User's Guide

IBM

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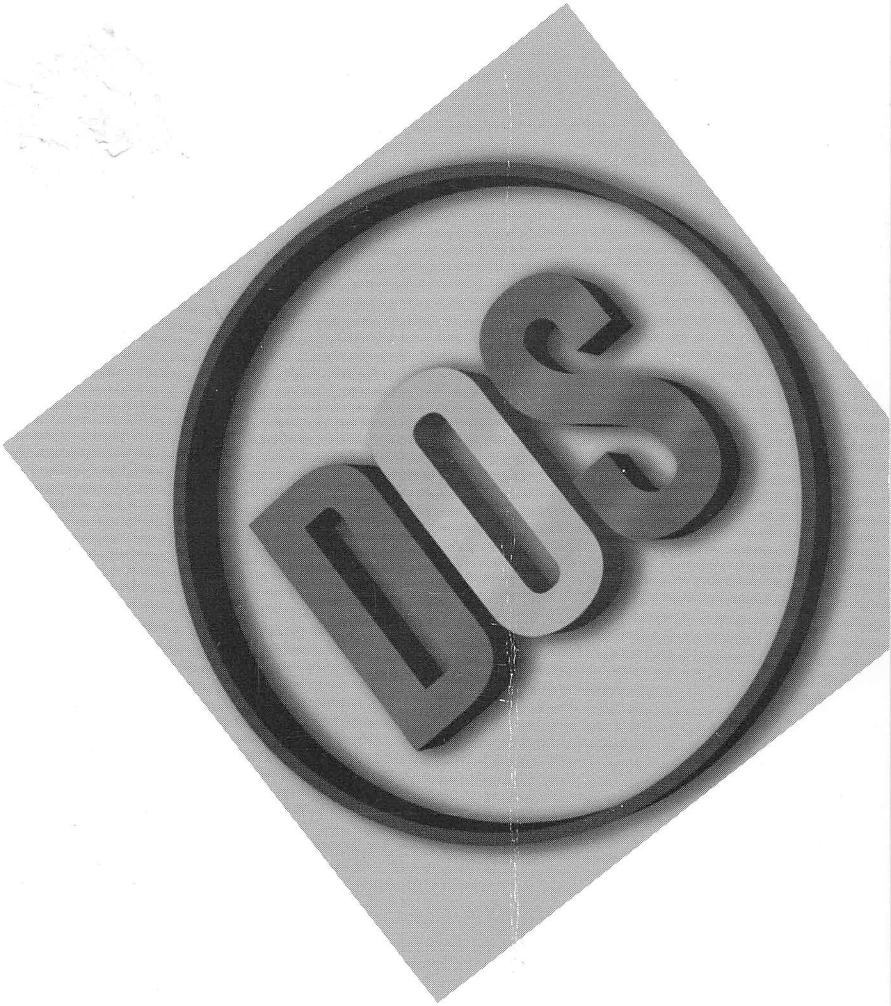

PC DOS 6.3

User's Guide

IBM

(RETAIL VERSION)

PC DOS 6.3

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Program Specifications

- PC DOS 6.3 provides user commands to perform the following functions:
  - Manage information by creating, assigning attributes to, copying, comparing, renaming, listing, printing, erasing, replacing, backing up, restoring, recovering files and rewriting fragmented files contiguously.
  - Manage directories by creating, removing, modifying, and displaying the structure of directories.
  - Format, unformat, copy, and compare diskettes.
  - Format and check status of a disk.
  - Perform system tasks, including:
    - Assign drives
    - Change the system code page
    - Clear the screen
    - Set the system time and date
  - Create a PC DOS 6.3 batch file to perform special or repetitive tasks.
  - Configure your system for multiple configurations.
- Memory Support:
  - PC DOS 6.3 will provide Expanded Memory Support (EMS) and Extended Memory Support (XMS). This support conforms to the Lotus**/Intel**/Microsoft** (LIM) 4.0 definition.
  - Memory optimization of available upper memory.
- Disk Cache:

  PC DOS 6.3 provides an improved hard disk caching program
- PC DOS 6.3 provides Anti-Virus support
  - Full-screen utility
  - Terminate-and-stay-resident
  - Updated signature files

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- PC DOS 6.3 provides a full-featured Backup utility
  - Full-screen utility
  - Backup to diskette, tape, or network drive
- Full-screen Editor:

  PC DOS 6.3 provides a full-screen editor that allows the end user to create, edit, save, and print ASCII files.
- Hard Disk Support:

  Allows greater than 32MB fixed disk partition support.
- Full-screen User Shell:
  - IBM DOS 6.3 Shell provides a limited application switching mechanism which suspends execution of one application while executing another.
  - IBM DOS 6.3 Shell enables the creation of a user-defined menu system for the execution of applications.
  - IBM DOS 6.3 Shell provides a full-screen user interface to facilitate PC DOS 6.3 file and directory maintenance.
- Full-screen interactive installation utility:
  - Installs all PC DOS 6.3 utilities and creates user configuration files.
  - Installs to a new system or replaces an existing system.
- Scheduler
  - Allows execution of DOS programs at specific times
  - Full-screen, easy to use interface
- File Compression
  - Automatic, transparent data compression that frees up storage space
  - Universal Data Exchange (UDE) that allows you to use compressed data on a system without compression.
  - Automated uncompress to convert compressed data back to its original form
- National Language Support:
  - PC DOS 6.3 provides support for code pages 437 (U.S., IBM PC), 850 (Multilingual), 860 (Portugal), 863 (Canadian-French), 865 (Norway), plus others.

Specified Operating Environment

System Requirements: PC DOS 6.3 will operate on all models of Personal System/2*, Personal System/1*, IBM Personal System/55*, IBM Personal Computer, IBM Personal Computer XT*, Personal Computer XT-286, Personal Computer AT*, Portable Personal Computer, PC Convertible, and IBM compatibles with a minimum system memory of 512KB.

The system should also have a 720KB, 1.44MB, or 2.88MB 3.5-inch or a 1.2MB 5.25-inch floppy diskette drive. The PC DOS 6.3 Upgrade requires a system with a prior version of PC DOS or MS-DOS** (2.1 or higher) installed on the hard disk.

Program Requirements: There are no program requirements.

Licensed Program Materials Availability: This licensed program is available in object code only.

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Note

Before using this information and the product it supports, be sure to read the general information under Appendix B, "Notices" on page 405.

Second Edition (February 1994)

Contents

Traveling Software

About This Book

This book is written for users who are already familiar with DOS or who have experience using computers. Anyone new to DOS or anyone who is unfamiliar with personal computers should refer to the *Everyday DOS for PC DOS 6* book.

This book is organized into two parts. Part 1 contains instructions for use with the fundamental DOS features. Part 2 contains information on the Optional Tools available with DOS.

If DOS is not yet installed on your computer system, you will need to run the Setup program. For information about how to set up DOS, see the *PC DOS Installation Guide*.

Related Documentation

The DOS library includes the following publications:

- *PC DOS Installation Guide*

  This book gives you the instructions you need to set up DOS on your computer.

- *Everyday DOS for PC DOS 6*

  This book gives the beginning user basic information to become productive quickly. It also has information on 20 frequently used DOS commands. You will find step-by-step procedures for using DOS Shell.

- *PC DOS Command Reference and Error Messages*

  Part 1 of this book contains the commands listed in alphabetical order that can be typed from the DOS command prompt. This book also includes information on DOS device drivers, CONFIG.SYS commands, menu configuration commands, and .INI file information. It includes error messages in a cause-and-action format.

- *PC DOS Data Compression Guide*

  This book provides instructions for using SuperStor/DS, the data-compression product designed exclusively for use with PC DOS. It effectively explains the function of data compression and steps the knowledgeable user through the data compression process.

- *PC DOS Keyboards and Code Pages*

  This book, an optional purchase item, contains examples of keyboard layouts, code page tables, and available accented characters that can be used with DOS.

- *DOS 5.02 Technical Reference*

  This book, an optional purchase item, is written for programmers who develop applications for DOS.

- Help for DOS

  To get a list of commands for which there is online help available, type the word `help` at the DOS command prompt. To get help on a particular command in the list, type `help` followed by the command name, or type the command followed by /?

  The online help gives brief information about each command, instructions on the format to use when typing this command, brief explanations about each switch, and notes to assist you.

What's New

PC DOS (Version 6.3) provides the following enhanced features:

- A new interactive boot using the key combination of CTRL+F8 at system initialization. Using this key combination, you can bypass the loading of the DBLSPACE.BIN file and be prompted to confirm each statement in your CONFIG.SYS and AUTOEXEC.BAT files.
- A new switch (**/y**) has been added to the COMMAND command to allow a user to step through a batch file.
- The COPY, XCOPY, and MOVE commands have been enhanced to prompt the user before overwriting files that have identical file names.
- The SMARTDRV function has been enhanced to support the caching of CD-ROMs.
- MSCDEX has been added to provide support for the use of CD-ROM drives.
- The CHKDSK, DIR, FORMAT, and MEM commands have been enhanced to display the country thousands separator. For example, in the US, the comma is used.

  Control of this feature is maintained at the command line prompt by being able to turn the separator on or off using SET NO_SEP= (turns the separator on) or SET NO_SEP=OFF (turns the separator off). The default is to have the separator on.
- The IBM AntiVirus product has been enhanced to recognize over 2,000 known viruses.
- RAMBoost has been significantly updated to enhance performance, including built-in DOS=UMB support and working with multiple configurations.

- The E Editor has been enhanced with a new command (ALL) that improves the search capabilities of the editor.
- Keyboard support has been enhanced to provide support for the Macedonia and Serbia countries.

Part 1. Using the DOS Operating System

Chapter 1. Learning Basic DOS Concepts

The information that your computer uses is stored in files. To help you keep track of your files, you can group your files into directories. To access the data stored in your files, you must identify the drive and path where DOS is to search.

This chapter discusses a few of the basic concepts you need to know to use DOS:

- Files, file names and extensions
- Drives and current drives
- Directories, current directories, subdirectories, and directory trees
- Paths, full and relative
- Wildcards
- DOS command prompt

Understanding Files

The information your computer uses is stored in *files*. The instructions used to run an application are stored in *program files*, and the information you create by using an application is stored in *data files*.

As you work with an application, DOS processes the information stored in program files and passes it along to your system when it is needed. When you are finished using the application, you can save your data files on a hard disk (also referred to as fixed disk) or on a diskette.

Every file has a name. Most files also have an extension. The file's name always appears first, and the extension is separated from the name by a period as in the following example:

```
readme.txt
```

In this guide, a file's name and extension are jointly referred to as the *file name*.

File Names

The name you assign to a file must meet the following criteria:

- It can contain no more than eight characters.
- It can consist of the letters A through Z, the numbers 0 through 9, and the following special characters:

_	underscore	^	caret
$	dollar sign	~	tilde
!	exclamation point	#	number sign
%	percent sign	&	ampersand
-	hyphen	{ }	braces
@	at sign	'	single quote
'	apostrophe	( )	parentheses

Note: No other special characters are acceptable.

- The name cannot contain spaces, commas, backslashes, or periods (except the period that separates the name from the extension).
- The name cannot be one of the following reserved file names: CLOCK$, CON, AUX, COM1, COM2, COM3, COM4, LPT1, LPT2, LPT3, LPT4, NUL, and PRN.
- It cannot be the same name as another file within the directory.

File names are not case sensitive so you can type the file name in either uppercase or lowercase characters.

Extensions

Extensions can help you identify the type of information in a file. For example, if you have a file called MINUTES.TXT, the extension .TXT identifies that it is a text file. The extension must contain no more than three characters. File name restrictions regarding characters and spacing also apply to extensions.

The following are some of the extensions used by DOS:

- .EXE (executable) or .COM (command) for files that contain programs
- .BAT (batch) for files containing lists of commands that DOS carries out consecutively
- .INI (initialization) for files containing startup commands for an application

Current Drive

If you type a command at the DOS command prompt, commands will be carried out on the drive you are currently working in unless you specify a different drive.

The drive you are currently working in is called the *current drive*. The letter of the current drive is usually shown as part of the DOS command prompt (such as `C:\>` if the current drive is C).

For example, suppose the current drive is drive A. To view a list of files on a diskette in drive A, you would type the following:

```
dir
```

You do not need to type the drive letter to see the current drive.

To change the current drive, type the letter of the drive you want to change to, followed by a colon. For example, suppose the current drive is C. To change the current drive to drive A, type the following:

```
a:
```

Directories

To help you keep track of your files, you can group your files into *directories*. Just as file folders in a file cabinet contain groups of related documents, directories can contain groups of related files. Each directory can be assigned a unique name so that you can identify it. For more information, see "Making Directories" on page 20.

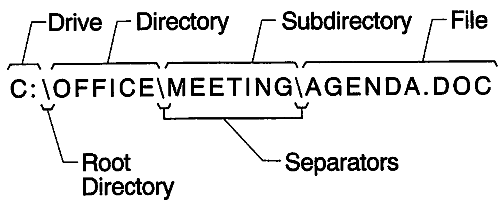
Sometimes you might want to further divide a directory to be more specific, or else your directory might contain so many files that it is too confusing to find the one you want. When this happens, you can use DOS to create additional directories. This is similar to placing a file folder within a larger file folder. A directory that contains another directory is called a *parent directory*.

You will see more information about directory trees and how to view items in your directory in "Viewing Directory Contents" on page 19.

Paths

When you give the full path name for a file, you are stating a series of directory names that DOS follows before any actions are performed on that file. Each directory name is separated by a backslash (\).

Every file has its own separate path. If you have two files with the same file name but in different directories, DOS considers these to be two completely different files because it considers the path and the file name to be the full *file specification*. For example, C:\NOTES\AGENDA.DOC and C:\MEETING\AGENDA.DOC can have the same files, but the file contents can be different because their file specification is different. The following illustration shows the components that make up a path statement. The path statement is limited to 127 characters.



You can specify a path statement in your AUTOEXEC.BAT file that contains one or more paths to be searched whenever you start your computer. When you designate more than one path you must separate the paths with a semi-colon (;) as follows:

```
path=c:\dos\system\;\utils;
```

Wildcards

If you want to perform a task for a group of files whose names have something in common, you do not have to use the same command repeatedly for each file name in the group. A substitute for a name or extension is known as a *wildcard*. You can use wildcards to specify groups of files.

There are two DOS wildcards:

- The asterisk (*) represents a whole word or a group of characters.
- The question mark (?) represents a single character.

The following table shows various wildcard combinations.

Wildcard	What it represents	Examples
*.TXT	All files with a .TXT extension	JULY93.TXT, RECIPE.TXT
REPORT.*	All files named REPORT with any extension	REPORT.TXT, REPORT.WRI
M*.*	All files beginning with the letter M, regardless of extension	MEMO.TXT, MARCH.XLS
???.*	All files having 3-letter names, with any or no extension	SUN.BMP, WIN.INI, AUG

Note: When you use an asterisk in the file name or the extension, DOS ignores the letters that come after the asterisk.

For example, if you use the wildcard `*M.EXE`, it is the same as if you typed `*.EXE`.

DOS Command Prompt

When you see this prompt (C:\>), this means DOS is ready to receive a command. The C:\ prompt is set by typing:

```
prompt $p$g
```

If you want to change this prompt, you can view the options available by typing `help prompt`.

The PROMPT command allows you to keep track of where you are in your tree structure visually. For example, the prompt C:\OFFICE\LETTERS> shows you the root, OFFICE, and LETTERS directories in the tree structure.

Add the PROMPT command to your AUTOEXEC.BAT file so that the prompt you specify is available every time you start your computer.

Working with Files

Certain DOS commands, allow you to do tasks such as: finding, copying, renaming, deleting, moving, comparing, modifying, creating, and viewing the contents of files and directories.

Finding Files

To find a file, use the DIR /S command. This command directs the system to list every occurrence, in the specified directory and all subdirectories, of a specified filename. For example, to find all occurrences of **MYFILE.DAT** on drive C, type the following at the command prompt:

```
dir c:\myfile.dat /s
```

Copying Files

You can use the COPY command to copy:

- A file from one directory or diskette to another
- A group of files by using DOS wildcards

If your copy request involves a file that has the same name as a file or files in the directory to which you are copying, DOS displays a message indicating that you are about to overwrite an existing file. You are prompted to provide direction to the system as the following example indicates:

```
c:\dos>copy *.dat \
Overwrite c:\scores.dat (yes/no/all)?
```

Your choice will affect the Copy function as follows:

Yes (Y) Overwrite the file and continue the Copy function or return to the command prompt if only one file was involved.

No (N) Do not overwrite the file. Continue the Copy function and receive the system prompt for overwriting if other duplicate file names are found. Or, return to the command prompt if only one file is involved.

All Overwrite the indicated file and all subsequent files and suppress the system prompt for overwriting during this Copy function.

For information on copying a directory tree with files, type `help xcopy` at the DOS command prompt. For information on duplicating a diskette, type `help diskcopy` at the DOS command prompt.

Copying a Single File

To copy a file to another diskette or directory, use the COPY command. To use the COPY command, type the location and file name of the file you want to copy from (*source file*). Then type the location and file name of the file you want to copy to (*target file*).

Suppose drive C is the current drive. If you want to copy the AGENDA.DOC file from the \OFFICE\MEETING directory on a hard disk in drive C to the root directory on a diskette in drive A, you would type the following command:

```
copy \meeting\agenda.doc a:\agenda.doc
```

DOS makes a copy of the AGENDA.DOC file in the \MEETING directory on drive C and places the copy in a file having the same file name in the root directory of drive A. If you want the source and target files to have the same file name, you omit the target file name. For example, you could use the following command to produce the same result achieved by using the previous command:

```
copy \meeting\agenda.doc a:\
```

After you use the COPY command, DOS indicates how many files were copied:

```
1 File(s) copied
```

If DOS cannot find the file you want to copy, it displays the `File not found` message. Check to see that you typed the file name correctly and that the file is in the directory you specified.

Using Wildcards to Specify a Group of Files to Copy

Suppose you have a number of files on a diskette in drive A that you designated as temporary by giving them the same extension (such as .TMP). If you want to copy these files to a diskette in drive B, you can use the asterisk wildcard:

```
copy a:\*.tmp b:\
```

Renaming a File as It Is Copied

If you want to give a new name to a file you are copying, specify the new file name as the destination file. For example, to copy the OUTGO.XLS file from a diskette in drive A to a diskette in drive B and rename it EXPAND.XLS, you would type the following at the command prompt:

```
copy a:outgo.xls b:expand.xls
```

You can copy a file to the same directory if you rename the file. If you do not rename the file when copying it to the same directory, DOS displays the following message:

```
File cannot be copied onto itself
        0 file(s) copied
```

Renaming a File

To change the name of a file without changing its location, use the REN command. The REN command stands for **ren**ame.

For example, suppose you have two versions of a file named SALES.LST. The version on the diskette in drive A contains last year's sales projections, whereas the version in drive C is up-to-date. Assume drive C is the current drive. To avoid confusion between the two files, you can use the following command to rename the file that contains outdated prices:

For example, the following command changes a file named SALES.LST to SALES.OLD.

```
ren a:\sales.lst sales.old
```

You can use DOS wildcards to rename a group of files. For example, if you want all .TMP files to be renamed to .TXT files in a directory, use the following command.

```
ren *.tmp *.txt
```

Deleting Files

You will eventually want to clean up your hard disk by removing files that are no longer useful. You can delete a single file, select a group of files to delete, or delete all files in a directory on a hard disk or diskette. When you delete files, you might not be able to recover them. Ensure that the files you specify for deletion are the ones you want to remove.

If you accidentally delete files you want to keep, use the UNDELETE command as soon as possible to recover them. If you have created or changed other files after issuing the delete command, the UNDELETE command might not be able to recover the deleted files. The UNDELETE command works best if you set up your system to keep track of files you delete by using the DATAMON command in your AUTOEXEC.BAT file as described in "Choosing a Delete Protection Method" on page 224.

For more information about undeleting files and directories, see Chapter 12, "Using Central Point Undelete" on page 195.

Deleting a Single File

You delete a single file by typing the DEL command, followed by the location and name of the file you want to delete. For example, to delete a file named SALES.LST from a directory on drive C, type the following command:

```
del c:sales.lst
```

Deleting a Group of Files

You can use DOS wildcards (an * is a wildcard) to delete a group of files. For example, the following command deletes all files with the .TMP extension on a diskette in drive A.

```
del a:\*.tmp
```

Before using the wildcard, it is a good idea to use the DIR command to view the files in a directory. If the display scrolls off the screen too quickly, use the DIR command with the **/p** switch. This switch pauses the display of information at the end of each full screen of text and gives you a `Press any key to continue...` message that allows you to continue on to the next screen display until completed. For example, type the following command:

```
dir a:\*.tmp /p
```

Deleting All Files in a Directory

To clear a directory of all files, you can use the DEL command and DOS wildcards. For example, to delete all the files in the \OFFICE directory on drive C, type the following:

```
del c:\office\*.*
```

If you do not specify a directory, all files in the current directory are deleted.

Whenever you specify *.* with the DEL command, the following prompt is displayed.

```
All files in directory will be deleted!
Are you sure (Y/N)?
```

If you type the directory without specifying any files, it is assumed you want to delete all the files in that directory. For example, to delete all files in the \MYDOCS directory on drive C, you could type the following command:

```
del c:\mydocs
```

If you want to delete the directory itself, use the RD (**r**emove **d**irectory) command. Or you can use the DELTREE command to delete both the directory and all the files at one time. The RD command and the DELTREE command are discussed in more detail in "Deleting Directories" on page 21.

Recovering Deleted Files

When you delete a file, DOS does not delete the data in the file. Instead, it *marks* the file as deleted so DOS can reuse the area of the hard disk or diskette that was occupied by the deleted file. The data remains on the hard disk or diskette until DOS records the data of another file in the same region of the disk.

Because the data in a deleted file can remain intact for a while, it is possible to recover a file that was accidentally deleted. As soon as you discover that the file has been deleted, use the UNDELETE command to restore the file. For more information about how to use the Undelete program, see Chapter 12, "Using Central Point Undelete" on page 195.

Moving Files

To move files, use the MOVE command. For example, the following command moves the file AGENDA.DOC from the current drive to a diskette in drive A.

```
move agenda.doc a:
```

If the destination you specify already has a file or files with the same name, you are prompted to give direction to the system. You can choose the following:

Yes (Y) Overwrite the file and continue the Move function or return to the command prompt if only one file was involved.

No (N) Do not overwrite the file. Continue the Move function and receive the system prompt for overwriting if other duplicate file names are found. Or, return to the command prompt if only one file is involved.

All Overwrite the indicated file and all subsequent files and suppress the system prompt for overwriting during this Move function.

You can also move groups of files using wildcards. For example to move all the files on drive A with an extension of .TXT to drive C in the directory \TEXT, you would type:

```
move a:*.txt c:\text\
```

You can rename a directory when you move files. For example, to move all the files in the \NOTES directory to a new directory with the name \LETTERS, type:

```
move c:\notes\*.* c:\letters
```

You are prompted whether you want the directory created if it does not already exist:

```
Make directory "c:\letters\"?  (Y/N)
```

The MOVE command allows you to rename a file when you move only one file. To move the file LETTER1.TXT from the root directory of drive C, rename it to NEWLTR.TXT, and place it in the \LETTERS directory on drive D, type:

```
move c:\letter1.txt d:\letters\newltr.txt
```

If the directory does not already exist, you will receive the `[Unable to create destination]` message. Use the MD command to create the directory, then, retry the MOVE command.

Comparing Files

To get an approximate comparison of two files, you can look at file size and time of creation. To get a precise comparison of two files, use the FC command. For example, you have two text files that have the same file name. They exist on two different diskettes. To see if they are the same and where they differ you can use the FC command as follows:

1. Insert one disk in drive A and one in drive B.
2. Type the following at the command prompt:

   fc /a a:(*filename*).txt b:(*filename*).txt

The **/a** switch in this example abbreviates the output for the comparison of the two text files. DOS starts at the beginning of the two files and compares each byte. When DOS finds a difference, it displays the file name, the line of text that begins a set of differences, and the line that ends the set of differences, as in the following example:

```
*****a:(filename).txt
Our expected revenues for the month of January are expected to rise
\...
when the results are not yet certain.
*****b:(filename).txt
Our expected revenues for January are less than projected
\...
when the results are not yet certain.
*****
```

For more information about the FC command, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help fc` for a brief explanation and command syntax.

Viewing and Changing File Attributes

Every file can have the following attributes associated with it. These attributes are used as switches with the ATTRIB command.

a Specifies the archive attribute which is used with the RESTORE, XCOPY, and other commands to control which files are backed up.

r Specifies the read-only attribute which prevents a file from being changed or deleted. When a file has this attribute, you can look at the file but you cannot delete it or change its contents.

h Specifies the hidden attribute which prevents DOS from displaying a file in a directory list. The file remains in a directory, but you cannot use the file unless you know its file name. This attribute is useful if you are working on confidential files.

s Specifies the system attribute which designates a file as a system file. Files with the system attribute are not shown in directory listings.

For more information about these attributes and how they are used with the ATTRIB command, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help attrib` for a brief explanation and command syntax.

Viewing File Attributes

To see a file's attributes, type the ATTRIB command followed by the file name. For example, you would type the following to see the attributes associated with the CONFIG.SYS file on a disk in drive A:

```
attrib a:\config.sys
```

DOS displays up to four attributes in front of the file name. For example, if the CONFIG.SYS file has the archive and read-only attributes, DOS displays the following:

```
A R C:\CONFIG.SYS
```

You can see the attributes for a group of files by using wildcards with the ATTRIB command. For example, you would type the following to see the attributes of all files in the root directory of drive C:

```
attrib c:\*.*
```

Changing a File Attribute

You can add to or take away file attributes by using the ATTRIB command along with the attribute letter. To assign an attribute, precede the attribute letter with a +. To remove an attribute precede the attribute letter with a –. For example, use the following command to make the OUTGO.XLS read only:

```
attrib +r outgo.xls
```

If you should decide at a later time to remove the read-only attribute from this file, you would type:

```
attrib -r outgo.xls
```

Finding Text Within a File

If you want to search one or more files for specified text, you can use the FIND command. For example, if your personal phone book is in the PHONE.TXT file, you can use the following command to view all lines of the file that contain the text "Area Code: 206":

```
find "Area Code: 206" phone.txt
```

DOS searches the PHONE.TXT file and displays each line that includes the text "Area Code: 206". You must enclose the search text in quotation marks. DOS finds only text that exactly matches the characters you specify, including capitalization and spacing. If the text in the file has formatting codes (for example, if the words "Area Code" are underlined), DOS cannot find the specified text.

You cannot use wildcards to search more than one file, but you can include in the FIND command all the files you want to search. For example, the following command searches the ADDR.TXT file in addition to the PHONE.TXT file:

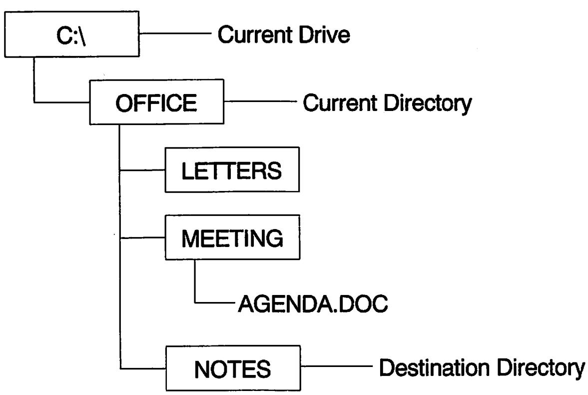
```
find "Area Code: 206" phone.txt addr.txt
```

Understanding and Working with Directories

When you type a command at the DOS command prompt, it is carried out on the directory you are currently using unless you specify a different directory.

Directory Tree

The organization of directories and files is called the *directory tree*. When you format a hard disk, DOS creates one directory, called the *root directory*. The root directory is the very top-most directory. All other directories you create on the hard disk branch out from the root directory. This is illustrated by the following:



You can view a list of files and directories in a directory by using the DIR command.

For example, suppose you use the DIR command to view the list of files in the C:\ directory. Your screen would display a list similar to the following:

```
:
AUTOEXEC BAT         495 03-30-92  7:04p
CONFIG.SYS           525 03-30-92  6:47p
DOS         <DIR>        01-14-93  9:38a
MYFMT    TXT        4735 02-16-93 10:43p
MOVEDIR  BAT        7046 03-08-93  8:58a
NETWORK     <DIR>        03-29-93  6:47p
:
```

Naming Directories

Except for the root directory, which is always represented by the first backslash (\) following the drive letter, each directory has a name. A directory can also have an extension.

The rules for directory names and extensions are the same as for naming files. Typically, however, directory names do not use extensions. For more information, see "File Names" on page 4.

Sometimes, you see "." and ".." entries in a directory (especially when you use the DIR command to view the files and directories in a directory). These are normal entries that are present in every directory. The single period (.) represents the current directory and the double period represents the parent directory. If you delete these entries, you can lose files.

Working in the Current Directory

The directory you are currently working in is called the *current directory* for that drive. The name of the current directory is usually shown as part of the DOS command prompt. You might see `C:\NOTES>` if your current directory is \NOTES in drive C.

For example, if drive C is the current drive and \OFFICE\NOTES is the current directory, you can delete the REPORT1.TXT file in the C:\OFFICE\NOTES directory by typing this command:

```
del report1.txt
```

Because drive C is the current drive and \OFFICE\NOTES is both the current directory and where the file is located, you do not need to specify the path in the command. DOS searches for the file in the current directory. When the file is not located in the current directory you can do one of the following:

- Specify where the file is located by including its path in the command.
- Change to the directory containing the file by using the CD command. The CD command is described in "Changing Directories."

If you are working with more than one drive, each of them has a current directory. If you do not specify a different path for the files, DOS will complete the operation in the current drive and directory.

When you start your system, all current directories are the root directories of the drives in your system. The current directory on a diskette drive changes to the root directory when you change diskettes.

Changing Directories

To change to a different directory on the current drive, use the CD command. The CD command stands for **c**hange **d**irectory.

To use the CD command, type:

```
cd
```

followed by the directory to which you want to change.

If you want to change from the current directory to a *subdirectory*, a directory contained within the current directory, type the name of the subdirectory. For example, the following command changes the current directory to the MYDOCS directory within the current directory:

```
cd mydocs
```

If you want to change to a directory that is not a subdirectory of the current directory, type the path for the new directory. For example, to change from the directory C:\MEETING\STATUS to the directory C:\ART, type the following:

```
cd \art
```

You can use double periods as a shortcut to typing the name of the parent directory. To change to the parent of the current directory (the directory one level closer to the root), you can also use two periods (..) in the command.

```
cd ..
```

Regardless of which directory is current, you can change to the root directory of the current drive by typing:

```
cd \
```

Viewing Directory Contents

To view the contents of a directory, use the DIR command. The DIR command stands for **dir**ectory and lists the contents of the directory you specify.

For example, if C:\ is your current directory, type the following command to view its contents:

```
dir
```

DOS displays a listing similar to the following:

```
:
CONFIG   SYS        525  03-30-92   6:47p
AUTOEXEC BAT        495  03-30-92   7:04p
DOS          <DIR>       01-14-93   9:38a
MYFMT    TXT       4735  02-16-93  10:43p
MOVEDIR  BAT       7046  03-08-93   8:58a
NETWORK      <DIR>       03-29-93   6:47p
:
```

Note: The file names shown here are separated from the extensions not by a period, but by several spaces. When you refer to these files, however, you must separate the file names from the extensions with a period.

If there is more information than can fit on one screen, use the DIR command followed by the **/p** switch to view files and subdirectories one screen at a time. For example, to view the contents of the current directory one screen at a time, type:

```
dir /p
```

You will see one screen of the directory contents. At the bottom of the screen, you will see this prompt:

```
Press any key to continue...
```

If you add the path of a directory to the command, DOS displays the contents of the specified directory rather than the current directory. Regardless of which drive and directory are current; you would use the following command to view a list of files in the MEETING directory on drive C:

```
dir c:\meeting
```

Viewing Groups of File Names in a Directory

Unless you specify otherwise, DOS displays all file names and directory names contained in a directory. To view only certain file names in a directory, you can use wildcards. For example, to see a list of all files that have a .DOC extension in the root directory of a diskette in drive B, type:

```
dir b:\*.doc
```

Making Directories

When you have a group of related files (such as specialized files that you use with one program or files from a specific project), you might want to store them in their own directory. To create a new directory, you can use the MD command, which stands for **m**ake **d**irectory. The new directory cannot have the same name as any other file or directory contained in that directory.

For example, suppose the current directory is the root (\). To create a directory called OFFICE, you would type the following command:

```
md office
```

The MD command makes a directory within the current directory, unless you specify a different directory. For example, suppose the current directory is \OFFICE. While you are within the OFFICE directory, the DOS command prompt looks like this:

```
C:\OFFICE>
```

To make a directory called NOTES, you can type:

```
md notes
```

In this example, DOS makes a directory called NOTES in the \OFFICE directory. To see this change you must type:

```
cd notes
```

at the C:\OFFICE> command prompt. The command prompt then changes to display:

```
C:\OFFICE\NOTES>
```

If you are not making a directory within the current directory, you must type the entire path of the new directory or specify the path relative to the current directory. If you include a drive letter with the MD command, you can create a directory on a hard disk or diskette that is not current.

Deleting Directories

There are two ways to delete directories:

- You can use the DELTREE command, which allows you to remove the directory at the same time you delete all the files and subdirectories within the directory.
- You can use the RD command, which allows you to remove the directory or subdirectory after you have deleted all the files within the directory.

Deleting All Files and the Directory Simultaneously

To delete a directory and all the subdirectories and files in it, you can use the DELTREE command. For example, to delete the \WORK directory and all the files in the directory on drive C, type the following:

```
deltree c:\work
```

You also can use the DELTREE command to delete one or more files and directories. For example, to delete all the subdirectories and files in the \WORK directory on drive C and to delete the \OFFICE directory and all the files within this directory on drive A, type the following:

```
deltree c:\work a:\office
```

Use caution when you use the DELTREE command because every file and subdirectory within the directory you specify will be deleted. You are prompted before the deletion of each top-level directory or file, similar to the following:

```
Delete directory "c:\work" and all its subdirectories? (Y/N)
```

Deleting Only the Directory

The directory you delete cannot contain any files or other directories. If the directory you want to delete contains files or other directories, you must first delete them.

To delete only the directory, use the RD command, which stands for **r**emove **d**irectory. For example, to delete the \MEETING\NOTES directory, type the following command:

```
rd \meeting\notes
```

DOS removes the NOTES subdirectory from the \MEETING directory on the current drive.

If DOS does not delete a directory after you have deleted all files and subdirectories in it, there might be hidden or read-only files in the directory. For information about viewing or changing the attributes of hidden or read-only files, type `help attrib` at the DOS command prompt.

CAUTION:
Do not use the ERASE command to delete the "." or ".." entries in a directory. These are normal entries that are present in every directory. If you erase these entries, you can lose files.

To delete a directory:

1. Delete all files and directories within the directory you want to delete.

   For example, suppose the current directory is \ART, and \ART contains a directory called WORK. Before you can remove the WORK directory, which does not contain any other directories, you must delete its contents. To do so, you can type the following command:

   ```
   del work\*.*
   ```

   You can also type the following command with the same results:

   ```
   del work
   ```

2. The following message appears:

   ```
   All files in directory will be deleted!
   Are you sure? (Y/N)
   ```

   Type `Y` for Yes to delete the files. Or, type `N` to cancel the command.

3. Make sure the directory you are trying to delete is not the current directory. If it is, change to the directory one level higher by typing the following command:

   ```
   cd ..
   ```

   You cannot remove a directory while it is the current directory.

4. Use the RD command to remove the directory.

For example, when the WORK directory is empty, you can type the following command to remove the directory from the \ART directory:

```
rd work
```

DOS removes a subdirectory of the current directory, unless you specify otherwise by typing the full path of another directory. If you include a drive letter with the RD command, you can remove a directory from a drive that is not current.

If you delete a directory accidentally, you can use the Undelete program to recover the directory and its files. For more information about undeleting a directory, refer to "Undeleting a Directory" on page 206.

Copying Directories

To copy a directory and its subdirectories, you can use the XCOPY command. The XCOPY command works with a single directory or a group of directories. You can create new files in the destination directory as well as new subdirectories with this command.

If the destination you specify already has a file or files with the same name, you are prompted to give direction to the system. You can choose the following:

Yes (Y) Overwrite the file and continue the XCopy function or return to the command prompt if only one file was involved.

No (N) Do not overwrite the file. Continue the XCopy function and receive the system prompt for overwriting if other duplicate file names are found. Or, return to the command prompt if only one file is involved.

All Overwrite the indicated file and all subsequent files and suppress the system prompt for overwriting during this XCopy function.

Copying All Files in a Directory

To copy a single directory (without subdirectories), use the XCOPY command without switches. For example, the following command copies all files in the C:\NEW\REPORTS\FINANCE directory to the \FINANCE directory on a disk in drive A:

```
xcopy c:\new\reports\finance a:\finance
```

If you do not make a directory before you use the XCOPY command, one will be created for you by the XCOPY command.

Because the XCOPY command copies all files in a directory, you do not need to use wildcards. For example, the following XCOPY command copies all files in the current directory from drive A to drive B:

```
xcopy a: b:
```

While DOS prepares to copy the files, it displays a "Reading source file(s)" message. A message is also displayed showing the names of the files it copies and indicating how many files were copied when the operation is complete.

Creating Directories as You Copy Files

If the destination path in an XCOPY command does not exist, DOS creates it. For example, the following command copies all files from the root directory of a disk in drive A to the C:\TMP directory:

```
xcopy a:\ c:\tmp
```

If the directory does not exist, there is a prompt asking you whether the name specified is a file or directory. To prevent DOS from prompting you, add a backslash at the end of the directory name.

If you do not type a path, DOS copies the files to the current directory.

Copying Subdirectories

To copy files in a directory along with any subdirectories that contain files, add the **/S** switch to the XCOPY command. For example, you have a disk in drive A which contains the following subdirectories: SCHOOL, WORK, and HOME in the \SCHEDULE directory. The following command copies the files in the \SCHEDULE directory of drive A, including the three subdirectories and all their files, to the \MEMOS directory on drive C:

```
xcopy a:\schedule\ c:\memos /s
```

The backslash (\) after a: indicates that DOS should start at the root directory. When the **/s** is added, every file in every subdirectory that contains files is copied. DOS copies files from the root directory of drive A to C:\MEMOS, from A:\SCHOOL to C:\MEMOS\SCHOOL, from A:\WORK to C:\MEMOS\WORK, and from A:\HOME to C:\MEMOS\HOME. If any of the directories do not exist on drive C, DOS creates them. In this example, empty subdirectories on drive A are not copied.

To copy an empty directory, use the **/e** switch with the **/s** switch. For example, suppose the disk in drive A has an empty subdirectory called MISC, in addition to the three subdirectories just mentioned. You could type the following command to copy all subdirectories, including the empty subdirectory:

```
xcopy a:\ c:\memos /s /e
```

You can use the **/s** switch without the **/e** switch, but you cannot use the **/e** switch without the **/s** switch.

Renaming Directories

To rename a directory, use the MOVE command. The following command renames the \OPS\STATS directory to \OPS\FIGURES:

```
move \ops\stats \ops\figures
```

The REN command, which you use to rename files, cannot be used to rename directories.

Chapter 2. Configuring Your System

Configuring your computer is setting it up so that DOS, your hardware, and your applications work the way you want them or the way they were intended to be used. This can be as simple as customizing the appearance of the DOS command prompt or as complex as setting up a new hardware component. Most of your system's configuration information is stored in two files:

- The CONFIG.SYS file is a text file that contains special commands. These commands set up your computer's hardware components (such as memory, keyboard, mouse, and printer) so that DOS and applications can use them. When DOS starts, it processes the commands in the CONFIG.SYS file.
- The AUTOEXEC.BAT file is a special batch file that DOS runs immediately after carrying out the commands in your CONFIG.SYS file. AUTOEXEC.BAT can contain any commands you want to carry out when you start your system. For example, this file can contain commands that define the port to which your printer is connected, clear your screen of startup messages, or it can start your favorite program.

These files typically are located in the root directory of your hard disk (usually drive C).

Normally, DOS carries out the commands in both the CONFIG.SYS and AUTOEXEC.BAT files each time you start your computer. However, if you need to, you can instruct DOS to bypass the commands in these files. For more information, see "Bypassing CONFIG.SYS and AUTOEXEC.BAT Commands" on page 28.

When you installed DOS, Setup created a basic system configuration that works for most people. You might want or need to change your system configuration. Before changing your configuration, refer to the following information.

To:	See:
Customize the way DOS uses hardware, memory, and files.	"Using CONFIG.SYS Commands" on page 30.
Add a new hardware component or reconfigure an existing component.	"Hardware Devices Configuration" on page 30.
Specify commands you want DOS to carry out when your computer starts.	"Specifying Startup Commands in Your AUTOEXEC.BAT File" on page 39.
Define more than one system configuration. For example, if several people use the same computer, each person can have a separate configuration.	"Using Multiple Configurations" on page 34.

The rest of this chapter explains how to configure your system by using commands in your CONFIG.SYS and AUTOEXEC.BAT files.

The settings in your CONFIG.SYS file control basic components of your system, such as memory and disks drives. If you change your CONFIG.SYS file and the new settings are incorrect, your system might not be able to start correctly. If this happens, restart your computer using your startup diskette (diskette 1 of the DOS Setup diskettes), or use the procedure to bypass CONFIG.SYS and AUTOEXEC.BAT commands.

Bypassing CONFIG.SYS and AUTOEXEC.BAT Commands

If you need to, you can start your system without running the commands in your CONFIG.SYS and AUTOEXEC.BAT files. This is most useful when you are experiencing system problems that might be related to the settings in your CONFIG.SYS or AUTOEXEC.BAT file. To bypass startup commands:

- You can bypass your startup files completely.
- You can have DOS confirm each CONFIG.SYS command and process each command in your AUTOEXEC.BAT file every time your computer starts.

Bypassing Your Startup Files

If you are having system problems that might be related to the commands in your CONFIG.SYS or AUTOEXEC.BAT files, you can temporarily bypass those files to start your computer.

To bypass these files:

1. Start your computer.
2. Press F5 immediately after your computer displays the message

   ```
   Starting PC DOS...
   ```

Any device that requires an installable device driver does not work because the installable device drivers are not loaded. For example, programs that require expanded or extended memory are not able to run because no expanded- or extended-memory drivers are loaded.

DOS uses the default environment variables of PATH=C:\DOS, PROMPT=PG, and COMSPEC=C:\COMMAND.COM temporarily until you correct the problem and restart your computer.

Confirming Each CONFIG.SYS and AUTOEXEC.BAT Statement

You can bypass selected CONFIG.SYS and AUTOEXEC.BAT statements when you initialization your system. This is done when you start your system as follows:

1. Start your computer. Just after your computer starts, DOS displays the text

   ```
   Starting PC DOS...
   ```

2. Immediately press and release the F8 key.

   One at a time, DOS displays each command in your CONFIG.SYS file followed by a prompt. For example, when DOS reaches the DOS=HIGH,UMB command, it displays the following prompt:

   ```
   DOS=HIGH,UMB  [Y,N]?
   ```

   Respond by typing either `Y` for Yes or `N` for No for each command in your CONFIG.SYS file.

   When DOS finishes processing the CONFIG.SYS file, it displays the following prompt:

   ```
   Process AUTOEXEC.BAT  [Y,N]?
   ```

3. Type `Y` to confirm each statement in your AUTOEXEC.BAT file or type `N` to bypass your AUTOEXEC.BAT file completely.

Using CONFIG.SYS Commands

When your computer starts, DOS carries out commands that configure hardware and reserve space in memory for information processing. The file that contains these commands is called CONFIG.SYS. DOS Setup creates a CONFIG.SYS file and stores it in the root directory of your startup hard disk. The commands within this file control peripherals like your printer, your mouse, the display, various types of memory, and so forth. You can add and change CONFIG.SYS commands to configure your system as needed. For a list of the CONFIG.SYS commands supported by PC DOS and an explanation on how to use them, see the *PC DOS Command Reference and Error Messages* manual.

CONFIG.SYS File Editing

To edit the CONFIG.SYS file, use a text editor, such as E Editor, that can save files as unformatted (ASCII) text. Do not edit the CONFIG.SYS file using a word processor that saves files in a special document format. If you do, your computer might not start.

Because the CONFIG.SYS file controls how DOS starts, DOS reads it only when you start your computer. Therefore, after changing the CONFIG.SYS file, you must restart your computer for your changes to take affect.

To make changes to your CONFIG.SYS file:

1. Make a copy of your CONFIG.SYS file on a separate diskette before you make any changes.
2. Edit the CONFIG.SYS file using the E Editor.
3. Add or change CONFIG.SYS commands as necessary. Each CONFIG.SYS command must begin on a separate line.
4. When you have finished editing the CONFIG.SYS file, save your changes and exit from the text editor.
5. Restart your system by pressing CTRL+ALT+DEL so that your changes can take affect.

Note: Most CONFIG.SYS commands can appear in the CONFIG.SYS file in any order. For example, the DOS, FILES, or BUFFERS commands can appear anywhere in the file. Only the relative order of the DEVICE and DEVICEHIGH commands is important.

Hardware Devices Configuration

Each hardware component of your computer is called a *device*. Your computer's keyboard, mouse, display, printer, disk drives, and memory boards are all devices. Each device has its own characteristics that can be customized.

DOS uses a special program called a *device driver* to control each device. For example, DOS uses a built-in device driver to control how information is read to and from a diskette drive. DOS has built-in device drivers for your keyboard, display, hard and diskette drives, and communication ports. Because these device drivers are built in, you do not have to do anything special to use them. You can customize certain features of these devices by using CONFIG.SYS commands.

Other devices, such as memory boards, a mouse, or CD-ROM have device drivers that are not built into DOS. Such a device driver is called an *installable* device driver because you install it by adding a command to your CONFIG.SYS file. Many hardware devices come with their own device drivers. For example, DOS comes with a device driver called HIMEM.SYS. Several other installable device drivers are included with DOS.

Note: The device driver for your CD-ROM does not come with PC DOS. To use your CD-ROM and access it through PC DOS (using MSCDEX.EXE), the CD-ROM device driver must be loaded in the CONFIG.SYS file. For more information about MSCDEX**, see "Specifying Startup Commands in Your AUTOEXEC.BAT File" on page 39.

To use an installable device driver, add a DEVICE command for that driver to your CONFIG.SYS file. When DOS starts, it loads the device driver into memory. For example, to load the HIMEM.SYS device driver from the C:\DOS directory, you would add a command like the following to your CONFIG.SYS file:

```
device=c:\dos\himem.sys
```

When DOS reads this command, it loads the HIMEM.SYS device driver into memory. The HIMEM.SYS device driver remains in memory and manages extended memory.

Note: Many hardware devices come with installation programs that automatically add the necessary commands to your CONFIG.SYS file.

DOS comes with the following installable device drivers. DOS users can refer to the *PC DOS Command Reference and Error Messages* manual for specific details about these device drivers.

The order in which DEVICE and DEVICEHIGH commands appear in the CONFIG.SYS file is important because some device drivers enable devices that are then used by other drivers. For example, the HIMEM.SYS extended-memory driver must be started before any drivers that use extended memory.

The order in which device drivers should appear in your CONFIG.SYS file is as follows:

1. HIMEM.SYS if your system has extended memory.
2. Your expanded-memory manager if your system has an expanded-memory board.
3. EMM386.EXE if your system is an 80386 or higher processor with extended memory. If your CONFIG.SYS file includes both an expanded-memory manager and EMM386, the EMM386 command line should include the **noems** switch.

   EMM386 uses extended memory to simulate expanded memory on systems that do not have expanded memory. EMM386 can also provide access to the upper memory area. For more information, see Chapter 10, "Making More Memory Available" on page 165.
4. Any other device drivers.

Note: This list is intended to show only the correct order for device drivers. It is not intended to be a list of the commands that your CONFIG.SYS file should contain. The contents of your system's CONFIG.SYS file depends on the type of system, the amount or type of memory, the hardware configuration, and the applications you use.

CONFIG.SYS File Examples

The following is a typical CONFIG.SYS file for an 80386 computer with 2MB or more of extended memory:

```
device=c:\dos\himem.sys
dos=high,umb
device=c:\dos\emm386.exe ram
files=40
buffers=20
break=on
devicehigh=c:\dos\ansi.sys
```

In this example:

- The BUFFERS command reserves 20 buffers for transferring information to-and-from disk drives.
- The FILES command reserves enough room to have 40 files open at one time.

- The BREAK command checks frequently for the CTRL+C or CTRL+BREAK key combination.
- The DOS=HIGH,UMB command runs DOS in the high memory area and specifies that programs should have access to the upper memory area. For more information about the upper memory area, see Chapter 10, "Making More Memory Available" on page 165.
- The DEVICE commands load the HIMEM.SYS and EMM386.EXE device drivers. The HIMEM.SYS driver manages extended memory. The EMM386.EXE driver, when used in a DEVICE= statement with the **ram** switch, provides access to the upper memory area and simulates expanded memory.
- The DEVICEHIGH commands load device drivers into the upper memory area.

If you use a network and your system includes an 80286 processor and expanded memory, your CONFIG.SYS file might look like this:

```
rem This computer's expanded-memory board came with
rem its own expanded-memory driver, EMSDRV.SYS.
device=c:\emsdrv\emsdrv.sys
devicehigh=c:\dos\himem.sys
device=c:\net\network.sys
device=c:\dos\ramdrive.sys /a
rem The /a switch instructs RAMDrive to use expanded memory.
buffers=20
files=30
break=on
rem The following command reserves space for 26 drives.
lastdrive=z
```

In this example:

- This CONFIG.SYS file loads device drivers for the expanded memory board, the HIMEM.SYS memory manager, and the network.
- The RAMDRIVE.SYS driver creates a RAM drive in expanded memory.
- The LASTDRIVE command reserves space for 26 logical drives so that letters from A to Z are available as labels for drives.

Using Multiple Configurations

A single CONFIG.SYS file can define several different system configurations. This can be useful if several people share a single computer, or if you want to be able to start your computer with a choice of configurations.

Each step in defining how you would type multiple configuration commands in your CONFIG.SYS file is explained.

Step 1: Defining a Startup Menu

To use multiple configurations, you must define a startup menu. To do this, create a configuration block with the block heading [Menu]. A menu block can contain any of the following commands:

- The MENUITEM command
- The MENUDEFAULT command
- The MENUCOLOR command
- The SUBMENU command

When your computer starts, the startup menu appears and lists the available configurations; you choose the configuration you want.

If you type this in your CONFIG.SYS file:

```
[MENU]
menuitem=DLS, Load DOS LAN Services Client
menuitem=INTLNK, Load InterLnk Client
menuitem=CPSW, Load Code Page Switching
menucolor=7,1
menudefault=DLS,20
:
```

DOS produces this startup menu:

```
   IBM DOS Startup Menu
   =======================

   1. Load DOS LAN Services Client
   2. Load InterLnk Client
   3. Load Code Page Switching

Enter a choice: 1  Time remaining: 20
```

In this example:

- The MENUITEM command defines the item on the menu. The first MENUITEM command value, `[DLS]`, specifies the name of the associated configuration block. The second value, which is optional, specifies the text, `Load DOS LAN Services Client` to display on the menu. If you do not specify any menu text, DOS uses the name of the configuration block as the menu text.
- The MENUCOLOR command sets the text color to 7 (white) and the background color to 1 (royal blue).

- The MENUDEFAULT command is optional. When this command is used, it specifies which menu item is to be the default configuration. The block must be defined elsewhere in the CONFIG.SYS file. When DOS displays the startup menu, the default menu item is highlighted, and its number appears after the `Enter a choice` prompt. If no item is specified, the default is set to the first item.

  The MENUDEFAULT command also sets a timeout value. You can specify a timeout value from 0 to 90 seconds. A timeout of 0 seconds forces automatic selection of the default, effectively bypassing the menu display.

  If you specify a timeout value but no item is selected within the specified time, DOS starts the computer with the default configuration.

  If you do not specify a timeout value, DOS does not continue until the ENTER key is pressed.

Step 2: Defining Configuration Blocks

A *configuration block* is a set of CONFIG.SYS commands that you want DOS to run when that particular configuration is selected from the startup menu. A configuration block begins with a block header—the block name surrounded by brackets. The block name must be a single word but can be as long as you want. When DOS starts with a particular configuration, it carries out all the commands between that block header and the next block header.

A configuration block can contain any command you would normally place in your CONFIG.SYS file. A CONFIG.SYS file can define a [Common] block that includes commands common to all configurations. DOS carries out the command in a [Common] block for every configuration. You can have as many [Common] blocks as you want; DOS runs [Common] commands in the order in which they appear in the CONFIG.SYS file.

The following CONFIG.SYS file defines two configurations and includes several commands that are common to both:

CONFIG.SYS file (continued)

```
:
[COMMON]
files=30
buffers=30
lastdrive=z
break=on
device= C:\DOS\HIMEM.SYS
dos=HIGH,UMB
device=C:\DOS\EMM386.EXE NOEMS
device=C:\DOS\SETVER.EXE

[CPSW]
country=001,,C:\DOS\COUNTRY.SYS
devicehigh=C:\DOS\display.sys con=(ega,,1)

[DLS]
devicehigh=C:\NET\protman.dos /i:C:\NET
devicehigh=C:\NET\dlshelp.sys
devicehigh=C:\NET\ibmtok.dos

[INTLNK]
devicehigh=C:\DOS\INTERLNK.EXE

[COMMON]
devicehigh=C:\DOS\ANSI.SYS
shell=C:\DOS\COMMAND.COM /P /E:512
:
```

This CONFIG.SYS file configures the computer for LAN networking [DLS], laptop computer connectivity [INTLNK], and code page switching and keyboard support [CPSW]. For all three configurations, DOS runs the commands in the [Common] configuration blocks.

