Eraser "erases" only those objects drawn in the current foreground color.



The word *erases* is in quotation marks because neither of these tools works quite like the rubber tip at the end of your pencil. When you erase something in Paintbrush, you change the object from its present color to the current background color.

To use the eraser tools to completely erase an object, set the current background color to match the default background color—the color of your entire canvas before you started drawing on it. The objects you “erase” with the eraser tools then become invisible because they blend in with the background.

You can also use either eraser tool as a color-switcher. Simply set the current background color to some shade other than the default background.

When you select the Eraser tool, the cursor changes to an open square. When you select the Color Eraser, the cursor changes to a square with a cross in it.

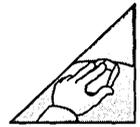
To erase an object (or change its color), put the eraser cursor at one end of the object, press and hold the left mouse button, and drag the mouse. Whatever the cursor passes over is erased. If you change your mind, choose the Edit menu’s Undo command before selecting your next tool, scrolling the Paintbrush window, or taking any other action that “pastes down” your erasure. For more information, see “Pasting Down an Object,” page 489.

You can make the eraser fatter or thinner by changing the selection in the line-size box. For careful work, select the top line in the box. When you want to wipe out large areas with a few broad strokes, pick a line near the bottom.

For careful work in a color picture, select the Color Eraser tool and set the foreground color to match the object you want to erase. That way, if your eraser strays onto an object in a different color, that object is not affected.



WINDOWS TIP: When you’re working with a black-and-white picture, the Eraser and the Color Eraser perform the same function.



The Color Eraser has a global option that you can use to change all objects of one color into another color—much like a search-and-replace command in a word processor. To use this option, double-click the color eraser.

For example, if you grow tired of looking at red lines in your picture and decide you'd rather see green, you can make the switch by choosing red as the foreground color and green as the background color, and then double-clicking the Color Eraser tool.

This global option works on only the portion of your picture that you can see in Paintbrush's drawing-area window. If your picture extends beyond the window, you need to scroll each section into view and repeat the global switch.

The Color Eraser and Eraser have almost identical toolbox icons, but you can tell them apart by remembering the difference between the two tools, shown below.



Color
eraser

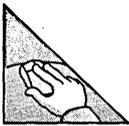


Eraser



WINDOWS TIP: Be careful when using the Color Eraser's global-switch option if the current foreground color is a *dithered color*. Because a dithered color is actually a mixture of pixels in two or more solid colors, the Color Eraser under these circumstances modifies each component color. As a result, areas of your picture that you wanted to leave alone might change color.

To be safe, save your work before you use any command—such as a global color switch—that has the potential to alter your picture radically. Then check the results after you use the command. If you don't like what you see, use Undo. If you discover a problem after it's too late to use Undo, use File Open to reload the picture you saved.



The Eraser tool alters all objects in its path, regardless of their color, so its icon shows a white stripe across several strips of contrasting colors. The Color Eraser affects only the current foreground color, so its icon shows the colored strips without the white stripe.

Defining Cutouts: The Scissors and the Pick

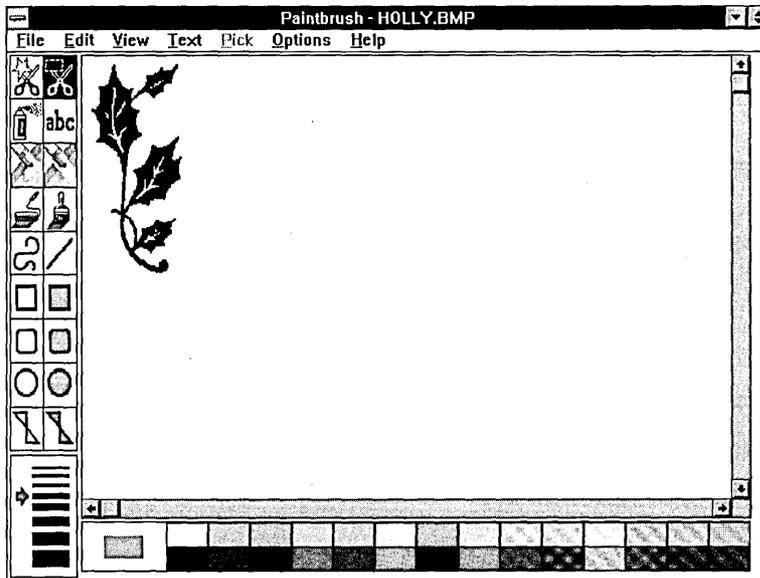
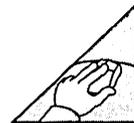
The tools at the top of the toolbox—the scissors with the star and the scissors with the rectangle—are used for specifying *cutouts*—defined areas of a picture that can be manipulated in various ways. (For information about cutouts, see “Working with Cutouts,” page 504.) The tool with the scissors and star is called the Scissors tool; the one with the scissors and rectangle is called the Pick tool.

The Scissors tool allows you to define an area of any shape in your picture as a cutout. The Pick tool allows you to define a rectangular area.

Regardless of which tool you use, your cutout can be no larger than the drawing-area window. To define an area that extends beyond the window, use the Zoom Out command. For information about this command, see “Zooming Out to Get the Whole Picture,” page 480.

The Scissors tool is useful when you want to select an irregularly shaped object without including any of the surrounding canvas. For example, if you want to work with one branch of holly from the illustration on the next page, the Scissors is the appropriate tool.

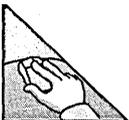
To use the Scissors, start by clicking the Scissors tool icon. Then put the cross-hair cursor anywhere along the edge of the object you want to select. Press and hold down the left mouse button, and drag the cursor around the object. Paintbrush displays a solid line in the path of the cursor. When you have the object surrounded, release the mouse button. Paintbrush changes the solid line surrounding the object to a dotted line to indicate that the object is selected. (You don’t actually have to close the selection; when you release the mouse button, Paintbrush connects the current cursor position to the place where you started.)



WINDOWS TIP: You might find the keyboard more effective than the mouse when you need to select a convoluted shape such as the holly shown in the illustration. To use the Scissors tool with the keyboard, position the cursor near an edge of the object to be selected. Hold down the Ins key and use the direction keys to encircle the object. Release the Ins key when you complete the selection.

When the object you want to select is rectangular or when it doesn't matter if you pick up a little background canvas along with the object, the Pick tool is handier to use than the Scissors.

To use the Pick tool, position the cursor at one corner of the object you want to select. Press and hold down the left mouse button, and drag the mouse toward the diagonally opposite corner. When you get there, release the mouse button.



MOUSE TIP: The right mouse button cancels any selection made with the Scissors and Pick tools—but only if the editing action isn't completed. Therefore, you must click the right mouse button while still holding the left button to cancel the selection.

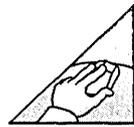
Working with Cutouts

After you define a cutout, you can do any of the following with it:

- ❑ Cut it to the Clipboard.
- ❑ Copy it to the Clipboard.
- ❑ Copy it to a disk file as a bit map.
- ❑ Move it to another place within the current picture.
- ❑ Copy it to another place within the current picture.
- ❑ “Sweep” it across the current picture, leaving a trail of copies in its wake.
- ❑ Change its size or shape.
- ❑ Tilt it.
- ❑ Flip it horizontally.
- ❑ Flip it vertically.
- ❑ Reverse its colors.

Cutting or Copying a Cutout to the Clipboard

To put your cutout on the Clipboard, pull down the Edit menu and choose Cut or Copy. If you choose Cut, Paintbrush removes it from the current picture and transfers it to the Clipboard. If you choose Copy, Paintbrush puts a copy of the cutout on the Clipboard and leaves the current picture unchanged.



WINDOWS TIP: Paintbrush's Cut and Copy commands normally transfer information to the Clipboard in two formats: *picture* and *bit-mapped*. (For more information about these formats, see "Viewing the Clipboard's Contents," page 176.) If the application you are pasting into doesn't need the picture format, you can force Paintbrush to transfer only the bit-mapped format. To do so, choose Omit Picture Format from the Options menu. The bit map-only alternative is quicker and uses less memory, but picture format provides better quality at different resolutions and sizes.

When you remove a cutout to the Clipboard using the Cut command, the area that the cutout occupied assumes the current background color. If you want this area to look like blank canvas after the cutout is gone, be sure the current background color matches your initial (default) background color.

Copying a Cutout to a Disk File

You can copy a cutout to a disk file as well as to the Clipboard. It's a good idea to do this if you think you might want to paste your cutout into a variety of different pictures, if you're planning to use it in another application (such as Cardfile or Write), or if you want to use the cutout as wallpaper for your Windows desktop.

To save a cutout as a disk file, use the Edit menu's Copy To command and fill out the dialog box that appears. The dialog box is identical to the one presented by the Save As command—the command you use to save an entire picture for the first time (or to save it under a new name). For information about this dialog box, see "Saving and Opening Paintbrush Files," page 518.



Pasting a Cutout from the Clipboard

To paste a cutout from the Clipboard into the current picture, choose the Edit menu's Paste command. The cutout appears in the upper left corner of the drawing area, surrounded by a dotted line. You can then move the cutout by dragging it to where you want it. Or you can copy it, sweep it, or manipulate it in any of the other ways described below.

Note that pasting in Paintbrush is a little different from pasting in other kinds of applications. In a word processor, for example, you position the insertion point at the place where you want the Clipboard's contents to appear; then you choose Paste. In Paintbrush you choose the Paste command first; then you position the pasted object.

NOTE: Paintbrush handles Clipboard text differently than graphics. When you paste text from the Clipboard, you must position the insertion point first; then choose the Paste command.

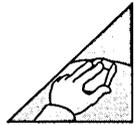
Pasting from a Disk File

To paste a cutout that was saved as a disk file, choose the Edit menu's Paste From command, and then fill out the dialog box that appears. The dialog box is the same as the one used by the File menu's Open command.



WINDOWS TIP: The dialog box that appears when you choose Paste From includes an Info button. This button presents size and color-format information about any selected file. You might want to check this information if you think the file you want to paste might be too large for the picture you're currently working in.

When you use the Paste From command, Paintbrush displays the cutout in the upper left corner of the current picture, surrounded by a dotted line. You can then move the cutout to the place where you want it. Or you can copy it, sweep it, or manipulate it in any of the other ways described below.



Moving a Cutout

To move a cutout from one place to another in a picture, put the cursor anywhere within the dotted line that encircles the cutout. Then press and hold down the left or right mouse button while you drag the cutout to its destination.

When you move a cutout, the area that the cutout occupied assumes the current background color. If you want this area to look like blank canvas after the cutout is gone, be sure the current background color matches your initial (default) background color.

Moving Transparently or Opaquely

When you move a cutout transparently, any part of the cutout drawn in the current background color assumes the color of the location to which it's moved. When you move a cutout opaquely, all parts of the cutout retain their colors at the new location.

The mouse button you press while dragging the cutout determines whether the move is transparent or opaque. To move a cutout transparently, drag it using the left mouse button. To move it opaquely, drag it using the right mouse button.

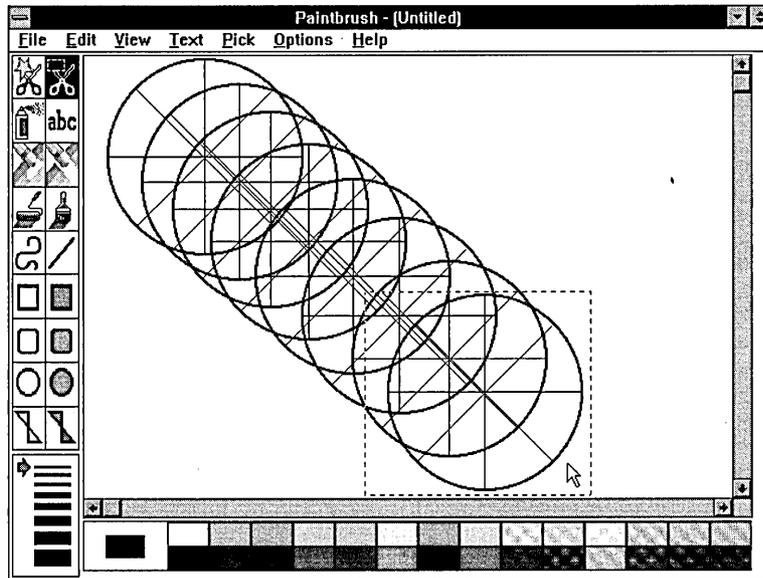
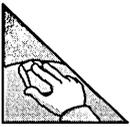
Copying a Cutout within a Picture

To copy a cutout from one place to another within the same picture, place the cursor anywhere within the dotted line that encircles the cutout. Then hold down the Ctrl key while you drag the cutout to its destination. Paintbrush makes a copy of the cutout at the new location, leaving the original cutout unchanged.

You can copy the cutout transparently or opaquely. To copy the cutout transparently, drag it while holding down the left mouse button. To copy it opaquely, drag it while holding down the right mouse button. For more information, see “Moving Transparently or Opaquely,” above.

Sweeping a Cutout

“Sweeping” a cutout means creating a trail of copies as you move the mouse across the canvas. In the illustration on the next page, for example, a cutout of a wagon wheel has been swept across the canvas.



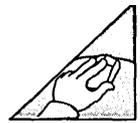
To sweep a cutout, first move the cutout to the place where you want to begin the sweep (if it's not there already). Then put the cursor anywhere within the dotted line that encircles the cutout and hold down the Shift key while you drag the cutout. To sweep transparently, drag the cutout while holding down the left mouse button. To sweep opaquely, drag the cutout while holding down the right mouse button. For more information, see “Moving Transparently or Opaquely,” page 507.

The slower you move the mouse, the more copies you will generate with the sweep.

Modifying a Cutout with the Shrink + Grow Command

The Pick menu's Shrink + Grow command allows you to expand or contract a cutout. In the process you can either maintain the cutout's original ratio of width to height or change it—as you choose. The resized cutout can either replace the original cutout or appear in another location as a modified copy of the cutout.

The Shrink + Grow command always produces an opaque replica of the original cutout.

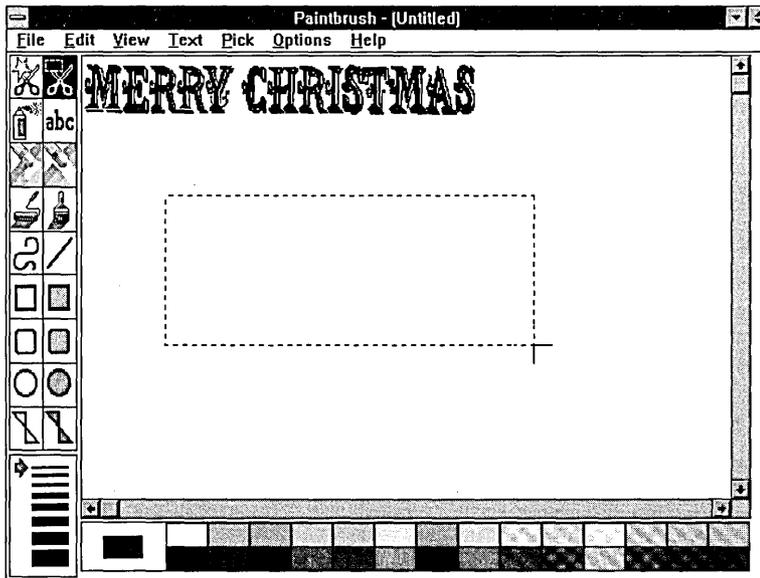


Making a Copy in a New Size and Shape

To make a copy of a cutout in a new size and shape, follow these steps:

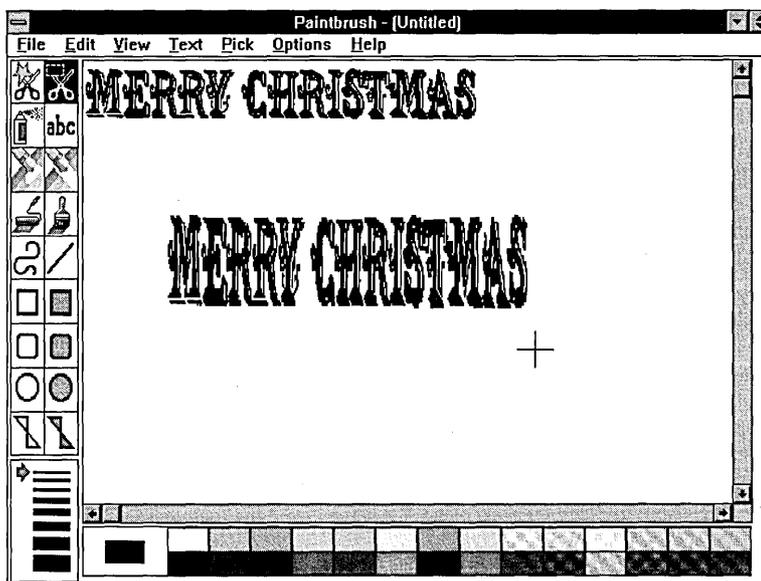
1. Use either the Scissors tool or the Pick tool to define a cutout.
2. Pull down the Pick menu. If a check appears next to the Clear command, choose Clear to remove the check. (If the Clear command is checked, the new copy replaces the original cutout.)
3. Choose the Pick menu's Shrink + Grow command.
4. Put the cursor at one corner of the position where you want the resized and reshaped copy to appear. Then hold down the left mouse button and drag the mouse toward the diagonally opposite corner. A dotted-line rectangle follows the path of the mouse to show you the size and shape the cutout will assume.

At this point, your picture might look something like this:



5. Release the mouse button.

Paintbrush draws your copy, as shown on the next page.



6. To make another copy, repeat steps 4 and 5.

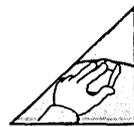
You can make as many resized and reshaped copies as you want. When you've made enough, paste down the copy. For information about pasting down, see "Pasting Down an Object," page 489.



MOUSE TIP: The right mouse button cancels any change made with the Shrink + Grow command—but only if the editing action isn't completed. Therefore, you must click the right mouse button while still holding down the left mouse button to cancel the change.

Making a Copy in a New Size and the Original Shape

To maintain the original shape of the cutout while you make a copy in a new size, follow steps 1 through 6 above, but hold down the Shift key during steps 4 and 5.



Replacing a Cutout with a Resized and Reshaped Version

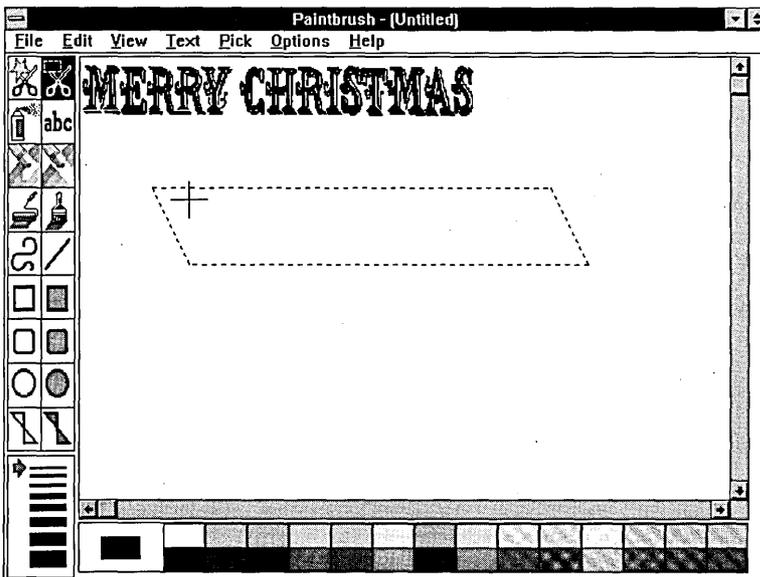
To change the size and shape of a cutout and at the same time remove the original cutout from the picture, follow steps 1 through 6 above, but be sure a check mark appears next to the Clear command in step 2.

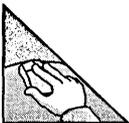
Modifying a Cutout with the Tilt Command

The Pick menu's Tilt command allows you to distort a cutout by slanting one edge of it. For example, you can use Tilt to change the shape of a cutout from a rectangle to a parallelogram.

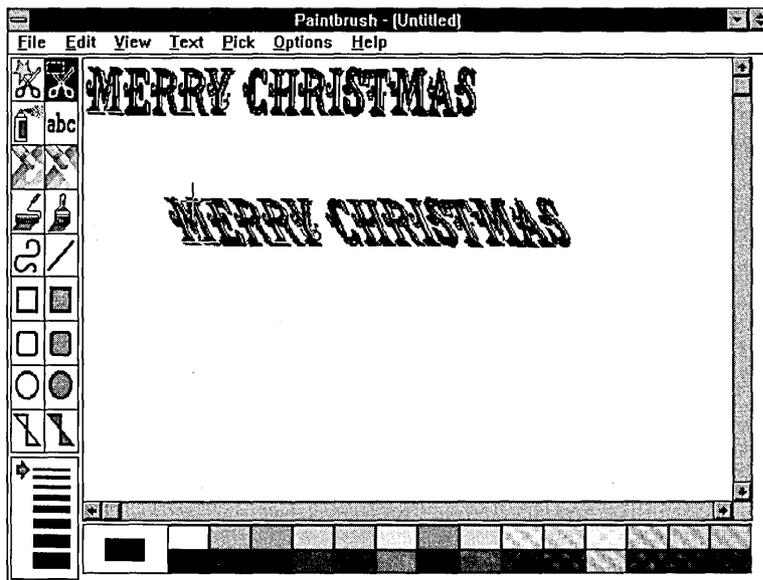
The Tilt command works much like the Shrink + Grow command, described in the previous section. Start by defining the cutout you want to modify. Then choose Clear on the Pick menu if you want to replace your original cutout with the modified version. Or deselect (remove the check mark from) Clear if you want to maintain the original and produce a modified copy. Then choose the Tilt command.

After choosing Tilt, put the cursor at the place where you want the upper left corner of the tilted version to appear. Press and hold the left mouse button while you move the mouse to the left or right. As you move the mouse, Paintbrush displays a tilted dotted outline, as shown in the following illustration.





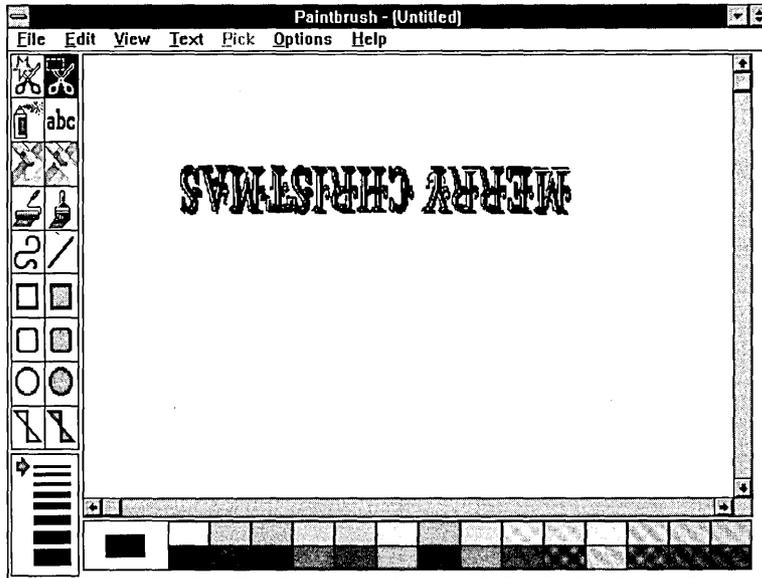
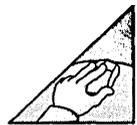
When the outline has the shape you want, release the mouse button. Paintbrush redraws the cutout to fit the new shape.



MOUSE TIP: The right mouse button cancels any change made with the Tilt command—but only if the editing action isn't completed. Therefore, you must click the right mouse button while still holding down the left mouse button to cancel the change.

Flipping a Cutout Horizontally or Vertically

With the Pick menu's Flip Vertical and Flip Horizontal commands, you can flip or invert a cutout. Simply define the cutout, and then choose the appropriate Flip command. For example, the following illustration shows how our Christmas banner would look after using both the Flip Horizontal and Flip Vertical commands.



Reversing the Colors of a Cutout

The Pick menu's Inverse command “reverses” the colors of your cutout. Black becomes white, white becomes black, and colors switch to their complementary colors on a red-green-blue color wheel.

If you apply the Inverse command to a dithered color, each component of the color is inverted separately. The result might be a color different from any you now have on your palette. You might want to experiment to see what effects you can achieve with this command.

Working with Large Cutouts

If you want to define a cutout larger than Paintbrush's drawing-area window (that is, larger than you can see on screen without zooming out), you must first pull down the View menu and choose the Zoom Out command. The same is true if you want to paste an image (from a file or from the Clipboard) that's larger than the drawing-area window. If you paste a large image without first using the Zoom Out command, Paintbrush pastes only as much of the image as it can fit in the drawing-area window.

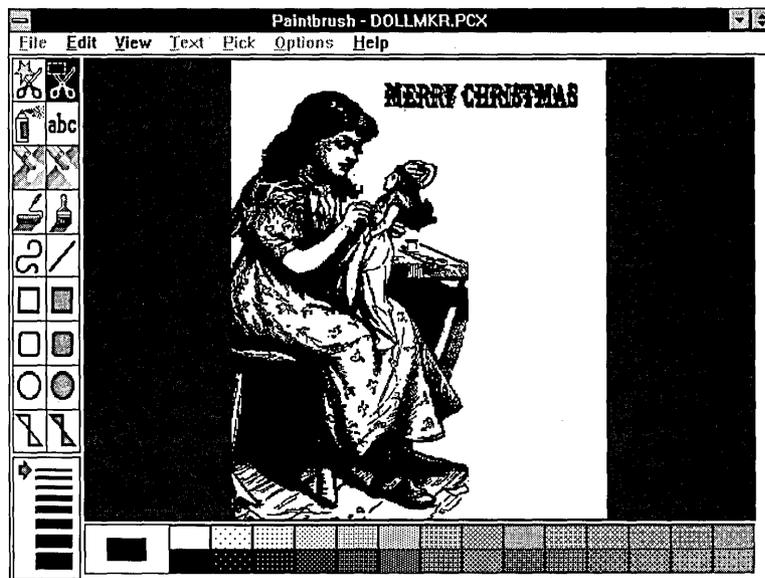


PART 4: Running Applications

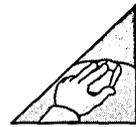
When you use the Paste or Paste From command after zooming out, Paintbrush displays the pasted image as a cross-hatched shape in the upper left corner of the window, like this:



Drag the cross-hatched cutout to the place where you want to put it, and then click anywhere outside the cutout. Paintbrush removes the cross-hatches. The following illustration shows the result.



Use the View menu's Zoom In command to return to the normal view.



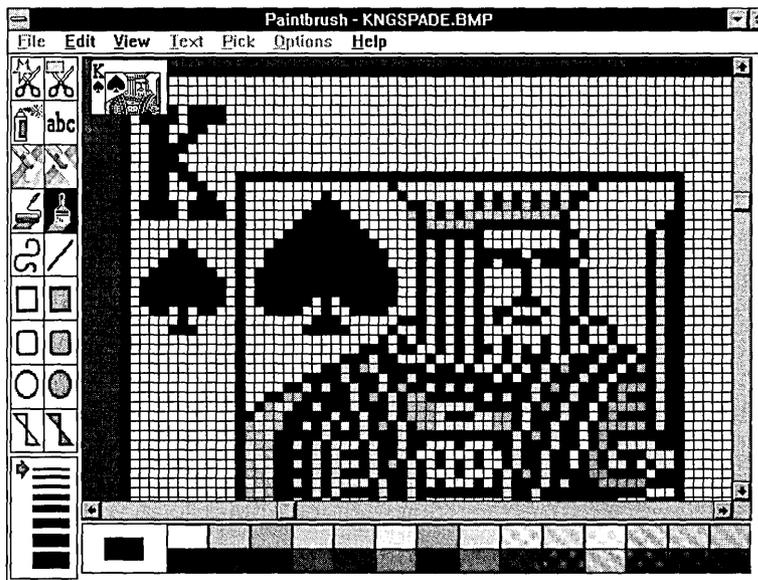
Fine-Tuning Your Image with Zoom In

Paintbrush stores the images you create as *bit maps*, which record the relative position of each visible dot on screen. The individual dots are called pixels.

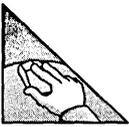
You might not normally be aware of separate pixels as you create and modify Paintbrush images, but when you want to see and edit the image pixel by pixel, Paintbrush will accommodate you.

Simply choose the View menu's Zoom In command. Paintbrush turns your cursor into a small rectangle. Position the rectangle over the portion of the image that you want to zoom in on, and click the left mouse button.

Here's an example of an image that has been zoomed in:



Each little square in this view represents one pixel of the image. You can change any pixel to either the foreground or background color by positioning the mouse on the pixel and clicking. To change the pixel to the current foreground color, click the left mouse button; to change the pixel to the current background color, click the right mouse button.



You can “paint” a group of pixels at once with either the foreground or background color by holding down the appropriate mouse button and dragging the mouse. Be careful not to move too quickly when you do this, though, or some of the pixels in your path might not be painted.



MOUSE TIP: To paint straight horizontal or vertical lines in zoom-in mode, hold down the Shift key while dragging the mouse.

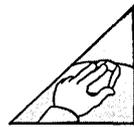
When you're ready to return to the normal view of your image, open the View menu again and choose Zoom Out.

Working with Custom Color/Pattern Palettes

Paintbrush gives you a set of 28 default colors or patterns to use in your pictures. With a 16-color display driver, 16 of these are solid colors. The remaining 12 are dithered—mixtures of two or more solid colors. (For information about selecting a display driver, see “Changing System Settings,” page 766.)

You can create additional custom colors or patterns by choosing the Option menu's Edit Colors command. Each new color or pattern replaces one color or pattern in your palette, but you can use as many different colors or patterns as you want.

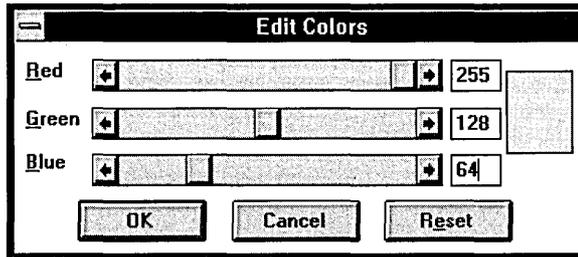
Note that pictures that use more than 16 solid colors can be imported into Paintbrush, and—if your display adapter permits—all solid colors will be displayed. You cannot use more than 16 solid colors to modify such pictures, however.



Creating a New Color or Pattern

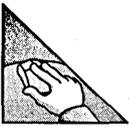
To create a new color or pattern, do the following:

1. Put the cursor on the color or pattern you want to replace, and click the left mouse button.
2. Open the Options menu and choose Edit Colors.
You'll see this dialog box:



3. Use the scroll bars to adjust the red, green, and blue levels.
Note that when you're using Paintbrush in black and white, the three scroll bars are locked together; when you adjust one, the other two adjust at the same time.
As you experiment with different levels of red, green, and blue, you can see the result of your mixture in the sample box to the right of the scroll bars.
4. When you achieve the color you want, click OK.

If you change your mind and want to reinstate the color you started with, click Cancel. If you change your mind after clicking OK, choose Edit Colors again. Then click Reset and OK. The default (standard) color is reinstated.



MOUSE TIP: To edit one of the current palette colors, simply double-click it in the palette. Doing so immediately displays the Edit Colors dialog box.

Saving and Retrieving Custom Palettes

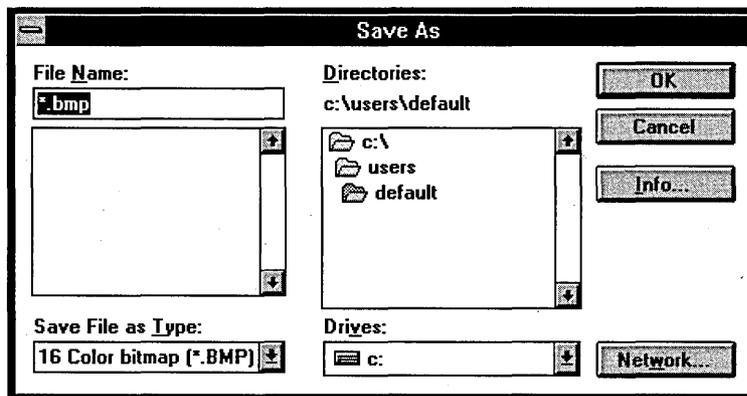
If you create a color or pattern you particularly like, you can save your modified palette with the Options menu's Save Colors command. You'll be asked to supply a filename for your custom palette; Paintbrush supplies the extension PAL.

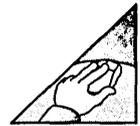
At the start of your next Paintbrush session, you can replace the standard palette with the custom palette you saved. To do this, choose the Options menu's Get Colors command.

Saving and Opening Paintbrush Files

To save a Paintbrush image for the first time, choose the Save As command. Thereafter, choose Save to save it. Both commands are located on the File menu.

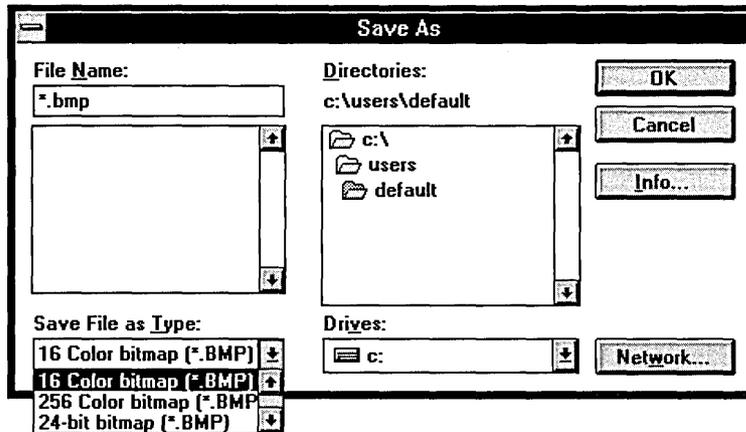
You'll see the following dialog box when you choose Save As:





File Format Options

Paintbrush provides five file-format options. To see your choices, click the arrow at the right of the Save File as Type list box, shown in the following illustration.



The two file formats used by Paintbrush are PCX and BMP. But, as the illustration shows, the BMP format is available in four flavors: monochrome, 16-color, 256-color, and 24-bit.

You should save your file in the PCX format if you want to be able to import it into a non-Windows-based application that does not support BMP files. Such applications currently include a number of non-Windows-based word processors, such as Microsoft Word and WordPerfect.

Use one of the BMP (bit map) formats if any of the following is true:

- ❑ You want to use your picture as wallpaper for your Windows desktop. (For information about wallpaper, see “Wallpapering Your Desktop,” page 149.)
- ❑ You want to incorporate the picture into a document created under the OS/2 Presentation Manager (version 1.2 or later).
- ❑ You want to incorporate your picture into another Windows-based application that supports BMP files, but not PCX files.



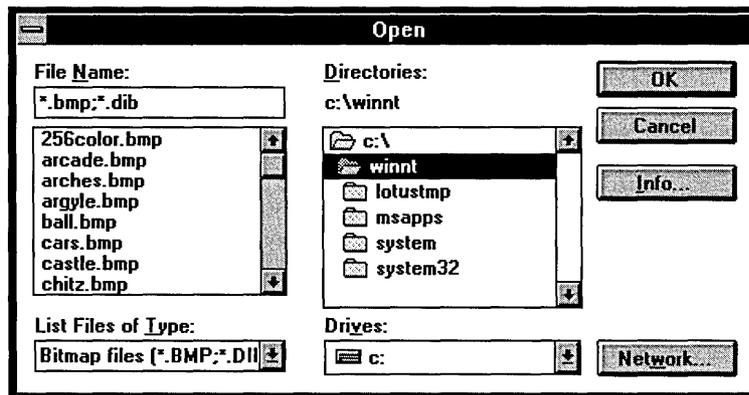
If you're not concerned about using your picture as Windows wallpaper or importing it into another application, you can take your pick between PCX and BMP. If you choose BMP, pick your flavor according to the following guidelines:

- If your picture is black and white, select Monochrome bitmap.
- If your picture uses only the standard 16 solid colors, select 16 Color bitmap.
- If you created or imported a picture into Paintbrush that uses more than 16 but no more than 256 colors, select 256 Color bitmap.
- If you created or imported a picture into Paintbrush that uses more than 256 colors, select 24-bit bitmap.

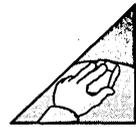
NOTE: If you're not sure how many colors your picture uses, click the Info button in the Save As dialog box. The Info button also shows the size of the picture you're working on.

Opening a Paintbrush File

To open an existing Paintbrush file, choose the File menu's Open command. You'll see the following dialog box.



This dialog box works like its counterparts in other Windows-based applications, except that you need to specify a file type, and you can click



a button to get information about a file you might want to open. The Files box lists only those files that have the selected format. If you don't find the file you're looking for with BMP selected, try selecting MSP or PCX.

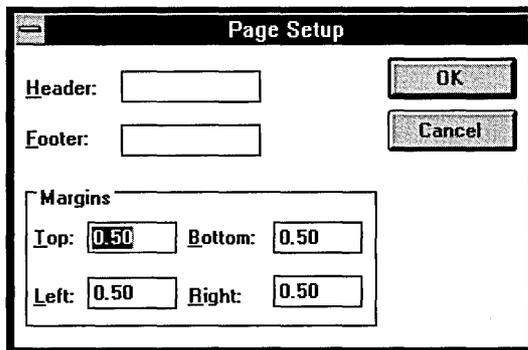
The MSP option in the List Files of Type box allows you to import a file that was created in Paint, the drawing program included in versions of Windows before 3.0. Paint files are black and white only. You can edit them in Paintbrush, but you can't save them again in MSP format. Choose PCX or Monochrome bitmap to save a modified Paint file.

Click Info to open a dialog box that displays size and color-format information about a selected file.

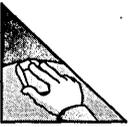
Printing a Paintbrush Image

To print a Paintbrush image, first be sure your printer is set for the graphics resolution and orientation you want to use. To change resolution or orientation, or to switch to a different printer, use the File menu's Print Setup command. This command works the same way in Paintbrush as it does in Write, Terminal, and the Windows desktop accessories.

Paintbrush normally prints with half-inch margins on all four sides. You can change any of these margins by choosing the File menu's Page Setup command. The dialog box for this command, shown below, also gives you an opportunity to specify a header and footer for your printout.

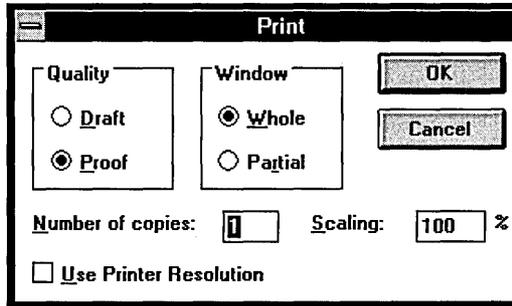


You can use codes to specify the position of your header or footer, or to insert the current date or time, the name of your file, or the page number.



The codes used by Paintbrush are the same as those used by the desktop accessories. For information about these codes, see “Notepad’s Printing Commands,” page 545.

When you’re ready to print, open the File menu again and choose Print. The Print dialog box looks like this:



As you can see, you have some choices to make before printing.

Draft or Proof Quality

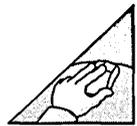
If your printer offers a draft mode, you can select Draft for fast printing and lower quality, or select Proof for higher quality printing.

Whole or Partial Printout

By default, Paintbrush prints your entire image. If you want to print only part of it, select Partial. When you choose OK to start the printout, Paintbrush adjusts the screen to display your entire image. Put the cursor at one corner of the area you want to print, press and hold down the left mouse button, and drag the mouse to the diagonally opposite corner.

Number of Copies

Change the value in this box if you want more than one copy of your artwork.



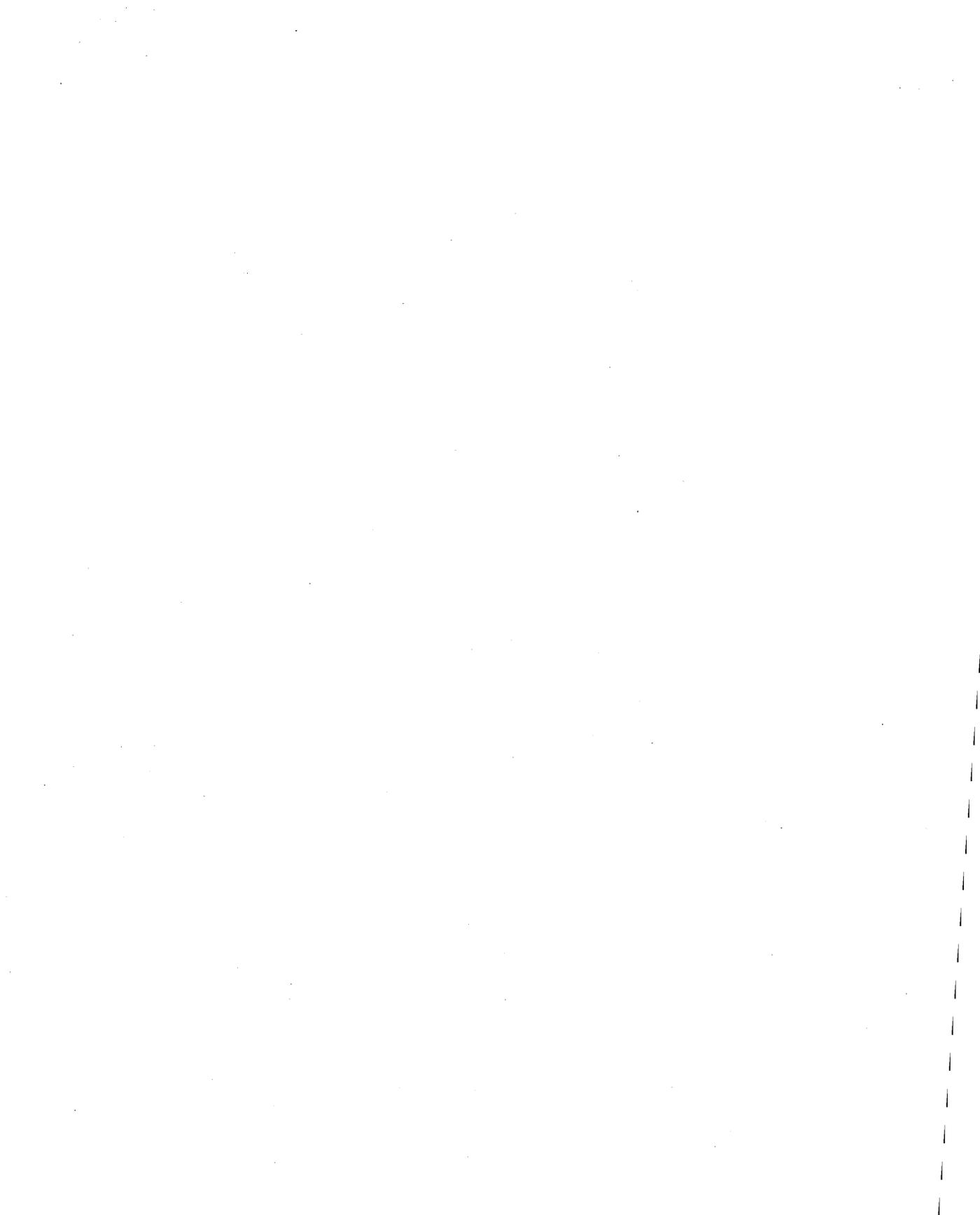
Resolution and Scaling

Paintbrush stores the relative position of each pixel in your picture. When you print, that information is simply transferred to your printer and reproduced with dots on paper instead of points of light on a video screen. The size of the dots used by your printer is determined by its graphics resolution. The higher the resolution, the smaller the dots.

By default, Paintbrush prints at screen resolution, which approximates what you see on your video display. If you're not satisfied with the printed image you get with screen resolution, put a check in the Use Printer Resolution check box.

Selecting printer resolution usually produces finer, but smaller, output than screen resolution because the dots on most printers are smaller than those on most screens. If neither the screen resolution nor any of your printer's resolution options produces the image size you want, pick the setting that comes closest. Then enter a scaling factor in the box marked Scaling. To make the image larger, enter a value greater than 100; to make it smaller, enter a value less than 100.

When you enter a scaling factor other than 100, Paintbrush adds or removes dots from the image's bit-mapped information to produce the size you request. As a result, scaled-up images might have unacceptably jagged diagonals and curves, and scaled-down images might lose detail. For these reasons, it's usually best to try changing resolution before applying scaling.



Using the Desktop Accessories

Clock **528**

It won't chime or make coffee, but Clock can give you the time of day, even when it's minimized.

Calculator **529**

For simple calculations, Calculator is more efficient than a spreadsheet program. It uses little memory, loads immediately, and offers all the functionality you'd get from a desktop calculator.

Notepad **541**

As a plain-text editor, Notepad is ideal both for quick jottings and for editing INI files. In the Windows NT version, Notepad can accommodate very large text files as easily as small ones.

Cardfile **547**

Cardfile is an electronic equivalent of the familiar Rolodex file. Unlike its paper counterpart, though, Cardfile can dial your telephone.

Character Map

562

Need a copyright sign, an accented letter, or a Wingdings dingbat? Character Map can help you find it quickly and will even copy it into your document.

Sound Recorder

566

You can use Sound Recorder to create and edit WAV files, which you can then use as system sound effects or for annotating documents.

Chat

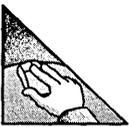
569

With Chat, you and your network-mates can type messages onto each other's screens.



n this chapter, we'll look at seven desktop accessories: Clock, Calculator, Notepad, Cardfile, Character Map, Sound Recorder, and Chat.

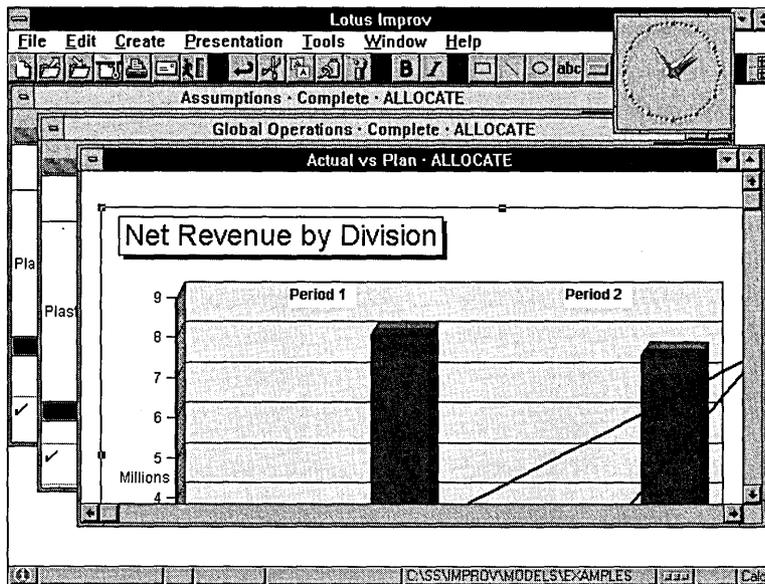
- ▣ *Clock* is just what its name implies—an electronic timepiece. You can run it as either an analog (traditional) or a digital clock. And even when it's minimized, you can tell at a glance what time it is.
- ▣ *Calculator* is an electronic calculator with a full set of scientific functions. Calculations made in Calculator can be transferred easily into any Windows-based program by way of the Windows Clipboard.
- ▣ *Notepad* is a plain-text editor with a handy time-stamping feature. You can use it as a scratch pad while you work in other applications. Files created in Notepad can be read by virtually any word processing program.
- ▣ *Cardfile* is the Windows equivalent of a Rolodex file. But unlike a Rolodex, Cardfile automatically sorts your cards, merges cards from different files, and even dials the phone for you (provided that your computer is equipped with a modem).
- ▣ *Character Map* helps you enter special characters, such as accented letters or mathematical symbols, in your text documents. With Character Map, you can look at the complete character set for each font installed on your system and copy special characters to your document by pointing and clicking with the mouse.
- ▣ *Sound Recorder* allows you to record, play, and edit sound files in waveform (WAV) format. Because Sound Recorder supports object linking and embedding (OLE) as a server application, you can also use it to embed sound annotations in programs, such as Microsoft Excel, that support OLE as client applications. To use Sound Recorder, your computer must be equipped with audio hardware, and you must have an appropriate sound driver installed.
- ▣ *Chat* is a program that lets you and another member of your domain or workgroup converse by typing messages onto each other's screens.



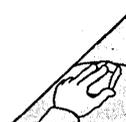
Clock

Clock is the simplest of the Windows accessories. It does nothing but report the date and time. Clock continues to operate when minimized. In fact, you can still read the time when Clock is reduced to an icon. This makes Clock a handy item to have around: It doesn't take up much space, it doesn't use much memory, and you can glance at it whenever you need to know the time.

Clock also includes a handy Always on Top command on its Control menu. If you choose this command, Clock is always visible, whether minimized or open, even when you're working in a maximized application. In the following illustration, for example, Lotus Improv is maximized, but Clock can still be seen in a small window near the upper right corner of the screen.



If you like to keep Clock visible at all times, you might also want to simplify its display by removing the title and menu bars. You can do that by double-clicking anywhere within the Clock window. (The title bar and menu bar have been removed in the illustration above.) Double-click a second time to restore the title bar and menu bar.



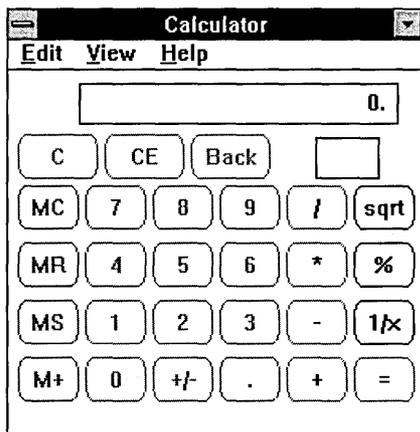
Clock's Settings menu includes commands to switch between Digital and Analog display modes, and to turn on or off display of the second hand and the the current date. If you use Clock in its digital mode, you can also change the font by choosing the Settings menu's Set Font command. Any screen font available on your system can be used for the digital display. You'll get the best results, however, by sticking with TrueType or other scalable fonts. (For more information about fonts, see "Working with Fonts," page 40.)



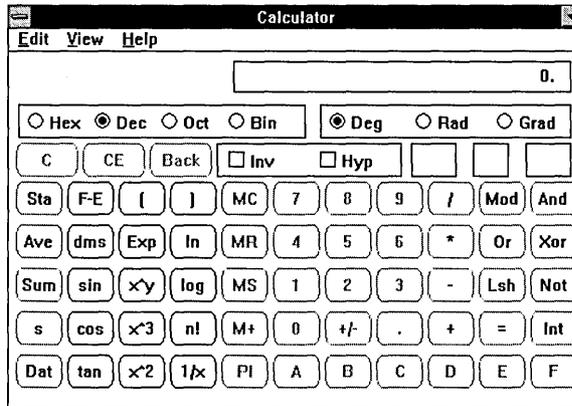
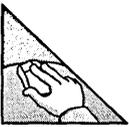
WINDOWS TIP: Clock gets its time from your computer's internal clock. If you need to reset the clock, you can do so with Control Panel. For information about setting the clock, see "Setting the Date and Time," page 161.

Calculator

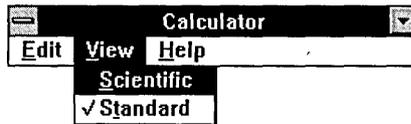
Calculator has two operating modes. You can use it as a standard arithmetic calculator with memory buttons, in which case it looks like this:



Or you can use it as a scientific calculator, in which case it looks like the illustration on the next page.



To switch from one mode to the other, use the View menu.



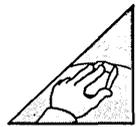
Calculator retains any displayed value and any value in its memory register when you switch from one mode to the other.

In both standard and scientific modes, Calculator can operate on numbers ranging from -10^{308} through 10^{308} , including numbers as small as 10^{-323} . Results or entries outside of that range produce an error message. (To recover from an error, click Calculator's C (clear) or CE (clear entry) button, or press Esc.)

Entering Numbers and Symbols into Calculator

You can enter numbers and symbols either by clicking them with the mouse or by typing them at the keyboard. For example, to have Calculator compute the sum of two and two, you can:

1. Click 2.
2. Click the plus sign (in the lower right corner of the standard-mode window).



3. Click 2.
4. Click the equal sign (right next to the plus sign).

Or you can type

2+2=

Try both methods to see which works best for you.

If you're adept at typing numbers, you might find it easier to enter numbers using the keyboard. To get the result of a calculation using the keyboard, you can either press the Enter key or type an equal sign.

All of Calculator's buttons have keyboard equivalents. Table 17-1 lists the keyboard equivalent for each of the standard calculator's buttons. Table 17-2 on the next page lists the keyboard equivalents for the additional buttons available in the scientific calculator.

Button	Keyboard Equivalent	Button	Keyboard Equivalent
+	+	Back	Backspace or Left
-	-	C	Esc
*	*	CE	Del
/	/	M+	Ctrl+P
+/-	F9	MC	Ctrl+C
.	. or ,	MR	Ctrl+R
%	%	MS	Ctrl+M
=	= or Enter	sqrt	@
1/x	R		

TABLE 17-1.

Keyboard equivalents for the standard calculator buttons.

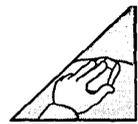


Button	Keyboard Equivalent	Button	Keyboard Equivalent
((log	L
))	Lsh	<
And	&	Mod	%
Ave	Ctrl+A	n!	!
Bin	F8	Not	~
Byte	F4	Oct	F7
cos	O	Or	
Dat	Ins	PI	P
Dec	F6	Rad	F3
Deg	F2	s	Ctrl+D
dms	M	sin	S
Dword	F2	Sta	Ctrl+S
Exp	X	Sum	Ctrl+T
F-E	V	tan	T
Grad	F4	Word	F3
Hex	F5	x^y	U
Hyp	H	x^2	@
Int	;	x^3	#
Inv	I	Xor	^
ln	N		

TABLE 17-2.
Keyboard equivalents for the scientific calculator buttons.

Cutting and Pasting with Calculator

Calculator can exchange numbers with other applications by way of the Windows Clipboard. If you choose the Copy command from Calculator's Edit menu, whatever number Calculator is currently displaying is transferred to the Clipboard. If you choose the Paste command from Calculator's Edit menu, the current contents of the Clipboard are transferred into Calculator character by character, as if you typed the characters at the keyboard.



Using the Standard Calculator

Here's a quick tour of the standard arithmetic calculator. It functions almost exactly like a simple pocket calculator, except that you don't have to fumble around looking for it on your desk.

Clearing and Correcting

If you make a mistake while entering a number, press Backspace or click Calculator's Back button. This erases the last digit from the display. Continue erasing a character at a time until you correct the error.

To clear the last entry in a sequence of numbers and arithmetic symbols, press Del or click the CE (clear entry) button. For example, if you're adding up a list of numbers and you make a mistake, you can click the CE button and reenter the last number. You don't have to start over.

To clear the current calculation entirely and return the display to 0, press Esc or click the C (clear) button.

Numbers and Operators

The heart of Calculator's standard window is the 10-key pad. To the right of and below the pad are the basic arithmetic operators. Note that for division, you use the slash (/), and for multiplication, you use the asterisk (*).

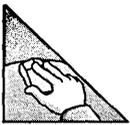
The sqrt button produces the square root of whatever number is in the display. To get the square root of 796.5, for example, enter 796.5 and click sqrt. (You don't have to click the = button.)

The % button calculates percentages. For example, to calculate 8.75% sales tax on a \$56.50 purchase, do the following:

1. Enter 56.5 (with or without the trailing 0; it doesn't matter).
2. Click the multiplication button (*).
3. Enter 8.75.
4. Click the percentage button (%).

The display shows 4.94375, or \$4.94 in sales tax.

The 1/x button produces the reciprocal of whatever number is in the display. For example, if you enter 10 and then click 1/x, the display shows 0.1, or 1/10.



The +/- button changes the sign of the number currently in the display. A typical use for this button is to enter a negative number in the middle of an arithmetic operation. For example, to multiply 52 times -23, you can:

1. Enter 52.
2. Click the * button.
3. Enter 23.
4. Click the +/- button.
5. Click the = button.

The result is -1196. If you enter 52, click the * button, and then click the minus sign followed by 23, Calculator treats the minus sign as a replacement for the multiplication operator and simply subtracts 23 from 52.

Repeating Calculations

After you click the = button to finish a calculation, you can make Calculator repeat the last part of the calculation by clicking = (or pressing Enter) again. For example, if you enter

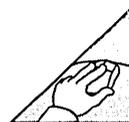
1034.5+23471/4=

Calculator displays 6126.375. Click = again, and Calculator divides that result by 4, giving 1531.59375. Subsequent clicks on the = button produce further divisions by 4.

Using Calculator's Memory Features

Calculator has four memory buttons, marked MC, MR, MS, and M+. Here's what each memory button does:

- MS *stores* the currently displayed value in the memory register, replacing any value that was there before. An *M* is displayed in the upper right corner of the Calculator window.
- M+ *adds* the value currently displayed to the value already in the memory register.
- MR *recalls* the value currently in memory and enters it into the current calculation. The value remains in memory.
- MC *clears* the memory register. The *M* displayed near the upper right corner of the Calculator window disappears.



For example, suppose you want to divide each of a dozen numbers by the same factor—say, .01375. To spare yourself the drudgery of entering that factor in a dozen separate calculations, you can do this:

1. Enter .01375.
2. Click the MS (store in memory) button.
Calculator stores the current value (.01375) in its memory register and displays an *M* in a box near the upper right corner of the window.
3. Enter the first of your dozen numbers.
4. Click the / button.
5. Click the MR (recall from memory) button.
6. Click the = button.
7. Repeat steps 3 through 6 for each remaining number.

Using the Scientific Calculator

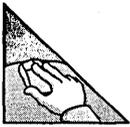
Calculator's scientific mode has all the features of the standard calculator, plus the following:

- ▣ Additional arithmetic operations
- ▣ Exponential and logarithmic operations
- ▣ Calculations in the binary, octal, and hexadecimal numbering systems
- ▣ Bitwise operations
- ▣ Trigonometric calculations
- ▣ Statistical calculations

Order of Evaluation in the Scientific Calculator

In Calculator's standard mode, calculations are always performed in the order in which they're entered. If you type $4+5*6=$, for example, Calculator displays 54, the result of adding 4 to 5 and multiplying the sum by 6.

This is not the case in Calculator's scientific mode. Here, the order in which an expression is evaluated depends on the operations involved.



Multiplication and division, for example, are always performed before addition or subtraction. In the scientific calculator, therefore, the expression $4+5*6$ returns 34, the result of adding 4 to the product of 5 and 6.

Fortunately, it is not necessary to memorize Calculator's rules about operator precedence. You can simply watch Calculator's display as you enter your calculation. Whenever you type an operator (for example, +, *, or /), Calculator checks to see if the operator you just typed has higher precedence than the previous operator you entered. If it does not have higher precedence, Calculator evaluates the last operation and displays an intermediate result. If it does have higher precedence, no intermediate result is displayed.

For example, suppose you type the following using Calculator's scientific mode:

$4*5+$

After you type the plus sign, Calculator, recognizing that addition has lower precedence than multiplication, evaluates $4*5$ and displays the intermediate result, 20. If, on the other hand, you type

$4+5*$

Calculator sees that your last operation, multiplication, has higher precedence than the previous one, addition. So it does not display an intermediate result. Instead it waits for your next number or numbers. If you follow the asterisk with

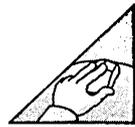
$6=$

Calculator goes ahead and multiplies $5*6$. Then it adds 4 to the result.

What if you need to override Calculator's normal order of operations? You can do that in either of two ways. In the case of $4+5*6$, for example, you can simply click the = button after entering the 5. That forces Calculator to carry out the addition and display the intermediate result, 9. Now you can complete the calculation by entering $*6=$.

Alternatively, you can enter parentheses before and after the operation you want Calculator to perform first. Expressions within parentheses are always evaluated immediately, regardless of what follows the closing parenthesis.

With the discussion of precedence out of the way, let's now take a tour of the scientific calculator's capabilities.



Additional Arithmetic Operations

The Mod (modulus) button returns the remainder of a division. For example, if you enter 65, click the Mod button, enter 7, and then click the = button, Calculator returns 2, because 65 divided by 7 is 9, with a remainder of 2.

The n! button returns the *factorial* of the currently displayed number. For example, if you enter 6 and then click the n! button, Calculator returns 720 ($6 \times 5 \times 4 \times 3 \times 2 \times 1$).

The ((left parenthesis) and) (right parenthesis) buttons allow you to nest calculations within calculations, in effect changing the order in which expressions are evaluated. You can nest up to 25 levels.

The Int (integer) button strips the fractional component from the currently displayed number. For example, if you click Int when 456.789 is displayed, the display changes to 456. You can strip the integer portion of a number by first selecting the Inv (inverse function) check box, and then clicking Int. The Int button works only when Calculator is using the decimal numbering system.

The Exp (exponent) button lets you enter numbers in scientific notation. For example, to enter 6.4×10^{-14} (which is displayed as 6.4e-014), enter 6.4, click Exp, enter 14, and then click +/- . The Exp button works only when Calculator is using the decimal numbering system.

Exponential and Logarithmic Operations

The x^y button lets you raise a number to any power. For example, to find the seventh power of 2, enter 2, click x^y, enter 7, and then click the = button.

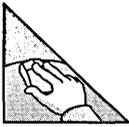
The x^3 button returns the cube of the currently displayed number.

The x^2 button returns the square of the currently displayed number.

The log button returns the base-10 logarithm of the currently displayed number.

The ln button returns the natural (base *e*) logarithm of the currently displayed number.

The Inv check box, located next to the Back button, provides the *inverse function* of the above operations. First select Inv, and then click the function you want to use. After you use an inverse function, the Inv box is automatically turned off.



When the Inv box is checked, x^y returns the y th root. For example, to find the seventh root of a number, enter the number, click Inv, click x^y , and then click 7.

Similarly, the inverse of x^3 and x^2 return a number's cube root and square root, respectively. And the inverse of log and ln return 10 and e , respectively, raised to the power of a number.

The F-E button toggles the display (in decimal numbering) between normal (floating point) and scientific (exponential) notation.

Using Binary, Octal, and Hexadecimal Numbering

The Hex, Dec, Oct, and Bin option buttons let you switch numbering systems. If Calculator is displaying a number when you switch, it converts that number to the system you switch to. For example, if you want to know the octal equivalent of 123456 decimal, simply enter that number in decimal mode and then click the Oct button.

You can enter only those digits that are appropriate for the current numbering system. If you're in binary, for example, Calculator accepts only 0 and 1. If you're in hexadecimal, you can use the numerals 0 through 9 and the A through F buttons.

When you're in binary, octal, or hexadecimal numbering, you can use the option-button group at the Calculator window's right side to change the size of the value currently displayed. If this group is set at Dword, Calculator displays the full value of the current number. If you switch to Word, Calculator displays only the least significant 16 bits. If you choose Byte, you see only the least significant 8 bits.

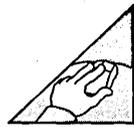
Bitwise Operations

The And, Or, Xor, and Not buttons perform logical bitwise operations on numbers in any numbering system. The Lsh button shifts numbers left one bit; when the Inv box is checked, Lsh shifts one bit to the right.

Trigonometric Functions

The sin, cos, and tan buttons return sine, cosine, and tangent, respectively. When the Inv box is checked, they return arcsine, arccosine, and arctangent.

For hyperbolic functions, first click the Hyp box, and then click the button for the function you want.



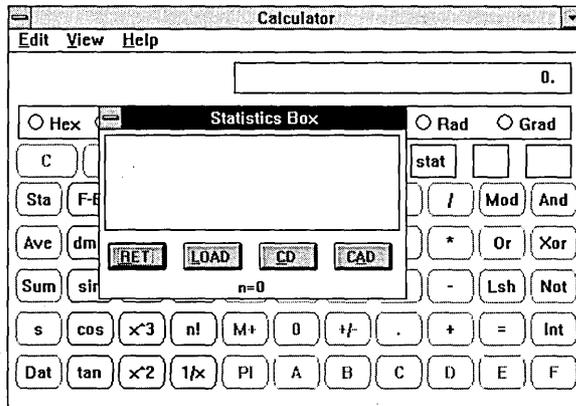
When you're in the decimal numbering system, the option-button group on the right side of Calculator's window governs the way Calculator expects to see angles expressed. The default setting is Deg (degrees), but you can switch to Rad (radians) or Grad (grads).

To switch the displayed number from normal decimal format to degree-minute-second format, click *dms*. In degree-minute-second format, the degrees are to the left of the decimal point. The minutes are the first two digits to the right of the decimal, and the seconds are to the right of the minutes. To switch back, select the *Inv* check box, and then click *dms*.

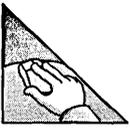
Clicking the *PI* button enters the constant pi (π). A shortcut for entering 2π is to select the *Inv* check box, and then click *PI*.

Opening a Statistics Window

To calculate sums, averages, and standard deviations of groups of numbers, first click the *Sta* button. That opens a separate window, in which you can enter as many numbers as your computer's memory allows. The statistics window looks like this:



The first thing you'll want to do after opening this window is move it to another part of the screen so that it doesn't overlap the main Calculator window. You'll be moving back and forth between the two windows, so it's helpful to be able to see both at once.



If you have a mouse, you can move between the two windows simply by clicking the one you want. If you're working with the keyboard only, press Alt+R (RET) to move from the statistics window to the main window. Press Ctrl+S to move from the main window back to the statistics window.

To enter numbers in the statistics window, do the following:

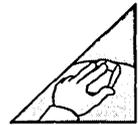
1. Activate the main Calculator window.
2. Enter the number.
3. Click the Dat button or press the Ins key.

When you have entered all the numbers you need to work with, you can perform the following calculations. The result is displayed in the main Calculator window.

- ▣ *Sum*. Click the Sum button.
- ▣ *Sum of squares*. Select Inv, click Sum.
- ▣ *Mean*. Click Ave.
- ▣ *Mean of squares*. Select Inv, click Ave.
- ▣ *Sample standard deviation*. Click s. Calculator uses $n-1$ for the population parameter.
- ▣ *Population standard deviation*. Select Inv, click s. Calculator uses n for the population parameter.

The four buttons in the statistics window do the following:

- ▣ RET activates the main Calculator window.
- ▣ LOAD makes the main Calculator window display the number that is currently selected in the statistics window. This makes it easy to perform arithmetic operations on particular values in the statistics window.
- ▣ CD deletes the number that is currently selected from the statistics window.
- ▣ CAD deletes all numbers from the statistics window.



Notepad

Notepad is an editing program that reads and writes plain text files—files that contain words and numbers but no formatting information. Although it works with only one font and has very little formatting capability, Notepad is more effective for certain tasks than a full-featured word processor. It's quicker on screen than programs that display text in a variety of styles and sizes, and it's extremely easy to learn.

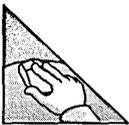
The fact that Notepad creates plain text files is also a virtue under some circumstances. For example, Notepad is ideal for creating files that you can upload via modem to a bulletin board, a public e-mail service, or another personal computer. It's also good for creating and modifying batch files (such as an AUTOEXEC.BAT file) that you run at the MS-DOS command line, and for working with initialization (INI) files. (For more information about INI files, see “Modifying Private INI Files,” page 164.)



WINDOWS TIP: Unlike many other Windows-based applications, Notepad permits you to open multiple copies of itself. Thus, for example, you can keep one copy of Notepad around for logging phone conversations, another for tracking your to-do-list, a third for miscellaneous ruminations—or whatever. If you like to work with the same number of Notepad files each day, consider putting multiple copies of the Notepad launch icon in your Startup program group.

Opening and Saving Files

Notepad uses Windows' standard File Open, File Save, and File Save As dialog boxes. For information about these dialog boxes, see “Creating, Opening, and Saving Files,” page 27. If you save a file without specifying a filename extension, Notepad uses the extension TXT. If you want to save a file with no extension at all, add a period at the end of the filename.



Turning Word Wrap On or Off

Unlike full-featured word processing programs, Notepad does not automatically perform *word wrap*. That is, when you reach the right side of the window, Notepad does not automatically move the insertion point to the beginning of the next line.

The fact that Notepad doesn't wrap words automatically makes it convenient for entering program source code, but it's less convenient for ordinary notes and memos. To keep your lines from extending beyond the right side of Notepad's window, open the Edit menu and choose Word Wrap. To turn word wrap off again, repeat the Word Wrap command.

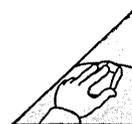
NOTE: Notepad does not save the Word Wrap setting between sessions. Therefore, if you want to use Word Wrap, you must select it each time you start Notepad.

Word Wrap is a display and printing option. It does not affect the Notepad file in any way. If you change the width of Notepad's window while Word Wrap is on, the lines adjust to fit the new window width. Without word wrap, some information might not show in the window.

Using Notepad's Time-and-Date Stamp

Notepad has a feature that automatically places a time-and-date stamp in a document every time it is opened. If you frequently use Notepad to jot down notes on conversations, ideas, or just changes in schedules, you can have the time printed above your notes. You can also use Notepad to keep a time log of your activities and determine the amount of time you spend at specific tasks. If the first line in a Notepad file consists of the characters *.LOG* (a period followed by the word *LOG*), then each time the file is opened, Notepad adds the current time and date to the end of the file. So, to keep a time log, you can do the following:

1. Start Notepad.
2. In the empty Notepad window that appears, type
`.LOG`
3. Choose the File menu's Save command and give your file a name.



Notepad is now ready to record the time and date each time the file is opened.

4. Use the File menu's Open command to reopen the file you just saved.

Your file reappears. Below the word *.LOG*, you see the current time and date.

5. Below the time-and-date stamp, type a description of the task you're about to start.
6. Use the File menu's Save command, and then close Notepad.
7. When you finish your task, start Notepad again and open your file.

Once again, Notepad adds the current time and date to the end of the file. You can now subtract the first time from the second to determine the amount of time you spent on this task. You can continue using this log file to time additional tasks, or you can start a new one for each task.



WINDOWS TIP: Another way to log time usage with Notepad is to use the Edit menu's Time/Date command. Choose this command—or press its keyboard shortcut, F5—and Notepad types the time and date at the current location of the insertion point.



WINDOWS TIP: You can use Calculator's scientific mode to add or subtract times expressed in hours and minutes. Use the inverse dms function to convert a time to decimal, do your calculation, and then use the dms function to convert the result back to hours and minutes. For more information about the dms function, see "Trigonometric Functions," page 538.



Using the Undo Command

The Edit menu's Undo command reverses your last editing action in Notepad. For example, if you delete a paragraph and then realize that you meant to delete a different paragraph instead, you don't have to retype the one you accidentally deleted. Simply choose Undo (or press Ctrl+Z).

Using the Clipboard with Notepad

You can copy or cut any amount of Notepad text to the Clipboard, and then paste it into a different Notepad file or a different application. You can also use the Clipboard to paste unformatted text that originated in a different application into Notepad.

To place a block of Notepad text on the Clipboard, start by selecting the block. You can do so by simply dragging the mouse over the text you want to select. To select with the keyboard, position the insertion point at the beginning of the block, hold down the Shift key, and move the insertion point to the end of the block. To select all of the text in a Notepad file, use the Edit menu's Select All command.

After you have selected the text, use the appropriate Edit menu command. Copy puts the selection on the Clipboard without removing it from your file; Cut puts it on the Clipboard and deletes it from the file.

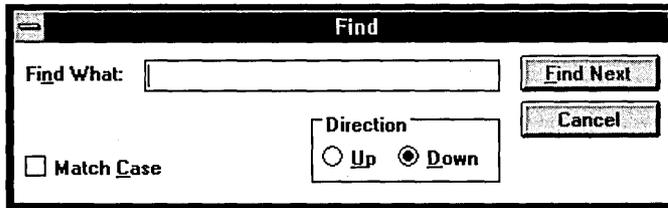
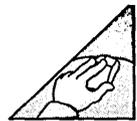
To insert text from the Clipboard into a Notepad file, position the insertion point where you want the text to go. Choose Paste from the Edit menu, and the Clipboard text is inserted into the file before the remainder of the file's text.

If you want to replace a block of Notepad text with text stored on the Clipboard, first select the text you want to replace. Then choose Paste.

Searching for Text in Notepad

The Search menu has two commands, Find and Find Next. When you choose Find, Notepad presents the dialog box shown on the next page.

Type what you're looking for in the Find What text box. Choose Up or Down in the Direction box, depending on whether you want to search backward toward the beginning or forward toward the end of the file, starting from the insertion point. Click the Find Next button to begin the search.



The Find command normally ignores case—that is, it considers *NEXT*, *next*, and *NeXT* to be equivalent. If you want to limit its search to text that matches your string exactly, including capitalization, select the Match Case check box.

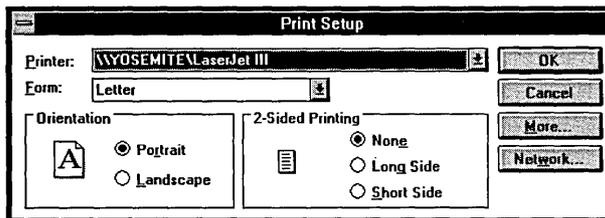
Notepad's Find command does not accept wildcard characters. The asterisk and question mark are treated as ordinary text characters.

After you use the Find command, you can use Find Next to search for the next occurrence of the same text. F3 is the keyboard shortcut for Find Next.

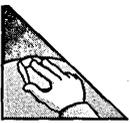
Notepad's Printing Commands

To print a Notepad file, choose the File menu's Print command. If you have Word Wrap turned on, Notepad will do its best to make the printout's line breaks match those of the display window. If you want your lines longer or shorter, adjust the window accordingly.

To change to a different printer, choose the File menu's Print Setup command. The resulting dialog box, shown in the following illustration, lists all installed printers and offers a few other useful options as well.

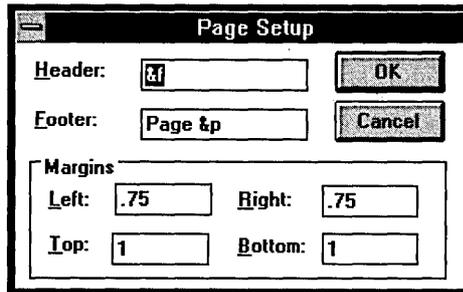


Select the printer you want to use, and then click OK.



PART 4: Running Applications

To change the default margins, header, or footer, choose the File menu's Page Setup command. You'll see the following dialog box.



The margin values are expressed in inches.

The header and footer boxes can use a combination of text and special codes recognized by Notepad (and the other accessory programs). Four of these codes are replaced by text when your file is printed. The codes and their replacements are as follows:

&d	The current date
&t	The current time
&f	The name of your file
&p	Page number

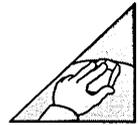
You can use the following three codes to tell Notepad how to position the header and footer:

&l	Flush with the left margin
&c	Centered between the left and right margins
&r	Flush with the right margin

The header and footer codes can be used singly or in combination. For example, to create a header with today's date flush left and the name of your file flush right, type the following in the header line:

```
&l&d&r&f
```

Headers and footers are centered by default.



WINDOWS TIP: If your Notepad window is maximized and you're printing with default margins in portrait orientation, Notepad might try to print more characters per line than your printer accommodates. The result will be a very ragged printout with alternating long and short lines. You can avoid this problem in either of two ways: by choosing the Print Setup command and selecting landscape orientation, or by choosing the Page Setup command and decreasing the left and right margins. Unfortunately, the orientation and margin settings are not saved with a file's contents when you use the File Save command. Therefore, you might need to make these adjustments each time you print a file.

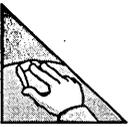
Using Drag and Drop with Notepad and File Manager

If you have File Manager and Notepad running at the same time, you can take advantage of a convenient drag-and-drop feature for opening files in Notepad. Simply drag a file icon from a File Manager window and drop it onto a Notepad window (or icon). Notepad opens your file, exactly as it would if you used the File Open command. This feature makes Notepad a convenient file viewer for plain-text files.

Cardfile

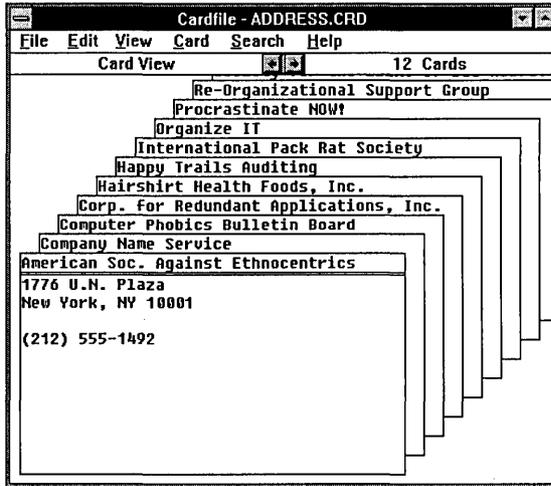
Cardfile is an electronic index card system. You can use it to store the kind of information you might have in a Rolodex, to maintain research notes for a project, to log telephone calls, and to do many other tasks.

Cardfile has several features you won't find in a conventional Rolodex system: You can store colorful pictures as well as text on your cards, you can have Cardfile dial your phone (if you have a modem), and you can merge cards from separate Cardfile files.



Cardfile's Display

A Cardfile card consists of an index line and an area for notes.

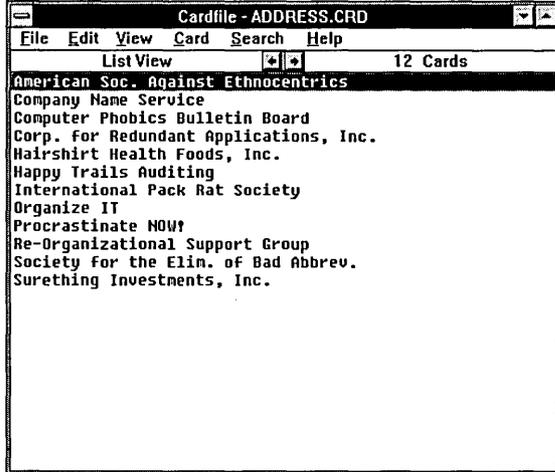
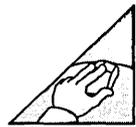


Cardfile automatically sorts your cards according to what's on their index lines, so if you're using the program to store information about people, you should enter their last names first.

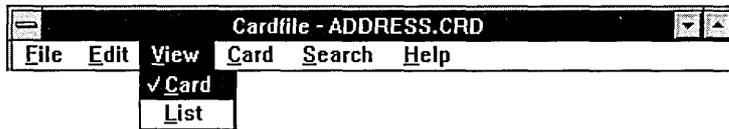


WINDOWS TIP: You can have more than one card with the same index line. When you add a card that has the same index line as an existing card, Cardfile inserts the new card in front of the existing card.

In addition to the card view shown above, Cardfile also offers a list view. In list view, you see only the index lines, as shown in the illustration on the next page.

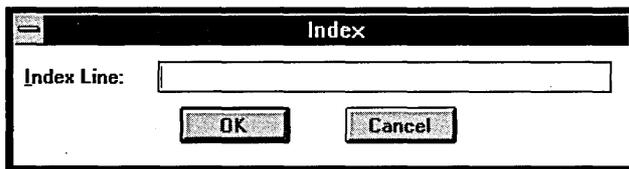


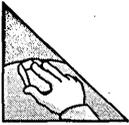
To switch from one view to the other, use the commands on the View menu.



When you first open Cardfile, the program gives you one blank card. You can simply start typing information in the note area, or you can begin by filling out the index line.

To fill out the index line, double-click the mouse there or press F6. Cardfile presents a dialog box.





Type whatever you want to appear on the index line, and then click OK or press Enter to get back to the note area.

Cardfile's note area can hold up to 11 lines of text. When you fill the card, simply start a new card.



WINDOWS TIP: You can write notes in Notepad or another Windows-based application, and then transfer them to Cardfile cards with the help of the Clipboard. If your Clipboard text exceeds Cardfile's 11-line limit, however, Cardfile beeps and refuses the transfer.

Starting a New Card

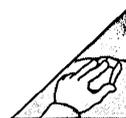
To add a new card to your file, choose the Card menu's Add command—or press F7, its keyboard shortcut. Then type the new index line, and click OK. Your new card appears at the front of the stack, and remains there until you select a different card. When you do that, your new card is placed in its proper alphabetic position within the existing card stack.

Duplicating Cards

Should you ever need to create two or more cards that are identical except for minor details, you can take advantage of the Card menu's Duplicate command. Select the card you want to duplicate (see the information below about navigating in Cardfile), and then choose Duplicate from the Card menu. Then select the duplicate card and make whatever changes are needed.

Changing a Card's Index Line

If you need to change the index line of a duplicate card (or any other card), select that card, and then double-click the index line or choose the Edit menu's Index command. Or press F6, the keyboard shortcut for the Index command. With any of these techniques, Cardfile presents a dialog box in which you can edit the index line.



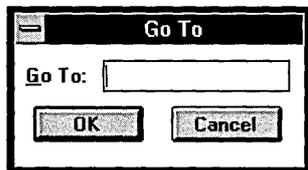
Another way to change an index line is to switch to list view. Then double-click the card whose index you want to change. Cardfile presents the same dialog box that you get by pressing F6.

Navigating in Cardfile

You can move from card to card in a number of ways. If you have a mouse and you can see the index line of the card you want to move to, simply click that index line. If you can't see the card you want or you don't have a mouse, here are some other methods:

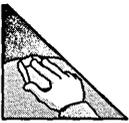
- ▣ Click the left or right arrow below the menu bar to move forward or backward through the card stack.
- ▣ Press PgUp to move forward in the stack or PgDn to move backward.
- ▣ Switch to list view (so you can see the index lines for more cards), select the card you want, and then switch back to card view.
- ▣ Choose the Search menu's Go To command or press F4, its keyboard shortcut.

Go To is a search command that looks only at index lines, disregarding the note area of your cards. When you choose the Go To command or press F4, you see the following dialog box.



Fill out any part of the index line (even the middle of a word, if you like), and Cardfile will take you to the first matching card.

Whatever method you use to select a card, Cardfile “cuts the deck” to bring the selected card to the front. For example, suppose your file consists of cards for Campbell, Jones, Miller, Smith, and Wilson. If you select Miller, the Miller card comes to the front. Behind Miller are Smith and Wilson (as before), and behind Wilson come the cards at the front of the alphabet—Campbell and Jones.



Searching for Cardfile Text

The Go To command is fine when you're looking for a card with a particular (known) index line. But what if you want to find some text that's out there somewhere on a card—and you have no idea which card? For that purpose, Cardfile provides the Find command.

The Find command is located on the Search menu. Fill out the dialog box, click OK, and Cardfile takes you to the first card containing the text you specify. To find another card that matches your search text, press F3 (or choose the Search menu's Find Next command).

The Find command limits its search to the cards' note areas, in contrast to the Go To command, which limits its search to the cards' index lines.

Editing Cards

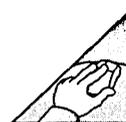
To change the contents of a card, position the insertion point where you want to make changes, and then use the same editing techniques that you use in other applications for Windows. For more information, see "Entering and Editing Text in Documents," page 32.

Cardfile's Edit menu has the usual Copy, Cut, and Paste commands. These commands make it easy to duplicate information on several cards or move information from one card to another.

The Edit menu also has two commands to assist you in case you make changes that you regret. The Undo command reverses your last edit, and the Restore command reverses all changes made to the current card since you brought it to the front of the stack. After you move a new card to the front of the stack, changes you made to the previous card can no longer be reversed with the Restore command.

Using Pictures

You can put pictures as well as text on Cardfile's cards. You can do such things as add scanned photographs to a personnel file or clarify research notes with charts created in a Windows-based spreadsheet program.



Any graphics information that can be stored on the Windows Clipboard can be pasted onto a Cardfile card. The procedure is as follows:

1. Use a graphics program (such as Paintbrush) to create or import an image.
2. Use the graphics program's Cut or Copy command to transfer the image to the Clipboard.
3. Bring the card you want to use to the front of the Cardfile stack.
4. Choose the Edit menu's Picture command.
5. Choose the Edit menu's Paste command.

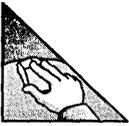
The image appears in the upper left corner of the card's note area. The aspect ratio (ratio of width to height) of the original is preserved.

6. Drag the image with the mouse or use the direction keys to position the image where you want it on the card.



WINDOWS TIP: Cardfile accepts color as well as black-and-white images. It also scales imported graphics to fit your card. However, if the original image is a large bit map, the scaled-down version of it might lose too much detail to be useful. If you have a choice between importing an image in a picture format (such as CGM or WMF) or importing it in a bit-mapped format (such as BMP or PCX), choosing the picture format will give you better results.

Graphics and text can be mixed on the same card. To annotate an image, for example, choose the Edit menu's Text command and begin typing. You can use Spacebar or Tab to move the text away from the graphic. Or you can switch back to Cardfile's graphics mode and use the mouse or keyboard to reposition the image away from the text.



Linking and Embedding

Cardfile supports object linking and embedding (OLE) as a client application. (For more information about OLE, see “Making Connections with OLE,” page 184.) If you paste an object that was created in a program that supports OLE as a server application, you can establish a permanent connection to the source, enabling you to either edit the object more easily or have it updated automatically if it changes in the source application.

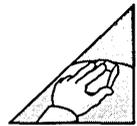
In the next few pages, we’ll look at the procedures for embedding and linking objects in Cardfile, using Paintbrush as an example of a server application. The techniques described apply to any OLE server, however. If you have a multimedia-capable system, for example, you can also link or embed sound objects from an OLE server program.

Using Paste to Embed a Graphic

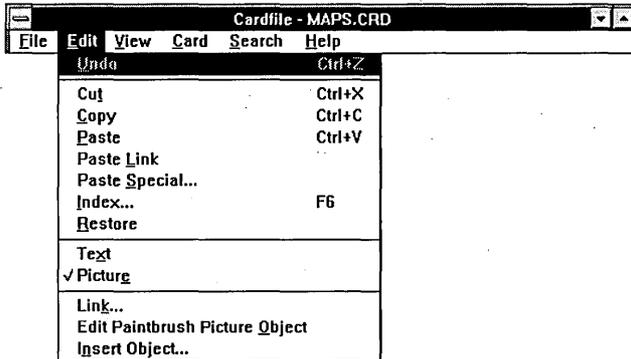
If you copy an image from an OLE server application—such as the Windows Paintbrush program—onto the Windows Clipboard, and then you use Cardfile’s Paste command to replicate the image on a Cardfile card, Windows treats the image as an *embedded object*. This means that when you double-click the image on the Cardfile card, Windows brings the server application to the desktop with the image in place so you can make any changes you need. After you edit the image, you can use the Update command in the server program to send the modified image back to Cardfile.

For example, suppose you want to create a cardfile of maps to friends’ houses. Do the following:

1. Create the maps in Paintbrush and use Paintbrush’s Copy command to put a map on the Clipboard.
2. Switch to Cardfile.
3. Create a new card.
4. Choose the Picture command from the Edit menu to tell Cardfile you want the current card to display an image instead of text.
5. Open the Edit menu again and choose Paste.



After the image arrives in Cardfile, you can verify that it is an embedded object (as opposed to a *static* image) by opening the Edit menu once more. Near the bottom of the menu you see “Edit Paintbrush Picture Object” where there was a grayed-out “Object” before.



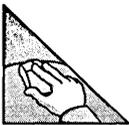
Now suppose you decide to change a few details on the map. If you double-click the image in Cardfile or choose the Edit Paintbrush Picture Object command from Cardfile’s Edit menu, Windows brings a copy of Paintbrush to the desktop (a new copy if Paintbrush happens to be on the desktop already) and loads your original map image.

NOTE: Before you can edit an embedded object, Cardfile must be in Picture mode. To put it in Picture mode, open the Edit menu and choose Picture. Cardfile always defaults to Text mode, even if it was in Picture mode when you last quit the program.

After you make your changes, open Paintbrush’s File menu.

Because you’re using Paintbrush to edit an embedded object, the File menu differs in two respects from the normal Paintbrush File menu. In place of the Save command, you see an Update command. And the Exit command now says “Exit & Return to” followed by the name of your Cardfile document.

As you edit your image in Paintbrush, you can pass along the changes to the Cardfile document by choosing the Update command. When you finish, you can close Paintbrush (and update the Cardfile document) by



choosing the Exit command. If you don't want the changes you've made to appear in your Cardfile document, use the Control menu's Close command (or double-click the Control-menu box) instead of the File menu's Exit command.

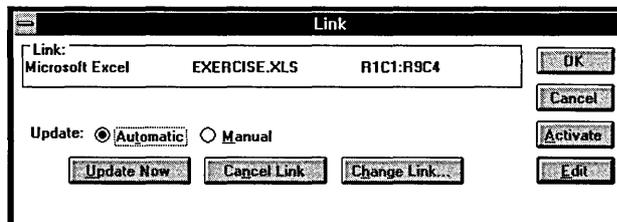
Embedding an Object with the Insert Object Command

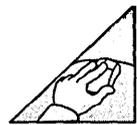
The simplest way to embed an object in a Cardfile document is to copy that object from the OLE server application to the Clipboard, and then use Cardfile's Paste command. The Insert Object command on Cardfile's Edit menu provides an alternative method. When you choose this command, you see a dialog box listing all object types recognized on your system. Select an object type, click OK, and Windows invokes the appropriate server application. There you can create the document you want to embed.

Linking an Object with Paste Link

Another way to establish a connection between an image in Cardfile and its source is to use Cardfile's Paste Link command. Using Paste Link instead of Paste creates an "automatic" or "hot" link to the source application, so that whenever the object is changed in the source program, the changes are immediately reflected in Cardfile. If you prefer, you can change the link to a "manual" or "cold" link. In this case, changes in the source application are not reflected in Cardfile until you explicitly ask for them to be.

After you paste-link an image into Cardfile, the Edit menu's Link command becomes available. Choosing Link brings up a Link dialog box. (As a shortcut to the Link dialog box, hold down the Alt key and double-click the object.)





The top part of this dialog box provides information about the source of the linked object. Here, for example, you can see that the linked object is the range R1C1:R9C4 in the Microsoft Excel worksheet EXERCISE.XLS.

Changing a Hot Link to a Cold Link—and Vice Versa

The Link dialog box gives you a way to change the “temperature” of a link from hot to cold or vice versa. Choose Automatic for a hot link or Manual for a cold link. If you make the link manual, changes to the linked object in the source document will not be reflected in Cardfile until you click the Update Now button.

Editing a Linked Object

Just as you can edit an embedded object by double-clicking it, you can also edit a linked object. Double-clicking a linked object, however, invokes a normal copy of the source application, not one with a modified title bar and File menu. If your link is automatic, changes that you make in the source application are immediately passed to Cardfile. If the link is manual, the changes don't take effect until you use the Update Now button in Cardfile's Link dialog box.

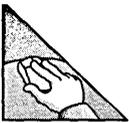
NOTE: Before you can edit a linked object or modify the link in any way, Cardfile must be in Picture mode. To put it in Picture mode, pull down the Edit menu and choose Picture. Cardfile always defaults to Text mode, even if it was in Picture mode when you last quit the program.



WINDOWS TIP: If you don't have a mouse, you can invoke a linked object's source application by selecting the object in Cardfile, and then pressing Alt, E, O. Alternatively, if you happen to be in the Link dialog box, you can press Alt+E.

Breaking the Link

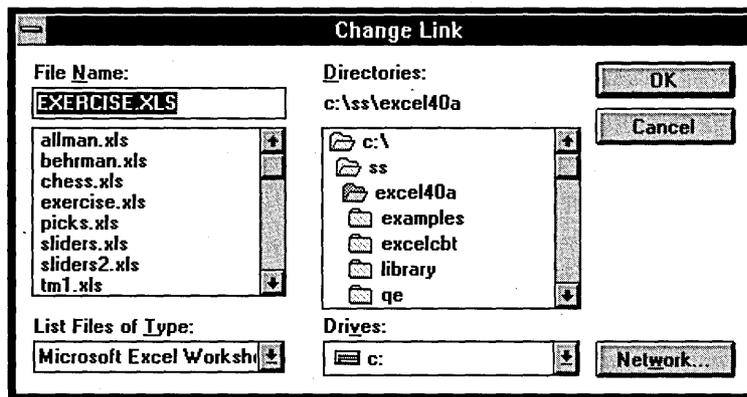
If you decide that you no longer want a linked object to respond to changes in the source document, you can convert it to a *static* object. To do this,



select the object in your Cardfile document. Then invoke the Link dialog box (by holding down Alt while double-clicking, or by choosing the Edit menu's Link command). In the dialog box, click the Cancel Link button.

Changing a Link

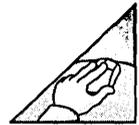
If you move or rename the document to which a Cardfile object is linked, you must let Cardfile know about the change. You can do that by invoking the Link dialog box and clicking the Change Link button. When you do, you'll get a familiar-looking dialog box.



This is simply Windows' standard File Open dialog box with a Change Link title bar. Find the current location or name for your source file, click OK, and your link will remain up-to-date.

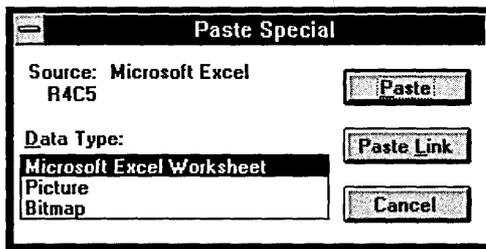
Controlling the Format of a Graphic Object with Paste Special

By default, when you paste or paste-link a graphic object into Cardfile, you get the most information-rich format available. For example, if the object on the Clipboard came from an OLE server application and you choose Paste, you get an embedded (rather than a static) object. If the image on the Clipboard is a drawing made in Paintbrush and you choose Paste Link,



the image is displayed in your Cardfile document in *picture* format rather than *bit-mapped* format. (For more information about these terms, see “Viewing the Clipboard’s Contents,” page 176.)

Cardfile’s Paste Special command (available only in Cardfile’s Picture mode) gives you an opportunity to override the default. When you choose this command, a dialog box appears listing of all the formats accessible to Cardfile for whatever data is currently on the Clipboard. Here, for example, is how this dialog box would appear if the object on the Clipboard is a range of cells copied from an Excel worksheet:



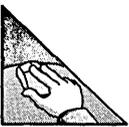
To paste or paste-link a particular format into Cardfile, choose that format from the list and click the appropriate command button.

Using Cardfile to Dial the Phone

If you have a Hayes-compatible modem, you can use the Card menu’s Autodial command to dial any phone number listed on the card at the front of your Cardfile stack.

Before you use this feature the first time, follow these steps to set up the modem’s speed and dialing method, the communications port you’ll be using, and any access code you may require:

1. Choose the Card menu’s Autodial command or press F5, its keyboard shortcut.
2. In the dialog box that appears, click Setup or press Alt+S. Cardfile presents the dialog box shown on the next page.



PART 4: Running Applications

Autodial

Number:

Prefix:

Use Prefix

Dial Type

Tone Pulse

Port

COM1 COM3
 COM2 COM4

Baud Rate

110 4800
 300 9600
 1200 19200
 2400

OK
Cancel
Setup >>

3. In the Dial Type box, select Tone if your telephone uses tone dialing or Pulse if it does not.
4. In the Port box, select the communications port to which your modem is connected.
5. In the Baud Rate box, select the speed (baud rate) at which you want your modem to operate.
6. If you need to dial a prefix to get an outside line (or for some other purpose), enter that prefix in the Prefix box.
7. If you will always be using the dialing prefix, check the Use Prefix box. Otherwise, leave it blank for now.
8. Click the OK button.

To dial a number, bring the card containing the phone number to the front of the stack. Then press F5 or choose the Card menu's Autodial command. Cardfile displays in a dialog box the number it proposes to dial.

Autodial

Number:

Prefix:

Use Prefix

Dial Type

Tone Pulse

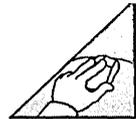
Port

COM1 COM3
 COM2 COM4

Baud Rate

110 4800
 300 9600
 1200 19200
 2400

OK
Cancel
Setup >>



Select the Use Prefix box if you want the prefix dialed, be sure that the number is correct, and then click the OK button. Cardfile dials the number and displays a message instructing you to pick up the telephone.

If the card you're dialing from contains more than one telephone number, Cardfile will propose to dial the first one it finds—or the first one it thinks is a telephone number. If you want to dial a different number, you can type that number in the dialog box. Alternatively, you can select the number itself on the card before using the Autodial command.



WINDOWS TIP: To ensure that Cardfile's Autodial command chooses the correct number automatically, you might want to type in the phone number above the address, which might contain numbers confusing to Cardfile.

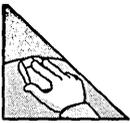
Saving, Loading, and Merging Cardfile Files

Cardfile's New, Open, Save, and Save As commands work the same way as in the other Windows desktop accessories. (For more information about these commands, see "Creating, Opening, and Saving Files," page 27.) Cardfile's files have the extension CRD.



WINDOWS TIP: Because it supports OLE, Cardfile uses a slightly different file format from Cardfile versions included with Windows version 3.0 or earlier. To load a Cardfile file created in one of those versions, choose the Open command, open the file-type list box, and select 3.0 Card File (*.CRD).

Cardfile's File menu also has a Merge command that lets you combine a CRD file stored on disk with one currently in memory. Cardfile simply blends the two files together into a single alphabetized file. The combined file retains the name of the file you're currently working with.



Printing Cardfile Information

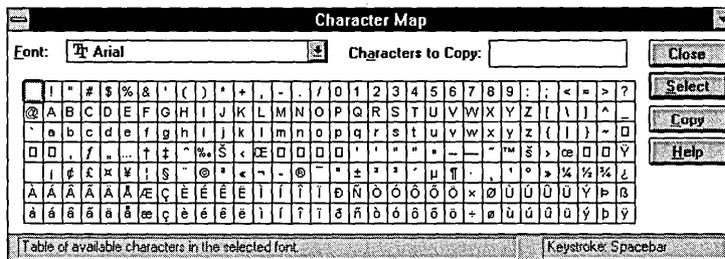
You can print Cardfile information in three ways:

- To print a single card, move that card to the front of the stack and choose the File menu's Print command.
- To print all cards in a file, put Cardfile in card view (not list view). Then choose the File menu's Print All command.
- To print a summary consisting of only the index lines for each card in your file, put Cardfile in list view. Then choose the File menu's Print All command.