The INTLNK configuration uses the Client Device Driver (INTERLNK.EXE) to make the client computer use devices on the server computer as though they were local drives. INTERLNK loads itself into upper memory when upper memory blocks are available. The [Common] section makes these upper memory blocks available.

Step 3: Using INCLUDE statements for Multiple Configurations
The CONFIG.SYS file can also contain the INCLUDE command.: You can include the contents of one configuration block in another by using the INCLUDE command. The INCLUDE command instructs DOS to carry out the commands in another configuration block as well as the commands in the current block. This command specifies the name of the block you want to include; the command can be used only within a configuration block.

Suppose you wanted to add another configuration that includes all three of the previously discussed configuration blocks combined. You could use the INCLUDE command to do this by adding a fourth configuration similar to the following:

CONFIG.SYS file (continued)

```
:
[LOADALL]
include=CPSW
include=DLS
include=INTLNK
set path=c:\net;c:\dos
:

[Common]
```

The [LOADALL] configuration uses the INCLUDE command to include the [CPSW], [DLS], and [INTLNK] blocks. It also has its own SET PATH command.

It is a good idea to place a [Common] block at the end of your CONFIG.SYS file, even if it does not contain any commands. Some applications append commands to your CONFIG.SYS file. If your CONFIG.SYS file has a [Common] block at the end, an application can append commands to the CONFIG.SYS, and DOS will carry out those commands for all your configurations.

Step 4: Modifying the AUTOEXEC.BAT File for Multiple Configurations
When using multiple configurations, it can be useful to have DOS run different AUTOEXEC.BAT commands for each configuration. You can create branching code in the AUTOEXEC.BAT file by using batch commands such as the IF and GOTO commands. With batch commands, you can have DOS carry out different AUTOEXEC.BAT commands depending on the startup configuration.

When a configuration is selected from the startup menu, DOS sets the CONFIG environment variable to the name of the selected configuration block. In the AUTOEXEC.BAT file, you can use the IF command to test the value of the CONFIG variable and then have DOS carry out different commands for different values. When you test the value of the CONFIG variable, you can enclose it both in percent marks (%) and double quotes ("), as shown in the example below. For information about the IF command, type `help if` at the DOS command prompt.

The following AUTOEXEC.BAT file tests the CONFIG variable and executes different commands depending on the result; it is designed to work with the example CONFIG.SYS file.

AUTOEXEC.BAT file

```
@ECHO OFF
PATH C:\DOS;C:\NET;
PROMPT $p$g
SET TEMP=C:\DOS

rem Test the CONFIG environment variable to see what menu item was selected.
rem Was the network chosen to start?
if "%CONFIG%" == "DLS" C:\NET\net start

rem Was code page switching and keyboard support chosen?
rem  ISO.CPI gives you ISO Support.
if NOT "%CONFIG%" == "CPSW" GOTO NOTCPSW
MODE CON CODEPAGE PREPARE=((850) C:\DOS\ISO.CPI)
MODE CON CODEPAGE SELECT=850
LOADHIGH KEYB US

:NOTCPSW
rem Inquire about loading mouse support?; wait 3 seconds for a
rem  response, if no response default to No.
CHOICE /C:YN /TN,3 Do you want to load MOUSE support?
IF ERRORLEVEL 2 GOTO SKIPMOUSE
LOADHIGH C:\DOS\MOUSE.COM

rem Now load DOSKEY, show CALL batchcommand to load IBM Antivirus/DOS
rem  and then come up in the DOSSHELL
:SKIPMOUSE
LOADHIGH DOSKEY
SET IBMAV=C:\DOS
C:\DOS\
CALL C:\DOS\IBMAVDR.BAT
C:\DOS\DOSSHELL.EXE
```

When DOS runs this AUTOEXEC.BAT file, it sets the path, prompt style, and the TEMP environment variable.

DOS then tests the value of the CONFIG variable. The CONFIG.SYS value was set when you entered your choice of configuration from the Startup Menu.

For example, if the name of the current configuration is not CPSW, DOS inquires whether you want mouse support. If you do not want to load the mouse or you do not make a choice of whether to load the mouse in three seconds, mouse support is not loaded.

Whether or not you choose to have mouse support, this configuration then runs the DOSKey program, starts the IBM AntiVirus/DOS, and starts the DOS Shell program.

Specifying Startup Commands in Your AUTOEXEC.BAT File

Each time you start your system, DOS carries out the commands in your AUTOEXEC.BAT file. This file is located in the root directory of your hard disk (usually drive C).

The .BAT file-name extension indicates that the file is a *batch file*—a series of commands that DOS carries out automatically. The commands in the AUTOEXEC.BAT file set the characteristics of your devices, customize information that DOS displays, and start memory-resident programs and other applications. To run AUTOEXEC.BAT without restarting your system, type `autoexec` at the DOS command prompt.

You can customize your system by adding commands to your AUTOEXEC.BAT file. You can use any commands you would normally type at the DOS command prompt. To edit your AUTOEXEC.BAT file, type `e autoexec.bat` at the DOS command prompt. If your AUTOEXEC.BAT file is not on your root directory, you must also include the path where it is located when you type the E command.

Note: Before changing your original AUTOEXEC.BAT file, make a copy and save it with a different name, such as AUTOEXEC.BAK, as a precaution.

For example, if you have a CD-ROM, you might want to include the MSCDEX command in your AUTOEXEC.BAT file. This command must include a **/d:***drivename* parameter that matches the **/d:***drivename* parameter used in the CONFIG.SYS file for the CD-ROM device driver. Each CD-ROM device driver currently in use must have a unique driver name.

Note: The device driver that came with your CD-ROM must be loaded in the CONFIG.SYS file before you can access it in PC DOS using the MSCDEX command.

For more information about this command refer to the *PC DOS Command Reference and Error Messages* manual.

AUTOEXEC.BAT Commands

Every command in an AUTOEXEC.BAT file can also be used in other batch programs. Following are some of the most common AUTOEXEC.BAT commands.

Command	Purpose
PROMPT	Sets the appearance of your DOS command prompt.
MODE	Sets the characteristics of your keyboard, monitor, and serial and parallel ports.
PATH	Specifies the directories in which DOS searches for executable files (files with a .COM, .EXE, or .BAT file name extension).
ECHO OFF	Directs DOS not to display the commands in your AUTOEXEC.BAT file as they run. You can also prevent a command from being displayed by inserting an at sign (@) at the beginning of that line.
SET	Creates an environment variable that can be used by programs. The SET command can also be used in the CONFIG.SYS file.

For information about these commands, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help` followed by the command name at the DOS command prompt for a brief explanation and command syntax.

For more information about programming batch files, see Chapter 5, "Working with Batch Programs" on page 71.

Terminate-and-Stay-Resident Programs

Another common use of the AUTOEXEC.BAT file is to start *memory-resident programs*—programs that load into memory and stay there while you use other programs. These are also called *terminate-and-stay-resident* (TSR) programs. DOS comes with several memory-resident programs that are commonly started from the AUTOEXEC.BAT file, such as:

APPEND	FASTOPEN
CPSCHED	KEYB
DATAMON SENTRY (or TRACKER)	MOUSE
DOSKEY	SMARTDRV

For more information about the these programs, you can type `help` followed by the command name at the DOS command prompt for a brief explanation and command syntax for these commands.

Changing Screen Attributes

You can change your screen attributes using the PROMPT command and an ANSI set graphics mode escape sequence in your AUTOEXEC.BAT file. To do this, you must ensure that the ANSI.SYS driver is loaded in your CONFIG.SYS file.

Note: If you load the ANSI.SYS driver after loading RAMBoost, place your DEVICE statement after the RAMBoost statement in the CONFIG.SYS file.

There are three kinds of screen attributes:

text format Specifies whether text is bold, underscored, blinking, or hidden.

text color Specifies the text color.

background color Specifies the screen color.

You must use the following syntax when changing these attributes in your AUTOEXEC.BAT file:

```
prompt $e[x;xx;xxm
```

In this example:

- **$e** indicates the ANSI escape code.
- **x** indicates the number 1, 4, 5, or 8 which control the text format.
- **xx** indicates the numbers 30 through 37 which control the color of the text.
- **xxm** indicates the numbers 40 through 47 which control the screen color and m which indicates the ANSI set graphics mode.

Note: The order in which you type the parameters is not important. However, each parameter must be separated by a semicolon.

Changing Text Format

To change the text format use one of the following:

1 Changes the text to **BOLD** or high intensity.

4 Changes the text to be underscored. This works on monochrome displays only.

5 Changes the text so that it blinks.

7 Changes the screen display to reverse video. Reverse video reverses the foreground and background colors or shades used on the screen. For example, if your screen normally displays dark letters on a light background, reverse video displays light letters against a dark background.

8 Hides the text unless you subsequently change the background color.

Changing Text Color

To change the text color, use the following:

30	Black
31	Red
32	Green
33	Yellow
34	Blue
35	Magenta
36	Cyan
37	White

Changing Background Color

To change the background color, use the following:

40	Black
41	Red
42	Green
43	Yellow
44	Blue
45	Magenta
46	Cyan
47	White

If you choose a parameter that is not supported, the system ignores it and no change takes place.

Some examples of the types of statements you can put in your AUTOEXEC.BAT file are:

```
prompt $e[1;33;41m
```

This command would show yellow text on a red background in bold or high intensity.

```
prompt $e[5;34;47m
```

This command would show blue text on a white background and it would be blinking.

Note: The AUTOEXEC.BAT file is initially configured with a PROMPT command that provides a C:\> prompt and blinking cursor. When you change the prompt command as in the prior examples, only the blinking cursor is displayed. By adding on to the original PROMPT command you can retain your C:\> prompt.

AUTOEXEC.BAT File Examples

The following example of a AUTOEXEC.BAT file contains the most commonly used AUTOEXEC.BAT commands:

```
path=c:\;c:\dos;c:\utility;c:\batch
prompt $p$g
set temp=c:\temp
doskey
c:\smartdrv.exe
```

In this example:

- The PATH command directs DOS to search for program files in the current directory and then in the following directories: the root directory of drive C, C:\DOS, C:\UTILITY, and C:\BATCH. A semicolon (;) separates each directory.
- The PROMPT command sets the command prompt so that it shows the current drive and directory, followed by a greater-than sign (>).
- The SET command creates an environment variable named TEMP and sets it equal to the directory C:\TEMP.

  Note: The name you specify must be the name of an existing directory. Many programs, including DOS itself, use this variable when storing temporary files.

- The DOSKEY command loads the DOSKey program into memory. DOSKEY.COM can be located in any of the directories listed in the PATH command.
- The SMARTDRV command loads the SMARTDrive program into memory.

Suppose your system has one diskette drive, one hard disk drive, a laser printer connected to port COM1, and DOS Shell. You might want to put the following commands in your AUTOEXEC.BAT file:

```
@echo off
path=c:\;c:\dos;c:\utility;c:\lotus;c:\norton
prompt $p$g
mode lpt1=com1
set temp=c:\temp
doskey
dosshell.exe
```

In this example:

- The ECHO OFF command prevents the AUTOEXEC.BAT commands from being displayed as they are carried out. The @ sign at the beginning of the line prevents the ECHO OFF command from being displayed.
- The MODE command redirects printer output from LPT1 (its default port) to the serial port COM1.
- The DOSKEY command loads the DOSKey program, which provides keyboard shortcuts at the DOS command prompt.
- The DOSSHELL command starts the DOS Shell program, which provides a graphical interface that forms many of the same file-management and disk-maintenance tasks that you perform from the command line.

Chapter 3. Managing Disks

Disks provide long-term information storage. The information you save on disks remains intact until you delete it. This chapter discusses the following:

- The types of disks and how they are used.
- How to format and unformat a disk.
- How to create a system diskette.
- How to label disks.
- How to recover information from a defective disk.

Types of Disks

There are generally two classifications of disks: hard disk (also referred to as *fixed disk*) and diskettes which come in two basic sizes: 5.25 and 3.5 inches.

Disks store information on magnetic surfaces. In a diskette, the magnetic surface is a thin, flexible disk inside a protective plastic cover. A hard disk has two or more rigid disks stacked on top of each other in a sealed case. It remains in your computer until you upgrade to a larger hard disk or it somehow becomes damaged.

Information on disks is divided into tracks and sectors. The more tracks a disk has, the more information it can store. The information is divided by DOS into sectors. A sector is the basic unit of storage on a disk.

All disks need to be formatted so that they can receive and store information. Formatting writes track and sector marks on the disk defining the areas that DOS can use. When you format, the diskette is checked for defects.

Diskettes vary in physical size and the amount of information they can hold. The storage size of a diskette is measured in *bytes* for files, and *kilobytes* and *megabytes* for disks. These terms are defined as follows:

byte The amount of space it takes to store a character.

kilobyte A kilobyte is approximately 1000 bytes, represented by a K in this guide (1024 bytes for CPU memory).

megabyte A megabyte is approximately 1000000 bytes, represented by MB in this guide (1048576 bytes for CPU memory).

The following list shows the two most common types of diskettes that PC DOS can work with and the capacity for the diskettes drives and diskettes.

Diskette	Diskette Drive Capacity
5.25-inch, double-sided/double-density	360K
5.25-inch, double-sided/high-density	1200K or 1.2MB
3.5-inch, 1MB capacity	720K
3.5-inch, 1MB/2MB capacity	1440K or 1.44MB
3.5-inch, 4MB capacity	2880K or 2.88MB

The 1MB diskettes can be used in both 720K and 1.44MB diskette drives; they must be formatted to 720K which you do with either a 720K or a 1.44MB diskette drive. When you use a 1.44MB diskette drive, be sure to specify a format of 720K.

The 2MB diskettes can be used in 1.44MB diskette drives only and must be formatted to 1.44MB. You must use a 1.44MB or 2.88MB diskette drive to format.

If you intend to transfer diskettes between computers that have diskette drives with different capacities, use only 1MB diskettes formatted to 720K.

Note: A 1.44MB diskette drive might have "1.44" printed on the diskette eject button. A 720K diskette drive usually has no identification mark.

Most diskettes have labels indicating their type. You can also use the DIR or CHKDSK command to view information about the storage capacity of a formatted disk. For information about these commands, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help dir` or `help chkdsk` for a brief explanation and command syntax.

Types of Diskette Drives

Not all types of diskettes are compatible with all types of diskette drives. In general, the diskette must be formatted at a capacity less than or equal to the capacity of the drive in order for the diskette and diskette drive to be compatible. For example, if you have a high-density 5.25-inch diskette drive designed to work with 1.2MB diskettes, you can use diskettes formatted as 360K disks. However, if you have a 360K drive, you usually cannot use disks formatted as 1.2MB disks. If you are unsure whether a diskette works with a certain drive, you can try using the diskette by inserting it in the diskette drive and using the DIR command. If the diskette and drive are incompatible or if the diskette is unformatted, DOS displays a `General failure` error message.

DOS adjusts its operations to work with the type of diskette drive you are using. When using some commands, you must add a switch if your diskette drive and diskette do not have the same capacity.

Considerations for Formatting Disks

Before you can use a disk, you must prepare it by using the FORMAT command. The diskette might or might not have been previously formatted.

When you format a disk, DOS performs a *safe format* by default. Because of the safe format, you can restore the diskette to the way it was before the format by using the UNFORMAT command, provided you have not stored files on the newly formatted disk.

When you format a diskette or hard disk, DOS reserves a small part of the disk for its tracking system. The tracking system consists of two parts: a *file allocation table*, which tracks the location of each file on the disk, and the *root directory*, which stores the name, size, creation date and time, and file attributes for the files on the disk.

If you are using a new hard disk, you must partition it before you can format it. While you are running the DOS Setup program, if the hard disk is unpartitioned or unformatted, you can partition and format the hard disk. For information about setting up DOS on a hard disk, refer to the installation instructions. You can also partition a new hard disk by using the Fixed Disk Setup Program (FDISK). For information about FDISK and partitioning, see Chapter 4, "Partitioning Your Hard Disk" on page 55.

CAUTION:
Because the FORMAT command destroys all information on a disk, it is a good idea to develop the habit of using the DIR command before formatting a disk so that you do not destroy important files. DOS displays a warning message if you attempt to format your hard disk. If you accidentally format your hard disk and you have not written new information to it, you might be able to use the UNFORMAT command to recover its contents. For information, see "Unformatting a Disk" on page 50.

Formatting a Disk

To format a diskette or hard disk, use the FORMAT command. For example, the following command formats a diskette in drive A:

```
format a:
```

Note: You must specify the drive that contains the diskette you want to format.

To format a hard disk after it has been partitioned, type:

format (*drive letter*)

at the DOS command prompt. If the hard disk has already been formatted, the following message prompt is displayed:

```
Warning, all data on non-removable disk drive C: will be lost!
Proceed with format (Y/N)?
```

Type `y` to proceed, or `n` to cancel the command.

There are several switches that can be used with the format command. Some of the more common that you will use are as follows:

/q Use this switch on a previously formatted disk to speed up the format process.

/u Use this switch on new disks to speed up the format process or on a disk where you have received read and write errors during the use of the disk.

Use this switch to specify an unconditional format process which destroys all existing data on a disk and prevents you from using the UNFORMAT command.

/f Use this switch to specify the size of the diskette to format. For example, if drive A is a 1.2MB, 5.25-inch drive, and you want to format a 360K diskette in it, you would type the following:

```
format a: /f:360
```

For more information about the switches that can be used with the FORMAT command, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help format` for a brief explanation and command syntax.

As it formats the disk, DOS displays the percentage of the disk that has been formatted. After the disk is formatted, you are prompted to give the disk a *volume label*. Type the name you want to give the disk, or press ENTER if you do not want a label.

DOS then displays information about how the disk has formatted:

```
1,213,952 bytes total disk space
1,213,952 bytes available on disk

    512 bytes in each allocation unit
   2,371 allocation units available on disk

Volume Serial Number is 382C-17F4
```

Bytes total disk space	Indicates the storage capacity of the disk.
Bytes used by system	Displayed if you have transferred the DOS system files to the disk. This line shows how much disk space is used by the three system files.
Bytes in bad sectors	Indicates how much of the disk is unusable because of bad sectors. If there are no bad sectors, this line is omitted. If a diskette has any bad sectors, do not store important files or backup files on it. Most hard disks have a small number of bad sectors. In general, the portion of a hard disk taken up by bad sectors should be a small fraction of the total space available.
Bytes available on disk	Indicates the total disk space minus the space taken up by the system files and any bad sectors. If the disk does not contain system files and there are no bad sectors, this number should be the same as the "bytes total disk space" number.
Bytes in each allocation unit *and* allocation units available on disk	Indicate how DOS has divided the available disk for file storage. If you multiply the two numbers on these lines, the result is the same as the "bytes available on disk" number.
Volume serial number	Indicates the serial number assigned to the disk. This number does not change unless the disk is formatted again.

Following this information, you are prompted to format another disk. Type `y` to format another disk in the same drive with the same switches, or type `n` to return to the DOS command prompt.

Unformatting a Disk

You can restore a disk that has been reformatted by using the UNFORMAT command. The UNFORMAT command works most reliably if the disk was safe-formatted (that is, if you used the FORMAT command without the /**u** switch). The UNFORMAT command is most effective if used immediately after a disk has been reformatted.

If the disk was safe-formatted, UNFORMAT restores the disk to the way it was at the time of the format. To restore a disk that has been safe-formatted, use the UNFORMAT command. For example, to restore a hard disk (drive C), use the following command:

```
unformat c:
```

You cannot restore a formatted disk if you use the /**u** switch with the FORMAT command. The /**u** switch performs an unconditional format (removes the safe-formatting). You also cannot restore a diskette if you changed its storage capacity when you reformatted it. You need to use the UNFORMAT command immediately after you have formatted a disk. If you have saved anything on the disk between formatting and unformatting, you will probably lose some of the information.

For more information about the UNFORMAT command, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help unformat` for a brief explanation and command syntax.

Creating a System Diskette

It is recommended that you make a system diskette to handle emergencies such as your computer system not starting. When the system files are on a diskette, you can use the diskette to start your system from drive A.

System diskettes contain three DOS system files—IBMBIO.COM, IBMDOS.COM, and COMMAND.COM. When you start your system, these three files are copied from the system diskette to your system's random-access memory (RAM). The IBMBIO.COM and IBMDOS.COM files are hidden files; you do not see them in directory listings on the diskette unless you use the /**a** switch with the DIR command. The COMMAND.COM file is usually in the root directory of every system diskette.

In addition to these three DOS system files, you want to include the file FDISK.COM and an editor. You must copy these files to the system diskette.

To create a system diskette during formatting, use the FORMAT command with the **/s** switch. For example, the following command formats the diskette in drive B and makes it a system diskette:

```
format b: /s
```

You can also use the following to ensure the use of a system diskette:

- Make a formatted diskette a system diskette by using the SYS command. For example, to copy the system files COMMAND.COM, IBMBIO.COM, and IBMDOS.COM to a formatted diskette in drive A, type the following:

  ```
  sys a:
  ```

- Keep diskette # 1 of the install diskettes handy. This diskette can be used to start your system.

Note: You cannot make a system diskette by using the COPY command. This command does not copy the hidden system files. You must use the FORMAT or SYS command. For more information about these commands, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help format` or `help sys` for a brief explanation and command syntax.

Labeling a Disk

Each disk can have a name, called the *volume label*, and a number, called the *volume serial number*. DOS uses the volume serial number to keep track of which disk is in a drive. DOS assigns a serial number to a disk when you format it. The serial number does not change unless the disk is formatted again. Only disks formatted by DOS Version 4.0 and later have a serial number. DOS displays the disk's volume label and serial number above the list of files in every directory.

You can change a disk's volume label by using the LABEL command. The volume label you choose can contain no more than 11 characters, and it cannot include the following characters: asterisk (*), question mark (?), slash (/), backslash (\), pipe (|), period (.), comma (,), colon (:), semicolon (;), plus sign (+), equal sign (=), less-than sign (<), greater-than sign (>), caret (^), quotation mark ("), brackets ([ ]), ampersand (&), parentheses (), or any key combinations. Volume labels can include spaces but not tabs.

Note: You can use extended characters in a label, but if you do, it is recommended that you use code page 850. If you use code page 437, support for extended characters is limited.

For information about extended characters, refer to the *PC DOS Keyboards and Code Pages* book (optional purchase).

Assigning and Deleting Labels

If you work with a large number of disks, it might be convenient to create a label for each disk. You can view the label when you use the DIR or VOL command.

To assign a volume label, use the LABEL command. For example, use the following command to assign the label *disk 2* to a diskette in drive A:

```
label a:disk 2
```

If you type a drive letter, but no label, DOS prompts you for a label. For example, to label the diskette in drive B, type the following command:

```
label b:
```

DOS displays the current label and serial number of the diskette in drive B and then prompts you to type a new volume label.

To delete a volume label, use the LABEL command without a name. When DOS prompts you to type a new volume label, press ENTER. A message appears, asking you to confirm deletion of the volume label. Type y to delete the label.

Viewing Labels

To view a disk's volume label and serial number, use the DIR or VOL command. When you use the DIR command, the volume label and serial number for the disk that you specify are displayed above the list of files.

The VOL command displays the volume label and serial number of the disk in the drive you specify (if the disk has no serial number, only the volume label is displayed). For example, type the following command to view the volume label and serial number of the diskette in drive A:

```
vol a:
```

Recovering Files from Defective Disks

If DOS or a program can no longer read a file or directory, there might be one or more damaged sectors on the disk. To recover the parts of the file or directory that are not damaged, you can use the RECOVER command.

CAUTION:
The root directory, where the recovered files are stored, can hold only a limited number of entries. If you try to recover more files than the root directory can hold, some files will be lost. In general, use the RECOVER command only when it is absolutely necessary.

Recovering Files

You cannot retrieve the part of a file that is stored in a defective sector, but you can recover the rest of it by using the RECOVER command. For example, if part of the GRAY.HIC file on a diskette in drive A is no longer readable by the program that created it, you can use the following command to try to recover some of the information in the file:

```
recover a:gray.hic
```

DOS reads the file one sector at a time. If any of the sectors are damaged, DOS removes them from the file. DOS marks the bad sectors so that information cannot be stored there in the future.

When the operation is complete, DOS stores the recovered file in the root directory of the disk it came from. DOS names the recovered files sequentially, beginning with FILE0001.REC.

Note: Even if a part of a file is successfully recovered, the file might be unusable if the information that was unrecoverable is critical to the file.

If a directory is unusable, you can use the RECOVER command to recover as much of the information on the disk as possible. For example, to recover files in a directory on a diskette in drive A, you would type this command:

```
recover a:
```

All files that DOS recovers are stored in the root directory of the disk they came from.

Chapter 4. Partitioning Your Hard Disk

Each operating system has conventions for storing files on a hard disk. If you use only DOS, your entire hard disk can be set up to use DOS conventions. However, if you want to use another operating system in addition to DOS, you must *partition* your hard disk into DOS sections and non-DOS sections.

If you use only DOS, you can create a single DOS partition that occupies your entire disk. If you use only DOS and want to separate groups of directories, you can create a second DOS partition. When you use multiple partitions, DOS still has access to the entire hard disk. However, the files in the second partition appear to be on a different drive.

If you are going to use your hard disk with another operating system (for example, OS/2* HPFS), you must create a partition for DOS and a partition for the other operating system. You use an operating system by making its partition *active*.

Partitioning your disk is different from formatting it. When you partition a disk, you specify which sections of the disk DOS or another operating system can use. When you format a disk, DOS prepares an existing partition to receive files. After partitioning your disk, you must still format each partition before it can be used. See "Formatting Your Hard Disk After Using FDISK" on page 69.

To create one or more DOS partitions on a hard disk, use the Fixed Disk Setup Program (FDISK) described in "Using FDISK" on page 57.

Understanding Hard-Disk Partitions

You can create two kinds of DOS partitions on a hard disk:

- The *primary DOS partition* is the area that stores the IBMBIO.COM, IBMDOS.COM, and COMMAND.COM files necessary to run DOS. The primary partition can contain other files as well. If you want to start DOS from a hard disk, that disk must have a primary DOS partition.
- An *extended DOS partition* is an area where other non-system files can be stored on a disk. An extended partition is optional.

* OS/2 is a trademark of IBM Corporation.

You can have two partitions on a hard disk: one primary DOS partition and one extended partition. The extended partition can contain up to 23 *logical drives*. A logical drive is a section of a hard disk that serves as a separate disk drive. If you create a primary partition that does not occupy the entire hard disk, you can create an extended partition in the remaining space. In the extended partition, you can create logical drives.

The Primary DOS Partition

If you start DOS from a hard disk, the disk must have a primary DOS partition that contains the three DOS system files (IBMBIO.COM, IBMDOS.COM, and COMMAND.COM). This partition must be the active partition. In general, the primary DOS partition on the first hard disk is assigned the drive letter C.

You can reserve a portion of the disk space for the primary DOS partition. The rest of the disk space can be used for other partitions.

The Extended DOS Partition

When you create an extended DOS partition, you divide it into one or more logical drives. There are 26 letters available for logical drives (A through Z). Drives A and B are reserved for diskette drives. Drive C is reserved for the first primary DOS partition. Thus, there is a maximum of 23 logical drives that you can create in an extended DOS partition.

You can use logical drives to group your directories and files. Logical drives do not create more disk space, however.

For information about how to create an extended DOS partition, see "Creating an Extended DOS Partition" on page 63.

Non-DOS Partitions

Non-DOS partitions are partitions for other operating systems (such as OS/2 HPFS). You cannot use the DOS version of the Fixed Disk Setup Program to create a non-DOS partition. For information about creating non-DOS partitions, see your system documentation.

The Active Partition

To start your operating system from a hard disk, you must make the primary partition (in which the operating system is stored) the active partition. For example, to use DOS, make your primary DOS partition active. You can use a partition that is not designated as active, but you cannot start an operating system from that partition. The only way you can start an operating system from a partition not designated as active is if you run a multi-boot manager program, such as IBM OS/2 Boot Manager, which must be active.

A hard disk can have only one active partition at a time.

If you have only a primary DOS partition, it must be the active partition. For more information about the active partition, see "Setting the Active Partition" on page 66.

Using FDISK

The FDISK program displays information about partitions, creates partitions and logical drives, sets the active partition, and deletes partitions and logical drives.

If your computer has never had an operating system installed on it, you can choose to have your disk partitioned during installation or you can run FDISK to partition your disk after you have installed DOS.

CAUTION:
FDISK destroys all existing files in partitions you modify. If you are using FDISK to change the partitions on a disk with files on it, be sure to back up the files you want to keep before you begin. If you want to create smaller partitions on a hard disk that has only a large DOS partition, you must first back up all files you want to save.

Running FDISK During DOS Installation

If DOS is the first operating system to be set up on your computer, you can choose to partition your disk when you run the Setup program. By default, the Setup program creates one primary DOS partition that occupies the entire disk. If you want to create more than one partition, select **Partition some of the free space for DOS** during Setup. To partition the disk, follow the steps described in the subsequent sections of this chapter. When you finish creating partitions, DOS continues the Setup program. For more information about setting up DOS, refer to the *PC DOS Installation Guide* for details.

Running FDISK After DOS Has Been Installed

After you set up DOS, you can repartition your disk by typing:

```
fdisk
```

at the DOS command prompt. When the Fixed Disk Setup Program starts, the main menu appears, as follows:

```
                    PC DOS Version 6.3
                 Fixed Disk Setup Program
        Copyright (c) IBM Corporation 1983 - 1993

                      FDISK Options

Current fixed disk drive: 1

Choose one of the following:

1. Create DOS partition or Logical DOS Drive
2. Set active partition
3. Delete partition or Logical DOS Drive
4. Display partition information

Enter choice: [1]

Press Esc to exit FDISK
```

CAUTION:
If you use FDISK to change existing partitions on a hard disk, you lose the information contained in those partitions. Be sure you have copies of all files in a partition before using FDISK to change the partition.

To choose a menu option, type the option number and then press ENTER. To return to a previous menu, press ESC. To quit FDISK, return to the main menu, and then press ESC.

Each menu displays a `Current fixed disk drive` message, followed by a number. If you have only one hard (fixed) disk drive, the number is always 1. If you have more than one hard disk drive, the number shows which drive FDISK is currently working with. The first hard disk drive in your system is 1, the second is 2, and so on. Changing the current drive when you are using FDISK does not change the current drive when you return to the DOS command prompt. The current drive refers only to physical disk drives, not logical drives, when you are using FDISK.

Viewing Partition Data

You can view information about the status, type, and size of the partitions on a hard disk by selecting **Display Partition Information** (option 4) from the FDISK main menu.

The Display Partition Information screen looks like this:

```
                         Display Partition Information

 Current fixed disk drive: 1

 Partition  Status  Type      Volume Label  Mbytes   System    Usage
  C:1       A      PRI DOS    PCDOS_6        21    FAT16       50%
    2              EXT DOS                   21                50%

   Total disk space is   42 Mbytes (1 Mbyte = 1048576 bytes)

   The Extended DOS partition contains
   logical DOS drives.  Do you want to
   display logical drive information?  [Y]

   Press Esc to continue
```

The information varies, depending on the number, size, and type of partitions on your hard disk.

Column	Description
Partition	Shows the drive letter associated with each partition and the number of each partition.
Status	Displays the letter A next to the active partition.
Type	Shows whether a partition is a primary DOS partition (PRI DOS), an extended DOS partition (EXT DOS), or a non-DOS partition.
Volume Label	Shows the volume label of the primary partition. This field can be blank.
Mbytes	Shows the size of each partition, in megabytes.
System	Shows the type of file system being used on the partition.
Usage	Shows the percentage of the current disk that each partition occupies.

If there is an extended DOS partition that contains logical drives, a prompt appears, asking whether you want to see information about that partition's logical drives. Type y if you want to view this information.

The screen displaying information about logical drives resembles this:

```
Display Logical DOS Drive Information

Drv  Volume Label  Mbytes  System  Usage
 D:   BACKUPA         18    FAT16    90%
 E:   BACKUPB          2    FAT12    10%

Total Extended DOS Partition size is  20 Mbytes (1 Mbyte = 1048576 bytes)

Press Esc to continue
```

The information varies, depending on the number and size of the logical drives.

Column	Description
Drv	Displays the drive letter of each logical drive.
Volume Label	Shows the label assigned to each drive. This field can be blank.
Mbytes	Shows the size of each logical drive, in megabytes.
System	Shows the type of file system being used on that partition.
Usage	Shows the percentage of available space in the extended DOS partition that each logical drive occupies.

Creating a Primary DOS Partition

The hard disk you use to start DOS must have a primary DOS partition. You can create a primary DOS partition that occupies the entire hard disk or only part of it. If you want to create an extended DOS partition with logical drives or, if you want to have space for a non-DOS partition, you must create a primary DOS partition that does not occupy your entire disk.

You cannot change the size of an existing primary DOS partition. If you want a primary DOS partition of a different size, you must delete the existing partition and create a new one. When you delete the existing partition, you lose any information stored there, so back up files you want to save. For information about deleting a partition, see "Deleting a Partition or Logical Drive" on page 67.

If your hard disk does not already have a partition, you can use the following procedure to create a primary DOS partition that occupies the entire disk.

To create a primary DOS partition that occupies the entire hard disk:

1. From the FDISK main menu, select **Create DOS Partition or Logical DOS Drive** (option 1) and press ENTER.

   Another menu is displayed.

2. Select **Create Primary DOS Partition** (option 1) and press ENTER.

   Another prompt appears, displaying this message:

   ```
   Do you wish to use the maximum size for a Primary DOS
   Partition and make the partition active (Y/N).........? [Y]
   ```

3. Type y

   If you type n, FDISK prompts you to create a smaller primary partition. See the following procedure for more information.

   FDISK creates a primary partition that takes up all the available space on the hard disk. If you have only one hard disk, DOS displays the following message:

   ```
   System will now restart

   Insert DOS system diskette into drive A:
   Press any key when ready
   ```

4. Insert a DOS system diskette and then press any key.

After partitioning the hard disk, you need to format it by using the FORMAT command with the **/s** switch. For more information, see "Formatting Your Hard Disk After Using FDISK" on page 69.

To create a primary DOS partition that occupies part of the hard disk:

1. From the FDISK main menu, select **Create DOS Partition or Logical DOS Drive** (option 1) and press ENTER.

   Another menu is displayed.

2. Select **Create Primary DOS Partition** (option 1) and press ENTER.

   Another prompt appears, displaying this message:

   ```
   Do you wish to use the maximum available size for a Primary DOS
   Partition and make the partition active (Y/N).........? [Y]
   ```

3. Type n and another menu is displayed.

4. If you want the default size (100 percent), press ENTER. Otherwise, type the number of megabytes or the percentage of the disk to use. If you type a percentage, follow the number with a percent (%) sign.

   The following message is displayed:

   ```
   Primary DOS Partition created, drive letters changed or added.
   ```

5. To return to the FDISK main menu, press ESC.

When you quit FDISK, you need to format the new partition on your hard disk by using the FORMAT command with the **/s** switch. For more information, see "Formatting Your Hard Disk After Using FDISK" on page 69.

Note: When you create a primary DOS partition that does not occupy your entire hard disk, you must make the partition active before you can use the hard disk with DOS. For more information about making a partition active, see "Setting the Active Partition" on page 66.

Creating an Extended DOS Partition

If you want to divide your hard disk into more than one DOS partition, you can create an extended DOS partition in addition to the primary DOS partition. Within the extended DOS partition, you typically can assign up to 23 logical drives. Logical drives are areas of your hard disk that DOS treats as separate disk drives. You must assign at least one logical drive to an extended DOS partition.

If you have one hard disk, there must already be a primary DOS partition that uses only part of the disk before you can create an extended DOS partition. If you have more than one hard disk, only the disk you use to start your system must have a primary DOS partition; your other hard disk(s) can contain only extended DOS partitions. However, if you are using only one partition per disk, set the single partition as a primary partition.

To create an extended DOS partition:

1. From the FDISK main menu, select **Create DOS Partition or Logical DOS Drive** (option 1).

   The Create DOS Partition or Logical DOS Drive menu appears.

2. From this menu, select **Create Extended DOS Partition** (option 2) and press ENTER.

   A menu is displayed showing the total number of megabytes available for an extended partition. The default for the partition size is the maximum available space on the hard disk drive, minus the size of the primary partition. If there is no space available, you must delete and recreate the primary DOS partition so it is smaller or reduce the size of any non-DOS partitions that exist.

3. If you want the default size, press ENTER. Otherwise, type the number of megabytes or the percentage of the unused disk space to be used for the extended DOS partition. If you type a percentage, follow the number with a percent (%) sign.

   The Create Logical Drive(s) in the Extended DOS Partition menu is displayed.

When you create an extended DOS partition, you can set up one or more logical drives. See the following section for more information.

Note: If FDISK finds defective tracks at the beginning of an extended DOS partition, it adjusts the partition boundaries to avoid those tracks.

Creating Logical Drives in an Extended DOS Partition

To store information in an extended DOS partition, you must create one or more logical drives. Each logical drive is assigned a drive letter. You can store and retrieve information on a logical drive as though it were a physical disk drive. For example, you can use logical drive D to store files for a particular program, and you can work with those files by specifying drive D rather than a directory.

To create or modify a logical drive:

1. Create an extended DOS partition.

   See page 63 for information about how to create an extended DOS partition.

2. Using the Create Logical DOS Drive(s) menu, type the number of megabytes or the percentage of the partition space you want to use for the first logical drive. If you type a percentage, follow the number with a percent (%) sign. If you want one logical drive to occupy the whole extended DOS partition, press ENTER.

3. Continue specifying the sizes of partitions until you have used up the entire partition or until you have created all the logical drives you want.

   If the entire partition is assigned to logical drives, the FDISK main menu reappears. To quit the menu before all the space has been allocated, press ESC.

After you create a logical drive, you must format it. For more information about formatting a logical drive, see "Formatting Your Hard Disk After Using FDISK" on page 69.

How Drive Letters Are Assigned

The primary DOS partition on your startup hard disk is drive C. The drive letters of additional hard disks and logical drives depend on the number of disks you are using and how they are partitioned.

If you have only one hard disk, logical drives you create in the extended DOS partition are given letters beginning with D. For example, if you create five logical drives in the extended DOS partition, they are named D, E, F, G, and H.

If your system has more than one hard disk and you have only one primary DOS partition, all logical drives you create in the extended DOS partitions are assigned letters consecutively.

Suppose your system has two hard disks. The first has a primary DOS partition and an extended DOS partition with two logical drives, and the second hard disk has an extended partition with two logical drives. The primary DOS partition on the first disk is drive C; the two logical drives on the disk are drives D and E. The two logical drives on the second disk are drives F and G.

You might have primary DOS partitions on more than one hard disk. If so, DOS assigns drive letters consecutively to all the primary DOS partitions first and then assigns drive letters consecutively to the logical drives in the extended DOS partitions.

Some programs only accept drive letters A and B. In these cases, you can use the SUBST (substitute) command, which temporarily substitutes a drive letter with another drive letter and path. While a substitution is in effect, DOS regards any reference to drive A or B as a reference to a directory on your hard disk.

For example, suppose you are using a communications program that only accepts files from drive A. To substitute the drive letter A with the \COMM directory on drive C, you would type the following command before starting the program:

```
subst a: c:\comm
```

Then, when the program requests files from drive A, DOS looks in C:\COMM instead.

The drive letter you specify in the SUBST command must not be greater (in alphabetic order) than the letter specified in the LASTDRIVE command in your CONFIG.SYS file. For more information about the LASTDRIVE command, refer to the *PC DOS Command Reference and Error Messages* manual.

When you finish using the program, remove the association between the drive and the directory by using the **/d** switch:

```
subst a: /d
```

The following commands ignore any substitutions you make when using the SUBST command: FORMAT, CHKDSK, DISKCOMP, DISKCOPY, FDISK, LABEL, RECOVER, RESTORE, and SYS.

Setting the Active Partition

The active partition contains the operating system that is loaded when you start or reset your system. Unless you create a primary DOS partition that occupies your entire hard disk, you must set the active partition by using FDISK. If you are using a non-DOS partition, you must reset the active partition when you want to switch between DOS and the non-DOS operating system. Only one partition can be active at a time.

To set the active partition:

1. From the FDISK main menu, select **Set Active Partition** (option 2).

   A menu is displayed that indicates the status of each partition. The active partition is designated by the letter A.

2. Type the number of the partition you want to make active. The default setting is the current active partition number.

3. To return to the FDISK main menu, press ESC.

You can make only primary partitions active. If you try to make an extended DOS partition active, FDISK displays a message similar to the following:

```
Partition selected (3) is not startable, active partition not changed.
```

Deleting a Partition or Logical Drive

You might need to change the size of your partitions. You cannot reduce or enlarge an existing partition. If you want to change a partition's size, you must delete the partition and recreate it.

When you delete a partition, all information in the partition is deleted and cannot be recovered. Therefore, be sure you have backup copies of the information you want to save. When you delete a partition, you do not lose information stored in other partitions on your disk. For example, if you delete the extended DOS partition but not the primary DOS partition, files in the primary DOS partition are not deleted.

If you want to delete the primary DOS partition on a disk, you must first delete each logical drive in the extended partition, then the extended partition itself.

You can delete one or more logical drives in the extended DOS partition of a hard disk. All information on a logical drive is lost when you delete it. Deleting one logical drive does not affect the information on other logical drives.

If there are logical drives that have drive letters greater (in alphabetic order) than the drive you delete, these letters will change. Suppose, for example, that you have logical drives D, E, and F on a disk. If you delete drive D, drive E becomes drive D, and drive F becomes drive E.

Note: To continue using DOS after you delete the primary DOS partition, you must restart your system, using a DOS system diskette in drive A. Make sure you have a diskette formatted as a system diskette before you delete the primary partition.

To delete a partition or logical DOS drive:

1. From the FDISK main menu, select **Delete Partition or Logical DOS Drive** (option 3).

   Another menu is displayed.

2. Type the number of the option you want.

   FDISK displays the status of the partition or logical drives along with a message warning that the data in the partition or logical drive will be lost.

3. Type the number that corresponds with the drive letter and then type the volume label of the logical drive you want to delete.

   FDISK displays a message confirming the information you typed.

4. Type y to delete the partition or drive.

If you deleted your primary DOS partition, you need to create a new one before you can use DOS from your hard disk.

To create a new primary DOS partition before you quit the Fixed Disk Setup Program:

1. From the FDISK main menu, select **Create DOS Partition or Logical DOS Drive** (option 1).

   Another menu appears.

2. Follow the instructions in the preceding sections to create a DOS partition that occupies either your entire hard disk or only part of it.

   When FDISK is finished, a prompt appears.

3. Insert a system diskette in drive A and press any key to restart your system.

4. Format the new partition by using the FORMAT command with the **/s** switch.

5. Remove the system diskette from drive A and restart your system.

   At this point, your hard disk contains the DOS files IBMBIO.COM, IBMDOS.COM, and COMMAND.COM. You can now install the remaining DOS files by inserting the next Setup diskette and continuing with DOS installation.

Working with More Than One Hard Disk

If your system has more than one hard disk drive, you can use FDISK to create and modify partitions on any drive. The first physical disk must have a primary DOS partition. Your other disks can have primary DOS partitions or extended DOS partitions, or both. On most computers with multiple hard disks, only drive C can be used to start the operating system.

When you start FDISK, you work with the first hard disk on your system. To work with a different disk drive, you must select **Change Current Fixed Disk Drive** (option 5) from the FDISK main menu and specify the number of the drive you want to partition. If you have only one hard disk drive, the **Change Current Fixed Disk Drive** option is not displayed on the FDISK main menu.

Formatting Your Hard Disk After Using FDISK

When you quit FDISK after you change the size of any of the DOS partitions on your hard disk, this message is displayed:

```
System will now restart
```

If you changed the size of your primary DOS partition, FDISK prompts you to insert the DOS system diskette in drive A and press any key. You then return to the DOS command prompt.

After using FDISK, you must use the FORMAT command to prepare any partition that you create or change. If you do not format the disk, DOS gives you the following error message when you try to use the hard disk:

```
Invalid media type
```

If you are formatting the primary DOS partition of the hard disk from which you will start your system, be sure to transfer the DOS system files from a diskette by using the FORMAT command with the **/s** switch or by using the SYS command after you format.

When you format your hard disk, you must format each new partition separately. For example, if you made your primary DOS partition (drive C) smaller and created two logical drives in an extended DOS partition (drives D and E), you must use the FORMAT command three times:

```
format c: /s
format d:
format e:
```

The first command formats the primary partition and transfers the DOS system files from the startup disk to that partition. The second and third commands format the logical drives.

CAUTION:
If you made changes to some but not all of the partitions or logical drives on your system, be careful when you format the partitions or drives you changed. Because FDISK can assign different letters to drives after you change partitions or logical drives, you might inadvertently format a drive that has information stored on it.

Before you format a drive, you can use the CHKDSK command to check the contents of the drive. If you see the message `Probable non-DOS disk` or `Invalid media type` before the disk information is displayed, the drive is not formatted. If the disk information is displayed without this message, the drive is formatted.

You might want to give a descriptive label to each logical drive you create so that you know what information is on it when you make changes to your system. You can do this by using the **/v** switch when you use the FORMAT command.

For more information, see "Considerations for Formatting Disks" on page 47.

Chapter 5. Working with Batch Programs

As you work with DOS, you might find yourself repeatedly typing identical sequences of commands. For example, you might often type the same three commands to change the current drive, change the current directory, and then start a program. By using DOS, you can store commands in a *batch program* or *batch file*. Instead of typing commands individually, you need only type the name of the batch program. DOS carries out this "batch" of commands as if you had typed the commands individually from the keyboard.

A batch program is an unformatted text file that contains one or more DOS commands. For example, a batch program might contain the commands you use to change your directory and start a text editor, such as the E Editor.

Suppose you are copying files to a diskette by using the following commands:

```
cd\work\docfiles
copy *.txt a:
cd\reports\xfiles
copy *.txt a:
```

To put these four commands into a batch program, you store them in an unformatted text file and assign the file a .BAT extension. Each time you want to copy these files, you type the name of the batch program at the DOS command prompt.

Using batch programs gives you the following advantages:

- Batch programs speed up your work. When you run a batch program, you only have to remember one command, instead of several. You do not have to retype multiple commands or look up commands you cannot remember.
- Batch programs customize DOS. Using batch programs, you can create personalized commands that perform the exact task you need. You can also design your own prompts and messages.

Understanding Batch Program Commands

Any DOS command you use at the DOS command prompt or in DOS Shell can also be put in a batch program. In addition, there are DOS commands that are specially designed for batch programs. The commands and their functions are as follows:

Command	Action
CALL	Runs a second batch program and then returns to the first one.
CHOICE	Prompts you to choose from a set of choices, waits until you make a choice by pressing a key, and beeps if you select a key that is not among the available choices.
ECHO	Displays messages on your screen or turns the ECHO feature on or off.
FOR	Carries out a command for a group of files or directories.
GOTO	Switches to commands in another part of your batch program and continues processing commands from that point.
IF	Carries out a command based on the result of a condition.
PAUSE	Temporarily stops your batch program from running; your program starts running again when you press any key.
REM	Annotates your batch program so that you can remember what each part of the program does.
SHIFT	Changes the position of replaceable parameters.
@	Is placed in front of a command in your batch program and prevents the single command from being displayed.

The CALL, ECHO, GOTO, IF, PAUSE, and REM commands are explained further in this chapter.

For information about the remaining commands (FOR, CHOICE, and SHIFT command), refer to the *PC DOS Command Reference and Error Messages* manual, or type `help` followed by the command name for a brief explanation and command syntax.

Creating a Batch Program

You can create a batch program by using the E Editor or the COPY command. When you use a text editor other than the E Editor to create a batch program, save your files as unformatted (ASCII) text. Most text editors have an option for saving files this way.

For information about the E Editor, see Chapter 8, "Working with the Text Editor" on page 105.

When you are creating a small batch program, it might be more convenient to use the COPY command, which is described on page 74.

Naming a Batch Program

A batch program must have a .BAT file name extension. It is generally not a good idea to give a batch program the same name as an existing DOS command. Suppose, for example that you create a batch program for a customized formatting command and name it FORMAT.BAT. The program does not run if DOS finds the FORMAT.COM file before it finds FORMAT.BAT, because DOS gives precedence to files with .COM and .EXE extensions.

You can avoid this problem by using a name that is not already assigned to a DOS command. For example, you might name the program MYFMT.BAT.

Running a Batch Program

To run a batch program, you type its name without the extension. For example, if you had a file named FILES.BAT in your current directory, you would type the following command to run the batch program:

```
files
```

When the batch program has parameters, add a space after the file name. For example, when the FILES.BAT program requires a file specification as a parameter, you would type a command like this:

```
files c:\reports\data
```

By default, DOS displays each command in a batch program as the command is carried out. After the batch program runs, DOS might display two DOS command prompts because it treats the end-of-file character in a batch program as a new line.

Stopping a Batch Program

When you want to stop a batch program before all of its commands have run, press CTRL+C or CTRL+BREAK (more than once, if necessary). You get a message asking to confirm that you want to stop the batch program.

Type `Y` to stop the program or `N` to continue with the next command. You can temporarily stop a batch program by pressing CTRL+S or the PAUSE key. This "freezes" the screen until you press another key.

When your batch program is on a diskette and you remove the diskette while the program is running, DOS displays the following message:

```
Not ready reading drive A
Abort, Retry, Fail?
```

To continue running the batch program, reinsert the diskette and type `r`.

Making a Small Batch Program

You can use the E Editor provided with DOS to create a batch program. When there are more than a few lines in your batch program, it is a good idea to use a text editor to create the file.

Suppose, for example, you want to create a batch program that formats a 360K diskette in your high-density diskette drive. To create the program and name it MYFMT.BAT, use the following E command:

```
e c:\myfmt.bat
```

At this point, the file is empty and the cursor is placed where you can add the FORMAT command to the file. Type the following:

```
format a: /f:360
```

Now you are ready to close the file and return to the DOS command prompt. You do so by pressing F4.

After you have created the batch program, you need only type the name of the batch program to format a 360K diskette in your high-density diskette drive, as follows:

```
myfmt
```

DOS displays the FORMAT command on the screen, and then prompts you to insert a diskette in drive A. Make sure the directory that contains this batch program is either current or in the directory search path.

Testing a Batch Program

It is generally best to a create a large batch program in stages. This ensures that one part of the batch program works before you create another part.

When you run a batch program that contains a command that is not valid, DOS cancels that command and proceeds to the next. If the batch program is set up to display commands as they are carried out, you will see an error message when a command is not valid. If commands are not displayed, the batch program will contain an ECHO OFF command. Remove any ECHO OFF commands if you want commands to be displayed along with the error messages.

Displaying Messages with a Batch Program

You can include messages in a batch program to prompt you for additional information or to remind you of a particular task that the batch program does.

When you want DOS to display a message on your screen, use the ECHO command. For example, to display the message `Put a diskette in drive A`, you would use the following command:

```
echo Put a diskette in drive A
```

Tip: On networks, your message is displayed quicker when you put it in a .TXT file and then use the TYPE command in your batch program to display the message.

DOS displays this message on the screen. When you want the message shifted to the right a certain number of spaces, you must include the spaces as part of the message. For example, to center the message on your screen, add the necessary spaces in the command, as follows:

```
echo          Put a diskette in drive A
```

When you want to skip a line, type ECHO followed by a period:

```
echo.
```

When ECHO is on, DOS displays batch commands at the command prompt as it carries them out. Therefore, the message in the preceding example (`Put a diskette in drive A`) is displayed twice: first at the command prompt as part of the batch command and secondly as a prompt to carry out the command itself. To suppress commands that appear at the command prompt and display a message only once, use the following command:

```
echo off
```

Add this command to the beginning of your program as the first line.

Tip: To prevent a single command in your batch program from being displayed, put an at sign (@) in front of it. For example, to prevent the display of the ECHO OFF command, type `@echo off`

When you want commands to be displayed, use this command at the beginning of the program:

```
echo on
```

Using the PAUSE Command

To momentarily stop a batch program at a predetermined command or print task, use the PAUSE command in the batch program, as follows:

```
pause
```

When DOS finds a PAUSE command in a batch program, it displays the following message:

```
Press any key to continue...
```

DOS stops running the program until you press any key (except the PAUSE key).

For example, adding a PAUSE command to the following COPYIT.BAT program stops the program from running while you put a diskette in drive A.

```
echo off
echo Put a diskette in drive A then
pause
copy c:\work\may\*.txt a:
copy c:\reports\may\*.doc a:
cls
echo Here are the files you copied:
echo.
dir a:  /p
```

When this batch program pauses, DOS displays the following:

```
Put a diskette in drive A then
Press any key to continue...
```

Including Remarks in a Batch Program

When your batch program is longer than a few lines, it is helpful to include remarks. You can use remarks to comment on the commands in a batch program and to make the program easier to read by separating it into sections.

You add a remark by typing `rem` followed by a space and the comment you want to include, as in this example:

```
rem This part of the batch program copies files to a diskette.
```

Note: Ensure that the ECHO command is turned off before using the REM command.

After you type `rem` and a space, DOS ignores any other text on the line. Therefore, you can type any character you want on the remark line or leave it blank with the exception of the following character symbols that have special meaning for COMMAND.COM:

- less-than (<)
- greater-than (>)
- pipe (|)

For example, the following remarks divide and explain sections of COPYIT.BAT:

```
rem *****Copy of the MAY subdirectories*****
rem
echo off
echo Put a diskette in drive A then
pause
copy c:\work\may\*.txt a:
copy c:\reports\may\*.doc a:
rem
rem Clear the screen and display the files that were copied
rem
cls
echo Here are the files you copied:
echo.
dir a:  /p
```

Remarks do not affect the way a batch program runs; they simply annotate the commands for anyone who reads the file.

Running One Batch Program from Another

You can run a batch program from another batch program by including just the name of the program you want to start or by including the CALL command with the name of the program. If you type only the name, the original batch program quits running, and the new batch program runs instead.

For example, the following batch program runs four commands and then starts a batch program named NEXTONE:

```
a:
cd\tmp
copy c:\*.sys a:
cd\perm
nextone
```

When NEXTONE finishes running, DOS displays the command prompt.