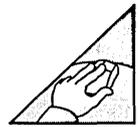
As in Notepad and Calendar, you can switch to a different installed printer by choosing the Print Setup command. And you can change Cardfile's margins, header, or footer by using Page Setup. These commands work the same way in Cardfile as they do in Notepad. For more information about Notepad, see "Notepad's Printing Commands," page 545.

Character Map

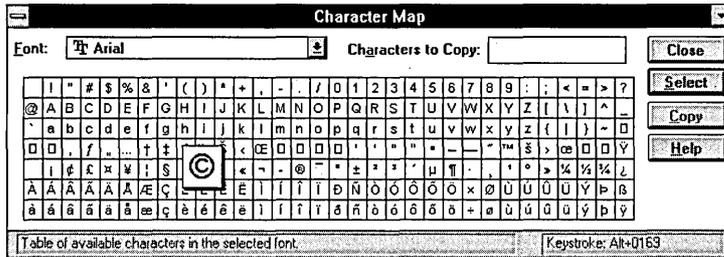
Character Map is a simple utility that helps you place accented letters and symbols in your text documents. Character Map's initial display looks like the following illustration.



In the top left corner of the window is a drop-down list in which you can select any font available on your system. (For more information about fonts, see "Working with Fonts," page 40.) Below the font list is a table displaying all the characters available in the chosen font. You can't change the size of the Character Map window (other than to minimize it), but you



can get an enlarged view of any character by selecting it with the mouse or the keyboard. Here is how Character Map looks when the copyright symbol in the TrueType font Arial is selected:



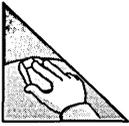
The panel in the lower right corner of the Character Map window tells you how you can produce any character using the keyboard. For example, in the illustration above, the panel reads “Keystroke: Alt+0169.” This means that if you are working on a document in a word processor and need a copyright symbol in the Arial font, you can do the following:

1. Use the word processor’s formatting commands to specify Arial as your font.
2. Hold down the Alt key.
3. Type *0169* on the numeric keypad.
4. Release the Alt key.

Note that you must type the numbers 0169 on the numeric keypad; the number keys at the top of your keyboard won’t work.

If you don’t want to type Alt+key sequences, you can generate special characters with the help of Character Map’s Select and Copy commands. For example, you can enter a copyright symbol in your document by doing the following:

1. Be sure the Characters to Copy box (in the upper right corner of the Character Map window) is blank. If it is not blank, clear it by selecting whatever is currently there and pressing the Del key.
2. Use the mouse or keyboard to select the copyright symbol in the main part of the Character Map window.
3. Click the Select button or press Alt+S.



4. Click the Copy button or press Alt+C to copy the contents of the Characters to Copy box to the Clipboard.
5. Activate your word processor and use its Paste command.

You can use this method to copy more than one character at a time. Each time you click the Select button, Character Map adds the current character to the end of the character sequence in the Characters to Copy text box.



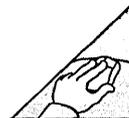
MOUSE TIP: Double-clicking a character in the main part of the Character Map window is equivalent to selecting the character and then clicking the Select button.

Fonts and Character Sets

Most of your Windows fonts share a common character layout known as the eight-bit American National Standards Institute (ANSI) character set. This is simply a table in which each character in the font is mapped to a particular number from 0 through 255. In memory and on disk, the characters in your documents are recorded by their ANSI character-set numbers, and because most of your fonts use the same mapping scheme, switching a block of text from one font to another usually produces a change in the typeface, style, or size, but not a change in the characters themselves.

You should be aware, however, that the ANSI character set used by most Windows fonts is not the same as the IBM PC, or extended ASCII, character set used by most MS-DOS-based applications. The “normal” alphabetic and numeric characters—the letters *A* through *Z* in uppercase and lowercase, the numerals 0 through 9, and the common punctuation symbols—are mapped to the same character values in both the ANSI and extended ASCII character sets. But the two systems diverge widely for accented letters and other special symbols. Therefore, an Alt+key sequence that produces a particular symbol in your favorite MS-DOS-based application will probably have quite a different effect in a Windows-based program.

When you copy text to the Clipboard from most Windows-based applications, the text is stored on the Clipboard in at least two formats, called



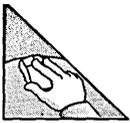
Text and *OEM Text*. (For more information about data formats and the Clipboard, see “Viewing the Clipboard’s Contents,” page 176.) The inclusion of the OEM Text format, in most cases, allows you to copy symbols from a Windows-based application to the Clipboard, and then paste those symbols (unchanged) into an MS-DOS-based application.

For example, if you copy the letter *u* with a circumflex accent (*û*) from Word for Windows to the Clipboard, and then paste this character into an MS-DOS-based application, you will still get a *û* in your MS-DOS-based program, despite the fact that this character is mapped to the value 251 in the ANSI character set and the value 150 in the extended ASCII set. Windows takes care of the translation for you. A similar conversion process takes place automatically when you copy text to the Clipboard from an MS-DOS-based program.

Unfortunately, the extended ASCII character set includes characters not available in the ANSI set, and vice versa. The block-graphics characters in the extended ASCII character set, for example, are not available in the ANSI set (which is usually no great loss, because Windows is a graphical environment). If you attempt to copy such incompatible characters from one environment to the other, you will get something—but not what you started with.

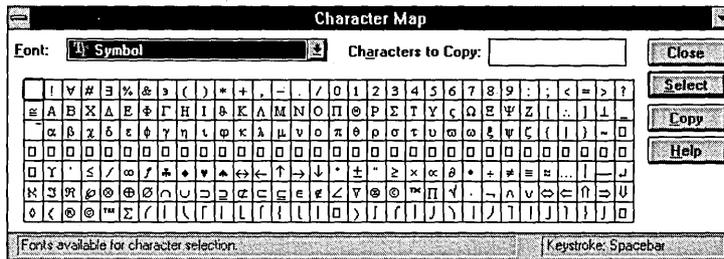


WINDOWS TIP: If you use Character Map to compare the character sets of your various Windows fonts, you will find some differences in the fourth row of the Character Map table. In most non-TrueType fonts, the values in this portion of the character set are undefined. (Character Map uses either a solid vertical bar or an open square to indicate an undefined character value.) In most TrueType fonts, many values in the fourth row have been assigned to useful symbols, such as true typographic quotation marks, em and en dashes, and an ellipsis. You might want to use these TrueType characters occasionally, even if the document you’re creating is based primarily on non-TrueType fonts.



The Symbol Font

In addition to the Wingdings “dingbat” font, Windows NT includes one other TrueType font that does not use the ANSI character set. That font, called Symbol, includes the Greek alphabet, the four standard card-suit symbols, plus a variety of other mathematical, logical, chemical, and business symbols. The following illustration shows what’s available in the Symbol font.



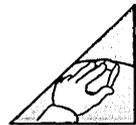
Some of the characters in the bottom row of this character set are meant to be combined with one another in an over-and-under fashion. The tenth and twelfth characters from the right in the bottom row, for example, can be assembled to produce a large integral symbol.

Sound Recorder

Sound Recorder is a utility that lets you record, edit, and play sound files in waveform format. You can also use it to provide sound annotations for documents created in programs that support object linking and embedding (OLE) as client applications. (For more information about OLE, see “Making Connections with OLE,” page 184.) Before you can use Sound Recorder, your computer must include audio hardware, and you must have installed a driver appropriate for that hardware. For information about installing sound drivers, see “Installing Drivers,” page 163.

Sound Recorder’s display, shown on the next page, looks somewhat like a tape recorder with a built-in oscilloscope.

You can operate the buttons by clicking on them with the mouse, or you can tab to them with the keyboard and press Enter when the button you want to use is highlighted.



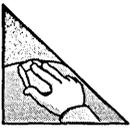
The two-headed arrow buttons in the lower left corner are rewind and fast-forward controls, respectively. The single-headed arrow is the play button, the square is the stop button, and the microphone icon at the right is the record button.

Windows NT includes a few sample sound files, all of which have the extension WAV. To listen to these files, choose Sound Recorder's Open command from the File menu, and then click the play button. As the sound is played, the scroll box moves from left to right across the scroll bar, and the oscilloscope display gives you a visual representation of the sound.

To record a new sound file, use the File menu's New command. Then click the record button and begin speaking into your microphone. Unlike most tape recorders, Sound Recorder doesn't require you to press two buttons at once to begin recording. As soon as you click the microphone button, Sound Recorder is in recording mode. You can record up to a minute's worth of sound. When you finish, use the File menu's Save command and supply a filename.

You can embed a sound file in any application that supports object linking and embedding as a client program. To do so, follow these steps:

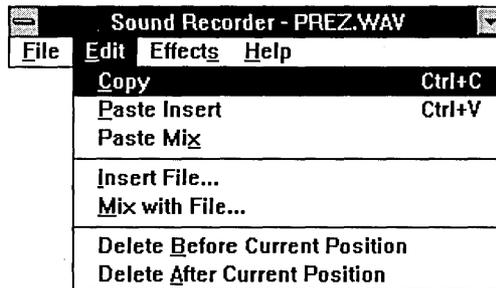
1. Open or record the file you want to embed.
2. Use Sound Recorder's Copy command to put the sound data on the Clipboard.
3. Activate the application into which you want to embed the sound (the client application).
4. Put the cursor where you want the sound file to be embedded. Then use the client program's Paste command.



In the client document, the embedded sound file is displayed as a small microphone icon. To play the sound, double-click the icon.

Editing Sound Files

Sound Recorder's Edit menu has six editing commands, in addition to the Copy command.



The Insert File and Mix with File commands allow you to combine two or more sound files. To use either command, first use the scroll arrows to position the scroll box at the point in the current file where you want the incoming file to appear. The Position indicator to the left of the oscilloscope display will help you find the appropriate spot.

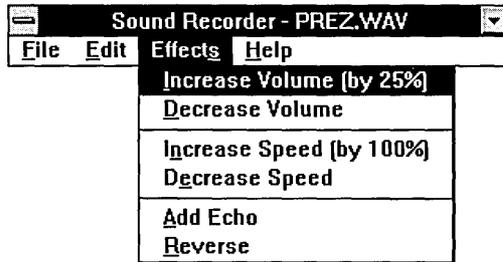
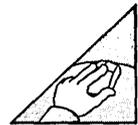
The Insert File command adds a sound file at the current location and moves the remainder of the file forward. The Mix with File command superimposes the incoming sound file on whatever sound data is already at the current location.

The Paste Insert and Paste Mix commands combine sounds in a similar manner, except that they use the Clipboard as their source instead of a file.

The last two commands on the Edit menu simply delete data from the current location to the beginning or end of the file.

You can also edit a sound file with commands on the Effects menu, shown on the next page.

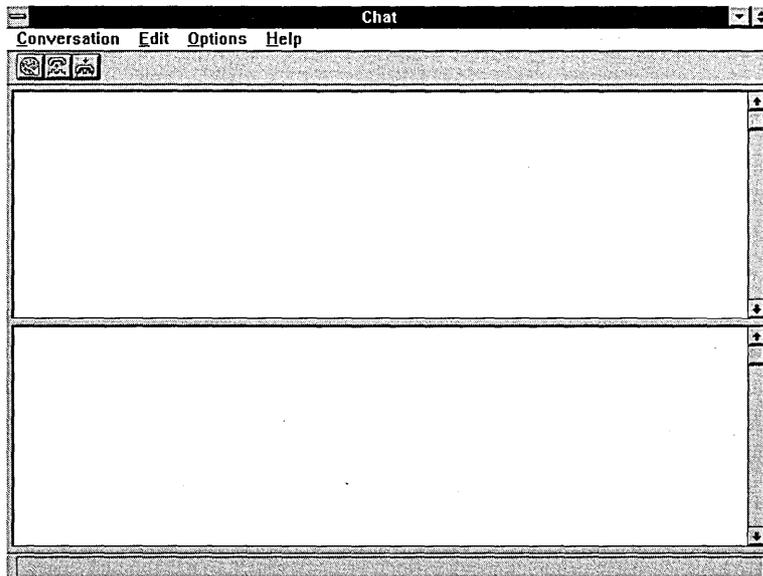
These commands actually change the sound data that makes up your file, not merely the playback mode. For example, if you increase the speed of a file and then use the Save command, the file plays at the increased speed each time you open it.



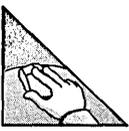
Chat

Chat is a simple utility that allows you to exchange messages in real time with another user in your domain or workgroup. Conversing with Chat is like talking on the phone, except that you use your keyboard instead of your voice.

When you double-click the Chat icon, a simple window divided into two panes appears, similar to this:



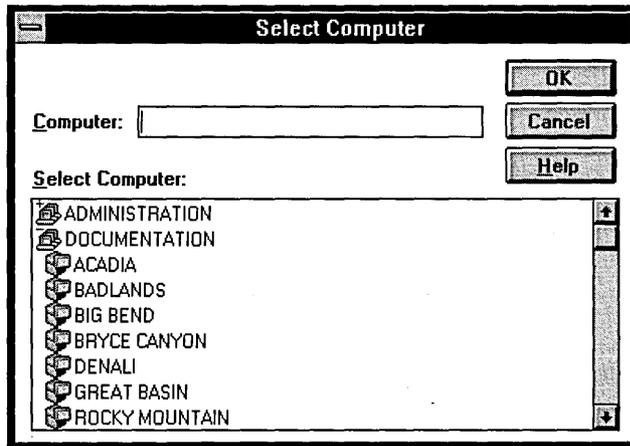
After you establish a connection, everything you type or paste (with Ctrl+V or the Edit Paste command) appears in the top pane of your Chat



window and simultaneously in the lower pane of the other user's Chat window—and vice versa. If you want, you can use the Options menu's Preferences command to change the window so that the space is split vertically instead of horizontally.

Dialing

To initiate a Chat session, click the Dial tool (the leftmost tool on the Chat window's toolbar). Or choose the Dial command from Chat's Conversation menu. A network browser dialog box appears, similar to the following:

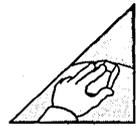


Select the name of the computer whose user you want to chat with, and then click OK.

Windows NT launches Chat as an icon on the selected user's computer, if Chat is not already running, and alerts the user by sounding the computer's speaker. He or she can then “answer the phone” by double-clicking the Chat icon.

Answering the Phone

When you receive a Chat call, your speaker beeps. (It doesn't beep if you've turned off that form of notification. See “Options,” below.) If your copy of Chat isn't running, Windows NT launches it as an icon. You'll see an image of a telephone with its receiver bouncing in the hook. To “answer the phone,” double-click the icon. Then begin typing to “talk” to your caller.



If Chat is running in an open window when another user calls you, Chat's title bar flashes to alert you to the incoming call. To pick up the phone in this case, click the Answer tool (the middle icon) on the toolbar. Or choose the Answer command from Chat's Conversation menu.

Hang Up

When you're finished chatting, click the Hang Up tool (the rightmost icon on the toolbar). Or choose the Hang Up command from Chat's Conversation menu.

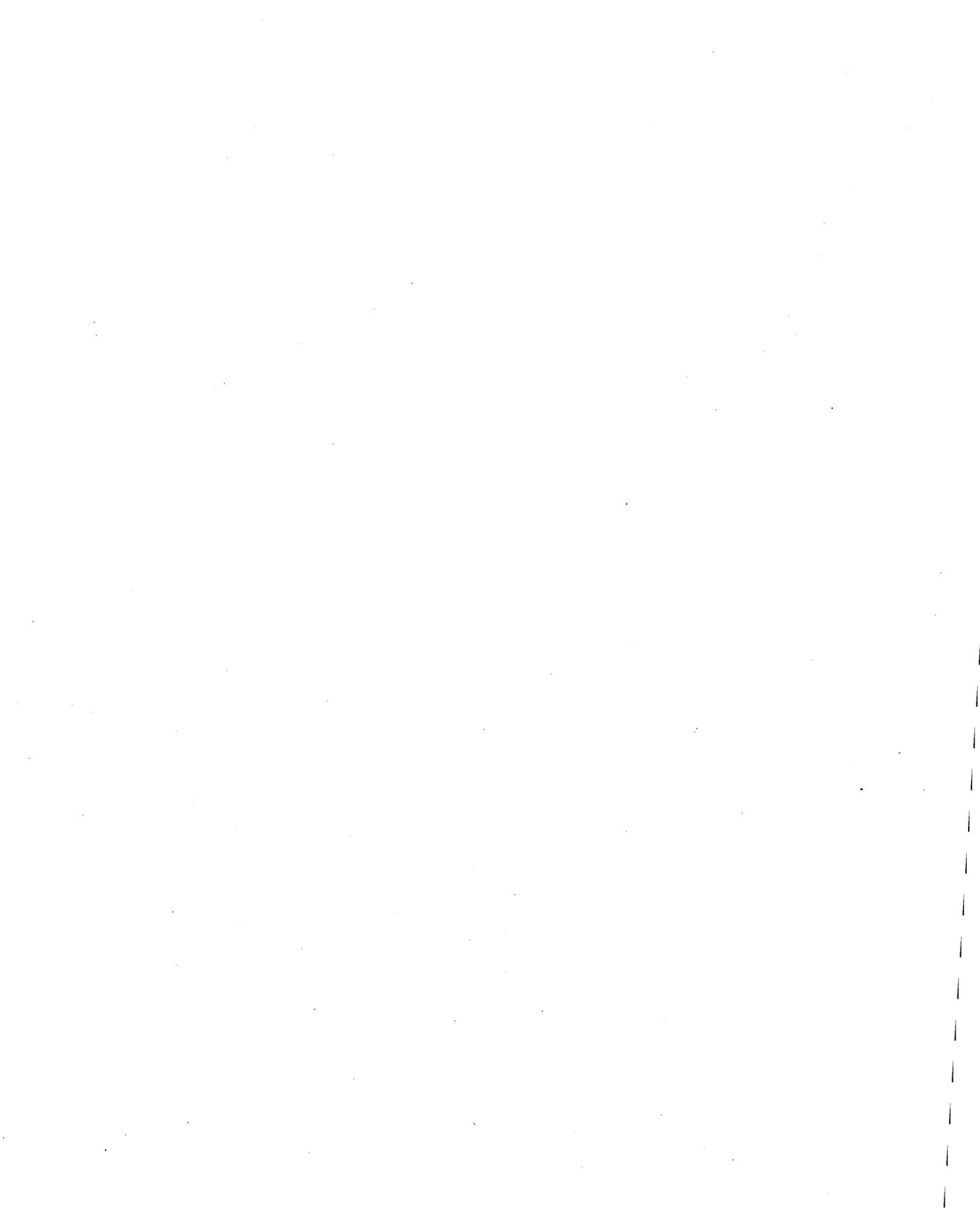
Options

You can use the Font command on Chat's Options menu to change the font you use when you type. By default, this is the font that your chat partner sees. So if you want to be emphatic, choose a large and bold font. (If your partner does not have your font on his or her computer, Chat will use the available font nearest in style to your choice.) Your partner may elect to ignore your emphatic font, however, by choosing Preferences from the Options menu and selecting the Use Own Font option button. You can do the same on your end if you don't care for the font your chat partner is inflicting on you.

Other commands on the Options menu allow you to suppress the display of the toolbar and status line, and to turn off the sound. The sound option is particularly useful at times when you don't want to be interrupted. If you're working in a maximized window when someone tries to "chat you up," you won't even know there's a call coming in if you've turned off the sound.



WINDOWS TIP: If you think silence is golden, but you still want to be available for Chat sessions, choose the Always on Top command from Chat's Control menu. Then close Chat. When someone calls, the Chat icon appears at the bottom of your screen, even if you're working in a maximized window.



Working from the Command Prompt

- | | |
|---|------------|
| Starting a Command Prompt Session | 576 |
| Start as many command prompt sessions as you want ... | |
| Ending a Command Prompt Session | 577 |
| ...and end them with a double click. | |
| Controlling the Command Prompt Window | 579 |
| A command prompt window is merely an application window like any other. You can control its color, size, and other attributes with the Control menu. | |
| Using the Command Prompt | 585 |
| Running programs from a Windows NT command prompt works almost the same as running programs from other command-prompt operating systems, but you'll find a few interesting new tricks and features. | |
| Understanding File Systems and Filenames | 597 |
| If you're used to MS-DOS, you'll be pleasantly surprised at new Windows NT features such as long filenames and better handling of wildcards. | |

Using Command Symbols

601

Windows NT lets you use special symbols to combine several commands onto a single command line—and determine which commands get executed and in which order.

Using Windows NT Commands

608

Whether you're looking at a directory listing or finding strings in a text file, Windows NT has some surprising new features—a few little things to make your life easier.

Using Network Commands

617

You can handle all your network tasks from File Manager, Print Manager, and other utilities, but sometimes a command line provides the fastest way to connect to a shared drive or to perform some other network task.



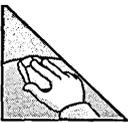
indows NT offers two very different but compatible modes of working. You can take the newer route with the easy-to-use, point-and-click graphical user interface of Program Manager, File Manager, and other Windows-based programs. Or you can choose the old-fashioned way, using the efficient but cryptic command prompt interface. The real power users will combine the best of both worlds.

Windows-based graphical interface programs have some advantages over MS-DOS-based programs. Windows-based programs provide a very intuitive approach to working with data—for example, you can move a file or a piece of data by physically moving it on the screen. Pointing and clicking is also much easier than learning command-line syntax. On the other hand, the MS-DOS command line is undoubtedly the fastest way to work when you know exactly where you are and what you are doing. For many experienced computer users, typing at the command prompt gives a feeling of control and power that they don't experience when running Windows-based programs.

Unlike MS-DOS, Windows NT offers multiple command prompts, each in its own separate session and protected from any failures that might occur in other sessions. Unlike Windows 3.1, Windows NT allows you to run other types of programs from the command prompt in addition to MS-DOS-based programs. For example, you can run any program for Windows NT, Windows 3.1, OS/2 version 1.x, or POSIX. In addition, Windows NT command prompt sessions have many enhancements not available in MS-DOS or Windows 3.1.

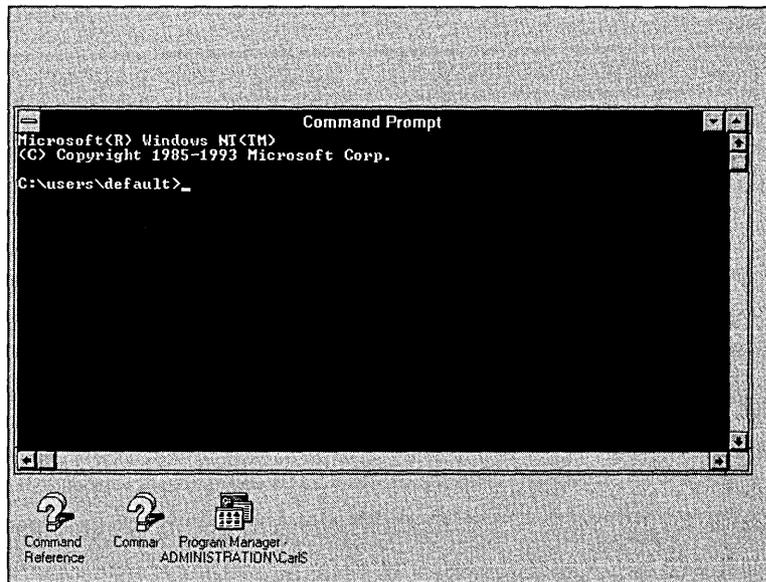
If you're willing to invest the time to learn how to use it (or if you have already invested the time), the Windows NT command prompt offers the fastest way to work with your programs. On the other hand, using the command prompt is never required in Windows NT; if you hate typing convoluted command lines, feel free to skip this chapter.

Whole books have been written about working from the command prompt. We can't possibly cover the entire subject in one chapter, but if you're still reading, you probably aren't starting at ground zero. Therefore, we'll assume that you have used MS-DOS or some other command-line operating system, and we'll concentrate on the new features that make Windows NT more powerful than MS-DOS.

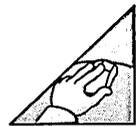


Starting a Command Prompt Session

To start a command prompt session, double-click the Command Prompt icon in Program Manager. (The Windows NT Setup program puts the Command Prompt icon in the Main group, but you can copy or move the icon to any group you like. For example, you might want to put a copy of the Command Prompt icon in the Startup group so that it starts every time you log on.) After you start a command prompt session, you can leave it running in the background while you work on other tasks. If it takes up too much screen real estate, simply minimize it.



If you click the Command Prompt icon in Program Manager and then choose Properties from the File menu, you can see what makes a command prompt session tick. The Command Line entry in the Properties dialog box shows the name of the program that Windows runs when you double-click the Command Prompt icon—CMD.EXE. CMD.EXE is a command interpreter (called a command shell in some operating systems). Its primary functions are to display the command prompt and to read, interpret, and execute what you enter at the prompt. Double-clicking the Command



Prompt icon is the usual way to run CMD.EXE, but you can also run it the same way you would any other program—by choosing Run from the File menu in File Manager or Program Manager.

CMD.EXE Versus COMMAND.COM

CMD.EXE is to Windows NT what COMMAND.COM is to MS-DOS. Note that COMMAND.COM is part of MS-DOS, not part of Windows. This is an important difference. Under Windows 3.1 a command prompt session looks and acts like MS-DOS because it *is* MS-DOS. Under Windows NT, a command prompt session may look and act like MS-DOS, but it is actually a far more powerful command interpreter capable of running programs from multiple operating systems.

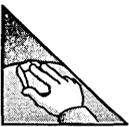


WINDOWS TIP: You can open additional command prompt windows from the command prompt. For example, you might want to open another command prompt window to see two directories or to see different tasks in side-by-side windows. To open another command prompt window, type *start* or *start cmd* at the command prompt. (If you type *cmd* without *start*, you probably won't get the results you expect.) For more information about the Start command, see "Launching Programs," page 595.

Ending a Command Prompt Session

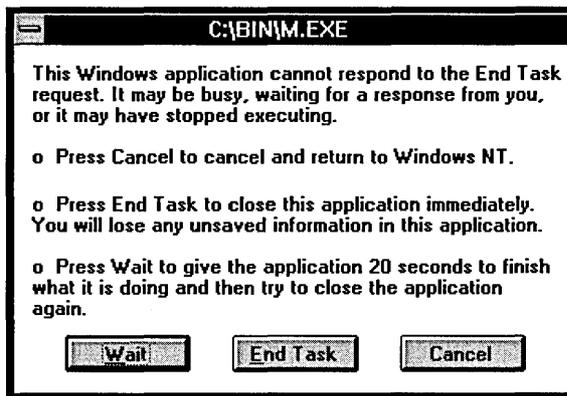
When the command prompt is active, you can end a command prompt session in any of the following ways:

- ▣ Double-click the Control-menu box.
- ▣ Press Alt+F4.



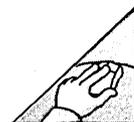
- Select Close from the command prompt window's Control menu.
- Type *exit* at the command prompt.

If you are running a character-based program in the command prompt window, you should terminate the program through its normal exit command before attempting to close the window. However, if you are sure the program doesn't have any unsaved files, you can safely and quickly close it using one of the first three methods listed above. A dialog box appears asking if you really want to terminate the program. Click OK.



Unfortunately, some programs can fail in a way that breaks their normal termination mechanism. You can't quit in the normal way and you can't keep running. In operating systems less protected than Windows NT, such programs can cause problems for the whole system. This is particularly true of programs for MS-DOS, each of which believes it is the only program in the system. Windows 3.1 makes valiant efforts to harness rude programs, but experienced Windows users can always cite instances of MS-DOS-based programs crashing the system. Windows NT, however, really is in control. It can't make bad programs behave themselves, but it can send them to bed without any supper.

You can terminate a program that is out of control in the same way you terminate a command prompt session—by double-clicking the Control-menu box and then clicking OK in the dialog box that appears. Another method is to choose Settings from the Control menu, and then click the Terminate button. This brings up a message box with a warning about the



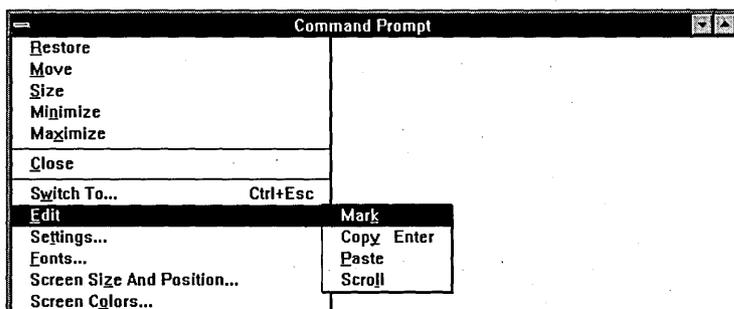
terrible things that might happen to unsaved program data if you continue. Unfortunately, on the rare occasions when you need to use this option, those terrible things have most likely happened already and you have no choice but to click OK. Just be sure your program has really failed before you submit. When you end a program this way, the command prompt session in which it is running is also terminated.

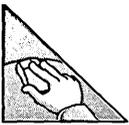


WINDOWS TIP: With Windows 3.1, you can terminate a failed program by pressing Ctrl+Alt+Del. This doesn't work with Windows NT. Instead, a dialog box appears that gives you several choices, including logging off, shutting down, or going to the Task List. If you click the Task List button (or press Ctrl+Esc at any time), you can select the program you want to kill and click the End Task button. But be careful! You won't see any dire warning message. It's up to you to be sure there's no hope for your program.

Controlling the Command Prompt Window

Before we get into the real purpose of a command prompt window—to enter command lines—let's look briefly at the window itself. Like most application windows, the command prompt window allows you to set options and execute commands through selections on its Control menu.





The first several commands on the command prompt window's Control menu are the same as those in other application windows—Restore, Move, Size, and so on. For more information about these commands, see “Working with Windows,” page 11. The selections near the bottom of the menu (beginning with Edit) are the commands and options unique to command prompt windows.

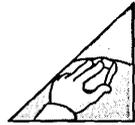
The ellipses after the menu commands indicate that they bring up dialog boxes with options for you to select. Each command brings up a slightly different dialog box, but all of the dialog boxes have a Save Configuration check box. Be sure to select this check box if you want to make your settings effective every time you start a command prompt session. If you don't save the configuration, your changes affect only the current command prompt session, and your previously stored configuration applies the next time you start a session.

Window settings are saved based on the title of the program window. If you start a command prompt window from an icon, the icon title determines the window title. If you set up multiple icons with different titles or set up icons for specific character-based programs, each icon has its own settings. You can set the window title of a program controlled by a PIF with the Window Title field of PIF Editor. (For more information about PIF Editor, see “Using Program Information Files,” page 670.) The Start command also allows you to set the window title for a program. (For more information about the Start command, see “Launching Programs,” page 595.)

Copying and Pasting

You can copy text from a command prompt window to the Clipboard and then paste it into other applications. You can also paste text from the Clipboard to the command prompt or to a character-based program. For example, you might want to paste a list of files from a directory listing into Notepad or into a character-based text editor in another command prompt window.

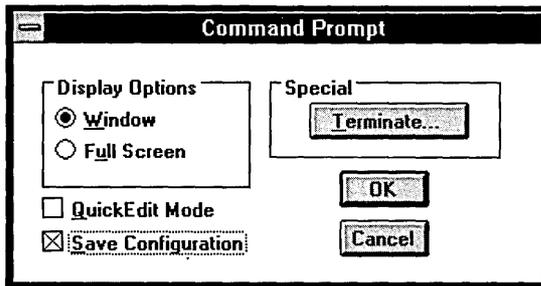
For information about how to copy and paste text, see “Using the Clipboard with Non-Windows-Based Applications,” page 171.



Setting the Display Mode

On x86-based computers, command prompt sessions can run in a window, or they can run full-screen. To switch between these two modes, press Alt+Enter. When running full-screen, press Alt+Esc or Ctrl+Esc to switch to another application. When you make the switch, the full-screen command prompt session appears as an icon on the Windows desktop. Click the icon once to pop up its Control menu, or double-click it to switch back to the full-screen command prompt session.

By default, Windows NT opens command prompt sessions in windowed mode. To change the default so that command prompt sessions open in full-screen mode, open a command prompt window and select Settings from the Control menu. The following dialog box appears.

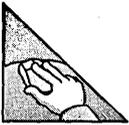


Click the Full Screen option button, be sure the Save Configuration check box is selected, and click OK.

NOTE: On RISC-based computers, the dialog box does not have a Display Options group because command prompt sessions always run in a window.

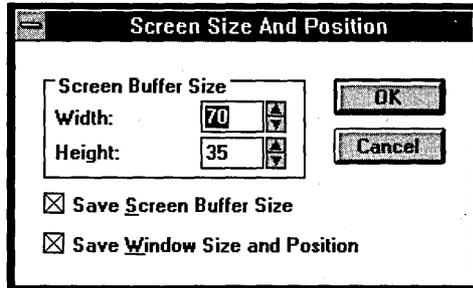
Customizing the Window's Appearance

You can customize the appearance of a command prompt window in several ways: You can change its size, select a font, even use eye-pleasing colors. And you can save these settings independently for each program item that launches a command prompt session, so you can make appropriate settings for different tasks.



Setting the Window Size and Position

To change the screen position where any new command prompt window appears, move the current session's window to the desired position and then choose Screen Size and Position from the Control menu. You'll see a dialog box like this:



Be sure the Save Window Size and Position check box is selected and then click OK.

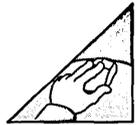
Windows NT also lets you change the size of the “virtual screen” that is displayed in a command prompt window. To change the number of columns and rows, choose the Screen Size and Position command and set the number of columns and rows.



KEYBOARD TIP: You can set the number of columns and rows for the command prompt window using the Mode command at the command prompt. For example, to set the screen size to 85 columns and 55 lines, type the following at the command prompt:

```
C:\>mode con:cols=85 lines=55
```

For more information about the Mode command, see “Mode” in the online Command Reference Help.



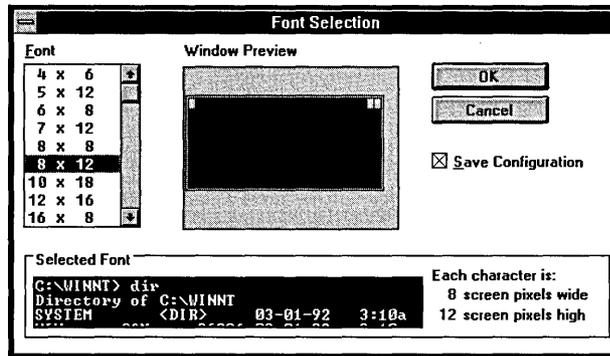
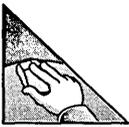
How Programs Handle Unusual Screen-Size Settings

Changing the size of the command prompt window's virtual screen will not necessarily affect the size of the screen when you run programs. Many programs are written to use a particular screen size. When you start a program that knows how to use only an 80×25 screen, the size of the command prompt window automatically adjusts to 80×25. More sophisticated programs check the screen size when they start and try to run at the same size. However, many programs for MS-DOS and OS/2 can run only in certain sizes. For example, the Edit program supplied with Windows NT knows how to run only 80×25, 80×43, or 80×50. If you set the window to an odd size, such as 90×32, Edit adjusts the window to the nearest size it understands—80×25.

Character-based programs for Windows NT can recognize any screen size (although there is no guarantee that a particular program will be written to do so). For example, the command interpreter recognizes and adjusts to any screen size. From a command prompt window, try changing the screen width to various unusual sizes such as 140 or 60 and then type *dir/w*. The command interpreter uses the screen width to figure out how many full columns of filenames can be displayed on the screen and adjusts accordingly.

Selecting a Font Size

The size of your command prompt window depends on the number of rows and columns you select, and on the size of each character—the font. To modify the character size (and thus the window size), choose Fonts from the command prompt window's Control menu. The Font Selection dialog box appears, as shown on the next page.



When you select a size in the Font list box, a sample of the selected font appears at the bottom of the dialog box. The Window Preview section shows the relative size of the command prompt window compared to the full screen. When you are happy with your selection, click OK.

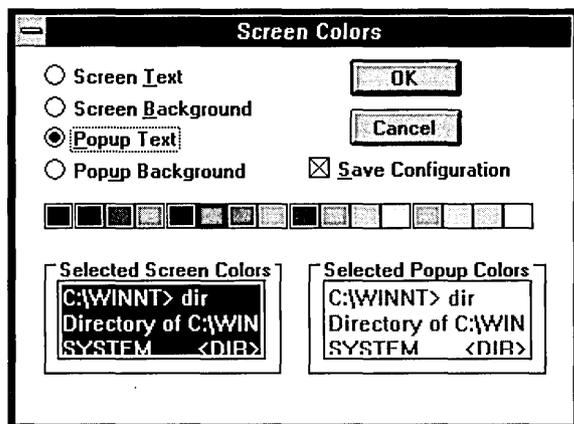
To find the best display for your work style, experiment by setting different sizes in the Font Selection dialog box, and different window heights and widths in the Screen Size and Position dialog box. If you want to get as much data as possible in the window, choose one of the smaller fonts and set a large height and width. If readability is more important, choose fewer columns and rows and a larger font. For information about changing the number of columns and rows in the command prompt window, see “Setting the Window Size and Position,” page 582.

Setting Screen Colors

You can set the color of the text and background of the command prompt window. You can also set the color of the text and background of pop-up windows that originate from the command prompt, such as the command history. (For more information about the command history, see “Editing the Command Line,” page 588.)

To set screen colors, choose Screen Colors from the command prompt window’s Control menu. The dialog box shown on the next page appears.

Select the option button for the item you want to set, and then select the color you want. The boxes at the bottom of the dialog box show you how your colors look. When you are happy with your selections, click OK.



Using the Command Prompt

At first glance, running programs from the Windows NT command prompt might seem the same as running programs from the command prompt of any other operating system. MS-DOS, OS/2, UNIX—if you’ve seen one, you’ve seen them all. Every operating system has a command to delete files, another to display lists of files, another to copy files, and so on. The names and details may be different, but it’s the same cast of characters.

Actually, Windows NT has some interesting differences. We’ll concentrate on these, rather than giving a blow-by-blow account of all the commands available.

Getting Help

The first thing you need to know about using the command prompt is how to get help. You can get help on any command-line program or internal command supplied with Windows NT in two ways. You can:

- ▣ Type the name of the command followed by `/?`. For example,

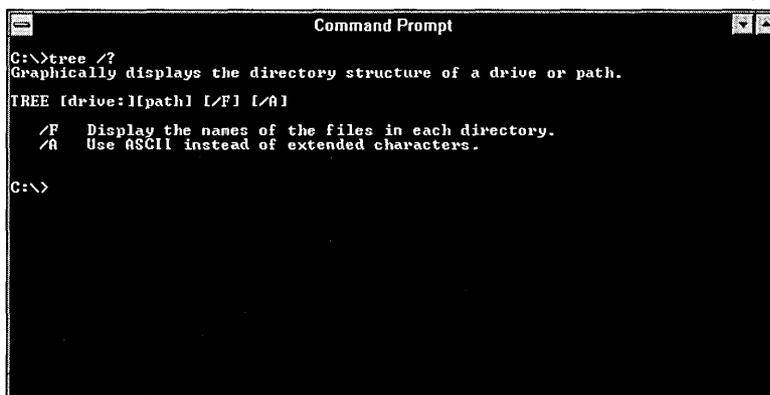

```
C:\>dir /?
```
- ▣ Type *help* followed by the name of the program. For example,


```
C:\>help dir
```



PART 4: Running Applications

Either method brings up exactly the same help screen showing the command followed by its argument syntax. Let's take the Tree command as an example:



```
Command Prompt
C:\>tree /?
Graphically displays the directory structure of a drive or path.
TREE [drive:] [path] [/F] [/A]
  /F  Display the names of the files in each directory.
  /A  Use ASCII instead of extended characters.
C:\>
```

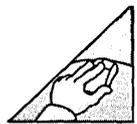
The first line gives you a short description of the command. The next line shows the command syntax. The command is given in uppercase followed by the arguments. Optional arguments are enclosed in square brackets. Most commands have options, which consist of the slash character followed by a letter. The meaning of the options and any other arguments that aren't obvious from their names is displayed below the command syntax.

If this terse form of help is not enough, you can get full details on all Windows NT commands from a Windows NT help file. To open the help file, double-click the Windows NT Help icon (the yellow question mark) in the Main group of Program Manager. Or type:

```
C:\>start winhlp32 c:\windows\system32\ntcmds.hlp
```

The location of your help file might be different, depending on how you set up Windows NT. You'll soon find that you don't need full help very often. After you get used to the way commands work, the simple command-line help will be enough.

You can also type *help* with no arguments to get a list of the internal commands and system utilities provided with Windows NT.



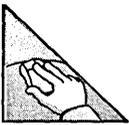
If You're Coming from UNIX

If you're a UNIX user trying out Windows NT, you'll probably feel partly at home and partly lost. Most of the commands have different names, but somehow they seem familiar. Most commands have fewer options than you're used to, and it might take you a while to figure out that almost nothing is case-sensitive. The directory structure looks the same, but the directory separator is a backslash (\) instead of a slash (/). Command-line options start with a slash instead of a dash (-), except sometimes they can start with either, and occasionally you'll find a converted UNIX program that recognizes only the dash. You'll be shocked at filename limitations (eight-character base, three-character extension), until you realize that this is only for compatibility and you can set up your disk to allow long filenames. If you're a UNIX script-file guru, you'll be amazed and amused at the crudeness of the Windows NT batch language.

The Windows NT command prompt interface simply isn't as complicated or complex as UNIX, but it's much easier to learn. You'll have no trouble picking it up. To get you started, here's a list of some of the most common UNIX commands with their rough Windows NT equivalents.

UNIX	Windows NT	UNIX	Windows NT
cat	type	grep	find, findstr
ls	dir	diff	fc, comp
rm	del	chmod	attrib
cp	copy, xcopy	cd, md, rd	cd, md, rd
mv	move, ren	more	more

If you try Windows NT and still don't like the command prompt interface, don't give up. Several vendors sell converted UNIX command interpreters with all the familiar UNIX utilities. With one of these, you can enjoy the terse UNIX syntax and powerful script language while still getting the benefits of Windows NT.



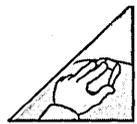
WINDOWS TIP: The practice of providing syntax help for command-line utilities was common long before Microsoft made it standard for MS-DOS and Windows NT. Because this convention evolved naturally, other software vendors don't always do things quite the same way as Microsoft. Some programs use /h instead of /? as their help option. Some programs recognize both a dash (-) and a slash (/) as the first character of command-line options. A few programs, mostly converted UNIX-based programs, recognize only a dash. Many programs display help automatically if you enter arguments incorrectly or fail to give arguments for a program that requires them.

Editing the Command Line

When working on a command line, you frequently have to enter the same command several times, or enter several similar commands. If you make a mistake when typing a command line, you don't want to retype the whole thing—just fix the part that was wrong. Windows NT makes it easy to recall previous commands and edit them on the current command line.

The Windows NT features for command-line editing and recall are similar to the ones provided by the Doskey utility in recent versions of MS-DOS (5.0 and later). Although Doskey is familiar to most MS-DOS users, Windows NT command-line editing has some interesting new features, as we'll see.

Command-line editing works the way you might expect. The Left and Right direction keys move the cursor left and right. The Ins key toggles between insert and overwrite modes. The Del key deletes the character at the cursor, and the Backspace key deletes the character to the left of the cursor. It's no different than editing on a single line in most text editors. Table 18-1 shows the editing keys and what they do.

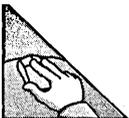


Key	Function
Up	Recalls the previous command
Down	Recalls the next command
PgUp	Recalls the earliest command used in this session
PgDn	Recalls the most recent command used
Left	Moves left one character
Right	Moves right one character
Ctrl+Right	Moves right one word
Ctrl+Left	Moves left one word
Home	Moves to the beginning of the line
End	Moves to the end of the line
Esc	Clears the current command
F6	Inserts an end-of-file character (Ctrl+Z)
F7	Displays the command history in a scrollable pop-up box
F8	Displays commands that start with characters currently on the command line
F9	Prompts for the number of the command to execute
Alt+F7	Clears the command history

TABLE 18-1.
Command-line editing keys.

The command-line recall feature works by keeping a history of the commands entered during the command session. You use the Up and Down direction keys to move back and forth to the command you want. You can see how the command history works by pressing the F7 key. A window pops up, showing commands you have recently entered. You can scroll through the history with the direction keys to select the command you want. Some users form a mental picture of the command history and find it easier to use the Up and Down direction keys at the command prompt. Others prefer using F7 to bring up the pop-up window.

The F8 key provides a useful alternative to the Up direction key. The Up key moves you through the commands to the top of the command buffer and then stops. The F8 key does the same, except that when you get to the top of the buffer it cycles back to the bottom. Furthermore, F8 does command completion. Type *d* at the command prompt (don't press Enter) and



then press F8 a few times. You'll cycle through recently entered commands that start with *d*, such as Dir and Del. Now type *e* (after the *d*) and press F8 a few more times. You'll cycle through Del commands along with any others that start with *de*. You can save a lot of keystrokes with F8 if you know the first letters of the command you're looking for.

Improving on the MS-DOS Doskey Command

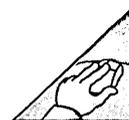
In MS-DOS, F7 displays a list of recent commands, but not in a scrollable pop-up window. You can look at a numbered list of commands and then use F9 to enter the number of the command you want. F9 is also available in Windows NT for entering a command by number, but you probably won't need it because the pop-up window provides the same feature in a more convenient form.

In MS-DOS, you can use Doskey's `/BUFSIZE` option to specify how much memory is allotted for storing the command history. Because Windows NT has virtually unlimited memory, setting memory size doesn't make much sense. Instead, you can set the maximum number of commands to store with the `/LISTSIZE` option. For example, you might set the list size to 20 if you think that anything beyond the previous 20 commands is unlikely to be useful.

Running All Kinds of Programs

Windows NT runs several different kinds of programs seamlessly, so you don't need to know a program's origin or type in order to run it. If it's on your disk, simply type its name (and path, if needed) followed by any parameters. It should run with no questions asked.

If you're accustomed to Windows 3.1, the following words will be familiar: "This program requires Microsoft Windows." Windows NT automatically detects your program's native environment and adapts to it, so you'll never see this bothersome message again.



Windows NT can run the following kinds of programs from the command prompt:

- ▣ Graphics-based programs for Windows NT
- ▣ Graphics-based programs for Windows 3.1
- ▣ Graphics-based programs for MS-DOS
- ▣ Character-based programs for Windows NT
- ▣ Character-based programs for POSIX (a subset of UNIX)
- ▣ 16-bit character-based programs for OS/2
- ▣ Character-based programs for MS-DOS

We'll look at the graphics-based programs first, and then the character-based programs.

Graphics-Based Programs for Windows and Windows NT

Among the graphics-based programs, Windows NT-based applications run the best because they can take advantage of all the sophisticated features of Windows NT. The problem might be in finding them. This book is being published shortly after the release of Windows NT, when it's not entirely clear how the operating system will evolve. By the time you read this, things might have cleared up, but if you're an early adopter, here are some comments on what you may find in the early days of Windows NT.

A new operating system always has the proverbial chicken-and-egg problem—people won't write programs for it until it is in wide use, but it won't be in wide use until people write programs for it. Microsoft tried to minimize this problem in two ways: Programs written for Windows 3.1 run unchanged under Windows NT, and software developers can easily convert their Windows-based programs to native Windows NT-based programs. Because Microsoft provided programming tools for creating Windows NT-based programs long before its release, Windows NT is starting life with more native applications than most new operating systems. However, your favorite Windows-based program may not be among them.

When you see a program running on someone else's Windows NT computer, you probably won't be able to tell whether it was written for Windows NT or Windows 3.1. However, the user probably knows. If it was written for Windows 3.1, it runs slightly slower under Windows NT than if



it were running under Windows 3.1. On the other hand, if it's a native Windows NT-based program, it probably runs faster than a comparable Windows-based program running under Windows 3.1.

Applications for Windows NT can take advantage of new operating-system features such as multi-threading, interprocess communications, and enhanced security. At first, many Windows NT-based programs might not have these new features. Windows NT-based programs will often look and work exactly like their Windows-based counterparts because it is easy to create such programs quickly. But you will begin to see more programs with Windows NT's advanced features as developers integrate these features into their programs.

Graphics-Based Programs for MS-DOS

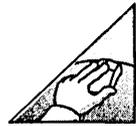
Graphics-based programs for MS-DOS run under Windows NT. On x86-based computers, they run only in full-screen mode. When a program for MS-DOS switches into a graphics mode on these computers, Windows NT automatically switches to full-screen mode. On RISC-based computers, graphics-based programs for MS-DOS run only in a window. (RISC-based computers have no full-screen mode under Windows NT.)

Character-Based Programs for Windows NT

Character-based programs for Windows NT work more efficiently than MS-DOS-based programs, and they take better advantage of Windows NT's operating-system features. Character-based programs for Windows NT can be written to recognize any screen size, and they can generally be more aware of their video, keyboard, and mouse environment. However, at publication time, the future of character-based programs for Windows NT is not clear. Will software developers convert their character-based programs for MS-DOS to run under Windows NT? Or will they concentrate on writing new graphics-based versions of their programs?

Character-Based Programs for POSIX

POSIX is a standard that allows programmers to convert existing UNIX-based programs to native Windows NT-based programs. If you are coming to Windows NT from UNIX, chances are that many of your favorite programs



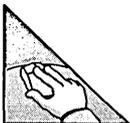
will soon be available for Windows NT. You can't simply copy your programs from a UNIX computer and expect them to run. You'll have to purchase new versions from companies that use their POSIX source code to create programs for Windows NT.

Windows NT on RISC-Based Computers

Windows 3.1 and Windows for Workgroups run only on computers using the *x86* family of processors. Windows NT runs on computers with any of several 32-bit processors, including 80386, 80486, and Pentium processors (known collectively as *x86* processors), and MIPS R4000 and DEC Alpha RISC processors. ("RISC" means *Reduced Instruction Set Computing*.) RISC-based computers have power comparable to minicomputer workstations.

Programs for Windows NT run the same way on all processors, but compatibility features for running MS-DOS-based programs and programs for Windows 3.1 differ. Here are the major differences:

- ▣ *x86*-based computers run programs for MS-DOS and programs for Windows 3.1 using the processor in the computer. RISC-based computers run these programs by emulating an 80286 processor. This means programs that use features of the 80386 and higher processors won't run on RISC-based computers.
- ▣ *x86*-based computers run graphics-based programs for MS-DOS full-screen. RISC-based computers run these programs in a window.
- ▣ *x86*-based computers can run character-based programs either in a window or full-screen. (You can switch between windowed and full-screen modes by pressing Alt+Enter.) RISC-based computers run character-based programs in a window.



Character-Based Programs for OS/2

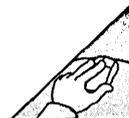
All character-based programs for OS/2 version 1.x and most character-based programs for OS/2 version 2.x run under Windows NT. However, graphics-based programs for OS/2 Presentation Manager or Workplace Shell won't run under Windows NT. If you have both MS-DOS-based and OS/2-based versions of a program, run the OS/2 version on your Windows NT system. It will probably work better because it is written for a protected-mode operating system.

Character-Based Programs for MS-DOS

Most character-based programs for MS-DOS run under Windows NT, but unlike other kinds of programs, they assume that they are alone in the world. A protected-mode operating system with strict security features such as Windows NT has to pull off some amazing sleight of hand to isolate MS-DOS-based programs from other parts of the system. Essentially, the operating system simulates a separate PC—with all the accompanying memory limitations—for each program. Despite all the behind-the-scenes magic, you'll be surprised at how well character-based programs for MS-DOS run under Windows NT.

Because of the limitations of MS-DOS, various techniques and standards have been developed to enhance MS-DOS programs. Windows NT supports both the extended (XMS) and expanded (EMS) memory standards. However, programs that use the Virtual Control Program Interface (VCPI) or DOS Protected Mode Interface (DPMI) will run under Windows NT only on x86-based computers. You don't need to understand what these standards are, only that DOS-extended programs that use VCPI or DPMI won't work on RISC computers.

MS-DOS-based programs that access hardware devices directly might not run under Windows NT without special drivers. For example, some file-recovery or disk-defragmenting programs won't run because they access disk hardware directly rather than going through the operating system. Eventually, vendors of these tools may supply drivers to make them work under Windows NT. For information about installing device drivers, see "Using CONFIG.NT," page 665.



WINDOWS TIP: You might occasionally find an MS-DOS-based program that Windows NT won't run from the command prompt. In the unlikely event that this happens, use the `Forcedos` command to tell Windows NT that this is actually an MS-DOS-based program, even though it doesn't look like one. For example, to run a program called `BADDOG.EXE`, type the following at the command prompt:

```
C:\>forcedos baddog
```

For more information about the `Forcedos` command, see "Forcedos" in the online Command Reference Help.

Launching Programs

When you start a program from the command prompt under a single-tasking operating system such as MS-DOS, you don't expect to see the command prompt again until the program is finished. Only one program can run at a time, and that's that. The rules change under a multitasking system such as Windows NT.

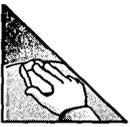
The old model still makes sense for some programs. For example, enter this command:

```
C:\>mode
```

The system pauses for a second, and then displays your device status. This seems natural. You gave the command asking for information, and there's probably not much else you need to do before you get the answer. But now enter this:

```
C:\>calc
```

The Windows Calculator accessory comes up on your screen, waiting for input. If the command prompt session was windowed, you still see it on your screen, but it is frozen, waiting for the `Calc` command to finish. This probably isn't what you intended. You want `Calc` to run in addition to the command prompt session, not instead of it.



PART 4: Running Applications

Windows NT provides the Start command to allow you to start another operation without freezing the command prompt session. To try it, close Calculator and then type:

```
C:\>start calc
```

Calculator starts again, but without freezing the command prompt session. The Start command tells Windows NT to run Calculator and the command prompt session at the same time instead of one after the other.

This works so well that you might think it would be nice to run Mode with the Start command so that you can continue working while it works. Realistically you'd probably want to do this with a program that takes a while, but let's use Mode for this example. Type the following:

```
C:\>start mode
```

A separate window appears where Mode works while the command prompt window remains available. But then the output disappears before you have time to read it. This is just what you asked for, if not what you intended. Start makes sense for interactive programs or programs that have no visual output, but not for command-line utilities that display their output to the screen and then terminate.

For example, try running the command interpreter, CMD.EXE, with and without the Start command. First type the following:

```
C:\>start cmd
```

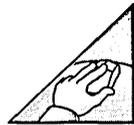
You get a new command prompt session in a new window. Now type this:

```
C:\>cmd
```

This time the Windows NT copyright message appears, followed by another command prompt. It looks like nothing happened, but in fact something has. A second copy of the Cmd program is running and the first copy is waiting for the second to terminate. You can confirm this by using the arrow keys to go back to previous commands. There aren't any. Now type *exit* to terminate the command interpreter. The window remains and again it looks like nothing happened, but if you press the arrow keys you'll see the commands from the original command interpreter. Any commands that you entered in the second command interpreter are lost.

Let's try one more example. Type this:

```
C:\>start dir
```



You might expect the Dir output to disappear just as the Mode output did, but it doesn't. The command prompt appears after the Dir output. The difference is that Mode is a program, whereas Dir is an internal command of CMD.EXE. The Start command recognizes CMD.EXE's internal commands, such as Dir. To run Dir, it automatically starts a new copy of the command interpreter with the /K option, which tells CMD.EXE not to return after running the command. You can get the same effect with Mode (or other executable programs) by using this form:

```
C:\>start cmd /k mode
```

Conversely, the /C option tells CMD.EXE to close the window after the command finishes. For example:

```
C:\>start cmd /c dir
```

The Start command has several useful options for specifying how a started program should appear on your desktop. For Windows-based programs, you can use /MIN or /MAX to make the program appear minimized or maximized. For character-based programs, you can enter the title that you want to appear on the program window in quotation marks. For more information, type the following:

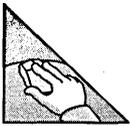
```
C:\>start /?
```

Understanding File Systems and Filenames

Windows NT supports three file systems, each with different filename conventions. You can set up your disk with a partition for each file system, but you will probably use only one or two of them. The three file systems are:

- FAT (File Allocation Table)
- NTFS (NT File System)
- HPFS (High Performance File System)

FAT stands for File Allocation Table, but for this discussion let's forget the technical jargon and simply call it the MS-DOS file system. Filenames



under this system consist of a base name of up to eight characters followed by an optional extension of up to three characters. Thus `BASENAME.EXT`, `BASENAME`, `B.EXT`, and `B.E` are all legal MS-DOS filenames.

NTFS is the new file system designed to speed up Windows NT file access without sacrificing MS-DOS compatibility. In this system you can have filenames of up to 256 characters with multiple extensions of any length. You can use uppercase and lowercase letters and embedded spaces in filenames. With NTFS, you can name your files just about anything you like, but keep the following points in mind when working with NTFS files:

- ❑ You cannot have more than one file in a directory with names that are identical except for case.
- ❑ You must use quotation marks around any filename containing spaces, as in the following:

```
C:\>del "Whole Lotta Spaces Goin On"
```

- ❑ Most file-operation commands ignore case in filenames. For example, typing:

```
C:\>copy *.case b:
```

copies the files `Mixed.Case`, `UPPER.CASE`, and `lower.case` to drive B.

- ❑ You can change the case of a filename with the `Rename` command. For example:

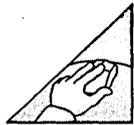
```
C:\>ren ALONGJUMBLEOFWORDS ALongJumbleOfWords
```

HPFS is designed for OS/2 and is supported by Windows NT for compatibility. If you have it, you probably have an OS/2 installation and already know how to use it. If you don't have OS/2, you don't need to know about HPFS.

Converting a Drive to NTFS

When you install Windows NT, the Setup program gives you an opportunity to convert your existing MS-DOS or HPFS drives to NTFS drives. If you passed up this opportunity during setup, you can still do it using the `Convert` command. For example, do the following:

```
C:\>convert d: /fs:ntfs
```



The drive you specify can't be the current drive. The /FS option is required and only supports converting to NTFS. If Windows NT can't lock all users off the drive—for example, if a running program is using a file on the drive or if the drive is being shared over the network—the conversion is delayed until the next time you shut down your computer.

Transferring Files Between NTFS and MS-DOS

What happens when you transfer files between an NTFS disk and an MS-DOS disk? Transferring files from MS-DOS to NTFS is simple: The files keep the same names in NTFS, all in uppercase.

But when you transfer an NTFS file to MS-DOS, Windows NT converts the filename so that it conforms to MS-DOS filename conventions. It does this by using the filename's first six characters and appending a tilde (~) and a number identifying the file. It removes spaces and periods, and converts other characters not allowed in MS-DOS filenames to an underscore (_). It creates an MS-DOS extension from the first three characters of the last NTFS extension.

For example, assume that drive M is an MS-DOS disk and drive N is an NTFS disk. If you type

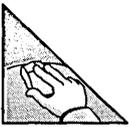
```
N:\>copy "This Is A Long.File.Name" m:
```

the resulting MS-DOS file is named THISIS~1.NAM. The number following the tilde in the filename varies if a previously existing file already has this name. For example, if you then copy another file with a slightly longer name to the same MS-DOS directory, like this:

```
N:\>copy "This Is A Longer.File.Name" m:
```

the result might be THISIS~2.NAM.

You can see how an NTFS filename appears in MS-DOS format with the Dir command's /X option. When you list a directory with the /X option, the files are shown with their short MS-DOS names in a column to the left of the long NTFS names, as the following example shows.



```
Command Prompt

N:\animals>dir /x
Volume in drive N is BigDisk
Volume Serial Number is BC05-0E42

Directory of N:\animals

06/14/93 03:26p          <DIR>
06/14/93 03:26p          <DIR>
12/05/94 09:00a          281 HIGHSI~1.HOR      High Silver.Horse
02/11/93 12:33p          28  MRED~1.HOR        Mr.Ed.Horse
05/06/94 11:45a          1259 MYFRIE~1.HOR     MyFriendFlicka.Horse
05/28/95 01:09p          35  OFDIFF~1.HOR      OfDifferentColor.Horse
05/04/92 03:10p          23  PHARLA~1.HOR        Phar Lap.Horse
10/12/93 04:11p          503 TRIGGE~1.HOR      Trigger.Horse
            8 File(s)      2129 bytes
            62625792 bytes free

N:\animals>
```

For more information about changing NTFS filenames to MS-DOS filenames, see “NTFS Filenames,” page 88, and “Naming a File or Directory” in the online help for File Manager.

Using Wildcards

Windows NT, like MS-DOS, recognizes two wildcard characters: ? and *. The question mark represents any single character in a filename. For example, the command

```
C:\docs>dir c?t.doc
```

matches CAT.DOC, COT.DOC, and CBT.DOC.

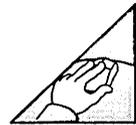
The asterisk matches any number of characters. In MS-DOS, the asterisk works only at the end of the filename or extension. Windows NT handles the asterisk much more flexibly, as the following examples show.

Let’s assume that you have a directory containing three files named ATE.DOC, BATE.DOC, and BAT.DOC. Notice that all three contain the letters *AT*—one at the beginning, one in the middle, and one at the end. Now suppose you want to find the one with *AT* at the beginning. Enter this command:

```
C:\docs>dir at*.doc
```

Sure enough, this command shows only ATE.DOC. Now look for *AT* at the end:

```
C:\docs>dir *at.doc
```



Windows NT finds only BAT.DOC. What will the following command do?

```
C:\docs>dir *at*.doc
```

Probably not what you expect. Windows NT finds all three files. Why? Because Windows NT interprets the asterisk as zero or more characters. ATE.DOC is found because it has zero characters before AT, and BAT.DOC is found because it has zero characters after AT.

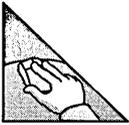
With NTFS, filenames can have multiple extensions separated by periods, and the asterisk can be used to match characters within each group. For example, let's assume that your current directory contains the files A.A.A, A.B.C, C.B.A, and A.B.C.D. The command *dir *.b.** matches A.B.C, C.B.A, and A.B.C.D, but not A.A.A. Typing *dir a.b.c.** matches only A.B.C and A.B.C.D.

Using Command Symbols

With the move to Windows and other graphical user interface systems, the emphasis has been on interactive programs. However, old-fashioned programs that take all of their input from a command line and then run unaided still have their place. In fact, they are even more useful in a multitasking system because you can turn them loose to do complicated processing in the background while you continue to work with interactive programs in the foreground. Windows NT includes features that make noninteractive programs easier to run and more powerful, and that let you chain programs together so that later ones use the output of their predecessors as input.

In order to work together better, many command-line programs follow a set of conventions that control their interaction.

- By default, programs take all of their input as lines of text typed at the keyboard, but input in the same format can be redirected from a file or any device capable of sending lines of text.
- By default, programs send all of their output to the screen as lines of text, but output in the same format can be redirected to a file or another line-oriented device such as a printer.
- Programs are written to set a number called a return value when they terminate, to indicate the results of the program.



When programs are written according to these rules, you can use the symbols below to control a program's input and output, and to connect or chain programs together.

Symbol	Purpose
>	Redirect output
>>	Append redirected output
<	Redirect input
	Pipe output to input
&	Combine commands unconditionally
&&	Combine commands with logical AND
	Combine commands with logical OR
^	Treat next symbol as character
(and)	Group logical commands

The Redirection Symbols

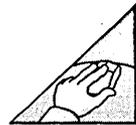
Like MS-DOS and UNIX, Windows NT allows you to override the default source of input (the keyboard) or the default destination for output (the screen). For example, if you want the output of the Dir command to go to a file instead of the screen, use a greater than sign (>) followed by the name of the file. For example:

```
C:\>dir /b *.bat > batch.lst
```

This command creates a file containing the names of all the BAT files in the current directory. The /B option in the example directs the Dir command to include only the names without sizes or other directory information.

Windows NT also recognizes the device names shown in Table 18-2. You can use one of these names in any context in which you can use a text file. For example, you can send the same file list to the printer (the PRN device) with this command:

```
C:\bat>dir /b *.bat > prn
```



Device	Description
CON	Console device (keyboard input and screen output)
AUX	Default auxiliary device (COM1)
PRN	Default printer device (LPT1)
LPTx	Line printer 1, 2, 3, or 4
COMx	Communications port 1, 2, 3, or 4
NUL	Empty device that swallows output or provides blank input

TABLE 18-2.
Device names.

Using two greater than signs (>>) redirects the output and appends it to an existing file. For example:

```
C:\bat>dir /b *.cmd >> batch.lst
```

This command appends a list of CMD files to the previously created file containing BAT files. If you use a single greater than sign in this command line, the command overwrites the existing file rather than appends to it. If you use the >> symbol to append to a file that doesn't exist, Windows NT creates the file.

Redirecting Input

Redirected input works the same way as redirected output except that you use a less than sign (<). Most Windows NT commands don't accept input, so there's no need to redirect input to them. However, the Sort and More commands do take text line input. Programs that take text input and give text output are called *filters* because you can send files in one end to be filtered so that they come out in a new form on the other end. The following example uses Sort to filter the file created with the Dir command above.

```
C:\bat>sort < batch.lst
```

The input file, BATCH.LST, contains a list of BAT files followed by a list of CMD files (assuming you have some of each in the current directory). The output to the screen has the same list of files sorted alphabetically by filename. Often you'll want to send filtered output to a file, like this:

```
C:\bat>sort < batch.lst > sbatch.lst
```



You can then pass the output file as input to another filter, and so on. For example, you can send SBATCH.LST as the input to the More command.

```
C:\bat>more < sbatch.lst
```

(For information about a better way to chain the input and output of different programs, see “The Pipe Symbol,” page 605.)

Standard Output and Standard Error

Programs can be written to send their output either to the standard output device or the standard error device. Sometimes programs are written to send different types of output to each device. For example, a program might send messages indicating invalid data input to standard output, and messages indicating program failure to standard error. You can't always tell which is which because by default both devices are the screen. However, if you redirect output to a file, messages written to standard error still appear on the screen, whereas messages written to standard output go into the file.

The Windows NT Type command illustrates the difference. When used with wildcards (something you can't do with the MS-DOS Type command), it sends the name of each matching file to standard error and sends the contents of the file to standard output. Normally they both go to the screen and you see a nice display with each filename followed by its contents.

However, if you try to redirect output to a file like this:

```
C:\bat>type *.bat > std.out
```

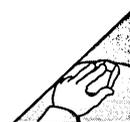
the filenames still appear on your screen because standard error is still directed to the screen. Only the file contents go to the redirected file.

MS-DOS does not have a way of redirecting standard error, but Windows NT allows you to qualify the redirection symbol by preceding it with a number. Use 1> (or simply >) for standard output and 2> for standard error. For example:

```
C:\bat>type *.bat 2> err.out
```

This time the file contents go to the screen and the names go to the redirected file. You can redirect both to separate files with this command:

```
C:\bat>type *.bat 2> err.out 1> std.out
```



Probably what you really want is to redirect both standard error and standard input to a file so that output is the same in the file as on the screen. Here's how.

```
C:\bat>type *.bat > both.out 2>&1
```

Looks like gibberish, doesn't it? What this command says (starting from the end of the command line) is: Redirect standard error (2>) to standard output (&1), and redirect standard output (now containing both) to the file BOTH.OUT.

The Pipe Symbol

The pipe symbol (|) is used to pipe the output of one program into a second program as the second program's input. Piping is commonly used with the More utility, which displays multiple screens of output one screenful at a time. For example:

```
C:\bat>dir | more
```

This command makes the output of Dir the input of More. More filters out the first screenful of Dir output, sends it to the screen as its own output, and then waits for a keypress before sending more filtered output.

Here is a more complicated example of piping:

```
C:\bat>dir /b *.bat | sort | more
```

This example sends the output of Dir as the input of Sort, which sends its output as input to More. This single command produces the same result as the following sequence of commands.

```
C:\bat>dir /b *.bat > temp1
```

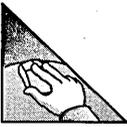
```
C:\bat>sort < temp1 > temp2
```

```
C:\bat>more < temp2
```

```
.....
```

```
C:\bat>del temp1 temp2
```

The only difference is that that the system manages the temporary files automatically. Under MS-DOS, temporary disk files are created and deleted, but Windows NT handles piping transparently in memory.



The Command Combination Symbols

Unlike MS-DOS, Windows NT allows you to enter multiple commands on a single command line. Furthermore, you can make later commands depend on the results of earlier commands. This feature can be particularly useful in batch files and Doskey macros, but you might also find it convenient from the command prompt. (For information about batch files, see “Using Batch Files,” page 644. For more information about Doskey macros, see “Using Doskey Macros,” page 637.)

To simply combine commands without regard to their results, use the `&` symbol, like this:

```
C:\data>copy a:file.dat & edit file.dat
```

But what if there is no FILE.DAT on drive A? Then it can't be copied to the current drive and the Edit command will fail when it can't find the file. Your screen will be littered with error messages. Windows NT provides two logical operation symbols for better control over situations like this.

The `&&` symbol represents the logical AND operation. The `||` symbol represents the logical OR operation. The success (or failure) of a program determines the result of these logical operations.

If a program fails, it should return false. If it succeeds, it should return true. When two operations are combined with the AND operator, if the first operation is true *and* the second operation is true, then the whole command line is true. However, if the first operation is false, then the combination can't be true. There is no need to perform the second operation, so Windows NT doesn't bother. Consider this modified version of the earlier example:

```
C:\data>copy a:file.dat && edit file.dat
```

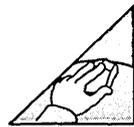
If the Copy command fails, the expression can't be true—so the Edit command is ignored.

Sometimes you want the opposite effect: Execute the second command only if the first fails. You can do this with the OR operation, like this:

```
C:\data>copy a:file.dat || copy b:file.dat
```

This command line instructs Windows NT to copy the file from drive A, *or* if that doesn't work, try copying from drive B.

You can use parentheses to specify the order of operations. Compare the following command lines.



```
C:\>(findstr "+" *.c || findstr "*" *.c) && findstr "/" *.c  
C:\>findstr "+" *.c || (findstr "*" *.c && findstr "/" *.c)
```

The first says, “if you find + or *, then look for /.” The second says, “if you can’t find +, then look for *, and if you find it, look for /.” This can get complicated fast!

Yes, We Have No Errors

If you’ve worked with logical operations before, you probably know that zero represents false and any other number represents true. But when working with return values, everything you know is wrong. Zero means true and any other number means false. The reason is that most programs can fail in many different ways, but they can only succeed in one way. A program can return a nonzero number indicating what kind of error it encountered, and this *error level* can be tested in batch files with the `ErrorLevel` statement. This doesn’t matter much when you use the command combination symbols, which test only for a program’s success. Whether it indicates success with a zero or some other number is unimportant. However, if you’re writing your own programs, be sure that they return zero for success.

The problem with testing for return values is that some programs deliberately disobey the rules, and others simply ignore them. Although most programs return zero for success, the author of a program may decide that there is only one way to fail, but there are lots of interesting ways to succeed. Programs like this work fine with `ErrorLevel` testing in batch files, but everything is backward if you try to use them with the command combination symbols.

In most interactive programs, the return value doesn’t matter and programmers sometimes don’t bother to set it at all. In this case, the return value comes out random, which means that it probably won’t be zero. You can even see the inconsistency in Windows NT commands. For example, `Copy` and `FindStr` return false if they fail, but `Del` and `Find` don’t bother. They always returns true regardless of the result.



The Escape Symbol

Some of the symbols used for command combination are legal characters in filenames. This leads to ambiguities. You can resolve ambiguities by using the caret (^) as an escape symbol to indicate that the symbol following it is intended as a character rather than a command symbol.

Consider the following command line.

```
C:\cartoons>copy f:\cartoons\Tom&Jerry
```

This copies the file F:\CARTOONS\Tom to the current directory, and then executes the Jerry command—probably not what you wanted or expected. You might think that because there is no space before or after the & symbol, the system will know that you are referring to the filename Tom&Jerry. Not true. When a command symbol appears on the command line, whatever follows is assumed to be a command, space or no space. Use the caret as shown below to indicate that you are referring to a filename.

```
C:\cartoons>copy f:\cartoons\Tom^&Jerry
```

The ampersand (&), parentheses (the (and) symbols), and the caret (^) are legal in file, directory, and network names; the pipe (|), less than sign (<), and greater than sign (>) are not. To delete the legal NTFS filename Bugs&Roger(rabbits)Like^s, use the following command:

```
C:\cartoons>del Bugs^&Roger^(rabbits^)Like^^s
```

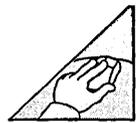
Using Windows NT Commands

People who like using command lines tend to be a pretty independent bunch, and those who don't like command lines have probably skipped this chapter. Therefore, this section doesn't do much hand-holding; it merely points out some of the ways that Windows NT commands differ from those of MS-DOS and other command-line operating systems.

The Dir Command

The lowly Dir command gets several new features in Windows NT. You can now list multiple directories or file groups with one command, as the following example shows.

```
C:\>dir \text\*.txt \winword\*.doc *.bat
```



You can still use the `/W` option to list filenames in multiple columns. If you sort the file list (using the `/O` option), the `/W` option sorts filenames by row, but now you can use the `/D` option instead to sort vertically in multiple columns. Try `dir /o/w` and then `dir /o/d` to see the difference.

The default output of `Dir` is different on FAT (MS-DOS) file system drives than on NTFS drives. The default format for an NTFS drive is shown below. This format—with the filename on the right—is necessary to accommodate filenames of different lengths. You can force similar output on MS-DOS drives with the `/N` or `/X` option.

```
N:\animals>dir *.horse
Volume in drive N is BigDisk
Volume Serial Number is BC05-0E42

Directory of N:\animals

06/14/95  03:26p      <DIR>          .
06/14/95  03:26p      <DIR>          ..
12/05/94  09:00a                281 HiOh Silver.Horse
02/11/93  12:33p                28 Mr.Ed.Horse
05/06/94  11:45a            1259 MyFriendFlicka.Horse
05/28/95  01:09p                35 OfDifferentColor.Horse
05/04/92  03:18p                23 Phar Lap.Horse
10/12/93  04:11p            503 Trigger.Horse
           8 File(s)          2129 bytes
           62625792 bytes free
```

It's easy and safe to experiment with the `Dir` options. When you find the ones you like, you can set them in the `DIRCMD` environment variable to change the default meaning of `Dir`. For information about environment variables, see "Using Environment Variables," page 629. For information about setting environment variables with Control Panel, see "Initializing Environment Variables," page 657. Try this:

```
C:\>set dircmd=/Od/N
```

This makes `Dir` always display files sorted by date in the new wide format with the filename on the right.



MOUSE TIP: As many MS-DOS users know, you can press Ctrl+S to pause while scrolling (from a Dir or Type command, for example), and then press any key to continue. In Windows NT, you can do the same thing with the mouse if QuickEdit mode is on. (To see that it is, choose Edit Mark from the Control menu.) Click the primary button to pause scrolling, and then click the secondary button to continue.

The Del Command

The Del command can delete several groups of files with a single command. For example,

```
C:\>del *.obj *.lst
```

deletes all of the OBJ and LST files in the current directory. Needless to say, you should use this feature with care. You can also live dangerously with the /Q option, which deletes all of the files in a directory without any warning prompt. (Without /Q, Del asks you to confirm your intentions if you enter a global wildcard specification such as *.*.) The /F option allows you to delete read-only files. The /S option lets you delete all files matching a wildcard specification from all subdirectories. You can clean up TMP files with the following command.

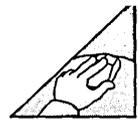
```
C:\>del /s /p *.tmp
```

The /P option here causes the command to prompt for a *Y* or *N* response before deleting each file.

In short, the new Del options give you more power, but they require caution. Be sure you don't give a command like this:

```
C:\>del /s /f /q *.*
```

This would leave your entire directory structure intact, but delete every file in every directory without any warning.



The Rmdir (RD) Command

The Rmdir command—usually invoked with its shorter form, RD—can now delete a directory that is not empty by using the /S option. In fact, you can kill a whole directory tree faster than you can say “disaster.” Use at your own risk!



WINDOWS TIP: MS-DOS version 6.0 added a command called DelTree that does the same thing as the /S option for Rmdir. If you prefer the name DelTree, a Doskey macro can do the trick.

```
C:\>doskey deltree=rd /s $*
```

For information about Doskey macros, see “Using Doskey Macros,” page 637.

The Move and Ren Commands

The Move command moves a file or group of files from one directory to another (on the same disk or a different disk). You specify the source directory and files in the first argument, and the destination directory in the second. For example,

```
C:\>move \temp\*. * \tmp
```

moves all of the files in the TEMP directory to the TMP directory. Incredibly, versions of MS-DOS prior to 6.0 had no Move command. You had to do this operation by copying the files to the destination directory and then deleting them from the source directory.

The Ren command (also recognized as Rename) can rename directories as well as files under Windows NT. Despite this enhancement, the Ren command is now redundant. Anything you can do with Ren you can also do with Move. For example, the command

```
C:\>ren \tempdir \tmpdir
```

has the same effect as

```
C:\>move \tempdir \tmpdir
```



Moving a directory to a directory with a new name is the same as renaming the directory. You can use `Move` to move files or directories to another disk, whereas you can use `Ren` only to rename a file or directory on its current disk.

The More Command

The `More` command allows you to break multiple screens of output from commands like `Type` or `Dir` into pages. The output stops after each screen so that you can read it, and you press a key to continue to the next screen. You can use the command as a crude file browser by typing a filename or wildcard specification after the command name, as in the example below.

```
C:\>more *.txt
```

But usually, `More` is used as a filter for piped output, as in

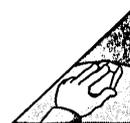
```
C:\>dir | more
```

For more information about piping, see “The Pipe Symbol,” page 605.

The Windows NT version of `More` has more functionality than MS-DOS versions (but far less than many public domain versions). You can specify the `/E` option to make `More` recognize a variety of commands at the end of each screen. Instead of pressing any key to get to the next screen, you can press `Enter` to see the next line, `Spacebar` to see the next screen, `F` to see the next file (if multiple files were specified), and `Q` to quit, among others. The `More` command doesn't modify or delete files, so it's safe to experiment with it.

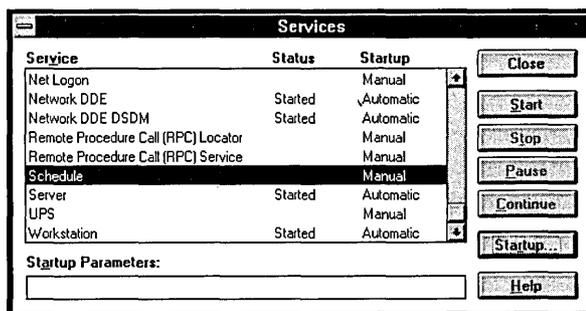
The At Command

The `At` command allows you to schedule execution of a command at some specified time. Similar utilities are common in multitasking and networked systems, but the concept might be new if you are coming to Windows NT from MS-DOS. It is easy to schedule programs in a multitasking operating system, but very difficult in a single-tasking system where each program thinks it is the only one in the system.

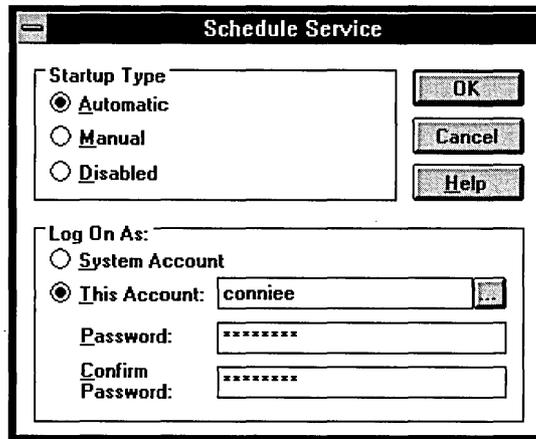
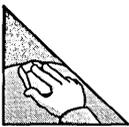


Although you don't have to be connected to a network to use the At command, you do have to start the network schedule service. To do this, take the following steps:

1. Start Control Panel. (For more information, see "Starting Control Panel," page 128.)
2. Double-click the Services icon in Control Panel.
3. Select the Schedule service from list of services, as shown below.



4. If the service is not marked Started in the Status column, click the Start button.
5. Look at the Startup column. The Schedule service will be marked Manual, Automatic, or Disabled—probably Manual if you haven't changed anything since you set up Windows NT. If you plan to use the At command often, you should change the setting to Automatic so that the Schedule service starts every time you log on. The Schedule service must be running not only when you schedule a task with the At command, but also when it comes time to run the tasks you scheduled. If you log off your computer and log on without restarting the Schedule service, any tasks scheduled with the At command won't be executed.
6. To set the Schedule service to Automatic, click the Startup button. The dialog box shown on the next page appears.

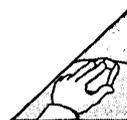


7. Select Automatic in the Startup Type option button group.
8. Select This Account in the Log On As group and enter your user name and password. If you select System Account, you cannot use the At command because the Schedule service will be running in the System account, which is available only if you log on as a member of the Administrators group. (You can use the System Account setting if several people are authorized to use your computer, but you don't want them to be able to schedule tasks with the At command. You log on as administrator and schedule the tasks. These tasks will then affect all of the users who log onto the computer, but they won't be able to change them without authorization.)

After the Schedule service starts, use the At command to schedule commands at a particular time. For example, you can send yourself a reminder with the following command.

```
C:\>at 16:30 "echo Don't forget to buy groceries & pause"
```

This poor man's alternative to the Schedule+ application creates a command session window with a reminder message. Note that the time has to be given



in 24-hour format. (This command will be executed at 4:30 P.M.) The command itself must be enclosed in quotation marks. (For information about the Echo and Pause commands, see “Anatomy of a Batch File,” page 647.)

You can also use `At` to schedule a task at regular intervals. For example, if you have written a batch file called `UPDATE`, you can schedule it to run every weeknight at 3 A.M. with the following command.

```
C:\>at 03:00 /every:M,T,W,Th,F "update"
```

You can also indicate the date as a day of the month (for example, `/EVERY:5,10,15,20,25,30`), or you can schedule an event on the next occurrence of a given date (`/NEXT:Su`). If the command you give takes filenames as arguments, be sure to specify the names with the drive or network name and a complete path description.

You can expect to see many interesting programs that take advantage of the `At` command as developers of programs for MS-DOS and Windows become familiar with the possibilities of a multitasking operating system.

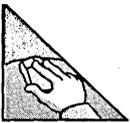
The Find and Findstr Commands

The `Find` and `Findstr` commands are filter programs that search text files for specified strings. `Find` is the junior version inherited unchanged from MS-DOS. `Findstr` is the grown-up version inherited from UNIX, where the corresponding utility is called `grep`.

The difference between the two is in how the search string is specified. With `Find`, you specify a string of characters. With `Findstr`, you specify a string that can include wildcard characters to match variable sequences of characters. For example, you can search for all words beginning with `W` at the start of a line, or all words that start with `C` and end with `T`. Strings containing the wildcard characters shown in Table 18-3 on the next page are called *regular expressions*.

Explaining regular expressions could take a whole chapter or even a book. In addition, `Findstr` takes a variety of complex options. The following example gives a taste of the power of `Findstr`.

```
C:\bat>findstr /s /c:" [0-9][0-9]*$" *.bat *.cmd
```



Character	Description
.	Wildcard: any character
*	Repeat: zero or more occurrences of previous character or class
^	Line position: beginning of line
\$	Line position: end of line
[<i>class</i>]	Character class: any one character in set
[<i>^class</i>]	Inverse class: any one character not in set
[<i>x-y</i>]	Range: any characters within the specified range
\ <i>x</i>	Escape: literal use of symbol <i>x</i>
\< <i>word</i>	Beginning of word
<i>word</i> \>	End of word

TABLE 18-3.

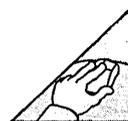
Wildcard characters used by Findstr.

This command finds every line that ends with a number in every batch file (with extension CMD or BAT) on the current drive. The /S option extends the search to files in the current directory and all its subdirectories. The /C option forces Findstr to treat spaces as literal characters rather than as separators between multiple patterns. The pattern is enclosed in quotation marks because it contains a space. The files to be searched are specified after the pattern.

Now let's look closely at the pattern. It begins with a literal space, which lets Findstr find the start of a word. The pattern [0-9] tells Findstr to find any digit after the space. The second [0-9] pattern is followed by *, which means to find zero or more digits after the initial digit. The pattern ends with \$, which means the end of the line. In other words, this pattern searches for something that starts with a space, has one or more digits (but no other characters), and comes at the end of the line.

The XCopy Command

XCopy is an extended copy command that can copy whole directory trees, update files that have changed recently, and perform many other complicated copy operations. The Windows NT version is similar to the MS-DOS



version, but it has so many new options that it's hard to keep track of them. You might find it more useful to think of XCopy as a collection of commands and use Doskey macros or batch files to give these commands names you can remember. For information about changing XCopy behavior with Doskey macros, see "Sample Macros," page 642. For information about using XCopy for backup operations, see "Backing Up with XCopy," page 394.

Using Network Commands

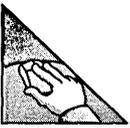
Networking is a fundamental part of Windows NT, not an add-on product that you purchase separately, as with MS-DOS. Although you can install Windows NT on a single computer that is not connected to other computers, most users will be networked. And yet, networking will probably be an unfamiliar concept to some users moving to Windows NT from Windows 3.1 or MS-DOS.

This section summarizes networking concepts and describes some of the most common networking user commands. As with other topics in this chapter, networking at the command prompt is completely optional. Any operation described here can also be done through File Manager, Print Manager, and other Windows NT utilities.

Because network setup and administration is a topic worthy of a book in itself, we'll assume here that your network administrator has already set up your system properly and that network services are available to you.

Using Network Names

Network resources can include printers, disks, modems, tape drives, and just about any other device connected to the computer. If a user somewhere on the network makes a device on his or her computer available to users, that device is said to be *shared*. In order to use a shared device on someone else's computer, you must *connect* to that device. Like files and directories, network resources must be named so that users have some means of specifying which devices they want to connect to.



A network name includes the following elements:

- The name always starts with *two backslashes* (\\) to distinguish it from directory names.
- The *computer name* appears next.
- Another *backslash* separator follows the computer name.
- The *share name* completes the network name.

NOTE: A single resource can be shared with multiple names, each having different permissions and settings. To outside users, each share appears as a completely different device even though it may physically be the same as another share.

A computer name might consist of an e-mail name and computer number, for example. The share name should provide some indication of its purpose. Printers might have a room number in the name, and server drives shared by a department might have the department name. For example, a user with the e-mail name CONNIEE who wants to use a directory on her second computer for exchange of files might name her computer CONNIEE2 and her share EXCHANGE. Users can access the shared directory as \\CONNIEE2\EXCHANGE. Network names are not case-sensitive.

Getting Help

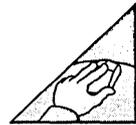
The first thing to learn about using network resources from the command prompt is how to get help. You can get help on most network services with the Net Help command. Typing this command with no arguments gives you a list of all available help topics.

To get help on a specific service, type *net help* followed by the name of the service. For example,

```
C:\>net help share
```

gives syntax and a description of the command to share a network resource from your computer. Alternatively, you can get help on each command with the /HELP or /? option, like this:

```
C:\>net share /?
```



Command-line help is terse, but usually sufficient once you get used to it. You can get more detailed help from the Windows NT Help file (in your Main group in Program Manager).

When you get an error message from a Net command, an error number is displayed along with a brief description. To get more detailed information about the error, give the number as an argument of the Net Helpmsg command. For example:

```
C:\>net helpmsg 2182
```

Connecting to Shared Devices

Using a shared device is the most common network task. You can connect to a shared device by specifying a device name and a network name as part of the Net Use command.

```
C:\>net use x: \\conniee2\exchange *
```

This command connects a directory called \\CONNIEE2\EXCHANGE as the X: drive. The asterisk tells the system to prompt you for the password. The password is not displayed as you type it. You can type the password instead of the asterisk, but anyone looking at your screen can see the password. You might want to include the password in batch files, however.

If the command succeeds, you can use the X: drive exactly as you would any drive on your local computer, subject to any restrictions imposed by the owner. For example, the owner might allow anyone to read files, but allow only selected users to write, modify, or delete them.

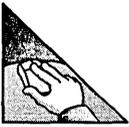
You can connect to network printers in the same way. For example:

```
C:\>net use lpt1 \\prn1345\okips
```

After this command, anything you print to LPT1 will go to the shared printer.

If a shared resource doesn't have a password, you can access it directly without first connecting to it. Simply use the network name in place of the drive name. For example, to copy WORK.BAT from the \BAT directory of \\STEVEO\PUBLIC to your C drive, use the network name instead of a drive letter, as shown below.

```
C:\>copy \\steveo\public\bat\work.bat c:
```



This saves you from having to connect the shared drive to a drive letter, copy to the drive, then disconnect the drive, but it works only for public devices. Because the directory has to be appended directly to the network name, there is no place to put the password.



WINDOWS TIP: If you want to use the network name to access a shared directory that is password protected, first connect to the share without specifying a drive letter, like this:

```
C:\>net use \\steveo\private *
```

After you have connected with a password, the network allows you to access files without the password. For example:

```
C:\>copy \\steveo\private\bat\ball.bat c:
```

When you are finished using a resource, you can disconnect by giving the Net Use command with the /DELETE option (usually abbreviated as /D), as in

```
C:\>net use x: /d
```

The /PERSISTENT option determines whether any connections that existed at your last logoff are restored automatically when you log on again. By default, persistence is on. If you want to connect to a share temporarily without the resource being reconnected at your next session, use this format:

```
C:\>net use x: \\marketing\backup /persistent:no
```

If you find yourself turning persistence off for most connections, you can change the default with this command:

```
C:\>net use /persistent:no
```

After this command, you must use the /PERSISTENT option when you connect to a resource that you want reconnected automatically at logon. For example:

```
C:\>net use lpt1 \\prn1345\okips /persistent:yes
```



Browsing Network Resources

The Net View command browses the network for the servers and shared resources you might be interested in. First you browse domains to see which servers are available, and then you browse the servers to see which shares are available.

A domain is a group of servers. A small network might have only one domain. In a large corporation, the network might be organized into many domains. For example, a company might put each floor, building, or branch office in a separate domain. When you log onto Windows NT, you log onto a domain—usually one recommended by your system administrator. You can browse the servers in your domain by typing *net view*, which displays a list of servers similar to the following.

```
C:\>net view
Server Name          Remark
-----
\\CONNIEE2           Connie Ehrlich's second machine
\\STEVEO             Steve Overholt's machine
\\SHARONG            Sharon Gardner's machine
\\SALES              Sales department server
\\MARKETING          Marketing department server
The command completed successfully.
```

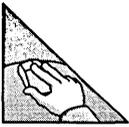
The following command checks to see which other domains are available for browsing.

```
C:\>net view /domain
```

To view the servers in a particular domain (other than your own), specify the domain name, like this:

```
C:\>net view /domain:boston
```

After you've found the name of a server, you can browse its shares. For example, typing *net view \\sales* displays information similar to that shown on the next page.



Shared resources at \\sales
Sales departmental server

Sharename	Type	Used as	Comment
CONTACTS	Disk	P:	Regional contact sheets
ACCOUNTS	Disk		Accounting reports
EXCHANGE	Disk		File exchange area
OKIPS	Print	LPT1	Okidata Postscript
HP	PRINT	LPT2	Laserjet

The command completed successfully

When you find a share, you can use the `Dir` or `Tree` command to examine the contents (as long as the share is public), like this:

```
C:\>tree /f \\sales\contacts | more
```

Browsing through lists of computers and shares should raise some concerns about how you want your own computer to appear. Remember that everyone on the network can see your computer name (unless you specifically hide it) and the shared resources you have. Be sure to keep sensitive data in directories that are not shared, or set the passwords and protection levels appropriately. If you do want to share a resource, be sure to add comments so that browsers will know what you are offering. Comments are optional when you set up your own shares, but they can save a lot of frustration for people searching for information. The next section describes one way to share your own devices.

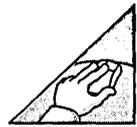
Other Network Commands

Of the many network commands available (type *net help* to see a list), most are for administrators or advanced users. But all users might find the following commands useful.

The Net Share Command

If you want to share a directory on your disk, you'll probably find it easier to do so with File Manager. (For information, see "Sharing Directories with Other Users on the Network," page 100.) However, you can also use the Net Share command, as shown below.

```
C:\>net share contacts=c:\contacts /remarks:"Contact lists"
```



If your computer's name is SHARONG, this command makes your CONTACTS directory public with the network name \\SHARONG\CONTACTS. Browsers will see the description given with the /REMARKS option. You can't set access restrictions or password-protect your share from the command prompt; use File Manager if you need these features.

You can stop sharing the directory with the following command. The /D option deletes the share.

```
C:\>net share contacts /d
```

The Net Send Command

You can send messages to other users with the Net Send command, as in the example below.

```
C:\>net send conniee1 Meeting in my office at 4 pm
```

This displays a pop-up message on the CONNIEE1 computer if that computer is running the network Messenger service (most computers do so by default). In addition to specifying a particular computer as the recipient, you can send a message to everyone in your group or everyone in a specified domain. Pop-up messages have the potential to be obnoxious, so use discretion, especially if the receiving group includes a lot of people.



WINDOWS TIP: If you find that you are receiving too many inappropriate messages, you can turn off the Messenger service on your own computer with the Services applet in Control Panel or with this command:

```
C:\>net stop messenger
```

The Net Time Command

You can use the Net Time command to synchronize your computer's time setting with the time of a master server computer. Normally the network administrator assigns a computer to keep time for a group or company. If you are instructed to use the computer \\TIMESVR, for example, you can give the following command to synchronize the time on your computer:

```
C:\>net time \\timesvr /set /y
```



WINDOWS TIP: You can use Doskey macros to shorten network commands. Use Notepad or another editor to create a file named NET.MAC that contains the following information:

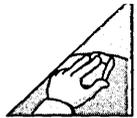
```
:= Connect to a share, reconnect if that
:= is the default
use=net use $*
:= Connect temporarily to a share, don't
:= reconnect regardless of default
uset=net use $* /persistent:no
:= Connect permanently to a share, reconnect
:= regardless of default
usep=net use $* /persistent:yes
:= Delete a share
delete=net use $1 /delete
:= View the shares on a machines
vshares=net view $*
:= View the machines on a domain
vdomain=net view /domain:$1
:= View the available domains
vdomains=net view /domain
:= Share a resource
share=net share $*
:= Send a message
send=net send $*
:=
```

Then load the macros with this command:

```
C:\>doskey /macrofile=c:\bat\net.mac
```

You don't need to know how the macros work to start using them. For more information about Doskey, see "Using Doskey Macros," page 637.

The /SET option is required to set your computer's time. Without the /Y option, the network shows the time and asks if you want to set your computer's time to match the server's time. This option (or its partner /N) is used frequently with network commands to specify yes (or no) in response



to a prompt. You might want to synchronize the time periodically by placing this command in a logon script or by calling it periodically with the At command. For example:

```
C:\>at 02:00 /every:f "net time \timesvr /set /y"
```

For information about logon scripts, see “Setting Account Policies,” page 328. For information about the At command, see “The At Command,” page 612.

Customizing Command Prompt Sessions and Character-Based Programs

Using Environment Variables

629

Environment variables are the traditional way to pass information between programs. Sometimes you set environment variables for the system to read; sometimes you read variables set by the system.

Using Doskey Macros

637

For simple automation tasks, Doskey macros often work better than batch files. They're easy to write and execute instantly.

Using Batch Files

644

Batch files let you automate your system and create new commands by combining old commands. Windows NT offers a few new tricks for the batch file guru.

Customizing Your Configuration

656

Windows NT offers many options for configuring command prompt sessions, logon behavior, and the operation of MS-DOS-based programs. Even unruly TSR programs can be tamed.



indows NT runs your old and new programs right out of the box. You don't have to do anything special to run character-based programs or to use the command prompt. But if you like, you can automate commands, change your working environment, and smooth the rough edges between the graphical-user-interface and character-based worlds.

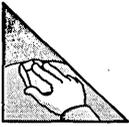
Chapter 4, "Customizing Windows NT with Control Panel," explains how to customize the graphical-user-interface world of Windows and Windows NT using Control Panel. This chapter explains how to customize the character-based world of command prompts and non-Windows-based programs. You'll soon see that it really is a different world. Control Panel has a consistent feel and easy-to-use interface, but techniques for customizing the character-based world, although often powerful, are inconsistent, sometimes confusing, and generally old-fashioned. They are borrowed from several earlier operating systems, with a few new touches added specifically for Windows NT.

If you like the command prompt approach because it is terse and efficient, then you'll probably enjoy using Doskey macros and batch files to make it even more so. If you've used MS-DOS or OS/2, you might already know how to write macros and batch files, but Windows NT offers a few new twists. For example, you'll find significant differences in how you write configuration and initialization files. Program Information Files (PIFs), which make non-Windows-based programs work more smoothly under Windows, provide another interesting area for customization.

As in the previous chapter, we assume that you have some experience with batch files and the like from using MS-DOS. Therefore, this chapter concentrates on the differences between MS-DOS and Windows NT.

Using Environment Variables

Command-prompt operating systems traditionally use environment variables as a means for programs to share information and read global settings. Windows 3.1 and Windows NT use initialization files for the same purpose. But the distinction between the old environment-variable system and the new initialization-file system is not always clear. Windows-based programs



can use environment variables, and non-Windows-based programs can use initialization files. For example, many MS-DOS-based programming tools read settings from a configuration file called `TOOLS.INI`, the location of which is determined by the `INIT` environment variable.