If you want to return to the original batch program after running the other batch program, use a CALL command with the name of the program you want to start. When the second batch program finishes running, DOS returns to the original batch program and carries out the next command.

For example, the following batch program carries out two commands, starts NEXTONE, and then carries out two more commands when NEXTONE finishes running:

```
a:
cd\tmp
call nextone
copy c:\*.sys a:
cd\perm
```

Using Replaceable Parameters

DOS includes symbols called *replaceable parameters*, numbered **%0** through **%9**. You can include replaceable parameters in a batch program. When you run the batch program, DOS replaces the symbol with the parameter you include when you type the batch command.

The **%0** replaceable parameter substitutes for the name of the batch command as it is typed at the DOS command prompt.

Replaceable parameters **%1** through **%9** substitute for command-line parameters typed after the batch-command name. The first parameter on the command line is **%1**, the second is **%2**, and so on. If you want to specify more than nine parameters, use the SHIFT command.

For information about the SHIFT command, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help shift` for a brief explanation and command syntax.

Suppose you created a batch program (COPYIT.BAT) that moved data from one subdirectory to another. After the creation of the batch program, you could use the replaceable parameter feature to accomplish this task. The following example illustrates this:

```
copyit %1 %2
```

This batch program in COPYIT.BAT is set up to move all information from the first parameter **%1** to the second parameter **%2**. If you wanted to move all information from subdirectory `c:\april\*.*` to drive A using the replaceable parameters, you would type the following at the DOS command prompt:

```
copyit c:\april\*.* a:
```

DOS replaces **%1** with `c:\april\*.*` and **%2** with `a:`

Note: If you use the percent sign (%) as part of a file name or string within a batch program, you must type it twice. The first occurrence indicates that the second % is part of a name, rather than a replaceable parameter.

In addition to replaceable parameters, you can use environment variables in a batch program. For information about environment variables and an example of how to use one in a batch program, see the SET command in the *PC DOS Command Reference and Error Messages* manual, or type `help set` for a brief explanation and command syntax.

Controlling Program Flow

To increase the flexibility of a batch program, you can use the IF command to carry out different commands under different conditions, and the GOTO command to switch to different parts of the program. By using replaceable parameters with IF and GOTO commands in a batch program, you can perform complex tasks.

Using the IF Command

You can use the IF command to specify a condition that must be true for a command to be carried out. For example, suppose you want to create a batch program named RUNIT.BAT that starts your chess program, CMATE, when you type the following command:

```
runit A
```

To perform this task, include the following IF command in RUNIT.BAT:

```
if "%1"=="A" cmate
```

The double equal sign (==) means the parameter must equal the value. When DOS carries out this command, it checks to see whether or not **%1** is an A. If **%1** is an A, DOS carries out the command that follows (in this case, it starts the CMATE program). When you quit CMATE, DOS carries out the command on the next line of RUNIT.BAT.

If **%1** is not an A, DOS skips the command that runs CMATE and moves to the next line of the batch program. Both the parameter and the letter with which it is compared should be enclosed in quotation marks to avoid syntax errors when no parameter is present.

Using the GOTO Command

The GOTO command directs your program to switch to another part of the program and continue processing the commands at that point. The line that the program is to switch to is marked with a label preceded by a colon (:). The same label appears in the GOTO command, as in the following example:

```
goto skipdown
echo both of these echo commands
echo will be skipped
:skipdown
cls
```

Using the IF and GOTO Commands Together

If you use the GOTO command with an IF command, you can run different sections of a batch program under different conditions. For example, when you are at the command line about to run the batch file, the following command directs DOS to switch to the line labeled *chess* if you type an uppercase A:

```
if "%1"=="A" goto chess
```

Using a series of IF commands, you can create a batch program that can run several programs. For example, the following batch program changes to the C:\GAMES\CHESS directory and runs the CMATE program if you type an uppercase A; it also changes to the C:\GAMES\CHECK directory and runs the CHECKERS program if you type anything but an uppercase A.

```
if "%1"=="A" goto chess
rem
rem****************************************************
rem If the user doesn't type A, run Checkers.
rem
cd\games\check
checkers
rem Checkers game has finished running to end this batch file
rem Skip over Chess by jumping to the line labeled :end.
goto end
rem
rem
rem *******************************************************
rem If DOS jumps to this label, the user wants Chess.
rem
:chess
cd\games\chess
cmate
rem The following line marks the end of the batch program.
:end
```

Chapter 6. Redirecting Input and Output

Redirection characters let you perform many useful tasks. A *redirection character* changes the place that a command gets information from or sends information to. Redirection characters are useful when you want DOS to save information in a file rather than display it on your screen. You can also use a *filter command* to redirect information that a command typically would send to the screen. Filter commands help you sort, view, and select parts of the output of a command.

Redirecting Command Input and Output

Unless you specify otherwise, DOS receives input from your keyboard and sends output to your screen. Sometimes it is useful to redirect the input or output to a file or a printer. For example, you might want to redirect a directory listing from the screen to a file.

To redirect the input or output of a command, you use one of the following redirection characters:

- The greater-than sign (>) sends the output of a command to a file or a device, such as a printer.
- The less-than sign (<) takes the input needed for a command from a file rather than from the keyboard.
- The double greater-than sign (>>) adds output from a command to the end of a file without deleting the information already in the file.

Redirecting the Output of a Command

Almost all commands send output to your screen. Even commands that send output to a drive or printer also display messages and prompts on your screen.

To redirect the output from the screen to a file or printer, use the greater-than sign (>). You can use the greater-than sign with most DOS commands. For example, in the following command, the directory listing produced by the DIR command is redirected to the DIRLIST.TXT file:

```
dir > dirlist.txt
```

If the DIRLIST.TXT file does not exist, DOS creates it. If DIRLIST.TXT exists, DOS replaces the information in the file with the output from the DIR command.

The following command creates a file named CHECKDSK.TXT, which contains the output of the CHKDSK command:

```
chkdsk a: > checkdsk.txt
```

If CHECKDSK.TXT already exists, DOS replaces its contents with the output that the CHKDSK command usually sends to your screen.

To add the output from a command to the end of a file without losing any of the information already in the file, use a double greater-than sign (>>). For example, in the following command, the directory listing produced by the DIR command is appended to the DIRLIST.TXT file:

```
dir >> dirlist.txt
```

To send the output of a command to a printer, use the greater-than sign with the name of the port to which the printer is connected. For example, the following command redirects the output of the DIR command from the screen to the printer attached to the LPT1 port:

```
dir > lpt1
```

Note: Some command output, such as error messages, cannot be redirected when using the greater-than sign (>).

Redirecting the Input to a Command

Just as you can send the output of a command to a file or printer rather than to your screen, you can take the input for a command from a file rather than from the keyboard. To take input from a file, use the less-than sign (<). For example, the following command takes the input for the SORT command from the LIST.TXT file:

```
sort < list.txt
```

DOS alphabetizes the lines of the LIST.TXT file and displays the result on your screen.

For more information about the SORT command, see "Sorting Text Files" on page 86.

Passing Information through Filter Commands

Filter commands divide, rearrange, or extract portions of the information that passes through them. DOS has three filter commands:

- The MORE command displays the contents of a file or the output of a command one screen at a time.
- The FIND command searches through files and command output for the characters you specify.
- The SORT command alphabetizes files and command output.

To send input from a file to a filter command, use the less-than sign (<). If you want the filter command to get its input from another command, use the pipe (|).

Note: Before using the pipe, you should set a TEMP environment variable. For information about setting environment variables using the SET command, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help set` for a brief explanation and command syntax.

Controlling the Screen Display by Using the MORE Command

The MORE command displays the contents of a file or the output of a command one screen at a time. For example, the following MORE command displays the contents of the LIST.TXT file one screen at a time:

```
more < list.txt
```

After a screen of information is displayed, you see the word `More` appear. To continue to the next screen, press any key. To stop the command without viewing more information, press CTRL+C.

The MORE command is helpful if you are working with a command that produces more than one screen of output. For example, suppose you want to view a directory tree for your hard disk. If you have more directories than DOS can display on the screen, you can use the TREE command with a pipe (|) and a MORE command as in the following example:

```
tree c:\ | more
```

The first screen of output from the TREE command is displayed, followed by the word `More`. DOS pauses until you press any key (except the PAUSE key).

Searching for Text by Using the FIND Command

The FIND command searches one or more files for the text you specify. DOS displays every line containing that text. The FIND command can be used as a filter command or as a standard DOS command.

For information about the FIND command as a standard DOS command, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help find` for a brief explanation and command syntax.

To use FIND as a filter command, include a less-than sign (<) and a file name to search through. The search is case-sensitive. For example, the following command finds occurrences of the string `Pacific Rim` in the file TRADE.TXT:

```
find "Pacific Rim" < trade.txt
```

To save the output of the FIND command rather than display it, use a greater-than sign (>) and the name of the file that is to store the output. For example, the following command finds occurrences of "Pacific Rim" in the TRADE.TXT file and saves them in the NWTRADE.TXT file:

```
find "Pacific Rim" < trade.txt > nwtrade.txt
```

To print the output rather than display it, use a greater-than sign and the name of the port your printer is attached to, as in the following command:

```
find "Pacific Rim" < trade.txt > LPT1
```

Sorting Text Files

The SORT command alphabetizes a text file or the output of a command. For example, you would use the following command to sort the contents of a file named LIST.TXT and display the results on your screen:

```
sort < list.txt
```

In this example, the SORT command sorts the lines of the LIST.TXT file and displays the results without changing the file. To save the output of the SORT command rather than display it, include a greater-than sign (>) and a file name in the command. For example, you would use the following command to alphabetize the lines of the LIST.TXT file and store the results in the ALPHLIST.TXT file:

```
sort < list.txt > alphlist.txt
```

To sort the output of a command, type the command followed by a pipe (|) and the SORT command. For example, the following command sorts the output of the FIND command:

```
find "Jones" maillst.txt | sort
```

When you type this command, DOS lists in alphabetical order the lines in which the string `Jones` appears.

Note: You can use the SORT command on files that are 64K or less in size.

For more information about the SORT command, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help sort` for a brief explanation and command syntax.

Combining Commands with Redirection Characters

You can combine filter commands, other commands, and file names to make custom commands. For example, you might use the following command to store the names of files that contain the `LOG` string:

```
dir /b | find "LOG" > loglist.txt
```

DOS sends the output of the DIR command through the FIND filter command and stores the file names that contain the `LOG` string in the LOGLIST.TXT file. The results are stored as a list of file names (for example, A.LOG, LOGDAT.SVD, and MYLOG.BAT).

To use more than one filter in the same command, separate the filters with a pipe (|). The following command would search every directory on drive C, find the file names that include the string `LOG` and display them one screen at a time:

```
dir c:\ /s /b | find "LOG" | more
```

Because you use a pipe (|), DOS sends the output of the DIR command through the FIND command. The FIND command selects only file names that contain the `LOG` string. The MORE command displays the file names that are selected by the FIND command—one screen at a time.

Chapter 7. Using Editing Keys for Commands

You can use *editing keys* to quickly view and edit your last command rather than retype it. In addition, you can use the DOSKey program to do your editing. By adding the DOSKEY command to your AUTOEXEC.BAT file, this program will be loaded and ready to use every time you start your computer. The DOSKey program includes the DOS editing keys plus a number of other keys that are useful for editing commands.

Using the DOSKey program you can also do the following:

- Store the commands you use over and over again so that you do not have to retype them to use them.
- Create *macros* that contain a series of commands. A macro runs much like a batch program.

Using DOS Editing Keys

DOS provides several editing keys that you can use to edit the last command you typed at the command line. For example, suppose you misspell the name of a file in a COPY command. Rather than retype the entire command, you can use editing keys to view the command and change the part that is misspelled. This section describes the editing keys you can use if you do not have the DOSKey program loaded in your AUTOEXEC.BAT file.

When you type a command, DOS carries out the command and saves it in a temporary location called the *template*. For example, suppose you type the following command:

```
type ada.txt
```

When you press ENTER, DOS displays the contents of ADA.TXT and copies the command `type ada.txt` to the template. The template can contain only the previously typed command. For information about saving and reusing more than one command, see "Using DOSKey to Work with Commands" on page 91.

You can use the command stored in the template as a starting point for typing your next command. The following editing keys display and edit the previous command stored in the template:

Editing Key	Command Carried Out
F1 (or RIGHT ARROW)	Copies the previous command to your screen, one character at a time. One character is displayed each time you press F1. For example, if your last command was `dir c:\work\finals\*.bak`, by pressing the F1 key three times `dir` is displayed at the DOS command prompt. To add a character, press the INSERT key, type the character, and press F1 to display the rest of your command one character at a time.
F2	Copies the previous command to your screen, up to but not including the character you specify. For example, your last command was `dir c:\worknew\final`. If you press F2 and type `\`, `dir c:` is displayed at the DOS command prompt.
F3	Copies the remainder of the previous command to your screen.
F4	Deletes the previous command from the template, starting from the beginning of the command, up to but not including the letter you specify. For example, suppose the previous command was `type ada.txt`. If you press F4 and type `d`, and then copy the template to your screen by pressing F3, DOS displays `da.txt`.
F5	Copies the current command line to the template, but does not carry out the command.
F6	Places a CTRL+Z character (^Z) in the current command line.
LEFT ARROW or BACKSPACE	Deletes the character before the cursor on the current command line, without affecting the template.
DEL	Deletes the character on the template corresponding to the current cursor position.
INSERT	Starts insert mode so that characters you type do not replace characters in the same position in the template. Press the INSERT key again to stop insert mode.
ESC	Cancels the current command line without carrying it out, leaving the template unchanged.

Note: Some of these keys function differently when DOSKey is loaded.

Copying a Previously Typed Command

When you type a command, DOS carries it out, copies the command to the template and displays the DOS command prompt. For example, suppose you type the following command:

```
copy c:\work\*.txt a:
```

The files are copied to a diskette in drive A, the command is copied to the template, and the DOS command prompt appears. At this point, you can view the entire previous command by pressing F3. The command from the template is displayed:

```
copy c:\work\*.txt a:_
```

The cursor appears at the end of the command. To copy your files to another disk, insert a different disk in drive A and then press ENTER. DOS carries out the COPY command again.

Editing a Previously Typed Command

Using the F3 and LEFT ARROW keys, you can quickly fix a command that you mistyped. For example, suppose you typed `*.dpc` and pressed ENTER when you meant to type `*.doc`, as in the following command:

```
copy c:\work\*.dpc a:
```

Rather than retype the command, you can edit the incorrect one. To edit the command, first press F3. The command from the template is displayed:

```
copy c:\work\*.dpc a:_
```

The cursor appears at the end of the command. To change dpc to doc, press the LEFT ARROW key five times to move the cursor back five spaces:

```
copy c:\work\*.d_
```

To correct the command, type `o`, press F3, and then press ENTER.

Using DOSKey to Work with Commands

You can use the DOSKey program to view, edit, and carry out DOS commands that you have used previously. DOSKey includes the DOS editing keys and other keys that make it easy for you to use previous commands. When using DOSKey, you can type several commands on one line.

In addition, you can create, run, and save command *macros*. A macro is one or more DOS commands that are stored in random-access memory (RAM). It runs much like a batch program. The first time you use DOSKey it is loaded into RAM. Thereafter, DOS saves your previous commands and any macros you create.

Although you have more editing power with DOSKey than you do with DOS editing keys, DOSKey takes up a small amount of your computer's memory. If you need the maximum amount of memory for other purposes, you might want to use DOS editing keys instead of DOSKey.

Loading DOSKey Into Memory

To load the DOSKey program into memory, type the following at the DOS command prompt:

```
doskey
```

Unless you indicate otherwise, DOS reserves 512 bytes of memory for the commands and macros you record. If your average command contains 15 characters, you can store or have the ability to recall about 35 commands with the amount of memory reserved. The resident portion of the DOSKey program itself occupies about 4K of memory.

If you want to reserve more or less memory, you can include the **/bufsize=** switch in the command. For example, to reserve 300 bytes of memory for recorded commands, type the following command:

```
doskey /bufsize=300
```

As the memory you reserved for DOSKey is used up, the oldest commands are removed so that the new ones can be stored in the buffer. You can clear the buffer by pressing ALT+F7.

Typing More Than One Command on a Line

Typically, you type one command per line. After you install DOSKey, you can type several commands on a line. You separate each command by pressing CTRL+T. A paragraph mark (¶) appears on your screen each time you press CTRL+T. You can type as many commands as you like on one line as long as the total line length does not exceed 128 characters.

For example, to delete all the files in the \TMP directory and then remove the directory, type the following two commands on the same line:

```
del \tmp\*.* ¶ rd \tmp
```

The DEL command is initiated and you are prompted to confirm the deletion. Then the second command is initiated.

Viewing Previous Commands

When DOSKey is loaded, it keeps a list of your commands as you type them. You can use the following keys to view previous commands. To carry out a command again after it is displayed, press ENTER.

Editing Key	Command Carried Out
UP ARROW	Displays the previous command in the list.
DOWN ARROW	Displays the next command in the list.
F7	Displays the list of commands DOSKey has stored.
F8	Cycles through the stored commands that start with the characters you specify. (You type the search text and then press F8).
F9	Prompts you to type the number of the stored command you want. To see the numbered list of commands, press F7.
PAGE UP	Displays the oldest command in the list.
PAGE DOWN	Displays the newest command in the list.
ESC	Clears the command from the screen.

Viewing the List of Stored Commands

DOSKey displays a numbered list of the commands it saves. For example, suppose you type the following three commands after you load DOSKey:

```
copy c:\work\*.txt c:\revised
dir c:\revised\*.txt
dir c:\work\*.txt
```

DOSKey saves the three commands. To view the full list of commands, press F7. A numbered list of the commands appears:

```
1: copy c:\work\*.txt c:\revised
2: dir c:\revised\*.txt
3: dir c:\work\*.txt
```

If there are more commands in the list than can fit on one screen, DOSKey pauses after each screen of commands. To see the next screen of commands in the list, press any key except PAUSE.

Viewing the Previous or Next Command

The first time you press the UP ARROW key, DOSKey displays the most recent command.

You can reuse the command by pressing ENTER.

If you press the UP ARROW key more than once, DOSKey displays commands further back in the list. To move backward in the list and view the next most recent command, press the UP ARROW key again. Continue this process to move backward in the list of commands.

To move forward in the list, press the DOWN ARROW key.

Viewing the First or Last Command

To view the most recent command, press PAGE DOWN. To view the oldest command, press PAGE UP.

Viewing Other Commands in the List

You can use F9 or F8 to view a specific command in the list. Suppose DOSKey has saved the following list of commands:

```
1: a:
2: dir
3: c:\myuts\figdsk a: time=30 space=35.8
4: dir
5: del *.tmp
```

If you want to view command number 3, you can use the arrow keys or press F9. When you press F9, the following appears:

```
Line number:
```

To view line 3, type `3` and then press ENTER.

You can also use F8 to view a command that begins with letters you specify. For example, to view a command that begins with C:\, type `c:\` at the DOS command prompt and then press F8.

When you press F8, DOSKey displays the most recent command that begins with the characters you typed. You can press F8 again to view the next command in the list that begins with the characters you typed. Keep pressing F8 to cycle through all the matching commands. If DOSKey does not find a matching command in the list, nothing happens.

Editing and Using Previous Commands

As you type a new command or after you view a previous command, you can use editing keys to change it. You can use the same editing keys with DOSKey that you use with the command template. When you use some of these keys with DOSKey, however, you see slightly different results. DOSKey provides a number of additional editing keys that make it easy to change a previously typed command. The editing keys affect only the displayed command; they do not change any commands that DOSKey has already stored.

You can use the following editing keys with DOSKey:

Editing Key	Commands Carried Out
HOME	Moves the cursor to the beginning of the displayed command.
END	Moves the cursor to the end of the displayed command.
LEFT ARROW	Moves the cursor back one character in the displayed command.
RIGHT ARROW	Moves the cursor forward one character in the displayed command.
CTRL+LEFT ARROW	Moves the cursor back one word in the displayed command.
CTRL+RIGHT ARROW	Moves the cursor forward one word in the displayed command.
BACKSPACE	Deletes the character before the cursor on the current command line, without affecting the template.
DEL	Deletes the character at the cursor.
CTRL+END	Deletes all characters from the cursor to the end of the line.
CTRL+HOME	Deletes all characters from the cursor to the beginning of the line.
INSERT key	Toggles between insert mode and replace mode.
ESC	Clears the displayed command from the screen.

If you hold down CTRL while you press the RIGHT ARROW or LEFT ARROW key, the cursor moves to the beginning of the next or previous word. A word in this case is a group of characters separated from other characters by a space. For example, the following command has three words:

```
copy c:\games\suzz.exe a:_
```

If the cursor is at the end of the line, as in this example, you can move it to the "C" in C:\GAMES\SUZZ.EXE by pressing CTRL+LEFT ARROW twice.

With the cursor anywhere in the word C:\GAMES\SUZZ.EXE, you can move the cursor to the beginning of the next word by pressing CTRL+RIGHT ARROW. If you press CTRL+RIGHT ARROW again, the cursor moves to the end of the line.

By pressing the INSERT key, you can add characters at the position of the cursor. The INSERT key toggles between insert and replace mode. In replace mode, new characters you type replace any characters that follow the cursor. After you press the INSERT key , you switch to insert mode; the character at the cursor position and the characters following the cursor move right as you type. For example, suppose the following line is displayed, and the cursor is under the S in SUZZ.EXE:

```
copy c:\games\suzz.exe a:
```

To change the line so that C:\GAMES\SUZZ.EXE becomes C:\GAMES\NEW\SUZZ.EXE, you press the INSERT key and type `new\`. The line now appears like this:

```
copy c:\games\new\suzz.exe a:
```

To turn off insert mode, press the INSERT key again. The characters you now type replace any characters following the cursor. Insert mode is turned off when you press ENTER to carry out a command. You can start DOSKey and specify insert mode as the default by using the **/insert** switch.

For more information about the DOSKEY command, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help doskey` for a brief explanation and command syntax.

Deleting the List of Stored Commands

To delete the list of stored commands and begin a new list, press ALT+F7. The list is also deleted when you reload DOSKey or reset your system.

Saving the List of Stored Commands in a Batch Program

To save the list of stored commands, you can type the DOSKEY command with the **/history** switch, the output redirection character (>) and the name of the file in which you want the list stored. For example, to store your list of commands in the SAVCOMMS.TXT file, you would type the following command:

```
doskey /history > savcomms.txt
```

To create a batch program by using DOSKey, first press ALT+F7 to delete the list of commands from DOSKey. Then type the commands you want to save. Use the **/history** switch to save the commands in a file with a .BAT extension.

Using DOSKey to Work with Macros

A macro is a set of commands that you can carry out by typing the name of the macro. A macro is very much like a batch program. Both contain sets of commands that you carry out by typing a name.

A macro has the following characteristics:

- It is stored in RAM and as a result processes much faster than a batch program.
- It can be run from any directory.

- The macro is created as one command or a series of commands separated by a special character all on one line. The total length of the macro cannot exceed 127 characters.
- You can use replaceable parameters. These are represented by the characters **$1** through **$9**.
- Macros are lost each time you turn your system off or reset it. This can be avoided by putting the definition commands for the macros you commonly use into one batch program. To make the macros available, you run the batch program.

Creating a Macro

To create a macro, type `doskey` followed by the macro name, an equal sign, and the commands in the macro. For example, you can use the following command to create a macro called DDIR that displays a directory in wide format:

```
doskey ddir=dir /w
```

If you type `ddir` at the DOS command prompt, DOS processes the macro, displaying a five-column list of the files in the current directory. Because the macro is stored in memory, it does not matter which directory is current when you run it.

To include more than one command in a macro, separate the commands with a dollar sign ($) and the letter T. For example, the following command creates a macro called CMP that alphabetizes and lists the .DOC files and then the .BAK files in the current directory:

```
doskey cmp=dir *.doc /o:n $t dir *.bak /o:n
```

While you are creating and testing a macro, it is easiest to type the command that defines the macro at the DOS command prompt. Then, you can use the DOSKey editing keys to change and redefine the macro quickly.

Because macros are stored in memory, they are lost when you turn your system off or reset it. Therefore, if you create a macro that you use often, put the command that defines the macro in your AUTOEXEC.BAT file so the macro is available each time DOS starts.

Running a Macro

To run a macro, type its name at the DOS command prompt. For example, to run the DDIR macro, type the following command at the DOS command prompt:

```
ddir
```

If the macro has parameters, leave a space between the macro name and the parameters. For example, suppose you create a macro called DUPS that has as parameters the name of the text file you want to copy and the name of the directory that you want to copy the file to. To copy all .TXT files from the current directory to the C:\TXTFILES directory, you would type the following command:

```
dups *.txt c:\txtfiles
```

There cannot be any space between the DOS command prompt and the macro name. If there is, DOS does not recognize the name and displays the following message:

```
Bad command or file name
```

Suppose you want to create a macro that has the same name as a command. For example, you would use the following command to create a macro called DIR so that typing `dir` would replace the DOS DIR command:

```
doskey dir=dir /w
```

When you have a macro with the same name as a command, DOS runs the macro rather than the command. Thus, when you are at the DOS command prompt, DOS runs the DIR macro rather than the DIR command.

Whenever you want to use the DIR command instead of the DIR macro, you can type a space between the DOS command prompt and `dir`. Now, DOS does not recognize DIR as a macro name, but it does recognize it as a command.

Note: You cannot run a macro from within a batch program, but you can define it in a batch program. For more information about batch programs, see Chapter 5, "Working with Batch Programs" on page 71.

When you want to stop a currently running macro, you must press CTRL+C for every command in the macro. Each time you press CTRL+C in a macro, DOS stops the command it is currently processing.

Editing a Macro

You can change a macro by editing the command that created it. If the macro is defined in a batch program, you can edit the batch program and then run it again. If the macro is one of the commands that DOSKey has stored, you can redisplay the macro command, edit it by using DOSKey editing keys, and complete the edit by pressing ENTER. For information about DOSKey editing keys, see "Editing and Using Previous Commands" on page 94.

Saving a Macro

To save macros stored in memory, use the DOSKEY command with the **/macros** switch, a greater-than sign (>), and a file name. In the following example, the names and contents of the macros currently in memory are stored in the MACS.BAT file:

```
doskey /macros > macs.bat
```

If you add the DOSKEY command to the beginning of each macro that you saved in the MACS.BAT file, you can load the macros into memory by running the batch program. For example, suppose you created the following three macros and saved them in the MACS.BAT file:

```
ddir=dir /oe /p
mv=copy $1 $2 $t del $1
where=dir /s /p $1:\*.$2
```

If you want these macros to be available each time you start your system, first add the DOSKEY command to them, as follows:

```
doskey ddir=dir /oe /p
doskey mv=copy $1 $2 $t del $1
doskey where=dir /s /p $1:\*.$2
```

Each time you run the batch program, DOSKey loads the three macros into memory. You might want to run the batch program from your AUTOEXEC.BAT file by using the CALL command. Put the name of the batch file after the CALL command. When you start your system, the macros are re-created. For more information about the AUTOEXEC.BAT file, see Chapter 2, "Configuring Your System" on page 27.

Deleting a Macro

To delete a macro, type `doskey`, followed by the name of the macro you want to delete plus an equal sign. For example, to delete the DDIR macro, type the following command:

```
doskey ddir=
```

DOSKey removes the macro from memory. To delete all macros, press ALT+F10.

Note: Deleting macros makes the memory available for other macros, but it does not return the memory to the command-history buffer.

Using Replaceable Parameters

You can use replaceable parameters in a macro in much the same way you use them in a batch program. In a macro, the replaceable parameters are **$1** through **$9** rather than **%1** through **%9**.

For example, the following command creates a macro named FINDIT that searches through the directories on drive C for file names that match the one you specify:

```
doskey findit=dir c:\$1 /s
```

The **/s** switch is used to display file names from all directories on drive C (including the current directory) that match the file name you specify.

To run this macro, type `findit` followed by a file name at the DOS command prompt. For example, to locate all files on drive C that have the extension .OLD, you would type the following command:

```
findit *.old
```

DOSKey substitutes the file name you type for the **$1** parameter in the macro. The resulting command looks like this:

```
dir c:\*.old /s
```

You can use the same parameter more than once in a macro. For example, the following command creates a macro called DDEL. This macro moves a file to a directory named DELETED on drive C.

```
doskey ddel=copy $1 c:\deleted $t del $1
```

When you run the DDEL macro, you type the name of the file that is to go into the C:\DELETED directory. DOSKey replaces the `$1` in the macro with the file name. It copies the file to DELETED and then deletes it from its original directory.

To delete the files in the C:\DELETED directory, you can use this macro named CLEANUP:

```
doskey cleanup=dir c:\deleted $t del c:\deleted\*.*
```

The macro displays a list of files in the C:\DELETED directory and then starts the DEL command. Because the DEL command prompts you to confirm deletion of all the files, you have a chance to review the file names before deleting any files.

Using the $* Replaceable Parameter

You can use the **$*** replaceable parameter to assign to a single parameter all of the text following the command that starts a macro. Typically, DOS distinguishes parameters by looking for a space. The text between the first two spaces is the first parameter, the text between the second and third spaces is the second parameter, and so on. If you use the **$*** parameter, DOSKey ignores spaces and assigns all text to the **$*** parameter.

The **$*** parameter is most useful when the macro you create uses a variable number of parameters. For example, you can use the following command to create a macro named D that allows you to abbreviate the DIR command:

```
doskey d=dir $*
```

This macro works exactly like the DIR command, regardless of the number of parameters you specify. For example, all of the following commands are carried out in the same way with the D macro as they are with the DIR command:

```
d *.txt
d *.txt /s
d *.txt /s /b
```

If you use the **$1** parameter instead of the **$*** parameter with the macro, DOS substitutes the first parameter and ignores the rest of the command line.

Redirecting Input and Output

You redirect input and output in macros the same way you do using DOS commands. The only difference is that macros require different characters:

Character	Redirection
$L (or **$l**)	Equivalent to the less-than sign (<). It redirects the input to a command.
$G (or **$g**)	Equivalent to the greater-than sign (>). It redirects the output of a command.
GG (or **gg**)	Equivalent to the double greater-than sign (>>). It appends output onto the end of a file.
$B (or **$b**)	Equivalent to the pipe (|). It redirects output from one command to another.

For example, the following command creates a macro named PDIR that prints directory listings:

```
doskey pdir=dir $g lpt1:
```

The following command creates a macro named MTYPE that displays the contents of the file you specify and pauses between each screen of information:

```
doskey mtype=type $1 $b more
```

The following command creates a macro named ASORT that alphabetizes the file and stores the information in a different file:

```
doskey asort=sort $L $1 $g $2
```

To run this macro, you type the file name you want to sort. DOSKey replaces the **$1** replaceable parameter with the first file name you specify. The **$L** parameter redirects the file to the SORT command. The **$g** and **$2** parameters redirect the output of the SORT command to the second file you specify.

For example, after you create the ASORT macro, type the following:

```
asort input.txt output.txt
```

This is the same as typing:

```
sort < input.txt > output.txt
```

When defining a DOSKey macro, you must mark the dollar sign ($) when it occurs anywhere other than in parameters, command separators, and redirection characters. You mark it by typing two dollar signs rather than one.

For example, suppose your macro copies a file to the $&CENTS directory. When you type the name of the directory, you must use "$$&cents" in your macro definition. As the command is carried out, the dollar sign is assumed to be a standard character rather than a marker or parameter.

Chapter 8. Working with the Text Editor

A *text editor* allows you to create, edit, and print memos, letters, and special files (such as AUTOEXEC.BAT or CONFIG.SYS) that customize DOS.

A text editor, sometimes referred to as an editing tool, differs from a word processing program in the following ways:

- Files you create by using the text editor are unformatted text files, such as ASCII text files, which means they do not contain any special formatting characters. If you save such a file when using a text editor, the special characters of the word processing program may lose their formatting function.

  Because DOS batch programs and files, such as AUTOEXEC.BAT and CONFIG.SYS must be unformatted text files, text editors are a useful tool for customizing your system.

- When you reach the end of a line using a text editor, you must press ENTER to move the cursor to the next line because there is no "word wrap" feature used with a text editor. A line of text can be up to 255 characters long.
- Unlike word processing programs that always place files in a specific directory, you must specify the exact location (full path) where you want to place the file when using a text editor.
- A text editor can have its own command line within the program. This command line is not the same command line as the DOS command prompt. This command line allows you to type editor commands used only for performing tasks within the text editor.

Although not designed to be a word processor, the flexibility of the DOS text editor allows you to do some tasks to make it "act" more like a word processing program, such as:

- Set a margin before you start typing. The text will then "word wrap" when it reaches the right margin you have set. This will eliminate your having to press ENTER at the end of each line of text.
- Use the AUTOSAVE feature to automatically get temporary backup versions of your files.
- Use the split-a-line and join-a-line feature to resemble pressing ENTER and DELETE when using a word processing program.

Choosing a Text Editor

DOS provides a more flexible text editing tool than provided with previous versions of DOS.

The DOS E Editor:
Using the E Editor, you can:

- Type commands from the E Editor command line.
- Select text and move, copy, overlay, or delete it.
- Copy and move text from one file into another file.
- Access multiple files.
- Locate and make a change globally in a file.
- Size and drag an editing window.
- Draw boxes around text.
- Add and multiply numbers in a marked area.
- Change characters in a marked area to all uppercase or all lowercase letters.
- Use online help for information about the E Editor function keys and commands.
- Edit large text files.

Note: *This chapter only discusses how to use the E Editor*

The Edlin editor:
Edlin, the line editor included in previous versions of DOS, is also available. For information about specific EDLIN command options, refer to the *PC DOS Command Reference and Error Messages*.

The DOS 5.0 Editor:
When you install this version of DOS, it analyzes your system and determines if you have a previous version of DOS on your system. If you are a previous user of DOS 5.0, the DOS editor provided with DOS 5.0 will still be available for your use. If you prefer to use this editor, you can select it from the programs area of the DOS Shell or type `edit`, followed by the path and name of the file you want, to load the DOS 5.0 Editor.

Starting the E Editor

You can start the E Editor by:

- Selecting the editor from DOS Shell.

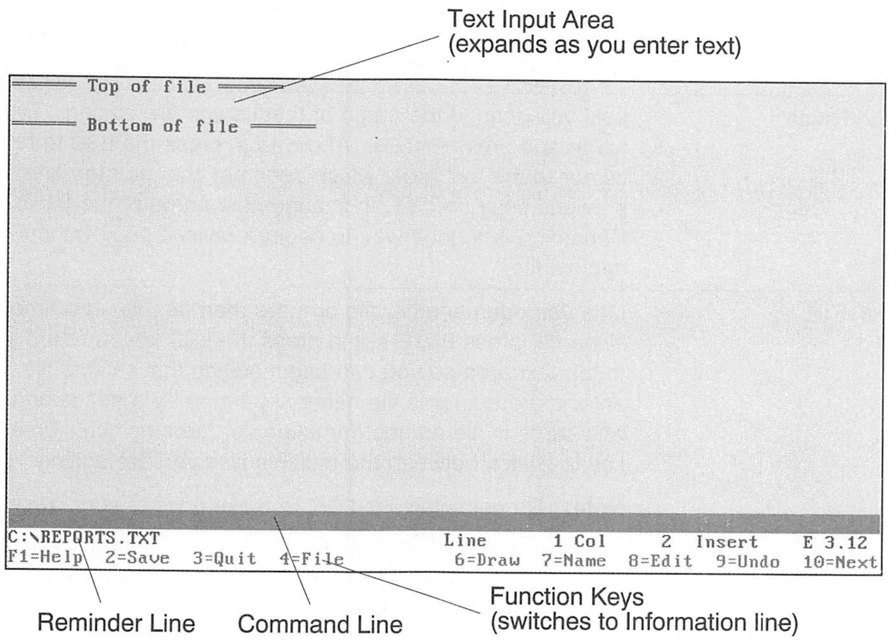
  Information on how to select files and run programs using DOS Shell can be found in the *Everyday DOS for PC DOS 6* manual.

- Typing `e` (or `e` followed by the path and name of the file) at the DOS command prompt.

When you load the E Editor, you will be using the E Editor command line to perform many of the tasks discussed in this chapter. Press ESC to switch between the E Editor command line and the editing window.

Viewing the E Editor Screen

After you start the E Editor and begin typing, the version number displayed is replaced by the function keys at the bottom of the screen and you see a screen similar to the following:



Reminder Line

The bottom line of the E Editor screen displays a brief reminder of each action associated with the function key (or F keys, such as F1=Help and F2=Save). You can perform the most common editing tasks with one keystroke.

Function Key	What It Does
ESC	Allows you to move between the text input area to the E Editor command line (not a function key).
F1=Help	Accesses help information about function keys and editing commands. You can page through this help information using the PAGE UP and PAGE DOWN keys.
F2=Save	Saves the file you are editing but does not exit the file.

Function Key	What It Does
F3=Quit	Removes your file's text from memory without saving it. If your file has been modified, you will be asked whether you really want to quit the file without saving. When there are no remaining files in memory, then you can exit to DOS.
F4=File	Saves your file and quits the editor after saving. When there are no remaining files in memory, then you can exit to DOS.
F6=Draw	Starts the drawing text graphics feature. Then you type a number (1 through 6), B for blank, or / followed by any character. You can create or erase text graphic drawings by moving around with the cursor keys. See "Drawing Lines" on page 138 for more information.
F7=Name	Lets you change the name of the file you are editing. Type the new name and press ENTER. Afterwards, press the ESC to return the cursor to the text area, which does not change the name of the previous copy on disk. It changes the name of the file to be saved. Renaming is a good way to begin a revised copy without losing the original file.
F8=Edit	Lets you open another file or more than one file at a time. Type a *filename*, press ENTER, and press the ESC key to return your cursor to the text area so you can begin editing this second file. You can enter more than one file name separated by a space and can specify wild cards in file names (for example, *.doc or *.c.). Press the F10 key to switch between the multiple files you are editing. **Note:** Do not select F8=EDIT to make edits to your current file.
F9=Undo	Restores the original contents of a line you typed incorrectly. Undo does not restore deleted lines or changes to multiple lines. Only the current line you are editing can be restored.
F10=Next	Switches between active files if you have loaded another file (F8 key or EDIT command).

The reminder line, called the *function key text area*, changes when you hold down a SHIFT, CTRL, or an ALT key, to show you the function key text appropriate to that shifted state.

Information Line

You also can see the name of the file you are editing, location of the cursor (line number and column number), typing mode (insert or replace), and the version number of the IBM DOS E Editor.

Command Line

The command line can be found near the bottom of the E Editor screen. To jump the cursor from the typing area to the command line, press ESC. Press the ESC key again to return to the typing area.

Window Style

You can change the location of the reminder line, the information line, and the command line by selecting a different window style. See "Customizing the E Editor" on page 144 to learn how to alter the appearance of the editing screen and other customization techniques.

Getting Help

To get information about the E Editor after the editing window appears, press F1 to display help information.

```
═══ Top of file ═══

 E  Editor Help       Directory of Help Panels

 Page 1:      Function Keys and      (F1          - F10)
              Alt+Keys               (Alt+F1      - Alt+F10)
 Page 2:      Shift+Keys and         (Shift+F1    - Shift+F10)
              Ctrl+ Keys             (Ctrl+F1     - Ctrl+F10)
 Page 3:      Alt+ Summary           (Alt         - Alt+0)
 Page 4:      Alt+Summary and        (Alt+P       - Alt+=)
              Ctrl+ Summary          (Ctrl+Enter  - Ctrl+Backspace)
 Page 5:      Ctrl+ Summary          (Ctrl        - Ctrl+Z)
 Page 6-9:    Command Summary
 Page 10:     Edit Commands
 Page 11:     Termination Commands
 Page 12:     Cursor Movement Controls
 Page 13:     Copying, Moving, and Deleting text

 Page Down                                                  F3=Exit

C:\DOS\EHELP.HLP                  Line      2 Col      1  Insert    E 3.12
F1=Help  2=Save  3=Quit  4=File    6=Draw  7=Name  8=Edit  9=Undo  10=Next
```

You can then use the PAGE UP and PAGE DOWN keys to move forward and backwards through the help screens.

You should not alter the Help file so always press the F3 key to quit or to exit Help.

Leaving the E Editor

You can stop editing and exit from the E Editor in two ways: QUIT (without saving changes) or FILE (saving changes).

F3=Quit	Removes your file's text from memory without saving it. If your file has been modified, you will be asked whether you really want to quit the file without saving. When there are no remaining files in memory, then you can exit to DOS.
F4=File	Saves your file and removes it from memory. When all files have been removed from memory, you exit to DOS.

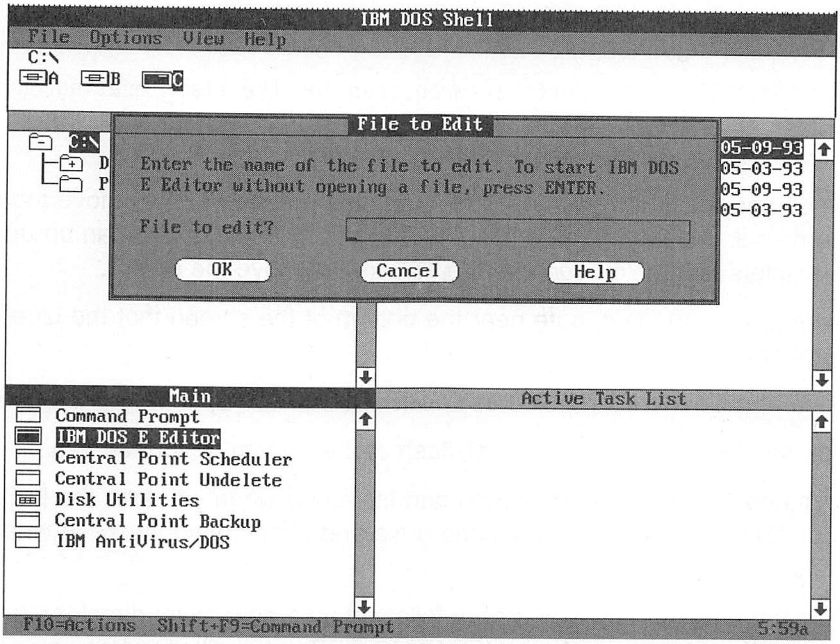
Creating or Modifying a File

You can use the E Editor to create a new text file or modify an existing file. For example, try entering some lines of text in a file named REPORTS.TXT in your root directory. You can use either method, DOS Shell or entering a command from the DOS prompt, to try this example.

To edit a text file using DOS Shell:

1. In the Main group, select the text editor by:
   - If you are using a mouse, double click on the **IBM DOS E Editor** icon.
   - If you are using a keyboard, press the TAB key to move to the Main group. Use the UP ARROW or DOWN ARROW keys to move the selection cursor to **IBM DOS E Editor**. Then press ENTER.

   The File to Edit pop-up window appears.



2. Type in the name of the file you want to create or modify, including its path and file name in the **File to Edit** field. For example, you would type `c:\reports.txt` in the field if you wanted to create a new file REPORTS.TXT in your root directory.

   If you want to modify an existing file, you must enter the file's name and full path.

3. Select **OK**.

To start the editor from the DOS command prompt:

Type the following to try entering some lines of text in a file named REPORTS.TXT in your root directory.

```
e c:\reports.txt
```

You must always type the full path of the file unless you started the E Editor from the directory where you eventually want the file to be placed.

You have opened the C:\REPORTS.TXT file using both DOS Shell and the E command typed at the DOS command prompt.

You see the editing window. Your directory path and file name are displayed at the bottom of the screen. For descriptions of the parts of an E Editor screen, see "Viewing the E Editor Screen" on page 107.

1. Begin typing your text from where the cursor is positioned. Try typing the text in the following example:

```
The following reports are required for the staff meeting on Friday:
    1.  Weekly Status Report
    2.  Funding Report
```

2. When you reach the end of a line, you must press ENTER to move the cursor to the next line because there is no "word wrap." A line of text can be up to 255 characters long. You can use the TAB key to move the cursor.

   As you enter the text, note near the bottom of the screen that the Line and Col numbers change.

3. Save and file the information as C:\REPORTS.TXT by pressing the F4 key.

   You see `Saving C:\REPORTS.TXT` flash at the bottom of your screen.

   If you do not specify the full path and file name when you load the E Editor, your file will be saved to the same drive and directory you were at when you created the file.

   You can change it by typing `save` followed by a new drive, directory, or file name. If you were in the C:\OFFICE\NOTES subdirectory when you typed `e reports.txt`, your file is saved as C:\OFFICE\NOTES\REPORTS.TXT instead of C:\. If you want to save the file to this directory, you would type the following at the E Editor command line:

   ```
   save c:\reports.txt
   ```

   After leaving the E Editor, you are returned to a command line. or to DOS Shell.

4. If you chose to run **IBM DOS E Editor** from DOS Shell, refresh DOS Shell to see the file you created.

Naming an Unnamed File

If you type only `e` at the DOS command prompt or select **OK** in the File to Edit pop-up window in DOS Shell without specifying a file name, you would see `.Unnamed file` near the bottom on the left side of the screen.

To name the unnamed file:

1. Press F7=Name if you loaded an unnamed file by typing e.

   You are prompted to enter a name for the file on the Editor command line.

   Enter a file name after Name on the E Editor command line.

   Remember: Be sure to include a full path name (drive, directory, and subdirectory if applicable) where you want to find this file when you exit the E Editor. Unlike word processing programs that always place files in a specific directory, you must specify the exact location where you want to place this file. Otherwise, the file is put in the same drive and directory as you were in when you loaded the E Editor.

2. Save and file under the new name by pressing F4=FILE.

In addition to creating a new file and editing an existing file, you can also save and print files using the E Editor.

Saving and Exiting a File

After you create a file or make changes to an existing file, you can save it using a new name or you can save it using the name you specified when you opened the file. You also can save it with the same file name or new file name in a different drive or directory.

It is a good idea to save your work in case there is a power loss or equipment failure by pressing F2=Save often during the editing session. Also, the E Editor has an AUTOSAVE feature. If you type autosave 15 at the E Editor command line, your file is temporarily saved to a file after you press ENTER 15 times.

CAUTION:
Some files that you open might include special formatting characters. If you save such a file when using the E Editor, special characters lose their formatting function.

To save the file and exit using the same file name:	• Press F4=FILE to save the file and exit. The file is saved in the same drive and directory you were in when you started the E Editor.
To save the file and exit using a different file name:	1. Press ESC to get to the E Editor command line. 2. Type: `file` *`newname.ext`* where *newname.ext* is the new file name and extension for the file you are saving. **Remember:** If you attempt to save a file using the name of a file that already exists, the E Editor will not display a message asking whether you want to replace the existing file.
To save the file in a different drive or directory and exit:	1. Press ESC to get to the E Editor command line. 2. Type: `file` *`drive:\dir\filename.ext`* where *drive:\dir* is the new drive and directory where you want to store the file, and *filename.ext* is the name you want to give the file. The name can be the same name or a new name. **Remember:** If you attempt to save a file in a directory that contains a file with the same name, you are not prompted and asked whether you want to replace the existing file.

Tip: You can save a modified version of a file without losing the original version. For example, if you have a file named MEMO.TXT, you can keep the original file and save a modified version as MEMO_2.TXT.

Editing Multiple Files

One advantage you have with the E Editor over other text editors is the ability to open and edit more than one file at a time. This ability to edit multiple files means, for example, that you can create a new file and copy (or move) information from an existing file into the new file. Or, you can edit multiple new files, multiple existing files, or any combination of new and existing files. The files are placed into memory in a type of invisible *ring*, and you can switch between all files in the ring by pressing F10.

To edit more than one file at a time:

Open a file from the DOS command prompt. You can open the files from either DOS Shell or by typing the E command from the DOS command prompt.

Here are some sample commands you might type:

`C:\>e report.txt`	In this first example the E Editor loads the file REPORT.TXT you created earlier in the chapter into the E Editor.
`C:\>e report.txt data.dat`	In this second example, two files are loaded into the E Editor. Use the F10 key to switch between files that are loaded for editing.
`C:\>e *.c`	In this third example, all the files with the C extension are loaded into the E Editor.

From the E Editor command line, the equal sign (=) substitutes the current file's directory and saves keystrokes if you are editing several files in another directory. File names must be separated by spaces. For example:

Your current directory is C:\EDIT
The current file is C:\MYDOC\PROG\JIM.DOC
You issue the command: EDIT =MIKE.TXT
The E Editor loads C:\MYDOC\PROG\MIKE.TXT

Printing a File

You can use the E Editor PRINT command to print an open file. This command works only if you have a printer connected to or redirected through your LPT1 (parallel) printer port.

To print a file:

1. Edit the file you want to print. (You can use REPORTS.TXT as a file you are wanting to print.)
2. At the E Editor command line, type:
   ```
   print
   ```
3. Press ENTER.

   The readiness of the printer is tested first to avoid having to wait for a device timeout in case the printer is offline. You might see the message:

   ```
   Printer not ready
   ```

   which means the printer is turned off, offline, or perhaps out of paper. Make sure the printer is ready and then repeat the PRINT command.

Using Cursor Movement Keys to Move Around in the Text File

When you load an existing file into the E Editor, your file appears on the screen and the cursor is placed in the top, far left position in the text. To view a different part of the file, you have to move the cursor.

Summary of Cursor Movement Keys

Cursor Movement Key	Action
UP ARROW	Moves cursor one line up.
DOWN ARROW	Moves cursor one line down.
LEFT ARROW	Moves cursor one character to the left.
RIGHT ARROW	Moves cursor one character to the right.
HOME	Moves cursor to column 1 of the current line.
END	Moves cursor to the end of the current line.
PAGE UP	Shifts view to page above current page. The cursor stays at same position on screen.
PAGE DOWN	Shifts view to page below current page. The cursor stays at same position on screen.
CTRL+HOME	Moves cursor to top line of file.
CTRL+END	Moves cursor to bottom line of file.
TAB	Moves cursor to next tab stop.

Cursor Movement Key	Action
SHIFT+TAB	Moves cursor to previous tab stop.
CTRL+PAGE UP	Moves cursor to top of screen.
CTRL+PAGE DOWN	Moves cursor to bottom of screen.
CTRL+LEFT ARROW	Moves cursor to beginning of word left of cursor.
CTRL+RIGHT ARROW	Moves cursor to beginning of word to right of cursor.
ENTER	Creates a new line and moves the cursor to the beginning of the new line.
CTRL+ENTER	Moves cursor to column 1 of next line.
ESC	Moves cursor back and forth between text and E Editor command line.
ALT+E	Moves cursor to end of marked block.
ALT+Y	Moves cursor to beginning of marked block.
CTRL+F5	Moves cursor to the beginning of a word.
CTRL+F6	Moves cursor to the end of a word.
CTRL+F (repeat FIND)	Moves cursor to next found text.
CTRL+Q	When in .ALL file, positions cursor on corresponding line in original file. If not in .ALL file, you are placed there and the cursor is moved down one line.

Note: You can also scroll by holding down an arrow key. For additional information about the .ALL file and All command see "Searching for Text Using the ALL Command" on page 134.

Performing Basic Editing Tasks

In addition to entering text, there are basic features that most text editors perform, such as:

- Inserting or replacing text.
- Connecting or breaking a line of text.
- Adding a blank line.
- Deleting all or only part of a line.
- Deleting characters, words, or lines of text without marking them first.
- Restoring a deleted line.
- Setting tabs.
- Setting margins.
- Saving keystrokes in a macro.

Inserting or Replacing Text

The E Editor has two modes for entering text: insert mode and replace mode. Press the INSERT key to alternate between modes.

To insert text:	Position the cursor at the point where the next text is to start and type it in. Existing text moves to the right to make room for what you type. When you start the E Editor, it is automatically in insert mode. At the bottom right-hand corner of the E Editor screen, you see the word "Insert." Press the INSERT key if you want to change to replace mode. In insert mode, the cursor is a box shape.
To replace text:	Press the INSERT key to replace characters instead of inserting them. At the bottom right-hand corner of the E Editor screen, you now see the word "Replace." Position the cursor at the point where the next text is to start and type it in. Existing text is overwritten when you type. Press the INSERT key again to resume inserting. In replace mode, the cursor is an underscore.

Connecting or Breaking a Line of Text

Because a text editor does not have "word wrap" (except for setting a margin before you begin typing), the way to break lines at a certain point in the text is to split (breaking) them. Other times you might want to join (connecting) two or more shorter lines into one line of text. The E Editor allows you to split or join a line:

Split a Line:	Position the cursor at the point where you want to split the line and press ALT+S. The text after the point where you put the cursor is now on the next line.
Join a Line:	Position the cursor at the end of the line where you want the text to continue or be connected and press ALT+J. The line of text just below the cursor is now brought up to join the line the cursor is on.

Adding or Erasing Lines

Basic tasks you can perform using a text editor are to add a line, or erase all or part of a line of text.

To add a blank line:	Position the cursor anywhere in the line just above the row where you want to add the line and press ENTER.
To erase to the end of the line	Position the cursor anywhere on the line to the left of what you want to erase and press CTRL+E. The text to the end of the line is now erased.

Deleting Unmarked Characters, Words, or Lines

You can delete text one character at a time, one word at a time, one line at a time, or several lines at a time in blocks at one time.

To delete a character:	Place the cursor on the character you want to delete and press the DELETE key. The character is deleted from the screen and the text to the right of the cursor shifts to the left to fill the gap. To delete multiple characters, repeat the steps for each character you want to delete.
To backspace over a character:	Press the BACKSPACE key. The character to the left of the cursor is deleted from the screen and the text to the right of the cursor shifts to the left to fill the gap. By pressing the BACKSPACE repeatedly, characters continue to be deleted.
To delete a word:	Position the cursor at the beginning of the word to be deleted and press CTRL+D. The word is deleted from the screen and the text to the right of the cursor shifts to the left to fill the gap. Repeat the steps to delete multiple words. A text editor assumes a *word* to be a string of characters from the point where your cursor is positioned up to and including the first following space.
To delete a line:	Place the cursor in any column on the line to be deleted and press CTRL+BACKSPACE simultaneously. The line is deleted from the screen and the lines below it move up to fill the gap. Continuing to press CTRL+BACKSPACE deletes multiple lines.