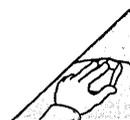
The following sections explain how to use environment variables for these tasks:

- Setting and using environment variables to pass information to your batch files and programs
- Reading environment variables set by the system to get information about your environment
- Setting standard environment variables that have a special meaning recognized by the command processor and other programs

Setting and Using Environment Variables

The `Set` command allows you to examine as well as set environment variables. To examine the current environment variables, open a command prompt window (for information about this, see “Starting a Command Prompt Session,” page 576) and type `set` (without any arguments). Windows NT displays a listing of all the current environment variables and their values, as the following typical example shows.

```
ComSpec=C:\winnt\system32\cmd.exe
HOMEDRIVE=C:
HOMEPATH=\users\conniee
OS=Windows_NT
Os2LibPath=C:\winnt\system32\os2\dll;
Path=C:\winnt\system32;C:\winnt;C:\BAT;C:\BIN;C:\DOS
PROCESSOR_ARCHITECTURE=x86
PROCESSOR_LEVEL=4
PROMPT=$P$G
SystemRoot=C:\winnt
temp=C:\temp
tmp=C:\temp
USERDOMAIN=BOSTON
USERNAME=ConnieE
windir=C:\winnt
```



To set an environment variable, use the Set command followed by the variable name and value. For example:

```
C:\>set FullName=Connie Ehrlich
```

When you use the Set command to set an environment variable, the variable is in effect in the current command prompt session and in any sessions or programs started from that session. To set environment variables that will be permanent for all command prompts and programs, use the Control Panel's System applet. For more information about the System applet, see "Initializing Environment Variables," page 657.

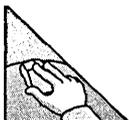
You can use any case when you specify an environment variable in Windows NT. Unlike MS-DOS, which converts all environment variable names to uppercase, Windows NT remembers the case you use when you define a variable. However, you cannot define multiple variables with the same name and different case. Windows NT commands ignore the case of variable names.

Although Windows NT internally ignores the case of environment variable *names*, it retains the case of the *value* you assign to a variable. The environment variable's value is always supplied to programs in the same case you used when you assigned it.

To use the value of an existing environment variable, enclose it in percent signs (%). For example, the SystemRoot variable is automatically set to the drive and directory where your Windows initialization files are installed. You can change to this directory with the following command.

```
C:\>cd %systemroot%
```

MS-DOS recognizes environment names within percent signs in batch files, but not on the command line. Windows NT recognizes them almost anywhere—on the command line, in PIF Editor, and in Program Manager dialog box fields. We illustrate some of the convenient uses of this feature later in the chapter.

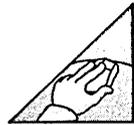


Using System Environment Variables

Windows NT automatically sets several environment variables with information about your system. You can use these values in batch files, Doskey macros, and command lines—and if you're a programmer, in the programs you write. The system environment variables include the following.

Variable Name	Value
ComSpec	The path and name of the command processor (normally CMD.EXE)
OS	The operating system: "Windows_NT"
Os2LibPath	The directory where OS/2 Dynamic Link Libraries (DLLs) are located
PROCESSOR_ARCHITECTURE	The type of the processor, such as "x86" or "MIPS"
PROCESSOR_LEVEL	The version of the processor, such as "4" (for 486) or "4000" (for MIPS 4000)
SystemRoot	The drive and directory where Setup installs INI files, normally \WINNT or \WINDOWS
HOMEPATH	The default directory used by File Open and Save As dialog boxes, and as the default startup directory for new command prompt sessions (For information about setting the home directory, see "Using Logon Scripts and Setting a Home Directory," page 326.)
HOMEDRIVE	The default drive associated with the default directory
USERDOMAIN	The network domain you logged onto
USERNAME	The username you logged on with
windir	The Windows directory, normally the same as SystemRoot

You should not modify these environment variables. Windows NT won't prevent you from doing so, but they won't be of much use if they are inaccurate.



WINDOWS TIP: If you use MS-DOS and Windows NT on the same computer, you might want to set similar variables in your MS-DOS setup by putting them in AUTOEXEC.BAT. For example, you can set OS to MS-DOS, and then write batch files that take different actions depending on whether OS is “MS-DOS” or “Windows_NT.” Similarly, you can write batch files that run on different computers, testing the processor or username and taking appropriate action. For information about testing values in a batch file, see “Anatomy of a Batch File,” page 647.

Setting Standard Environment Variables

Some environment variables have a standard meaning known to the command processor and recognized by many other programs. Most standard variables have default values, but you can change them in order to change the way your system operates.

The Path Variable

The Path environment variable determines the order in which programs that run other programs (such as CMD.EXE) search for executable files. The paths to be searched are listed in order, separated by semicolons. The Path variable is so frequently used that Windows NT (and MS-DOS) includes a Path command to save you several keystrokes when typing it. The command

```
C:\>path c:\winnt\system32;c:\bat;c:\bin;c:\dos;
```

is exactly equivalent to

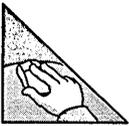
```
C:\>set path=c:\winnt\system32;c:\bat;c:\bin;c:\dos;
```

The Path command is also useful for listing the existing search path.

```
C:\>path
```

```
PATH=C:\winnt\system32;C:\winnt;C:\BAT;C:\BIN;C:\DOS
```

The Set command displays the same information, but it also shows all of the other environment variables.



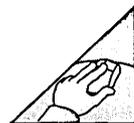
You should have a strategy for organizing executable files on your disk. Choose a few directories where you will store your programs, and put those directories in your search path. It takes slightly longer to find a program in a directory at the end of the search path, so you might want to put the directories with your most important programs first. Another factor to consider when setting up your search path is what happens if you have two programs with the same name in different directories. The one found first in your search path will be executed. For example, if you have `DOIT.BAT` in your `\BAT` directory and `DOIT.EXE` in your `\BIN` directory, and your search path is set up as in the previous example, `DOIT.BAT` will be executed when you type `doit` at the prompt.



WINDOWS TIP: If you have a flex-boot system with MS-DOS 6 and Windows NT, you can put the MS-DOS `\DOS` directory at the end of your Windows NT search path and the Windows NT `%SystemRoot%\SYSTEM32` directory at the beginning. This way, if you run utilities common to both MS-DOS and Windows NT, such as `Sort`, the Windows NT version is found first. And you can still run MS-DOS utilities like `DELTREE.EXE` and `CHOICE.COM` because they don't have Windows NT equivalents. But this sharing of directories works only one way. Putting the `SYSTEM32` directory in your MS-DOS search path will cause nothing but trouble.

The Temp and Tmp Variables

The `Temp` and `Tmp` environment variables should be set to the directory where you want temporary files to be created. By convention, programs that need to create temporary files check one of these environment variables for directions on where to put the files. Unfortunately, the practice of using an environment variable to indicate a temporary directory has spread spontaneously and inconsistently. Some programs use the `Tmp` variable, some



the Temp variable. Windows NT uses Temp, but some MS-DOS-based programs use Tmp. The safest solution is to define both variables and point them to the same directory.

It's a good idea to create a directory directly off your root directory for this purpose. When programs that create temporary files crash, they usually fail to clean up their files. It is easier to delete these files manually if they are located in a directory of their own.

NOTE: A common technique among MS-DOS users is to point the temporary directory to a RAM disk for faster processing of temporary files. Because Windows NT has faster disk I/O, no RAM disk software is provided. In fact, applications for Windows NT rarely use temporary files because new features such as virtual memory, named pipes, and memory-mapped I/O make them not only unnecessary, but undesirable. For example, MS-DOS implements pipes by creating temporary files in the Temp directory, but Windows NT implements the same feature more efficiently in memory. For more information about pipes, see "The Pipe Symbol," page 605.

The PROMPT Variable

The PROMPT environment variable determines the appearance of the command prompt. You can customize your prompt by setting the PROMPT variable using text and special character sequences that start with a dollar sign. For example, \$p represents the current drive and directory, and \$g represents the greater than sign. Together, \$p\$g forms the familiar default prompt. As it does for the Path variable, Windows NT includes a Prompt command to save you keystrokes. You can customize your prompt by typing *set prompt=* or simply *prompt* followed by the text and special characters you want. We won't go into the details here, since you can get all the information you need by typing this command:

```
C:\>prompt /?
```



But just for fun, here are a couple of examples:

```
C:\>set prompt=What's up, Doc?$s
```

```
What's up, Doc? prompt $p$_d $t$h$h$h$h$h$h$h$_v$g
```

```
C:\
```

```
Sat 12-25-93 11:59
```

```
Windows NT Version 3.10 >prompt
```

```
C:\>
```

The first command sets the PROMPT environment variable to “What’s up, Doc?” followed by a space (represented by \$s). The second command saves four keystrokes by using the Prompt command instead of the Set command to create a multiline prompt with the date, time, and Windows NT version number. The \$h sequence deletes the seconds portion of the time for a cleaner display.

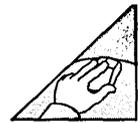
The Prompt command with no arguments resets the default \$p\$g prompt. After experimenting for a while, chances are you’ll go back to the simple default prompt so you can get some work done without distraction.

NOTE: With MS-DOS, you can create complex colored prompts anywhere on the screen by using ANSI escape sequences.

Windows NT does not support the ANSI.SYS driver, so you can’t duplicate your fancy MS-DOS prompts in Windows NT. (You can change the screen colors with the Control menu, however. For information about screen colors in a command prompt window, see “Setting Screen Colors,” page 584.)

Other Environment Variables

Any program can check a particular environment variable to get information such as a directory path or other options. For example, many programming tools check the LIB and INCLUDE environment variables for directories containing libraries and include files. Some MS-DOS-based programs check the INIT environment variable for a directory containing initialization and settings files. CMD.EXE (and COMMAND.COM in MS-DOS versions 5 and 6) checks the DIRCMD variable for options to control the Dir command. A



common technique for programs that take many options is to check an environment variable with the program name for default options. For example, WHODAT.EXE may check the WHODAT environment variable.

Using Doskey Macros

When you have a task to automate, be sure you choose the right tool. With Windows NT, Doskey *macros* serve as the first level of automation. A macro is a keystroke sequence that is passed to the command interpreter when you type the name of the macro. Macros are easy to define, take up little disk space and memory, and execute instantly. They work best for shortening long commands and assigning a name to a simple sequence of commands. At some point, you'll find that the tasks you want to automate are too complex for macros. When that happens, move up to the second level of automation—batch files. For information about batch files, see “Using Batch Files,” page 644.

Batch files and Doskey macros are two similar ways to create new commands by combining existing commands and programs. In both cases, you essentially give simple names to longer commands or sequences of commands.

Defining Macros

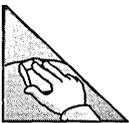
The simplest Doskey macro is one that gives a long command a short name. Starting the Windows help program at the Windows NT command prompt normally requires a very long command line. You can abbreviate that command by entering the following:

```
C:\>doskey h=start winhlp32 c:\winnt\system32\ntcmds.hlp
```

This command defines a macro named H; the content of the macro is the text that follows the equal sign. After defining this macro, you can get help on Windows NT commands at any time with the following command.

```
C:\>h
```

You can make this macro a little more reliable by using the SystemRoot environment variable instead of giving an absolute path. Your SYSTEM32 directory might not be in the C:\WINNT directory, but it will definitely be in the SystemRoot directory.



```
C:\>doskey h=start winhlp32 %systemroot%\system32\ntcmds.hlp
```

The new macro overrides the previous definition of the H macro.

If you want to eliminate an existing macro (perhaps because you gave it the wrong name), simply assign the name a blank value, like this:

```
C:\>doskey h=
```

Managing Macros

Before we get into some interesting sample macros, let's take a brief look at how to manage your Doskey macros. The key point is that Doskey macros are local to each command prompt session. If you define a macro in one session, it won't work in other sessions. If you exit the session in which you defined it, your macro is gone. You should save useful macros so that you can load them whenever and wherever you want.

The easiest way to save macros in a file is with Doskey's `/MACROS` option. This option displays all active macros on the screen. However, the default action isn't much use; normally you'll want to redirect your macros to a file. For example:

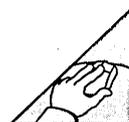
```
C:\>doskey /macros > cmdinit.mac
```

After you create a file with Doskey macros from one session, you can read them into another session with the `/MACROFILE` option.

```
C:\>doskey /macrofile=c:\cmdinit.mac
```

Of course, you don't really want to type this command every time you start a new command prompt window, so you should put it in your initialization file. For more information about initialization files, see "Initializing Command Prompt Sessions," page 660.

After you develop a library of macros, you can organize them in different files. You'll probably want one group that you load automatically in every command prompt window. Then you might want to add a few more files for different types of work. You might have a `BACKUPMAC` file that you load only when you're backing up files, or a `PROGRAM.MAC` for programming tasks. You can create or edit macro files with any text editor (Notepad or Edit, for example).



WINDOWS TIP: Complex macros are often not very readable, so you might want to keep a description of each macro in the file next to the definition. Unfortunately, Windows NT doesn't have a comment character, but you can define your own. Choose a character that you would never use as a command—a semicolon is a good choice—and follow it by an equal sign so that Doskey won't complain about an illegal macro. Then add the text of your comment. Technically, you're defining a macro named ";" with the comment text, but you're not going to use that macro, so no damage is done. For example:

```
:= Set 80x50 line mode  
50=mode con:lines=50
```

```
:= Set 80x25 line mode  
25=mode con:lines=25
```

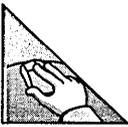
```
:= Set a given number of lines  
Lines=mode con:lines=$1
```

```
:= Set a given number of columns  
Cols=mode con:cols=$1
```

```
:= Delete all files on a disk matching a given  
:= specification (redirecting standard error to  
NUL  
:= prevents unnecessary messages)  
CleanUp=del /p /s $* 2> NUL
```

```
:=
```

The := at the end cleans up by clearing the macro assigned to the semicolon character.



Using Parameters in Macros

Like batch files, Doskey macros handle replaceable parameters. In batch files, you use %1 to %9 to represent up to nine command-line parameters. In macros, you use \$1 to \$9 for the same purpose. For example, you might write the following macro to shorten the name of the Start command to the letter S.

```
C:\>doskey s=start $1
```

This is equivalent to writing the following batch file called S.BAT.

```
@echo off  
start %1
```

You wouldn't really want this macro (or the batch file, for that matter) because it accepts only one argument. If you type *s edit /b autoexec.nt*, you start the editor, but the /H option and the name of the file to edit are lost. To handle multiple arguments, you would write the batch file like this:

```
@echo off  
start %1 %2 %3 %4 %5 %6 %7 %8 %9
```

Then you'd pray that no one ever calls your batch file with more than nine arguments. This is one of the few areas where Doskey macros are actually more powerful than batch files. In macros, \$* represents all the arguments passed, even if there are more than nine.

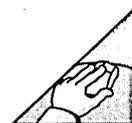
```
C:\>doskey s=start $*
```

For more information about using replaceable parameters in batch files, see "Anatomy of a Batch File," page 647.

Using Symbols in Macros

You can use redirection, piping, and command combination symbols in macros, but you must use the escape symbol (^) before each symbol. (For more information about these symbols, see "Using Command Symbols," page 601.) Otherwise, the symbols are interpreted as part of the command line instead of as part of the macro. For example, you might try defining a macro that saves your current macros to a file, like this:

```
C:\>doskey macsave=doskey ^/macros > %temp%\current.mac
```



What this command actually does is redirect the output of the macro definition line up to the redirection symbol to CURRENT.MAC. But the Doskey command doesn't produce any output, so you end up with an empty file. Meanwhile, the MacSave macro has been defined to display macros to the screen instead of to a file. Not what you intended. Here's the correct definition command:

```
C:\>doskey macsave=doskey /macros ^> %temp%\current.mac
```

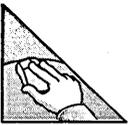
Here's an example in which the pipe symbol needs an escape symbol. The macro creates an enhanced Type command that pipes output through the More filter.

```
C:\>doskey seymour=type $* ^| more /e
```

You need the escape symbol only when defining a macro at the command line. Don't put it in your macro files. It won't show up when you display current macros with the /MACROS option.

Doskey originated with MS-DOS, which doesn't have an escape symbol or command combination symbols. To include command symbols in macro definitions, MS-DOS Doskey uses special character sequences that begin with a dollar sign. For compatibility, Windows NT Doskey recognizes the following \$ sequences.

Operation	Windows NT Way	MS-DOS Way
Redirect output	^>	\$G
Append redirected output	^>^>	\$G\$G
Redirect input	^<	\$L
Pipe output to input	^	\$B
Combine commands	^&	\$T
Combine commands with AND	^&^&	No way
Combine commands with OR	^ ^	No way
Display caret	^	^
Display dollar sign	\$\$	\$\$



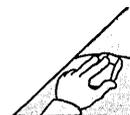
Sample Macros

You might find it useful to create a group of directory-listing commands. The idea here is that each variation of the `Dir` command starts with `D` and has one or two modifying letters that indicate its function. Rather than show each of these on a command line, we'll show the definitions the way they would appear in macro file.

```
:= Default directory listing
D=dir $*
:= Directory listing with pause
Dp=dir /p $*
:= Directory listing of visible files sorted by extension
De=dir /a-d-h-s $* /oe
:= Directory listing of visible files only
Df=dir /a-d-h-s $*
:= Wide directory listing sorted in columns
Dc=dir /d $*
:= Wide directory listing sorted in rows
Dr=dir /w $*
:= Bare directory listing of visible files only
Db=dir /b /a-d-h-s $*
:= Tree directory listing of visible files only
Dt=dir /s /a-d-h-s $*
:= Directory listing of both DOS and NTFS filenames
Dx=dir /x $*
:=
```

To use these macros, enter the data in your editor, save it as a macro file called `DIR.MAC`, and load it with the `Doskey /MACROFILE` option. (These macros assume that you have already set global preferences such as your sort order in your `DIRCMD` environment variable. For information about `DIRCMD`, see “The `Dir` Command,” page 608.) When using the macros, you can include additional options on the command line.

You can use `Doskey` macros to change the behavior of Windows NT commands. Consider the `Copy` command and the `XCopy` command. Why are they separate? `XCopy` does a better job of almost everything `Copy` does, plus more. You can enhance the `Copy` command by entering the following command. (Ignore the `/I` and `/F` in the following example; we'll discuss them later.)



```
C:\>doskey copy=xcopy /i /f $*
```

Voila! Copy now works faster, has a neater, more consistent output, and can do nearly any copy operation you can imagine except one—combine multiple files into one. If you need to combine files, nothing but the real Copy command will do, but you don't have the real Copy command because you've defined it away.

To use the Copy command, you have two alternatives. First, you can still use the Copy command. Simply precede it with one or more spaces on the command line.

```
C:\> copy one.doc+two.doc onetwo.doc
```

Better yet, create a Combine command that does what the Copy command used to do.

```
C:\>doskey combine=copy $*
```

Notice that the Combine command calls Copy, but Copy has been redefined to mean XCopy. So which Copy does Combine use, the original command or the macro? It turns out that macros know nothing about other macros and can't call them. The Combine command uses the original Copy command.

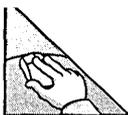
We've defined Copy to mean XCopy, so now we don't need XCopy anymore. Why not redefine XCopy to do the most common XCopy task, which for many people is copying entire directory trees?

```
C:\>doskey xcopy=xcopy /e /i /f /k $*
```

The /E option makes XCopy always copy entire trees, including empty directories. The /F option shows both the source and destination of each file copied. The /K option copies the file attributes of the files copied.

The /I option fixes an annoying characteristic of the XCopy command. Assume that you try to copy a directory full of files to a new directory.

```
C:\>xcopy olddir newdir
Does newdir specify a file name
or directory name on the target
(F = file, D = directory)?
```



To humans the answer seems pretty obvious, but XCopy takes things very literally. Because most users will want to copy to a directory 99 times out of 100, Windows NT (but not MS-DOS) lets you use the /I option to suppress the question. We used it earlier when redefining Copy to XCopy.

It's a bit risky to change Windows NT commands. You might forget what you did and try to use the old version. If you let someone else use your computer, your guest might be confused. If you use someone else's computer, you might be confused. Think of the previous illustrations as examples of what you *can* do, not what you *should* do. Redefining commands will always cause "gotchas."

For example, our new, more powerful Copy command usually works the same as the old version, but not always, as the following command illustrates:

```
C:\>copy *.doc docfiles
```

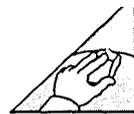
The old Copy appends all the DOC files to create one combined file called DOCFILES. The new Copy command copies the first DOC file to DOCFILE, then overwrites it with the second, and so on. The final DOCFILE contains only the last DOC file.

Using Batch Files

A batch file is a text file containing a sequence of commands to be executed. You define a sequence of commands, name the sequence, and then execute the commands by giving the name.

When you type the name of your batch file at the command prompt, the command interpreter opens the file and starts reading the statements. It reads the first line, executes the command, and then goes on to the next line. On the surface, this is just the same as if you typed each line yourself at the command prompt. However, things get much more complicated, because you can use parameters with batch files to vary their behavior just as you can with programs. Batch files can also respond to values returned by programs and to the values of environment variables.

At this level, writing batch files becomes computer programming. You might not feel like a programmer after writing your first batch file—it seems too simple. But as you learn to handle parameters, environment variables, and values returned from programs, you'll start to feel first a sense of



accomplishment, and then eventually some frustration. Programming batch files turns out to be one of the most complex and difficult forms of programming because the batch language doesn't provide many tools to work with. You might eventually graduate to a "real" programming language—but that's another book.

Batch File Basics

Batch files are text files created with a text editor. You can use Notepad if you like a graphics-based editor, or Edit if you prefer a character-based editor. More likely, you already have a text editor, or possibly a word processor that can produce unformatted files.

In Windows NT, you can name your batch files with a BAT or CMD extension. The Windows NT command interpreter will attempt to execute commands from any file with either of these extensions. If you're coming to Windows NT from MS-DOS, you might already have some batch files with the BAT extension. They should work fine under Windows NT. If you're coming from OS/2, you might have batch files with the CMD extension. They should also work without change. If you're writing new batch files to run only under Windows NT, take your pick. If you have two batch files in the same directory with the same base name but different extensions, the BAT file will be executed—not the CMD file. We'll use BAT for sample batch files in this chapter.

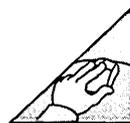
Batch Command Summary

Batch commands are the commands that generally make sense only when used from a batch file. Some of the commands we'll discuss here can actually be used from the command line, but generally aren't. With a few exceptions, Windows NT has the same batch file commands as MS-DOS. Most new features are subtle changes in the way commands work, but there are also a few new commands. We'll start by summarizing all the batch commands (see Table 19-1 on the next page), and then concentrate on the differences and new possibilities in Windows NT batch files. We'll explain the new commands, but for most commands, this table—along with the Windows NT Command Reference Help file—will suffice. You can also get help about the commands using the `/?` option.



Command	Purpose
@	When used as the first character in a line, prevents the line from displaying on the screen
Echo [Off On]	Turns echoing off or on
Echo <i>msg</i>	Displays <i>msg</i> on the screen
Echo.	Displays a blank line on the screen
Rem <i>msg</i>	Identifies <i>msg</i> as a comment
If [Not] ErrorLevel <i>num cmd</i>	If the ErrorLevel returned from the previous command is less than or equal to <i>num</i> , then <i>cmd</i> is executed (Not reverses the logic.)
If [Not] Exist <i>file</i> <i>cmd</i>	If <i>file</i> exists, then <i>cmd</i> is executed (Not reverses the logic.)
If [Not] <i>txt1==txt2</i> <i>cmd</i>	If <i>txt1</i> is the same as <i>txt2</i> , including case, then <i>cmd</i> is executed (Not reverses the logic.)
Goto <i>label</i>	Transfers control to the line marked by label
: <i>label</i>	Names the line to be reached by a Goto command
For %% <i>var</i> In (<i>set</i>) Do [<i>cmd</i>] %% <i>var</i>	Loops through the items in <i>set</i> , executing <i>cmd</i> for each loop and replacing any instances of <i>var</i> with the the matching item from <i>set</i> , which can be a list separated by spaces or can contain the wildcard characters * and ?
Shift	Shifts command line parameters one place so that %1 becomes %2, %2 becomes %3, and so on
Call <i>batfile args</i>	Executes <i>batfile</i> with <i>args</i> and then returns to the calling batch file
SetLocal	Makes current environment variables local to this batch file; any changes to variables are known only in this batch file until EndLocal is executed
EndLocal	Makes environment variables known to the system; any changes made after EndLocal remain in effect when the batch file terminates
PushD <i>dir</i>	Saves the current directory on a directory stack and changes to <i>dir</i>
PopD	Restores the last directory saved by PushD
Pause	Suspends processing until a key is pressed

TABLE 19-1.
Batch commands.



WINDOWS TIP: The Rem command is the documented way to put comments in your batch files, but it is intrusive because the command looks like part of the comment. Furthermore, if you leave echoing on while debugging a batch file, all of your comments are echoed, making it harder to read commands. A better way to comment code is to use two colons, as shown below.

```
:: This line is for humans; computers ignore it
```

This kind of comment is never echoed. Be sure you use two colons—using only one creates a label that might conflict with a legitimate label. Although this commenting style is handy, we use the conventional Rem statement in this book's examples to avoid confusing readers who miss this tip.

Anatomy of a Batch File

Rather than trying to discuss each batch file feature in succession, let's plunge into the deep end and learn by example. If you're new to batch files, the following batch file is easy enough that you can probably figure it out, though it won't be easy going. Yet the example is interesting enough that you might learn something new even you're a batch file wizard.

The most important step in writing a batch file (or any other kind of computer program) is to state the problem correctly. In this case, the problem is to quickly and unobtrusively wipe all of the data off a floppy disk, leaving the disk bare except for a label name.

Sounds simple enough, and in fact the Format command can handle the quick part if you specify the /Q option. However, the unobtrusive part is a problem because Format pauses three times—first to remind you to insert the disk, second to ask for the label, and third to ask if you want to format another. You can get rid of all those interruptions by creating a new WipeOut command that works when you enter a command to specify the drive and the volume name, like this:

```
C:\>wipeout b datadisk
```



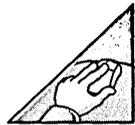
PART 4: Running Applications

Our WipeOut command works only on drives A and B, because the last thing anyone needs is a quick, efficient way to reformat a hard disk. Take a moment to read through WIPEOUT.BAT before we examine it line by line.

```
@echo off
rem Check for missing argument
if "%1"==" " goto Syntax
rem Validate drive argument
if %1==b goto Format
if %1==B goto Format
if %1==a goto Format
if %1==A goto Format
echo Invalid - you must specify floppy drive A or B
echo.
goto Syntax
:Format
rem Create file to supply input to Format command
echo. > %temp%\WIPEOUT.TMP
echo n >> %temp%\WIPEOUT.TMP
rem Quick format using file input to suppress prompts
format %1: /q /v:%2 < %temp%\WIPEOUT.TMP > NUL
rem Delete the temporary file
del %temp%\WIPEOUT.TMP
goto Done
rem Display syntax message after invalid input
:Syntax
echo SYNTAX: WipeOut {A^|B} [volume]
:Done
```

By default, batch files display each line on the screen before attempting to execute it. This is seldom desirable, so probably 95 percent of all batch files start with the same line ours starts with:

```
@echo off
```



The at sign (@) says not to display the Echo Off command. The Echo Off command says not to display any more lines for the rest of the batch file.

The next line tests to be sure the command wasn't used without any arguments:

```
if "%1"==" " goto Syntax
```

The %1 represents the first argument on the command line. (A %2 would represent the second, and so on up to %9. A %0 would represent the command name, or WipeOut in this case.) So if you type the command *wipeout a*, the command interpreter would see this as the second line in the batch file:

```
if "a"==" " goto Syntax
```

The test for equality would not be true, and so the Goto statement would not be executed. But if you type *wipeout* (without any arguments), the command interpreter would see

```
if ""==" " goto Syntax
```

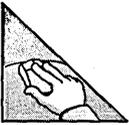
and the Goto would be executed.

Notice that the %1 is surrounded by quotation marks. This isn't a requirement. We could just as easily have written *%1\$==\$*. All we're doing is making sure the command interpreter always sees something on both sides of the equal signs. Without a character there, it sees the line as:

```
if == goto Syntax
```

The result would be a syntax error, causing the batch file to terminate. The quotation marks are a readable way to be sure neither side is ever empty.

If the Goto is executed, the command interpreter jumps to the line with the matching label and starts executing the lines it finds following the label. A label is a line starting with a colon. In this case the Syntax label is near the end of the file.



```
:Syntax  
echo SYNTAX: WipeOut {A^|B} [volume]
```

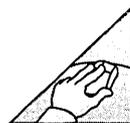
The Echo command displays the text following it—in our case, the WipeOut syntax for users who type something invalid. The interesting thing about this line is the use of the escape symbol (^) to indicate that the pipe (|) should be treated as a character and not interpreted as a pipe symbol. Without the escape symbol, the command interpreter would try to pipe the Echo command and the first few words to whatever follows the pipe symbol, which would cause a syntax error. You must use the escape symbol any time you want to echo a pipe (|), a greater than sign (>), a less than sign (<), an ampersand (&), or a caret (^).

NOTE: MS-DOS has no escape symbol; you cannot echo command symbols. This is one of several reasons that WIPEOUT.BAT can't be run under MS-DOS.

Let's go back to the top of the file and continue as if valid arguments have been entered for the WipeOut command. After testing for no argument, we test for valid arguments with the following lines.

```
if %1==b goto Format  
if %1==B goto Format  
if %1==a goto Format  
if %1==A goto Format  
echo Invalid - you must specify floppy drive A or B  
echo.  
goto Syntax
```

Because tests with the double equal sign are case-sensitive, we have to test both uppercase and lowercase variants. (Because we already know that argument 1 exists, we don't have to put the %1 in quotation marks.) If one of the four valid inputs is found, the command interpreter jumps to the Format label, where the main work of the batch file is done. Otherwise, WipeOut echoes a message telling the user what went wrong. The Echo command followed by a dot in the next line displays a blank line for a nicer display, and the next line jumps to the same Syntax label and message that we discussed earlier.



WINDOWS TIP: Before we go on to the main point of the batch file, here's an extra-credit problem. What would happen if we replaced the four lines testing for valid drive letters with the following line?

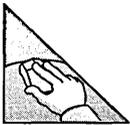
```
for %d in (a A b B) do if %1==%d goto Format
```

And the answer is... exactly the same thing. The For command loops through each of the items in parentheses, and for each one replaces the %%d in the Do command with the current item. This might be a big leap for beginning batch file authors. Study the online help if you find the For command confusing.

Finally, we get to the whole point of this exercise. The following lines make the Format command work cleanly with no extra messages or prompts.

```
:Format
rem Create file to supply input to Format command
echo. > %temp%\WIPEOUT.TMP
echo n >> %temp%\WIPEOUT.TMP
rem Quick format using file input to suppress prompts
format %1: /q /v:%2 < %temp%\WIPEOUT.TMP > NUL
rem Delete the temporary file
del %temp%\WIPEOUT.TMP
```

The problem with Format is that it is too careful and polite. First it asks the user to insert a blank disk (but we are assuming that WipeOut users have already done this), and when finished it asks if the user wants to format another (WipeOut users don't). We need to supply input to Format telling it our default responses. The way to do this is to redirect input from a file. The first line of this file should be blank to simulate pressing the Enter key in response to the "insert disk" message. The second line should supply the letter *n* to say "no, we don't want to format another." Our batch file creates this input file. Then, when we're done using it, WipeOut politely cleans up by deleting it.



The first Echo line redirects a blank line to the file WIPEOUT.TMP in the directory pointed to by the Temp environment variable. To use the contents of an environment variable, put a percent sign (%) on each side of the name, like this: %temp%. Notice that this line contains only one greater than sign, so that if WIPEOUT.TMP already exists, the redirection overwrites it. (For more information about redirection, see “The Redirection Symbols,” page 602.) The second Echo line appends a line with an *n* to the file.

NOTE: In an MS-DOS batch file line, you can’t follow a redirection symbol with a parameter or the value of an environment variable. In our sample file, for example, you couldn’t specify the Temp environment variable. This is the second reason that WIPEOUT.BAT doesn’t work under MS-DOS.

Finally, we reach the line that does the actual work:

```
format %1: /q /v:%2 < %temp%\WIPEOUT.TMP > NUL
```

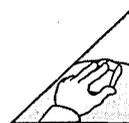
This line says to format the disk in drive A or B (we’ve already verified the argument) with the /Q option. The /V option specifies the label name given by %2. It then redirects our dummy file into Format to supply answers to the prompts. Because we’ve already responded to all of the Format messages, we don’t want them littering the screen. The final part of the line, therefore, sends the output from the Format command to the batch file author’s black hole—the NUL device.

But remember, the label argument is optional. What if the user doesn’t supply one? In this case, the command interpreter sees the command as:

```
format a: /q /v: < %temp%\WIPEOUT.TMP > NUL
```

What happens now depends on what the authors of the Format command told it to do with a blank argument to the /V option. It could fail with an error message or prompt the user to fill in a label, but we’re lucky this time—it simply ignores the option and we get the right results.

NOTE: In some versions of MS-DOS, the /V option doesn’t exist, or a blank /V option causes a syntax error instead of being ignored. That’s one more reason that WipeOut doesn’t work under MS-DOS.



A final word about debugging batch files: You usually have to do some experimenting to get your batch files to work exactly the way you want. You can write the batch file in one command prompt window and test it in another. To see exactly what the command interpreter sees, change the first line to:

```
rem @echo off
```

This “comments out” the Echo Off command so that each line echoes to the screen with parameters and environment variables filled in before it is executed. In our sample file, you’d probably also want to temporarily remove the redirection to NUL from the Format command so that you could see all the output. You could also comment out the line that deletes the temporary input file. That way you could Type the contents of the file to be sure it is being created correctly.



WINDOWS TIP: The Pause command always puts up the same boring message: “Press any key to continue.” You might prefer to instruct your users to type, strike, hit, depress, or otherwise activate a key. You can use the Echo command to display your own message, and then get rid of the unwanted Pause message by redirecting it to the NUL device. You might even wax poetic.

```
echo If the going gets too tough,  
echo Hit Control+C to stop this stuff.  
echo But if you'd like to see the rest of me,  
echo Continue on! Press any key.  
pause > NUL
```

PushD and PopD

A common sequence of events in a batch file is move to a specific directory, do some work there, and then return to the original directory. The problem is, your batch file can be run from any directory. If you don’t know where you are, you can’t go back. PushD and PopD to the rescue.



The `PushD` command saves the current directory and sets a new one. The `PopD` command restores the original. Normally you need these commands only in batch files, but an example from the command line shows how they work:

```
C:\bat>pushd \data  
  
C:\data>pushd sales  
  
C:\data\sales>popd  
  
C:\data>popd  
  
C:\bat>
```

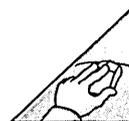
You can probably figure out intuitively what's going on here, but if you're not a programmer, you might wonder what “push” and “pop” in the command names mean. *Push* means to put something onto a *stack*. It might be a stack of plates or a stack of computers, but in this case we mean a stack of directory names. *Pop* means to take the top item—the only one you can get at—off the stack.

In the example, we first push the `BAT` directory onto the stack. If we popped now, we'd get the `BAT` directory back. Instead we push another directory, `DATA`. We have to pop it off the stack before we can get at the `BAT` directory. Of course in a batch file we'd be doing some work in each directory before we pushed another one or popped to restore the old one.

NOTE: The online help for `PushD` says that the directory parameter is optional, but don't believe it. If you don't supply the directory to the `PushD` command, the `PopD` command won't restore it.

SetLocal and EndLocal

In many cases, a batch file needs to change a standard environment variable such as `Path`. Yet it is extremely rude to change this critical variable without restoring it when you are finished. If you're writing the batch file for your



own use, it's not difficult to restore modified variables, although it gets tiresome after a while. But if you're writing a batch file to be run by others, you probably won't even know what settings to restore.

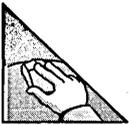
Windows NT addresses this problem with the `SetLocal` and `EndLocal` commands. `SetLocal` makes any further settings or changes to environment variables local to the current batch file. `EndLocal` returns handling of environment variables back to normal mode—any further changes remain after the batch file terminates.

You might want to use a batch file to modify environment variables for either of two reasons. First, this might be the primary purpose of the batch file, as it is in the following short batch file (call it `ADDPATH.BAT`), which adds a directory to the end of the search path.

```
@echo off
set Path=%Path%;%1
```

But more often you will use environment variables to save values or change program behavior within the batch file. The simple rule is to always use `SetLocal` at the start of the batch file and `EndLocal` at the end. Even if your batch file only sets a temporary environment variable, you want to be sure the variable is cleared on termination. Actually, the `EndLocal` command is usually redundant. If you use `SetLocal`, the system automatically performs the equivalent of an `EndLocal` statement when the batch file terminates. Technically, you need the `EndLocal` statement only if you plan to make a permanent change to an environment variable. However, using `SetLocal` and `EndLocal` in pairs makes your batch files more consistent and easier to understand. For example:

```
setlocal
rem Set new path
set Path=D:\BIN
rem Do something with the new path
. . . . .
endlocal
rem Path goes back to its original value after EndLocal
```



WINDOWS TIP: SetLocal and EndLocal are not available in MS-DOS, but batch file authors often try to get the same functionality by setting temporary environment variables. For example:

```
rem Save old path and set new
set Tpath=%Path%
set Path=D:\BIN
rem Do something with the new path
. . . . .
rem Restore old path and destroy temporary
set Path=%Tpath%
set Tpath=
```

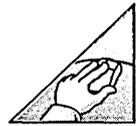
The problem with this technique is that if you press Ctrl+C to terminate the batch file during processing, you never reach the lines that restore the original path. You end up with a modified path and a useless temporary variable. In contrast, if you use SetLocal, your original environment will be retained no matter how the batch file ends. If you have MS-DOS batch files that set and restore temporary environment variables, you might want to convert them to use the Windows NT SetLocal technique.

Customizing Your Configuration

You can configure the way your command prompt sessions and non-Windows-based programs work in several ways. This gets a bit complicated because different parts of the system can be configured using different tools, and in some cases you can use the various tools to do the same thing in different ways.

The tools you use to configure command prompt sessions and character-based programs include:

- ▣ The System applet in Control Panel and AUTOEXEC.BAT to set user environment variables (For information, see “Initializing Environment Variables,” below.)



- ▣ Batch files to perform initialization (For information, see “Initializing Command Prompt Sessions,” page 660, and “Using Logon Batch Files,” page 662.)
- ▣ AUTOEXEC.NT and CONFIG.NT to configure default behavior for MS-DOS-based programs (For information, see “Setting the MS-DOS Configuration,” page 664.)
- ▣ Program Information Files, initialization batch files, and system configuration files to set behavior for specific MS-DOS-based programs (For information, see “Using Program Information Files,” page 670.)

Initializing Environment Variables

You can preset environment variables every time you log on. Every command prompt session and every character-based or Windows-based program you run from Program Manager, File Manager, or a command prompt sees these values. You can change them within a command prompt session, or even start a specific session with different values. But for now let’s talk about the starting point.

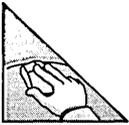
Windows NT presets some environment variables, and then lets you set additional variables. Three factors determine what your environment variables will be after you log on:

- ▣ System variables set by Windows NT
- ▣ Any variables set in your AUTOEXEC.BAT file
- ▣ User variables you set with the System applet in Control Panel

When you log on, Windows NT scans the AUTOEXEC.BAT file in the root directory of your boot drive. If you use the flex-boot feature, this is the same AUTOEXEC.BAT file used by MS-DOS. At logon, the system does not actually execute AUTOEXEC.BAT as it does when booting MS-DOS. It simply scans for environment variables initialized with the Set command.

If you want to set some variables for MS-DOS but not for Windows NT, you can move the Set statements to a separate batch file that you call by including a command like this in AUTOEXEC.BAT:

```
call ENVDOS.BAT
```



PART 4: Running Applications

When the system starts, MS-DOS calls this batch file and sets the variables, but Windows NT does not.

To set environment variables specific to Windows NT, use the System applet:

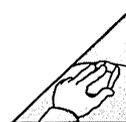
1. Double click the System icon in Control Panel. The System dialog box appears.

The screenshot shows the 'System' dialog box with the following content:

- Computer Name:** connice
- Operating System:** Startup: Windows NT Version 3.1, Show list for 30 seconds
- System Environment Variables:**
 - ComSpec = C:\windows\system32\cmd.exe
 - Os2LibPath = C:\windows\system32\os2\dll
 - Path = C:\windows\system32
 - windir = C:\windows
- User Environment Variables for Administrator:**
 - temp = C:\temp
 - tmp = C:\temp
- Variable:** Path
- Value:** C:\BINNT;C:\BINPOSX;

2. Notice the System Environment Variables group. If you click one of these settings, nothing happens. You can't modify these settings (and you wouldn't want to).
3. Set any variables you want in the User Environment Variables group. To modify an existing variable, select it and then edit it in the Value field. To set a new variable, type its name in the Variable field and its value in the Value field. In either case, click the Set button (or press Enter) when you finish. To remove an existing variable, select a variable line and then click Delete.

Your new variables are initialized and remembered when you click OK to leave the System applet, but they do not affect currently running programs. If you are running a command prompt session, the session and



programs run from it do not use the new settings. If you terminate the session and start a new one, your new settings will be in effect. You can verify this with the Set command. Similarly, if you have Windows-based programs that use environment variables, you must close and restart them before they will recognize the new settings.

Variables set in the System applet have precedence over variables with the same names in AUTOEXEC.BAT. Thus, for example, if AUTOEXEC.BAT includes the statement

```
set temp=C:\DOS\TEMP
```

but you use the System applet to add the line `temp=C:\WINNT\TEMP`, the Temp variable will have the value C:\WINNT\TEMP.

The Path variable is handled a little differently than other variables. Its final value is determined by all three sources—the System Environment Variables section, the User Environment Variables section, and AUTOEXEC.BAT. Normally the system root is set to C:\WINNT\SYSTEM32 or C:\WINDOWS\SYSTEM32, depending on whether you installed Windows NT over Windows 3.1. Let's assume you have purchased some programs for Windows NT that you put in directory C:\BINNT and some POSIX-based programs that you put in C:\BINPOSX. (BIN, for *binary*, is a traditional name for a directory that contains executable files.) You want these programs to run under Windows NT, but you don't want them in your MS-DOS search path. Set the following user-environment search path with the System applet.

```
Path=C:\BINNT;C:\BINPOSX;
```

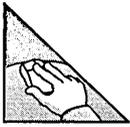
Let's assume that your MS-DOS search path is set in AUTOEXEC.BAT as

```
path C:\DOS;C:\BAT;C:\BIN;
```

The effective path (which you can confirm with the Path command) is

```
C:\winnt\system32;C:\BINNT;C:\BINPOSX;C:\DOS;C:\BAT;C:\BIN;
```

If you want your Windows NT search path to be completely different from your MS-DOS search path (or if you don't run MS-DOS), set the complete path with the System applet and be sure that no path is set in AUTOEXEC.BAT. You can do this by setting DOS environment variables in another file, as described on page 657.



Initializing Command Prompt Sessions

You can execute a sequence of commands every time you start a command prompt session by attaching an initialization batch file to the Program Manager icon for the command prompt. For example, you might want to always load a file with your favorite Doskey macros.

Use the /K option of CMD.EXE to attach initialization batch files or programs to command prompt sessions. The /K option (which has no equivalent in MS-DOS) tells Windows NT to run the command that follows and then return to the command prompt. You can use /K on the command line to specify a program, but the real power of the /K option comes when you use it with program icons or Doskey macros to launch startup batch files. For more information about the /K option, see “Launching Programs,” page 595.

To set up command prompt initialization, do the following:

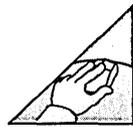
1. Write an initialization batch file. For example, CMDINIT.BAT might contain the following:

```
@echo off
rem Load standard Doskey macros
doskey /macrofile=C:\CMDINIT.MAC
rem Do other standard initialization tasks here
```

You can initialize environment variables here if they are needed only in command prompt sessions. If programs started from Program Manager or File Manager need the environment settings, use the System applet in Control Panel.

2. Select the Command Prompt icon (in the Main group by default) and choose Properties from Program Manager’s File menu. (Alternatively, you can select the icon and press Alt+Enter.)
3. The Command Line field in the Properties dialog box probably contains “CMD.EXE.” Modify it as follows and click OK when you are done:

```
cmd.exe /k c:\cmdinit.bat
```



WINDOWS TIP: It's a good idea to choose a standard directory for all of your initialization files. Our examples use the root directory, but you can use your home directory, %SystemRoot%, SYSTEM32, or an INIT directory created for the purpose.

You can also set up a Doskey macro so that a command prompt window started from the command prompt initializes the same way. For example, you can name your macro CmdS (for Cmd Standard) and add the following line to CMDINIT.MAC:

```
CmdS=start cmd /k C:\CMDINIT.BAT
```

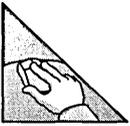
You might want to have different command prompt icons for different purposes. Perhaps you want one command prompt icon that starts an 80×25 command prompt window and another that starts an 80×50 window. For each one, do the following:

1. Write a startup batch file for each program item. For example, CMD50.BAT would contain the following:

```
@echo off
mode con:lines=50
rem Add other non-standard commands here
C:\CMDINIT.BAT
```

CMD25.BAT would be the same, except that it would contain *lines=25*. Note that the last line invokes the standard CMDINIT.BAT file described earlier. (Don't use the Call command to invoke this batch file; simply give its name to chain to it.) By invoking the standard initialization file rather than duplicating the commands in it, you make the two independent. If you want to add or modify standard commands, you can do so in one place—in CMDINIT.BAT. Custom initialization files like CMD50.BAT will then change automatically.

2. Select the program group where you want the new icons and select New from Program Manager's File menu.



3. Name the program item appropriately in the Description field—for example, *50-line Command Prompt*. You might even want to use the Change Icon button to assign different icons to the two items.
4. In the Command Line field, type:

```
cmd /k c:\cmd50.bat
```

For the 25-line item, use CMD25.BAT. Set any other fields the way you want them and click OK.

To set up Doskey macros to start these sessions from the command prompt, add the following lines to CMDINIT.MAC:

```
Cmd25=start cmd /k C:\CMD25.BAT  
Cmd50=start cmd /k C:\CMD50.BAT
```

Notice that you have a Cmd50 batch file and a Cmd50 macro, but that's OK because a Doskey macro is always executed instead of an identically named batch file.

Using Logon Batch Files

If you're used to MS-DOS, you might be surprised to learn that Windows NT has no automatic initialization file comparable to AUTOEXEC.BAT. You might be even more surprised to realize that you probably don't need one. If you examine your MS-DOS AUTOEXEC.BAT carefully, you'll see that most of the tasks you do there are done in other ways under Windows NT.

- ▣ Standard environment variables are set with the System applet.
- ▣ Network services are loaded automatically and controlled through the Services applet.
- ▣ Most MS-DOS memory-resident programs have Windows NT equivalents, and the ones that don't can be loaded with AUTOEXEC.NT or CONFIG.NT. (For information about these files, see "Setting the MS-DOS Configuration," page 664.)
- ▣ Network connections are reloaded automatically if you have the persistent option on.



- ▣ Many tasks done only once in a single-tasking operating system must be done for every command prompt window in Windows NT. For example, load Doskey macros during command prompt initialization, not during logon initialization.

What's left? Not much. However, if you do have a task that you need done every time you log on, Windows NT provides two ways to run one-time-only initialization batch files.

The first way is to assign an initialization batch file as a logon script for each account you use. However, if the account you log on with is controlled by the network administrator, you can't assign your own logon script. You can ask your network administrator to assign a script for you, but you'll probably find it easier to start your batch file by putting it in the Startup group of Program Manager. For information about assigning a logon script, see "Using Logon Scripts and Setting a Home Directory," page 326.

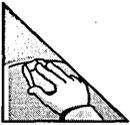
Normally you use the Startup group to start the Windows tools you use most often—maybe Mail, File Manager, Schedule+, and a Command Prompt. But there's nothing to prevent you from starting an initialization file like the following LOGINIT.BAT:

```
.@echo off
rem Synchronize time with server
net time \\timesvr /set /y > %temp%\LOGINIT.LOG
rem Add other initialization commands here
exit
```

Be sure that the programs or commands you call can't generate errors and aren't interactive. You might want to redirect output to the NUL device or to a log file. Then create a new program item in your Startup group with the Command Line field set to LOGINIT.BAT, and check the Run Minimized box so that the batch file won't have any visible output.

If you normally start a command prompt session from your Startup group, you might prefer to tie your LOGINIT.BAT to the same program item. Select Properties from Program Manager's File menu, and view the Command Line field. If you followed the procedure that begins on page 660, your program item runs a file called CMDINIT.BAT with the /K option:

```
cmd /k c:\cmdinit.bat
```



Change the field to run LOGINIT.BAT.

```
cmd /k c:\loginit.bat
```

Then remove the Exit command and add the following line to the end of LOGINIT.BAT so that it will chain to the command prompt initialization statements in CMDINIT.BAT:

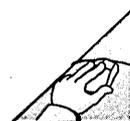
```
C:\CMDINIT.BAT
```

Be sure that you call LOGINIT.BAT only from the Command Prompt item in the Startup group. You want LOGINIT.BAT to run only once, so don't call it from a Command Prompt item in Main or other program groups.

Setting the MS-DOS Configuration

The files AUTOEXEC.NT and CONFIG.NT set the configuration used by MS-DOS-based programs. These two files serve a purpose similar to that of AUTOEXEC.BAT and CONFIG.SYS in MS-DOS, but they also have important differences.

- ▣ AUTOEXEC.NT and CONFIG.NT are executed the first time an MS-DOS program is run in a command prompt session. Subsequent programs run in the same session use the settings established by the first program. This means that if you change either file, you must terminate the session and start a new one before the changes take effect.
- ▣ AUTOEXEC.BAT and CONFIG.SYS must be located in the root directory of your boot drive. AUTOEXEC.NT and CONFIG.NT must be located in the %SystemRoot%\SYSTEM32 directory.
- ▣ AUTOEXEC.BAT and CONFIG.SYS are the only configuration files needed or available under MS-DOS. AUTOEXEC.NT and CONFIG.NT are the default configuration files, but you can actually define custom configuration files for different MS-DOS-based applications. If you need a configuration command for only one particular program, consider setting up custom configuration files instead of using the standard ones. For information about setting up custom configuration files using PIFs, see “Using Program Information Files,” page 670.



NOTE: Don't confuse MS-DOS configuration files with command prompt initialization or logon initialization files. AUTOEXEC.NT and CONFIG.NT affect only MS-DOS-based programs. The command interpreter, CMD.EXE, is a Windows NT-based program and is not affected by anything in these configuration files. Use the /K option as described on page 660 to initialize a command prompt session.

Using CONFIG.NT

In MS-DOS, the CONFIG.SYS file contains special commands to load device drivers and set global configuration parameters. Because some MS-DOS-based programs depend on settings in CONFIG.SYS, Windows NT has to provide a comparable configuration system. In order to be compatible with past and future versions of MS-DOS, Windows NT does not validate commands in CONFIG.NT. It recognizes and acts on some of the commands used in CONFIG.SYS, but it simply ignores anything it doesn't understand.

When you first run Windows NT Setup, it scans your CONFIG.SYS and copies relevant settings to CONFIG.NT. You probably won't need to modify it further. However, if you acquire new programs for MS-DOS, you might need to make changes. If the manual for your MS-DOS-based program recommends a particular setting for CONFIG.SYS, put it in CONFIG.NT. The setting might not be used by Windows NT, but usually it won't do any harm.

Device drivers are the exception. If your CONFIG.SYS loads a device driver with the DEVICE= or DEVICEHIGH= statement, you might not be able to load the same driver in CONFIG.NT. The comments in Table 19-2 on the next page suggest how you should handle device drivers commonly used under MS-DOS.

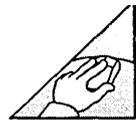
You can generally experiment safely with CONFIG.NT settings. Windows NT protects the rest of the operating system from your MS-DOS-based programs, so failures won't harm the system. Naturally, you won't want to do much experimenting with valuable data in your MS-DOS-based programs, but usually the questionable device drivers you test will fail when loading—before the program even starts.



Device Driver	Comments
HIMEM.SYS	Use the Windows NT version if you have programs that require it or if you use it in MS-DOS. Windows NT installs this in CONFIG.NT by default.
ANSI.SYS	Use the Windows NT version if you have MS-DOS-based programs that require it. The Windows NT command interpreter is not an MS-DOS-based program and it does not recognize ANSI escape sequences. Therefore, you can't use them with the Prompt or Echo commands.
COUNTRY.SYS and SETVER.EXE	Use the Windows NT versions as you would the MS-DOS versions if you have MS-DOS-based programs that need them.
EMM386.EXE	Don't use it. Windows NT automatically provides equivalent functionality and more.
SMARTDRV.SYS	Don't use it. Windows NT has built-in disk caching.
RAMDRIVE.SYS	Don't use it. Windows NT doesn't support (and generally doesn't need) RAM drives.
DBLSPACE.SYS	Don't use it. Windows NT can't recognize or set up DoubleSpace drives on a local hard drive, although it can use DoubleSpace drives shared from a networked MS-DOS computer.
Network drivers	Don't use them. Windows NT has built-in networking.
Drivers for hardware devices	You generally won't be able to use the MS-DOS versions. Some vendors might provide Windows NT versions of device drivers.

TABLE 19-2.
Using MS-DOS device drivers in Windows NT.

To see output from device drivers in CONFIG.NT and from programs in AUTOEXEC.NT, put the EchoConfig statement at the start of CONFIG.NT. Use the Rem statement to add comments or to comment out statements during testing. Comment out the EchoConfig statement when you finish testing.



WINDOWS TIP: In MS-DOS, some people use the Shell statement in CONFIG.SYS to install a command processor with features different than those of COMMAND.COM. If you try this with the Shell statement in CONFIG.NT, it won't have the effect you want. If you prefer a different command processor, you must first persuade your vendor to write a version of the program for Windows NT. Some vendors are already working on it. After you have the command processor, simply install it with an icon in Program Manager the same way CMD.EXE is installed by default. Windows NT also provides a COMMAND.COM, but it is actually an MS-DOS-based program that links with CMD.EXE. Your command interpreter vendor probably provides a similar program. You can use this program in your Shell statement. Bottom line: Don't use the Shell statement unless the manual for your third-party Windows NT-based command interpreter instructs you to do so.

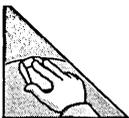
Using AUTOEXEC.NT

In your AUTOEXEC.NT file, you should load any programs that your MS-DOS-based programs need. Windows NT gives you a basic AUTOEXEC.NT and most likely you won't need to change it. The default file loads MSCDEXNT.EXE, REDIR.EXE, and DOSX.EXE. These programs enable CD-ROM extensions, network services, and extended MS-DOS services needed by some MS-DOS-based programs.

You can use AUTOEXEC.NT to load memory-resident programs, but read the next section for other alternatives.

Using TSR Programs and MS-DOS Shells

Terminate-and-Stay-Resident programs (TSRs) are a part of the MS-DOS culture. They provide through the back door what Windows NT provides through the front door. With Windows NT you don't need a hot key to make a TSR utility pop up over your MS-DOS-based programs. Simply run



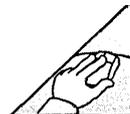
a Windows-based utility and switch to its window whenever you need it. In other words, *every* Windows-based program is a pop-up TSR. Windows NT will eventually make MS-DOS-based pop-up programs unnecessary.

This pie in the sky won't make you feel any better if no one has written a Windows version of your favorite TSR. So, for compatibility, Windows NT lets you run MS-DOS-based pop-up programs, but it forces you to make some hard choices about how they run. TSR programs weren't supposed to work under MS-DOS, but software developers, recognizing the needs of their customers, found undocumented techniques for doing the impossible. Windows NT must support questionable programs of every sort while still doing its primary task—running well-behaved native programs. If the following description of options and settings seems complex, remember it's a miracle that TSRs work at all. The more TSR programs you use, the more likely you are to have compatibility problems and the more you have to experiment to find settings that work for you.

Many of the issues associated with memory-resident programs also apply to command interpreter shells run from MS-DOS-based programs. Many MS-DOS-based programs have a shell command that allows you to start a command interpreter from inside the program. You can do some tasks at the command prompt and then return to the program with all settings exactly as you left them. This is a useful technique in MS-DOS and is supported in Windows NT, although it's much less useful in a multitasking operating system.

When you run a TSR, the program makes a small part of itself resident in memory (usually just the part that checks for a hot key) and then terminates back to the command interpreter. But which command interpreter? Similarly, when you use a shell command from an MS-DOS-based program, a command interpreter is invoked to create the shell. But which one? There's the rub. Windows NT provides two different ones: `CMD.EXE` is a 32-bit Windows NT-based program that knows everything about command lines except how to recognize hot keys from 16-bit MS-DOS-based programs. `COMMAND.COM` is a 16-bit MS-DOS-based program that knows about hot keys and pop-ups, but in other ways is a less capable version of `CMD.EXE`. In particular, it doesn't know about command editing and history.

By default, when you start a memory-resident program or exit to a shell from an MS-DOS program, you end up running `COMMAND.COM` with



all its limitations. If you start a pop-up program from the command prompt, you can activate it by pressing its hot key. You can do this at the command prompt or in any MS-DOS program you run from the command prompt. The only problem is that you lose all of your command history and you can't edit the command line—a pretty high price for people who use those features hundreds of times a day. You also pay this price anytime you start an MS-DOS shell.

If you don't like this choice, you can put the line

```
ntcmdprompt
```

in your CONFIG.NT or custom configuration file. After loading a pop-up program, you can continue using the command history and editing keys, but you can't pop up from the command prompt by pressing your program's hot key. If you run an MS-DOS-based program (don't use the Start command), you can pop up. If you execute a shell command from an MS-DOS-based program, you can use editing keys and the shell has a separate command history, but you can't see the history from other command prompt sessions. This isn't as great as you might think, because you'll probably find yourself using MS-DOS shells less and less as you get used to having multiple command-prompt windows.

TSRs are notoriously ill-behaved and are frequently incompatible with each other and with non-resident programs. You might find cases in which TSRs conflict with Windows NT-based programs. In such a case, you can put the following line in CONFIG.NT or a custom configuration file:

```
dosonly
```

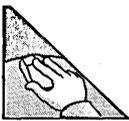
With this setting, you can run only MS-DOS-based programs after running a TSR or starting a shell from an MS-DOS-based program.

You can choose among several different ways of loading memory-resident programs:

- ▣ From the command prompt or an initialization batch file
- ▣ From CONFIG.NT or a custom configuration file with an Install statement, such as:

```
install=C:\BIN\POPUP.EXE
```

- ▣ From AUTOEXEC.NT or a custom startup batch file



If you load your TSR from the command prompt or an initialization batch file, you face all the potential compatibility problems and choices described earlier. The other methods are essentially equivalent and avoid some compatibility problems. However, CONFIG.NT and AUTOEXEC.NT (or custom files loaded in PIFs as described in the next section) are executed only when you run MS-DOS-based programs. You won't be able to pop up from the command prompt.



WINDOWS TIP: The best way to deal with TSR programs is to pretend that they aren't memory resident. Simply leave them running in a window like ordinary programs. You can move to the program at any time by clicking its window. Some pop-up programs have a command-line option that allows them to run as non-resident interactive utilities. If yours has this option, use it to create a program item in Program Manager. If your utility doesn't have a non-resident mode, you can get the same effect by starting a separate command prompt window for it. Load it (possibly from an initialization batch file) and then activate it by pressing its hot key. Then simply leave it running in the window. Be sure the NTCmdPrompt command is not set, because this would prevent you from activating the pop-up program from the command prompt.

Using Program Information Files

Program Information Files—commonly called PIFs—smooth the rough edges between the Windows environment and non-Windows-based programs. PIFs from earlier versions of Windows are recognized under Windows NT.

Windows NT is smarter than Windows 3.1 and can usually guess the appropriate behavior for an MS-DOS-based program without a PIF. However, PIFs are still recognized, and in fact have some new features. You can create new PIFs with Windows NT and have them run correctly under Windows 3.1. Or you can run your old PIFs from Windows (any version) under Windows NT. Many of the Windows PIF settings are irrelevant under



Windows NT but do no harm. They are simply ignored. If you use flex boot, be sure to define all of the appropriate fields for both Windows and Windows NT so that your PIFs run correctly in both environments.

The file `_DEFAULT.PIF` in the `%SystemRoot%` directory determines the default behavior when Windows NT starts an MS-DOS-based program that doesn't have a PIF. When creating a new PIF, you might find it more convenient to edit `_DEFAULT.PIF` and then rename it with Save As rather than starting from scratch. You might also want to modify `_DEFAULT.PIF` to change the default behavior of MS-DOS-based programs.

Creating or Modifying a PIF

Windows NT includes a program called PIF Editor, shown below, that lets you create a new PIF or modify an existing one. To start PIF Editor, double-click its icon in the Main program group of Program Manager.

PIF Editor - MEM.PIF

File Mode Help

Program Filename:

Window Title:

Optional Parameters:

Startup Directory:

Video Memory: Text Low Graphics High Graphics

Memory Requirements: KB Required KB Preferred

EMS Memory: KB Required KB Limit

XMS Memory: KB Required KB Limit

Display Usage: Full Screen Windowed

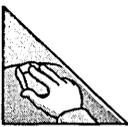
Execution: Background Exclusive

Close Window on Exit

Press F1 for Help on Optional Parameters.

To create a new PIF, simply make your entries in PIF Editor's initial display. To modify an existing PIF, choose Open from PIF Editor's File menu and select the PIF you want to edit.

When you finish making changes, choose Save or Save As from the File menu. Use Save As to name a new PIF or rename an existing one.

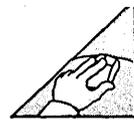


Many of the fields in the PIF Editor window are for older versions of Windows. Although Windows NT ignores them, you should set these fields if you want to use the same PIF in other environments. PIF Editor has complete help on all fields, even those ignored by Windows NT. Table 19-3 describes only the fields used by Windows NT.

Field Name	Notes
Program Filename	Use the name of an EXE, COM, BAT, or CMD file. PIFs are usually used for MS-DOS-based programs, but they also work with character-based programs for Windows NT or OS/2.
Window Title	Enter the name you want to appear under the program icon and on the title bar of the window.
Optional Parameters	Provide command-line arguments or use a question mark (?) to have Windows NT prompt you for arguments. Any arguments you provide when starting a PIF from a command prompt or a program item override arguments in the PIF.
Startup Directory	Normally leave this blank so that the program starts in the current directory.
Display Usage	Select full-screen or windowed. You can switch a running program to the other mode by pressing Alt+Enter. (RISC-based computers always run windowed regardless of this setting. On x86-based computers, graphics-based programs for MS-DOS always run full-screen regardless of this setting.)
EMS Memory and XMS Memory	Windows NT is very flexible in how it allocates expanded (EMS) and extended (XMS) memory. If you will use the PIF under Windows 3.1, choose whatever settings are appropriate for that environment. If you will use it only under Windows NT, you can usually get maximum flexibility by specifying 0 for the KB Required field and -1 (that is, as much memory as the program requests) for the KB Limit field.

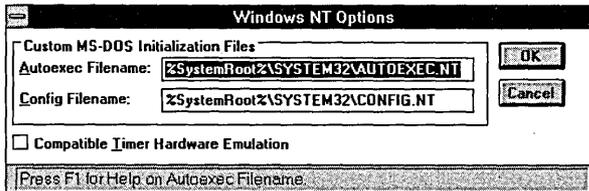
TABLE 19-3.
PIF Editor fields.

(continued)

TABLE 19-3. *continued*

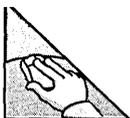
Field Name	Notes
Close Window on Exit	If selected, the window closes when the application terminates. This is usually the appropriate setting for interactive programs, but for programs that leave their output on the screen, you might want to leave this box deselected. The application remains on screen in an inactive state so that its output can be examined. Use the Control menu to close the window.
Reserve Shortcut Keys	If your application uses one of the Windows NT shortcut keys, select the appropriate key to prevent Windows NT from acting on the keystroke while the application is active. (You set this option by first clicking the Advanced button.)
Application Shortcut Key	You can assign a shortcut key to switch to your application when it is running. (You set this option by first clicking the Advanced button.)

You can set custom files for a MS-DOS configuration and startup from the Windows NT PIF Editor (but not from the Windows 3.1 PIF Editor). Click the Windows NT button in the main PIF Editor screen to get the following dialog box.



This is where you enter the names of configuration files for specific MS-DOS-based programs. As you can see, the defaults are CONFIG.NT and AUTOEXEC.NT. You can replace these with the names of your custom files. The easiest way to create custom configuration files is to copy CONFIG.NT and AUTOEXEC.NT to the filenames you choose. Then use an editor to add any additional statements required for the specific program.

The Windows NT Options dialog box also has a check box for Compatible Timer Hardware Emulation. You can generally leave this field as is.



If you use a timing-dependent MS-DOS-based program that doesn't work correctly under Windows NT, try checking this box. Some MS-DOS-based games need this setting.

Using PIFs

If you want to run a PIF from an icon, choose New from Program Manager's File menu. Enter the filename of the PIF—including the path and PIF extension—in the Command Line field. Fill in other fields the way you want them and click OK. You can also run a PIF by double-clicking it in File Manager.

You can run a PIF from the command prompt, but you must use the Start command and provide the full path and PIF extension. For example, assume that you have a PIF for the Mem program in the %SystemRoot% directory. Set the Display Usage to Windowed and deselect the Close Window on Exit box. Create a new Mem program item in Program Manager with %SystemRoot%\MEM.PIF in the Command Line field. Now try running the Mem command in different ways. First run from the command prompt:

```
C:\>start mem /c
```

The Mem command works, but the PIF settings are ignored (unless the PIF happens to be in the current directory). The output of Mem flashes on screen and then disappears because the Close Window on Exit setting is ignored.

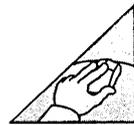
Now try it with the full path and PIF extension:

```
C:\>start %systemroot%\mem.pif /c
```

This time the PIF settings do have an effect. The output appears, but the window doesn't close when the program terminates. Notice that the window title identifies the program as inactive. You can read the program output and then close the window by double-clicking the Control-menu box. Here's a Doskey macro that makes running the program a little easier:

```
C:\>doskey smem=start %systemroot%\mem.pif $*
```

You might want to create a PIF and a Doskey macro for each MS-DOS-based program you run in a separate window. An extra benefit of using a PIF is that window settings are saved separately for each PIF as long as the Window Title field is unique. For example, you can turn off the QuickEdit mode for your command prompt and for programs that don't use the mouse



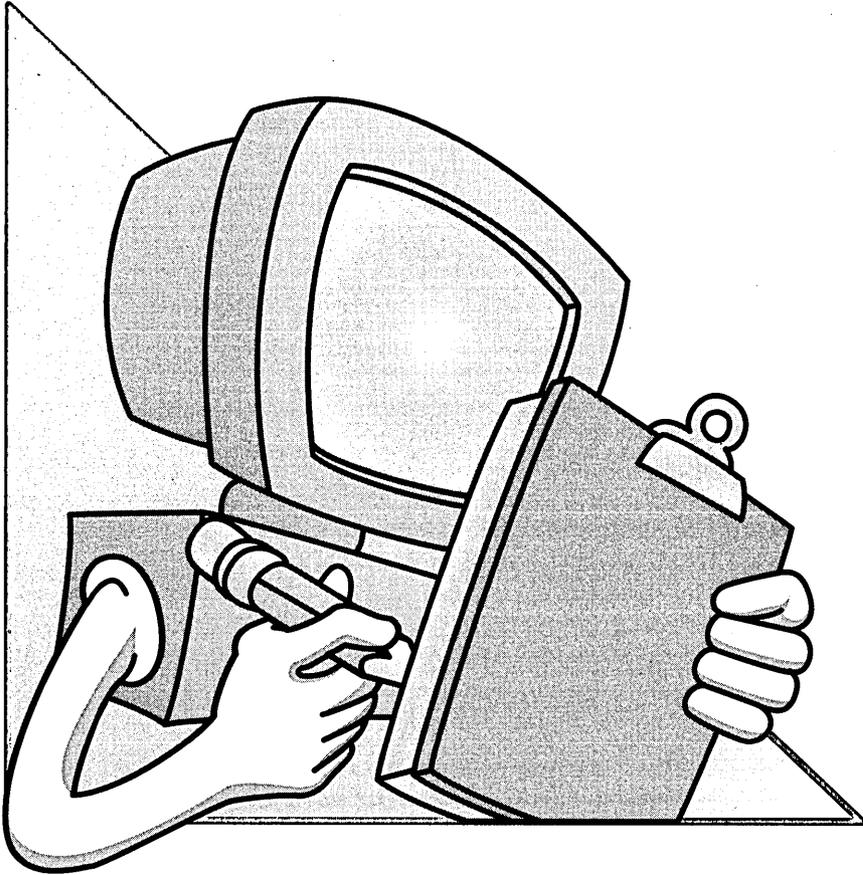
(such as Mem). For MS-DOS-based programs that use the mouse (such as Edit), create a PIF. Then when you run the program with the PIF, deselect the QuickEdit Mode check box and select the Save Configuration box. The program will always start with QuickEdit off regardless of settings for other programs or for the command prompt.

You should establish a consistent naming convention for your configuration and startup files. Under MS-DOS, the file-naming convention was established for you—you called them AUTOEXEC.BAT and CONFIG.SYS and you liked it. Windows NT recognizes AUTOEXEC.BAT, CONFIG.SYS, AUTOEXEC.NT, and CONFIG.NT, but you must name your own startup and custom configuration files. You can use the following proposed names as a starting point for creating your own convention.

Filename	Purpose
LOGINIT.BAT	Batch file called from the Startup group or as a logon script to do one-time initialization. If called from a Command Prompt item, its last line should call CMDINIT.BAT.
CMDINIT.BAT	Batch file called with CMD /K to do standard initialization for a command prompt session. It should load CMDINIT.MAC.
CMD*.BAT	Batch file called with CMD /K to do initialization for a specialized command prompt session. Its last line should call CMDINIT.BAT to do standard initialization.
CMDINIT.MAC	Doskey macros to be loaded for every command prompt session from CMDINIT.BAT.
*.MAC	Related Doskey macros to be loaded when needed.
CONF*.NT	Custom configuration file to replace CONFIG.NT for a specific program.
AUTO*.NT	Custom configuration file to replace AUTOEXEC.NT for a specific program.

PART

5



Maintaining Your System

Chapter 20	Managing Disks	679
Chapter 21	Monitoring System Performance	713
Chapter 22	Using the Windows NT Setup Program	761

Managing Disks

- | | |
|---|------------|
| Using Disk Administrator | 680 |
| <p>Configuring space on your hard disk is no longer as hazardous as it used to be. Use this powerful tool to create and manage partitions, logical drives, and much more.</p> | |
| Managing Disk Partitions | 687 |
| <p>You can create a drive within your hard drive that you treat as a self-contained unit. Windows NT recognizes two major types of partitions, primary and extended.</p> | |
| Working with Volume Sets | 702 |
| <p>Disk Administrator lets you set aside space on one or more hard disks for use by a particular file system.</p> | |
| Working with Stripes and Mirrors | 706 |
| <p>Here are more methods of distributing data across your disks.</p> | |
| Saving and Restoring Disk Configurations | 709 |
| <p>Disk Administrator can save and restore disk configurations and even overwrite your current configuration. It proceeds with caution, of course.</p> | |

W

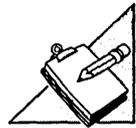
ay back, when the dust settled and you finally knew in your bones what all those pieces of your computer were meant to do, one fact was obvious: Without disks, you had no way to save, recall and modify, or archive your work. Disks, especially hard disks, are as essential to computer use as books and other print documents are to a paper-based world.

Using Disk Administrator

Earlier chapters in this book have covered disk formatting, disk and file management with File Manager, backups, and the essentials of the MS-DOS FAT file system and Windows NTFS. This chapter has little to do with saving data, but it has everything to do with giving that data a congenial and well-designed home. This chapter is about Disk Administrator, a tool that allows you to manage the actual space on your hard disks. With Disk Administrator, you can adjust the space allocation on your hard drives, use available space more efficiently, and even define a new hard disk if you add one to your system.

If you're familiar with MS-DOS, you'll recognize Disk Administrator as something of a graphical super-Fdisk. Even if you've never used Fdisk, however, you will most likely still recognize Disk Administrator as a tool for managing the spaces, known as *partitions*, on the hard disk or disks attached to your system.

Working with storage space on a hard disk can be a tricky proposition because significant changes almost invariably damage or destroy disk contents, as many people know from experience with procedures such as formatting, unformatting, and directory and file recovery. From this standpoint, one of the best aspects of Disk Administrator—other than ease of use—is its “awareness” of potentially harmful activities. As a result, whenever you use Disk Administrator to alter a hard disk in such a way that information can be lost, Disk Administrator makes no changes to your system until you quit, and even then it makes the changes only after requesting confirmation. Furthermore, because Disk Administrator refuses to remove the active partition or any logical drive or volume containing NT system files on an x86-based machine, the files you need to start and run Windows NT are protected from inadvertent deletion. Thus, unlike Fdisk,



which can immediately and irrevocably remove your startup partition and make your hard disk inaccessible, Disk Administrator adopts a kinder, gentler approach to hard-disk management.

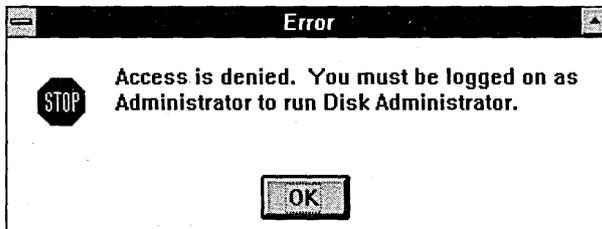
Who Can Use Disk Administrator, When, and For What

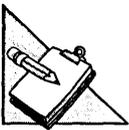
Although Disk Administrator is a powerful aid in configuring and managing space on a hard disk, it is not a tool you need to use frequently. You need Disk Administrator primarily when:

- You want to check disk size or the assigned letters of logical drives. (For more information, see “Starting Disk Administrator,” below.)
- You are setting up a new hard disk. (For more information, see “Managing Disk Partitions,” page 687.)
- You want to create or delete a logical drive, or you want to assign a different drive letter to an existing drive. (For more information, see “Logical Drives,” page 697.)
- You are comfortable enough with Windows NT that you want to consolidate separate regions of free space in a single volume set. (For more information, see “Working with Volume Sets,” page 702.)
- You want to maximize disk performance by spreading data across two or more disks in a stripe set. (For more information, see “Working with Stripes and Mirrors,” page 706.)

Starting Disk Administrator

In order to use Disk Administrator, you must be a member of the Administrators group. If you’re not, Disk Administrator refuses to start and displays an error message:



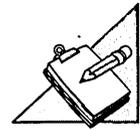


WINDOWS TIP: If you use Disk Administrator to set up or enhance performance on your system, save the configuration as described in “Saving and Restoring Disk Configurations,” page 709. The Windows NT Setup program automatically saves your original disk information in a file named SYSTEM on your Emergency Repair disk. If you change the configuration, however, and you like the new arrangement better than the old, save the new settings. That way, you’ll ensure that if anything goes wrong or if you later make a mistake in fine-tuning the disk, you will be able to restore the disk to its former state. You can save a new disk configuration on the Emergency Repair disk (if you’re certain that you’ll never need the original disk information) or you can save it on a different floppy disk.

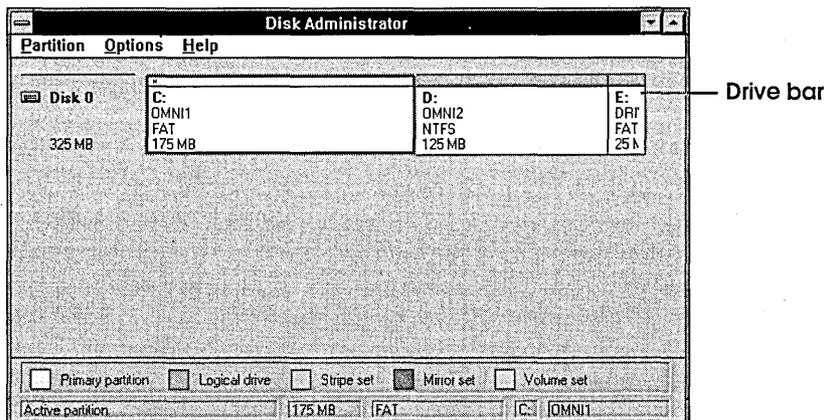
After you log on as a member of the Administrators group, you can start Disk Administrator in either of two ways:

- ▣ By double-clicking the Disk Administrator icon (which looks like a toolbox) in the Administrative Tools group
- ▣ By typing *windisk* or *start windisk* at the command prompt (Including *start* in your command enables you to continue working at the command prompt after starting Disk Administrator; omitting *start* essentially “freezes” the command prompt window until you quit Disk Administrator.)

NOTE: You see the dialog box shown on the next page the first time you start Disk Administrator and after you add a new disk to your computer. Click OK to continue to Disk Administrator’s main window.

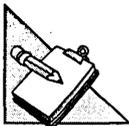


Whichever way you start it, Disk Administrator appears in a fuss-free window that shows the hard disk or disks attached to your system. Each disk is represented by a divided bar known as the disk bar on which each partition or logical drive is shown as a labeled segment. The window does *not* show hard disks to which your computer is connected over the network.



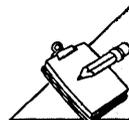
As you can see in the figure above, most of the Disk Administrator window is self-explanatory. (Terms such as *stripe set*, *mirror set*, and *volume set* are defined later in this chapter.) When you first start Disk Administrator, however, it does not select any logical drive, and therefore does not show any information in the status bar at the bottom of the window.

To select a logical drive on the disk, click on it. To extend the selection, hold down Ctrl and click.



How Can a Disk Drive Be Logical?

If you don't know much about disk drives and you always assumed that logic was the domain of Greek philosophers and Sherlock Holmes, you might be puzzled by references to logical drives on a hard disk. Well, logic in this sense doesn't have a whole lot to do with syllogisms or deductive reasoning. When applied to a disk drive, the word *logical* is in many respects the opposite of *physical*. Specifically, a logical drive is a portion of a hard disk that you set aside, format, assign a drive letter, and treat as if it were a separate disk of however many megabytes you decide to set aside. A physical drive, in contrast, is the drive itself, whole and indivisible. Thus, you have a physical hard drive installed in your computer. On that drive, however, you can create many logical drives—drive C as your startup drive, plus drives D, E, F, and so on. For example, suppose you have a 325-MB hard disk. You can, if you choose, dedicate the entire hard disk to Windows NT. In that case, the physical drive and the logical drive are identical as far as you're concerned. When you talk about drive C, you don't care if you're talking about the hardware or the drive letter it bears. You might, however, decide to break that 325 MB into smaller chunks: 50 MB for a flex-boot MS-DOS/Windows NT startup drive, plus 175 MB for NTFS, and another 100 MB for files and programs that rely on the MS-DOS FAT file system. In this case, because you want each portion of the drive to be independent of the others, you would format each chunk separately and assign each its own drive letter: C for the startup drive, probably D for the NTFS portion, and E for the FAT portion. Each of these resulting segments would then be a logical drive that is separate from, but coexists with, the others on your 325-MB physical drive. For information about how to do this type of arranging, see "Managing Disk Partitions," page 687, and "Logical Drives," page 697.



KEYBOARD TIP: To select the first logical drive on the first hard disk with the keyboard, press either Spacebar or Enter. To select a different logical drive, use the Right or Left direction key to move the selection frame to the desired drive, and then press Enter. To extend the selection, hold down Ctrl and press Spacebar or Enter. To select a different disk, use the Up or Down direction key.

Notice, too, that by default Disk Administrator shows the relative sizes of the logical drives on the disk (drives C, D, and E in the illustration on page 683). If you have more than one hard disk attached to the system, Disk Administrator also shows the disks in proportion to one another, although the shortest disk bar is never less than 25 percent of the length of the longest disk bar. For information about ways to change the look of the screen, see “Customizing the Display,” page 686.

Quitting Disk Administrator

You quit Disk Administrator in much the same way that you quit any other Windows NT program. You can do any of the following:

- ❑ Double-click the Control-menu box
- ❑ Choose Close from the Control menu
- ❑ Choose Exit from the Partition menu
- ❑ Press Alt+F4

If you made any changes to the configuration of one or more hard disks, Disk Administrator always prompts for confirmation before quitting, asking if you want to make the changes permanent with the message “Changes have been made to your disk configuration. Do you want to save the changes?”

If you choose Yes to save the changes, Disk Administrator updates its internal description of your hard disk and then tells you that the system must be restarted for those changes to take effect. If you choose OK at this point (your only option), Disk Administrator goes the extra mile by shutting down and restarting the system for you.

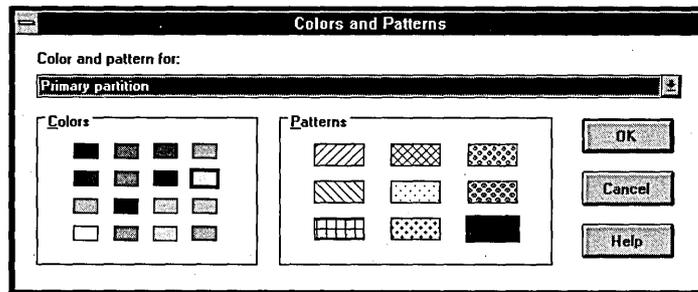


WARNING: Be sure that you want to make the changes before shutting down. You can restore an earlier configuration, but you can do so only if you saved the needed configuration on a floppy disk before making your current changes. (For more information, see "Saving and Restoring Disk Configurations," page 709.)

Customizing the Display

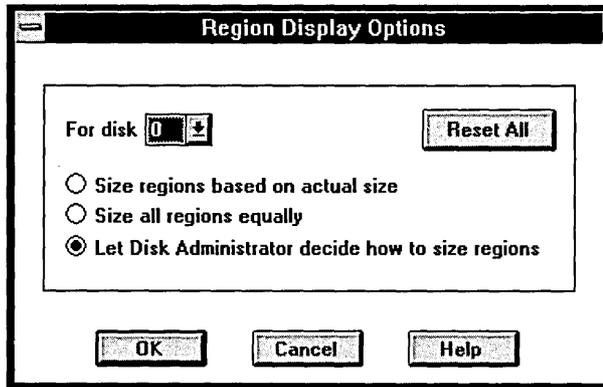
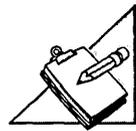
The default Disk Administrator window is functional, easy to read, and particularly informative in the way it shows relative disk sizes. If relativity is not your style, however, or if you want to change the colors used for legends, use the Options menu:

- ▣ The Colors and Patterns command lets you choose from an assortment of colors and patterns to customize the disk bars.



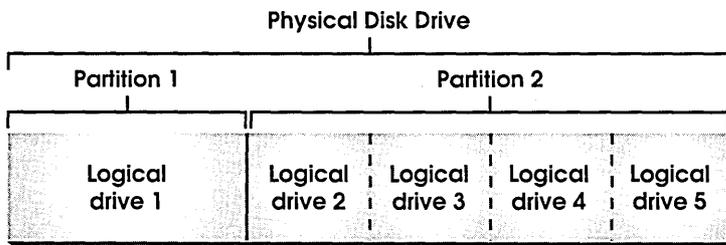
- ▣ The Region Display command lets you show the logical drives on a disk as equal-sized pieces of the disk bar.

The default in the Region Display dialog box (shown on the next page) is "Let Disk Administrator decide how to size regions." This choice affects the sizing of each bar representing a hard disk attached to your system. To size the bars of one or more disk drives either proportionally or in equal-sized pieces, choose the drive from the For disk drop-down list box and choose the setting you want. Click Reset All to restore decision-making for all drives to Disk Administrator.



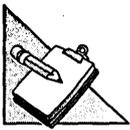
Managing Disk Partitions

To any operating system, including Windows NT, a partition is a portion of the hard disk that can be treated as a data-saving world unto itself. A section of the disk with its own starting and ending track numbers, a partition is essentially a drive within a drive. With Windows NT, you can have up to four partitions per hard disk. The illustration below shows how partitions are related to the disk as a whole and to the logical drives you refer to in retrieving and saving files. For ease of reference, the hard disk in the illustration is shown as it would be represented by Disk Administrator—that is, as if it had been “unwound” and stretched out linearly.



Primary and Extended Partitions

A partition by any name is always a distinct, physical portion of a hard disk. When you look at partitions more closely, especially at what they hold and

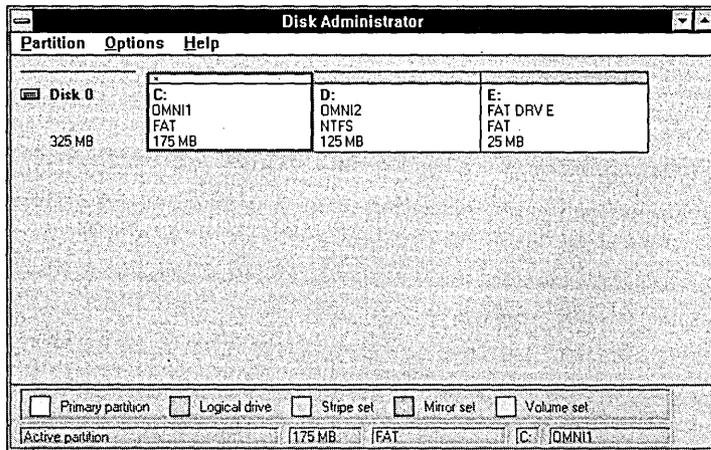
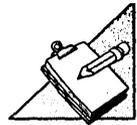


what they do, you find subtler shades of meaning attached to them. Depending on the function it performs, a partition can be primary or extended, and it can be an active, system, or boot partition.

Starting with the broadest categories, you need to know that Windows NT (like MS-DOS) recognizes two major types of partitions, *primary* and *extended*.

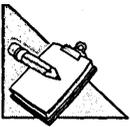
- ▣ A primary partition is the one used by your operating system. With MS-DOS, the primary partition usually holds all of MS-DOS. With Windows NT, the primary partition can hold the system's startup files only, or both the startup files and the files needed to give the operating system its functionality. If your computer is set up as a flex-boot system, the primary partition contains both MS-DOS and part or all of Windows NT. You can create four primary partitions or three primary and one extended partition per hard disk. If you are partitioning a disk, bear in mind that you cannot subdivide a primary partition into multiple logical drives, but you can subdivide an extended partition.
- ▣ An extended partition, of which you can have only one per hard disk, covers whatever space remains after you create your primary partition or partitions. You cannot boot from an extended partition, but you can divide the space in it into as many logical drives as you want, of whatever size you want. Each drive in an extended partition can be formatted separately for the FAT file system, NTFS, or HPFS, and can be treated as a physically separate disk drive. During installation, Windows NT can be set up to start from the primary partition but run from a logical drive in an extended partition.

The illustration on the next page shows how Disk Administrator displays information about a 325-MB hard disk divided into a 175-MB primary partition and a 150-MB extended partition that is further divided into two logical drives, D (formatted for NTFS) and E (formatted for the FAT file system).



Whereas primary and extended partitions refer to physical portions of a disk, *system partition*, *active partition*, and *boot partition* refer more to functionality. The three are closely related:

- ▣ The system partition is the partition that contains the files needed to load Windows NT and enable the operating system to use your hardware. It must always be a primary partition, and on x86-based computers, it must be marked as active (a term you might remember from using the MS-DOS Fdisk program).
- ▣ The active partition must be a primary partition. It is the partition from which the computer starts up. If you use Windows NT exclusively, the active partition must be the same as the system partition. If you use Windows NT and MS-DOS, the active partition must contain the startup files for both operating systems. If you use Windows NT and OS/2, each operating system occupies its own system partition, so you must use Disk Administrator to mark the OS/2 partition as active before you run OS/2. After marking the active partition, reboot the computer. The concept of the active partition applies only to x86-based computers. RISC-based computers are handled by special configuration programs; the system partition does not have to be marked active in order for the machine to boot.



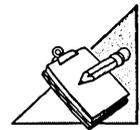
- The boot partition, which sounds like it ought to be the one you boot from, is actually the partition that contains the Windows system and support files. If you run Windows NT from a single partition (either FAT or NTFS), the boot partition is, indeed, the same as the system partition. If you start the system from a FAT partition but install Windows NT in a different (NTFS) partition, the FAT partition is the system partition and the NTFS partition is the boot partition.

Creating or deleting a partition represents a significant step in the configuration or reconfiguration of a hard disk. Creating a new partition turns disk space into virgin territory ready for definition as one or more logical drives, each of which you must format before using. Deleting an existing partition essentially means wiping out everything stored in it. In a sense, partitioning all or part of a new hard disk is like creating storage where there was just the possibility of storage before. Because partitioning is such a sweeping act, the only time you need to create new partitions is when you set up a hard disk for the first time or when you plan to rebuild and reformat a used hard disk. The only time you should consider deleting a partition is when you want to reorganize a disk and are certain that all important programs and data have been backed up to another medium. Deleting a partition means starting over.

The following sections describe how to use Disk Administrator to manage partitions. Primary partitions are covered first, extended partitions later.

Creating a Primary Partition

To create a new partition, you need free—that is, unformatted—space on your hard disk. This space can belong to a portion of a new hard disk that you have not assigned to either a primary or an extended partition, or it can be space you make available by deleting an existing partition or a logical drive. Remember that there are two types of partitions that you can create: primary and extended.

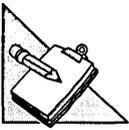


To create a new primary partition, one that cannot be divided into multiple logical drives, do the following:

1. In the Disk Administrator window, select the disk space you want to include in the partition.
2. Choose Create from the Partition menu.
3. Type or choose the partition size by clicking the up or down arrow in the dialog box that appears, and then click OK.

Disk Administrator creates the new partition and assigns it the next available drive letter. (Disk Administrator will warn you that the partition might not be accessible from MS-DOS if the partition's starting or ending cylinder value is too high.) You can assign a different drive letter to the partition with the Drive Letter command on the Partition menu. For more information, see "Assigning a Drive Letter," page 699.

NOTE: If the free space you selected is already part of an existing partition, the Create command produces a dialog box for creating a new logical drive; this dialog box is almost identical to the partition dialog box. It appears because you cannot create a new partition within an existing partition. Thus, if your entire hard disk has already been assigned to either a primary or an extended partition, you cannot create a new partition without first deleting an old one. There are some limits to this capability, however, because Disk Administrator does not allow you to delete either the primary partition on the startup hard disk (always called disk 0) or an extended partition if it contains the Windows NT system files. If you have a flex-boot system, you can do this kind of partitioning by booting with MS-DOS and using the Fdisk utility. Be forewarned, however, that deleting the primary partition makes your entire hard disk unusable until you repartition and reformat the drive and reinstall your system software—not a task to be taken lightly.



Formatting a New Partition

Before you can use a new primary partition or a logical drive within an extended partition, you must format it and, if you want, give it a volume label—a descriptive name, such as DATA FILES—that gives you and others an immediate idea of the types of information stored on it.

Formatting is one task that Disk Administrator does not handle. To format a new partition or a logical drive in an extended partition, do the following:

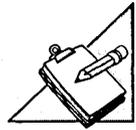
1. Quit Disk Administrator, save the changes you made, and reboot the computer to make the changes effective. Disk Administrator is fully aware of what has to happen, so all you really need to do is click OK a few times when Disk Administrator prompts for confirmation as it quits.

WARNING: If Disk Administrator displays a message telling you to edit BOOT.INI, be sure to do so before restarting the system. BOOT.INI is a file on your boot partition; to see and edit it, you must remove the system and read-only attributes. Restore the attributes after saving the edited file. For more information, see “Changing Your BOOT” on the next page.

2. Double-click Command Prompt in the Main program group to open a command prompt window.
3. If you need help with the syntax of the Format command, type *format /?* or *help format*.
4. To format the partition (or a logical drive in an extended partition), type a command such as the following:

```
C:\>format e: /fs:fat /q /v:fat
```

This sample command formats drive E. The /FS option identifies which file system the partition will use—FAT, in this case. The /Q option produces a quick format. The /V option assigns the volume label FAT as part of the



command and saves time by avoiding the prompt for a volume label that otherwise appears when formatting is complete. The volume label can be up to 11 characters long and can include spaces, but avoid using special characters such as ?, *, and especially |.

Changing Your BOOT

If your Windows NT operating system files are on a drive that is an extended partition, you must edit the system information file `BOOT.INI` when you create an additional primary partition. (For more information about `BOOT.INI`, see the troubleshooting chapter in the *Windows NT System Guide*.)

The [operating system] section of `BOOT.INI` tells Windows NT which partition contains its system files. For example, if your hard disk contains a primary partition (drive C, partition 1) and an extended partition (drive D, partition 2) that holds the Windows NT system files, the operating system information in `BOOT.INI` looks similar to this:

```
multi(0)disk(0)rdisk(0)partition(2)
```

If you now add a second primary partition, the partition number of the drive containing your system files changes because Windows NT internally numbers all primary partitions before numbering extended partitions. The new primary partition is partition 2, and the extended partition containing the Windows NT system files is now partition 3.

You must edit `BOOT.INI` to reflect this change before shutting down the system so that Windows NT can tell where to find its system files when you reboot. In our example, you would edit the operating system information in `BOOT.INI` to read:

```
multi(0)disk(0)rdisk(0)partition(3)
```

This tells Windows NT to look for its system files on partition 3 instead of partition 2.



WINDOWS TIP: If you format the drive for the FAT file system or HPFS, the `/V` option is not case-sensitive; the `Directory`, `Volume`, and `Label` commands show the volume label in uppercase whether you type the label name as *fat* or *FAT*. However, if you format the drive for NTFS, Windows NT distinguishes between uppercase and lowercase. Thus, if you want the volume label displayed as *NTFS*, be sure to type the label in capital letters.

Assigning or Changing a Volume Label

If you choose not to assign a volume label during formatting, or if you later decide to change the volume label to a more descriptive one, you can do so by using the `Label` command in a command prompt window. You can use the `Label` command in either of two ways:

- ▣ To have it display the current volume label and prompt for a new one, type the command as `label` followed, if necessary, by the drive letter and a colon, like this:

```
D:\users\default>label e:
```

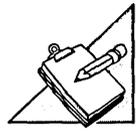
- ▣ To change the volume label quickly, type the label command, the drive letter and a colon, and the new volume label, like this:

```
D:\users\default>label e: jean
```

Remember that Windows NT is case-sensitive if the drive is formatted for NTFS.

Marking the Active Partition on an x86-Based System

As mentioned before, the active partition on a hard disk is the one from which your computer boots. Also as mentioned, you need to worry about an active partition only if you have an x86-based computer. On these machines, one primary partition—the one containing the files needed for



startup—must be marked active for the computer to start itself and an operating system. The active partition must always be on the first hard disk (Disk 0) attached to the system.

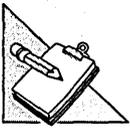
If you're familiar with MS-DOS and the Fdisk program, you already know that Fdisk includes an option for setting the active partition. With Windows NT, you use Disk Administrator to do the job. Onscreen, Disk Administrator indicates the current active partition with a small, x-shaped asterisk in the color bar above the partition. If you use Windows NT exclusively, or if you use Windows NT and MS-DOS, not only do you not have to change the active partition, Disk Administrator won't let you. The Mark Active command you need is dimmed and remains inactive. However, if you have installed another operating system, such as OS/2, you must mark its system partition as active and reboot the computer in order to use the alternate operating system.

To mark the active partition and start a different operating system, do the following:

1. In the Disk Administrator window, select the partition you want to mark as active.
2. Choose Mark Active from the Partition menu.
3. Reboot the computer.

Creating an Extended Partition

If your hard disk contains no more than three primary partitions, you can create an extended partition in the remaining space. The idea of an extended partition is a holdover from the MS-DOS operating system, which introduced this feature in version 3 as a means of enabling MS-DOS to use hard disks larger than 32 MB. These days, the main benefit of an extended partition is its ability to support more than one logical drive in a single (large) portion of the disk. Using an extended partition, you can define different-sized logical drives and assign each the drive letter and type of file system you want it to use.



To create an extended partition, do the following:

1. In the Disk Administrator window, select the free space you want to assign to the partition.
2. Choose Create Extended from the Partition menu.
3. Type or choose the partition size you want in the dialog box that appears.

After you create an extended partition, you must define one or more logical drives within it and format each separately. For information about how to do this, see “Logical Drives,” page 697.

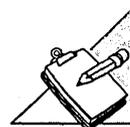
Deleting a Partition

The most important thing to know about deleting a partition is this: *All information in the partition will be irrevocably lost.* So be sure that you’ve backed up all needed programs and data files before deleting a partition. Although the partition won’t actually be deleted until you quit Disk Administrator and confirm your intention, knowing what you’re about to do and why will avoid jolts to your nervous system.

On an x86-based system, Windows NT will not allow you to delete the following:

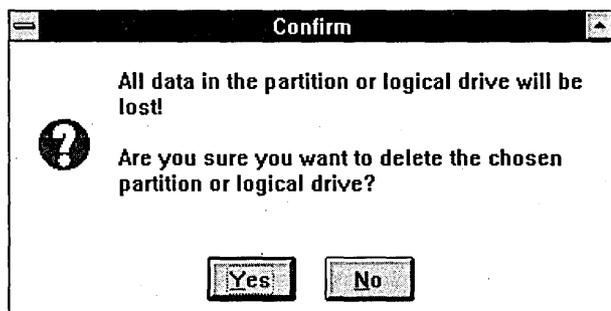
- The active partition on your startup hard disk
- The partition containing your Windows NT system files (if, for example, you place them on a logical drive in an extended partition)
- An extended partition that contains logical drives or volumes that have not been deleted (To delete the partition, you must delete the drives or volumes first, and then delete the partition.)

WARNING: If you’re using a RISC-based computer, take care when deleting partitions. Unlike x86-based computers, your system does not require you to set an active (system) partition. Thus, it is possible for you to delete the partition that contains your Windows NT startup files. If you mistakenly begin to delete this important partition, quit Disk Administrator and choose No when it asks whether you want to save your changes.