Note: If you have multiple characters, words or lines to delete, you might find it easier to mark words, lines, or blocks for deletion instead (see "Marking Text" on page 123).

Restoring a Deletion

Press F9=UNDO if you incorrectly type a change to a line and you want to restore its original contents.

Note: The contents will only be restored if you have not:

- moved the cursor from the current line.
- pressed ENTER.

The UNDO command does not restore deleted lines or changes to multiple lines. Only the current line you are editing can be restored.

Setting Tabs

Note: The changes to Tabs and Margin settings described in this section apply only to the current session. The Tab and Margin settings revert to the default values when you leave the session.

Use the TAB key to move the cursor across the screen and insert text at set points.

To change the tab settings:

1. Press ESC to move your cursor to the command line.
2. Type the TABS command on the E Editor command line.

   If you only type `tabs`, the current tab settings are displayed. The tabs are preset to every eighth column across the screen. For example:

   ```
   tabs 1 9 17 25 33
   ```

3. Change the tab setting using the TABS command using the following format:

   ```
   tabs  [t1 [t2 [t3 ... t32] ] ]
   ```

For example, you could reset tabs for specific tab stops by typing the following at the E Editor command line:

```
tabs  4 17 39 47 ... 55
```

and then pressing ENTER.

or

You can type the TABS command followed by a number to set the tabs to every fourth column across the screen:

```
tabs 4
```

In this example, the tabs are set at 1 5 9 13 ... 125.

Setting Margins

To set new margins:

1. Press ESC to move your cursor to the command line.
2. Type the MARGINS command on the E Editor command line.

   If you only type `margins`, the current margin settings are displayed. For example:

   ```
   margins 1 254 1
   ```

3. Change the margin setting using the MARGINS command using the following format:

   margins [*left margin*[*right margin*[*new paragraph margin*]]]

   For example, you could type margins similar to:

   ```
   margins 1 70 5
   ```

   and press ENTER.

   To put the cursor back in the text area, press the ESC key. As you continue typing, the E Editor keeps your text within the new margin settings.

   Notice that your previously entered text is not automatically reflowed to the new margin settings.

4. Press ESC to move your cursor to the command line.

Saving Keystrokes in a Macro

You can record and play back any sequence of keystrokes. Such a recorded sequence constitutes a temporary *macro* that can be repeated numerous times. If you find yourself entering the same key sequence more than twice, record them instead.

To record a sequence of keys:

1. Press CTRL+R.
2. Type your sequence of keys.

   Virtually any key can be recorded, including ESC, to switch to the E Editor command line. As you are recording the keys, the key operations are also taking place in addition to being recorded and saved.
3. Do one of the following when prompted:

   CTRL+R Finishes the recording of keystrokes.

   CTRL+T Completes the recording and immediately runs the saved sequence. This is a shortcut which eliminates having to press CTRL+R a second time before pressing CTRL+T.

   CTRL+C Cancels saving the keystroke sequence.

To replay the sequence at any other time:

Press CTRL+T.

Unless you have changed keystroke recordings, made a new recording, or left the E Editor, the keystroke recording is retained.

Selecting Text

You begin most editing operations by selecting a block of text. In a single line, you can select any amount of text, from a single character to the entire line. You can also select several lines or the entire file at once.

In the E Editor, selecting a section of the text is called *marking* the text. When this is done correctly, you see the area you have marked highlighted on your screen. To copy, move, or delete a section of text, you must first mark the text before you can perform functions on it.

Unmarking the text removes the highlighting and the text is no longer selected.

Marking Text

Four types of marks are recognized in the E Editor:

Line Mark An entire line from column 1 up to an including column 255, unless you have set your margins before blocking.

Note: Use line mark if you are going to copy or move text and then insert the text elsewhere in the file. Only the line mark moves the existing text down to let you insert the text. With line mark, no text shifts to the right. You are not required to add blank lines before you insert the moved or copied block of text.

Block Mark A strictly rectangular area of text.

Word Mark All characters from the point where your cursor is positioned up to and including the first following space.

Character Mark A single character on which the cursor is placed, or multiple characters in words, phrases, or sentences. Allows you to mark multiple lines without having to be in a rectangular area of text.

To mark a line of text:

1. Use the arrow keys or other cursor movement keys to move the cursor anywhere on the line you want to select or *line mark*.
2. Press the line combination keys ALT+L.

To mark multiple lines of text:

After you mark a line, move the cursor to another line and press the line combination keys (ALT+L) again. All lines between the first mark and the second mark are then marked.

To mark a block of text:

1. Use the arrow keys or other cursor movement keys to move the cursor to the upper, left character of the text you want to select or *block mark*.
2. Press ALT+B.
3. Move the cursor to the lower, rightward character of the text you want to block mark.
4. Press ALT+B again to complete the block mark.

The text you have marked is now highlighted.

To mark a word:

1. Use the arrow keys or other cursor movement keys to move the cursor anywhere on the word you want to select or *word mark*.

   A text editor assumes a *word* to be a string of characters from the point where your cursor is positioned up to and including the first following space. Unlike the line mark, you cannot mark more than one word with this type of mark.

2. Press the word combination keys ALT+W.

To mark a character:

1. Use the arrow keys or other cursor movement keys to move the cursor to a character you want to select or *character mark*.
2. Press the character combination keys ALT+Z. The character is highlighted.

To mark multiple characters in words, phrases, or sentences:

1. Use the arrow keys or other cursor movement keys to move the cursor to the first character of multiple words, phrases or sentences you want to select.

   A *multiple character mark* can span lines. Unlike the block mark, this type of a mark need not be a strictly rectangular shape. Because this mark is intended for marking sentences and phrases, the mark wraps around lines.

2. Press the character combination keys ALT+Z.
3. After you mark one character, move the cursor, and press the mark character keys ALT+Z again to character mark multiple characters.

   All characters between the two marks are highlighted.

After you have marked text, you can revise the range of the mark by placing the cursor at a different position and again pressing the combination key you last used. If the cursor is outside the range of the marked area, the marked area will be expanded to include the new position. If the cursor is within the marked area, it will be construed as a new *end* of the area mark.

Unmarking Text

You can clear marked text from the E Editor window by pressing ALT+U. Any marked text is no longer highlighted.

Summary of key combinations for marking and unmarking text:
Following is a table which summarizes the key combinations you would use to mark and unmark text.

ALT+B	Block mark for rectangles or lines.
ALT+L	Line mark for one or more lines.
ALT+W	Word mark.
ALT+Z	Character mark for sentences, phrases or characters.
ALT+U	Unmark.

Using Key Combinations to Manipulate Text

You can now perform any type of operation on the marked text that you want, such as copy, move, delete, or reflow it. To manipulate an area of text, follow these steps:

1. Mark the text you wish to copy, move, delete, or reflow by pressing the key combinations in the previous summary. The E Editor highlights the area to show you what you have marked.
2. For copying or moving, select the destination for the highlighted text by moving the cursor to the destination position.
3. Press a key combination, such as ALT+C (copy) to perform the operation.

Deleting Text

You use the DELETE command to delete a block of text and reposition the text once the deletion is made.

To delete text:

1. Mark the text you want to delete.

   Refer to "Marking Text" on page 123 for instructions on how to select text if you do not know how to mark it.
2. Press ALT+D.

   The text is deleted and the text to the right of the cursor shifts to the left to fill the gap.

Copying Text

You use the Copy command to copy and reposition a block of text.

To copy a block of text:

1. Mark the block of text you want to copy.

   Refer to "Marking Text" on page 123 for instructions on how to select text if you do not know how to mark it.

2. Select the destination for the highlighted text by moving the cursor to the destination position.

3. Press ALT+C.

   The block of text is copied to the new location, and it is not removed from its original location.

To copy a block of text into another file:

1. Load the two files you are going to copy text between (target and source files).

   For information on how to edit more than one file at a time, refer to page 115.

2. In the file that has the text you want to copy, mark the block of text.

   Refer to "Marking Text" on page 123 for instructions on how to select text if you do not know how to mark it.

3. Select the destination for the highlighted text by switching to the second file (F10) and moving the cursor to the destination position.

4. Press ALT+C.

   The block of text is copied to the new location, and it is not removed from its original location.

You can copy the marked text into a file as many times as you want by repeating the COPY command (ALT+C). The text remains in the *buffer*, a temporary storage area, until you change what is marked.

Moving Text

You can move a block of text. This procedure is useful if you want to rearrange the order of text in a file.

To move a block of text within the same file:

1. Mark the block of text you want to move.

   Refer to "Marking Text" on page 123 for instructions on how to select text if you do not know how to mark it.

2. Move the cursor to the position where you want to move the text using the arrow keys.
3. Press ALT+M.

   The block of text is deleted from the original location and moved to the new destination.

To move a block of text into another file:

1. Load the two files you are going to transfer text between (target and source files).

   For information on how to edit more than one file at a time, refer page 115.

2. In the file that has the text you want to move, mark the block of text.

   Refer to "Marking Text" on page 123 for instructions on how to select text if you do not know how to mark it.

3. Select the destination for the highlighted text by switching to the second file (F10) and moving the cursor to the destination position.
4. Press ALT+M.

   The block of text is moved to the new location, and it is removed from its original location.

When you move a block of text, the text is not removed from the buffer; it remains there until you move another block of text to the buffer. You can insert text from the buffer into a file as many times as you want by repeating the MOVE command (ALT+M).

Reflowing Text

The E Editor allows you to reflow text to fit with a new area between margin settings or in a defined area you define.

Adjusting a Paragraph to the New Margins

The E Editor recognizes a blank line as the end of a paragraph. Therefore, you can reflow text in a paragraph to adjust to new margin settings. Before you can adjust a paragraph to new margins, you must first set the margins. See "Setting Margins" on page 121 for information about setting margins.

If a paragraph is not followed by a blank line or an end-of-file indicator, you must mark the paragraph before you can reflow text.

To reflow text to revised margin settings:

1. Move the cursor to the beginning of the paragraph.
2. If the paragraph is not terminated with a blank line or end-of-file indicator, mark the area using combination keys.

   The E Editor highlights the text you have marked.
3. Press ALT+P to adjust the marked paragraph to the current margin settings.

Reflowing Marked Text

Pressing the ALT+R combination keys lets you reflow a section of text to a defined space. It is typically used to reformat a special paragraph (such as an indented paragraph) without changing the margins.

To reflow marked text:

1. First mark the text to be reformatted (with any type of mark).
2. Press ALT+R.

   You are prompted to mark the new block—the space into which you want the block reflowed.
3. Move the cursor to the upper-left character of the block of text you want to reflow and press ALT+B.

4. Move the cursor to the lower-right character of the block of text you want to reflow and press ALT+B.

5. Press ALT+R and the text is reflowed. The space where the text came from is filled with blank spaces.

   ALT+P reflows a block marked area into the shape and size of the marked area and ignores the margin settings.

In other words, with a block mark, ALT+P behaves as if you marked a block, pressed ALT+R, and remarked the same block.

Summary of Text Operation Keys:

After you have marked text, you can manipulate it by pressing the following key combinations:

ALT+A	Moves the text to the new position and fills the old position with blanks.
ALT+C	Copies the text to the new location by inserting it and pushing aside existing text.
ALT+D	Deletes marked text. The space formerly occupied is discarded.
ALT+O	Copies text to a new location except overlays the existing text rather than pushes it aside.
ALT+M	Moves marked text from one location to another location and discards the space previously occupied by the text.
ALT+F	Fills an entire marked area with a character you specify. The character can be a graphic; see "Entering Control and Graphic Characters" on page 146 for information on how to enter a graphic character. To end this operation, press the ESC key.
ALT+P	Reflows a marked paragraph to the new margin settings. If a block of text is marked, reflows only the marked text to the new margin settings. See "Adjusting a Paragraph to the New Margins" on page 128 for details.
ALT+R	Reflows the marked text into a new defined area. See "Reflowing Marked Text" on page 128 for details.
ALT+F7	Shifts marked text to the left. If you have text next to the left column of the marked area, it will overlay any text in the far left column of the marked area.
ALT+F8	Shifts marked text to the right. All text to the right of the left edge boundary is shifted right. The far left marked column is filled with blank spaces.

ALT+E	Moves the cursor to the end of the marked text. Except for line-marked text, this is the far right character of the last line. For line marked text, the cursor column is unchanged.
ALT+Y	Moves the cursor to the start of the marked text. Except for line-marked text this is the far left character of the first line. For line marked text, the cursor column is unchanged.

Some operation keys do not work with all combination keys, as shown in the following table.

The top heading gives the marking keys. The left column shows the operation keys. At the intersection of any row and column is a description of where the cursor should be placed to define the destination. If no such description is given (as at the intersection of ALT+L and ALT+A), the operation is not allowed.

	ALT+L	**ALT+B or ALT+W**	**ALT+Z**
Adjust (ALT+A)		Top Left Corner	
Copy (ALT+C)	Line Above	Top Left Corner	At Line
Delete (ALT+D)	Any Position	Any Position	Any Position
Overlay (ALT+O)		Top Left Corner	
Move (ALT+M)	Line Above	Top Left Corner	Top Left Corner
Reflow (ALT+P)	Any Position	Any Position	Any Position
SHIFT (ALT+F7/F8)	Any Position	Any Position	

Using E Editor Commands

In addition to pressing keys or combinations of keys, you can use the E Editor command line to perform many functions of the E Editor.

Enclosing an E Editor command in quotes when you invoke the editor lets you specify a command that takes effect immediately upon loading the E Editor. You can specify file names before the quoted command. For example, to start the E Editor, open a file named REPORT.DOC, and move the cursor to the bottom of the file, you would type:

```
C> e report.doc 'bot'
```

Remember to shift from the window area of the editor to the E Editor command line, press ESC. Press ESC again to return to the window area of the E Editor.

Finding Text

To find a word, a phrase, or a combination of characters in a file, use the / (search) or L (locate) command. The text can be a word, a phrase, or any combination of characters and spaces.

Note: To make sure the entire file is searched, go to the top of the file before you begin your search.

You need to be specific about limiting your searches so you find only separate occurrences, such as searching for “let” and finding these letters in the word “letters.” If you searched for “lett”, you are limiting the search to a more specific search pattern.

To find a word or phrase, use the following format:

/*findword*/ [*options*]

or

L/*findword*/ [*options*]

If you do not specify any options, the / (search) or L (locate) command will do the following:

- Search the entire file (not only the marked area) in the forward direction.

  For example, the search starts at the current line and proceeds toward the end of the file.

- Search but ignore case.

  For example, the E Editor will find both *Brown* and *brown*.

- Search left to right through lines.

Change the search options if you need to. When the E Editor searches for text, it starts at the current cursor position and selects the first occurrence of the text. You can specify the following search options:

–	Search from current line backwards, to top of file or to top of marked area if the **m** option is chosen but still searches left to right.
+	Search forward from current line to bottom of file.
m	Search within the marked text area only.
a	Search the current file, ignoring the marked area.
c	Search but ignore case.
e	Search but match the search pattern's case exactly.
r	Search from right to left through lines.
f	Search from left to right through lines.

To find text:

1. Return to the top of the file and type a / (search) or L (locate) command.

   For example, if you are trying to find "help" as a separate word, you would type:

   ```
   /help /
   ```

   or

   ```
   L/help /
   ```

Make sure you include the space after the word "help" because the E Editor finds all occurrences, such as the *help* in *helpless* if you do not add the space in your search pattern. The second / is normally not required if you do not have options listed. Because you are limiting your search to *help* followed by a space, the second / is required to add the space.

2. Press ENTER.

   If no occurrences of the text are found, you see the `String not found` message.

3. To search for the next occurrence of the specified text, press CTRL+F.

The / (search) or L (locate) command leaves the cursor in the text area, not on the E Editor command line.

The / (search) or L (locate) command continues to search through the file each time you press CTRL+F until it reaches the end of the file.

Here is an example of the / (search) or L (locate) command:

```
/finalize/e
```

The E option means to search but match the case exactly. After you press ENTER, the E Editor searches for the word "finalize", ignoring any words it might find that have uppercase letters in it, such as "Finalize".

Any search string delimiter (not only the slash /) can be used after the LOCATE command. You will need this if the search string itself contains a slash. When used with the slash delimiters (/), the command does not require a blank between the C and the /. However, if you are using a different delimiter, a blank space is required between the L and the delimiter. The same is true of the C (change) command.

```
L $/$
```

In the last example, '$' is the delimiter and '/' is the string for which to search.

Multiple options can be given at one time.

```
/helper/-re
```

If contradictory options are given (such as /rf), only the last option is the one remembered.

In this example, the E Editor searches for the word "helper" from the current line backwards in the file, searches from right to left in the lines, and finds only the word "helper" and matching capitalization exactly while it is searching.

Searching for Text Using the ALL Command

The ALL command creates a file called .All that shows all occurrences of a search pattern you designated for the file you are in. The occurrences matching the pattern are listed by line number. You can move from occurrence to occurrence by using the CTRL+Q key combination.

To find a word or phrase, use the following format:

```
all /findword[/[c]]
```

The / can be any delimiter and c indicates ignore case.

The following example shows how you can use the All command to find the word *command* in one of your files.

1. Open up the file you want to search.
2. Type the following command:

   ```
   all /command
   ```

   and press ENTER.

   If no occurrences of the word are found the message

   ```
   String not found
   ```

   is displayed.

   If the word is found:

   - The .ALL file is created showing the line number and contents of the line where the word is found.
   - You are placed in the .ALL file with the cursor blinking on the first occurrence of the word.
3. Press CTRL+Q and you are switched from the .ALL file to the original file. The cursor is placed on the first occurrence of the word in the original file.

   Each time you press CTRL+Q, you are switched between the two files.
4. Save and quit out of your original file as usual. The .ALL file still appears on your screen. You cannot save it. When you quit out of it, the file disappears as though it never existed.

Searching for and Replacing Text

To find a word or phrase, use the following format: You can search for and replace a set of characters in a file at the same time using the C (change) command. The C (change) command begins at the cursor location and continues to the end of the file. To make sure that you search for and replace the entire file, move the cursor to the top of the file before you begin to search and replace text.

To find a word or phrase and replace it with other text, use the following format:

1. Type a C (change) command using the following format:

   `c/`*`oldtext`*`/`*`newtext`*`/ [`*`options`*`]`

   For example, if you are trying to find "mail" and replace it with "letters", you would type:

   ```
   c/mail /letters /
   ```

   The "C" is the shortened form of the C (change) command.

   Make sure you specify the spaces where necessary because the C (change) command changes all occurrences. If the spaces were not specified in the preceding example, the *mail* in *mailbox* would then become *lettersbox* if you do not add the space in your search pattern.

   There is one option available with the C (change) command that is not available with the L (locate) command. If you want to make all the changes, without being prompted, add an asterisk (*) similar to the example that follows:

   ```
   c/mispeled/misspelled/*
   ```

   If you do not specify options, the C (change) command will do the following:

   - Change the entire file (not only the marked area) in the forward direction.

     For example, the change starts at the current line and proceeds toward the end of the file.

   - Search but ignore case.

     For example, the E Editor will find both *Brown* and *brown*.

   - Search left to right through lines.

Change the options if you need to. The E Editor starts at the current cursor position and changes the first occurrence of the text. You can specify the following change options:

*	Make all the changes, without being prompted.
-	Change from current line backwards, to top of file or to top of marked area if the **m** option is chosen, but still searches left to right.
+	Change forward from current line to bottom of file.
m	Change within the marked text area only.
a	Change the current file, ignoring the marked area.
c	Change but ignore case. (This is the default for the CHANGE command).
e	Change but match the search pattern's case exactly.
r	Search from right to left through lines.
f	Search from left to right through lines.

2. Press ENTER.
3. If the text is not found, you see the message `string not found`. If the text is found, you see the message `Yes/No/Last/Go/Quit?` near the bottom of the screen. Type:

Y	To make the change for this one item and search for the next occurrence.
N	To skip the change and search for the next occurrence.
L	To replace this last one and then stop.
G	To go ahead and replace the remaining occurrences without prompting for each occurrence.
Q	To stop making any further changes and discontinue the search. You can also press ESC.

From the E Editor command line:

Press CTRL+F	To find the next occurrence of the specified text.
or	
Type `C`	To repeat the same C (change) command without having to retype the C (change) command. You are immediately asked `Yes/No/Last/Go/Quit?`.

or

4. Press ESC to put the cursor back in the text area.

The C (change) command leaves the cursor in the text area, not on the E Editor command line.

The C (change) command continues to search through the file each time you press CTRL+F until it reaches the end of the file.

Here are some examples of C (change) commands:

In the following example, you would be prompted to answer each time the word "bills" is found whether you want to make the change, not change this instance but search for the next occurrence, replace this one and stop, or replace this one and all the rest without prompting.

```
c /bills/invoices/
```

Any search string delimiter (not only the slash /) can be used after the C (change) command. You will need this if the search string itself contains a slash. When used with the slash delimiters (/), the C (change) command does not require a blank between the C and the /. However, if you are using a different delimiter, a blank space is required between the "C" and the delimiter. The same is true of the L (locate) command. Typing:

```
c $/$\$
```

changes / to \

Multiple options can be given at one time.

```
/helper/-re
```

If contradictory options are given (such as /rf), only the last option is the one remembered.

In this example, the E Editor searches for the word "helper" from the current line backwards in the file, searches from right to left in the lines, and finds only the word "helper" and matching capitalization exactly while it is searching.

Drawing Lines

You can use graphics characters to draw boxes and diagrams. The DRAW command can be typed at the E Editor command line:

```
draw
```

Note: You can also press F6.

To select drawing mode, you must issue the DRAW command with one of these arguments:

Draw Option	Result
1	Draws a thin, single line
2	Draws a thin, double line
3	Draws a dotted line
4	Draws a thick line
5	Draws a double, thin line horizontally; single, thin line vertically
6	Draws a double, thin line vertically; draws a single, thin line horizontally.
/character	Uses any character that follows the slash (/) to form a box.

If you type the DRAW command without any arguments, the visual representations: `1, 2, 3, 4, 5, 6, B, or /any char` appear at the bottom of the screen as a reminder. For example:

```
Draw 2
```

You are now in draw mode, which means that the cursor becomes like a paint brush: everywhere you move the cursor, a double line (because you typed 2) is drawn.

Draw any shape with the cursor using the arrow keys (LEFT, RIGHT, UP, and DOWN). While in the drawing mode, you can stop drawing the double line and type in text or move the cursor to another location without drawing anything (in other words, lift the paint brush) by pressing INSERT. This key suspends the drawing without exiting from draw mode.

To begin drawing again, simply press the INSERT key again. Pressing any key besides those on the numeric key pad ends draw mode.

You can draw figures with characters other than the line graphics characters provided. For example, if you want to draw figures composed of the left parentheses, you would type at the E Editor command line:

```
Draw /(
```

This process works with any character on the keyboard, as long as you precede the character with a slash (/).

Creating Boxes Around Text

You can use graphics characters to draw boxes. The BOX command can be typed at the E Editor command line:

```
box
```

To create a box, you must issue the BOX command at the E Editor command line with one of these arguments:

Box Option	Result
C	Creates a box comment using the C language syntax.
P	Creates a box comment using the Pascal language syntax.
A	Creates a box comment using Assembler syntax.
E	Erases the box around the marked area.
R	Reflows text in marked area.
B	Places spaces on all sides of the marked area, creating a box of blank spaces.

If you type the BOX command without any arguments, the visual representations for: `1`, `2`, `3`, `4`, `5`, `6`, `B`, */x*, P, C, A, E, R, and S appear at the bottom of the screen as a reminder.

For example, for a double line, you could type:

```
box 2
```

Combining Files

There are three E Editor commands you can use to pull text from one file and place it into a different file: GET, PUT, and APPEND.

The E Editor allows you to have multiple files open at one time. You can mark text in one file and insert that text into another file you have open.

For example, you just finished a note summarizing your monthly activities in which you listed some statistics you want to put in a second file. You don't want to insert the entire note; you only want the statistical information pulled into a second file.

To use the GET command to insert another file into an opened file:

1. Open the file you want to pull information into.

   For example, open a file named NEWFILE.TXT by typing the following:

   ```
   e c:\newfile.txt
   ```

2. Place the cursor on a line above where you want to insert the file you want to get.

   Because this is a new file, place the cursor at the top of the file.

3. Press ESC to get to the E Editor command line.

4. Type the GET command using the following format:

   get *filespec*

   Substitute the full path and file name of the file you want to insert. For example, to pull the C:\REPORTS.TXT into the C:\NEWFILE.TXT, you would type the following at the E Editor command line:

   ```
   get c:\reports.txt
   ```

5. Press ENTER.

   The entire file will be pulled into the NEWFILE.TXT file following the line where the cursor is placed.

To append text to the bottom of a file:

The APPEND command works the same way as the PUT command, appending the text to the bottom of a file. Refer to the PUT command in the following section.

To use the PUT command to insert a file or part of the file into another file:

1. Open a file that contains information you want to put into another file.

   For example, open a file named NEWFILE.TXT by typing the following:

   ```
   e c:\newfile.txt
   ```

2. Mark the text you want to put into another file by using the line mark key combinations ALT+L. If you do not mark any text, the entire file will be inserted.

3. Press ESC to get to the E Editor command line.

4. Type the PUT command using the following format:

   `put` *`filespec`*

   Substitute the full path and file name of the file you want to insert the marked text into. The file can be a file that already exists or a new file.

   For example, to pull the marked text from the file C:\NEWFILE.TXT into the C:\REPORTS.TXT file, you would type the following at the E Editor command line:

   ```
   put c:\reports.txt
   ```

   and press ENTER.

   The marked text or the complete opened file (NEWFILE.TXT) is always written to the file specified in the PUT command. (REPORTS.TXT).

Only the marked text is inserted into the REPORTS.TXT file. If the file already exists, the information can only be placed at the bottom of the file; the file is not overwritten.

If you use the PUT command to insert an entire file, you do not have to open or mark the text first.

For convenience, *filespec* can be omitted if you want to repeat a PUT to the same file. PUT commands without a *filespec* reuse the last-specified name.

If you do not move the cursor and do another PUT command, the text from the second PUT command is inserted immediately following the text inserted from the first PUT command.

To print using the PUT command:

You can print a marked block of text by issuing `PUT prn`. The readiness of the printer is tested first to avoid having to wait for a device timeout in case the printer is offline. The PRINT command allows you to print only marked text.

If no text is marked, the entire current file is PUT. You can use the equal sign (=) as a shorthand for either the directory or file name.

To use the equal sign to repeat the file name:

You can use the equal sign (=) as a shorthand for either the current file's directory or file name. Remember that the equal sign is shorthand for "same path as last specified" at the DOS command prompt, or "same path as current file's" at the E Editor command line.

For example, you are currently editing a file named REPORT1.TXT located in the C:\REPORTS subdirectory. You want to edit REPORT2 in the same subdirectory. At the E Editor command line, you would type:

```
e =report2.txt
```

The file's path and file name can be seen as `C:REPORTS\REPORT2.TXT` near the bottom left-hand part of the screen.

Adding and Multiplying Numbers

If you need to add columns or rows of numbers, the E Editor provides both an ADD and a MULTIPLY command. See "Calculating Mathematical Expressions" on page 143 for the proper format.

To add or multiply a column or row of numbers:

1. Mark the text you wish to add or multiply.

   You can do this by pressing ALT+B once at the top left corner of the column and again at the bottom right corner of the column of numbers. When you finish marking the end of the text, the text is highlighted to show you the column of text you have marked.

2. Press ESC to get to the E command line at the bottom of your screen.
3. Type `add` or type `mult` depending on the type of operation you want to perform.
4. Press ENTER.

To return the cursor to the text area, press the ESC key.

Calculating Mathematical Expressions

If you need to add, subtract, multiply, or divide hex, octal, or decimal numbers, the E Editor provides a set of MATH commands that compute an *arithmetic expression* of the following format:

```
arithmetic expression: arith term arith operator arith term

arith term: decimal number
          | hex number
          | octal number
          | '('    arithmetic expression ')'

arith operator: '+'
              | '-'
              | '*'
              | '/'
```

Hexadecimal (base 16) numbers must be preceded by the letter "x", (for example, `x10 = 16`). Octal (base 8) numbers must be preceded by the letter "o" (for example, `o12 = 10`).

Math Command	What It Does
math *arithmetic expression*	The MATH command computes the *expression* and appends the result as a decimal number.
mathx *arithmetic expression*	The MATHX command computes the *expression* and appends the result as a hexadecimal number.
matho *arithmetic expression*	The MATHO command computes the *expression* and appends the result as an octal number.

Try some of the following MATH commands. If your cursor is not on the highlighted E Editor command line, press ESC.

```
math    -10 + 40
mathx   -xff + 10
matho   o11 * (xff - 10)
math    32000 + 32000
```

The above examples would yield 30, xFF0B, o4235, and -1536 respectively. The last result is because all numbers, answers, and intermediate results are limited to the range -32768 to 32767 (in other words, a 16-bit signed binary number).

Customizing the E Editor

You can use commands to change the way the E Editor window appears.

Changing the Window

Non-Overlapping (Tiled Window)

The E Editor provides two styles of windowing. In the *tiled* (non-overlapping) window style, which is how the E Editor window normally appears, the windows do not overlap. This allows changes to your file to be shown immediately in neighboring views of the same file.

You can see this with a quick experiment: Press CTRL+H to split the screen into two horizontal views of the same file and type.

Tiled windows cannot be resized or moved around the screen because this might cause one window to overlap another. Tiled windowing also has the interesting characteristic that each window or *tile* contains the same ring of files as the other tiles or windows. Simply press CTRL+W when you are in the text area to alternate between the tiles. Each tile keeps track of its own cursor position so that you can edit two places in the same file without having to page up or page down.

Note: You can use the key combination of CTRL+M to move between the non-overlapping and overlapping windowing styles.

Overlapping (Messy Window)

In *messy* (overlapping) desktop, the windows can overlap. You use the SIZE and DRAG commands to select the window's size and position.

Keys and Commands for Customizing the Window

Keys or Command	What They Do
CTRL+A	Selects next tiled window configuration. There are four different window arrangements you can use if you have specified tiled windows. You can view all four window configurations by continuing to press CTRL+A to view each window configuration. **Note:** CTRL+A can only be used in tiled windows. One window zoomed to fill the screen. Two equal windows positioned vertically. Four windows divided into four equally sized windows. Two equal windows positioned horizontally.
CTRL+H	Selects two horizontal window tile configuration.
CTRL+V	Selects two vertical window tile configuration.
CTRL+W	Switches to next window
CTRL+Z	Switches one fully zoomed window tile configuration. In the messy desktop configuration, this expands the current window to full screen.
F10	Switches to next file when you have multiple files open.
ALT+F10	Switches to a previous file when you have multiple files open.
WS (command)	(Also WINDOWSTYLE) Allows five different window styles for arranging the location of your reminder line, E Editor command line, and function keys; presents you with WS 1 when you open a file.
E or ED (command)	Presents you a zoomed window style for tiled window configurations when you open a file.
SIZE (command)	Is used for resizing a window and used for the messy desktop window configuration only.
DRAG (command)	Is used for moving window and used for the messy desktop window configuration only.

Entering Control and Graphic Characters

You can enter PC graphic characters (those with extended ASCII codes greater than 127) with ALT+*keypad* numbers.

For example, to enter the symbol for the Greek character pi (represented by the code 227):

1. Hold down the ALT key.
2. Type `227` on the numeric keypad.
3. Release the ALT key.

Graphic symbols with codes less than 32 might be harder to enter because they conflict with control characters recognized by the E Editor. You might want to enter the character with code 12 because you like the looks of the graphic symbol or because you wish to send that control code to a printer. Code 12 is the same as CTRL+L, which is recognized as a formfeed by printers. You cannot type it simply by pressing CTRL+L because a CTRL+L is recognized by the E Editor as a special action (copy the current line of text to the command line).

In such a case, you can force the E Editor to accept the code without evaluation by prefacing it with ALT+X. Press `alt+x` first, followed by `ctrl+l` and then press ENTER.

```
alt+x ctrl+l
```

Note: ALT+X is only necessary if the key has already been defined. But pressing ALT+X is always safe. If you are unsure whether the key is predefined, press ALT+X first.

You can also follow ALT+X with an extended key such as F1, but this is seldom useful. Extended keys are represented on the computer by two characters, a null (ASCII zero, which looks like a blank) with another character. For instance, F1 gives you a null with a semicolon.

The E Editor cannot handle the following graphic characters, as they have special control meanings:

```
Tab                x'09'
Line Feed          x'0A'
Carriage Return    x'0D'
End of File        x'1A' (only following a CR/LF)
```

Using Syntax-Directed Editing Features

If you have a Pascal or C programming background, you can use the E Editor for development of code because E Editor provides syntax-directed editing for Pascal and C files.

When ENTER or the SPACEBAR is pressed, the E Editor looks at the first word in the line and enters the rest of the structure when you press CTRL+X if it understands it. Structure expansion can include IF statements, loops, case statements, and comments.

Typical syntax-directed editing features can be demonstrated by the following sequence:

1. Type `e newfile.c`

   In this example the file name is NEWFILE.C. Remember that the file's extension must be .C for syntax-directed editing to work.

2. Type `main` and press the SPACEBAR, followed by pressing CTRL+X.

   Enter the main statement.

3. Then type `if` and press the SPACEBAR followed by pressing CTRL+X.

This sequence edits a new file called *newfile.c* and by pressing the SPACEBAR followed by pressing CTRL+X in both instances above you have inserted the rest of the MAIN and IF structures.

If you find automatic expansion distracting, you can turn it off. Pressing CTRL+X expands syntax even if the syntax expansion option is off.

The E Editor automatically expands the syntax of the Pascal or C languages according to the file's name and extension. For example, if the user edits a file called TEST.C, the E Editor will know this file contains C language programs.

Box comments can also be created easily according to the syntax particular to the language.

Summary of E Editor Commands

The following table briefly summarizes the tasks the E Editor can do from the E Editor command line.

In the following table, some of the commands are shown in both uppercase and lowercase letters. You only have to type the uppercase letters for these commands to work. For example, instead of typing `bottom`, you only need to type `bot`. If a command has all uppercase letters, you must type the entire command name.

Command Syntax	Usage
nnnn	Moves the cursor to the line number you specified. The current line number is displayed near the bottom of the editing screen.
+ [*nnnn*]	Moves forward (down) *nnnn* lines. If no number is specified, the cursor goes to the bottom of file.
- [*nnnn*]	Moves backward (up) *nnnn* lines. If no number is specified, the cursor goes to the top of file.
/pattern/	This command and the L (locate) command are the same. This slash (/) form saves a couple of keystrokes when the search string does not itself contain a slash; you do not have to type the L followed by a space.
ADD	Adds the marked block containing numeric expressions. See "Adding and Multiplying Numbers" on page 142. Real numbers are not supported.
ALL /pattern[/[c]]	Creates a new file called .ALL showing all occurrences of the pattern given.
APPEND [*filespec*]	Appends marked text to the file *filespec*. If no text is marked, the entire current file is taken as the source. In the E Editor, the APPEND and the PUT commands are basically the same.
AUTOSAVE [*nnnn* | ON | OFF]	Saves the current file to a temporary file after you press the ENTER key a specified number of times. If a number or ON is specified, the name of the temporary file is shown. If no number is given, the current AUTOSAVE value (*nnnn*) is displayed. **Note:** These temporary files are saved in case of system or power failure. They are deleted as soon as you exit from the E Editor.
AUTOSHELL 1 | 0 | ON | OFF	Turns ON (=1) or OFF (=0) the automatic pass-command-to-DOS feature. If you turn off AUTOSHELL, you can still direct commands explicitly to DOS by prefixing them with the "DOS" keyword.
BOTtom	Moves to the bottom of the file.
BOX 1 | 2 | 3 | 4 | 5 | 6 | C | P | A | E | R | B | /character	Draws a box around marked text block. The arguments are listed on the screen if the BOX command without an argument.
C */oldtext/newtext/*	Changes the *oldtext* to the *newtext* string. The '/' can be changed to any character; the first character after the 'C' and at least one space is used as the string delimiter. The third delimiter is needed only if options are specified. (See "Searching for and Replacing Text" on page 135 for details.)
CD [*path*]	If *path* is specified, changes current directory to *path*. If no path is specified, the current directory is shown in the function key text area.

Command Syntax	Usage
CENTER	If a line is marked, centers the text on the line according to the margins specified. If a block is marked, the text in the block is centered within the limits of the block.
CHR *ASCII character code*	Displays the character associated with the *ASCII character code* specified.
DOLINES	Executes the marked lines and works only if the text contained in the marked lines are E Editor or DOS commands.
[DOS] [*command*]	Runs the DOS command processor to execute the command. If no *command* is specified, you exit the E Editor temporarily and return to DOS. To return to the editing session, type `exit` at the DOS prompt.
DRAG	Moves a *messy* desk window to a different position on the screen using the cursor keys. DRAG command cannot be used with *tiled* windowing configuration.
DRAW [1 | 2 | 3 | 4 | 5 | 6 | B | /*character*]	Allows text drawing with cursor keys. If no option is specified, all options and their graphic representations are shown in the function key text area.
Edit [*options*] *filespec*]	Loads specified files into memory. If no files are specified, the next file in the current window is activated. If a file already exists in the active window, then it is activated. If a file already exists in a different window, a new view of the file is placed in the current window.
File [/q] [*filespec*]	Saves the current file and then quits it. If no *filespec* is given, the current name is used. You can use the equal sign (=) here as a shorthand for the same directory or file name as the currently open file's directory or file name. If the /q option is given, the message `Saving...` is not displayed.
GET *filespec*	Gets a file and inserts its text on the next line after the cursor position. You can use the equal sign (=) as a shorthand for the same directory or file name as the currently open file's directory or file name.
HELP	Opens the online file for help on the E Editor combination keys, edit commands, cursor movement keys, function keys, and editor termination commands.
KEY *nnnn* [*character*]	Allows the repeat of a key or macro. For example, you can repeat an entire set of recorded keystrokes (CTRL+T) 20 times. You are prompted for the key. You can specify the character to be repeated as an optional second argument, as in `KEY 80 =`. If you do not specify it in the command, you will be prompted to press a key.

Command Syntax	Usage
L /*pattern*/ [*options*]	Locates text in the active file, which matches *pattern*. The pattern delimiters shown as a slash (/) can be any special nonblank character and must not be present in *pattern*. The options following the second delimiter control the direction, scope, and uppercase and lowercase sensitivity of the search. The command name (L) can be omitted for convenience; in which case, the delimiter must be a slash (/). After a L (locate) command, pressing CTRL+F repeats the search with the same options. See details in "Searching for and Replacing Text" on page 135.
LOOPKEY *nnnn* | ALL	Allows the repeat of a key in a vertical column. You are asked to specify a key. The key is entered *nnnn* times, proceeding vertically downward in the current column. Compare this to the KEY command, which repeats the key horizontally in the same row. You can specify ALL instead of a number in which case the repetition continues to the end of the file.
LOWERCASE	Converts all uppercase alphabetic characters in the marked area to lowercase.
MArgins *left right new pgph*	Sets the margins with three values: the first number is for the column number on the left, the second number is the column number on the right, and the third number is the number of spaces to indent the start of a new paragraph. For example, the new-paragraph indentation occurs when you press ALT+P. Words typed past the right margin are wrapped to the next line. *left* and *new pgph* must be less than *right*.
MATCHTAB [ON | OFF]	If set on, the TAB and SHIFT+TAB keys use the previous line's columns for the current line's tab stops. The previous line's columns are defined by the first letter of each word. If no values are given, the current tabs are displayed.
MATH *expression*	Computes *expression* and returns result to the E Editor command line. The output number is a decimal number. Input numbers can be hex, octal, or decimal. Real numbers are not supported, only whole integers in the range -32768 to 32767. All intermediate results must also be in this range. Valid operators are +, -, /, and * See "Calculating Mathematical Expressions" on page 143 for further details.
MATHO *expression*	Same as MATH command but output is octal.
MATHX *expression*	Same as MATH command but output is hexadecimal.
MULT	Multiplies the numbers in the marked area and prints the product in the row underneath the marked area.
Name [*filespec*]	Renames the file in the E Editor, but not yet on disk. The new name is used the next time you save the file. A useful way to avoid overwriting the original. If no *filespec* is given, the current file name is displayed on the E Editor command line where it can be easily modified.

Command Syntax	Usage
NEWWINDOW *[options]* *filespec*	Creates a new window containing the file specified. The *options* available are the same as the E command options. This command is for use in messy windowing only.
PRINT	Sends the marked block, or the entire file if there is no mark, to your printer.
PUT *[filespec]*	Writes the marked text area to the named file. The PUT command is basically the same as the APPEND command. If the named file already exists it's appended rather than overwritten as before. For convenience, *filespec* can be omitted if you want to repeat a PUT to the same file. PUT commands without a *filespec* reuses the last-specified name. You can print a marked block of text by issuing `PUT prn`. The readiness of the printer is tested first to avoid having to wait for a device timeout in case the printer is offline. The PRINT command allows you to print a block if one is marked. If there is no mark, the entire current file is PUT. You can use the equal sign (=) as a shorthand for the same directory or file name as the currently open file's directory or file name.
Quit	Quits the current file and exits the E Editor if no more open files remain with a return code of zero (0). If there are multiple views of the current file, all views of the file are deleted.
RC *command*	Displays return code of *command*. Including this command is a good way to determine the exact result of a command. A number is shown that can be looked up in the *PC DOS Command Reference and Error Messages* manual. This command should be used similarly to the following: `rc tabs 35 10 20` This particular command results in the error number 272 (`Error in tab settings`) being displayed below the E Editor command line.
Save *[filespec]*	Saves the file to disk, using the current name if none is specified. You can use the equal sign (=) as a shorthand for the same directory or file name as the currently open file's directory or file name. If the /q option is given, the `saving` message is not displayed. If the /T option is specified, tab compression is performed. If there are eight spaces beginning in the first column anywhere in the file, a tab character is substituted for the eight blank characters.
SIZE	Allows resizing a messy desk window with cursor keys. The SIZE command cannot be used with tiled windowing configuration.

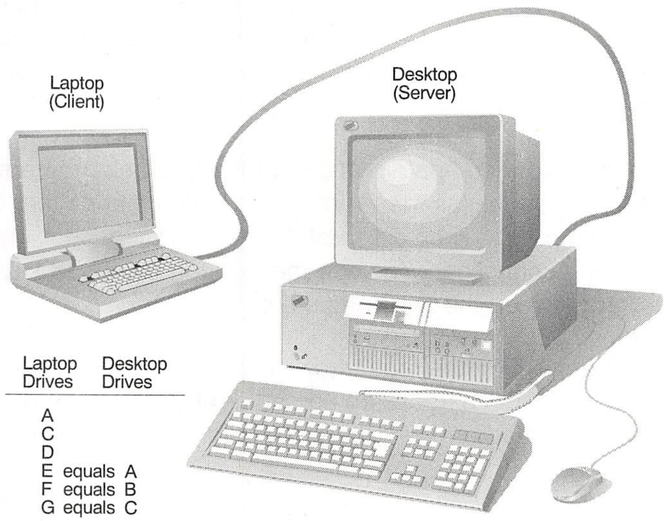
Command Syntax	Usage
SORT [R] [C]	If no area is marked, sorts the entire file. If an area is marked, the entire lines are sorted with the marked columns treated as the sort key. The /R option specifies a reverse (descending) sort. The /C option specifies case-insensitive and ignores whether the case is uppercase or lowercase. Allows you to sort a directory listing (for example, first by extension and again by file name). During the second sort, lines with equal file names are left in extension order.
TABS *n*1 *n*2 ... *n*32	Sets tab stops used by TAB and SHIFT+TAB keys. If only one tab stop is specified (for example, `tabs 8`), the E Editor interprets this as meaning that the user wants 32 tabs set, each 8 spaces apart, beginning with column 1. In this case, the result would be the same as issuing the following command: `tabs 1 9 17 25 ... 247` The tab stops must be listed in ascending order.
TOP	Moves to the top of the current file.
UPPERCASE	Converts all lowercase alphabetic characters in the marked area to uppercase letters.
VER	Displays the version of the E program on the status line and pauses the E Editor until you press ENTER. For example: `E Version 3.12.  Press any key.`
WindowStyle [1 | 2 | 3 | 4 | 5]	Sets active window style. The different styles adjust the location of the E Editor command line and the presence or location of the command and status lines. The WINDOWSTYLE command has no effect with the messy desktop windowing configuration.

Chapter 9. Connecting Computers

Using the InterLnk program and a cable, you can easily connect one computer to another computer to:

- Transfer files between computers.
- Use one computer to run programs located on another computer.
- Access information without having to copy files from one computer to another using diskettes.

Assume you regularly gather information in the field using your laptop computer to record the information. When you return to the home office, you need to transfer the information to a database on your desktop computer. Using the InterLnk program, you can directly add the information you have gathered to the database on your desktop computer and print out the new information without copying files to and from diskettes.



Understanding What the InterLnk Program Does

InterLnk is specifically designed to let you exchange files between any two types of computers (for example, laptop to desktop, or desktop to desktop) that can be connected by cables. InterLnk consists of two separate file transfer utility programs:

- INTERLNK.EXE
- INTERSVR.EXE

The Client and Server Relationship

Before you begin using these two programs, INTERLNK and INTERSVR, you need to understand the client and server relationship.

Client The computer you use to enter commands is called the *client*. After a connection is made to the server computer, the client computer presumes that the server computer's drives and printers are its own, giving it accessibility to additional information, files, and printers.

The client runs the INTERLNK.EXE program.

Server The computer connected to the client is the *server*, which is dedicated to serving the client. The server computer runs the file transfer program.

The server runs the INTERSVR.EXE program.

Using the InterLnk program, you can create a client/server relationship between two computers.

Once a connection is made to the server computer, you can do the same things with the server computer's drives and printers that you can do with your own computer, the client. If you connect a laptop to a desktop computer, the laptop is generally the client.

After you connect your computers and start the InterLnk program, you can use a laptop or other computer (as the client) to enter commands that control both it and your desktop computer. The screen of the desktop computer (the server) displays the status of the connection. You use the desktop computer keyboard only to break the connection between the two computers.

Suppose the laptop computer has three drives: a diskette drive (A) and two hard disk drives (C and D). The desktop computer also has three drives: two diskette drives (A and B) and a hard disk drive (C), similar to the following:

Laptop Drives	Desktop Drives
A	A
C	B
D	C

With the InterLnk program connecting the two computers, drives on the desktop computer (the server) appear as additional drives on the laptop computer (the client). In addition to drives A, C, and D, the laptop computer now includes drives E, F, and G from the desktop computer that have been *redirected*.

For example, if you typed the following command, on the laptop computer, you see displayed a list of files located in the root directory of a diskette inserted in drive A of the desktop computer:

```
dir e:\
```

A list similar to the illustration is displayed on your computer's screen:

```
This Computer          Other Computer
  (Client)               (Server)
  E:     equals          A:
  F:     equals          B:
  G:     equals          C:
```

This list displays how the drives were redirected. You see `E equals A` displayed. "E equals A" means that drive E of the client (laptop) is redirected to drive A of the server (desktop).

The server's drives A, B, and C are now presumed to be the client's drives E, F, and G. If you make drive E your current drive on the laptop computer, any commands you type on the laptop are carried out on the drive A of the desktop computer.

Note the InterLnk program reorders the drive letters, starting after the last drive letter and does not fill in any missing drive letters such as the missing drive B, as is the case with most laptop computers.

The Client Device Driver (INTERLNK.EXE)

INTERLNK is a single device driver performing either serial or parallel communication. This program redirects server drives and printers, meaning that the drives and printers from both computers can be controlled from one computer keyboard.

When you connect your computers and start INTERLNK, the server displays the way your drives are mapped. You can change which drives and printers have access by redirecting or remapping the server drives to the client drives. You can only access six drives at one time. If the drive or printer you need to access is not one of the six currently listed, you will need to redirect the drives or printers so the drive or printer is one of the six.

INTERLNK does not require any special switches or parameters for most configurations. Serial and parallel communications support and printer support are installed by default. Hardware ports and interrupt levels are set up automatically. INTERLNK loads itself into upper memory when upper memory blocks are available from DOS, unless you have set up the RAMBoost program to optimize your upper memory blocks.

For more information about INTERLNK, refer to the *PC DOS Command Reference and Error Messages* manual for a list of options you can type with this command, or type `help interlnk` for a brief explanation and command syntax.

The INTERLNK Server Program (INTERSVR.EXE)

INTERSVR is a dedicated, full-screen program, used for communicating with the client computer through serial and parallel lines. The server allows use of local drives and attached printers by the client computer.

The server program provides an interactive user interface and a command line option to do the following:

- Exclude certain drives from the server.

  Refer to "Excluding Drives from Redirection" on page 160.

- Sequence the offering of drives.

  For example, if you have five drives (A through E, of which A and B are empty diskette drives on the server computer and the client has only three drives available, the normal sequencing would *map* or assign the letters A, B, and C. To ignore drives A and B, you can change type the following on the server to sequence the drives:

  ```
  intersrv c: d: e:
  ```

While the server does not require any interaction after it is started, it provides the following types of feedback:

- Current state of drive mappings and printer redirection
- Drives that are offered
- Port you are connected to (a COM port means DOS searches only for serial ports; an LPT port means DOS searches only for parallel ports)
- Current baud rate (speed of data transmission)
- Drive activity

Note: Network drives cannot be redirected by this program.

For a list of the options available with INTERSVR, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help intersvr` for a brief explanation and command syntax.

Establishing the Connection between Computers

The following hardware, software, and available memory requirements must be met before you can use INTERLNK:

- Two computers running DOS 5.02 or higher. Running this version of DOS ensures that both the INTERLNK.EXE and INTERSVR.EXE files are available.

  If you do not have DOS 5.02 or higher on one of the computers, refer to "Remote Copying of INTERSVR.EXE and INTERLNK.EXE Files" on page 161.

- An available serial or parallel port on each computer. Your cable connection must be serial-to-serial or parallel-to-parallel; if you have an available serial port, the second computer must also have an available serial port.

  CAUTION:
  Plugging a parallel cable into a serial connector or vice versa will damage your computer system.

- A type of connecting serial or parallel cable, such as:
  - A 3-wire, serial cable
  - A bidirectional parallel cable
  - A 7-wire, null-modem, serial cable (only used for the remote installation)

    Refer to "Reviewing Cable Specifications" on page 162 for specific details to wire the pin connections for serial and parallel cable. The file transfer utility programs support serial links using a null-modem cable, as well as serial and parallel links that use cables provided with FastLynx**, LapLink**, and Brooklyn Bridge** products.

- 16K of free memory on the client computer and 130K of free memory on the server computer.

- The INTERLNK.EXE device driver statement in your CONFIG.SYS file on the designated client computer. Instructions on how to add this statement are given later in this chapter.

** FastLynx is a trademark of the Rupp Corporation, LapLink is a trademark of Traveling Software, Inc., and Brooklyn Bridge is a trademark of Fifth Generation Systems, Inc.

Including INTERLNK in Your CONFIG.SYS File

On the client computer, use a text editor, such as the E Editor provided with DOS, and add the following device driver statement to your CONFIG.SYS file:

```
device=c:\dos\interlnk.exe
```

By default, you are allowed to redirect three drives from the server. To redirect more than three, you must add the **/drive** switch to specify a number other than three or to specify no drives at all if you want to redirect only printers. For example, if you wanted to redirect four drives, you would type:

```
device=\c:\dos\interlnk.exe /drives:4
```

If you are using a RAM drive, place the DEVICE=INTERLNK.EXE statement after the DEVICE=RAMDRIVE.SYS line to prevent INTERLNK from redirecting these drives first.

After you have added the device driver statement in your CONFIG.SYS file, restart the client computer by pressing CTRL+ALT+DEL. Restarting the client computer loads INTERLNK.

Running the InterLnk Program

Before you start the InterLnk program, make sure you have physically connected your computers by attaching the appropriate cables to the ports, either serial-to-serial or parallel-to-parallel.

To start the InterLnk program

1. On the server computer, type the following at the DOS command prompt for a serial connection:

   ```
   intersvr
   ```

   or

   Type the following on the server computer at the DOS command prompt for a parallel connection:

   ```
   intersvr /lpt:1
   ```

You see a screen displayed listing the server drives first.

```
This Computer              Other Computer
  (Server)                    (Client)
========================================

  A:              equals   D:
  B:              equals   E:
  C:              equals   F:
  D:              equals   G:
  LPT1:           equals   LPT2:
```

Note: If you are running Windows, you will see a task swapping message; if you are running DOS, you will not see this message. Press ENTER to continue or F3 to quit.

2. On the client computer, make sure you have added the device driver statement in your CONFIG.SYS file (see "Including INTERLNK in Your CONFIG.SYS File" on page 158).

   INTERLNK attempts to load this program into upper memory blocks if they are available; if they are not available, it loads into conventional memory. By default, INTERLNK remains in memory whether or not it finds another computer to connect with unless you specify the **/noscan** switch.

3. Verify that the InterLnk program is loaded and view the status of the connections by typing the following at the DOS command prompt of the client computer:

   ```
   interlnk
   ```

You see a screen displayed listing the drives that are connected similar to the following:

```
This Computer              Other Computer
  (Client)                    (Server)
========================================

  D:     equals              A:
  E:     equals              B:
  F:     equals              C:
  G:     equals              D:
  LPT2:  equals              LPT1:
```

You are now able to access the drives of the server computer as though they were located on your client computer. If you need different drives than the ones currently accessed, redirect the drives.

When you are finished, press ALT+F4 on the server. The server returns to the command prompt and the client no longer has access to the server's drives.