To delete a partition:

1. Verify that all needed files have been backed up.
2. If the partition you want to delete is an extended partition, delete any existing logical drives or volumes within it.
3. In the Disk Administrator window, select the partition you want to delete.
4. Choose Delete from the Partition menu and confirm your intention when the Confirm dialog box appears.

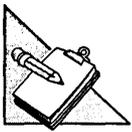


Disk Administrator then changes the on-screen representation to show free space in the area formerly occupied by the partition. At this point, the deletion is not yet permanent. You can create one or more logical drives in the newly freed space, but you cannot format or use the space yet. Create the logical drives you want, as described in the next section. Then finish the deletion as follows:

1. Quit Disk Administrator.
2. Confirm that you want to save the changes and let Disk Administrator reboot the computer.

Logical Drives

A logical drive is a part of a partition that you “wall off” and format so that you can use it as if it were a truly separate disk drive. Because Windows NT understands the FAT file system, NTFS, and HPFS, logical drives can help you enormously in putting a single hard disk to use for storing files in different formats. Disk Administrator doesn’t help you organize, maintain,

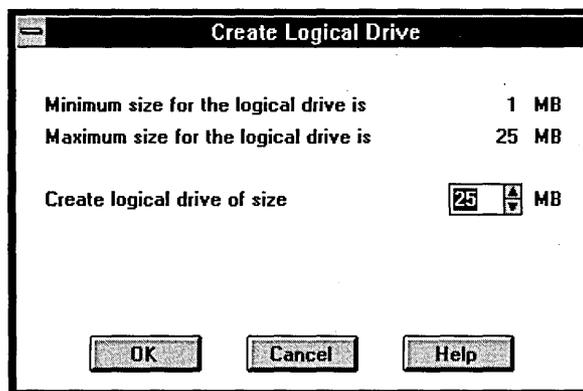


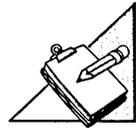
or otherwise manage a logical drive, any more than it helps you handle those tasks with a partition. What Disk Administrator does is enable you to create, delete, and assign drive letters to logical drives with a few simple select-and-click operations.

Creating a Logical Drive

Creating a logical drive is very similar to creating a new partition. It is, in fact, the second step in preparing an extended partition for use. To create a new logical drive, you must begin with some free space, either in a primary partition (which must become a single logical drive) or in an extended partition (which can be divided into more than one logical drive). To create the drive, do the following:

1. In the Disk Administrator window, select the free space you want to assign to the drive.
2. Choose Create from the Partition menu. (Yes, this is the same command you use in creating a new partition. If the space has not been partitioned, Windows NT assumes that you want to create a partition; if the space has been partitioned, Windows NT assumes that you want to create a logical drive.)
3. When the Create Logical Drive dialog box appears, either type the size of the drive you want or choose the size by clicking the up or down arrow.





- The dialog box initially proposes a drive size equal to the size of the selected free space, but you are free to make the drive smaller.
4. Click OK, and the new drive appears in the disk bar with a drive letter assigned by Windows NT. The letter assigned is the next available in the sequence of 24 letters available for use. These letters comprise all of the alphabet except for A and B, which are reserved for floppy drives.
 5. Quit Disk Administrator, save your changes, and format the new drive as explained in "Formatting a New Partition," page 692.

Assigning a Drive Letter

Disk Administrator allows you to assign drive letters to your system's logical drives in any order you want. If you'd rather not assign drive letters yourself, Windows NT takes charge of drive assignments, parceling the letters out according to a few simple rules:

1. It assigns the letter closest to the start of the alphabet to the first primary partition on each of your hard disks, beginning with C for the primary partition on your startup hard disk, D for the first primary partition on the second hard disk (if any), and so on.
2. It then assigns the next available letters, in order, to the logical drives on your hard disks, one after the other, beginning with the first hard disk (Disk 0), then the second, third, and so on.
3. Finally, Windows NT assigns drive letters to the remaining primary partitions, if any, on your hard disks.

The result, although it can look disjointed on a system with two or more hard disks, is understandable, as you can see from this illustration:

Disk 0	First Primary	First Logical	Second Logical	Third Logical
	Drive C	Drive E	Drive F	Drive G
Disk 1	First Primary	Fourth Logical	Fifth Logical	Second Primary
	Drive D	Drive H	Drive J	Drive I



Checking Your Environment

When you assign drive letters, you must remember that both your operating system and your application software might be making some assumptions about where to find specific files. To find out what drive-letter information is being passed to your software, you can check your computer's environment—a special portion of memory where Windows NT (and possibly other operating systems) find such information as the search path and the location of your temporary directory. To check all or part of the environment, you can use either of two commands from the command prompt: *Path*, to check on the search path for executable files, or *Set*, to request a look at all current environment variables, including the search path, the location of the command interpreter (CMD.EXE), and the values being used for your domain and username for the current session.

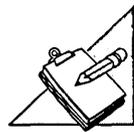
To check these bits of information, do the following:

1. Open a command prompt window. Press Alt+Enter if the command prompt appears as a full screen.
2. To check on the search path, type *path*. To check on the current environment variables, type *set*.

To save the information, redirect the command output to a file with a command such as *set > env.txt* or *path > path.txt*. Or, if you prefer, you can use the Control Menu as follows:

1. Open the command prompt window's Control menu and choose Edit. When the secondary menu appears, choose Mark.
2. Use the keyboard or the mouse to select the text (the search path or the list of environment variables) that you want to save, and then press Enter to copy the selection to the Clipboard.
3. Exit the command prompt window, open Notepad, and paste the Clipboard contents into Notepad.

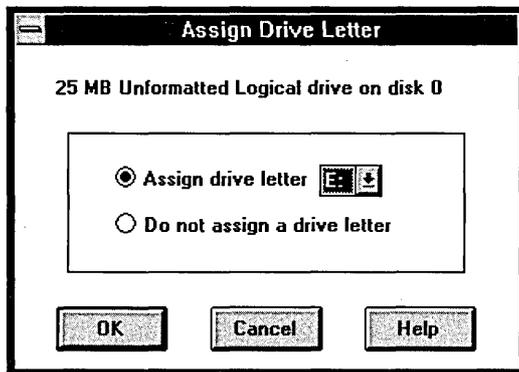
If you want, print the information for a more permanent record.



If you want, you can use Disk Administrator to permanently assign particular drive letters to specific disks, partitions, or volumes. This is called *static assignment*, and it means that later on, if you add another drive, for example, Windows NT will assume that the statically assigned drive letter is unavailable for use.

To assign a letter to a particular drive or partition, do the following:

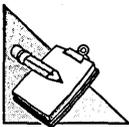
1. In the Disk Administrator window, select the drive or partition whose drive letter you want to change.
2. Choose Drive Letter from the Partition menu. The Assign Drive Letter dialog box appears.



Type the letter you want to assign, or choose the letter from the drop-down list box. Choose the second option, “Do not assign a drive letter,” if you want to delete the letter assigned to a drive or partition. If you delete the letter and confirm the change when you quit Disk Administrator, Windows NT assigns the next available letter to the drive when you restart the system.

Deleting a Logical Drive

As with any form of deletion affecting a hard disk, be very sure that you want to delete a logical drive. When you do this, all information on the drive is lost, so it's imperative to back up any programs or data you want to keep. (For more information about backing up files, see Chapter 13, “Backing Up and Restoring Files,” page 361.) If you're reorganizing a partition, you might want to delete one or more logical drives—perhaps to



combine them as a single larger drive or to create some free space for use as part of a volume set or (if you have more than one hard disk) as part of a stripe set.

NOTE: Don't delete a logical drive if all you want to do is change the file system on it. Reformatting will do the job for you. You can also use the Convert command from the command prompt to switch from the FAT file system to NTFS. If you change a drive from the FAT file system to NTFS, however, bear in mind that the file-storage structures needed by NTFS will require extra megabytes of space.

Deleting a logical drive is essentially the same as deleting a partition:

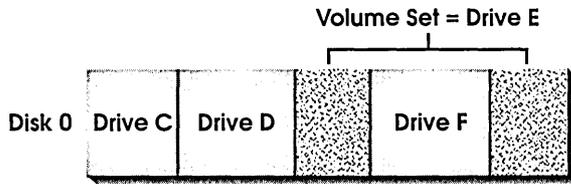
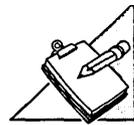
1. In the Disk Administrator window, select the drive you want to delete.
2. Choose Delete from the Partition menu.

Just as when you delete a partition, Disk Administrator cautions you that all data will be lost and asks you to confirm your intention. If you continue, the deleted drive appears as free space on the disk bar. When you quit Disk Administrator, you'll be asked if you want to make the changes permanent. If you do, Disk Administrator saves the changes and restarts the computer.

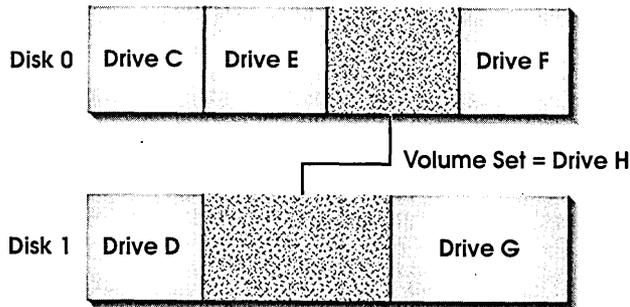
Working with Volume Sets

A *volume*, according to Windows NT, is any space on a hard disk that is formatted for use by a particular file system. In many cases, a volume is equivalent to a logical drive. If you have a flex-boot Windows NT/MS-DOS system, for example, your drive C, which is formatted for the FAT file system, represents one volume. If your Windows NT files (other than the startup files) are stored on drive D, that drive represents another volume.

Because Windows NT can work with multiple disks and partitions, however, a volume—actually a *volume set*—can sometimes also be a collection of discontinuous and even different-sized spaces on one or more disks, all of which are treated as if they were a single large volume with the same drive letter, as shown in the illustration on the next page.



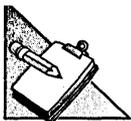
A volume set can span more than one disk, like this:



As you can see immediately, there are two advantages to such unions:

- ❑ You combine two smaller areas into one large logical area without having to repartition the disk.
- ❑ You cut down on the number of drive letters in use, because a single drive letter refers to more than one storage segment on one or more disks.

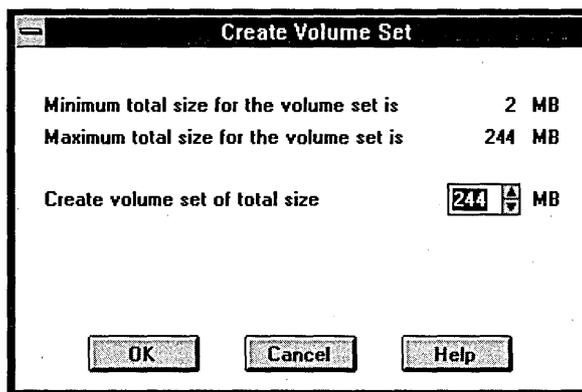
Volume sets have two additional but less obvious benefits. First, even though Windows NT allows you to combine free space on up to 32 disks into a single volume set, this set, once created, becomes invisible to you during normal use. As you save files, Windows NT fills one area after the other, moving in order from one area of the volume set to the next. Because Windows NT handles the logistics of storing and retrieving the files, even 32 discontinuous areas on 32 separate hard disks act as a single drive as far as you're concerned. In addition, if you create a volume set that spans more than one drive, you might find that system performance improves. This is because disk reads and writes, which are normally slow in relation to other activities, are more efficient when spread across two or more disks.



Creating a Volume Set

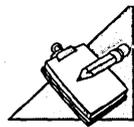
To create a volume set with Disk Administrator, you must begin with two or more areas of free space on one or more disks. These spaces can be pre-existing, or you can create them during the current session by deleting existing partitions or logical drives. After the spaces you need are freed, do the following:

1. In the Disk Administrator window, select the areas you want to combine into the volume set. Remember that you select multiple disk regions by clicking one and then holding down Ctrl while you click the others.
2. Choose Create Volume Set from the Partition menu. The Create Volume Set dialog box appears.



Specify the size of the volume set you want and click OK. If you create a volume set that is smaller than the total free space in the selected areas, Disk Administrator divides the free space proportionally so that each piece of the volume set represents approximately the same percentage of the original free space in each selected area.

When the Disk Administrator window reappears, the volume set is displayed, with the same identifying color or pattern and the same drive letter at the top of each area in the volume set in the disk bar. If you click



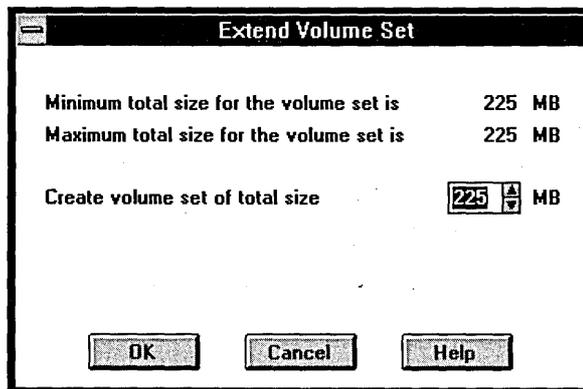
one portion of the volume set, you'll notice that Disk Administrator selects every area in the volume set. Quit Disk Administrator to save the changes, format the new multipart "drive," and your volume set is ready to use.

Extending a Volume Set

Although you cannot—for obvious reasons such as data loss—shrink a volume set, you can extend a volume set by adding one or more additional areas of free space. The only requirement is that the volume set be formatted for NTFS.

To extend a volume set, do the following:

1. In the Disk Administrator window, select both the volume set and the free space you want to add to it.
2. Choose Extend Volume Set from the Partition menu. The Extend Volume Set dialog box appears.



Specify the new total size of the volume set. If you specify less than the total amount of free space, Disk Administrator distributes the space assigned to the volume set as described in the previous section, "Creating a Volume Set."



Deleting a Volume Set

Deleting a volume set is equivalent to deleting a partition or a logical drive in that all information stored in the volume set is lost. To delete a volume set, back up all information that you want to keep, and then:

1. In the Disk Administrator window, select the volume set you want to delete.
2. Choose Delete from the Partition menu.

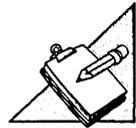
Just as when you delete a partition, Disk Administrator cautions you that all data will be lost and asks you to confirm your intention. If you continue, the deleted drive appears as free space on the disk bar. When you quit Disk Administrator, you'll be asked if you want to make the changes permanent. If you do, Disk Administrator saves the changes and restarts the computer.

Working with Stripes and Mirrors

Stripes and mirrors are additional means used by Windows NT to distribute information across disks. Striping means to “layer” information evenly across two or more disks. Mirroring, as the name implies, means to duplicate information on two disks.

Windows NT supports striping, striping with parity, and disk mirroring. However, striping with parity and mirroring are usable only on a computer running the Advanced Server version of Windows NT, the enhanced form of Windows NT designed specifically for use on large network servers administered by full-time professional network administrators.

Both the striping available with the desktop version of Windows NT and the striping with parity available with the Advanced Server version of Windows NT spread data across two or more disks. Striping with parity and disk mirroring provide data protection that allows the server to recover from disk failure or data loss. Striping with parity protects data with its parity information, which can be used to recover data if part of a “stripe” is lost when a disk fails. Mirroring, as its name implies, protects data by duplicating it on two disks so that if one of the disks fails, data can still be recovered from the “mirror image” on the other disk.



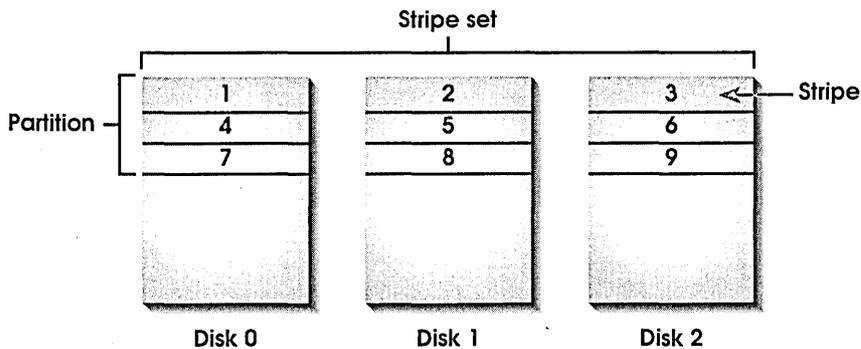
Windows NT, as opposed to Windows NT Advanced Server, supports the least sophisticated of these data-distribution methods—the creation and management of stripe sets that layer data evenly, in equal blocks, across 2 through 32 disks.

Unlike striping with parity, these stripe sets are *not* designed for data protection. Stripe sets improve system performance, but whereas striping with parity provides data protection (also known as *fault tolerance*), stripe sets are solely a means of making disk access more efficient. When striping with parity is used on a Windows NT Advanced Server machine, the server can recover data when a disk fails. When stripe sets are created on a regular Windows NT machine, disk failure means that all data is lost (which is another reason for regular backups).

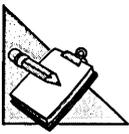
The rest of this discussion refers to stripe sets, not striping with parity.

Stripe Sets Versus Volume Sets

Conceptually, you can visualize a stripe set as something like the following, although in real life, of course, the disks containing the set are unlikely to be as symmetrically organized as the ones shown here:



After such a stripe set is created, information is layered across the disks in the numeric order shown.



As you can see from the illustration, stripe sets differ from volume sets in two important respects:

- ▣ A stripe set can be created only on a system with two or more disks; a volume set can be created on a single disk.
- ▣ A stripe set, because it layers data evenly across disks, contains partitions that are approximately equal in size. A volume set can include partitions of different sizes.

Stripe sets and volume sets are alike, however, in four significant respects:

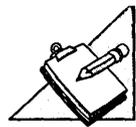
- ▣ Both are referenced by a single drive letter.
- ▣ Both lose all data if one of the disks fails.
- ▣ Both are selected and deleted as entire units, even though the storage areas they cover are physically separated on the same disk or on different disks.
- ▣ Both are invisible to MS-DOS because they handle disk storage in a way that MS-DOS cannot recognize.

Creating a Stripe Set

To create a stripe set, you need areas of free space that you want to combine on 2 through 32 disks. The process is simple:

1. In the Disk Administrator window, select the areas you want to combine.
2. Choose Create Stripe Set from the Partition menu. Specify the size of the stripe set you want in the Create Stripe Set dialog box that appears, and click OK.

When Windows NT creates the stripe set, it divides the areas of free space you selected into equal-sized partitions on each of the disks you specified.



Deleting a Stripe Set

As is the case with partitions, volume sets, and logical drives, deleting a stripe set means losing all information stored in it, so back up all data you want to keep before going ahead with the deletion. Otherwise, deleting a stripe set is easy:

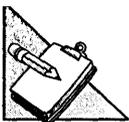
1. In the Disk Administrator window, select the stripe set you want to delete.
2. Choose Delete from the Partition menu.

Because such a deletion affects data and the organization of your hard disks, Windows NT asks for confirmation before carrying out the command. Remember, too, that the deletion isn't permanent until you quit Disk Administrator. If you have second thoughts, quit Disk Administrator and click No when asked if you want to record the change.

Saving and Restoring Disk Configurations

Disk Administrator, with its built-in conservatism, always requests confirmation before making any permanent changes to your disk configuration. You can, however, choose to save the current configuration or restore an earlier (saved) configuration. If you want, you can also search for the configuration used by a different installation of Windows NT and overwrite the current configuration with that of the other installation.

WARNING: When you restore or replace one configuration with another, be aware that data loss can occur if you change the definition of drives, volume sets, or stripe sets. Even though Disk Administrator asks for confirmation before making potentially destructive changes to a disk, be sure you know what you're doing, and always involve your system administrator in any such activity.

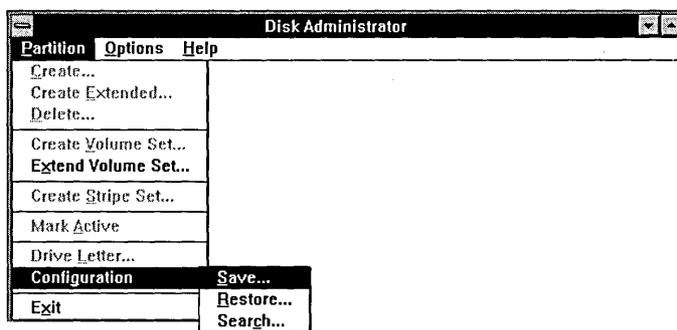


PART 5: Maintaining Your System

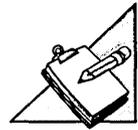
When Disk Administrator saves or alters the current disk configuration, it affects the following:

- ❑ Drive letters
- ❑ Volume sets
- ❑ Stripe sets
- ❑ Mirror sets and stripes sets with parity

Saving, restoring, and searching for a disk configuration are all handled by the Configuration command on the Partition menu. When you choose this command, a submenu appears:



- ❑ Save saves the current configuration on a floppy disk. Choosing this command causes Disk Administrator to display a dialog box asking you to place a formatted disk in drive A. You can save the configuration either on the Emergency Repair Disk created during setup and installation, or you can use a different disk.
- ❑ Restore restores an earlier, saved configuration. Choosing Restore produces two dialog boxes. First comes a warning and a request for confirmation telling you that drive letters and other configuration information might be lost. If you click OK to confirm, a second dialog box asks you to insert the disk containing the saved configuration in drive A.



- ▣ Search causes Disk Administrator to search for other Windows NT installations on your computer. Choosing this command produces the following:
 - ▣ A dialog box asking you to confirm your intention.
 - ▣ A search for other installations of Windows NT.
 - ▣ If other installations are found, a list of those installations. At this point, choose the one you want and click OK to replace the current configuration with the installation you selected.

Breaking Up a Mirror Set

Although you cannot create a mirror set with Windows NT (or with Windows NT Advanced Server), there's a remote possibility that you might have to deal with a mirror set on a set of disks or on a computer you take over from someone else. Windows NT cannot perform mirroring, but you can do the following:

- ▣ Save and use the information in both partitions by assigning new drive letters to one or both partitions.
- ▣ Delete the partitions and reformat them to make the space available for new storage.

In order to break up a mirror set, there's one important prerequisite: A floppy disk containing the Windows NT Advanced Server disk configuration. Without this disk, Windows NT is unable to recognize the mirrored volumes. To break up the mirror set:

1. Use the floppy disk and the Restore option of the Configuration command to write the Windows NT Advanced Server disk configuration to your Windows NT computer.
2. When your computer restarts, start Disk Administrator again. You'll see the mirrored partitions represented on the disk bar as primary partitions or logical drives, but without accompanying drive letters.
3. To save the information, assign each partition a drive letter. To use the space for other storage, delete the mirrored volume, create a new logical drive, and reformat the space.

Monitoring System Performance

- What Do You Monitor?** 715
Windows NT lets you look at your system from different angles. You can monitor system events, check your computer's performance as a server, and monitor computer efficiency.
- Monitoring System Activities with Event Viewer** 716
Event Viewer can tell you about four types of events on your system: errors, warnings, information events, and audit events.
- Monitoring System Use with Server** 728
If you share files and other resources, you can monitor and control user access using Server. The resulting event logs can be saved for future use.
- Monitoring System Efficiency with Performance Monitor** 738
When computer efficiency is a concern, Performance Monitor can step in and help you track a broad range of computer activities. You can display the results in a chart, a log, or a report—or request an alert.



Whether you're in charge of a single workstation or an entire network, it's always possible that the imp of electronics will suddenly start gobbling memory, blocking communication lines, causing gridlock on a hard disk, or producing pandemonium on the data bus. At those times, you might wish you could dive into the system to take an up-close and personal look at what's going on. Well, you can't; but with Windows NT, you can check on what the computer system is doing. You can then put aside a lot of guesswork and base corrective actions on fact.

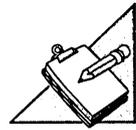
Before you go any further, you should know that much of this chapter is not necessarily for everyone. Three Windows NT programs are covered here:

- Event Viewer
- Server
- Performance Monitor

However, only Server is likely to affect your daily work. Event Viewer and Performance Monitor are specialized tools that you don't need in order to use Windows NT. You can run applications and access shared directories, files, and printers without Event Viewer or Performance Monitor. If you work through this chapter, you'll probably be intrigued enough by the capabilities of Windows NT to experiment once or twice with Event Viewer and Performance Monitor, but normally you won't have to pay much attention to them.

Why is this so? First, because Windows NT has the ability to fine-tune itself to some degree without your intervention. Second, because monitoring system performance falls largely into the realm of network administration, the job of the all-powerful person who determines how computers on the network are accessed, by whom, and with what levels of permission. For people with such job descriptions, performance monitoring is a tool that can help keep the whole show running smoothly.

Still, this book is designed to tell you about a remarkable operating system, and the ability to monitor system performance is a significant feature of Windows NT. So even if you are not a network administrator, you'll find this chapter useful if you have administrator privileges on your own computer and you want to monitor, fine-tune, or buy new hardware for your system.



What Do You Monitor?

Performance monitoring is one of those subjects you can look at from several perspectives, seeing different pieces of the whole from each. Basically, however, performance monitoring boils down to looking at the system from three related, but still separate, points of view:

- ▣ First, there's the issue of "What's going on in there?" For this, Windows NT provides Event Viewer. Event Viewer lets you monitor a whole slew of happenings, known collectively as *events*, that are stored continually in a set of files called *event logs*. Events can range from innocuous and expected occurrences, such as logon/logoff activities and print jobs, to serious and unexpected errors, such as driver problems or a disk on which storage space is becoming scarce. With Event Viewer, you can record and monitor significant incidents related to the computer, its security, and its applications.
- ▣ Second, there's the issue of how well a computer is performing its duties as a server. Is it being accessed too often at particular times of day? Are too many users attempting to open the same file at the same time? Can the computer handle the demands made on it as both a print server and a file and directory resource? To check on a computer's performance as a server, you use the Server applet in Control Panel. With the Server applet, you can find out who is using the server, which resources are being used, and even how much time has passed since a particular person used a particular resource.
- ▣ Third, there's the issue of how the computer itself is performing. Here, you are concerned not so much with *what* is happening (that is, with events), as you are with *how well* the computer is making things happen. If you're a programmer, for example, you might be interested in how quickly and effectively your program is running under Windows NT. This area of performance monitoring focuses on matters such as processor time, memory use, disk access, cache effectiveness, and the behavior of threads and processes. When you need to know how well your own computer or another



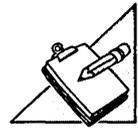
Windows NT computer on your network is functioning, you turn to Performance Monitor, which allows you to view, chart, record, and analyze system efficiency.

Monitoring System Activities with Event Viewer

To Windows NT, an event is any occurrence that is potentially noteworthy—to you, to other users, to the operating system, or to an application. Event Viewer is the operating system's means of telling you about these events. It functions as a combination report card and status report by storing lists of events in log files that you can review, archive, or transfer to a database or spreadsheet for analysis.

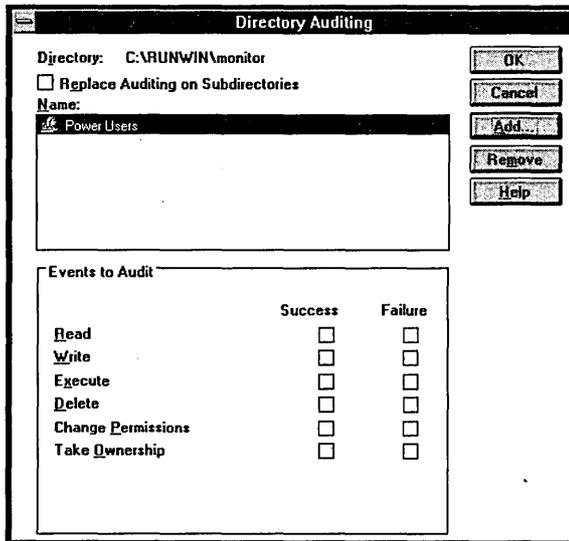
Windows NT recognizes three broad categories of events: application events, system events, and audit events. Application events are generated by applications and are recorded in a file called the application log. Application events can vary according to the occurrences that the application developer chooses to monitor. System events are generated by Windows NT itself and are recorded in a file called the system log. Windows NT classifies system events according to their severity as either errors, warnings, or information events, as follows:

- *Errors* are system events that represent possible loss of data or functionality. Examples of errors include events related to network contention or a malfunctioning network card, and loss of functionality caused by a device or service that doesn't load at startup.
- *Warnings* are system events that represent less significant or less immediate problems than errors. Examples of warning events include a nearly full disk, a timeout by the network redirector, and "illegal" transmissions routed to your workgroup or domain from another computer.
- *Information events* are all other system events that Windows NT logs. Examples of information events include someone using a printer connected to your computer, or the successful loading of a database program.



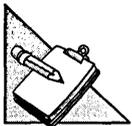
Audit events are generated by Windows NT when an activity you choose to monitor succeeds (called a success audit event) or fails (called a failure audit event). Audit events are recorded in a file called the security log. They apply only to NTFS volumes and can be either of two kinds:

- ❑ *File-related events*, such as attempts to access files and directories, or change permissions. To control auditing of file-related events, log on as a member of the Administrators group, start File Manager, and choose Auditing from the Security menu. The following dialog box appears.



Specify the groups or users you want to audit as well as the events you want to track.

- ❑ *Security-related events*, such as logon/logoff events and changes to security policies. To control auditing of security-related events, log on as a member of the Administrators group, start User Manager and choose Audit from the Policies menu. The dialog box shown on the next page appears.



	Success	Failure
Logon and Logoff	<input checked="" type="checkbox"/>	<input type="checkbox"/>
File and Object Access	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Use of User Rights	<input type="checkbox"/>	<input type="checkbox"/>
User and Group Management	<input type="checkbox"/>	<input type="checkbox"/>
Security Policy Changes	<input type="checkbox"/>	<input type="checkbox"/>
Restart, Shutdown, and System	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Process Tracking	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Specify the types of events you want to audit.

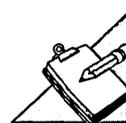


WINDOWS TIP: If you track successful rather than unsuccessful events, you can produce massive logs in no time—which can, in the eyes of the honest and innocent, cast you in a somewhat Orwellian light. In actual fact, however, audits can only tell who is using what and when, but not why or how. Big Brother is still a little way off ... in this area at least.

Event Logs

As already mentioned, when you start Windows NT, it keeps track of events in one of several logs:

- ▣ The *system log* contains events generated by Windows NT itself.
- ▣ The *application log*, if it exists, contains events generated by applications. These events will vary according to what the software developer chooses to monitor.



- ▣ The *security log* contains events generated by the security and file-related audits you requested. Unlike the system and application logs, which can be viewed by anyone, the security log is accessible only if you log on as a member of the Administrators group.

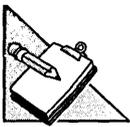
Viewing a Log

Because Windows NT automatically keeps at least a system log, you can easily see what a log looks like even if you never before thought of monitoring system performance. To view the system log, double-click the Event Viewer icon. When the program starts, the system log is displayed.

Date	Time	Source	Category	Event	User	Computer
5/27/93	2:29:59 PM	Print	None	10	Guest	OMN11
5/27/93	2:29:38 PM	Print	None	10	Guest	OMN11
5/27/93	2:16:33 PM	Print	None	10	Guest	OMN11
5/27/93	2:14:36 PM	Print	None	10	Guest	OMN11
5/26/93	12:06:29 PM	Mouclass	None	11	N/A	OMN11
5/27/93	8:48:03 AM	Srv	None	2013	N/A	OMN11
5/27/93	8:08:19 AM	Service Control Manager	None	7026	N/A	OMN11
5/26/93	3:57:36 PM	Print	None	10	Administrator	OMN11

Most of this display is self-explanatory. The following items might give you pause, however:

- ▣ The icon at the far left of each line identifies the event type. You might see any of the following icons in an event log:
 - ⊗ *Error.* The stop sign indicates an error event such as a loss of data or functionality.
 - Ⓢ *Warning.* The exclamation point indicates a warning event, such as a nearly full disk.
 - ⓘ *Information.* The lowercase *i* indicates an information event, such as someone using a printer attached to your computer.
 - 🔒 *Success Audit.* The lock indicates an audit event that was successful, such as someone successfully logging onto the system.
 - 🔑 *Failure Audit.* The key indicates an audit event that failed, such as a failed attempt to log onto the system.

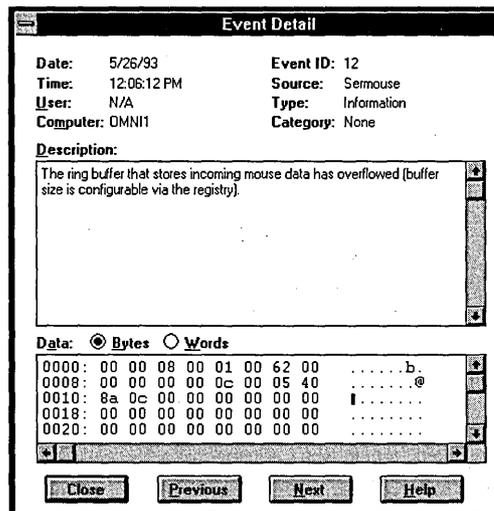


- ❑ The Source gives the name of the application software or system component that logged the event. In the illustration, for example, Print refers to Print Manager and Mouclass refers to the system component that monitors mouse actions.
- ❑ The Category tells you how the event is classified by the receiving software. Although all you see is None in the illustration above, categories can be highly descriptive. The security log, for example, shows categories such as Logon/Logoff and Object Access (for file and directory access).
- ❑ The Event shows the ID number used by the event-logging software to refer to each particular type of event.
- ❑ The User matches the name of the person (if applicable) involved in generating the event.

Taking a Closer Look

To get a closer look at an event in the Event Viewer window:

1. In the Event Viewer window, select the event you want to see.
2. Press Enter. (Or, if you prefer, choose Detail from the View menu.)



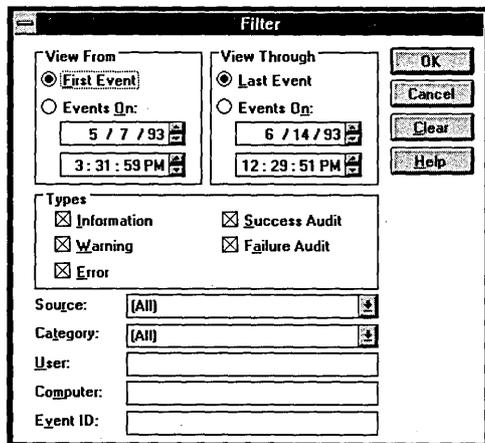


Some reports, including the one shown on the previous page, provide both a description of the event and hexadecimal (base-16) information, which can sometimes be useful if you are familiar with the program that generated the event.

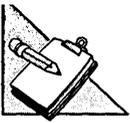
Filtering Events

As you can see from even a cursory look at your system log, events can pile up quickly, obscuring those of a particular type (such as print jobs) or those that occurred at a particular date and time (such as repeated, failed logon attempts). You can use Event Viewer to pinpoint clusters of events, or those that occur cyclically, by filtering the log to display only the events that interest you. To do this:

1. In the Event Viewer window, choose the log you want to filter—system, security, or application—from the Log menu.
2. Choose Filter Events from the View menu. The following dialog box appears.



Specify the time period you want to see in the View From and View Through group boxes. You can then specify the event type in the Types group box, but you might find this unnecessary because the choices you make next in the Source and Category drop-down list boxes automatically turn certain event types off or on. (The list of source programs and categories varies, as you would



expect, with the type of log you choose to filter.) You can refine the filter request further, if necessary, by limiting the search to a specific user, computername, and event ID. When you have set up the filter as you want it, click OK. In a few seconds, a list of events matching your specifications appears on screen. The following illustration, for example, shows the results of searching a security log for all guest logon activity between 8 A.M. and 6 P.M. on May 26, 1993.

Date	Time	Source	Category	Event	User	Computer
5/26/93	2:16:33 PM	Security	Logon/Logoff	528	Guest	OMN11
5/26/93	1:17:55 PM	Security	Logon/Logoff	528	Guest	OMN11
5/26/93	11:05:37 AM	Security	Logon/Logoff	528	Guest	OMN11

Searching for Events

The Find command on Event Viewer's View menu gives you another way to search a log. Although less useful than filtering by dates and times, Find is exactly what you need when you want to find a single needle in an event haystack. When you choose Find, the following dialog box appears.

Find

Types

Information Success Audit

Warning Failure Audit

Error

Source: [All]

Category: [All]

Event ID: []

Computer: []

User: []

Description: []

End Next

Cancel

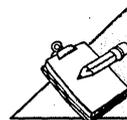
Clear

Help

Direction

Up

Down

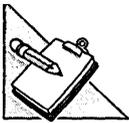


Most of this dialog box is similar to the Filter dialog box, but some elements are new:

- ❑ The Description box allows you to type a portion of the text description you see when you view the event details. If you specify text here, you can zero in on exactly the event or events you seek. However, the Find command does not search for hexadecimal data; you cannot type a set of hexadecimal numbers and expect Find to show you the event that produced those numbers in the Detail dialog box.
- ❑ The Clear button returns you to the default settings for the Find command.
- ❑ The Direction box lets you specify the direction of the search. If you neglect to specify a direction, don't worry. When Find reaches the end of the log, it displays a message asking if you want it to continue from the beginning. However, the Direction box can save you time by letting you search through the event log from the current position to the end (Down), or from the current position back to the beginning (Up).
- ❑ The Find Next button is the Find command's version of OK, meaning "go and do it." The first time you use Find, you might assume that the dialog box will remain on screen so that you can click Find Next again if the Find command locates the wrong event among several similar or identical events. Not so. The dialog box disappears when you click Find Next, but you can repeat the search from the keyboard. Press F5 to repeat the search until you find the event you want.

Managing Logs

Beauty is said to be in the eye of the beholder. So too is the importance of a Windows NT log. If you work in a security-conscious environment, or one in which users freely access resources on each other's machines, you'll find the event logs useful in helping you keep track of who, what, when, and where. If you don't care about such details, the system log will probably be of little interest to you, but the security log can still be helpful in letting you see how shared resources are being used, and the application log can



give you insight into how application programs are working. Although applications must be designed to record their “thoughts” in the application log, those that do provide an obvious benefit—to you, your technical support person, and even the developer—by profiling their behavior in the log.

If your computer is set up to share files or a printer with other users, checking the system log for print jobs and the security log for logon/logoff access will give you a feel for how and when your computer’s resources are being used. Although the information might simply make you feel more in control of your system, you might also find patterns that help you determine better ways to manage it. Bear in mind, however, that to view the security log, you must log on as a member of the Administrators group.

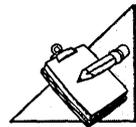


WINDOWS TIP: If you install Windows NT over an existing version of Microsoft Windows, at some point you might be greeted at startup with a message telling you that the system log is full. If this happens, you can restore peace and serenity by optionally saving the log and its contents and then choosing the Clear All Events command from Event Viewer’s Log menu, or by increasing the log size. These options are described in the following sections.

Saving a Log

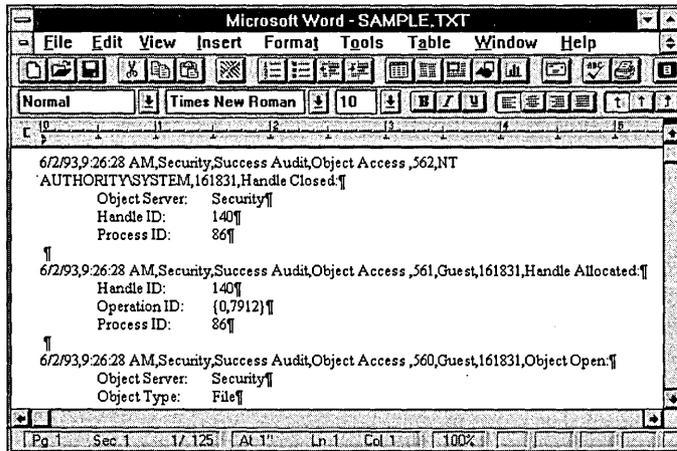
You can save the events recorded in your logs for historical purposes, for comparison over time, or to document or analyze system use. To save a log file, choose the Save As command from Event Viewer’s Log menu. This command is similar to other Windows NT applications and utilities except for the Save File as Type list box, where you choose the format in which to save the log. You can save a log in one of two formats:

- ▣ If you choose log-file format, the information is saved in a file with the extension EVT. You can later view the file in Event Viewer, where it looks just like any current event log.
- ▣ If you choose text-file format, the information is saved in a file with the extension TXT, in either of two forms: as a “normal” text



document of the type you load into a word processor, or as a comma-delimited text file of the type you load into a field-oriented application such as a spreadsheet or a database.

The following illustration shows part of a security log saved in text format after being loaded into Microsoft Word for Windows.

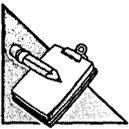


NOTE: Saving can take a fair amount of time. You'll also notice a lot of disk activity as the save progresses. It's normal. Event logs, especially full ones, can also take a considerable amount of disk space. Because they include binary data, the logs you save as EVT files are the largest. TXT files, however, are not that far behind. Either type of file can require 100 KB or more of disk storage, so you might want to consider either saving your logs on floppy disk or saving them temporarily on the hard disk and then transferring them to floppies or tape until they are needed.

Clearing a Log

The opposite of saving a log is clearing one, meaning erasing all events currently recorded in the log. To clear a log:

1. In the Event Viewer window, display the log you want by choosing it from the Log menu.
2. Choose the Clear All Events command, again from the Log menu.

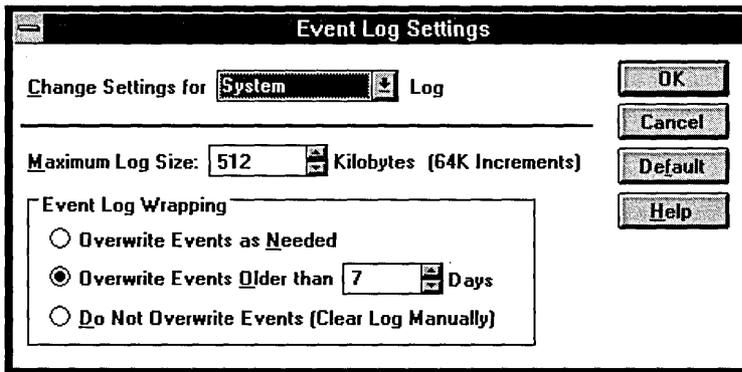


PART 5: Maintaining Your System

You can clear a log whether or not you save it first. Like any good operating system, however, Windows NT is cautious and protective of your well-being. It always assumes that you really, really want the information and so it will not clear a log without first prompting, "Do you want to save this event log before clearing it?" You see this message even if you saved the log a few seconds before.

Modifying Settings

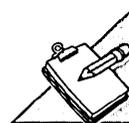
By default, the system, security, and application logs all hold 512 KB of information (quite a lot). If the log becomes full, another default tells Windows NT to begin overwriting the oldest information, but only if it is at least seven days old. You can adjust either or both of these default settings with the Log Settings command on Event Viewer's Log menu. When you choose Log Settings, the following dialog box appears.



The Default button on the right side returns the log you choose to the default settings described earlier.

To change the default settings:

1. Select the log you want from the drop-down list box at the top of the dialog box.
2. Specify the new size of the log in the Maximum Log Size box.
3. In the Event Log Wrapping group box, choose the option you want to use when the log reaches its maximum size and Windows NT must begin clearing away old entries. From top to bottom, the list represents successively more conservative options. The last option,



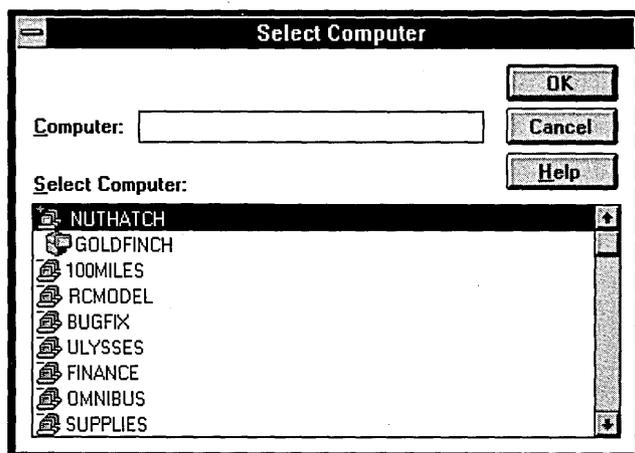
which requires you to clear the log manually, means that when the log is full, the system stops until you clear the log. This option ensures that no event records are ever lost, but it also involves a significant tradeoff: extra work, down time, and possibly lost data in exchange for the highest level of security auditing.

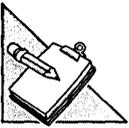
NOTE: If you specify a log size smaller than the size of the current log, Windows NT displays an additional dialog box telling you that you must clear the log before the new size takes effect. This extra step prevents you from destroying existing records by inadvertently making the log too small to hold all of the currently recorded events.

Monitoring Other Computers

In this section we will assume that you're in charge of the computer at the hub of a domain or workgroup, and that it's your responsibility to ensure that all computers, especially the server, are functioning well. You have Administrator privileges, and are in charge of tracking down unexpected system, security, and application-related events. These should be the only reasons you monitor a computer used by someone else. After all, anything else would be snooping.

Given these high moral standards, how do you find out what's happening on another computer? You use the Select Computer command on Event Viewer's Log menu, which produces the following dialog box.





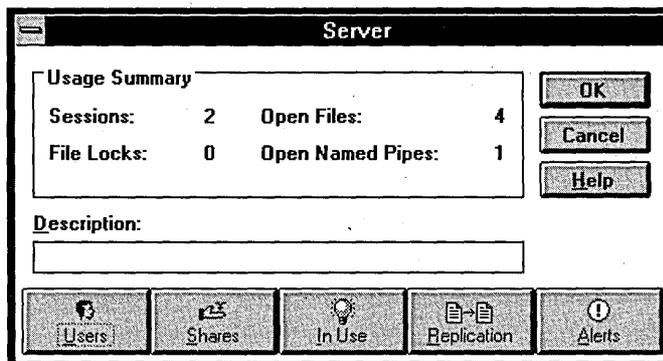
You can choose between typing the name of the computer—not the user—that you want to monitor, or you can choose the computer name from the list box that fills the bottom part of the dialog box. If you type the computer name, you must precede the name with two backslashes, like this: \\OMNII.

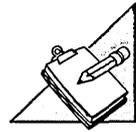
NOTE: You can monitor any of the following computers: a Windows NT workstation, a Windows NT Advanced Server station, or a LAN Manager 2.x server. You must, however, log on as a member of the Administrators group.

Monitoring System Use with Server

If you regularly share files and other resources with other users, Server provides you with some of the most interesting and useful information about your computer. Although you share files and directories with File Manager's Share As command, and share and control printers with Print Manager, you monitor and control user access to your computer with Server.

Server on a Windows NT workstation is a smaller version of Server Manager provided with Windows NT Advanced Server. Server is less comprehensive than Server Manager, but it is fully capable of helping you monitor your computer's use as a server. Unlike Event Viewer and Performance Monitor (which are also described in this chapter), Server starts from Control Panel in the Main program group. When you double-click the Server icon, the following dialog box appears.





Notice that Server, like most Control Panel applets, is a look-and-leave program: You use it, and then you close it. Server has no minimize and maximize/restore buttons.

After you start Server, you can use it to check on:

- ❑ Who is connected to your computer
- ❑ Which resources have been made available for sharing
- ❑ Which resources are in use, and by whom
- ❑ Which directories can be replicated (duplicated) on your computer
- ❑ Who receives administrative alerts—notices of problems related to security, resource availability, and access

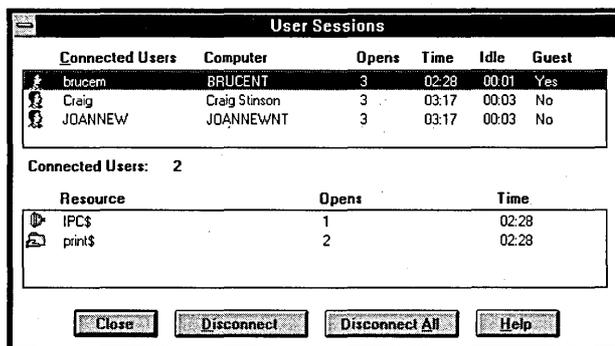


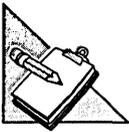
WINDOWS TIP: Server is the graphics-based equivalent (and more) of the command prompt Net Session and Net Statistics commands. If you prefer to do your monitoring from the command prompt, see “Checking from the Command Prompt,” page 733.

Monitoring Users

With Server, you can see who is currently using which resources on your computer, as well as how long the person has been logged on and how much time has passed since the user last initiated an action. To do this:

1. Click Users in the Server dialog box to display this dialog box:

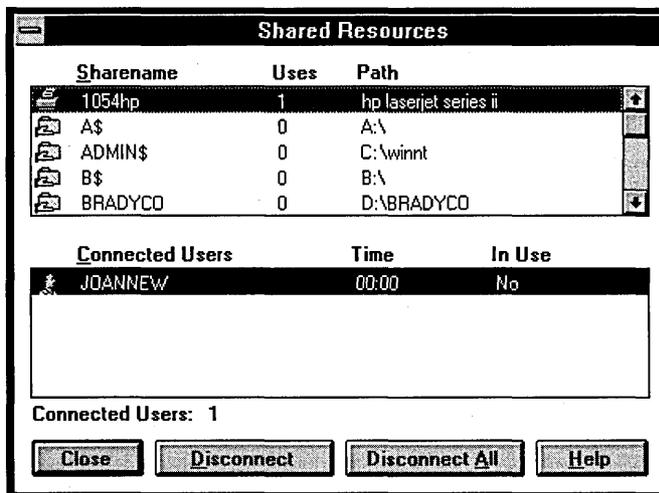




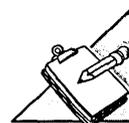
2. When you click the name of a user, the lower part of the dialog box shows the resources the selected person is using, the number of times each resource (such as a file) has been opened, and the amount of time the resource has been open.
3. Use the Disconnect button to disconnect the selected user; use the Disconnect All button to disconnect everyone. However, don't disconnect anyone without letting the person know what you intend to do. For information about sending alerts to users connected to your system, see "Sending Alerts," page 732, and "Making Your Intentions Clear," page 737.

Monitoring Shared Resources

Server's Shares button shows you pretty much the same information as the Users button, but from a different perspective. When you click the Shares button, you see a dialog box like this:



Here, the top of the dialog box lists the shared resources on your computer. The Uses column tells how many people have connected to the resource. The Path column gives the name, such as *hp laserjet series ii*, or the directory path of the resource.

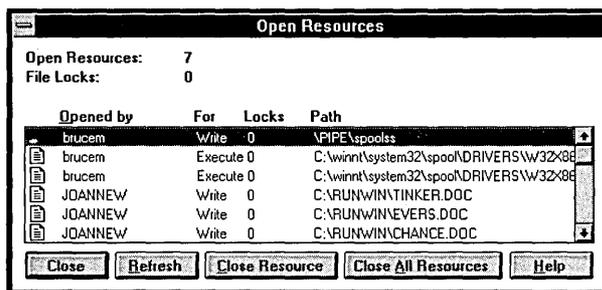


To see who is using a particular resource, click to select it. The lower portion of the dialog box will list the people using the resource, including the amount of time each has been connected and whether the person currently has the resource open.

As in the User Sessions dialog box, you can use the Disconnect and Disconnect All buttons to kick users off the computer, either individually or as a group. But remember to be polite when disconnecting people. For information about sending alerts to users connected to your system, see “Sending Alerts,” page 732, and “Making Your Intentions Clear,” page 737.

Controlling Resource Use

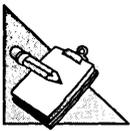
When you want to see exactly who is doing what and where, you use Server's In Use button. Clicking it produces the following dialog box.



This dialog box lists each open resource, the name of the connected user, the type of permission held by the user, the number of locks on the resource, and the path to the resource.

This dialog box offers several buttons:

- ❑ Refresh tells Windows NT to check for open resources and update the displayed list. The resource list is static, so the Refresh button is helpful if you've left the dialog box open and unused for awhile or if people are connecting and disconnecting to your computer like partners in a square dance.
- ❑ Close Resource closes the selected resource. Be careful. Closing a resource is like disconnecting a user.



- Close All Resources shuts off access to all shared resources on the system, leaving currently connected users in the lurch. Remember to send a message before closing one or all resources on your system—unless no one is connected. For information about sending alerts to users connected to your system, see “Sending Alerts,” page 732, and “Making Your Intentions Clear,” page 737.

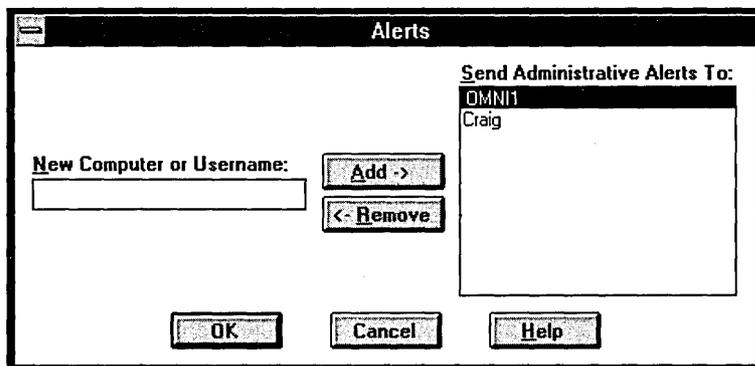
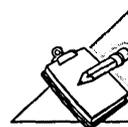
Replicating Directories

Although this feature is not directly connected to monitoring server use, Server also provides support for the replication of directories. That is, a directory and its files can reside and be modified on a server (always a Windows NT Advanced Server machine) but they can be duplicated on Windows NT workstations. When directories are replicated, any changes to the “master” copy are transferred to all workstations on which duplicates reside. Replication is thus a means of centralizing file and directory management, yet ensuring that accurate copies exist wherever they are needed. Directory replication can be enabled only on a server running Windows NT Advanced Server (the export machine). If you are running the desktop version of Windows NT—not Advanced Server—you can import replicated directories, but you cannot make them available for export.

Sending Alerts

The next section in this chapter describes how to use the Net Send command from a command prompt to send warning messages to users connected to your system. Windows NT supports another type of warning as well, known as an administrative alert. These alerts are generated by Windows NT under circumstances that can affect the use of a server or its resources—circumstances related to security, user access, and user sessions, as well as physical events such as available space on a disk becoming scarce.

With Server, you can control which computers and users are sent administrative alerts. To do this, click the Alerts button in the Server dialog box. When you do, the following dialog box opens.

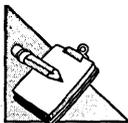


- ❑ To add a computer or a user to the alert list, type either the computer name (for example, \\OMNI1) or the username (for example, CRAIG) in the New Computer or Username text box and click the Add button.
- ❑ To remove a computer or a user, select the computer name or username in the Send Administrative Alerts To list box and click the Remove button.

NOTE: In order for your computer to send alerts, both the Alert and Messenger services must be running. In order for a computer to receive alerts, the Messenger service must be running on it. To check on or start either of these services, use Control Panel's Services applet. Highlight the service you want and click the Start button to turn on the service. Note that many services are turned on automatically at startup.

Checking from the Command Prompt

If you're a longtime user of MS-DOS or UNIX, you might be more comfortable working with a command-line interface. Windows NT includes a number of network commands you can use from the traditional MS-DOS command prompt. For more information about working from the command prompt, see Chapter 18, "Working from the Command Prompt," page 573.



To get to the command prompt:

1. Open Program Manager.
2. Double-click the Command Prompt icon.

When the command prompt appears, you can use the following commands to check on how your computer is being used:

- ▣ *Net Session*. This command tells you who is currently connected to your computer and, optionally, lets you end the sessions of any or all connected users. The Net Session command takes the form:

```
net session [\\computername] [/delete]
```

where *computername* is, optionally, the name of the computer you want to check on, and /DELETE ends the connection to *computername* and closes all open files. If you omit *computername* and /DELETE, the command reports on the local computer (presumably yours). If you omit *computername* but include /DELETE, the command ends the sessions of all connected computers. The Net Session command produces a report like this:

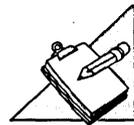
Computer	User name	Client Type	Opens	Idle Time

\\CRAIGS	CRAIGS	DOS LM 2.0	1	00:00:58
\\JOANNEW	JOANNEW	NT	3	00:01:56
\\BRUCENT	brucem	NT	3	00:02:10

The command completed successfully.

Net Session is a quick and easy way to see if anyone is connected to your computer. It is especially useful if your computer is acting as a server and you plan to make the computer unavailable.

NOTE: Always send a warning to connected users telling them that you're going to disconnect them or shut down. Use the Net Session command to check on who, if anyone, is connected. To send the warning, use the Net Send command described in "Making Your Intentions Clear," page 737.



- *Net Statistics Workstation.* This is one of two forms in which you use the Net Statistics command. (The other is described next.) The command has a simple form:

```
net statistics workstation
```

which you can abbreviate as *net stats workstation*. This form of the command tells you how your computer is performing as a workstation on the network with a report like the following:

```
Workstation Statistics for \\YOSEMITE
```

```
Statistics since 8/28/93 10:11AM
```

Bytes received	979315443
Server Message Blocks (SMBs) received	10279145
Bytes transmitted	1079297331
Server Message Blocks (SMBs) transmitted	10279319
Read operations	1056
Write operations	5203
Raw reads denied	0
Raw writes denied	0
Network errors	0
Connections made	66
Reconnections made	0
Server disconnects	26
Sessions started	73
Hung sessions	0
Failed sessions	0
Failed operations	0
Use count	10267750
Failed use count	8

The command completed successfully.

- *Net Statistics Server.* This is the second form of the Net Statistics command. Again, the form is simple:

```
net statistics server
```



PART 5: Maintaining Your System

and again you can abbreviate *statistics* as *stats*. This form of the command tells you how your computer is being used as a server for other computers. This command produces a report like the following:

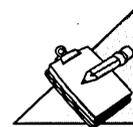
Server Statistics for \\YOSEMITE

Statistics since 8/28/93 10:11AM

Sessions accepted	0
Sessions timed-out	12
Sessions errored-out	2
Kilobytes sent	2357
Kilobytes received	2369
Mean response time (msec)	719
System errors	0
Permission violations	0
Password violations	13
Files accessed	1028
Communication devices accessed	0
Print jobs spooled	0
Times buffers exhausted	
Big buffers	0
Request buffers	0

The command completed successfully.

The Net Statistics commands are useful tools for recording system use and performance over time. They help you evaluate how your computer is being used and whether you need to make changes—such as adjusting schedules so that people access often-used directories or files at different



times of the day or, perhaps, limiting printer use to certain groups or certain hours (although, as you'll see later in this chapter, Performance Monitor is a better tool for these tasks).

To record statistics, use output redirection to send the report to a text file as follows:

- ▣ To keep each set of statistics in its own file, use the following command, replacing *filename* with your own filename, such as Workstation-stats1 or Server-stats1 or (if you're working from a FAT volume) WKSTN-1 or SVR-1:

```
net stats workstation > filename
```

or:

```
net stats server > filename
```

- ▣ To append statistics to a single file, use the double redirection symbol >> as follows:

```
net stats workstation >> filename
```

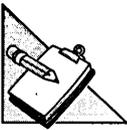
or:

```
net stats server >> filename
```

Making Your Intentions Clear

When you work on a single-user system, you give no thought to booting the computer and later turning it off at will. When your computer participates in a network with Windows NT, however, these simple acts require a little more reflection on your part. Remember that when you share files or other resources on your computer, you are responsible not only for letting people use the resources, but also for ensuring that they do not lose data.

To avoid both data loss and the specter of irate colleagues who you've unceremoniously bumped off the computer, make a habit of notifying everyone connected to your computer before you shut down, close resources, or disconnect users. (Note that this does not include logging off. You can safely log off your machine without affecting connected users.)



To warn others of an impending shutdown:

1. Double-click Command Prompt in the Program Manager group.
2. Use the following form of the Net Send command:

```
net send /users [message]
```

The /USERS portion of the command ensures that the message reaches all users connected to your machine. Replace *message* with whatever message you want to send. For example:

```
C:\>net send /users Shutdown in 10 minutes; get ready.
```

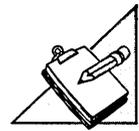
NOTE: The Windows NT Messenger service must be running for a computer to receive messages and alerts sent out over the network. To check or turn on the Messenger service, use Control Panel's Services applet. If you are administering a shared computer, be sure that your users know about this service. If you are using resources on a shared computer, check your own system to be sure that the Messenger service is turned on.

Monitoring System Efficiency with Performance Monitor

As its name implies, Performance Monitor helps you see how efficiently a computer is working. Performance Monitor is a diagnostic tool that can help you:

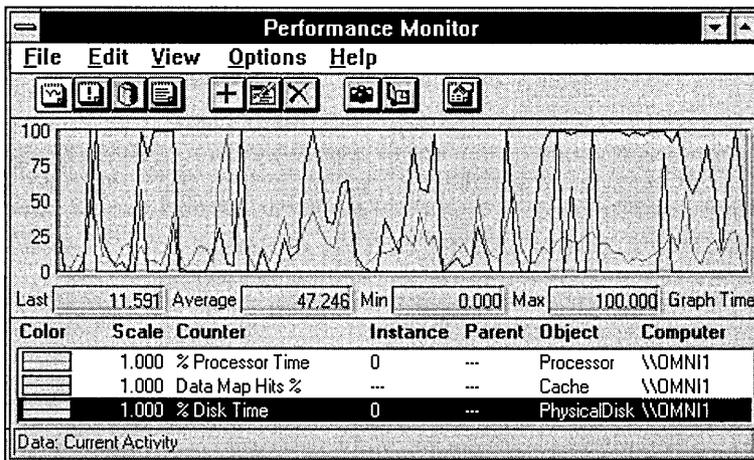
- ▣ Establish baseline performance values for any network computer running Windows NT.
- ▣ Save and compare performance values taken at different times so you can see whether, and in what way, a computer's response degrades as new or increased demands are made on it.

When you use Performance Monitor, you specify one or more activities that you want to track. What exactly does Performance Monitor track? Everything from relatively mundane but critical activities, such as processor time and disk access, to far more exotic beasts, such as the number of



nonpaging read bytes per second handled by the network redirector, or the number of times per second Windows NT switches from one program thread (portion of an application) to another.

Simple or exotic, the activities you choose to observe can be displayed by Performance Monitor in any of several ways, the most interesting being a “live” chart that constructs graphs resembling the output of a seismograph or, perhaps, a lie detector. Here, for example, is a chart showing processor time and disk activity on a computer with too little memory to run Windows NT adequately:



The frequent—and huge—spikes on the chart, show that Windows NT is accessing the disk almost constantly. Why? Because not a lot of information can be kept in memory at any one time. Therefore, Windows NT must resort to disk-based files as the processor (also quite lively in the illustration) works its magic on program instructions and data.

NOTE: This chapter is meant to introduce the main features of Performance Monitor and help you become comfortable with what it looks like and what it can do. To really put Performance Monitor through its paces, especially in monitoring network performance, you need more experience and a deeper understanding than this chapter can provide. If you are a network administrator or if you really want to know the ins and outs of Performance Monitor, a recommended source is



Optimizing Windows NT, by Russ Blake and edited by Chris Dragich. *Optimizing Windows NT* is volume 3 in the set of books collectively titled *Microsoft Windows NT Resource Kit*. It is written specifically for administrators, developers, and advanced users who need detailed information on maximizing Windows NT performance on the desktop or on a network.

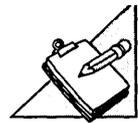
Objects and Counters

To understand how Performance Monitor keeps track of what's happening in the system, you must know what objects and counters are. Although the names are reminiscent of a child's game, objects and counters are, in fact, functionally closer to the dials and gauges in a car. They are ways of tagging and keeping track of all the activity that goes on "under the hood."

In Windows NT, an object is any portion of a computer's resources that can be assigned characteristics and manipulated as a single identifiable element. Windows NT "sees" a computer system, its programs, and its data files as a collection of manageable objects, each of a certain type with its own characteristics or attributes. So, for example, when Windows NT has to open a file, it handles the file as an instance of an object of the type *file*. When Windows NT is told to use the first serial port, it handles the port as an instance of an object of the type *port*.

What are counters? They are recorders that track various types of information about the objects they are assigned to. The processor, for example, is an object to Windows NT. With Performance Monitor, you can view the information gathered by a number of counters specific to the processor object. Each of these counters is descriptively named for you, and you can choose among them. There are, for instance, counters named % Processor Time, % User Time, and % Privileged Time. Each monitors a different phase of processor activity.

Now, on to Performance Monitor—a sophisticated and impressive tool that you might not expect if you're used to MS-DOS or Windows.



Starting Performance Monitor

Before you use Performance Monitor, you must do a little preparatory work. This involves starting the disk performance counters, which are turned off by default. You only have to do this once, but until you start these counters, you cannot use Performance Monitor to track physical and logical disk activity. To start the disk performance counters:

1. Log on as a member of the Administrators group.
2. Start a command prompt window and type:

```
C:\>diskperf \\computername
```

replacing *computername* with the name of the machine you want to monitor.

3. If the command reports that Disk Performance counters are not set to start when the system is booted, type the command:

```
C:\>diskperf -y \\computername
```

again replacing *computername* with the name of the computer—your own or another—whose disk performance you want to monitor.

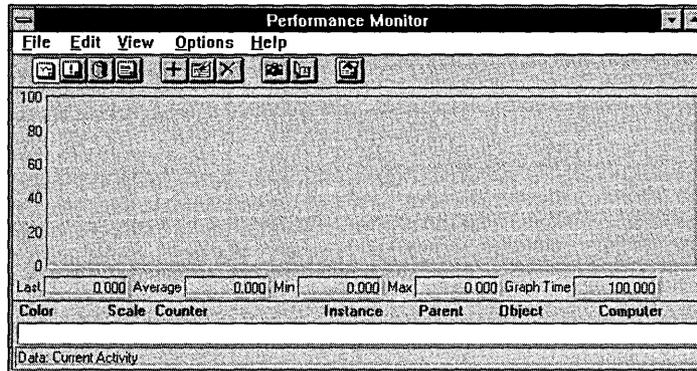
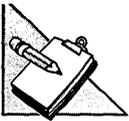
4. Reboot the computer you specified in order to start the counters.

After you've started the Disk Performance counters, you can open and work with Performance Monitor without logging on as a member of the Administrators group:

1. Open the Administrative Tools program group.
2. Double-click the Performance Monitor icon.

Charting Performance

When you start Performance Monitor, the first thing you see is a singularly unimpressive blank window, as shown on the next page. This is Performance Monitor's charting window. You can also look at performance data from other points of view, but charting is the default, so it's a good place to get started.

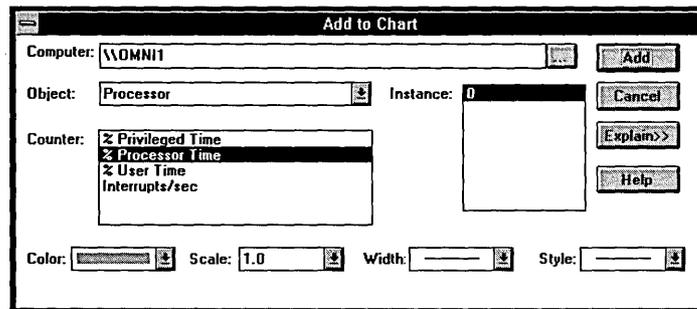


The window is blank at first because Performance Monitor needs you to tell it what objects to chart.

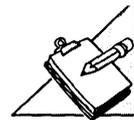
Choosing Objects to Chart

Performance Monitor is capable of tracking a large number of objects. Some, as already mentioned, are quite exotic. Others, which you'll see here, are easier to understand. To choose one or more objects to chart:

1. Open the Edit menu and choose Add To Chart. The following dialog box appears.

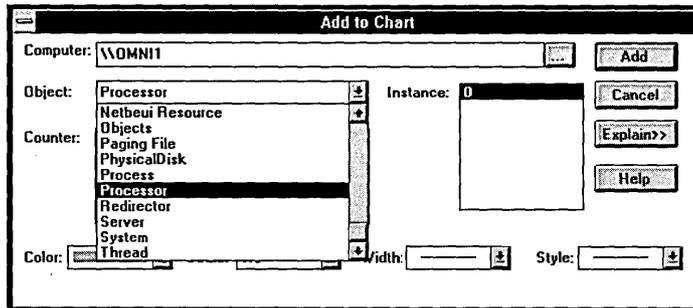


Performance Monitor allows you to choose the computer you want to monitor. Your own computer is shown by default, but you can either type another computer name or click the button with the ellipsis (...) to see a list of eligible candidates. Surprisingly, you



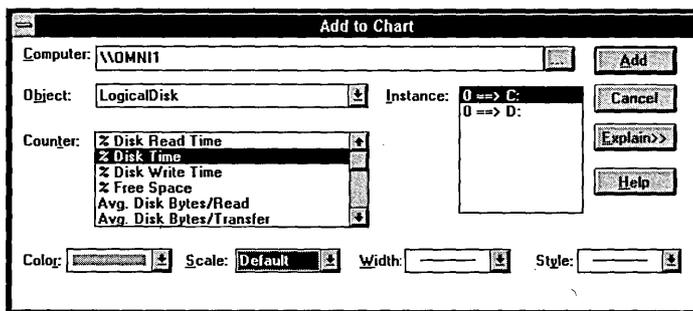
don't have to log on as a member of the Administrators group to monitor another computer (although you need network access). You should, however, notify the owner of the other computer.

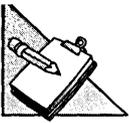
- Use the Object list box to select the object or objects to monitor. In the Object drop-down list box, Processor is selected by default, but you can click the down arrow to see a list of other objects.



If you scroll through the list, you'll notice objects ranging from the cache, memory, and logical and physical disks to processes, the server, and program threads. If you're experimenting with Performance Monitor, some useful choices are: LogicalDisk, Memory, System, NetBEUI (or the network protocol you are using), and, of course, Processor.

- Next, turn your attention to the Counter list box to specify the type of activity that interests you. The list changes with the type of object chosen. Here, for example, is the list you see when you choose LogicalDisk:





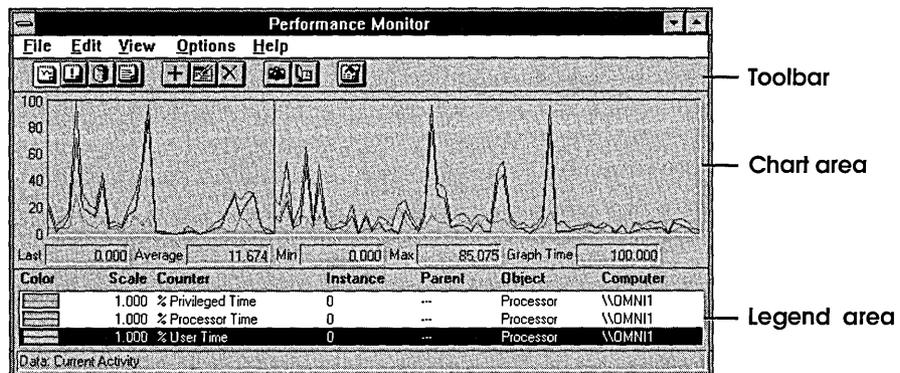
% Disk Time is selected by default, and the Instance list box to the right shows two items, drive C and drive D. When you choose an object or a counter that applies to more than one active element (instance of that object) on your system, each element is listed separately in the Instance list box, so you can further refine your choice by specifying which particular instance you mean. In the illustration, for example, you could choose to monitor the % Disk Time for either drive C, drive D, or both.

If you don't understand what a particular counter is or does, select it and click the Explain button on the right side of the dialog box. A definition appears at the bottom of the dialog box.

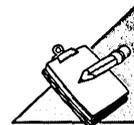
4. To add your selections to the chart, click Add. To signal that you're finished, click Done. The dialog box closes and a chart plotting the objects and counters you chose begins to appear.

A Closer Look at the Chart Window

Before you move on, take a quick look at the window elements that are labeled in the following illustration.



- ▣ The toolbar just below the menu bar contains a set of buttons that give you quick alternatives to choosing commands from the menus. To see what each button does, point to it and hold down the left (primary) mouse button. A short description of the button's function appears in the message bar at the bottom of the window. To



avoid clicking the button and thus carrying out its function, slide the mouse pointer off the button before releasing the mouse button.

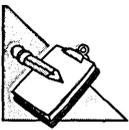
- The labeled boxes below the chart area display, in turn, the last, average, lowest, and highest values currently displayed in the chart for the object selected in the legend area (described next). The box labeled Graph Time at the far right shows the interval, in hundredths of seconds, between updates to the chart. The default interval, as shown in the illustration, is one second.



WINDOWS TIP: If you choose to monitor processes (which are active programs, roughly) with Performance Monitor, the Instance list box shows all active processes on the system. For an interesting look at your system, try the following:

1. Start Performance Monitor, choose Add To Chart from the Edit menu and choose Process from the Object drop-down list in the Add to Chart dialog box.
2. Verify that % Processor Time is selected in the Counter list box, and select both Idle and PERFMON in the Instance box. (Remember that to select more than one item, you select the first item, hold down Ctrl, and then scroll to and select the next item.)
3. Click Add, and then click Done.

The chart that appears shows the amount of time the processor spends idling and the amount of time it devotes to Performance Monitor. If your system is quiet, the idle line should be very high, while the Performance Monitor line is regular and quite low. To make a dent in the microprocessor's nap time, size the Performance Monitor window so that it occupies only part of the screen and then start another program, such as Event Viewer. Idle time will dip dramatically as the other program loads into memory.



- The legend area at the bottom of the window displays the names of the objects you chose to chart, along with the color, line style, and line weight (thickness) Performance Monitor uses for each.

The chart used in the illustration on page 744 monitors three activities related to the processor: % Privileged Time, % Processor Time, and % User Time. Privileged time is the amount of time the processor devotes to executing the programs that comprise Windows NT itself. Processor time is the amount of time the processor spends doing productive work. User time is the amount of time the processor spends executing such programs as applications, graphics and printer drivers, and the window manager. The three lines together show you how busy the processor is and how it is spending its time. To try this out for yourself, chart processor activity as you play a winning game of FreeCell. Do the following:

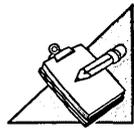
1. Resize the Performance Monitor window so it fits nicely in the lower right corner of the screen, pretty much out of the way of any cards you'll lay down in the area.
2. Open the Options menu and click Always On Top. That way, you'll be able to play the card game and see "live action" in the chart at the same time. (If your concentration suffers, you'll just have to play another game or two ... or three.)

Controlling What Is Displayed

When you view charts with Performance Monitor, you have several ways to control what you see and how the information is presented. As mentioned in the preceding section, you can select Always On Top to ensure that the Performance Monitor window is never obscured by another window, even when Performance Monitor is not the active program. You can also control the display of the menu bar and the title bar, the toolbar, and the status bar. (Bear in mind that these display options apply not only to the chart window, but to the other views described later as well.)

Select any of the following display options from the Options menu, or use the keyboard alternative shown in parentheses:

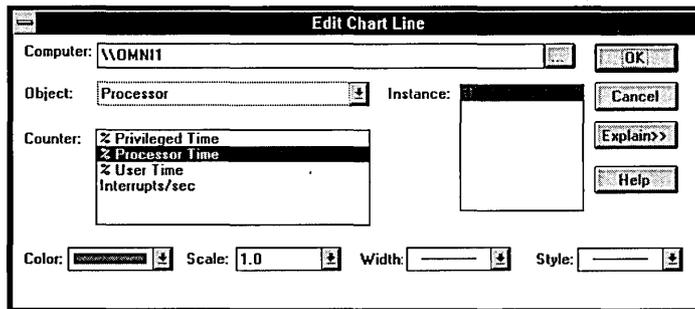
- Menu and Title (Ctrl+M)
- Toolbar (Ctrl+T)



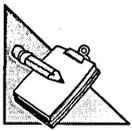
- ❑ Status Bar (Ctrl+S)
- ❑ Always On Top (Ctrl+P)

The following options apply to charts only. You can do any of the following:

- ❑ Start a new chart using the New Chart command on the Edit menu.
- ❑ Delete the object selected in the legend area using the Delete From Chart command on the Edit menu.
- ❑ Change the color, pattern, and width of any or all lines used in the chart. To adjust any of these items, either go to the legend area and double-click the item you want to change, or choose Edit Chart Line from the Edit menu. In either case, the following dialog box appears.

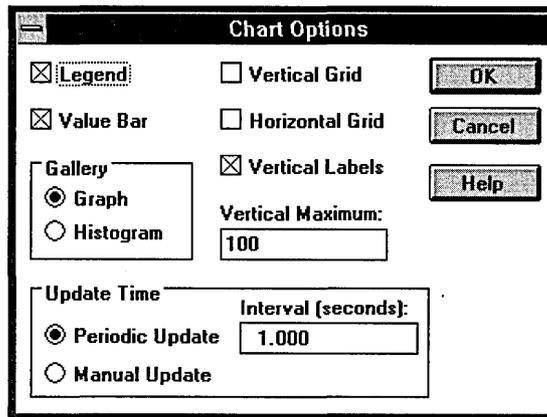


NOTE: Changing the scale means changing the relationship of the chart line to the (unscaled) vertical line of values at the left of the chart, thus moving the chart line up or down in the graph. Too drastic a change, however, can make the relationship of the chart line to the chart so different that the line itself becomes useless.

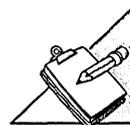


WINDOWS TIP: Use a heavier line for the most important object being monitored to emphasize that object and make it easy to pick out from two or more charted objects. Line width is more effective than line style (dotted, dashed, and so on) in emphasizing a chart line. (You can use styles only with the thinnest line.)

- ▣ Display gridlines, turn labels on or off, switch from a graph to a histogram, and adjust both the vertical maximum value and the update interval on the chart. To make any of these changes, choose Chart from the Options menu. This dialog box appears:



WINDOWS TIP: Turning on a vertical or horizontal grid makes a chart much easier to read. Changing the vertical maximum can help center chart lines. For example, if all the lines are near the top of the chart when the vertical maximum is 100, changing the vertical maximum to 200 centers the lines on the chart.



In the Update Time box, you can specify the intervals between updates or, if you prefer, specify Manual Update. If you choose Manual Update, the chart remains static until you either press Ctrl+U, choose Update Now from the Options menu, or click the Update Now toolbar button (which looks like a camera).

- Turn on chart highlighting so that the line representing the selected object is displayed in white. This option has no menu command; you turn it on and off by pressing Ctrl+H or the Backspace key.

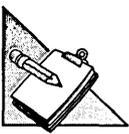
Printing Charts

When you chart object performance, you might assume that Windows NT records the data somewhere so you can review the information later. Well, Windows NT can record the data, but only if you enable Performance Monitor's ability to create logs, as described on page 751. A chart, unlike a log, lives very much in the present. You might even say that a chart gives a slightly different twist to the meaning of WYSIWYG. What you see on a chart is, indeed, what you get. But you get it here and now, not over yonder and later.

Does this focus on the present mean that you cannot save charted information? Not at all. You can save it in either of two ways: by taking snapshots of the screen whenever something significant occurs, or by exporting the chart data to a text file for "replay" in a word processor, spreadsheet, or database.

To take a picture of a chart, you essentially "dump" the screen image into a file using a procedure that produces an image very much like the illustrations you've seen throughout this book. Here's what to do:

1. If the chart you want is displayed in a window, press Alt+PrtSc to capture its image. If the chart is displayed full-screen, press PrtSc alone. Either of these keystrokes copies an image of the screen to the Clipboard.
2. Clipboard contents are temporary, so as soon as you've captured the image you want, minimize Performance Monitor and start Paintbrush.
3. When Paintbrush opens, choose Paste from the Edit menu to turn the image into a Paintbrush bit map. Don't move the window or



click the mouse just yet. Doing so will “paste down” the image into the Paintbrush drawing area, and if you’ve got a partial-screen image, you don’t necessarily want that to happen.

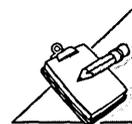
4. The next step depends on what you want to do:
 - ❑ To print either a full-screen or a partial-screen image, choose Print from the File menu.
 - ❑ To save a full-screen image, choose Save As from the File menu.
 - ❑ To save a partial-screen image, choose Copy To from the Edit menu and assign the image a name when the Copy To dialog box appears. Why save the image this way instead of using Save As? Because using Copy To can conserve a considerable amount of disk space. Copy To saves only the selected image (the portion surrounded by a dotted line when you Paste); Save As saves the entire Paintbrush image area. The savings, on disk, can be a matter of 100 KB or more.

Exporting Charts

When you export chart data to a file, you export its data to a text file in which values can be separated either by commas or by tabs. Exporting a chart does not, therefore, mean that you send a picture of it to another program, such as Microsoft Excel. What you do send the data which, if exported to a spreadsheet, can then be regraphed as a chart if the application is capable of doing so.

To export a chart:

1. Watch the chart. When the data you want to export is displayed, choose Export Chart from the File menu.
2. When the Export As dialog box (which is very much like a Save As dialog box) appears, assign a filename and specify the extension you want: CSV for a comma-separated format, or TSV for a tab-separated format.
3. Click OK.



The View Through Other Windows

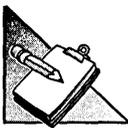
Performance Monitor provides four views: charts, log, report, and alert. Of the four, charting provides the most colorful and easily interpreted data for most people, but for the character-based among us, the report view provides a neat, columnar alternative that displays values as numbers rather than as up-and-down lines on a graph. Logging, in contrast to both charting and reporting, takes the long view, recording object behavior for as long as you want, whenever you want, and enabling you to save that data for later review and analysis. Alert view, the most specialized, acts like a system smoke detector by notifying you every time the behavior of a monitored counter goes above or below a value you specify.

Logs

By far the most useful of the four views, logging is the way to create a historical performance record for a computer or network you are monitoring. By logging activity over time you can, for example, establish a baseline for the system and determine when and where performance bottlenecks occur. Or you can monitor system performance before and after a significant change, such as a hardware upgrade or a reassignment of files, directories, or users to other machines in an attempt to ease the load on a busy server.

When you log object behavior, Performance Monitor stores the information you request in a file with the default extension LOG. The file contains not only the objects you specify, but the data collected for each object counter, at the intervals you request and for the length of time you keep the log active. After you've created a log, you can later retrieve it from disk and—this is important—replay the information it contains, in any view you choose: chart, alert, log, or report. You can even focus on the specific segment of time that interests you.

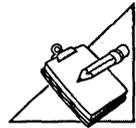
Not surprisingly, performance logs, like event logs, can grow quickly and can take up a surprising amount of disk space. Choosing to log active processes, for example, at the default time interval of 15 seconds, can build a 100 KB file in almost no time. The moral of the story: Plan ahead. Give some thought to which object or objects are most appropriate to the task, and consider experimenting with charting or reporting before logging, so you can decide on a time interval that gives you a sufficient but not overwhelming amount of data for analysis.



Extensions and Then Some

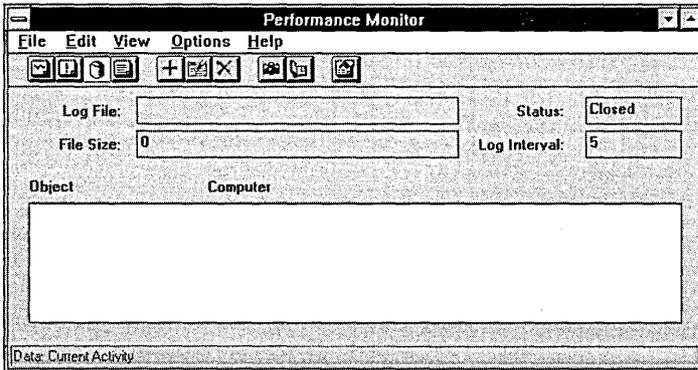
As you'll see at the end of the chapter in the section titled "Reusing View Settings and Your Workspace," Performance Monitor saves not only log data, but window and workspace settings as well. In addition, this versatile program can export the data in the current window to a text file for use with a word processor or a spreadsheet. To distinguish between different views and export types, Performance Monitor uses a number of extensions. When you first start using Performance Monitor logs, these extensions can be confusing because the File Open command lists files with one extension, the Export command lists files with another extension, and the Options Log command lists files with yet a third extension. None of these are required or enforced; they are conventions that can help you organize your work. To help you get your bearings, the following list gathers all of these extensions into one place for easy reference:

- LOG files contain the data you collect. When you create a LOG file, you can replay the information in it.
- PMC files store the settings you use in creating a chart. These are settings only, not data.
- PML files store the settings you use in creating a log. Note that these settings represent the objects and counters you monitor, not the data gathered for them in a LOG file.
- PMR files store the settings you use in creating a report. Again, these are settings, not data.
- PMA files store the settings you want used for creating alerts. Once again, these are settings, not data.
- PMW files store the information needed to re-create your entire workspace, meaning all open Performance Monitor windows (views) and their associated settings.
- CSV and TSV files contain the data from the current window exported as a text file in either comma-separated (CSV) or tab-separated (TSV) format. Note that exporting to either of these file types from log view exports displayed information, not the entire contents of the log file.



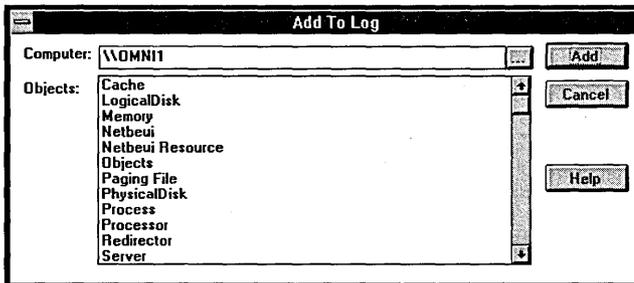
Starting and Stopping a Log

To start a log, you begin by choosing Log from the View menu. When you do this, a new Performance Monitor window opens:



Just as when you choose chart view, the window appears empty. The status bar tells you that the log is expecting to monitor current activity, but the Status text box at the top of the window tells you that the log is closed. You must open the log and add some objects to it:

1. In the Performance Monitor window, choose Add To Log from the Edit menu. A simple dialog box appears, showing the name of your local computer by default and listing all of the objects that Performance Monitor is capable of tracking:



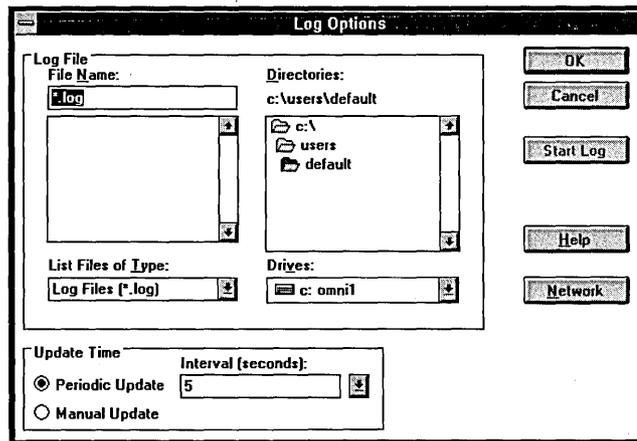


PART 5: Maintaining Your System

Choose the computer to monitor from the Computer list box. Choose the object(s) to monitor from the list in the Objects box, click Add to add the selected object(s), and click Done to signal that you're through.

Notice that the Add To Log dialog box does not include a list of counters like those in the Add to Chart dialog box. There's a reason for this: When you add an object to the log, you don't add one, two, or three counters for that object. You add every single one. In this respect, creating a log is like marrying into a large family: Pick one, and you get 'em all.

2. After you've told Performance Monitor what to log, you can start the process. Choose Log from the Options menu. This dialog box appears:



If you don't want to change the name of the log file or set a different update interval, all you do is click the Start Log button on the right of the dialog box. (If you choose an existing log file, the new data will be appended to it.) If you want to assign your own filename (such as a combination of date and object name, or date and computername), don't forget to include the LOG extension; Performance Monitor does not automatically add the extension for you. (On the other hand, it's not really necessary, so do as you like.)



Specify a different time interval if you want, and then, as already mentioned, click Start Log to set the ball rolling. That's it until you want to stop logging.

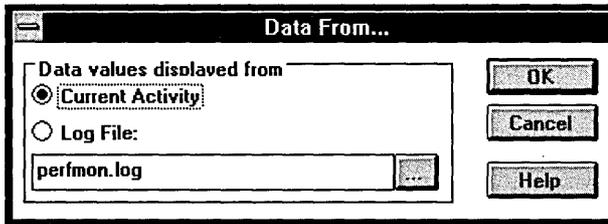
3. When you want to stop recording data, choose Log from the Options menu again and click the Stop Log button. (If you did not assign a filename earlier, you can do so now.)

That's it. Now, how do you take a look at what you've got?

Viewing a Log

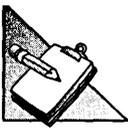
Opening and viewing a recorded log is not the most intuitive procedure in the world for two main reasons: First, you don't use the File Open command as you might expect; second, the mere act of opening a log doesn't display its contents. This is how you go about viewing a log:

1. In the Performance Monitor window, choose Data From from the Options menu. This dialog box appears:

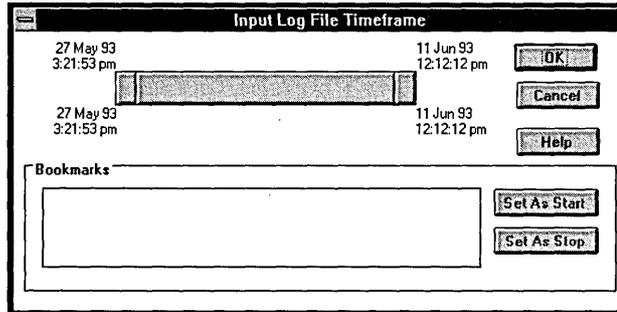


Open the list box, and choose the log you want to view from the Open Input Log File dialog box that appears. Click OK. At this point, your screen remains stubbornly blank, but the status bar at the bottom displays a message such as "Data: important.log," telling you that any data you choose to view will be taken from your log file.

2. Now choose the view you want from the View menu. Once you've recorded a log, you can view it in the chart, alert, or record window, or you can even use the log window if you want to relog information—for example, for a smaller or larger time interval.



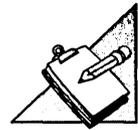
3. Next, choose the Time Window command from the Edit menu. This dialog box appears:



The Time Window command lets you display log entries for a specified time period. To indicate starting and stopping times, use the sliding bar at the top of the dialog box. (The light portion represents the period to be displayed; the dark color uncovered by the light bar represents the period that won't be displayed.)

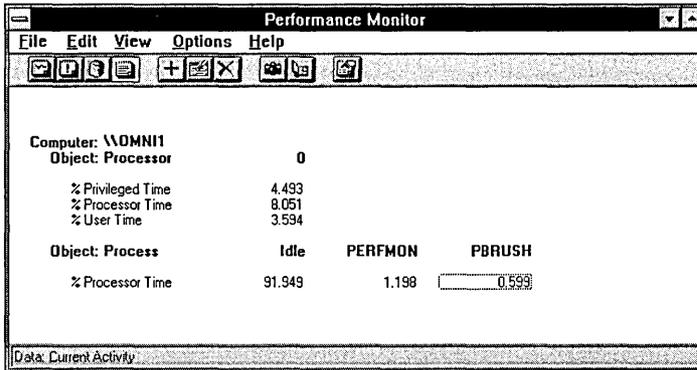
4. Finally, to display the data itself, choose Add To from the Edit menu for the view you've selected. The Add To dialog box appears, but as you can see by opening the Object drop-down list box, when you view a log, the list contains only the names of the object or objects recorded in the log. For example, if you logged only processor, memory, cache, and physical disk activity, these are the only objects you see listed.

Choose the object for which you want to view log data and click Add. Next, choose the counters and, if appropriate, the instances that interest you. Do the same for every object and counter you want to view, and click Done when you finish. There's your log.



Reports

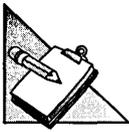
A Performance Monitor report is basically a chart in text form, like this:



Although you can't see it happening in the illustration, the report displays constantly changing values for the objects and counters you choose to monitor. Creating a report is almost the same as creating a chart:

1. In the Performance Monitor window, choose Report from the View menu.
2. Choose Add To Report from the Edit menu.
3. Choose the objects and counters you want to monitor, click Add, and then click Done.

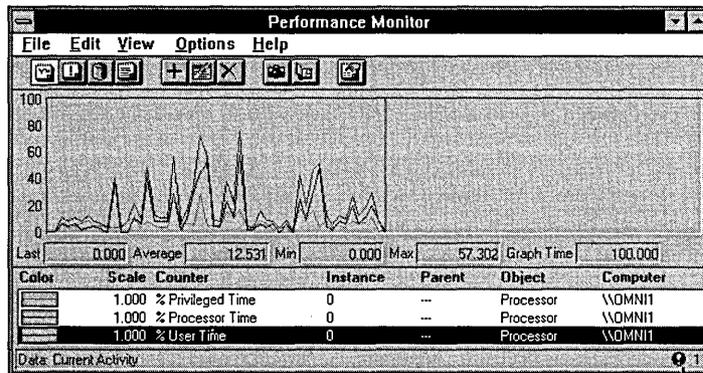
As mentioned in the preceding section, you can also choose to display a log in report format. To do that, follow the steps in "Viewing a Log," page 755, choosing report view from the View menu. Change the Time Window (the easiest way to do this is in chart view) to change the reported interval. You can also export a report to a comma-separated or a tab-separated text file with the Export command, as described in "Exporting Charts," page 750. Unlike a chart, however, an exported report contains only a single set of values—those displayed at the time the report is exported. To save a continuous set of values, export the data as a chart, or log the data and view it later in report view.



Alerts

Alerts are designed to help you determine when and where a noteworthy event has occurred. In Performance Monitor, you can use alerts to check the behavior of a specific counter at periodic intervals, and to determine whether its performance is above or below a certain value. For example, if your system doesn't seem to be working efficiently, you can use Performance Monitor alerts to find out when, say, memory pages/sec exceed 20 or physical disk activity exceeds 75(%) for sustained periods, or free disk space is running short.

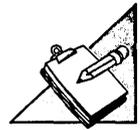
As you work with Performance Monitor, you are notified whenever an alert occurs. If you are working in the alert window, you see a report-like display that gives you the details, including time, date, alert value, and other essentials, of every instance in which Performance Monitor checks and finds that the counter value is above or below the value you specified. If you are working in a different view, you see a number accompanied by a red circle with an exclamation point at the right edge of the status bar whenever an alert is registered:



Alert symbol

To set up alerts, do the following:

1. In the Performance Monitor window, choose Alert from the View menu.
2. Choose Add To Alert from the Edit menu. Choose the object and counter that interests you in the resulting dialog box. In addition,



you must specify a value in the Alert If group box and click Over or Under so that Performance Monitor knows when an alert occurs. If you want, you can also use the Run Program on Alert group box to specify the name of a program that you want Performance Monitor to run, either the first time the alert occurs or every time it occurs. When you finish, click Done.

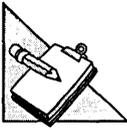
3. If you want to be switched into alert view whenever an alert occurs, or you want to send a network message or specify an update time other than the default five seconds, choose Alert from the Options menu and change the settings accordingly.

As is the case with charts and reports, you can export alerts to a comma-separated or a tab-separated file for work in a spreadsheet, database, or other application. Do this with the Export Alert command on the File menu, as described in “Exporting Charts,” page 750.

Reusing View Settings and Your Workspace

If you're establishing a baseline for measuring system performance, or if you need to check system use regularly at particular times of day, you need to be able to save and reuse Performance Monitor settings. You can save the settings for a single view, or for several views you've opened to monitor the behavior of the same or different objects. When you save settings, you not only save a record of the selected objects and counters, you also save the window's display options and size. You do not, however, save the data in the window. Remember: There's a difference between saving settings (the monitoring environment, so to speak) and saving data (your Performance Monitor logs). Forget this distinction and you might find yourself confused about whether to use the Open command on the File menu or the Data From command on the Options menu, as well as wondering why the Open command does not display the log you saved so carefully the last time you used Performance Monitor.

1. To save the settings of the current window, you use the File menu:
 - Choose Save (Chart, Report, Alert, or Log) Settings; if it's the first time you've saved settings, assign the settings a filename in the Save As dialog box that appears. Pay attention to the extension



PART 5: Maintaining Your System

you choose or type. Use PMC for a chart, PMR for a report, PMA for an alert, or PML for a log (log *settings*, that is, not the log itself).

- Choose Save to save the current settings under an existing name—for example, after you’ve edited previously saved settings.
- 2. To save workspace settings, use the Save Workspace command, also on the File menu. Assign a filename in the Save Workspace As dialog box that appears, and be sure to use the workspace extension, PMW. The Workspace saves its screen position as well as all settings.
- 3. To open a window or a workspace with previously saved settings, use the Open command on the File menu.

You’re in business.



WINDOWS TIP: To open settings for a single window in a particular view, choose the view you want before you choose Open from the File menu. That way, you don’t have to specify the file extension. By default, the File Open dialog box displays the names of files with the extension appropriate for the view you’re in—PMC for charts, PMR for reports, and so on.

Using the Windows NT Setup Program

- Using Setup and Its Relatives** 764
- Not to be confused with the full-scale Setup that installed Windows NT on your machine, this little icon in the Main program group is used to make adjustments to your system configuration.
- Changing System Settings** 766
- Use Setup to add a new video driver, mouse, or keyboard.
- Using Setup to Create Program Items** 769
- Here's where to shop for program items that launch applications on your hard drive. Select one or many from the list that Setup offers you.
- Removing Optional Components from Your System** 772
- You can clear out some of the optional Windows NT components that you never use. Later, if you change your mind, Setup will help you reinstall them.
- Adding and Removing SCSI Adapters and Tape Drives** 774
- Use the Drivers applet to tell your system that you've added one of these devices.

Deleting User Profiles

776

Windows NT can copy another person's user profile to your computer when he or she logs on temporarily. Use Setup to delete that profile once the person leaves.

A Note About Logging Off and Shutting Down

777

Turn to this section for a last bit of advice about exiting Setup.

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