Redirecting Drives

If a device was assigned when you started INTERLNK, you can redirect the device on the client by using the INTERLNK command and specifying the server drive you want to redirect it to. Suppose that client drive D is redirected to server drive A, and the other drives are redirected as in the following example:

```
This Computer              Other Computer
  (Client)                    (Server)
=======================================

  D:    equals                A:
  E:    equals                B:
  F:    equals                C:
  LPT2: equals                LPT1:
```

To redirect client drive G to server drive C, type the following at the client workstation:

```
interlnk g=c
```

To cancel the redirection of client drive G, do not specify a server drive, as follows:

```
interlnk g=
```

Excluding Drives from Redirection

On the server computer, if you want to exclude a drive from redirection and make it unavailable to the client system, add the **/x** switch followed by the letter of the drive you want to exclude, such as:

```
intersvr /x:d
```

Breaking the Connection between Computers

To break the INTERLNK connection between computers and stop the server, press ALT+F4 on the keyboard of the server computer.

To restart the server, type:

```
intersvr
```

Remote Copying of INTERSVR.EXE and INTERLNK.EXE Files

If, for some reason, you do not have DOS 5.02 or later installed on one of your computers, you will need to copy the INTERLNK.EXE and INTERSVR.EXE program files to the computer that does not have these files before you can run the InterLnk program. Although you only need the INTERLNK.EXE file for the client computer and the INTERSVR.EXE for the server computer, both files can reside on each computer.

To copy files remotely:

1. If the server computer is connected to the client computer by a 7-wire null-modem serial cable, type the following at the server computer command prompt:

   ```
   intersvr /rcopy
   ```

   The INTERLNK Remote Installation screen is displayed.

2. Specify the serial port of the other computer by using the direction arrows until you highlight the COM (serial) port you will use and press ENTER.

3. Type on the client computer the MODE command you see displayed on the server computer. For example, you would type something similar to:

   ```
   mode com1:2400,n,8,1,p
   ```

   which specifies a configuration for the serial port you have selected of 2400 baud, no parity, 8 bits, and 1 stop bit. The **p** switch tells the program to keep trying to configure the port until a confirmation message is received that it has been reconfigured.

4. Press ENTER

5. Instruct DOS to accept the input from the COM1 port by typing:

   ```
   ctty com1
   ```

   The program is uploaded and sends a program which then receives the INTERSVR.EXE and the INTERLNK.EXE files automatically.

Also, you can copy the INTERSVR.EXE and INTERLNK.EXE files to a diskette and then copy the files to the other computer, placing the files in the \DOS directory.

Reviewing Cable Specifications

The file transfer utility programs support serial links using a null-modem cable, such as LapLink or FastLynx cable. These programs interact directly with the serial port hardware instead of the computers BIOS to make the connection. In most cases, for these programs the connecting cables is a serial cable. However, if the parallel ports on both systems are bidirectional, you will be able to use a parallel cable. You can create your own serial or parallel cable using the wiring tables below.

If you want to use a serial port to transfer your data, then you must use the null-modem cable. Connect the null-modem cable to the serial port on your computer.

To use the file transfer utility programs, you need the following:

- Two computers with DOS 5.02 or higher installed on each computer.

  If you do not have DOS 5.02 or higher on one of the computers, refer to "Remote Copying of INTERSVR.EXE and INTERLNK.EXE Files" on page 161.

- A null-modem cable to connect to the serial ports of your computers, or a parallel cable to connect to the parallel ports of your computers.

Serial Cable

There are two kinds of physical RS-232 ports used by DOS—9 pin (DB9) and 25-pin(DB25). Use the following table to wire the pin connections for a serial cable.

9 Pin	**25 Pin**		**25 Pin**	**9 Pin**	
pin 5	pin 7	<-------->	pin 7	pin 5	Ground-Ground
pin 3	pin 2	<-------->	pin 3	pin 2	Transmit-Receive
pin 7	pin 4	<-------->	pin 5	pin 8	RTS-CTS
pin 6	pin 6	<-------->	pin 20	pin 4	DSR-DTR
pin 2	pin 3	<-------->	pin 2	pin 3	Receive-Transmit
pin 8	pin 5	<-------->	pin 4	pin 7	CTS-RTS
pin 4	pin 20	<-------->	pin 6	pin 6	DTR-DSR

Note: The ground wire is connected to the same pin on both ends. The last three wires are the reverse of the prior three.

Parallel Cable

Use the following table to wire the pin connections for a parallel cable.

25 Pin		25 Pin
pin 2	<-------->	pin 15
pin 3	<-------->	pin 13
pin 4	<-------->	pin 12
pin 5	<-------->	pin 10
pin 6	<-------->	pin 11
pin 15	<-------->	pin 2
pin 13	<-------->	pin 3
pin 12	<-------->	pin 4
pin 10	<-------->	pin 5
pin 11	<-------->	pin 6
pin 25	<-------->	pin 25

Note: Pin 25 to pin 25 is the ground-to-ground connection for this cable wiring table.

Chapter 10. Making More Memory Available

Memory provides temporary storage for programs and data. It exists on the main system board of your computer or on add-in memory boards. All programs must be loaded into memory to run.

In general, the more memory you have, the more programs you can run, and the more data you can work with at one time. Some programs require more memory than others.

To run a program, your system must contain as much physical memory as that program requires. You can increase the amount of physical memory on your system by plugging a memory board into a slot inside your computer.

For example, if a program requires 512K of memory, it is not going to run on a system that has only 256K of memory, no matter how much memory you free. You might add a 2-megabyte (2MB) memory board to your system which already has the 256K of memory on its main system board; the system would then have approximately 2.5MB of memory. 2.5MB is more than enough memory to run that program which requires 512K of memory.

If you are having trouble running programs because there is not enough memory, you might want to adjust your computer's configuration to make more memory available. Some programs might not run even if your system does contain sufficient physical memory. The cause is often that memory-resident programs are taking up some memory, and there is not enough memory left over. Usually the problem is caused by insufficient conventional memory. However, with a few programs, the problem is caused by insufficient expanded or extended memory.

A possible solution to these problems is to install and run an *optimizer* program such as RAMBoost. Running RAMBoost Setup increases your computer's available conventional memory and reduces the complexity of using computer memory management software. When RAMBoost is installed, it analyzes your computer's existing configuration and automatically reconfigures programs to load above 640K after restarting the system. During RAMBoost Setup, your existing programs in the CONFIG.SYS file are analyzed, and the LOADHIGH or DEVICEHIGH statements are changed for you by this program; you do not have to edit the CONFIG.SYS or AUTOEXEC.BAT files yourself. Whenever you add or remove items from the CONFIG.SYS or AUTOEXEC.BAT files, RAMBoost restarts the computer and automatically rearranges the new configuration to load programs into upper memory.

Understanding Memory

Programs that run with DOS normally use your system's conventional memory. Many programs can also use extended or expanded memory, if it is available. If your system has an 80386-based or higher processor, you can also run programs in the upper memory area.

To find out what type of memory your system has and which programs are currently loaded into memory, use the MEM command with the **/c** switch, or the QCONFIG command. For example, if you used the MEM command, you would type the following at the DOS command prompt:

```
mem /c /p
```

The **/c** switch provides you with a list of programs and classifies their memory into types of memory, such as conventional or upper memory. It is the Upper Memory Blocks that are used by RAMBoost to free conventional DOS memory. The **/p** switch pauses the information at the end of each screen of information.

If you want to use the QCONFIG command, a more complete description of the QCONFIG command can be found in "Analyzing Your Computer's Memory Before Running RAMBoost" on page 168.

Comparison of Memory Types

The five most common types of memory are described as follows.

- ***Conventional DOS Memory***

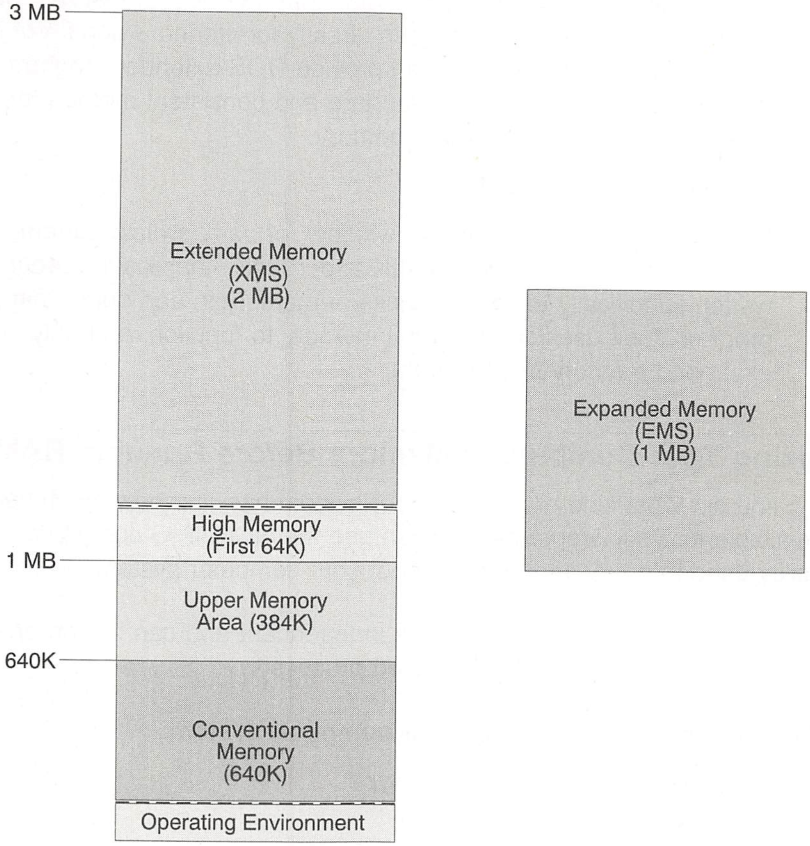
  The 80286-based or higher processors, which power personal computers and run the DOS operating system, have a 1024K (1 megabyte) address space when operating in real mode. *Real mode* means these processors are running as fast 8086-based computers. The lower 640K of this memory is designated as system memory and is called *conventional DOS memory*, (also known as *base memory*). This is the memory that DOS uses to process programs.

- ***Reserved Memory Area or Upper Memory Block (UMB)***

  The upper 384K in the 1MB address space is known as the *Upper Memory Block* and is used by video adapters, network hardware, ROM BIOS, and other memory-mapped hardware. This space, however, is never completely filled. Memory is mapped into this region between 640K and 1MB through the means of an upper memory manager (known as a *platform*). It is used for loading TSRs, DOS tables, and network software to free as much conventional DOS memory as possible. It is these Upper Memory Blocks that are used by RAMBoost to free conventional DOS memory.

- ***High Memory Area (HMA)***

  The high memory area is the first 64K minus 16 bytes of extended memory located just above 1MB.



- ***Extended Memory (XMS)***

  Extended memory is addressed above 1024K and cannot be accessed when the processor is in real mode. Therefore, it cannot be used by standard programs running under DOS. On 80286-based and 80386-based or higher machines, some programs (mostly RAM disks and disk-caching programs) switch the processor to protected mode and access this space. *Protected mode* is a special mode of operation that 80286-based or higher computers have to be in to access extended memory. Extended memory can never be used on 8088-based and 8086-based machines because these processors do not support protected mode or memory above 1MB.

The Extended Memory Specification (XMS) method allows DOS programs to make use of the additional extended memory found in 80286-based, 80386-based, and 80486-based or higher machines in a consistent, machine-independent fashion. XMS/HMA can add almost 64K of memory that some DOS programs can access directly for storing a portion of its code segment; or as XMS/EMA it can provide DOS-extender programs (such as Windows 3.0 or later) with a standard and consistent method for storing data (or inactive code) in extended memory.

- ***Expanded Memory (EMS)***

  Expanded memory uses a 64K window (of bank-switched memory), typically in the address space between 640K and 1024K. Application programs must be written specifically to switch blocks of memory in and out of this window. The program itself uses conventional memory to function, and only accesses this expanded memory to store data.

Analyzing Your Computer's Memory Before Running RAMBoost

To find out what kind of memory your system has and how much you have available for your programs, you can use the QCONFIG command. QCONFIG is a utility used to query information about your computer system.

The QCONFIG program is machine independent and can be run on any processor from a 8088-based to a 80486-based processor.

To query information about your computer system:

1. At the DOS command prompt, type:

   ```
   qconfig
   ```

You can use the **/p** switch (type `qconfig /p`) or the MORE command (type `qconfig | more`) to view the information one display screen at a time. QCONFIG examines your system and displays an analysis on the screen similar to the following:

```
:
Fixed Disk 1       :   379 MB  =   388096 KB  =  397419304 bytes
Logical Drive C :  Size  15312K =   14.9M    Avail  3920K =   3.8M
                   :  Total Units  3828  Avail Units  980 Total Sectors 30624
                   :  Sectors/Unit  8  Bytes/Sector 512
                   :  Local Drive - File System is FAT
:
Total Memory       :  16000 KB  = 15.6 MB
Conventional       :    640 KB   Free:   611 KB
Extended Memory :  15360 KB   Free:     0 KB
Expanded Memory :   2416 KB   Free:  2048 KB   Page Frame Address:  C000
XMS Memory         :   1984 KB   Free:  1984 KB
EMS Version        : 4.0
XMS Version        : 2.0
:
```

2. Redirect the information displayed to an output file by typing:

   `qconfig /o`
   : This option directs output of the information displayed on the screen to a file named QCONFIG.DAT.

   or

   `qconfig /`*ofilename.ext*
   : This option directs output of the information displayed on the screen to a text file (*filename.ext*) where you give the file a name of your own choice. Do not put a space between the "o" and the *filename.ext*.

3. Print the information so you can have it available if you need to contact a service representative, or use it to compare subsequent memory information data.

4. Review the information about your computer's memory and evaluate what you need to do to maximize the memory available for your applications, such as how to manually configure your system.

   Or, try running an optimizer program, such as RAMBoost, to free enough memory to run programs.

For more information about the QCONFIG command, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help qconfiq` at the DOS command prompt for a brief explanation and command syntax.

Understanding How RAMBoost Works

RAMBoost manages the area of memory of your computer from 640K to 1024K, called upper memory blocks (UMBs). RAMBoost runs invisibly on your computer, optimizing available memory automatically each time your computer's system configuration changes. If you add or remove programs from your CONFIG.SYS or AUTOEXEC.BAT files, RAMBoost automatically detects the change, reboots, and rearranges the remaining drivers in upper memory.

RAMBoost works in conjunction with a memory manager. A memory manager (such as EMM386, Quarterdeck QEMM**, and Qualitas 386MAX**) makes the open areas in your upper memory blocks available for loading memory-resident programs and device drivers (referred to as "loading high"). Loading programs high makes more DOS conventional memory available for your applications.

The amount of upper memory RAMBoost makes available is determined by the expanded memory specification (EMS) manager used with it. For example, if you use QEMM with Stealth the upper limit is approximately 225K. If you use DOS's EMM386, the upper limit varies from 64K to 160K, depending on the BIOS, peripherals, and the careful use of INCLUDE statements. You will see INCLUDE (for example, `i=b100-b7ff`) and EXCLUDE statements (for example, x=a000-b0ff) in your AUTOEXEC.BAT file after your have configured RAMBoost.

Because the open space in upper memory is usually in several pieces of different sizes, programs can fit in some areas but not in others. RAMBoost arranges your memory-resident programs, device drivers, and other DOS resources such as those specified in the CONFIG.SYS files (for example, FILES=, BUFFERS=) into upper memory. This increases the amount of memory available for DOS to run applications. RAMBoost does this by creating a profile of your memory usage and by automatically rearranging the programs in your upper memory blocks to give you the maximum amount of free conventional memory.

You configure RAMBoost once. Then, each time you start your computer, RAMBoost analyzes your computer's resident programs and device drivers, selects the optimal loading configuration, and loads them into upper memory blocks.

** Quarterdeck QEMM is a trademark of Quarterdeck Office Systems.

** Qualitas 386MAX is a trademark of Qualitas, Inc.

If you are familiar with memory-management techniques, you can customize RAMBoost's performance by manually editing the settings in the RAMBOOST.INI file. RAMBoost detects software that might cause incompatibilities when loaded high. In some cases, you might gain more conventional memory by manually shifting the position of the memory manager in the CONFIG.SYS file; however, this is generally not necessary. The RAMBOOST.INI file can also be edited to force "problem drivers" to load into conventional memory. See "The RAMBoost Configuration File" on page 182 for an overview of the RAMBOOST.INI configuration file.

RAMBoost System Requirements

The following items are required to use RAMBoost Setup. RAMBoost Setup is flexible, however, because it works with the following operating systems and memory managers:

- A minimum of 1MB random access memory (RAM).
- A 80386-based, 80486-based, or higher processor.
- For Upper Memory Block support, at least 640K and an EEMS/EMS 4.0 memory manager are required. Use one of the following EEMS/EMS 4.0 memory managers:
  - HIMEM.SYS and EMM386.EXE provided with DOS
  - Quarterdeck Expanded Memory Manager-386**
  - Qualitas 386MAX and BlueMAX**
  - Helix** Netroom**

  Note: Refer to "Compatibility with Memory Managers and Other Programs" on page 182 for compatibility information.

** Quarterdeck Expanded Memory Manager-386 is a trademark of Quarterdeck Office Systems

** BlueMAX is a trademark of Qualitas, Inc.

** Helix and Netroom are trademarks of Helix Software Company

Configuring RAMBoost

You use the RAMSETUP.EXE program to configure RAMBoost. When loaded, RAMBoost automatically checks for the existence of memory managers, such as HIMEM.SYS and EMM386.EXE, on your system. Then, it scans upper memory to configure itself with the optimal parameters for managing upper memory.

Considerations before configuring RAMBoost

You need to take the following into consideration before you configure RAMBoost:

- If you have adapter cards installed on your computer, ensure that you load or activate them before running RAMSETUP. RAMSETUP scans the upper memory area looking for unused adapter memory. If you do not have your adapter activated, RAMSETUP might incorrectly use the adapter memory space.
- If you are using QEMM386, 386MAX, or Netroom, you must install it according to its installation instructions before you activate RAMBoost. You must also make sure it provides upper memory blocks (UMBs).

To configure RAMBoost:

1. Make backup copies of your CONFIG.SYS and AUTOEXEC.BAT files as a precaution.
2. Save information about your memory to an output file so you can compare it later to the results you get after you have loaded RAMBoost. Before you begin the reconfiguration, type:

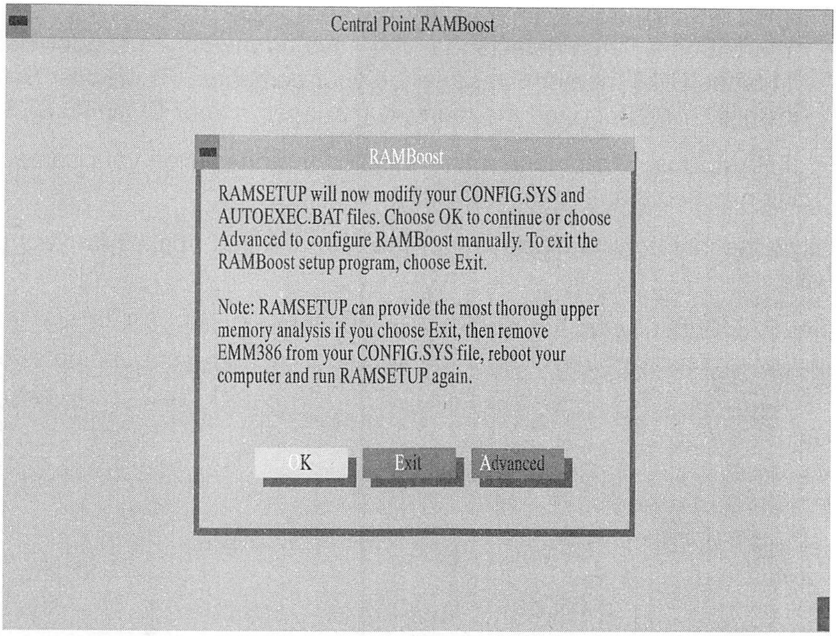
   ```
   mem /c > filename.ext
   ```

   where *filename.ext* is the name of the output file (for example, SAVEIT.OUT). The MEM command is preferred in this case rather than QCONFIG because it gives more details about your programs' upper memory.
3. From the DOS command prompt, type:

   ```
   ramsetup
   ```

   and then press ENTER.

RAMBoost reads the RAMBoost profile and configuration files and displays a pop-up window:



Any of the following scenarios are possible, depending on what programs exist in your CONFIG.SYS file when RAMBoost Setup is run:

- If RAMBoost Setup detects a DEVICE=EMM386.EXE statement in your CONFIG.SYS file, you should select **Exit**, remove or use the REM command to comment the DEVICE=EMM386.EXE statement, reboot your system, and then run RAMBoost Setup again.

  Removing this statement provides the most thorough upper memory analysis.

- If RAMBoost Setup detects that you have a DOS memory manager installed, RAMBoost Setup installs RAMBoost in your CONFIG.SYS file. You have the options of reconfiguring the DOS memory manager to its base settings by selecting **OK** or modifying your computer's upper memory blocks manually by selecting **Advanced**.

  Note: You must select **Advanced** to setup EMS memory.

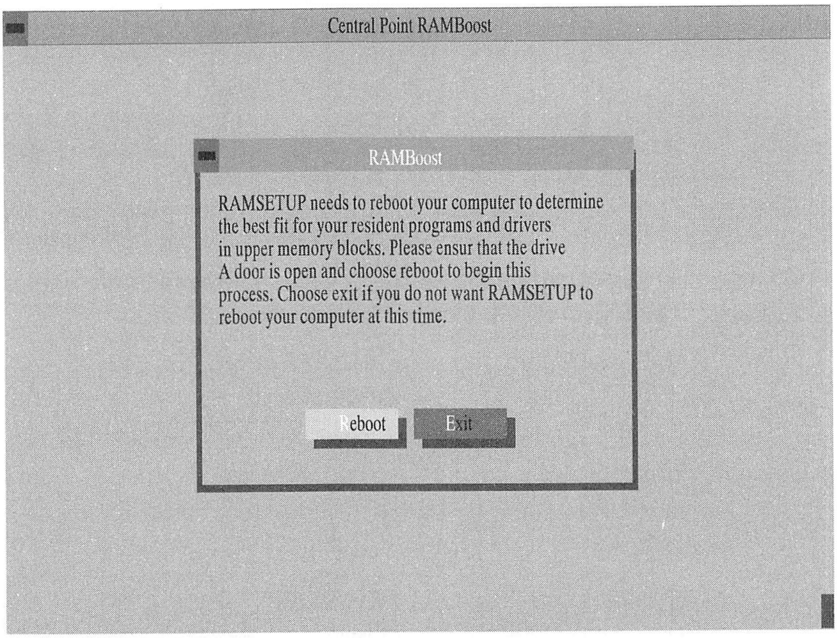
- If RAMBoost Setup detects that you have installed a memory manager other than the one in DOS, it installs RAMBoost in your CONFIG.SYS file and possibly modifies your AUTOEXEC.BAT file, removing any LOADHIGH or DEVICEHIGH statements.

Note: RAMBoost does not recognize the INSTALLHIGH statement so you should make sure any INSTALLHIGH statements are removed prior to running RAMBoost Setup.

- If RAMBoost Setup detects that you have no memory manager installed but finds the DOS memory manager on your computer, RAMBoost Setup installs RAMBoost and the memory manager in your CONFIG.SYS file.
- If RAMBoost Setup cannot find a memory manager on your computer, it informs you that you must install one.

4. Follow the instructions displayed for the scenario that applies for your particular system.

   After RAMBoost Setup installs RAMBoost in your CONFIG.SYS file, a pop-up window is displayed that allows you to *reboot* (restart) your computer or exit.



   If you select **Exit**, RAMBoost is activated the next time you start your computer.

5. Select **Reboot** to activate RAMBoost.

RAMBoost restarts your computer twice before RAMBoost is activated.

The first reboot:
RAMBoost Setup loads all your memory-resident programs as usual and keeps a record of how much memory they use and where the programs are placed in upper memory.

After restarting your computer, you see the following:

```
RAMBOOST will automatically load in 3 seconds.  Choose:

'Y' to continue.
'N' to prevent RAMBOOST from loading.

Load RAMBOOST  [Y/N] ?

RAMBOOST is loaded in LEARN mode.
```

The second reboot:
RAMBoost Setup actually rearranges the programs to fill your upper memory as much as possible. You should then find a noticeable increase in conventional memory available for running applications. You now see displayed on the last line:

```
RAMBOOST is loaded in ACTIVE mode.
```

followed immediately by the display of the DOS command prompt signifying that RAMBoost is loaded.

After this, each time you start your computer, RAMBoost is loaded and it optimizes memory usage. Whenever you restart your computer, if RAMBoost determines that one of the system files it tracks has been altered (such as your AUTOEXEC.BAT or CONFIG.SYS files) or some other special condition has changed, RAMBoost automatically enters LEARN mode to optimize your computer's new configuration.

Learn Mode

During the Learn mode, the RAMBoost program is working to determine the optimal location for every object loaded since (and including) the loading of RAMBoost. This can be a long process. A feature of the RAMBoost program is a progress bar that shows the current status of the Learn function.

The progress bar indicates the actual percentage of the possible combinations that have been looked at. The time display provides an estimate of how much longer the processing will take. This estimate is based on how long it has taken to process the current fraction of the job.

Bypassing the Learn Mode

If you change your AUTOEXEC.BAT and CONFIG.SYS files frequently, you might want to bypass the Learn mode. To do this, use the *synch* parameter.

From the DOS command prompt type:

```
ramboost sync
```

A message prompt is displayed asking for confirmation.

Note: You must include the *sync* parameter every time you want to bypass the Learn mode.

Analyzing Your Computer's Memory After Running RAMBoost

After RAMBoost is loaded, you might want to do the following to verify that you do have more conventional memory available:

- Edit your CONFIG.SYS file. Lines similar to the following are placed in this file if you successfully loaded RAMBoost

  ```
  device=c:\dos\emm386.exe noems ram x=a000-b0ff i=b100-b7ff x=b800-bfff ...
  device=c:\dos\ramboost.exe load
  ```

  The `i=` and `x=` are INCLUDE and EXCLUDE statements. The vellip `...` means that, although more of these statements are normally included in this DEVICE= statement, they are all not listed for this example.

- Note that all DEVICEHIGH= statements have been modified to show as DEVICE= instead.

- Save the output by typing:

  ```
  mem /c > filename.ext
  ```

  where *filename.ext* is the name of the output file (for example, SAVE2.OUT). The MEM command is preferred in this case rather than QCONFIG because it gives more details about your programs' upper memory.

  You should see information similar to the following:

```
Modules using memory below 1Mb:

  Name           Total       =   Conventional    +   Upper Memory
  --------  ----------------   ----------------   ----------------
  IBMDOS      11325   (11K)      11325   (11K)          0     (0K)
  SMARTDRV     2448    (2K)       2448    (2K)          0     (0K)
  HIMEM        1072    (1K)       1072    (1K)          0     (0K)
  EMM386       4096    (4K)       4096    (4K)          0     (0K)
  RAMBOOST    10432   (10K)        320    (0K)      10112    (10K)
  PENDEV         96    (0K)         96    (0K)          0     (0K)
  DISPLAY      7968    (8K)       7968    (8K)          0     (0K)
  COMMAND      2912    (3K)       2912    (3K)          0     (0K)
  IBMDOS      37776   (37K)          0    (0K)      37776    (37K)
  IBMDOS      15872   (16K)          0    (0K)      15872    (16K)
  APPEND       8912    (9K)          0    (0K)       8912     (9K)
  DOSKEY       4096    (4K)          0    (0K)       4096     (4K)
  IBMAVSH      5264    (5K)          0    (0K)       5264     (5K)
  FREE       743456  (726K)     632992  (618K)     110464   (108K)
```

- Print the information so you can have it available for comparison against your printout before you ran RAMBoost Setup.
- If you printed or saved the output from the MEM command before you ran RAMBoost, you should compare the two files.

  For the majority of individuals, running RAMBoost should give you more conventional memory than you had prior to running it. If it does not, you might have to manually manipulate the upper memory blocks. Refer to "Using Advanced Features" on page 178 for information about how to customize upper memory.

What RAMBoost Changes

RAMBoost Setup modifies your CONFIG.SYS file and possibly modifies AUTOEXEC.BAT file. Some of the following changes might be noted:

- A RAMBOOST.EXE statement is placed in your CONFIG.SYS file.
- EMM386 has been configured, unless you chose to use your existing memory manager.
- Your previous DEVICEHIGH= statements have become DEVICE= statements because RAMBoost now controls your upper memory blocks and does not permit you to manually insert programs into upper memory using DEVICEHIGH= statements.
- Any LOADHIGH commands in your AUTOEXEC.BAT file are removed for the same reason that DEVICEHIGH= statements are changed.
- For Multiple-Configurations the following changes are made:
  - The AUTOEXEC.BAT file is renamed by RAMSETUP to AUTOEXEC.CPS. This file is handled as a backup file.
  - All LOADHIGH commands are removed by RAMSETUP. If there are some LOADHIGH commands that you wanted to keep and they apply to an environment that is not controlled by RAMBoost, you can create and add them back to the AUTOEXEC.BAT file. When RAMBoost runs, it does not remove the new LOADHIGH commands.
  - An .INI file is created for each config variable found in the CONFIG.SYS file.

Using Advanced Features

RAMBoost runs by itself with minimal user interaction. It is possible, however, to customize the way RAMBoost uses the upper memory blocks of your computer.

CAUTION:
Use these advanced features only if you are very familiar with upper memory concepts and management.

There are two ways you can work with advanced RAMBoost features:

- Using the Upper Memory Usage Editor. This feature can only be used the first time you run RAMSETUP.
- Editing the RAMBOOST.INI file directly.

The Upper Memory Usage Editor

The Upper Memory Usage Editor is an advanced feature of RAMBoost Setup memory manager. The Upper Memory Usage Editor allows you to:

- View your current upper memory usage.
- Make changes to your upper memory usage.

You can use the Upper Memory Usage Editor to reserve upper memory blocks for devices that might not identify their upper memory usage during RAMBoost's Learn mode. These devices can be network or special video boards. You can also use the editor to make more upper memory blocks available. For example, if you know of an available region of upper memory blocks that appears unavailable, you can use the editor to change the status of the blocks from allocated to available.

To start the Upper Memory Usage Editor:

1. From the DOS command prompt, type:

   ```
   ramsetup
   ```

2. Then press ENTER

   If RAMSETUP detects that you have the DOS memory manager installed, RAMSETUP provides you with an Advanced option button.

3. Select **Advanced**.

   The following table shows status symbols for each block:

This Symbol	Indicates
- -	An available memory block.
. .	An occupied memory block.
RO	A block allocated for ROM.
VI	A block allocated for video RAM.
EM	A block allocated for the EMS frame.
AD	A block allocated for adapter RAM.

To change the current memory usage of a block:

1. Select the block you want to change, using the mouse or pressing the TAB key to activate the editor and then using the arrow keys.
2. Select the function key that corresponds to the type of memory specification you want to apply.

   See "Function Keys" for more information.
3. Repeat steps 1 and 2 until you have modified upper memory to your satisfaction.
4. Select **OK** to save the changes to your CONFIG.SYS file.

Function Keys: The following table shows the function keys you can use in the Upper Memory Usage Editor.

Function Key	Description
F1 HELP	Provides online help.
F2 AVAIL	Makes the selected memory block(s) available for another use.
F3 EXIT	Exits from the program.
F4 ROM	Changes selected memory block usage to ROM.
F5 VIDEO	Changes selected memory block usage to video RAM.
F6 EMS	Changes selected memory block usage to EMS frame.
F7 ADAPT	Changes selected memory block usage to RAM adapters.
F8 DEC	Switches between the display of memory block addresses in decimal and hexadecimal characters.

Using the Options Editor

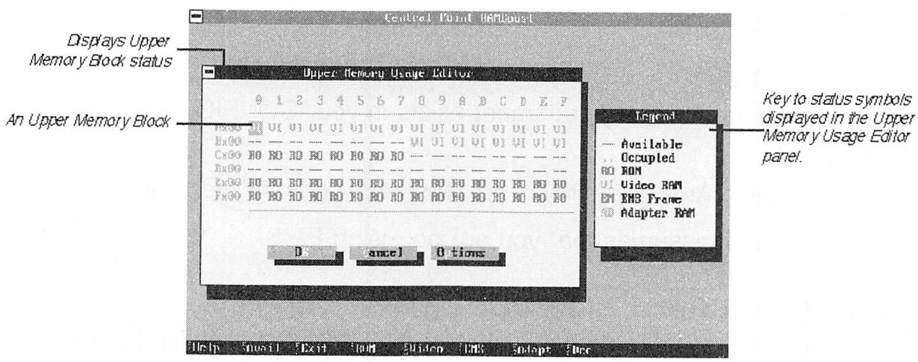
This dialog box lets you set the number of XMS (extended memory specification) handles DMA support and the size of your DMA (direct memory access) buffer. The default values are correct for most PCs. You can also enable or disable EMS (expanded memory specification) memory and specify whether your computer is equipped with a Weitek coprocessor.

These options correspond to command-line options for the DOS memory manager, EMM386.

Option	Description
XMS Handles	Specifies the number of extended memory handles EMM386 can use, from 2 to 255. If you use many programs simultaneously that use extended memory, you may need to increase this number.
DMA Buffer	Specifies how many kilobytes of memory to reserve for Direct Memory Access (DMA). This should be the largest DMA transfer that occurs while EMM386 is active, and can be from 16 to 256. The default value is optimized to work on most PCs.
Enable EMS	Enables EMM386 to access expanded memory by designating a memory area as a swap page, required for expanded memory orientation. You can enable EMS if a program you use requires it. If you do not need it, you will have more available upper memory if you leave it disabled.
Weitek	Enables support for the Weitek coprocessor. If your computer uses this coprocessor, enable this feature.

To use the Options Editor:

1. Select **Options** from the Upper Memory Usage Editor menu.



2. Make any necessary adjustments and select **OK** to save your settings.

The RAMBoost Configuration File

The RAMBoost configuration file is an editable ASCII text file. It contains all the necessary parameters for RAMBoost to manage your system. The profile is named RAMBOOST.INI. When RAMBoost needs to consult or edit this profile, it searches for it in the \DATA subdirectory below the current directory.

The RAMBOOST.INI file has eight sections. Each section begins with a section header and contains specific assignments relevant to the operation of RAMBoost. The sections are:

- System
- PIF.Advice
- Completion Triggers
- Text
- Learn
- Learn.PIF
- Learn.UMB
- PIF

Refer to the *PC DOS Command Reference and Error Messages* manual for specific details about the RAMBOOST.INI file.

Compatibility with Memory Managers and Other Programs

The following section describes RAMBoost's compatibility with the following memory managers and other programs:

- Helix Netroom386
- Qualitas 386MAX and BlueMAX
- Quarterdeck QEMM-386
- DESQview and enhanced Windows

Helix Netroom386

Ensure that the following statement exists in your CONFIG.SYS file before starting RAMBoost:

```
device=c:\netroom\rm386.sys ems=c800-efff frame=none
```

This statement assumes that you are not using EMS.

Qualitas 386MAX and BlueMAX

The following statement should exist in your CONFIG.SYS file before starting RAMBoost:

```
device=c:\max\386max.sys include=b000-b800 ems=512
```

If you do not need EMS, change the EMS parameter to read `ems=0`. Making this change increases the upper memory available to RAMBoost by 64KB.

If RAMSETUP detects 386MAX (Version 7 or above) or detects BlueMax (Version 6.02 or above), it adds the NO58 parameter to the MAX profile. If you install one of these versions after RAMBOOST is loaded, you need to edit the MAX profile manually, or run RAMSETUP again.

Note: Any version of 386MAX or BlueMAX prior to the version listed above should not include the NO58 parameter in the MAX profile.

RAMSETUP deletes from the CONFIG.SYS file two incompatible BlueMAX or 386MAX (Version 7) devices, both named EXTRADOS.MAX.

QEMM-386

If QEMM-386 is already installed, you should see the following statement in your CONFIG.SYS file:

```
device=c:qemm\qemm386.sys ram x=f000-ffff st:m
```

If you do not need EMS, add the *noems* parameter to this statement in your CONFIG.SYS file. Making this change increases the upper memory available to RAMBoost by 64KB.

RAMSETUP deletes the following uncompatible QEMM (Version 7) devices from the CONFIG.SYS file:

- DOS-UP.SYS
- DOSDATA.SYS

DESQview and enhanced Windows

RAMBOOST does not automatically reset from the DESQview DOS box or the enhanced Windows environment.

Chapter 11. Speeding Up Your System

This chapter explains how to speed up your system with the following methods:

- Improving the efficiency of your hard disk
- Using the BUFFERS command
- Using DOS Defragmenter
- Using SMARTDrive
- Using RAMDrive

Improving the Efficiency of Your Hard Disk

You can use the following methods to speed up your system without taking up additional memory.

Deleting Unnecessary Files

Deleting unnecessary files is an easy solution to freeing disk space. There are two categories of files you might consider deleting:

- Program and data files that you no longer use.
- Temporary files that were left on your hard disk when a program ended unexpectedly.

You can use the following guidelines to decide whether or not to delete a file and then use the DELETE command to delete the file.

Many programs create temporary files while they are running. Some programs store those files in a separate directory that is specified in your AUTOEXEC.BAT file by using the SET command. Most often, you designate such a directory by using the SET command with the TEMP or TMP environment variable.

You should periodically clean out your TEMP directory. This is not necessary if your TEMP directory is on a RAM (Random Access Memory) disk. To avoid deleting a temporary file that is currently in use, you should delete files in your TEMP directory only when you are not running any program.

CAUTION:
Never delete the files COMMAND.COM, IBMBIO.COM, or IBMDOS.COM. The IBMBIO.COM and IBMDOS.COM files are usually hidden files. If you delete any of these files, your system will not start.

Using the CHKDSK Command

You can use the CHKDSK command to recover lost allocation units that are taking up space on your hard disk. An allocation unit is the smallest piece of a hard disk that can be allocated to a file. Allocation units can get lost when a program ends unexpectedly, leaving temporary files on the hard disk without saving or deleting them properly.

Make sure you quit all programs before using the CHKDSK command. If you are using FASTOPEN, SMARTDrive, or any other memory-resident program, disable the corresponding commands in your CONFIG.SYS file and restart your system.

To follow the recommended procedure for using the CHKDSK command:

1. Quit all programs—including memory-resident programs.
2. Change to the hard disk you want to clean up.

   For example, if you want to clean up the files on drive D, you would type `d:` at the DOS command prompt.
3. Type:

   ```
   chkdsk /f
   ```

   The **/f** switch finds and recovers any lost allocation units.
4. If there are any lost allocation units, you are prompted to convert them to files.

   If you want to inspect the contents of the lost allocation units before deleting them, type `y`. If you are sure the lost allocation units do not contain information you want, type `n`. The information is deleted and you can skip the remaining steps in this procedure.

   If you answer yes, the lost file allocation units are converted to visible files with file names similar to FILE0001.CHK. These files are put in your root directory.
5. Use the TYPE command to view the contents of the files.
6. Delete any .CHK files you do not want.

For more information about the CHKDSK command, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help chkdsk` at the DOS command prompt.

Helping DOS Find Files Quickly

When you type a command or start a program, DOS must find the executable file before it can carry out the command or start the program. If you type the full path and file name of the file, DOS can find and carry out the command or run the program almost immediately. If you type only the file name, DOS searches for the program file as follows:

- DOS looks for the program file in your current directory.
- If the file is not in your current directory, DOS looks for the file in the directories specified by your PATH command. It searches the directories in the order they appear in the path command. Typically, the PATH command is included in your AUTOEXEC.BAT file.

This search can take time, particularly if your path contains many directories or if your directories contain many files. The fewer directories and file names DOS must search through, the faster the response will be.

If your hard disk has one or two directories that contain frequently used program files, you might want to list those directories first in your PATH command. For example, suppose all your DOS batch (.BAT) programs are in the directory C:\MYTOOLS, and the programs you use most frequently are in the directory C:\PROGRAMS. An efficient path command might look similar to the following:

```
path=c:\mytools;c:\programs;c:\dos;c:\;
```

You should keep the number of files in each directory to 150 or less. This reduces the time DOS spends searching.

Using DOS Defragmenter

Over time, as programs read from and write to your hard disk, information stored on your hard disk can become *fragmented*. Fragmentation occurs when a file, instead of being stored in contiguous sectors of the disk, is broken into fragments that are stored in different locations on the disk. Fragmentation does not affect the validity of the information—your files are still complete when you read them into a program. However, it takes much longer for your computer to read and write fragmented files than it does to read and write defragmented files. To *defragment* files, you run a program that reorganizes your files on disk drives back into contiguous files, which then optimizes performance.

To defragment the files on a hard disk:

1. Delete any unnecessary files from the hard disk.
2. Quit all programs.
3. Clean up lost allocation units by typing the following at the DOS command prompt:

   ```
   chkdsk /f
   ```

4. Run DOS Defragmenter by typing the following at the DOS command prompt:

   ```
   defrag
   ```

   DOS Defragmenter displays a list of the disk drives on your computer.

5. Choose the drive you want to defragment.

   DOS Defragmenter analyzes the data on that drive and recommends a defragmentation option. It also displays how the information is laid out on the drive you specified.

6. To begin defragmentation, select **Optimize**.

   Or, if you want to change the defragmentation settings or get more information about the current defragmentation settings before you begin it, select **Configure** by pressing the RIGHT ARROW key and then pressing ENTER.

   The Optimize menu appears.

   For information about the commands on the Optimize menu, select a command by pressing the UP ARROW or DOWN ARROW key and then press F1. To begin the defragmentation from the Optimize menu, select **Begin Optimization** and press ENTER.

If you need help while using DOS Defragmenter, press F1.

Using the BUFFERS Command

The BUFFERS command in your CONFIG.SYS file specifies the number of buffers that DOS reserves for file transfers. For information about the BUFFERS command, see the *PC DOS Command Reference and Error Messages* manual.

The greater the number of buffers (up to about 50), the faster your system runs. However, past a certain value, increasing the number of buffers only uses more memory without increasing speed.

When optimizing your system for speed, you want to specify the greatest number of buffers that are useful for your system. This number depends on the size of your hard disk. The following are the most effective buffer sizes for different sizes of hard disks:

Hard-disk size	**Buffer size**
Less than 40MB	20
40 through 79MB	30
80 through 119MB	40
More than 120MB	50

The following command specifies 40 buffers—an optimal number for a system with a 110MB hard disk:

```
buffers=40
```

When calculating the default number of buffers, DOS bases the number on how much conventional memory your system has, rather than on the size of your hard disk. The default number that DOS calculates is a minimum number. The numbers in the preceding list are larger in order to increase system speed.

Note: When a disk cache, such as the SMARTDrive program, is in use, the BUFFERS= number is not as critical and can be set lower.

Using SMARTDrive

The SMARTDrive program (SMARTDRV) is a terminate-and-stay resident (TSR) program that you can add to your AUTOEXEC.BAT file. This program reduces the time your computer spends reading data from your hard disk. You can control the size of the SMARTDRV memory cache and set up the hard disk cache in extended memory.

Note: If you need to use the double buffering feature of SMARTDRV, you must designate SMARTDRV as a device driver by including the proper device command in your CONFIG.SYS file. See “Using Double Buffering” on page 191.

To use the SMARTDrive program:

1. Verify whether your system has extended memory by typing the following at the DOS command prompt:

   ```
   mem
   ```

   Note: You must have a DOS memory manager, such as HIMEM.SYS installed on your system.

2. If your system has extended memory, you can add this command to your AUTOEXEC.BAT file so that this program runs whenever you start your computer. The line in your AUTOEXEC.BAT file would look like this:

   `smartdrv [[`*drive*`[+|-]]...] [`*options*`]`

   For a list of the options available for use with the SMARTDRV command, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help smartdrv` at the DOS command prompt.

Note: If your system does not have extended memory, you cannot use the SMARTDrive program.

SMARTDRV reserves an area in extended memory and then uses this area to store information it reads from your hard disk. An application gets this information much faster if SMARTDRV provides it from memory than if the application has to retrieve it from the hard disk. SMARTDRV also temporarily stores information to be written to your hard disk and later writes this information when system resources are in less demand.

Warning: Make sure that SMARTDRV has completed all writing-cache before you turn off your computer. This is not necessary if you restart your computer by pressing CTRL+ALT+DEL. To make sure that SMARTDRV has completed, type `smartdrv /c` at the DOS command prompt. After all disk activity has stopped, you can safely turn off your computer.

SMARTDRV also supports caching for CD-ROMs. This function can be enabled or disabled by typing:

`smartdrv` <u>`drive`</u>`+|-`

If you do not want CD-ROM caching, you can load SMARTDRV with the **/u** switch. However, when SMARTDRV is loaded with this switch, CD-ROM caching cannot be enabled again until SMARTDRV is disabled.

Using Double Buffering

Double buffering is most commonly required if you are using a Small Computer System Interface (SCSI) hard disk, Windows, or other hard disk controllers that cannot work with virtual memory.

To use the SMARTDrive program with double buffering:

1. Verify whether your system has extended memory.
2. If your system has extended memory, add the following command to your CONFIG.SYS file:

   ```
   device=c:\dos\smartdrv.exe /double_buffer
   ```

3. Press CTRL+ALT+DEL to restart your system.

Most hard-disk controllers do not need to use double buffering. You should remove the SMARTDRV command line from your CONFIG.SYS file if you do not require double buffering.

To determine whether or not you can remove this command:

1. Ensure that the SMARTDRV driver has been loaded and double buffering has been enabled.
2. At the DOS command prompt, type `smartdrv` and press ENTER.

   SMARTDRV displays information about your system.

3. Look at the column labeled "buffering." If every line in the column reads "no," you can remove the DEVICE command for SMARTDRV from your CONFIG.SYS file.

Using RAMDrive

RAMDrive is a memory-resident program, also known as a terminate-and-stay-resident (TSR) program, that lets you use part of your computer's memory, called a *RAM drive*, as if it were a hard disk drive. By using RAMDrive, you can make programs run faster. RAM disks are temporary—any data you place on the RAM disk is lost when you turn off your computer. You can set up as many RAM disks as you want, limited only by the amount of memory your computer has and DOS drive letters available. You can run this feature on your system in either extended or expanded memory.

Note: You should specify the extended or expanded parameter. Otherwise, RAMDRIVE.SYS uses your system's conventional memory.

For more information about RAMDRIVE.SYS, see the *PC DOS Command Reference and Error Messages* manual.

When you install DOS, the Setup program copies the RAMDRIVE.SYS file to your DOS directory. To create a RAM drive, you add a DEVICE or DEVICEHIGH command for RAMDRIVE.SYS drive to your CONFIG.SYS file. You must add a command for each RAM disk you use with your system.

To activate the RAMDrive feature of your system:

1. Make a copy of your CONFIG.SYS file as a backup file.
2. Open your CONFIG.SYS file by using a text editor, such as the E Editor.
3. Add a DEVICE or DEVICEHIGH command line for the RAMDRIVE.SYS device driver after the DEVICE command that installs the expanded or extended memory manager. It should appear similar to the following:

   ```
   device=c:\dos\ramdrive.sys 512 /e
   ```

   This example creates a RAM drive that takes up 512K of extended memory. You can specify how much and what type of memory your RAM drive uses by customizing the command line. The **/e** switch specifies that extended memory should be used.
4. Save the changes to your CONFIG.SYS file and exit the E Editor.
5. Open your AUTOEXEC.BAT file.
6. Set the TEMP environment variable to your RAM drive by adding a SET command line. The drive letter of your RAM drive should be the letter after that of your last physical drive.

   For example, if your last physical disk drive is C, your RAM drive would be D. In this case, you would add the following command to your AUTOEXEC.BAT file:

   ```
   set temp=d:\
   ```
7. Save the changes to your AUTOEXEC.BAT file.
8. Restart your computer by pressing CTRL+ALT+DEL.

IMPORTANT: If RAMDrive is to use extended memory, your CONFIG.SYS file must contain a DEVICE command for the HIMEM.SYS memory manager. If RAMDrive is to use expanded memory, your CONFIG.SYS file must contain a DEVICE command for the expanded-memory manager that came with your memory board. The DEVICE command for RAMDrive must come after the one for the memory manager.

You can improve the performance of RAMDrive by doing the following:

- If you run programs from your RAM drive, list your RAM drive first in your PATH command.

  For example, if your RAM drive is drive D, add `d:\` to the beginning of the PATH command. For information about the PATH command, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help path` for a brief explanation and command syntax.

- If you use the EMM386 program as an expanded-memory emulator, do not put the RAM drive in expanded memory.

Although RAMDrive can also use this emulated expanded memory, it is not as efficient as it would if it were using real physical memory.

Chapter 12. Using Central Point Undelete

The Central Point Undelete program (Undelete) recovers files and directories protected by these methods of delete protection:

- DOS
- Delete Sentry**
- Delete Tracker
- Novell** NetWare** 386
- DR DOS** DelWatch

Undelete is most effective when you protect files with one of the delete protection methods, but it can undelete most files even if they are not protected. For information about configuring Delete Sentry and Delete Tracker, see "Central Point Data Monitor" on page 223.

Note: Undelete files as soon as possible for the best chance of recovering all your data.

If you have accidentally erased or formatted your entire disk, use UNFORMAT to recover the disk.

Installing Central Point Undelete for Windows

The Central Point Undelete program (Undelete) for DOS is installed automatically during DOS Setup. However, if you want to use Undelete while in a Windows session, and you did not select Undelete for Windows at initial setup, you can still install this program.

During Setup, DOS checks whether your computer has Windows 3.1 installed. If you do not have Windows 3.1 installed and want to use the optional tools provided with DOS, you should make sure you install in this order:

1. Install DOS as you normally would, selecting the optional tools you want from the list provided. You will not see any of the optional tools for Windows listed.
2. After you have installed DOS, install Windows 3.1 as you normally would.
3. Install DOS again using the DOS Setup **/e** switch to install optional tools after DOS and Windows have been installed.

** Delete Sentry is a trademark of Central Point Software.

** Novell and NetWare are trademarks of Novell, Inc.

** DR DOS is a trademark of Digital Research, Inc.

To install Central Point Undelete for Windows using the DOS Setup /e switch:

1. Insert diskette 1 of the DOS Setup diskettes into drive A or B.
2. At the DOS command prompt, type:

   ```
   a:setup /e
   ```

   or

   ```
   b:setup /e
   ```

   The **/e** switch allows you to return to the optional tools selection menu without having to do a complete reinstallation. At this point, only the necessary files for the optional tools for Windows will be installed.
3. After Setup for DOS begins, follow the instructions displayed on the screen. Make sure you specify the same "Install to PATH" as you did when you did the initial DOS installation.

   At the Optional Tools menu, you see a `NO` next to Central Point Undelete for Windows.
4. Press the UP ARROW and DOWN ARROWS until you highlight Central Point Undelete for Windows. You can select other optional tools at this time by highlighting and pressing ENTER for each item.

   You now see `YES` next to Central Point Undelete for Windows and other optional tools you selected.
5. After you select the optional tools you want to install, move the cursor to highlight the following:

   ```
   The listed options are correct.
   ```
6. Press ENTER to accept the optional tool selections.

   Continue to follow the instructions displayed on the screen until the optional tools are installed.

Starting Undelete

Undelete is a tool that recovers files and directories protected by specific methods of delete protection. It can even undelete most files not protected by these methods. Undelete works in conjunction with Data Monitor, a memory-resident program that includes several options to guard against data loss and protect confidential data.

To start Central Point Undelete:

1. Type the following at the DOS command prompt:

   ```
   undelete
   ```

   and then press ENTER
2. If a password has been assigned, enter it and then select **OK**.

If you prefer, you can use the DOS command prompt to undelete files rather than use the full-screen version of Undelete.

To start the command-line version of Undelete:

1. At the DOS command prompt, type:

   undelete *drive:\directory*

   and then press ENTER.

   For each occurrence of a deleted file, you are prompted:

   ```
   Do you want to recover this file? (Y/N)
   ```
2. Press Y to answer yes, or press N to answer no when queried about each file.

You can limit your search by specifying the full path for the file if you know it, specifying a specific directory that you know contained this file, or through the use of wildcards just as you limit the search when using the DIR command. A better way to find out what files have been deleted is to type the following:

```
undelete /list
```

Typing this command provides a list of the files you have deleted and the method of protection being used to protect them, such as Delete Sentry, Delete Tracker, or DOS. You see a list of deleted files for the current directory.

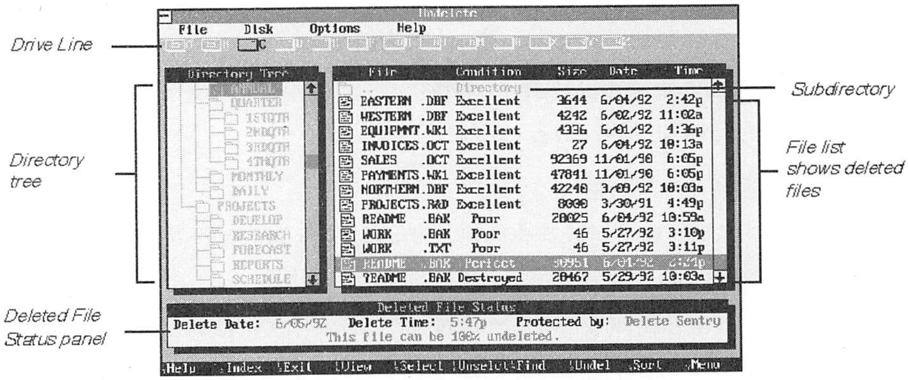
To start the Windows version of Undelete:

You can start Central Point Undelete for Windows by double-clicking on the Central Point Undelete icon located in the IBM Tools program group.

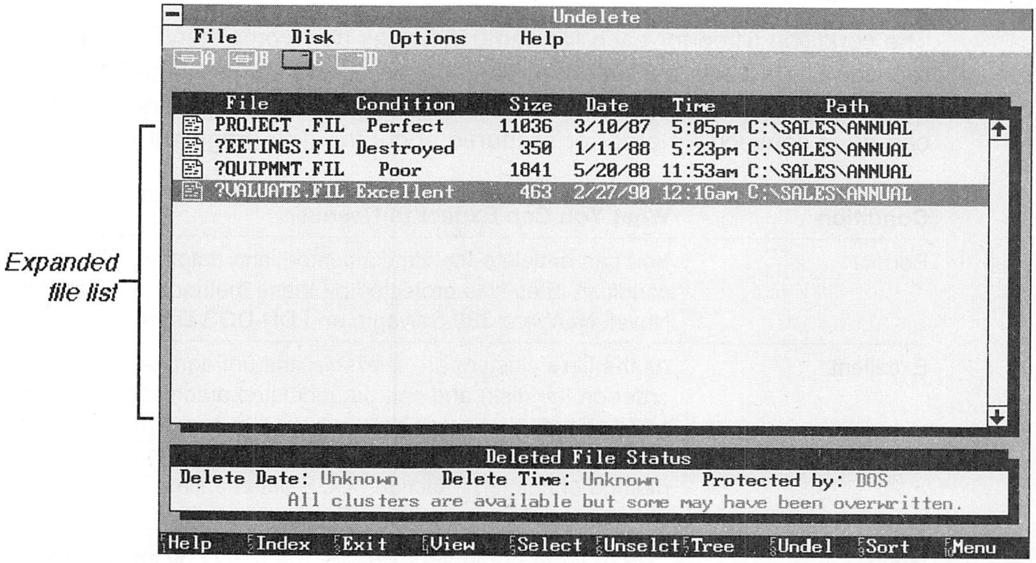
You then see the main window for Central Point Undelete for Windows.

Viewing the Undelete Window

When the Undelete window appears, the directory tree on the left shows the directory structure of the selected drive. The file list on the right shows subdirectories and files that have been deleted from the highlighted directory. When you delete a file, you no longer see it when you use the DOS DIR command, but its data might still be on the disk.



What you see	What it does
Drive Line:	Shows the currently selected drive.
Directory tree:	A graphical representation of all directories on the current drive.
File list:	Lists subdirectories and all deleted files from the highlighted directory. If a question mark (?) appears as the first character of the file name, this means that the deletion was not recorded by delete protection. If you are undeleting files on a network drive, Undelete comes up with an expanded file list rather than the directory tree and file list. See "Undeleting Files on a Network" on page 205.
Deleted File Status panel:	Tells you when and how the highlighted file was deleted and gives details about the file's condition.



Function Keys

The following function keys are available in Undelete:

Function Key	Description
F1 HELP	Provides online help about the selected item.
F2 INDEX	Displays the Help index.
F3 EXIT	Exits from Undelete.
F4 VIEW	Displays the contents of the highlighted file.
F5 SELECT	Lets you select files by file name specification.
F6 UNSELECT	Lets you deselect files by file name specification.
F7 FIND	Gives you the Find Deleted Files window.
F8 UNDEL	Undeletes selected files.
F9 SORT	Lets you select a sort order for listing files.
F10 MENU	Activates the horizontal menu bar.

Deleted File Condition

The condition listed for each file name indicates how completely Undelete can recover it. Undelete assigns conditions based on the status of the file's clusters. A cluster is a unit of disk space; a file occupies one or more clusters. A file's clusters can be in consecutive order or scattered about the disk (fragmented).

Condition	What You Can Expect to Recover
Perfect	You can undelete the file completely and automatically. This is the condition of all files protected by these methods: Delete Sentry, Novell NetWare 386 Salvage, and DR DOS DelWatch.
Excellent	All the file's clusters are available and unfragmented (in consecutive order on the disk) and can be undeleted automatically. There is a small chance that some data might be overwritten. This is the best condition you can expect for files protected by the Delete Tracker method of delete protection. DOS-deleted files that are small or unfragmented can also be in Excellent condition.
Good	One or more of the file's clusters are in use by another file; therefore, they are not available. Some data might be overwritten.
Poor	The file's first cluster and possibly more are not available. Use an Advanced Undelete method to recover as much as is still available.
Destroyed	The file cannot be undeleted because all of its known clusters are in use by other files. However, you might be able to recover some of the data from a DOS-deleted Destroyed file using an Advanced Undelete method.
None	The file cannot be undeleted because it had no data in it when it was deleted. It is a file entry with a size of 0 bytes.
Existing	The file is not a deleted file. It was added to the list by the Show Existing Files option so that you can rename it or add deleted clusters to it manually, using Append to Existing File, one of the Advanced Undelete methods.
Lost File	The file was found by scanning for lost deleted files. It is a deleted file whose directory cannot be determined. Most likely, its directory has been deleted.
Recovered	The file was undeleted during the current session.
Purged	The file was purged from Delete Sentry, DelWatch, or NetWare during the current session. You can no longer recover the file.

For technical information about the status of data in Excellent, Good, Poor, and Destroyed files that can help you decide how best to undelete files with those conditions, see “How the Delete Protection Method Affects File Recovery” on page 220. These conditions have slightly different implications, depending on whether the file was protected by Delete Tracker or DOS when it was deleted.

Delete Protection Methods

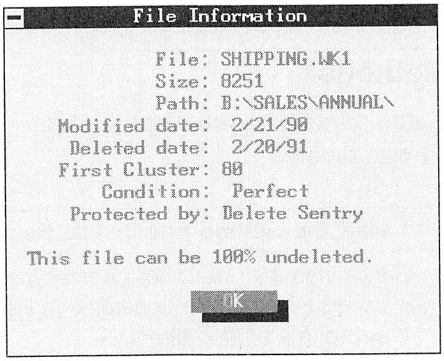
The Deleted File Status panel tells you what the highlighted file's delete protection method was when it was deleted.

Protection Method	How the Method Affects File Recovery and Condition
Delete Sentry	Indicates that the Delete Sentry method of delete protection was used. Files can be undeleted in Perfect condition because they are saved in a hidden directory.
Delete Tracker	Indicates that the Delete Tracker method of delete protection was used. DOS leaves deleted file data on the disk but marks the file's clusters as available. The Delete Tracker method records the cluster addresses of deleted files. As long as the file's clusters have not been overwritten by new data, a Delete Tracker-protected file can be undeleted in Excellent condition.
DOS	Indicates that no delete protection method was used. When DOS is the only source of information, files are undeleted based on their entries in the DOS directory and in the File Allocation Table (FAT).
NetWare 386	Indicates that Novell NetWare's method of delete protection was used on the network drive. Files can be undeleted in Perfect condition because they actually remain on the drive until they are purged or the space they occupied is overwritten. This method of delete protection must be configured by the network administrator and users given Create rights to retrieve files prior to using Undelete.
DelWatch	Indicates that the DR DOS method of delete protection, DelWatch, was used. Files can be undeleted in Perfect condition.

For technical details about these methods, see “How the Delete Protection Method Affects File Recovery” on page 220.

Getting More File Information

You can get additional information about any file you highlight by selecting **File Info** from the File menu.



Sorting the File List

By default, Undelete sorts by file name. However, you can change the order in which Undelete displays files by selecting a different sort order. For example, you might want to see all the .BAT files or all the files created on a certain date listed together so you can quickly find the one you wanted to undelete. Or, if you knew that the file was very small, you might sort the list in order of size.

If you select more than one file to undelete, the sort order determines the order in which the files will be undeleted. If you are undeleting a group of files at one time that have different conditions, before undeleting them, sort them in order of condition so that Undelete can recover the files that are in the best condition first. The displayed condition of a file can change as previous files are undeleted.

Changing the Sort Order

1. Select **Sort by** from the Options menu.
2. In the Sort by pop-up window, select a sort order and then select **OK**.

   Name: Sorts the files by file name, which is the default.

   Extension: Sorts the files by file extension.

   Size: Sorts the files by size, with the smallest files first.

   Deleted Date and Time: Sorts files protected by Delete Sentry and Delete Tracker in order of the date that files were deleted. Within each date group, files are sorted in order of time deleted. DOS-deleted files that have an unknown date are listed last in unchanged order.

Modified Date and Time: Sorts the files in order of the date that files were last modified. Within each date group, files are sorted in order of time last modified.

Directory: Sorts the files alphabetically by directory name. This option is available only in the expanded-file list displayed for network drives and files found by specification, where the directory tree is not shown.

Condition: Sorts the files by condition, in the following order: Perfect, Excellent, Good, Poor, Destroyed, Existing.

Selecting Files

You must first select the files that you want to undelete. The following table gives you several ways to select these files.

To:	Do This:
Select a single file	Move the highlight bar to the file you want to undelete and click the left mouse button, or press ENTER or SPACEBAR. The selected file changes color. You can select more than one file this way.
Select or deselect a group of files with the mouse	Press and hold the right mouse button, position the highlight bar over the first file, then also press and hold down the left mouse button. Drag the cursor over any additional files you want to select or deselect. Release both mouse buttons when finished.
Select a group of files by specification	Select **Select by Name** from the Options menu, enter a file specification, and select **OK**. Selected files change color.
Deselect a group of files by specification	Select **Deselect by Name** from the Options menu, enter a file specification, and select **OK**. The specified files are deselected.

Automatic Undelete Methods

When you have selected one or more files or directories, decide on an undelete method based on the condition of the deleted file. See "Deleted File Condition" on page 200. The methods described below undelete directories as well as files.

Note: *The Use Mirror File option is dimmed and deselectable when there is no Mirror file.*

Undeleting a File Automatically

If	Then
A selected file's condition is Perfect, Excellent, or Good	Select **Undelete** from the File menu or press F8 to undelete the file automatically, in the directory from which it was deleted.
The file's condition is Good	You might want to undelete it to another drive, as described next. At least some of the disk space occupied by a Good file can be in use by another file. That part of the file will not be included if you use **Undelete** but will be included if you use **Undelete to**.

Undeleting a File to a Different Drive

As a safety precaution, you can undelete a file to a different drive, leaving the original deleted file unchanged. You can undelete to a floppy disk, for example. Then, if that automatic undeletion does not recover all the data you want, you still have the option of rebuilding the unchanged deleted file one cluster at a time. See "Advanced Undelete Methods" on page 213.

To undelete a file to a different drive:

1. Select **Undelete to** from the File menu.
2. Select the drive where you want the undeleted file or files to be placed and select **OK**.
3. For each selected file, accept or change the default directory path and select **OK**.

   The file is undeleted to the specified path under its original name. If the first character of the file name was "?" Undelete replaces it with an "X"

Renaming an Existing File

Undelete lets you know if a file you are undeleting has the same name as an existing file. For example, this might happen if the deleted file is a previous version of an existing file. You can rename the existing file before you undelete the deleted one. That way, you can keep both files in the same directory.

To rename an existing file:

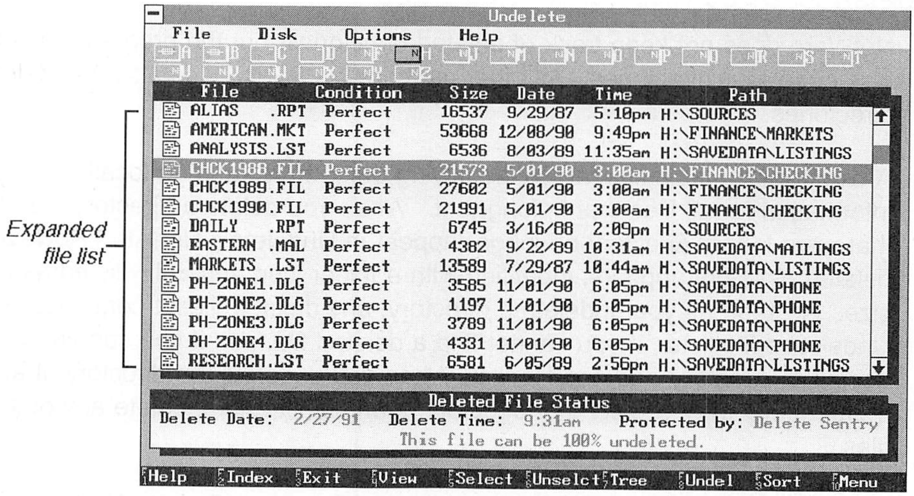
1. If the directory tree and file list are not visible, select **Tree & File List** from the File menu or press F7.
2. Select **Show Existing Files** from the Options menu to add all existing files to the list of deleted files in each directory.
3. Select the existing file you want to rename.
4. Select **Advanced Undelete ▸ Rename Existing File** from the File menu.

5. In the Rename Existing File pop-up window, type a new name for the existing file and select **Rename**.

6. After the existing file has been renamed, you can use **Undelete** to recover the deleted file that would have duplicated the existing file's name. To remove the existing files from the list, select **Show Existing Files** again.

Undeleting Files on a Network

If you are undeleting files on a network drive, Undelete lists the files users have deleted that were protected by Delete Sentry or Novell NetWare 386 method of delete protection. In place of a directory tree, Undelete shows the deleted files path in an expanded file list.



If a network directory is hidden, Undelete will not display the files unless the directory's hidden attribute is changed. Also, files deleted by other users do not appear in the list if you are using Delete Sentry, but the Novell NetWare method of deletion protection shows all files. You can undelete files that you have deleted with your current user name.

If you use Novell NetWare's method of delete protection to protect the network drive, users can see deleted files, but cannot recover files unless the network administrator has assigned Create rights to the directory that contained the deleted files.

If none of these methods of delete protection were used on the network drive, Undelete does not list any deleted files.

The following commands are not available if you are undeleting files on a network drive:

- Tree & File List on the File menu
- Advanced Undelete on the File menu
- All commands on the Disk menu
- Show Existing Files on the Options menu
- Use Mirror File on the Options menu

Note: The Use Mirror File option will be dimmed if Mirror is not available.

For more information, see "Deleted File Condition" on page 200. and "Delete Protection Methods" on page 201.

Undeleting Directories and Their Files

NetWare does not keep track of deleted directories, but the program does track the files in deleted directories. All other methods for finding files also find deleted directories.

A directory contains file entries identifying the names, starting locations, and other information for all files that belong to it. When you delete a directory, deleted files that were in that directory no longer appear in Undelete's file lists. However, the deleted directory appears, identified with a folder icon and <dir> listed as the file size. As soon as you undelete a directory, any deleted files it contained appear in Undelete's file lists. If you cannot find a deleted file, see if you can find its directory using the directory tree and file list. When you undelete the directory, it appears in the directory tree. Select that directory, then select and undelete any of its deleted files.

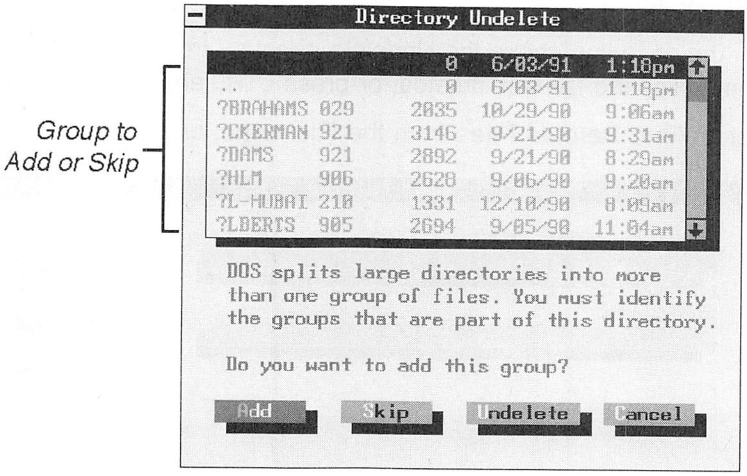
If you cannot find a deleted file's directory, you can still find the file or its data by using one of Undelete's disk scan methods discussed in "Scanning the Disk for Lost Files and Deleted Data" on page 211.

Undeleting a Directory

As you add files to a directory, it grows in size. DOS splits large directories into more than one group of file entries and does not keep track of the additional groups if you delete the directory. You can undelete most directories automatically. However, when Undelete cannot determine the location of all the parts of a directory, it displays the Directory Undelete pop-up window.

Identifying Groups of File Entries Belonging to a Directory

In the Directory Undelete pop-up window, identify the groups of file entries that belong in the directory you are undeleting.



In this pop-up window, you do not select individual files to undelete. Rather, you decide whether the entire group of file entries displayed in the list box represents files that belong in the directory you want to undelete.

If	Then
The group of file entries displayed in the scrollable file list was in the directory	Select **Add**. Undelete adds this group and searches for the next probable group of file entries.
The displayed group of file entries was not in the directory.	Select **Skip**. Undelete searches for the next probable group.

To identify groups of file entries belonging to a directory:

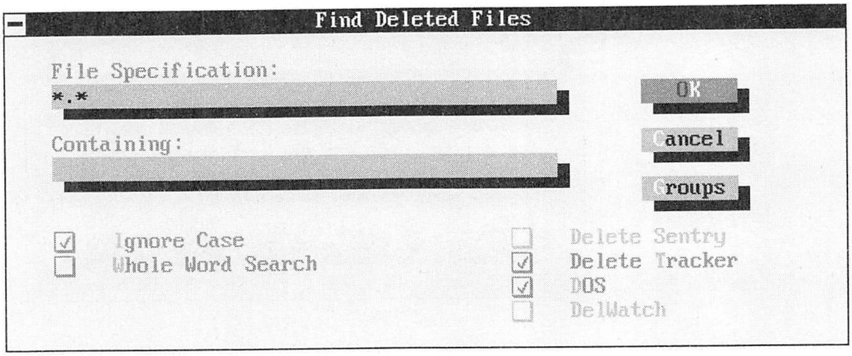
1. Continue adding groups of file entries that belong in the directory. When you have added the same number of groups as originally belonged in the directory, Undelete recovers the directory automatically (you do not have to select **Undelete**) and rebuilds the directory tree to include it.
2. Select **Undelete** to recover the directory before all groups are added.

Finding Deleted Files

If you cannot find a deleted file easily by looking for it in the Undelete directory tree and file list or when you want to display all deleted files on the disk in one listing, you can search for files by entering a file specification.

To find deleted files:

1. On the drive line above the Undelete directory tree and file list, click the drive from which the file was deleted, or press CTRL and the drive letter.
2. Select **Find Deleted Files** from the File menu, or press F7.



3. Select an option:

   File Specification text box: Lets you specify the name of the file or files you are searching for, using the DOS wildcard characters * and ?.

   Containing text box: Lets you narrow the search to deleted files that contain a specific text string. The program finds only files that contain that string.

   Groups: Finds files associated with a particular application.

4. In the File Specification text box, enter the file specification that describes the file or files you want to find.

   You can include more than one specification, separating each by one space.

   For example, type `*.EXE *.COM` to include all program files.

   You can exclude files by prefacing a file specification with a minus sign.

   For example, type `*.BAT -\*.BAT` to include all batch files except those in the root directory.

   - Use the LEFT ARROW and RIGHT ARROW to move the cursor one character right or left, and HOME and END to position the cursor at the beginning or end of the entry.
   - To insert characters, scroll to where you want to insert them, press INS and type the additional characters. To delete text, position the cursor after the character to be deleted and press BACKSPACE.

You can use file specifications and file contents together to narrow your search.

For example, if you type the file specification `*.DOC` and you type `budget` in the Containing text box, the program will find all IBM DisplayWrite files and other .DOC files that contain the word “budget.”

5. Enter the text you want to search for in the Containing text box.
6. Select the text search options:

   Ignore Case: Finds files containing the text whether it is upper or lowercase. For example, if you type CHOCOLATE, Undelete will find files containing “Chocolate,” “chocolate,” and “ChoCoLate.”

   Whole Word: Finds only the text you enter if it is one or more complete words. For example, if you type `tort`, Undelete will not find “tortellini” or “retorted.”

7. Select the delete protection methods to search for and then select **OK**.

   If no files on the current drive are protected by Delete Sentry, Delete Tracker, or DelWatch, those checkboxes are dimmed and you cannot select them.

   Delete Sentry: Finds deleted files that match the file and content specifications and were protected by Delete Sentry.

   Delete Tracker: Finds deleted files that match the file and content specifications and were protected by Delete Tracker.

   DOS: Finds deleted files that match the file and content specifications and were protected only by DOS.

   DelWatch: Finds deleted files that match the file and content specifications and were protected only by DR DOS's DelWatch.

   All files that match the specifications appear in the Find Deleted Files window, which contains an expanded file list that shows all files that match your Find Deleted Files specifications, including their paths.

   For more information, see “Deleted File Condition” on page 200 and “Delete Protection Methods” on page 201.

   Most menu commands available in the Undelete directory tree and file list are also available in the Find Deleted Files window. The following commands are not available: Show Existing Files and its related commands, Rename Existing File, and Append to Existing File.

8. To return to the directory tree and file list from the Find Deleted Files window, select **Tree & File List** from the File menu or press F7.

   The function associated with F7 switches between **Tree and Find**, depending on which window you are in. The command on the File menu also switches between **Tree & File List** and **Find Deleted Files**.

Searching for a Group of Files

Search groups make it easy to find deleted files associated with specific applications.

To search for a group of files:

1. Select **Find Deleted Files** from the File menu.
2. Select **Groups** in the Find Deleted Files pop-up window.
3. Select the group or groups from the Search Groups pop-up window and select **OK**.

   The specification for the group or groups you selected appears in the File Specification text box. If you selected more than one group, all of their specifications appear in the text box, separated by spaces.
4. Select **OK** in the Find Deleted Files pop-up window.

   The groups you selected remain in effect until you change the file specification or leave the program.

To add a search group:

1. Select **Find Deleted Files** from the File menu.
2. Select **Groups** in the Find Deleted Files pop-up window.
3. Select **Edit**.
4. Select **New**, and enter a group name and file specification.

   Enter a file specification that describes the names and location of the files. For example, if all your IBM DisplayWrite files were located in C:\DW5 and had the extension .DOC, you can enter the file specification C:\DW5*.DOC to define a group called "DW5 Files."
5. Select **Save**.
6. To use this group for the next search, select it and select **OK** in the Search Groups pop-up window.

To edit or delete a search group:

1. Select **Find Deleted Files** from the File menu.
2. Select **Groups** in the Find Deleted Files pop-up window.
3. Select **Edit**.

4. Select the search group you want to edit or delete.
   - To edit a search group, change the group name, file specification, or both and select **Save**.

     or

     To delete a search group, select **Delete**.
5. Select **OK**.
6. To use this group for the next search, select it and select **OK** in the Search Groups pop-up window.

Scanning the Disk for Lost Files and Deleted Data

If you have not found a deleted file using any of the following methods, you can scan the entire disk for *lost files* or for deleted data that is not associated with any file or directory.

- Looking in the Undelete directory tree and file list
- Using the Find Deleted Files command
- Undeleting the file's deleted directory

Try the Scan for Lost Deleted Files option first. If you cannot find the files you are looking for, you can scan the diskette's free clusters for the deleted data.

Scanning for Lost Deleted Files

You can scan the entire disk for lost files—files no longer associated with any existing directory.

1. Go to the directory where you want lost files to be recovered. Undelete recovers lost files to the current directory.
2. Select **Scan for Lost Deleted Files** from the Disk menu.
3. Select the delete protection methods to scan for:

   Delete Sentry: Finds deleted files that match the file and content specifications and were protected by Delete Sentry.

   Delete Tracker: Finds deleted files that match the file and content specifications and were protected by Delete Tracker.

   DOS: Finds deleted files that match the file and content specifications and were protected only by DOS.

   If no files on the current drive are protected by Delete Sentry or Delete Tracker, that checkbox is dimmed and you cannot select it.

4. Select **OK**.

Undelete scans the disk for files protected by the method or methods you selected. If you selected more than one method, Undelete scans the Delete Sentry directory first, then the Delete Tracker file, then the entire disk.

The Scan for Lost Deleted Files pop-up window shows the file or cluster number being scanned and the number of scan items found. A progress bar shows you how much of the disk has been scanned.

When the disk scan is complete, the list of files found appears in the Find Deleted Files window, with Lost File as its condition. Lost files retain their original names and other information, so you can easily select and undelete the files you are looking for.

Scanning Free Clusters for Deleted Data

You can scan the diskette's free clusters—disk space no longer associated with any existing file or directory—for a specified type of data or a text string.

Note: When Undelete scans the diskette's free clusters, it does not look at files protected by Delete Sentry or DelWatch.

To scan free clusters for deleted data:

1. Go to the directory where you want clusters containing the specified type of data to be recovered. Undelete recovers clusters to the current directory.
2. Select one of the cluster scans from the Disk menu:

   If you select **Scan for Data Types**, select the type of data to scan for (Lotus 1-2-3 and Symphony**, dBASE, or normal text).

   or

   If you select **Scan for Contents**, specify a word, phrase, or text string to scan for. It does not matter whether you use uppercase or lowercase letters.
3. Select **OK**.

   The pop-up window shows the cluster number being scanned and the number of scan items found. A progress bar shows you how much of the disk has been scanned.

   When Undelete finds a contiguous group of free clusters that match the data type, it counts the group as a file and gives it a unique name. Undelete tries to

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match lost data with directory entries, making its best guess at the file's name. When the disk scan is complete, the list of clusters found appears in the Find Deleted Files window.

Two additional Disk menu commands act on disk scanning:

- **Set Scan Range:** Lets you limit the scans to a range of clusters, rather than scanning the entire disk for clusters that cannot possibly contain the data you are looking for. For example, if your hard disk has never been more than half full, you can limit the upper end of the cluster range to half the total number of clusters shown in the Cluster Range pop-up window. The scan range remains in effect for all disk scans until you change it, leave the program, or change drives.

- **Continue Scan:** Lets you continue a scan you interrupted by selecting **Cancel.** You can interrupt a scan at any time to look at the list of files found to that point.

Showing Existing Files

You can add existing files to the list of deleted files to rename or add deleted clusters to them. This option is available only when you are in the Undelete directory tree and file list.

When you select **Show Existing Files** from the Options menu, all existing files are added to each directory's list of deleted files. After existing files appear, you can select them.

To rename an existing file (to undelete a file whose name already exists), select it and select **Rename Existing File** from the File menu. For more information, see "Automatic Undelete Methods" on page 203.

To add deleted clusters to an existing file, select it and select **Advanced Undelete ▸ Append to Existing File** from the File menu. See "Advanced Undelete Methods."

Selecting **Show Existing Files** turns the option on and off. To remove existing files from the list, select the option again.

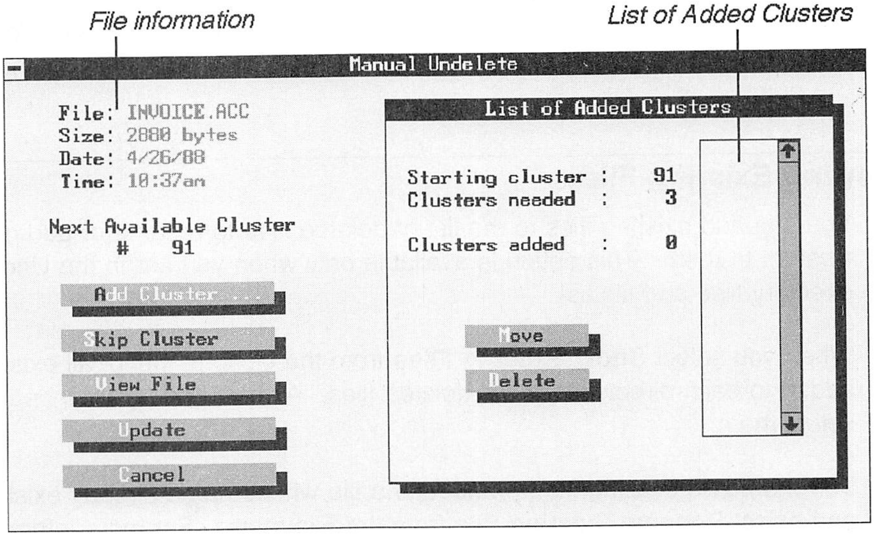
Advanced Undelete Methods

If one of the automatic undelete methods will not work, Undelete tells you to use one of its advanced file recovery methods.

Manual Undelete: Lets you undelete the highlighted file by selecting the clusters you want in it. Use this method to undelete files listed in Poor condition, on DOS-deleted Destroyed files, or on files listed in Good and Excellent condition that contain some overwritten clusters. You can start with a list of available (free) clusters that Undelete associates with the highlighted file, then add, delete, and reorder free clusters until the file contains the data you want.

To manually undelete a file:

1. From the Undelete directory tree and file list or the Find Deleted Files window, select a file to undelete manually.
2. Select **Advanced Undelete ► Manual Undelete** from the File menu.



3. If the file you selected is a DOS-deleted file whose first character has been replaced by a question mark, enter a new first character when requested.
4. In the Manual Undelete window you can add, view, move, and delete free clusters from a list that you create. See "The Advanced Undelete Window" on page 215.

Create a File: Lets you construct a new file when Undelete cannot find the file, but you are reasonably sure that it is still on the disk—which can happen, for example, if the file's directory has been overwritten. You enter a new file name and build the file by selecting available (free) clusters.

To create a new file from deleted clusters:

1. Select **Advanced Undelete ▸ Create a File** from the File menu.
2. In the Create a File pop-up window, type a name for the new file and select **OK**.
3. In the Create a File window, you can add, view, move, and delete free clusters from a list that you create. See "The Advanced Undelete Window."

Append to Existing File: Lets you add available (free) clusters to an existing file. For example, if you realize that some data is missing after you undelete a file manually or create a file from available clusters, use this method to add the additional clusters. After you have appended available clusters to an existing file's clusters, you can reorder all the clusters and delete any you do not want.

Note: When you add a free cluster to a file, it might prevent you from undeleting other deleted files, so do this only after you have undeleted any other files you want to recover that can be automatically undeleted.

To add deleted clusters to an existing file:

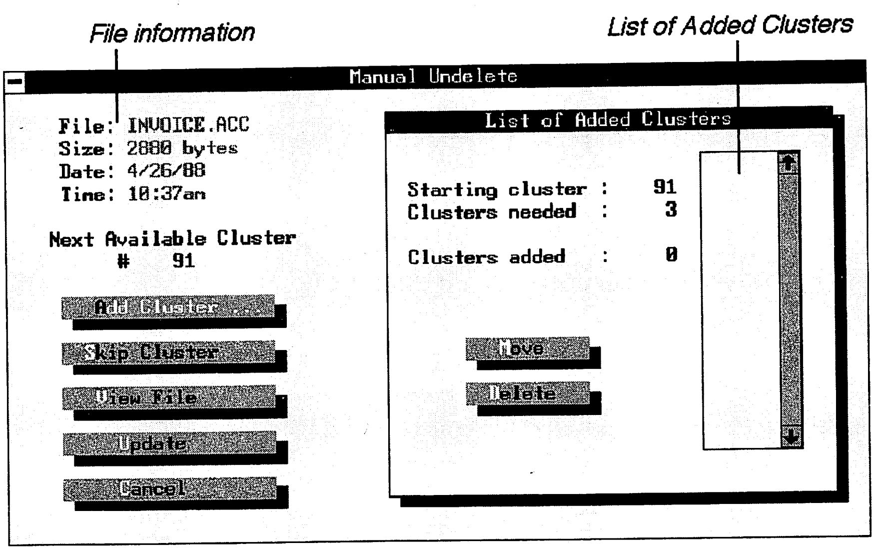
1. If you are not already in the Undelete directory tree and file list, select **Tree & File List** from the File menu.
2. Select **Show Existing Files** from the Options menu.

   All existing files are added to the list of deleted files and appear in the directory tree and file list. The condition column identifies them as Existing.
3. Select the existing file you want to add clusters to.
4. Select **Advanced Undelete ▸ Append to Existing File** from the File menu.
5. In the Append to a File window you can add, view, move, and delete free clusters to the list of clusters occupied by the selected file.

The Advanced Undelete Window

In the Advanced Undelete window, you determine which clusters to include in the file and in what order. By viewing clusters before you add them and by viewing the assembled file, you can tell whether the clusters you are adding contain data you want.

The window title differs, depending on whether you chose **Manual Undelete**, **Create a File**, or **Append to a File**.



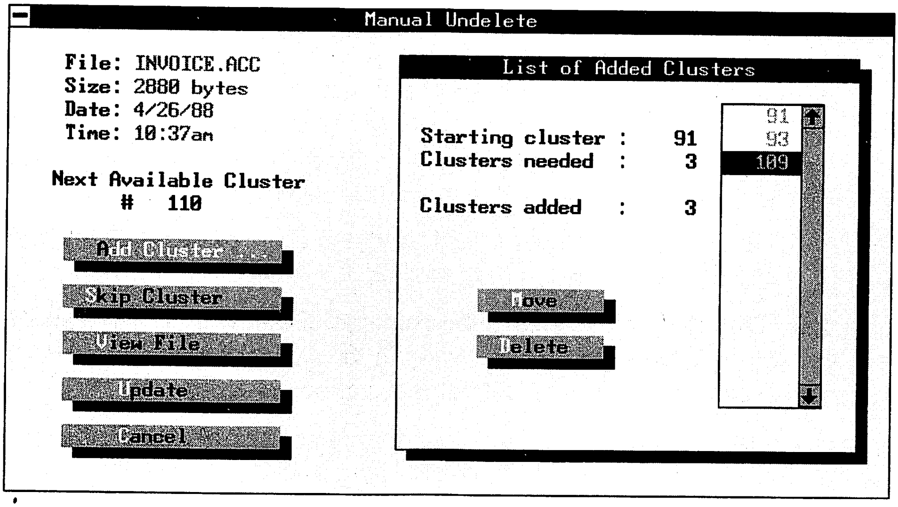
File Information: Includes the name and size of the file you selected to undelete, and the date and time it was last modified.

List of Added Clusters: Lets you assemble a list of clusters you want to include in the undeleted file. You can add all free clusters on the current drive to this list. *Free clusters* are those not currently associated with any file or directory. After you add clusters to this list, you can view the assembled file to see if it contains the correct data, organized the way you want it.

Item	What It Means
Next Available Cluster	The next free cluster on the disk that you can add to the undeleted file.
Starting cluster	The disk location of the file's original first cluster.
Clusters needed	The number of clusters the original file contained.
Clusters added	The total number of clusters you added. Added clusters are listed in the scrollable panel on the right-hand side of the List of Added Clusters. These clusters are not actually assigned to the file until you select **Update**.

Undeleting Clusters

Use these buttons on the Advanced Undelete window to assemble the file you want to undelete:



Button	What It Does
Add Cluster	Lets you add all or specified free clusters, view the next available cluster, or scan free clusters for specified data. See the following procedure. Each cluster you add is listed in the scrollable List of Added Clusters panel.
Skip Cluster	Skips to the next available free cluster.
View File	Lets you examine all the clusters you have already added. If the first cluster is a recognizable file type, the clusters appear in native format; otherwise they appear in text or binary format.
Update	Undeletes the file. The File Allocation Table is updated so that the clusters you added (shown in the List of Added Clusters panel) are associated with the undeleted file name.

To undelete clusters:

1. Select **Add Cluster**.
2. Select a cluster option:

   Add All Clusters: Available in Manual Undelete only, adds to the list the same number of free clusters originally assigned to the file. For example, if the selected file consisted of eight clusters, then the file's starting cluster and the next seven available cluster numbers will be added to the list. If the deleted file was fragmented, these might or might not contain the data that originally belonged to the file. You can view each cluster to find out.

   Add This Cluster: Adds the next available cluster (shown at the top of the Cluster Options pop-up window) to the list.

   View This Cluster: Displays the contents of the next available cluster so you can decide whether to add it. When in the Cluster Viewer, you can view each next available free cluster without leaving the viewer window.

   Scan for Contents: Lets you scan the diskette's free clusters for a text string you enter in the pop-up window. The first cluster that matches your string appears in the Cluster Viewer. You can add this cluster or display the next one containing the text string.

   Enter Cluster #: Lets you specify a cluster number to add to the list. This can be useful as a starting point if you know approximately where the file is on the disk.

3. After cluster numbers are displayed in the List of Added Clusters, you can modify the list.
4. Select an option:

   Move: Lets you use UP ARROW, DOWN ARROW, HOME, END, PAGE UP, and PAGE DOWN to move the highlighted cluster to a new place in the list.

   Delete: Removes the highlighted cluster from the list.

5. When the list includes the clusters you want in the file, in proper order, select **OK**.

Purging Deleted Files

You can specify how many days to save deleted files and a maximum percentage of disk space to allow for Delete Sentry's hidden directory by editing the DATAMON.INI file. Delete Sentry files are purged automatically when these limits are reached or when DOS needs the disk space they occupy. When Delete Sentry purges files, it removes the oldest deleted files first. See "Central Point Data Monitor" on page 223 for more information about Delete Sentry and how to configure it.

You can also use Undelete to purge all or selected deleted files that are protected by Delete Sentry, Delete Tracker, NetWare, and DelWatch. This does not change the free space actually available on your disk because these methods allow DOS to use its disk space when needed. However, purging files does create more room for protected files, especially when disk space is at a premium.

If one of these methods is not currently protecting files on the current drive, the Purge Deleted Files command will be dimmed in the File menu and you cannot select it.

Warning: After you purge files, other files can overwrite their data, and you might not be able to recover them.

To purge all deleted files:

1. Select **Purge Deleted Files** from the File menu.
2. In the submenu that appears, choose which type of protected files to purge.
3. In the Purge File pop-up window, select **Purge All**.

   Undelete removes all files on the current drive protected by the selected method.

Note: Purging NetWare files on a large file server can be slow.

To purge selected deleted files:

1. From the Undelete directory tree and file list, select the files you want to purge.

   You can purge all files except those protected by DOS.
2. Select **Purge Deleted File** from the File menu.
3. In the submenu that appears, choose the type of protected files to purge.
4. In the Purge File pop-up window, select **Purge**.

   If any of the files you select cannot be purged or do not match the protection type you selected, that file selection will be ignored.

How the Delete Protection Method Affects File Recovery

Undelete can recover files by using information saved by Delete Tracker, Delete Sentry, Mirror, Novell NetWare's method of delete protection, and DR DOS's DelWatch. If none of these were used, Undelete uses information available through DOS. The way a file was protected when it was deleted determines how successfully you will be able to undelete it. Delete Sentry is the most reliable. To configure delete protection, use Data Monitor. See "Central Point Data Monitor" on page 223.

Undeleting Files without Delete Protection

When you delete a file without delete protection installed, DOS leaves the data on the disk; but in the File Allocation Table (FAT), it marks all the clusters used by the file as available. DOS replaces the first character of the deleted file's name with a special character that tells DOS not to include the deleted file in the directory listing. This means that you can no longer find that file using DOS.

The file's data remains on the disk and can be undeleted until DOS overwrites it. Because the deleted file's clusters are no longer allocated in the FAT, DOS can use those now-free clusters for expanding or creating a file. Fortunately, a deleted file's clusters are likely to remain intact for a while because DOS usually looks beyond the last-saved data cluster for the next available disk space before it uses deleted-file clusters.

DOS keeps a record of a deleted file's name (with its first character replaced by the special character), its starting cluster, and how many clusters belonged to the file. This information alone might not be enough to undelete the correct data because the clusters belonging to a file can be scattered about the disk.

Here is a guide to interpreting the status of a file that was deleted without delete protection based on the condition assigned to it by Undelete:

Condition	Status of a file
Excellent:	There are enough contiguous (sequential) free clusters following the starting cluster to rebuild the file. If the original file was unfragmented, this group of contiguous clusters contains its data and you can **Undelete** it automatically. If the file was fragmented, use **Manual Undelete** to look for its data elsewhere on the disk. More information follows this list.
Good:	If the file's starting cluster is available but there are not enough contiguous free clusters following the starting cluster to rebuild a multiple-cluster file, Undelete assumes that one or more of the file's clusters are in use by other files and reduces its condition to Good. You can use **View File** to see what would be undeleted automatically. If data is missing, look for it elsewhere on the disk with **Manual Undelete**.
Poor:	The file's starting cluster is in use by another file. Use **Undelete to**, which copies to another drive all the clusters that Undelete assumes belonged to the original file, whether they are in use or not. Then you can examine the file to see if any of its original data was recovered. If more than the beginning of the file is missing, use one of the Advanced Undelete methods to look for the file's data elsewhere on the disk.
Destroyed:	The file's first cluster and enough contiguous clusters to rebuild it are in use by other files. However, because DOS does not keep track of all the clusters of deleted files, some of the data might still be on the disk if the file was fragmented. The missing data can be found by using one of the Advanced Undelete methods or by scanning the disk for deleted data.

If you do not know whether the original file was fragmented, you might want to use **View File** or **Undelete to**, and examine the file to see if it contains the data you expect. If not, use **Manual Undelete** and look for the file's original clusters. If the file was fragmented, you might be able to find the missing data elsewhere on the disk.

It is possible that some of the data in the available clusters of a DOS-protected file can be overwritten, even if the file's condition is Excellent or Good. See "When Data Might Be Overwritten" on page 223.

Undeleting Files Protected by Delete Tracker

The Delete Tracker method of delete protection creates a hidden file named PCTRACKR.DEL in the root directory of the protected drive. It intercepts the DOS DEL command. In the PCTRACKR.DEL hidden file, Delete Tracker stores the name of the deleted file and the location of all the clusters it occupied. DOS then completes the delete operation and changes the FAT to indicate that the file is deleted and its clusters are available.

If Delete Tracker was active when the file was deleted, Undelete will use information saved in the hidden file to find and evaluate all the deleted file's clusters.

Here is a guide to interpreting the status of a deleted file protected by Delete Tracker based on the condition assigned to it by Undelete:

Condition	Status of a file
Excellent:	All of the original clusters for this file are available. Recover it automatically with **Undelete**.
Good:	The file's starting cluster is available. However, one or more of its remaining original clusters is currently in use by another file.
Poor:	The file's starting cluster is currently in use by another file.
Destroyed:	All of the file's clusters are in use by other files. Most likely, Undelete cannot recover any of it.

For Good, Poor, and Destroyed files protected by Delete Tracker, you might want to use **Undelete to**, which copies to another drive all the clusters that belonged to the original file, whether those clusters are currently in use by another file or not. You can then examine the file to see how much of the original data was recovered.

Even if the file's condition is Excellent, Good, or Poor, some of the data in the available clusters of a file protected by Delete Tracker might be overwritten, as described next. Before recovering the file, you can use **Manual Undelete** to remove any overwritten clusters.

When Data Might Be Overwritten

Files protected by Delete Tracker or DOS that have a condition of Excellent, Good, or Poor might contain some overwritten data in their available clusters.

Undelete can determine only if a file's clusters are currently in use by another file. It has no way of determining if that file's data has been overwritten by another file that has also been deleted, which makes those clusters available once again. For example, many programs write to temporary files that are deleted when you exit from the program. These temporary files can overwrite the same clusters that were occupied by other deleted files. For this reason, undelete files protected by Delete Tracker or DOS as soon as possible after deleting them.

Undeleting Files Protected by Delete Sentry

The Delete Sentry method of delete protection creates a hidden directory named \SENTRY off the root directory of the protected drive. It intercepts the DOS DEL command and moves the deleted file to this directory without changing the record of the file's location stored in the FAT—effectively changing the path to the file but not its physical location. As far as DOS is concerned, the file has been moved. The file's clusters are still allocated in the FAT and are protected from being overwritten by DOS. Undelete can find the file in Delete Sentry's hidden directory.

If Delete Sentry was active when the file was deleted, Undelete can recover the complete file in Perfect condition. However, Delete Sentry files are purged automatically when limits set in the DATAMON.INI file are reached or when DOS needs the disk space occupied by Delete Sentry files. In that case, or if you purge Delete Sentry files using Undelete, those files can be undeleted only through DOS information.

Central Point Data Monitor

Central Point's Data Monitor (DATAMON) is a memory-resident program that includes several options to guard against data loss.

Warning: Do not use Data Monitor with versions of Central Point programs, such as Backup, earlier than Version 7. These versions are not compatible and can cause data loss. Use Version 7 or 8 programs instead.

Choosing a Delete Protection Method

Delete Protection provides you with two different methods of security against accidentally deleting an important file. By selecting either of the following methods, you greatly improve your chances of being able to use the Undelete program to recover a deleted file.

- Delete Tracker
- Delete Sentry

Delete Tracker

You can turn on (+) or off (-) the Delete Tracker method of protection after Data Monitor is loaded. This method provides a somewhat lesser degree of protection than Delete Sentry. However, when you use Undelete soon after a file is deleted, you have a good chance of recovering it. This method is not available on network drives.

Delete Sentry

You can turn on (+) or off (-) the Delete Sentry method of protection after Data Monitor is loaded. If you turn off Delete Sentry, you will notice a decrease in the number of free bytes reported by DIR. The value for bytes available reported by the CHKDSK command does take into account the space occupied by the Delete Sentry files.

You can use this method on network and local drives.

Before you can use Delete Sentry on a network volume, the network supervisor should use Data Monitor to configure Delete Sentry for that volume. The hidden \SENTRY directory is created automatically. The supervisor should then assign users the following rights to the \SENTRY directory:

NetWare 286	All rights except Parental
NetWare 386	All rights except Access Control and Supervisory

Loading and Configuring Data Monitor

Data Monitor loads itself high automatically to conserve conventional memory if you have:

- A memory manager such as QEMM, 386MAX, or EMM386.
- Memory available between 640K and 1MB.

However, when you have RAMBoost loaded into memory, the RAMBoost program loads Data Monitor where optimally most efficient.

To load Data Monitor:

1. From the DOS command prompt, type:

   ```
   datamon /sentry+
   ```

   or

   ```
   datamon /tracker+
   ```

   Choose either method of protection for your data based on your needs. You can only have one method of protection running at one time; Delete Sentry and Delete Tracker are mutually exclusive.

2. Configure Data Monitor options anytime after you load one of the methods of protection. To see a list of the options available with Data Monitor, type the following at the DOS prompt:

   ```
   help datamon
   ```

Because DATAMON is a memory-resident program, you can add this command to your AUTOEXEC.BAT file.

Loading Data Monitor for Network Drives

For a network drive, you must use Delete Sentry; you cannot use Delete Tracker for network drives. To use Delete Sentry on a Novell network drive, you must load Data Monitor into memory after the Novell network drivers.

If Data Monitor is already resident in memory, you can only turn on (+) an option from the command line *if one of the following is true*:

- Data Monitor is originally loaded with that option turned on, and it has been temporarily turned off.
- Data Monitor is the last program loaded into memory.

Loading Data Monitor into Low Memory

If you have a memory manager program installed and memory available between 640K and 1MB, Data Monitor normally loads itself high automatically unless a memory optimization program, such as RAMBoost is running.

If you know you are running a memory optimizer, you can use the /**LOW** switch when you configure Data Monitor to specify that you do not want to load it into Upper Memory Blocks even if they are available.

Unloading Data Monitor

Using the minus sign (-) turns off either the Delete Sentry or Delete Tracker method of protection, but to remove (unload) Data Monitor from memory you must type:

```
datamon /unload
```

Data Monitor configuration choices are saved in a file called DATAMON.INI in the C:\DOS\DATA subdirectory. If an option is turned off and on, your original configuration choices are will still be in effect until you unload Data Monitor from memory.

If you remove the DATAMON command in your AUTOEXEC.BAT file, you must restart your computer before Data Monitor can be unloaded.

Chapter 13. Using Central Point Scheduler

Scheduler lets you schedule *any program* to run without having to monitor the process. This is especially useful for lengthy procedures that do not require your presence, like a backup session or hard disk compression. For example, you might want to perform a backup to a tape drive every workday at 7:00 pm. You can schedule any executable command accepted at the DOS prompt.

When a scheduled event occurs, Scheduler interrupts whatever program is running and provides a 15-second warning before it runs the scheduled event in case you are in the middle of an application that you do not want interrupted. When the event is complete (for example, making a backup), Scheduler returns to the application you were running.

Scheduling a Program

The memory-resident portion of Scheduler (CPSCHED.EXE) must be loaded before you can start a program at a scheduled time.

To schedule a program:

1. From the DOS command prompt, type:

   ```
   cpsched
   ```

   and press ENTER. This loads CPSCHED.EXE as a terminate-and-stay-resident program. Or, you can add CPSCHED to your AUTOEXEC.BAT file so that this TSR is loaded whenever you start your computer.

   Note: Load this program after all other TSRs and before a task switcher or shell program starts.

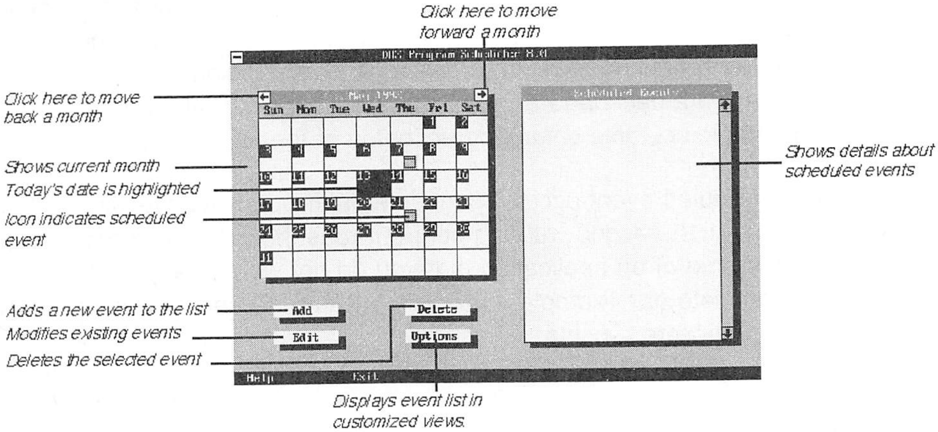
   If you have an execution password set, make sure you remove the password before the program is scheduled to run or it will not start as scheduled.

2. After the TSR is loaded, type:

   ```
   schedule
   ```

   at the DOS command prompt and press ENTER.

You see the DOS Program Scheduler main window:



3. Select the day on the calendar you want to schedule a program to run and select **Add**. The Schedule or Edit an Event window is displayed.

   Note: You can just select **Add** and then make applicable changes in the Schedule or Edit an Event window.

4. If you want to change the date, then type the date, using the format `mm/dd/yy` in the **Date** field.

5. Type the time you want to schedule your program, using the format `hh:mma` (you can use either `a` or `p` and Scheduler will append an "m" for you) in the **Time** field.

   Do not put a space between the time and the am or pm.

6. If you want to customize a scheduled event, select a setup file. Use the TAB key to move to the **Setup Files** field and then press ENTER.

   You see a list of Scheduler setup files.

7. Use the DOWN ARROW if you are using a keyboard or click on a setup file.

8. Select a frequency:

   Note: The Windows Scheduler does not support weekly, biweekly, or monthly scheduled backups.

   One Time Only: Schedules the event to occur one time.

   Daily: Schedules the event to occur every day.

   Workdays Only: Schedules the event on the days you identify as workdays. You select the days of the week you want treated as workdays.

   Weekly Schedules the event on the same day every week.

   Monthly-Fixed Day Schedules the event on the same date each month.

   Monthly-Fixed Weekly Schedules the event on the same weekday each month.

   Biweekly Schedules the event the same weekday every other week.

9. Type the program name in the **Event** field.

   For example, type `ibmavd` and any options (up to 64 characters). The file's extension is not necessary, and you can use any DOS character.

   or

   Select **Browse** to navigate to the directory and file that you want to schedule.

   Note: If you are scheduling an event, this pop-up window shows a Setup Files options. See "Using Preconfigured Setup Files" on page 336 for descriptions of these options. You can also schedule automatic virus scanning when you use the Backup program to back up your files.

10. Select **OK** to save this information.
11. Continue in this manner until you have scheduled all the events you want.
12. Select **Exit**.
13. Make sure the **Save Changes in Schedule** option in the Close pop-up window is checked to save your scheduling information.

When you want the program to run, be sure the computer is on and CPSCHED is loaded by typing `cpsched` at the DOS command prompt, or by selecting Scheduler from DOS Shell. The scheduled event occurs at the specified time and returns the machine to the state it was in prior to the event.

Editing Existing Scheduled Events

On the Scheduler window, you can see what events are scheduled because icons appear on each day there is a scheduled event. If you have scheduled events that you want to change (for example from daily at 5:00 pm to daily at 7:00 pm), you can change these scheduled events by editing them.

To edit a schedule event:

1. From the DOS command prompt, load the CPSCHED.EXE terminate-and-stay-resident program by typing:

   ```
   cpsched
   ```

   and then press ENTER.

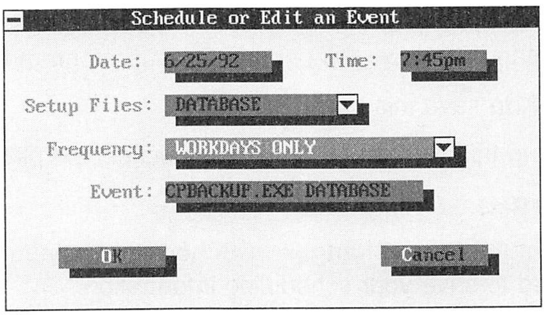
2. After the TSR is loaded, type:

   ```
   schedule
   ```

   and then press ENTER.

   The Scheduler calendar appears with icons representing events scheduled for the day.

3. Select the event you want to change in the Scheduled events list.
4. Select **Edit**.
5. Make your changes in the Schedule or Edit an Event pop-up window.



   For details, see steps 4 through 9 in "Scheduling a Program" on page 227.

6. Select **OK** to save this information.
7. Select **Exit**.
8. Make sure the **Save Changes in Schedule** option in the Close pop-up window is checked to save your scheduling information.

Deleting Scheduled Events

If you decide you do not want a scheduled event to occur anymore, you can delete it.

1. From the DOS command prompt, type:

   ```
   cpsched
   ```

   and press ENTER.

2. Type:

   ```
   schedule
   ```

   and press ENTER.

   The Scheduler window appears with events scheduled.

3. Select the event you want to delete in the Scheduled Events list.

4. Select **Delete**.

   The event is removed from the list.

Keystrokes for Navigating the Calendar

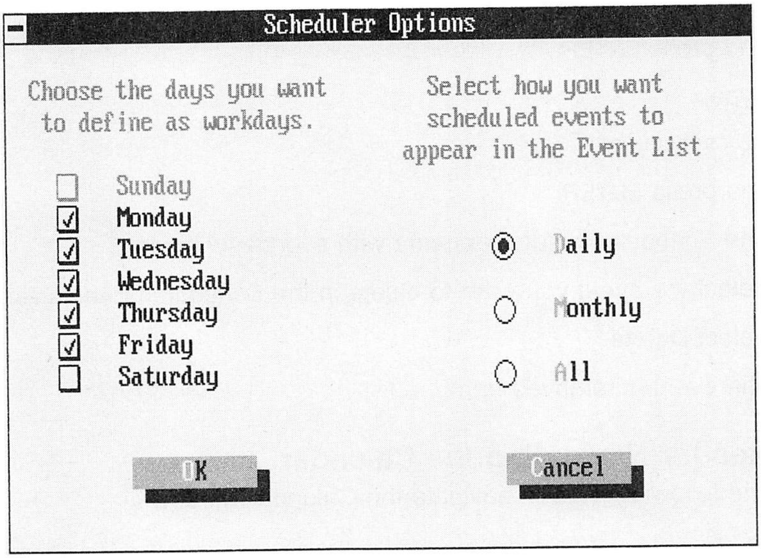
Use the following keys to navigate the Calendar window.

Use This Key	To Move To
LEFT ARROW and RIGHT ARROW	Yesterday and tomorrow
UP ARROW and DOWN ARROW	Last week and next week
TAB	Scheduled Events list and calendar
PAGE UP and PAGE DOWN	Last month and next month
CTRL+LEFT ARROW and CTRL+RIGHT ARROW	Last year and next year

Scheduler Options

The **Options** button lets you define what days you want the Scheduler to recognize as workdays, and change what to display in the Event List.

When you select **Options**, the following pop-up window appears:



1. Select the days you want defined as workdays.

   This specifies the days of the week that are treated as workdays and appear as options under Frequency.

2. Select how you want scheduled events to appear in the Events list.

   Daily: Displays only those events scheduled on the selected date.

   Monthly: Displays those events scheduled on any day in the current month.

   All: Displays all scheduled events.

Removing Scheduler from Memory

To remove CPSCHED from memory, type the following from the DOS command prompt:

```
cpsched /u
```

You can enter additional command-line options from the DOS command prompt that have the same effect as scheduling events from each of the specified programs.

For more information about the SCHEDULE command, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help schedule` for a brief explanation and command syntax.

Chapter 14. Problem Determination

This chapter explains how to solve problems you might have after you install DOS. It also answers some common questions about DOS.

Note: If you are having problems, be sure to view the text file README.TXT that came with DOS.

Using Memory

How can I get DOS to run in the High Memory Area?

If your computer has extended memory, the Setup program will configure your system so that DOS runs in the high memory area (HMA), which is the first 64K of extended memory. This conserves conventional memory for use by other programs.

You can confirm that DOS is running in the HMA by using the MEM command. If DOS is in the HMA, you see the following on the last line of the message:

```
PC DOS is resident in the high memory area
```

If your computer has extended memory and DOS is not running in the HMA, the problem is either that your CONFIG.SYS file does not contain the correct command, or your extended-memory manager is not correctly installed. HIMEM is the extended-memory manager provided with DOS. HIMEM (or another extended-memory manager) is required in order for DOS to use the HMA.

To run DOS in the HMA:

- The CONFIG.SYS file must contain the statement DOS=HIGH,UMB or DOS=HIGH.
- The CONFIG.SYS file must contain a DEVICE command for the HIMEM memory manager (or another extended-memory manager), as in the following example:

  ```
  device=c:\dos\himem.sys
  ```

- The DEVICE command for HIMEM must appear before the DEVICE commands for other memory managers.
- The HIMEM.SYS file must be in the path specified by the DEVICE command in your CONFIG.SYS file.
- HIMEM must be properly installed on your computer. The computer must have at least 1MB of memory and be a 286 computer or above.

Normally, the Setup program installs HIMEM and makes any necessary adjustments. There are a few hardware components that Setup cannot detect. View the README.TXT file for information about installing HIMEM with special hardware components.

If you installed DOS on a hard disk, the README.TXT file is located in the directory containing your DOS files.

If DOS does not run in the HMA, even though your CONFIG.SYS file contains the correct commands and HIMEM is properly installed, the memory configuration of your computer might not permit use of the HMA.

What can I do when I receive a packed file corrupt message?

DOS displays the message `Packed file corrupt` when a program cannot be successfully loaded into the first 64K of conventional memory. This is most likely to occur when you load device drivers into reserved memory, thereby freeing more low conventional memory.

DOS provides the LOADFIX command. It ensures that a program is loaded above the first 64K of conventional memory. To use the LOADFIX command, include it at the beginning of the command that starts the program. The syntax of this command is:

`loadfix` *drive:\path\filename*

For example, to ensure that a program file named MYAPP.EXE (in the C:\APPS directory) is loaded above 64K, you would type:

```
loadfix c:\apps\myapp.exe
```

What can I do when a program does not use XMS extended memory?

Most programs that use extended memory conform to the Lotus**/Intel**/Microsoft** /AST** (LIM) eXtended Memory Specification (XMS). To use such programs with DOS, you need an extended-memory manager, such as HIMEM.

Some programs do not conform to the XMS. Such programs cannot use extended memory if this memory is managed according to the XMS.

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If you are using HIMEM, you can allocate a portion of your extended memory to programs that use extended memory but do not conform to the XMS. This is done by including the **/int15** switch with the DEVICE command for HIMEM.SYS. The value you specify for the **/int15** switch should be the memory you want set aside, plus 64K. For example, to reserve 512K of non-XMS extended memory, you would include the following command in your CONFIG.SYS file:

```
device=c:\dos\himem.sys /int15=576
```

Note: Some of the programs that do not conform to the XMS cannot run when DOS is in the high memory area. If you encounter problems with such a program, load DOS into conventional memory.

What memory managers can I use with DOS?

Most memory managers work with DOS. In general, you cannot simultaneously use two memory managers that provide access to the same memory. Similarly, you cannot use EMM386 to simulate expanded memory if you already have an expanded-memory manager installed.

How can I increase the environment size of my system?

The *environment* is an area of memory in which DOS stores variables such as PATH, COMSPEC, and PROMPT. These variables are called *environment variables*. The default environment size is 256 bytes. You can allocate more environment space by specifying the **/e** switch with the SHELL command.

For example, if you added the following command to your CONFIG.SYS file, you would allocate 1024 bytes of environment space.

```
shell=c:\command.com /p /e:1024
```

If you are using more than one environment and you do not specify the **/e** switch for each, the size of the environments might vary. For information about environments, type `help set` at the DOS command prompt.

How do I run device drivers and programs in the upper memory area?

If you have a system with an 80386-based or higher processor and extended memory, you can make more conventional memory available by running certain device drivers and programs in the upper memory area. DOS provides RAMBoost, a memory optimizer program, that rearranges the existing items in your CONFIG.SYS and AUTOEXEC.BAT files for you when you run the RAMBoost Setup program. RAMBoost Setup rearranges your configuration and restarts the computer to load programs into upper memory. For information about using the upper memory area, see Chapter 10, "Making More Memory Available" on page 165.

I'm getting an error message regarding the option ROM or RAM being detected within a page frame when I restart my computer. What does it mean?

If you see the message `Option ROM or RAM detected within page frame`, the EMM386.EXE memory manager is detecting a device in the address area where it is trying to locate a page frame. It has found another 64K contiguous space but is notifying you that its original try was not successful. No action need be taken if you do not mind the message.

Another option is to include the area where the conflict is occurring. For example, on an AT BUS, EMM386.EXE detects a video adapter at the location C000. By including I=C000-CFFF on the EMM386 command line, this eliminates the warning message. Refer to the EMM386.EXE device driver information in the *PC DOS Command Reference and Error Messages* manual for more information.

My system hangs when I try to run RAMBoost Setup. Why?

Your EMM386 statement in your CONFIG.SYS file probably has an INCLUDE statement specifying a particular segment address for the monochrome video display region or other regions of video RAM which conflicts with the segment addresses that RAMBoost Setup attempts to assign. When you run RAMBoost Setup, this program attempts to allocate any unneeded or unused segment addresses when it optimizes your system.

If, for example, you have a color monitor, RAMBoost Setup will assign the monochrome display segment addresses because it assumes you will not be using these segment addresses if you have a color monitor. If, for example, you elect to use it as a monochrome display by altering the EMM386 INCLUDE statement, RAMBoost Setup attempts to change the segment address but cannot.

I have EMM386.EXE loaded in my CONFIG.SYS, but I still do not have access to my upper memory blocks. Why?

Besides using EMM386.EXE, you must have DOS=UMB or DOS=HIGH,UMB in the CONFIG.SYS.

I'm getting an error message at the EMM386.EXE setup line in my CONFIG.SYS file. When the system is finished starting up I do not have access to the upper memory. What can I do?

If you see the message `Unable to set page frame base address`, the memory manager, EMM386.EXE, is trying to locate a 64K EMS page address but it is already occupied by another device such as an Ethernet** or IBM Token Ring. With IBM PS/2* systems you can use the Reference Diskette to change the address of these devices. Generally speaking, they are easiest to move out of the way if they are placed at the very beginning or the very end of the allowed address ranges.

Printing

Why can't I print from the screen when I try to use the Print Screen key?

If pressing Print Screen does not print an image of your screen, make sure you are running the Graphics program. This memory-resident program is necessary only for printing screens that contain graphics.

To determine whether you are running Graphics, type `mem /c` at the DOS command prompt to view the names of the programs in memory. Check the "Name" column of the display for `GRAPHICS`. If it is present, the Graphics program is running. For more information about the Graphics program, see the GRAPHICS command in the *PC DOS Command Reference and Error Messages* manual.

Note: The use of the Print Screen key is disabled by some network software.

** Ethernet is a trademark of Western Digital Corporation.

* PS/2 and IBM Token Ring are trademarks of IBM Corporation.

Using Commands

I accidentally deleted a DOS file. Can I get it back?

If you inadvertently delete a DOS file that you need, there are two ways to get the file back:

- Restore the file by using the UNDELETE command.

  The UNDELETE command can restore a deleted file. It is effective only if you haven't changed any of the information on your hard disk or diskette since deleting that file. If you move or change any files or directories, you might not be able to restore the deleted file. For information about the UNDELETE command, refer to Chapter 12, "Using Central Point Undelete" on page 195.

- Copy and expand the file from your installation diskettes

  If the UNDELETE command does not work, you can retrieve the file from your DOS installation diskettes. Most of the files on these diskettes are in compressed form. Compressed files contain an underscore (_) in their file name extension (for example DOSKEY.CO_). To retrieve a compressed file, use the EXPAND command.

The following procedure explains how to retrieve a compressed file from an installation diskette.

1. Insert one of the DOS diskettes in drive A or drive B.
2. To find out the contents of the diskette, at the command prompt, type:

   ```
   dir a:
   ```

3. When you locate the missing file on one of the DOS diskettes, use the EXPAND command to expand and copy the compressed file from the installation diskette to your DOS directory.

   For example, to expand and copy the DOSKEY.CO_ file to the DOS directory on drive C, you would type:

   ```
   expand a:doskey.co_ c:\dos\doskey.com
   ```

4. Follow the same procedure to find the EXPAND.EXE file.

   Note: EXPAND.EXE is not compressed. If you accidentally delete the EXPAND.EXE file (or any DOS file that is not compressed), you can recover it from the installation diskette by using the COPY command.

5. Copy EXPAND.EXE from the appropriate installation diskette to your DOS directory.

For more information about the UNDELETE, COPY, and EXPAND commands, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help` followed by the command for a brief explanation and command syntax.

How can I get the UNDELETE command to work?

In general, the UNDELETE command works best under the following circumstances:

- If you use the UNDELETE command immediately after you delete a file.
- If you deleted only one file.
- If you use the DATAMON command, a memory-resident program that keeps track of certain changes you make to your hard disk or diskette. For more information about the DATAMON command, refer to "Central Point Data Monitor" on page 223.

Warning: Never run a storage-compaction program (defragmentation utility program) after deleting files you want to restore. The UNDELETE command cannot restore files that were deleted before you ran the storage-compaction program.

Why doesn't the DOS Editor run on my computer?

If DOS displays the message `Bad command or filename` when you try to run the DOS E Editor, make sure the E.EXE file is in your DOS directory. This file is required to run the DOS Editor. If E.EXE is not on your hard disk, copy it from the installation diskettes by using the EXPAND command. For more information about expanding and copying a file from your installation diskettes, see "I accidentally deleted a DOS file. Can I get it back?" earlier in this chapter.

I have installed DOS and want to expand drive C: to be larger than 32MB. What steps do I need to take?

This can be accomplished by backing up your system to diskettes, formatting the hard disk, repartitioning it, and then reformatting it. Then, you can reinstall DOS along with the other files. The following list outlines the steps to take:

1. Back up your entire system using the Backup program. To start Backup, type:

   ```
   cpbackup
   ```

   and back up all the files on all your drives. If you need more information about backing up your files, refer to Chapter 18, "Using Central Point Backup" on page 313.

2. Create a system diskette:

   ```
   format a: /s
   ```

3. Copy the file FORMAT.COM to the diskette:

   ```
   copy c:\dos\format.com a:
   ```

4. Copy the file FDISK.COM to the diskette:

   ```
   copy c:\dos\fdisk.com a:
   ```

5. Restart your system from the newly created system diskette
6. Run FDISK, delete all partitions and remake the desired number of partitions. Refer to "Using FDISK" on page 57 for more information.
7. Format C: and any other hard disk partitions.
8. Install DOS again.
9. Restore all files using the Central Point Backup program. Refer to "Restoring Data" on page 341.

Using DOS Shell

I changed the display type on my computer and now it doesn't work correctly with the DOSSHELL. What can I do?

The easiest way to undo the modifications you have made is to reinstall DOS Shell as an optional tool using the DOS Setup **/e** switch to return DOS Shell to the original default settings. Using this switch allows you to install (or reinstall) the selections you make at the optional tools menu. You must reinstall DOS Shell to the same path where you initially installed DOS.

Or, if you change the type of display you use, you can manually install files so that the display can work correctly with the DOS Shell. For example, if you were using an EGA display and change to a VGA display, you do not gain the benefits of the VGA display when running DOS Shell until you manually install the VGA files.

DOS Shell supports seven types of displays. The files for each are on your DOS installation diskettes. To install these files, expand and replace your current DOS Shell display files. It is necessary to expand these files because they are in a compressed format on the installation diskettes. You expand the files by using the EXPAND command, which simultaneously expands and copies files.

The following table shows the compressed files needed for each of the supported displays.

Display	Required files
MONO	(No .VI_ file necessary), MONO.IN_, MONO.GR_
CGA	CGA.VI_, CGA.IN_, CGA.GR_
EGA	EGA.VI_, EGA.IN_, EGA.GR_
EGA MONO	EGA.VI_, EGA.IN_, EGAMONO.GR_
COLOR (VGA, Super VGA, XGA*, 8514, and other high-resolution displays)	VGA.VI_, VGA.IN_, VGA.GR_
MONO (VGA, Super VGA, XGA, 8514, and other high-resolution displays)	VGA.VI_, VGA.IN_, VGAMONO.GR_
Hercules	HERC.VI_, MONO.IN_, HERC.GR_

To install the DOS files for a different display, locate the files you need, copy the correct .VI_ and .GR_ files, and then either create a DOSSHELL.INI file or modify your previous one.

To find and copy the .VI_ and .GR_ files you need:

1. Use the preceding table to determine which files you must install.
2. Use the DIR command to view the directory of each diskette to determine which installation diskette contains the file or files that you need.
3. Find the names of the files you need for your display and record the location of each file. Each file has an extension that ends with an underscore(_) to indicate it is a compressed file.

* XGA is a trademark of IBM Corporation.

4. Use the EXPAND command to expand and copy the appropriate .VI_ and .GR_ files from the installation diskettes to the directory that contains your DOS files. Make sure you name the destination files with the .VID and .GRB extensions, respectively.

   For example, you would type the following to expand the VGA.VI_ file:

   ```
   expand vga.vi_ c:\dos\dosshell.vid
   ```

   You would type the following to expand the VGA.GR_ file:

   ```
   expand vga.gr_ c:\dos\dosshell.grb
   ```

   At this point, determine whether to replace your current DOSSHELL.INI file. If you choose to replace this file, you can immediately use any additional colors your new display provides. However, you lose any modifications you previously made to DOS Shell, such as program groups and program items. If you don't want to lose these modifications, you must manually add the new color files to your existing DOSSHELL.INI file.

To create a DOSSHELL.INI file with updated colors:

Use the EXPAND command to replace your current DOSSHELL.INI file with the .IN_ file you need. Make sure you name the destination file DOSSHELL.INI.

For example, you would type the following to expand the VGA.INI file:

```
expand vga.in_ c:\dos\dosshell.ini
```

To add updated colors to your current DOSSHELL.INI file:

Note: This file may contain lines with more than 256 characters. Some editors will truncate or split these lines. If you are not sure whether your editor can handle long lines, exit now without saving the file.

1. Use the EXPAND command to expand and copy the .IN_ file to your hard disk.

   For example, you would type the following to expand the VGA.IN_ file:

   ```
   expand vga.in_ c:\dos\vga.ini
   ```

2. Compare your DOSSHELL.INI file with the .INI file you created. You might find it easier to compare these files if you print them.

3. In the DOSSHELL.INI file, find the section that begins with the command COLOR =.

   This section contains available color schemes for your display. Each color scheme begins with the command SELECTION =.

4. Add any new color schemes from the expanded .INI file to the COLOR = section of your current DOSSHELL.INI file.

5. Add the values of three other commands from the new .INI file to your current DOSSHELL.INI file.

   These commands are located near the beginning of the files. Two of them, SCREENMODE = and RESOLUTION =, are in the SAVESTATE section of the file. The other command, CURRENTCOLOR =, is in the PROGRAMSTARTER section.

The next time you start DOS Shell and use your new display, DOS Shell should have the correct default resolution.

Can I start a TSR or my network connection from DOS Shell with task swapping enabled?

Because DOS Shell is not a multitasking environment, you should load networks and TSRs before activating DOS Shell.

I deleted a file from my system and I do not know how I did it. What happened?

If you are using DOS Shell, be very careful with the powerful **Select Across Directories** option. When this option is enabled, if you select a file in one directory to delete (or change an attribute, or move), this file remains selected even if you change to a different directory. If you later chose to delete a file, ALL files that you have selected in every directory you have accessed are deleted.

If you did not realize that you have this option enabled, you might delete files accidentally. To disable **Select Across Directories**, from the Options menu, click (or press the space bar) next to **Select Across Directories**. To verify that **Select Across Directories** is disabled, look at the Options menu again. The diamond to the left of **Select Across Directories** is gone.

I have installed DOS and want to expand drive C: to be larger than 32MB. What steps do I need to take?

This can be accomplished by backing up your system to diskettes, formatting the hard disk, repartitioning it, and then reformatting it. Then, you can reinstall DOS along with the other files. The following list outlines the steps to take:

1. Back up your entire system using the CP Backup program. To start, type:

   ```
   cpbackup
   ```

   and back up all the files on all your drives.

2. Create a system diskette. Insert a diskette in drive A and type:

   ```
   format a: /s
   ```

3. Copy the following files to the diskette in drive A:
   - FORMAT.COM
   - FDISK.COM

4. Restart your system from the system diskette you just created.

5. Run FDISK, delete all partitions and remake the desired number of partitions.

6. Format C: and any other hard disk partitions.

7. Install DOS again.

8. Restore all files using the Central Point Backup program.

Miscellaneous Problems

I just got the error message *Out of Memory* right in the middle of running DEFRAG. How can I make DEFRAG finish running?

To ensure this problem does not occur again, disable all TSRs before running DEFRAG. This will free up conventional memory.

Follow the prompt to reboot your computer. Then, run DEFRAG again to run the DEFRAG routine. The problem that caused this message was that DEFRAG used up all of the conventional memory available.

What should I do when the program or device driver reports the wrong version of DOS?

Some programs or device drivers run only with specific versions of DOS. If a message appears indicating a program or device driver does not run with DOS, contact your vendor to get an updated program or to find out whether the current version of the program or device driver is actually compatible with DOS.

If the current version of the program or device driver is compatible with DOS, use the SETVER command to change the version number that DOS reports to the program or device driver. When you use SETVER, the program or device driver interprets DOS as the version it is designed to use. For example, if a program named MYAPP.EXE runs only with DOS 3.3 or earlier, you would type:

```
setver myapp.exe 3.3
```

DOS reports the changed version number to the program when you restart your computer. If the program is compatible with DOS, the SETVER command eliminates the apparent incompatibility.

There must be a DEVICE command for the SETVER.EXE device driver in your CONFIG.SYS file in order for the SETVER command to report a different version to a program. Also, make sure there is only one SETVER.EXE on your hard disk, because each SETVER.EXE contains a separate version table.

For more information about the SETVER command, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help setver` for a brief explanation and command syntax.

Warning: Contact your software vendor for information about whether a program works with DOS. It is possible that IBM has not verified whether the program will run successfully if you use the SETVER command to change the program version number and version table. If you run the program after changing the version table in DOS, you might lose or corrupt data, or introduce system instabilities. If you do not contact your software vendor to determine the compatibility of a specific program with DOS, IBM is not responsible for any loss or damage.

Chapter 15. Customizing for International Use

DOS Setup allows the option of either accepting the default values or making selections that change the country-related settings, keyboard, and the display font (or *character set*).

This chapter gives examples of how to modify these settings on your system without reinstalling DOS. For country-related settings, you can change:

- The country-specific conventions for displaying dates, times, currency, character sort order, and file name characters. You do this by using the COUNTRY command.
- The characters and arrangement of your keyboard to fit the standard keyboard of another country. You do this by using the KEYB command.
- The character set (code page) so that you can type and display characters from other languages. You do this by using the MODE command.

This chapter also gives you information on how to change the display fonts to an ISO font. ISO is the International Organization for Standardization, researching the ergonomic requirements for working with Video Display Terminals (VDTs). ISO fonts can improve the readability of characters displayed on certain VGA or better hardware.

Country Settings, Keyboards, and Code Pages

To change the national language and the country-related settings you selected during Setup, you need to follow the examples in this chapter to modify the commands that were added to your CONFIG.SYS and AUTOEXEC.BAT files.

For more information about:	See:
Changing country-specific conventions	"Switching Country Setting" on page 252.
Changing the keyboard arrangement	"Modifying the Keyboard Arrangement" on page 252.
Changing the character set	"Changing Code Pages" on page 253.

The examples show how to change your country settings. Depending on which country settings you change, you might need to specify a new country code, keyboard code, code page number, or keyboard identification number. Refer to the following table for the values you can specify:

Country or language	Keyboard code	Code page	Keyboard identification	Country code
Albanian	al	852, 850	448	355
Australia	us	437, 850		061
Belgium	be	850, 437		032
Bosnia/Herzegovina	yu	852, 850	234	387
Brazil	br	850, 437		055
Bulgaria	bg	855, 850	442, 241	035
Canadian-French	cf	850, 863		002
Croatia	yu	852, 850	234	384
Czech	cz	852, 850	243	042
Denmark	dk	850		045
Finland	su	850, 437		358
France	fr	850, 437	120, 189	033
Germany	gr	850, 437		049
Greece	gk	869, 850		030
Hungary	hu	852, 850	208	036
Iceland	ic	850, 861		354
International English	–	437, 850		061
Italy	it	850, 437	141, 142	039
Japan	jp	437, 932		081
Latin America	la	850, 437		003
FYR Macedonia (Cyrillic)	yc	855, 852	118	389
Macedonia (Cyrillic)	mk	855, 852	449	389
Netherlands	nl	850, 437		031
Norway	no	850		047
Poland	pl	852, 850	214	048
Portugal	po	850, 860		351
Romania	ro	852, 850	446	040
Russian	ru	866	441, 443, 341 (Russian DOS only)	007
Serbia/Montenegro (Cyrillic)	yc	855, 852	118	381

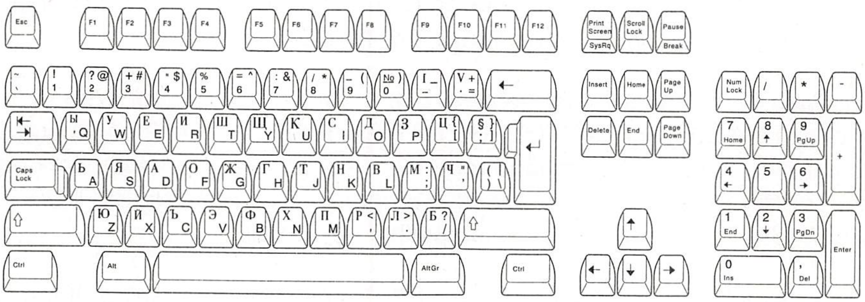
Country or language	Keyboard code	Code page	Keyboard identification	Country code
Serbia (Cyrillic)	sb	855, 852	450	381
Slovakia	sl	852, 850	245	042
Slovenia	yu	852, 850	234	386
Spain	sp	850, 437		034
Sweden	sv	850, 437		046
Switzerland (French)	sf	850, 437		041
Switzerland (German)	sg	850, 437		041
Turkey	tr	857, 850	440, 179	090
United Kingdom	uk	850, 437	166, 168	044
United States	us	437, 850		001
Yugoslavia	yu	852, 850	234	038

Note: The keyboard and code page for Thailand is not provided with DOS but available separately.

The following key combinations are needed to switch between keyboard layers:

- For the Bulgarian keyboard, use LEFT ALT+RIGHT SHIFT to access the Bulgarian layer and LEFT ALT+LEFT SHIFT to access the Latin layer.

  The following keyboard illustrates the Latin keyboard layer on the Bulgarian (442) keyboard.



- For Russian keyboards, use LEFT ALT+LEFT SHIFT to access the Russian layer and RIGHT ALT+RIGHT SHIFT to access the Latin layer.
- For Greek keyboards, use LEFT ALT+LEFT SHIFT to access the Greek layer and LEFT ALT+RIGHT SHIFT to access the the Latin layer.
- For Cyrillic keyboards, use LEFT ALT+LEFT SHIFT to access the Cyrillic layer and LEFT ALT+RIGHT SHIFT to access the Latin layer.

Switching Country Setting

When you change languages, you might need to change the country settings on your computer. The country settings specify the following:

- The date and time display
- The symbol used for currency
- The sort order used when alphabetizing files
- The characters used in file names and directory names

To change the DOS country-specific conventions, a COUNTRY command must be in your CONFIG.SYS file. Using this command loads the conventions for each country from a file (COUNTRY.SYS) included with DOS. When you change conventions, DOS uses the information in the COUNTRY.SYS file rather than the United States conventions. You can use the COUNTRY command regardless of whether you have loaded any code pages. By default, DOS uses United States conventions for the country settings.

When you use a COUNTRY command, you must include a three-digit *country code* (refer to the previous table) to specify which conventions you want to use. For example, the country code for Spain is 034. Usually, the country code is the same as the international long-distance telephone code.

Modifying the Keyboard Arrangement

To find out what keyboard layout you currently have, type:

```
keyb
```

When you specify a different keyboard arrangement, you can switch physical keyboards and use a keyboard specific to a particular country, or change which characters you type using your current keyboard.

To change the keyboard arrangement, use the KEYB command. You can specify this command from your AUTOEXEC.BAT file or from the DOS command prompt. You can use the KEYB command regardless of whether you have changed any other country-specific settings. The KEYB program works with IBM PC/XT*, IBM PC/AT*, IBM PS/2*, and IBM PC*-compatible keyboards.

You can specify any keyboard with the KEYB command. However, if the active code page is for a language other than the keyboard you specify, some of the characters on the keyboard might not be available.

* PC/XT, PC/AT, PS/2, and IBM PC are trademarks of IBM Corporation.

Suppose you want to use an Italian keyboard. Assume also that your *active code page* is 850, which is the default code page for Italy.

- If your KEYBOARD.SYS file is in the path specified in your AUTOEXEC.BAT file, you would type the following command in your AUTOEXEC.BAT file or at the DOS command prompt:

  ```
  keyb it
  ```

  where `it` is the two-letter keyboard code identifier that specifies the Italian keyboard.

- If your KEYBOARD.SYS file is in another directory (for example, C:\INTL directory), you would type the following command:

  ```
  keyb it,,c:\intl\keyboard.sys
  ```

  This form of the command must include two commas between the keyboard code and the path for KEYBOARD.SYS.

Note: You can also change keyboard layouts from your CONFIG.SYS file if your default code page is the same as the code page that came with your system.

If you change keyboards, you can return temporarily to your default keyboard configuration by pressing CTRL+ALT+F1. To switch to a typewriter mode (the standard for some countries), press CTRL+ALT+F7.

Changing Code Pages

This section describes how to change character sets (code pages) so that you can type and display characters from other languages.

DOS can use up to 256 different characters when displaying, printing, and working with text. The exact set of characters used at one time is known as the *code page*. DOS provides these character sets or code pages for countries, languages, and regions.

By default, DOS uses the code page that comes with your system. This code page is called the *hardware code page*. Your system has a hardware code page for your keyboard and your screen. DOS uses the character set in the hardware code page unless you specify otherwise.

If you need only the characters contained in your hardware code page, you do not have to install additional code pages. If you want to use characters that are not contained in your hardware code page, you must use a *prepared code page*. A prepared code page is an alternate set of 256 characters stored in code-page information (.CPI) files. By including several commands in your CONFIG.SYS and AUTOEXEC.BAT files, you can instruct DOS to use a prepared code page instead of the hardware code page.

Note: Monochrome and CGA monitors and many printers cannot use prepared code pages. See the documentation for your hardware device to determine whether prepared code pages are supported before you attempt any changes.

DOS has ten prepared code pages that you can use in addition to (or instead of) the hardware code page built into your system. Each prepared code page has the same set of standard ASCII characters—that is, the first 128 characters of each set are the same. However, each code page has a different set of national language characters, known as national language support (NLS).

Before you use a code page, you must load it into memory. You can load more than one code page into memory, but only one code page can be active at a time. If you do not install a prepared code page, DOS uses your hardware code page. If you install one or more prepared code pages, you can switch between hardware code pages and any of the prepared code pages.

For each of the countries supported by DOS, you can switch between two prepared code pages: a default code page and an alternate code page. If you want to change the code page, you must use one of the two code-page numbers that are valid for the new country settings. For example, if you want to specify a code page for Iceland's country settings, you must use either the default code page 850 or the alternate code page 861.

The DOS-prepared code pages include:

Number	Type	Description
437	United States	Contains characters for English and most other European languages
850	Multilingual (Latin I)	Contains characters for most of the languages, using the Latin alphabet that DOS supports
852	Multilingual (Latin II)	Contains characters for East European languages, using the Latin alphabet that DOS supports
855	Multilingual (Cyrillic)	Contains Cyrillic characters
857	Turkish	Contains characters for Turkish
860	Portuguese	Contains characters for English and Portuguese
861	Icelandic	Contains characters for Icelandic
863	Canadian-French	Contains characters for English and Canadian-French
866	Russian	Contains characters for Russian (Russian DOS only)
869	Greek	Contains characters for Greek

Refer to the *PC DOS Keyboards and Code Pages* manual for tables listing the characters contained in each prepared code page.

Screen Preparation for Code Pages

DOS comes with an installable device driver called DISPLAY.SYS that enables you to use prepared code pages with an EGA or VGA monitor. Monochrome and CGA monitors can use only their own hardware code page (usually 437).

Following are two examples of using prepared code pages— one example is using one prepared code page (850) and the other example is using two prepared code pages (850 and 863). The two examples are placed side-by-side so you can note the differences and identify the changes you would need to make in the AUTOEXEC.BAT and CONFIG.SYS files, depending on whether you are using one or two prepared code pages.

If the language you want to use requires one or two prepared code pages, you must add at least two commands to your CONFIG.SYS file and add two or more commands to your AUTOEXEC.BAT file.

Suppose your current code page defaults to 850 and your hardware code page is 437. However, you want to use a Belgian keyboard and an EGA monitor. Also suppose the DOS files you need are in the C:\DOS directory. To change to Belgian conventions (032) and install the display driver (EGA) that enables you to switch between code pages, and use the CHCP command to make the 863 code page active, use the following commands:

Using one prepared code page

Place in your CONFIG.SYS file:

```
country=032,,c:\dos\country.sys
device=c:\dos\display.sys con=(ega,437,1)
```

Place in your AUTOEXEC.BAT file:

```
nlsfunc
mode con cp prep=((850)c:\dos\ega.cpi)
keyb be,,c:\dos\keyboard.sys
chcp 863
```

Using two prepared code pages

Place in your CONFIG.SYS file:

```
country=032,,c:\dos\country.sys
device=c:\dos\display.sys con=(ega,437,2)
```

Place in your AUTOEXEC.BAT file:

```
nlsfunc
mode con cp prep=((850 863)c:\dos\ega.cpi)
keyb be,,c:\dos\keyboard.sys
chcp 863
```

In the CONFIG.SYS file:

- The COUNTRY command sets the Belgian conventions for date, time, currency, character sort order, and file name characters.
- The DEVICE command installs DISPLAY.SYS, indicates that you have an EGA monitor with a 437 hardware code page and reserves space for one (or two) prepared code pages.

In your AUTOEXEC.BAT file:

- You include the NLSFUNC command so you can switch between code pages for all devices at the same time. You can include the following NLSFUNC command in the CONFIG.SYS file rather than in the AUTOEXEC.BAT file:

  ```
  install=c:\dos\nlsfunc.exe
  ```

- You include the commands to prepare and select code page 850 if using one prepared code page (or code pages 850 and 863 if using two prepared code pages). The MODE command loads code page 850 (or 850 and 863) from the EGA.CPI file. The EGA.CPI file is used for loading code pages 437, 850, 852, 855, 860, 863, and 866. EGAX.CPI is used for loading code pages 850, 857, 861 and 869.

- The KEYB command changes the arrangement of the keyboard to match a Belgian keyboard.
- The CHCP command makes code page 863 active. While you are working, you can switch back to code page 850 by typing the following CHCP command at the DOS command prompt:

```
chcp 850
```

Make sure you restart your computer by pressing CTRL+ALT+DEL after making changes to your CONFIG.SYS and AUTOEXEC.BAT files.

Commands Used to Change International Settings

To summarize, the following commands are used to change international settings, such as country codes, keyboard layouts, and character sets (code pages).

DISPLAY.SYS — Loads the DISPLAY.SYS device driver by specifying a DEVICE command in your CONFIG.SYS file. The device driver prepares DOS to display code pages on your monitor. This device driver lets you display international character sets on EGA, VGA, and LCD monitors. This device driver must be loaded by a DEVICE or DEVICEHIGH command in your CONFIG.SYS file.

File: CONFIG.SYS

Example: Assume your DISPLAY.SYS file is in the \DOS directory on drive C, you want to load a VGA monitor, the hardware code page is 437 and you want to use two prepared code pages.

```
device=c:\dos\display.sys con=(vga,437,2)
```

KEYB	Starts the KEYB program which configures a keyboard for a specific language. The DOS default is United States English. If you configure for a keyboard other than United States English, you can use the United States keyboard temporarily by pressing CTRL+ALT+F1.
	File: AUTOEXEC.BAT
	Example: Assume your KEYB.SYS file is in the \DOS directory on drive C, you want to use an Italian keyboard, and your active code page is 850, which is the default code page for Italy.
	`keyb it,,c:\dos\keyboard.sys`
	or
	File: CONFIG.SYS
	Example: Make the same assumptions as above.
	`install=c:\dos\keyb.com it,,c:\dos\keyboard.sys`
	Your default codepage must be the same as the codepage that came with your system if you want to place this command in your CONFIG.SYS file.

NLSFUNC	Starts the Nlsfunc program, a memory-resident program, which loads country-specific information for national language support (NLS). NLS supports the use of country-specific information and character set (code page) switching. **File:** AUTOEXEC.BAT **Example:** `nlsfunc` or **File:** CONFIG.SYS **Example:** Assume your NLSFUNC.EXE file is in the \DOS directory on drive C. `install=c:\dos\nlsfunc.exe` **Note:** Do not use this command while in Windows.

MODE	Configures system devices, such as preparing devices for code page switching. Also loads the code page information (.CPI) file by specifying the MODE CON CODEPAGE PREPARE statement.
	File: AUTOEXEC.BAT
	Example: Assume your MODE.COM file is in the \DOS directory on drive C, you have an EGA monitor with a 437 hardware code page, and you are using two prepared code pages.
	`mode con codepage prepare=((850 863) c:\dos\ega.cpi)`
	`mode con codepage select=850`

CHCP	Displays the number of the active code page. Use this command to change the active character set for all devices that support character set switching. The Nlsfunc program must be installed before you can use this command. **File:** AUTOEXEC.BAT **Example:** Assume you want the active code page to be 850. `chcp 850`

ISO Fonts

On certain hardware, changing to ISO fonts improves the readability of the characters displayed. You can use ISO fonts by selecting ISO fonts during DOS Setup or by switching to the ISO.CPI file provided with DOS.

To meet ISO 9241 Part 3 and DIN 66234 compliance you need:

- To have system hardware that meets ISO 9241 requirements.
- To install code page switching software.
- To set your display to 80x25 text mode.

For more information about ISO compliance for your computer hardware, refer to the manufacturer of your computer system.

ISO.CPI contains the following code page fonts that comply with ISO:

437	United States	860	Portuguese
850	Multilingual (Latin I)	861	Icelandic
852	Multilingual (Latin II)	863	Canadian-French
855	Multilingual (Cyrillic)	866	Russian (Russian DOS only)
857	Turkish	869	Greek

Use of ISO fonts requires 12.1K of conventional memory when DOS is running low (DOS=LOW). If you are running DOS in the High Memory Area (DOS=HIGH), they require 8.1K of conventional memory. If the statement `device=display.sys` is in the CONFIG.SYS and the EGA parameter is specified, no change is required. This statement uses the CON=(EGA,,1) parameter, which requires 17.6K of conventional memory when DOS is running LOW.

If you selected ISO fonts during DOS Setup, you would see a statement similar to the following in your AUTOEXEC.BAT file:

```
mode con codepage prepare=((437) c:\dos\iso.cpi)
mode con codepage select=437
```

where 437 can be replaced with any number from the "code page" column of the table on page 250. If you didn't select ISO fonts, edit the AUTOEXEC.BAT file and add these two statements.

To use non-ISO fonts, you must modify the AUTOEXEC.BAT file and change ISO.CPI to EGA.CPI or EGAX.CPI as follows:

```
mode con codepage prepare=((437) c:\dos\ega.cpi)
```

or

```
mode con codepage prepare=((850) c:\dos\egax.cpi)
```

Note: The EGA.CPI file is used with code pages 437, 850, 852, 855, 860, 863, and 866. EGAX.CPI is used with code pages 850, 857, 861 and 869.

Part 2. Using the DOS Optional Tools

Chapter 16. Using DOS Shell

Through the use of color and graphics, DOS Shell offers a visual way of working with DOS. Information is set up in different areas on your screen, making it easy to find. For example, when you first run DOS Shell, the following information is displayed on your screen:

- The disk drives available on your system
- The directory structure or tree for the current disk drive
- A list of files in the current directory
- A list of programs that you can run

You can use DOS Shell to perform many of the same file-management and disk-maintenance tasks that you perform from the command line. For example, you can use the commands on the File menu to create directories, copy files, and view the contents of a file. You can use the Disk Utilities group to perform disk-maintenance tasks, such as formatting and copying disks. You can also use DOS Shell to organize and start programs, and to switch between them.

Because DOS Shell is easy to use and has a complete online help facility available, you will find the information you need to use this product described in *Everyday DOS for PC DOS 6*.

This chapter provides you with installation instructions if you elected not to install DOS Shell at the initial installation of DOS, gives instructions on how to start and leave DOS Shell, and provides information about Help.

Installing DOS Shell After Installing DOS

If you did not choose to use DOS Shell for file-management and disk-maintenance tasks at initial setup, you can still install DOS Shell using DOS Setup with the **/e** switch.

The DOS Setup diskettes contain everything you need to install DOS Shell. You might want to refer to the *PC DOS Installation Guide* before you begin the installation of additional optional tools.

During Setup, DOS checks whether your computer has Windows 3.1 installed. If you do not have Windows 3.1 installed and want to use the optional tools provided with DOS for Windows, you should make sure you install in this order:

1. Install DOS as you normally would, selecting the optional tools you want from the list provided. You will not see any of the optional tools for Windows listed if you do not have Windows 3.1 installed already.
2. After you have installed DOS, install Windows 3.1 as you normally would.
3. Install DOS again using the DOS Setup **/e** switch after DOS and Windows have both been installed.

To install DOS Shell using the /e switch:

1. Insert diskette 1 of the DOS Setup diskettes into drive A or B.
2. At the DOS command prompt, type:

   ```
   a:setup /e
   ```

   or

   ```
   b:setup /e
   ```

   The **/e** switch allows you to return to the optional tools selection menu without having to do a complete reinstallation of DOS. Only the necessary files for the optional tools will be installed.
3. After Setup for DOS begins, follow the instructions displayed on the screen. Make sure you specify the same "Install to PATH" as you did when you did the initial DOS installation.

   At the Optional Tools screen, you should see YES next to DOS Shell. There is no need to press the UP ARROW to highlight DOS Shell as you do with other optional tools because the default is to install DOS Shell.
4. Select other optional tools you want to install by highlighting the name of each optional tool and pressing ENTER to select each item.
5. After you select the optional tools you want to install, move the cursor to highlight the following:

   ```
   The listed options are correct.
   ```
6. Press ENTER to accept the optional tool selections.
7. Continue to follow the instructions on the screen until you have completed the installation of the optional tools.

Starting DOS Shell

DOS Shell is automatically set up to run whenever you start your system, and DOS Shell will appear on your screen when you start DOS. If the command prompt appears instead, you can start DOS Shell from there.

Warning: If you start a terminate-and-stay-resident (TSR) program before starting DOS Shell, do not quit the TSR program by using its exit procedure while you are still in DOS Shell. Instead, you must first leave DOS Shell and then quit the TSR program.

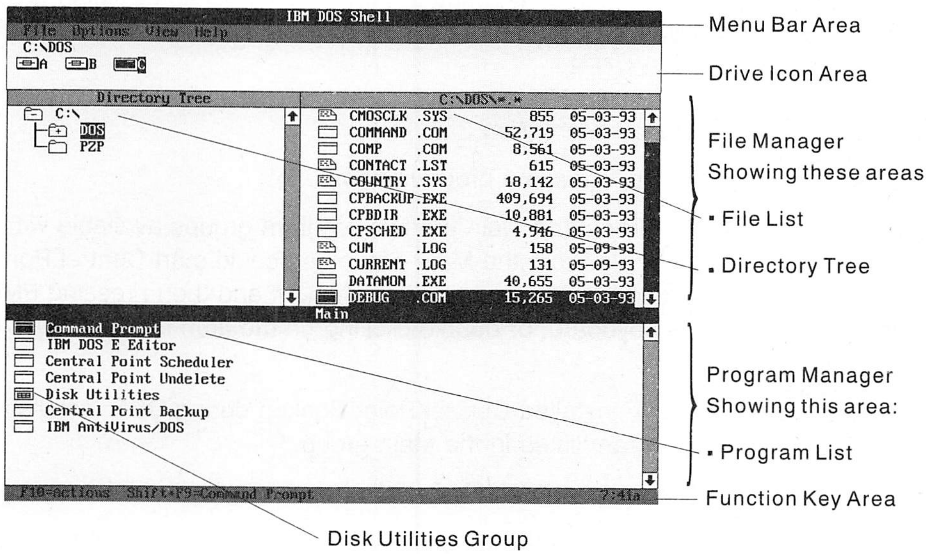
To start DOS Shell from the command prompt:

1. Type

   ```
   dosshell
   ```

2. Then press ENTER.

   The DOS Shell window is displayed.



Selecting Items from Lists or Menus

There are three ways to select items from lists or to select menu choices:

- Using a mouse
- Using a keyboard
- Using mnemonic selection

You can use mnemonic selection with DOS Shell. Make a selection by typing the single character displayed in a different color or different shade on the menu bar or list of menu items. This single character is known as a *mnemonic* character. To access the menu bar, you must press ALT followed by the underscored letter in the menu choice. For example, to access the File menu, you would press ALT+F to get the list of menu items.

Starting a Program

Programs can be started from the Main group of DOS Shell by double clicking on the program name or by using the TAB key to move the cursor to the Main group and then using the DOWN ARROW or UP ARROW until the program name is highlighted. Then press ENTER.

There are four ways to start a program:

- From a program group, choose a program item.

  For example, Disk Utilities and Main are two program groups available with DOS Shell. For example, from the Main group you could start Central Point Scheduler by selecting the program by highlighting it and then pressing ENTER if you are using the keyboard, or double clicking on the item if you are using a mouse.

  Note: You must have installed Central Point Backup during DOS installation to have this program listed in the Main group.

- From a file list, choose a program file or a file associated with that program.

  From the list of files in a specific directory, you can start the program by selecting any file with an extension of .BAT, .EXE, or .COM. For example, to start the E Editor, select the program by highlighting the E.EXE file and then pressing ENTER if you are using the keyboard, or clicking on the item if you are using a mouse.

- From the File menu, select **Run**. Type the name of the program file in the Run dialog box, and then select **OK**.

  For example, type `ibmavd` to start the IBM AntiVirus/DOS program.

- From the Main group, select **Command Prompt** and type the name of the program at the DOS command prompt.

  Note: Do not type `dosshell` to return to DOS Shell because the program is already running. To return to DOS Shell, you must type `exit` and then press ENTER.

Getting Help

Online Help provides a quick way to get information about DOS Shell basics and how to use menus, commands, dialog boxes, dialog box options, and procedures.

You can get help in three ways:

- By pressing F1.
- By selecting the Help button that appears in most dialog boxes.
- By using the Help menu.

To request help on a menu:

1. Press ALT.
2. Select the menu you want help on by using the RIGHT ARROW or LEFT ARROW key and press ENTER.
3. Press F1.

   A Help window containing information about the selected menu appears.

To request help on a command:

Mouse

1. Select the menu that contains the command you want help on and press ENTER.
2. Select the command you want Help on by using the DOWN ARROW or UP ARROW key and press ENTER.
3. Press F1.

   A Help window containing information about the selected command appears.

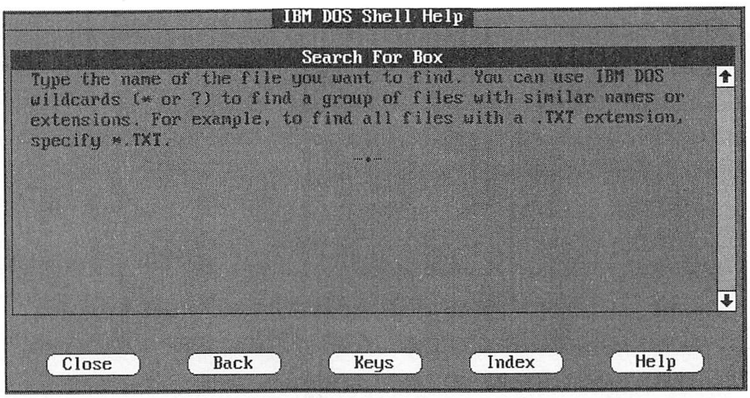
Keyboard

1. Press ALT to select the menu bar.
2. Select the menu that contains the command you want help on by using the RIGHT ARROW and LEFT ARROW keys.
3. Select the command you want Help on by using the DOWN ARROW or UP ARROW key and press ENTER.
4. Press F1.

To request help on a dialog box option:

1. Open the dialog box you want help on.
2. Select a command button or option using the TAB key or the arrow keys.
3. Press F1.

   For example, if you have selected **Search For** in the Search File dialog box and you press F1, DOS Shell displays the following Help window:



Getting Help on a Related Procedure

Often Help refers you to a related procedure. For example, if you requested Help on the Color Scheme dialog box, this Help contains a reference to the procedure for changing colors.

Within Help, related procedures are displayed in a different color or in reverse video, depending on the color scheme you have selected.

To view a related procedure:

Mouse	Double-click the related procedure. A Help window containing information about the related procedure appears.
Keyboard	1. Press TAB until the related procedure is selected. 2. Press ENTER. A Help window containing information about the related procedure appears.

Using the Help Menu

You can use the commands on the Help menu to view an index of Help topics; information on the keys you can use with DOS Shell; basic skills for working with DOS Shell commands and procedures; and information about using the Help system.

To use the Help menu:

Mouse	From the Help menu, choose the Help category you want. Either information about the subject or a list of topics related to the subject appears.
Keyboard	1. Press ALT, H. 2. Press the highlighted letter for the Help category you want. Or press the UP ARROW or DOWN ARROW key to select the Help category you want, and then press ENTER. Either information about the subject or a list of topics related to the subject appears.

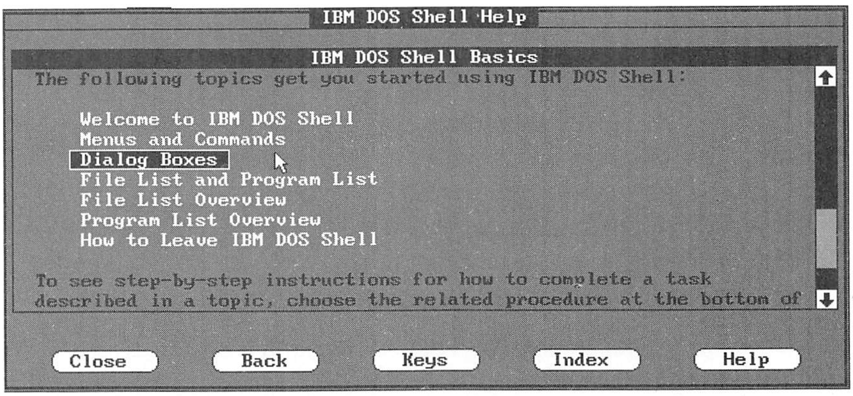
Note: If you have not used Help before, select **Using Help** from the Help menu to learn more about the type of information available.

Help Menu Options

The following items are available from the Help menu:

Index	Provides a list of all DOS Shell Help topics.
Keyboard	Lists keys and key combinations you can use with DOS Shell.
DOS Shell Basics	Provides an introduction to using DOS Shell.
Commands	Explains all DOS Shell commands. This information is organized according to the menu in which the command appears. You can get the same information by selecting a command and then pressing F1.
Procedures	Provides step-by-step instructions for performing tasks in DOS Shell.
Using Help	Provides an introduction to using DOS Shell Help.
About Shell	Displays copyright and version information about DOS Shell.

If you selected **Shell Basics** from the Help menu, the following help window demonstrates the type of information you would see:



Leaving DOS Shell

You can leave DOS Shell and move to the command prompt in two ways. You can quit DOS Shell temporarily, in which case you can work at the command prompt while DOS Shell is still in your system's memory. Or you can quit DOS Shell and remove it from your system's memory before you switch to the command prompt.

To leave DOS Shell temporarily:

- Press SHIFT+F9.

  or

  Select **Command Prompt** from the Main group on the program list.

- To return to DOS Shell, you must type `exit` and then press ENTER.

  Note: Do not type `dosshell` to return to DOS Shell because the program is already running.

If Task Swapper is enabled, you can switch back to DOS Shell without quitting Command Prompt by pressing CTRL+ESC. Note that Command Prompt is still running and listed in the Active Task List.

If you made changes to a directory such as adding or deleting files, the changes will not be displayed in the file-list area until you update the directory.

To update a directory:

1. Select the directory that you want to update.
2. Press CTRL+F5.

To quit DOS Shell:

1. If there are programs displayed in the Active Task List, you must quit each program before leaving DOS Shell.
2. From the File menu, select **Exit**, which is equal to pressing ALT+F4 as noted on the File menu next to **Exit**.

   or

   Press F3.

   If you try to quit DOS Shell while you still have programs listed in the Active Task List, the Exiting Error dialog box appears. The dialog box tells you that you cannot quit DOS Shell without first quitting all programs that you have running.
3. Select **OK** to close the dialog box.

Customizing DOS Shell

You can customize DOS Shell in several ways. You can change the screen colors or change the way information is displayed in the DOS Shell window. You can also organize your programs into groups and display the groups graphically, making it easier to find and use your programs. When you add a program item to a group, you can further customize the program by creating your own Help text, controlling the memory needed to run the program, and defining application shortcut keys.

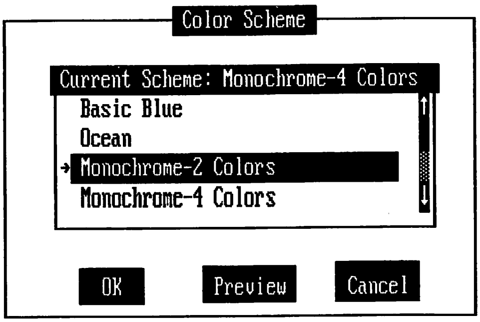
Changing Screen Colors

There are several color schemes available for DOS Shell.

To choose a color scheme:

1. From the Options menu, select **Colors**.

   The Color Scheme pop-up window appears.

2. To select the scheme you want, click on the scroll arrows until the color scheme you want comes into view and then click on that color scheme. Or use the UP ARROW or DOWN ARROW key to select the color scheme you want.
3. If you want to see what the selected color scheme looks like on your screen, select **Preview**.
4. Select **OK** to implement the color scheme.

Switching between Text and Graphics Mode

The appearance of DOS Shell on your screen depends on what type of *display adapter* you have and the *screen mode* you are using. A display adapter determines the screen display's capabilities, such as resolution and screen mode. The screen mode controls the size and shape of the images that appear on your screen.

There are two types of screen modes: text and graphics. All display adapters support text mode, which is the mode DOS Shell uses the first time you start it. Only some display adapters support graphics mode.

Within text or graphics mode, you usually have a choice of how many lines you want displayed. For example, if you choose to view 50 lines instead of 25 lines (the default), you see more information on your screen at once, but the words and symbols appear smaller.

To change the screen mode:

1. From the Options menu, select **Display**.

   The Screen Display Mode pop-up window appears.

2. Select the screen mode you want.
3. If you want to see what the selected screen mode looks like on your screen, select **Preview**.
4. Select **OK** to implement the screen mode.

   DOS Shell appears in the screen mode you selected.

Organizing Programs

You can organize programs into program groups to suit your needs. When you create a program group, you give it a title, which appears in the program list. In the default view, Program/File Lists, the program list appears in the lower-left corner of DOS Shell window. To work with a group, you choose its title.

Adding and Deleting Groups

You can add groups to the Main group, the Disk Utilities group, or a group you have created. For example, you might use three programs to keep track of your finances—one to maintain your checkbook, one to estimate taxes, and one to track your monthly bills. You might add a group named Accounts and put these account programs into it.

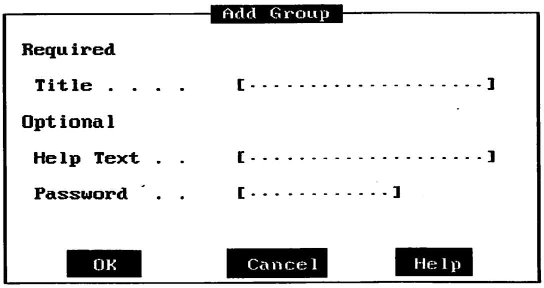
When you create a group, you must give it a title. You can also give it a password that a user must know to view the group, and a Help message that provides information on the group and its program items.

To add a group:

1. Make sure you have selected **Program/File Lists** on the View menu.
2. Press TAB to move to the program-list area of your screen. Or click anywhere inside the program-list area.
3. If the group to which you want to add the new group is not open, open it by double-clicking the group name. Or use the UP ARROW or DOWN ARROW key to select the group and then press ENTER.
4. From the File menu, select **New**.

   The New Program Object pop-up window appears.
5. Select **Program Group**.
6. Select **OK**.

   The Add Group pop-up window appears.



7. In the **Title** field, type a title for the new group.
8. If you want the group to have a Help message, type up to 255 characters (including blanks) in the **Help Text** field.

   For example, you might type a Help message that reads, "Use the programs in this group to perform statistical operations." When you select this group and press F1, DOS Shell displays the message. The message appears exactly as you have typed it and is formatted to fit in the Help pop-up window. If you want a line break to appear in the text, type **^m** (a caret followed by the letter M) at the point where you want the new line to start.
9. If you want the group to have a password, type the password in the **Password** field.
10. Select **OK**.

To delete a group:

1. Select the group you want to delete.
2. From the File menu, select **Delete**.

   or

   Press DEL.

   The Delete Item pop-up window appears.
3. Select **OK**.

When you delete a group, DOS Shell removes the group name from the program list and deletes the group's password and Help message.

Changing the Contents of a Group

You can change the contents of a group by adding program items, copying program items from another group, reordering items, and deleting items.

Adding a Program Item

When you add a program item to a group, you give it a title and specify the command that starts the program. In addition to assigning titles and startup commands, you can associate a variety of other information with a program item. For more information, see "Working with Properties" on page 278.

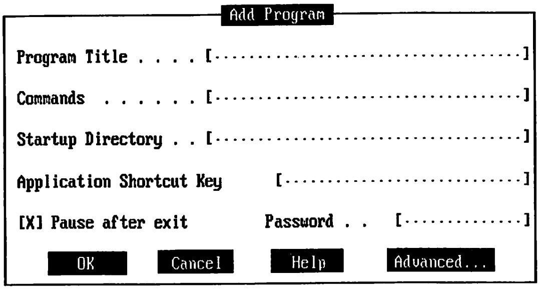
To add a program item to a group:

1. Make sure you have selected **Program/File Lists** on the View menu.
2. Press TAB to move to the program-list area of your screen. Or click anywhere in the program-list area.
3. If the group to which you want to add the new item is not open, open it by double-clicking the group name. Or, use the UP ARROW or DOWN ARROW key to select the group and then press ENTER.
4. From the File menu, select **New**.

   The New Program Object pop-up window appears, with New Program Item already selected.

5. Select **OK**.

   The Add Program pop-up window appears.



6. In the **Program Title** field, type the *program-item title* that you want to appear in the program list.

7. In the **Commands** field, type the *startup command*, the command that starts the program. If the command is not in the current directory or in a directory specified by the PATH environment variable, or if it is not an internal command, you must include the complete path of the file in the command.

   You can include more than one command in this field. For more information about startup commands, see "Specifying a Startup Command" on page 279.

8. Specify optional information you want to associate with the program item. You can specify the following:

   - A startup directory, which DOS Shell changes to before starting the program.
   - An application shortcut key, which (after you have started a program) you can use to switch to the program from other programs or from DOS Shell.
   - Pause after exit, which prompts you to press any key to return to DOS Shell after the program has finished running.
   - A password, which will be required before starting the program item.

     For more information about these options, see "Working with Properties" on page 278.

9. If you want to specify other options, select **Advanced**.

   The Advanced pop-up window appears.

   For information about the options in the Advanced pop-up window, see "Specifying Advanced Properties" on page 286.

10. Select **OK**. If you select **Advanced**, you return to the Add Program pop-up window when you select **OK**. You must then select **OK** in that field, also.

Copying a Program Item to Another Group

To copy a program item to another group, you select **Copy**. For example, if you have a spreadsheet program item in your Account group, you can also put it in your Tax group. You can copy a program item to as many groups as you like.

To copy a program item from one group to another:

1. Select the program item you want to copy.
2. From the File menu, select **Copy**. Instructions appear in the status bar.
3. Open the group you want to copy the program item to.

   If the group you are copying to has a password, the Password pop-up window appears.

4. Type the password, and select **OK**.
5. Press F2.

Reordering Items in a Group

To move a program item or group title from one position in a group to another, use the REORDER command.

To reposition a program item or group title:

1. Select the program item or group title you want to reposition.
2. From the File menu, select *Reorder*. Instructions appear in the status bar.
3. Double-click on the new location.

   Or move the selection cursor to the new location, and then press ENTER.

   The selected program item or group title moves to the new location.

Deleting a Program Item from a Group

You can delete a program item that you no longer need. Deleting a program item from a group does not delete the program file from the directory that contains it.

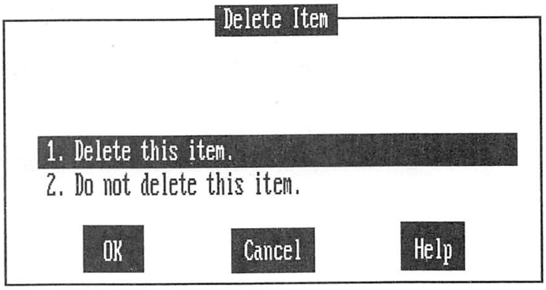
To delete a program item from a group:

1. Select the program item you want to delete.
2. From the File menu, select **Delete**.

   or

   Press DEL.

   The Delete Item pop-up window appears. If the program item has a password associated with it, you will see a warning message, but you can still delete the program item.



3. Select **OK**.

Working with Properties

A *property* is a piece of information that you associate with a program item. You can specify numerous properties for each program item.

The following two properties are required:

- Program-item title
- Startup command

These properties are optional:

- Startup directory
- Application shortcut key
- Pause after exit
- Password
- Additional advanced properties

For information about creating program items, see "Adding a Program Item" on page 275.

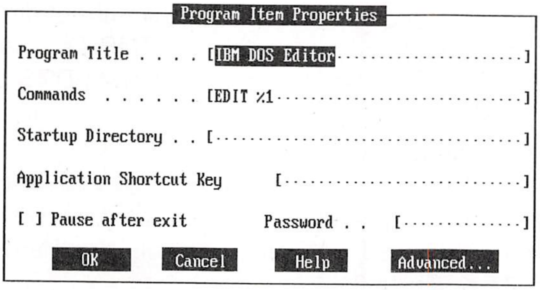
After you create a program item, you can change its properties by using the PROPERTIES command.

To change the properties of a program item:

1. Select the program item.
2. From the File menu, select **Properties**.

   If the program item has a password, the Password pop-up window appears. Type the password, and select **OK**.

   The Program Item Properties pop-up window appears. The **Program Title** field and the **Commands** field show the properties that have been specified for the program item you selected, along with any optional properties.



   The Program Item Properties pop-up window is the same as the Add Program pop-up window, which is displayed when you create a program item.

3. Type the information for the properties you want to change.
4. Select **OK**.

Specifying a Startup Command

When you create a program item, you must type a startup command in the **Commands** field of the Add Program pop-up window. If the command is not in the current directory or in a directory specified by the PATH environment variable, or if it is not an internal command, you must include the complete path of the program file. For example, if you are creating a program item named WordPerfect and the path for WordPerfect is C:\WP\WP.EXE, you would type that path in the **Commands** field.

You can also specify additional commands, run batch programs, and include replaceable parameters for the program. The following sections describe how to include these options.

Specifying Additional Commands

DOS Shell carries out each command in the order it appears in the **Commands** field. Each command must be separated by a semicolon (;). There must be one or more spaces on each side of the semicolon. Text in the **Commands** field cannot exceed 255 characters.

For example, suppose you want to put an abbreviated list of the files in a directory into a text file, load the file into your text editor, edit the file, save it under a different name, and delete the original file when you are finished. If you are using the E Editor, your startup command might look like this:

```
dir /b  > tmp.txt ; c:\dos\e.exe tmp.txt ; del tmp.txt
```

In this example, DOS Shell first stores the names of files in the current directory in a file named TMP.TXT. Then it runs the E Editor, loading the TMP.TXT file. When you quit the E Editor, the TMP.TXT file is deleted, and you return to DOS Shell.

Running Batch Programs in a Startup Command

You can run batch programs by including CALL commands in the startup command. For example, suppose you want to run a batch program named PREP.BAT before you start WordPerfect, and one called POST.BAT after you quit WordPerfect. You would type the following in the **Commands** field:

```
call prep ; wp ; call post
```

For information about batch programs, see Chapter 5, "Working with Batch Programs" on page 71.

Using Replaceable Parameters

A *parameter* is additional information you give a program when you start it. For example, when you start E Editor from DOS Shell, the File to Edit pop-up window appears. You can specify a filename in the **Text** field. If you type **recipes.txt**, for example, E Editor loads the file RECIPES.TXT as soon as it starts.

Many programs accept parameters in this manner. If the program item you add to a program group accepts parameters, you can include these parameters in the **Commands** field.

If you want to be able to specify a different parameter whenever you run the program item, you can put a replaceable parameter in the Commands field. Each time you select the *program item*, DOS Shell displays a pop-up window that prompts you to fill in the value for the replaceable parameter before the program starts.

In the **Commands** field, you indicate a replaceable parameter with the percent sign (%) followed by a numeral (**1** through **9**). For example, if you want DOS Shell to prompt you for a filename when you start WordPerfect, you might type the following in the **Commands** field:

```
c:\wp\wp.exe %1
```

The **%1** in this example indicates that you want DOS Shell to prompt you to type a value in place of **%1** every time you select the program item for WordPerfect. DOS Shell will prompt you by displaying a prompt pop-up window.

To include a replaceable parameter in a startup command:

1. Select the program item.
2. From the File menu, select **Properties**

   If the program item has a password, the Password pop-up window appears. Type the password and select **OK**.

   The Program Item Properties pop-up window appears.
3. In the **Commands** field, specify the command and indicate the replaceable parameters by typing a percent sign (%) followed by a numeral (**1** through **9**) for each.
4. Select **OK**.

   A Program Item Properties or Add Program pop-up window appears for each replaceable parameter you have specified.

```
Program Item Properties
Fill in information for % 1   prompt dialog.
Window Title . . . .     [·································]
Program Information .    [Enter the name of the file to edi]
Prompt Message . . .     [File to edit?····················]
   Default Parameters . .   [·····························]
        OK        Cancel        Help
```

5. The information you type in this pop-up window will create a customized pop-up window for the program item that you are adding or changing. Type the information that you want to appear in the pop-up window. Each time you select the program item, DOS Shell will display the information you have typed.

   The Window Title you supply will appear at the top of the pop-up window. The Program Information you supply will appear under the title. You can type up to 106 characters in the **Program Information** field. The Prompt Message you specify will appear to the left of the field where you specify the parameter value.

   If you specify a value in the **Default Parameters** field, the value will appear in the prompt pop-up window. You can accept the default parameter or change it. Specify a default parameter value if you plan to use that value frequently when you run the program. For example, if you are working on a project that often requires you to use a particular document, you might type that document's name as the default parameter for a text editor.

   There are two special parameters that you can use in the Default Parameters field to automatically set a default parameter. The **%f** parameter sets the default filename to the filename currently selected in the file list. The **%l** parameter (a percent sign followed by the letter L) sets the default parameter to the parameter that was specified the last time the program item was run.

   If you want DOS Shell to prompt you for a file to load when you start a text editor, you can specify values such as the following in the Program Item Properties pop-up window:

```
Program Item Properties
Fill in information for % 1   prompt dialog.
Window Title . . . .     [IBM DOS EDITOR···················]
Program Information .    [Enter the name of the file to edi]
Prompt Message . . .     [File to edit?····················]
   Default Parameters . .   [·····························]
        OK        Cancel        Help
```

Each time you select the program item, DOS Shell will prompt you with a prompt pop-up window.

Using the Same Replaceable Parameter More Than Once: You can use the same replaceable parameter more than once in a **Commands** field. For example, suppose you create files by using WordPerfect, and you store them in C:\EDIT\WP. Suppose that as you create these files, you always back them up on a disk in drive A. To load a file into WordPerfect and then back up the file (onto a disk in drive A) after you have edited it, you would type the following in the **Commands** field:

```
c:\edit\wp\wp.exe %1 ; copy %1 a:
```

Using More Than One Replaceable Parameter: You can include up to nine different replaceable parameters in the **Commands** field. For example, suppose you want DOS Shell to prompt you for a file to load with WordPerfect and for a backup directory to copy the file to when you finish editing. You would include two different replaceable parameters in the **Commands** field, as in the following example:

```
c:\wp\wp.exe %1 ; copy %1 %2
```

If you add this command in the **Commands** field, you will be prompted to provide the name of the file you want to edit in addition to the directory to which you want to copy the file. Then you can edit your WordPerfect document.

For each replaceable parameter, DOS Shell prompts you for information to appear in the prompt pop-up window, as described previously.

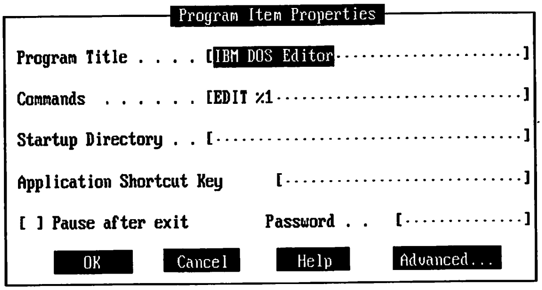
Specifying a Startup Directory

You can specify which directory you want DOS to change to before it starts a program that is in a program group. For example, if you keep budget spreadsheets in a directory named C:\FILES, you need to make sure DOS Shell changes to that directory before starting your spreadsheet program.

To specify a startup directory:

1. Select the program item whose properties you want to change.
2. From the File menu, select **Properties.**

   The Program Item Properties pop-up window appears.
3. In the **Startup Directory** field, type the drive and path of the directory you want DOS Shell to change to before it starts the program, as in the following example:



Specifying an Application Shortcut Key

If you have started a program but are not currently working with it, you can use a key combination to switch quickly to it from another program or from DOS Shell. The shortcut key must have the form CTRL+*character*, SHIFT+*character*, or ALT+*character*, where *character* is a letter, number, or function key on your keyboard. (Exceptions are noted later in this section.) You can use any combination of the CTRL, SHIFT, and ALT keys with the character.

To specify an application shortcut key:

1. Select the program item you want.
2. From the File menu, select **Properties**

   The Program Item Properties pop-up window appears.
3. In the **Application Shortcut Key** field, specify the key combination by pressing and holding down CTRL, SHIFT, or ALT, and then pressing a character.

For example, suppose you have a program item named My Editor in the Main group and that you have enabled Task Swapper. You could assign CTRL+E as the shortcut key for My Editor. If My Editor is on the Active Task List, you can press CTRL+E to switch back to it from another program or from DOS Shell.

The name of the shortcut key will appear next to the program-item title in the Active Task List. For information about Task Swapper and the Active Task List, refer to the *Everyday DOS for PC DOS 6* manual.

The following key combinations are reserved and are not available as application shortcut keys:

CTRL+M	SHIFT+CTRL+M
CTRL+I	SHIFT+CTRL+I
CTRL+H	SHIFT+CTRL+H
CTRL+C	SHIFT+CTRL+C
CTRL+[	SHIFT+CTRL+[
CTRL+5 (on the keypad)	SHIFT+CTRL+5 (on the keypad)

Specifying Whether to Pause After a Program Ends

You can specify whether DOS Shell should pause after you quit a program that is in a program group. By default, DOS Shell prompts you to press a key to return to DOS Shell after you quit such a program.

To eliminate the pause after you quit a program:

1. Select the program item you want.
2. From the File menu, select **Properties**.

   The Program Item Properties pop-up window appears.
3. Clear the Pause After Exit option by clicking the X.

   or

   Press TAB until you select the option, and press the SPACEBAR to clear it.
4. Select **OK**.

Specifying a Password

If you want DOS Shell to prompt you for a password before it starts a program item, you can specify the password in the Program Item Properties pop-up window.

To specify a password for a program item:

1. Select the program item.
2. From the File menu, select **Properties**.

   The Program Item Properties pop-up window appears.
3. In the **Password** field, type the password you want.
4. Select **OK**.

Specifying Advanced Properties

When you select **Advanced** in the Add Program or Program Item Properties pop-up window, another pop-up window appears in which you can specify additional properties. The Advanced pop-up window looks like this:

```
                          Advanced
Help Text  [.........................................]

Conventional Memory  KB Required  [..........]

XMS Memory  KB Required [..........]  KB Limit [..........]

Video Mode  (•) Text     Reserve Shortcut Keys [ ] ALT+TAB
            ( ) Graphics                       [ ] ALT+ESC
[ ] Prevent Program Switch                     [ ] CTRL+ESC

              OK           Cancel          Help
```

Adding Help Text

You can add a Help message of up to 255 characters to any program item. This Help message is displayed if you press F1 when the program item is selected. DOS Shell displays the message exactly as you have typed it and formats it to fit in a Help pop-up window. If you want to begin a new line of text, type **^m** (a caret followed by the letter M) at the point where you want the new line to start.

If you do not want the program item to have a Help message, leave the **Help Text** field blank.

Specifying Conventional Memory

Use the *Conventional Memory KB Required* field to specify how many kilobytes of conventional memory must be free in order to start a program. This property is useful for programs with specific memory requirements.

Regardless of what you type in the **Conventional Memory KB Required** field, when you start a program, DOS Shell gives it all available conventional memory. The number you type in this field determines how much memory must be available before DOS Shell starts the program; it does not limit how much conventional memory the program receives.

If DOS Shell cannot provide as much memory as you specify, a message appears, telling you there is not enough memory to run the program.

If Task Swapper is not enabled, DOS Shell ignores any conventional-memory specification.

Specifying Extended Memory

Use the XMS Memory options to specify how much extended memory to give to a program that uses memory according to the Lotus/Intel/Microsoft/AST Extended Memory Specification (XMS) standard. If Task Swapper is not enabled, the XMS memory specifications are ignored.

A description of each XMS Memory option follows. Before using these options, you must have extended memory set up on your system. For more information, see the discussion about extended memory in Chapter 10, "Making More Memory Available" on page 165.

KB Required Specifies how many kilobytes of extended memory must be free in order to run a program.

Leave this setting blank for most programs. Specifying a value significantly increases the time it takes to switch to and from a program. Specify a value only if a program requires a certain amount of extended memory in order to run.

If you run a program that requires extended memory, and DOS Shell cannot provide as much memory as you specify, a message appears when you try to start the program, telling you there is not enough memory. However, if Task Swapper is not enabled, the memory specification is ignored.

KB Limit Specifies the maximum amount (in kilobytes) of extended memory that DOS Shell can give to a program.

This option is useful for limiting a program's access to extended memory because some programs take all available extended memory whether they need it or not. If Task Swapper is not enabled, the KB Limit specification is ignored.

Leave this setting blank to prevent a program from gaining access to any extended memory.

Setting this option to –1 gives the program all the extended memory it requests (up to the maximum amount available). Set this option to –1 only if the program requires large amounts of extended memory.

Using Video Mode

Video Mode has two options: text and graphics. Use text mode unless you are having trouble switching to a program.

Usually the memory reserved by text mode is enough, but you might need more memory if you are using a CGA monitor. Graphics mode requires more memory than text mode. Use text mode for all program items if you have a high-resolution graphics (VGA or EGA) monitor or a monochrome monitor.

Reserving Shortcut Keys

Use the Reserve Shortcut Keys option when you want a program to use shortcut keys typically used by Task Swapper (ALT+TAB, ALT+ESC, and CTRL+ESC). For information about Task Swapper, refer to the *Everyday DOS for PC DOS 6* manual. If you want to reserve a shortcut key for a program, select it in the Reserved Shortcut Keys area of the Advanced pop-up window.

For example, suppose you have a text editor that typically uses the ALT+TAB shortcut key to insert a special character. If you want to maintain that function while your text editor is running under DOS Shell, you need to select the shortcut key for the program. When you select this key, it is no longer reserved for DOS Shell.

Preventing Program Switching

If you want to prevent a program from switching to another program or to DOS Shell, select the Prevent Program Switch option from the Advanced pop-up window. If you select this option, you must quit the program to return to DOS Shell.

Changing Group Properties

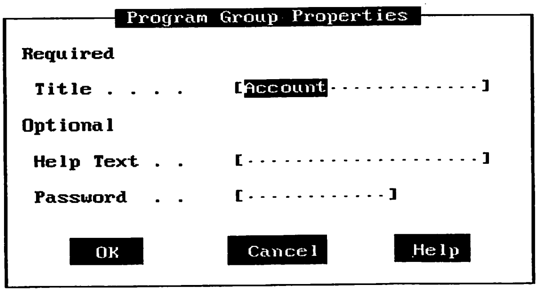
A program group must have a title associated with it. It can also have Help text and a password. You can change any of these properties for all groups except the Main group.

To change group properties:

1. Select the appropriate group.
2. From the File menu, select **Properties**.

   If the group has a password, the Password pop-up window appears. Type the password and select **OK**.

   The Program Group Properties pop-up window appears.



3. Change the title, Help text, or password.
4. Select **OK**.

Chapter 17. Using IBM AntiVirus/DOS

IBM AntiVirus/DOS (AntiVirus) is a comprehensive antivirus product for DOS and Windows systems. It is designed to detect and remove viruses from your system. It detects well over 2,000 viruses.

This chapter will help you understand viruses. It explains how to protect your computer data from viruses and describes how to install and use AntiVirus.

AntiVirus offers two kinds of automated protection. When you install AntiVirus, *Automated check* and *Shield DOS* are installed. If you want to turn off these features, refer to "Customizing AntiVirus" on page 298.

Automated check checks your fixed disks for viruses whenever you start your system. When Automated check detects a virus, you are given the opportunity to do a thorough examination of your system to find every instance of the virus and to remove it.

Shield DOS checks DOS memory for viruses when you start DOS and monitors programs as you run them. If Shield DOS detects a virus when you start DOS, you will be notified, and the virus will be disabled. If a virus is detected when you are running a program, you will be notified and the virus will be prevented from becoming active or spreading. You then can use the infected program without spreading the virus.

Note: After a virus has been detected, it is very important to run AntiVirus to check your entire system for viruses as soon as possible.

Some common viruses destroy programs so it is not possible to disinfect them reliably. Such programs, including AntiVirus, do not function correctly and must be reinstalled when they become corrupted. Keeping the DOS shield installed at all times helps prevent this from happening.

Installing IBM AntiVirus/DOS After Installing DOS

If you did not choose antivirus protection at initial installation, you can still install IBM AntiVirus/DOS by rerunning DOS Setup using the **/e** switch.

The DOS Setup diskettes contain everything you need to install AntiVirus. You might want to refer to the *PC DOS Installation Guide* before you begin.

During Setup, DOS checks whether your computer has Windows 3.1 installed. If you do not have Windows 3.1 installed and want to use the optional tools provided with DOS for Windows, you should make sure you install in this order:

1. Install DOS as you normally would, selecting the optional tools you want from the list provided. You will not see any of the optional tools for Windows listed if you do not have Windows 3.1 installed already.
2. After you have installed DOS, install Windows 3.1 as you normally would.
3. Install DOS again using the DOS Setup **/e** switch after DOS and Windows have both been installed.

To install IBM AntiVirus/DOS using the Setup /e switch:

1. Insert diskette 1 of the DOS Setup diskettes into drive A or B.
2. At the DOS command prompt, type:

   ```
   a:setup /e
   ```

   or

   ```
   b:setup /e
   ```

   The **/e** switch allows you to return to the optional tools selection menu without having to do a complete reinstallation. At this point, only the necessary files for the optional tools for Windows will be installed.
3. After Setup for DOS begins, follow the instructions displayed on the screen. Make sure you specify the same "Install to PATH" as you did when you did the initial DOS installation.

   At the Optional Tools screen, you see a `NO` next to IBM AntiVirus/DOS and IBM AntiVirus/DOS for Windows.
4. Press the UP ARROW or DOWN ARROW until you highlight IBM AntiVirus/DOS.
5. Press ENTER.

   You now see `YES` next to IBM AntiVirus/DOS.
6. Select other optional tools you want to install at this time, such as IBM AntiVirus/DOS for Windows, by highlighting the name of each optional tool and pressing ENTER for each item.

   If you are using IBM Boot Manager to start various operating systems, have IBM AntiVirus/DOS on each of the DOS and Windows partitions. For DOS, Boot Manager does not allow one bootable partition to access another.
7. Move the cursor to highlight the following:

   ```
   The listed options are correct.
   ```
8. Continue to follow the instructions displayed on the screen until the optional tools are installed.

Starting IBM AntiVirus/DOS

AntiVirus has been designed to protect your system automatically. You can also use it to check your system for viruses whenever you want. In addition, AntiVirus provides the following features:

AntiVirus Defaults: The defaults for the DOS Setup program have been constructed to provide the best protection for your system. DOS is set up to run a virus check on the first boot of the week on any new or changed program files. Shield DOS is installed whenever you start (boot) DOS.

Stand-alone AntiVirus Program: AntiVirus also includes a stand-alone program. The stand-alone program can be used from a diskette when you cannot access the usual AntiVirus program or start your system due to virus problems on your system. The stand-alone program can be started from a .BAT file or any command prompt after starting your system from a write-protected, virus-free diskette. See "Running the AntiVirus Stand-Alone Program" on page 305 for more information on the stand-alone program.

Dual Boot Systems: With Dual Boot systems, you can start either DOS or OS/2 from the same partition. If you want protection under both operating systems, you must have the AntiVirus program installed during DOS Setup and you must purchase the IBM AntiVirus/2 program separately for use with OS/2. Select **Contacts** from the Help menu for more information about ordering updates for IBM AntiVirus.

You can start AntiVirus by:

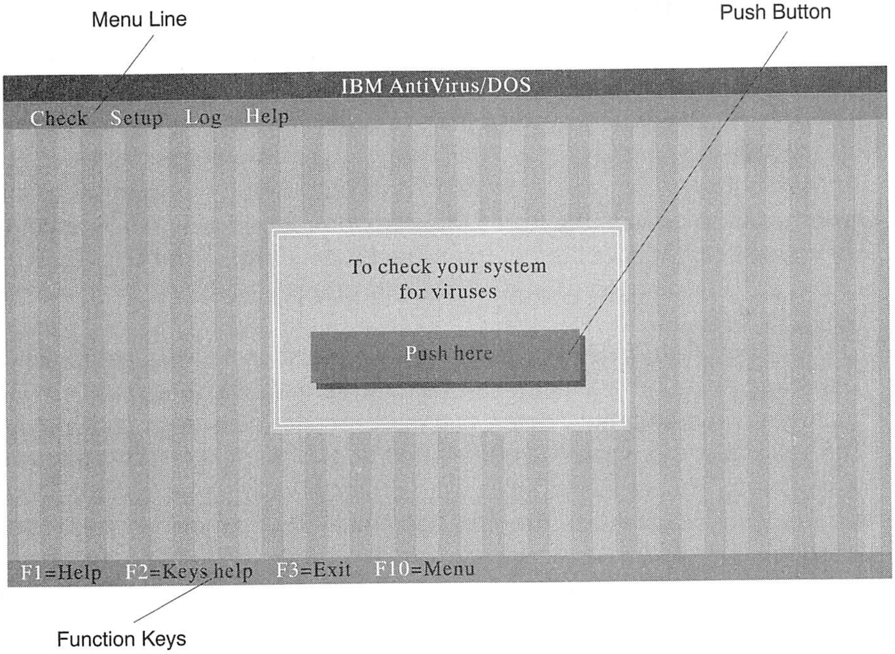
- Selecting IBM AntiVirus/DOS from the program area of DOS Shell. If you want to know more about DOS Shell, refer to the *Everyday DOS for PC DOS 6* manual.
- Typing a command at the DOS command prompt.

To start the DOS version of AntiVirus:

1. Type the following at the DOS command prompt:

   ```
   ibmavd
   ```

   You see the main IBM AntiVirus/DOS window.

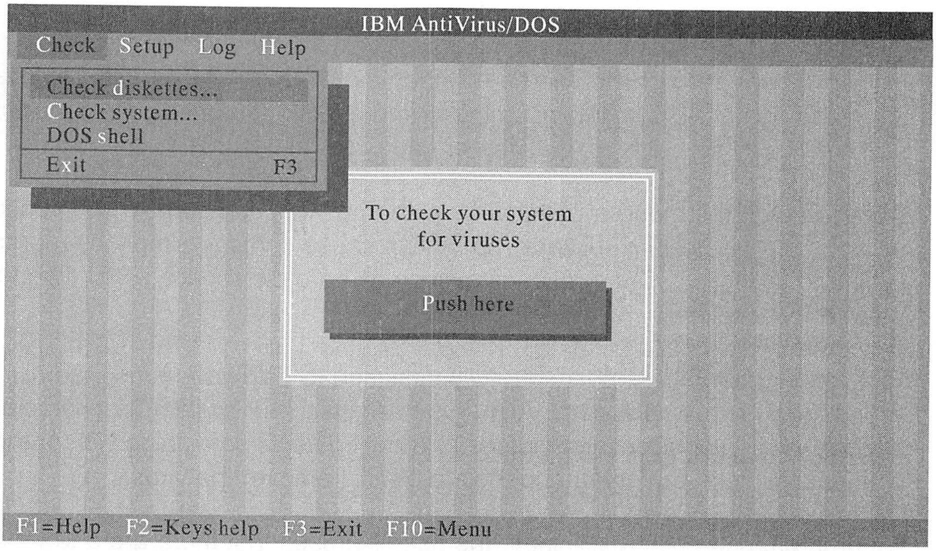


2. To begin a check for viruses, click on the box in the center of the window where you see `Push here` or type `P`. This box remains permanently placed in the center of the main IBM AntiVirus/DOS window.

You can use mnemonic selection with IBM AntiVirus/DOS. Make a selection by typing the single character displayed in a different color or shade on the push button. This single character is known as a *mnemonic* character.

To access the menu bar, you can either:

- Make a selection using a mouse.
- Press F10 and then press ENTER.
- Press ALT followed by the letter shown in a different color on the list of menu choices. For example, to access the Check menu, you would press ALT+C.



The first time you check your system, it will take longer to check for viruses because AntiVirus is building a database that remembers what your files look like. On subsequent checks for viruses, AntiVirus does not have to rebuild this database again; so the time needed to run checks is shortened.

To start the Windows version of AntiVirus:

You can start IBM AntiVirus/DOS for use within Windows by double-clicking on the AntiVirus icon located in the IBM Tools program group.

You then see the main window for IBM AntiVirus/DOS for Windows.

Protecting Your Computer Data against Viruses

A computer *virus* is a program that can "infect" other programs by modifying them to include a (possibly "evolved") copy of itself.

Viruses can spread themselves, without the knowledge or permission of the workstation users, to potentially large numbers of programs on many machines. Viruses can also contain instructions that cause damage or annoyance; the combination of possibly-damaging code with the ability to spread is what makes viruses a considerable concern.

Viruses are not mysterious. They are just computer programs and only do things that programs can do. However, unlike most other programs, they are specifically designed to spread themselves.

Viruses can often spread without any readily visible symptoms. When a virus is started on a workstation, it can run any instructions that its author chooses to include. These instructions can be event-driven effects (for example, triggered after a specific number of executions), time-driven effects (triggered on a specific date, such as Friday the 13th or April 1st) or can occur at random.

Depending on the motives of the virus author, a virus can contain no intentionally harmful or disruptive instructions. Or, it can cause damage simply by replicating itself and taking up scarce resources, such as hard disk space, CPU time, or network connections.

IBM AntiVirus/DOS has been carefully designed to help you reduce the risk of a virus infecting your computer. AntiVirus examines your system for characteristics of specific viruses or classes of viruses. When it detects something with one of these characteristics, it warns you and tries to *clean* (remove) the virus.

No program can entirely eliminate the risk of viruses, but there are a few simple things you can do to make sure the risk is reduced:

- Use AntiVirus' Automated checking and Shield DOS features to detect viruses sooner than you would without these features. Use AntiVirus to check diskettes for viruses before starting or running programs from these diskettes.
- Keep AntiVirus up to date. As new viruses are discovered, AntiVirus will be updated to deal with them. Select **Contacts** from the Help menu for more information about ordering updates for IBM AntiVirus.
- Keep good backups and update them periodically. In some cases, the only way to clean up a system that has become infected with a virus is to restore it using virus-free backup copies. Check your system using AntiVirus just before you do a backup to help prevent backing up infected files. If you do not currently have a good backup of your system, make one immediately after you install DOS.
- Keep your diskettes write protected whenever possible. Write protecting your diskettes keeps them from becoming infected. Most viruses travel from one computer to another on diskettes. Diskettes become infected when they are used in an infected system and have not been write protected.
- If possible, prevent executable files on LAN file servers from being modified by client computers. Preventing modifications keeps an infected client computer from infecting the LAN file server and keeps the infection from spreading to other client PCs. The DOS "read-only" attribute does not prevent virus infection.

  Your LAN administrator knows how to use the server's operating system to protect the server files.

Checking for Viruses

You can choose to check for viruses by either:

- Checking your system
- Checking diskettes

Checking Your System

Normally, Automated check verifies whether your system has any viruses when your computer is restarted. However, you can check your system whenever you want.

To check your system:

1. Select **Push here** on the main AntiVirus window.

   AntiVirus checks boot sectors (including Boot Manager boot sectors) and files on your system for known viruses and for changes that might indicate the presence of an unknown virus. Network drives (on LAN servers) and local drives also can be checked.

2. If a virus is detected, a thorough examination of your system will be done to find every instance of the virus, and you will be given the opportunity to remove it.

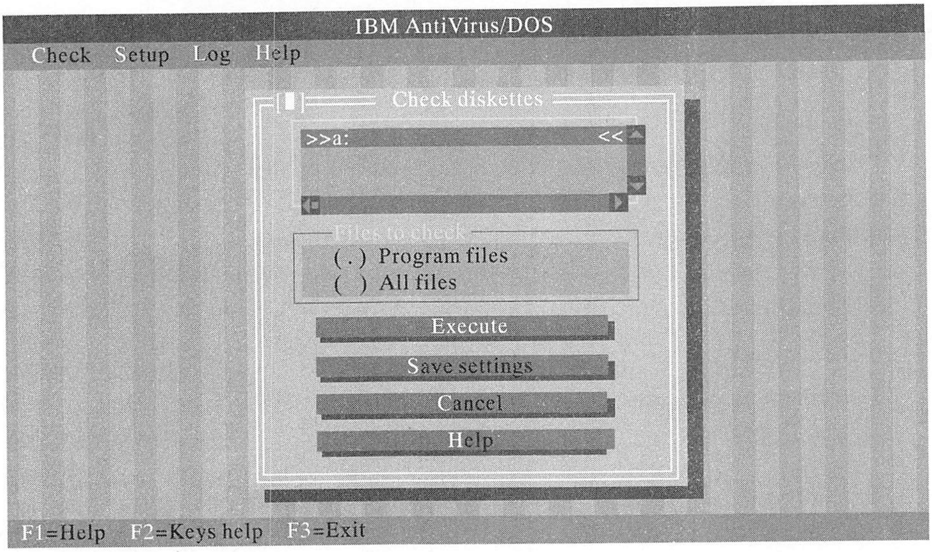
Checking Diskettes

It is a good idea to check diskettes for viruses before starting (booting) from them or before running programs from them.

To check a diskette:

1. From the Check menu, select **Check diskettes**

   The following illustration shows the Check diskettes pop-up window.



Boot sectors and files on diskettes in the selected diskette drive are checked for viruses.

2. Select **Execute** after all selections have been made.
3. When a virus is detected, you are given the opportunity to remove it from the diskette.

Checking Compressed Files

Many people use compression software to store individual program and data files. This software reduces the amount of disk space required to store a file and reduces the amount of time required to transmit it via modem. Some programs are distributed in compressed form and decompressed automatically before they are run. Because compression changes the contents of the file, it also inhibits scanning software from examining the byte patterns within the original, decompressed file to see if they match any known viruses.

IBM AntiVirus/DOS determines if individual compressed files have changed suspiciously but will not usually be able to search them properly for known viruses. To search them properly, decompress the files before you check your system.

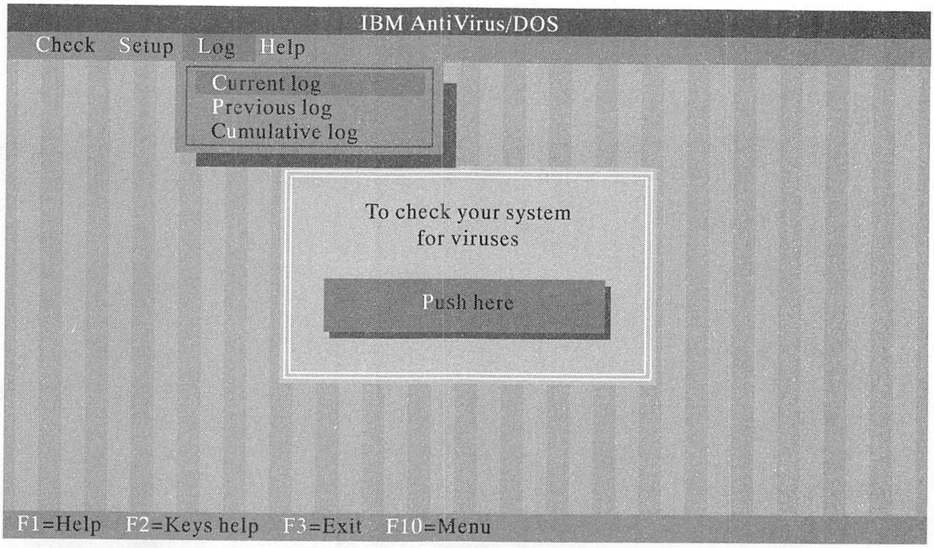
IBM AntiVirus/DOS will properly check disks that have been compressed with disk compression software, such as Stac**'s Stacker** program, as long as the disk compression software is currently active.

** Stac and Stacker are trademarks of Stac Corporation.

Shield DOS detects and deactivates any of the viruses it knows about if you run an infected program—no matter what compression technique is used to store the program file.

Reviewing Logs

AntiVirus logs its activities so you can review them later. These logs contain information about when your system was checked, what files were checked, and whether any viruses were detected.



The log from your current session of AntiVirus is stored in the file CURRENT.LOG. The log from your previous session is stored in PREVIOUS.LOG. A cumulative log that briefly summarizes the results of any automated checks is stored in CUM.LOG. All these log files are stored in the \DOS directory. These files can be printed directly to your printer.

An entry is added to the cumulative log each time AntiVirus does an automated check. It does not record checks you do manually. You can edit or erase this cumulative log file if it grows too large.

Customizing AntiVirus

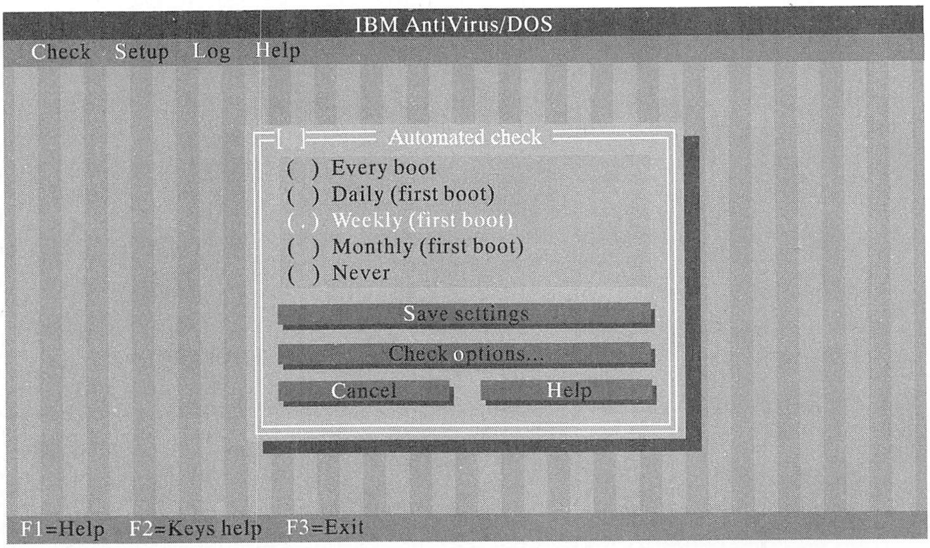
You can customize the automated checking, the DOS shield, diskette checking, and system checking features of IBM AntiVirus/DOS.

The default settings for AntiVirus have been designed to do the right thing for most systems. Use the default settings unless you have a specific reason for preferring another setting.

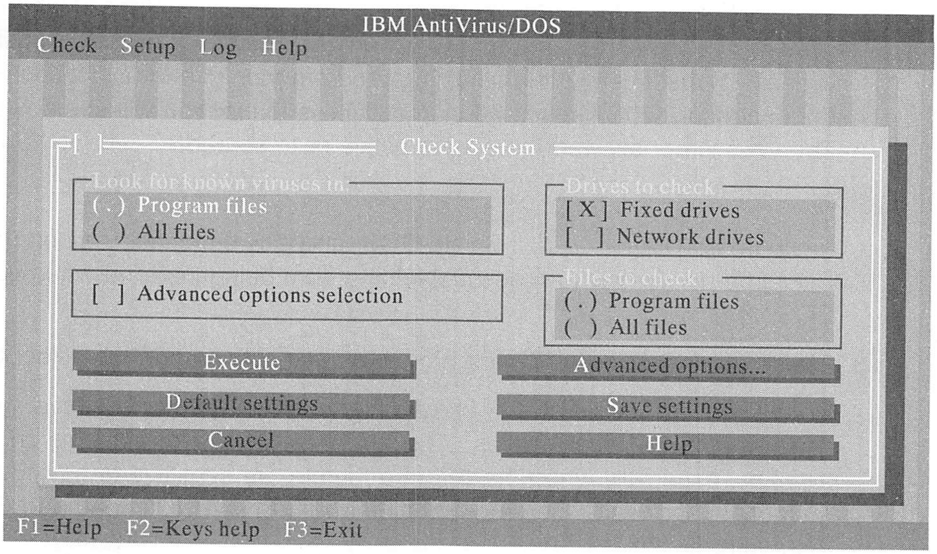
Customizing Automated Protection

To customize Automated check:

1. From the Setup menu, select **Automated check**.



2. Specify Automated check to be done either periodically or whenever you start your system. Then select **Save settings**.
3. Select **Check options** on the Automated check pop-up window to specify which drives to check, what kinds of files to check, and whether to check only new or changed files or to even check unchanged files. Then select **Save settings**.

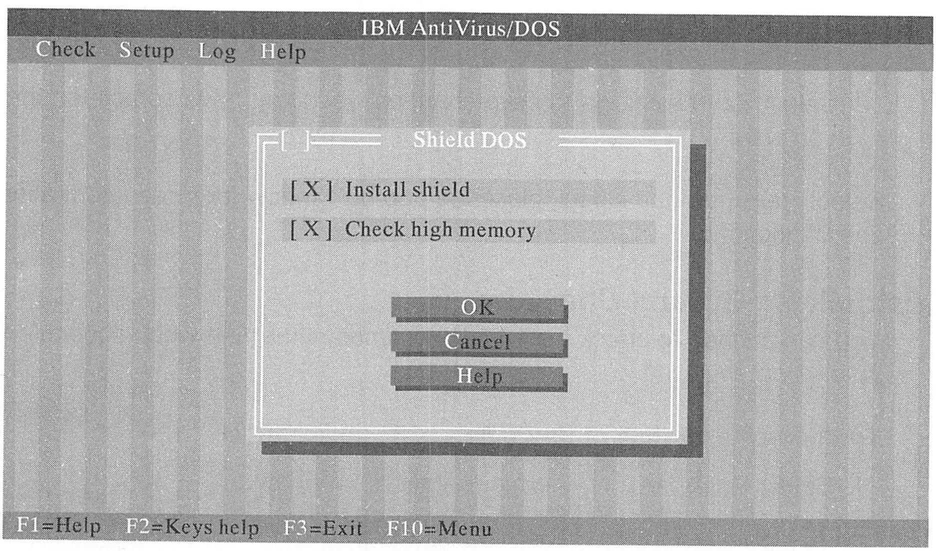


For Automated check to work, set it for any option except the **Never** option.

Select **Help** from the Automated check pop-up window for more information on specific options, such as **Advanced options**.

To customize Shield DOS:

1. From the Setup menu, select **Shield DOS**.



2. Check (or uncheck) the **Install shield** check box on the Shield DOS pop-up window and then select **OK**.

If you check **Install shield**, the shielding program will be loaded whenever DOS is started in the future and the DOS memory space is checked for resident viruses. Subsequently, the shielding program monitors for indications of activity from common DOS viruses. If viral activity is found, you will see a warning. The virus is not allowed to become active or to spread.

or

If you do not want to install Shield DOS, uncheck the check box on the Shield DOS pop-up window to prevent shielding from being installed when you run DOS.

3. Check (or uncheck) the **Check high memory** option and then select **OK**.

   Normally, IBM AntiVirus/DOS checks high memory (memory above the 640K DOS limit) for resident viruses. This check might cause problems on some systems, especially where hardware adapters are sensitive to having their memory space read. Refer to "Problems with Shield DOS" on page 311 for more information.

For more information on customizing Shield DOS, select **Help** from the Shield DOS pop-up window.

Customizing Diskette Checking

To customize the way diskette checking is done:

1. From the Check menu, select **Check diskettes.**

   The Check diskettes pop-up window lets you specify which drive to check and whether to check all files or only program files.

2. Select **Save settings** to save changes when you have completed the changes you want.

Select **Help** from the Check diskettes pop-up window for more information on specific options.

Customizing System Checking

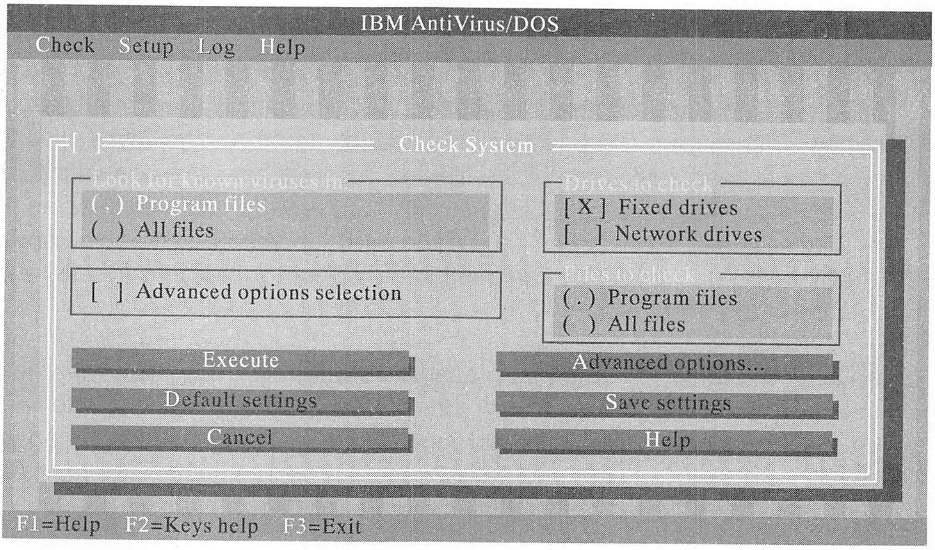
You can choose to check the system at times other than when scheduled for automated checking.

To check the system at any time:

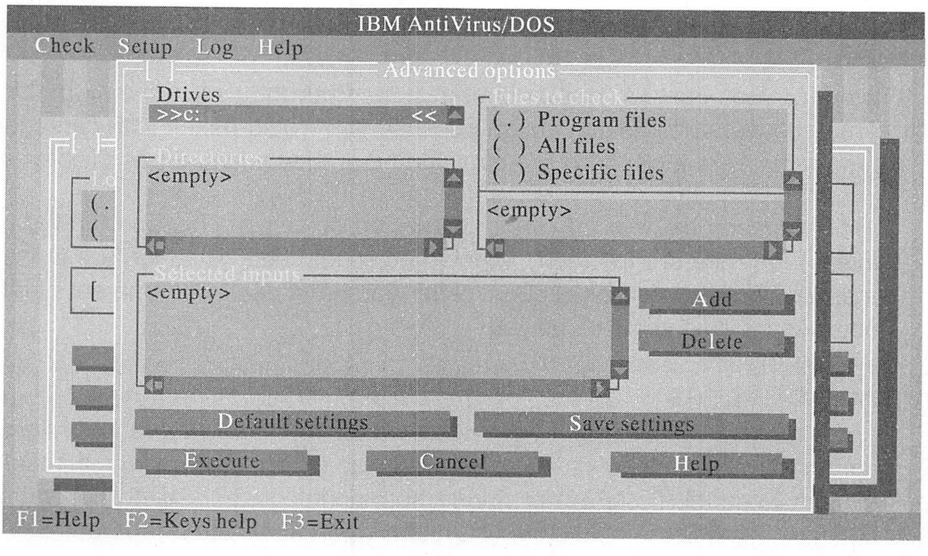
1. Select **Push here** on the main AntiVirus window.

   or

2. From the Check menu, select **Check system** to customize the way in which this checking is done.



The Check system pop-up window lets you specify which drives to check, what kinds of files to check, and whether to check new and changed files, or all files. Other combinations of disks, directories, and files can be checked by selecting **Advanced Options**.



3. Select **Save settings** to save any changes after resetting to the new options.

Select **Help** from the Check system pop-up window for more information on specific options.

Cleaning Up When a Virus Is Detected

When a virus is detected during a check of your system, you are given the opportunity to clean up any infected files or boot sectors that have been detected so far. Cleaning up a virus infection does not stop there, however. It is likely your check only examined some of the files on your system—those in which viruses are most likely to be detected. It is possible that the virus has also infected other parts of your system. If you only clean up the infection you have detected so far, the infection you did not detect can continue to spread within your system and perhaps to other systems as well.

Anytime a routine check turns up a virus, AntiVirus provides you with the opportunity to perform a thorough check of your entire system, and to let you clean up any viruses detected. This thorough check can take more time than your routine check, but it helps ensure you have thoroughly cleaned your system. Let AntiVirus complete this thorough check anytime you encounter a virus.

Infected Systems

When AntiVirus finds a virus on your system, the virus infection report presents you with choices on how to remove the virus. Viruses whose identity can be positively verified can usually be disinfected, restoring the infected files or boot sectors to their original, uninfected condition. AntiVirus is designed so that all common viruses can be reliably repaired this way.

Some viruses damage files or boot sectors when they infect them. In this case, AntiVirus does not disinfect them because you would be left with damaged programs afterwards. You are cautioned that they might not be disinfected.

AntiVirus can deal with hundreds of infected objects at one time. In the unlikely event that there are too many infected objects to deal with, you are presented with a series of virus infection reports. After you have dealt with one set of infected objects, the next set is displayed.

Infected Diskettes

The virus you detected on your system came from somewhere and might have spread beyond your system as well. If it was a boot sector virus, it infected your system when the system was started from an infected diskette. If it was a file-infecting virus, it infected your system when an infected program was executed or copied from a diskette or file server. In either case, the virus might have spread to the diskettes used in your system if your diskettes were not write protected.

After an infection is detected, it is very important to check for viruses on the diskettes that were used recently in the infected systems. If you do not, the virus might reinfect your system or might spread to other systems.

To check diskettes for viruses, see "Checking Diskettes" on page 295.

Infected Nearby Systems

When you share diskettes with other systems and use file servers on local area networks, infections can be passed between systems. The virus that infected your system might have come from one of these types of systems. It is very important to notify the users of these other systems and to make sure they also check their systems for viruses. You cannot eliminate this step in the antivirus procedure or else the virus will continue to be spread from their systems, reinfecting your system again, or continue to infect other systems.

If you find a virus on your own system and your system is connected to a file server, it is very important to check that file server thoroughly for viruses. If any viruses are detected on the server, all the client PCs that use that server must be checked as well.

Even if your system is not connected to a file server, nearby systems should be checked for viruses because you might have exchanged diskettes with them recently. This includes all the other systems in your office or laboratory, systems that belong to your friends, systems in your department or related departments, and systems belonging to people located near you.

Ideally, all these other systems also have AntiVirus installed on them. In this case, the users of these systems can have AntiVirus check their systems. If AntiVirus is not installed, you can use the AntiVirus stand-alone program to check them.

Uncommon Viruses

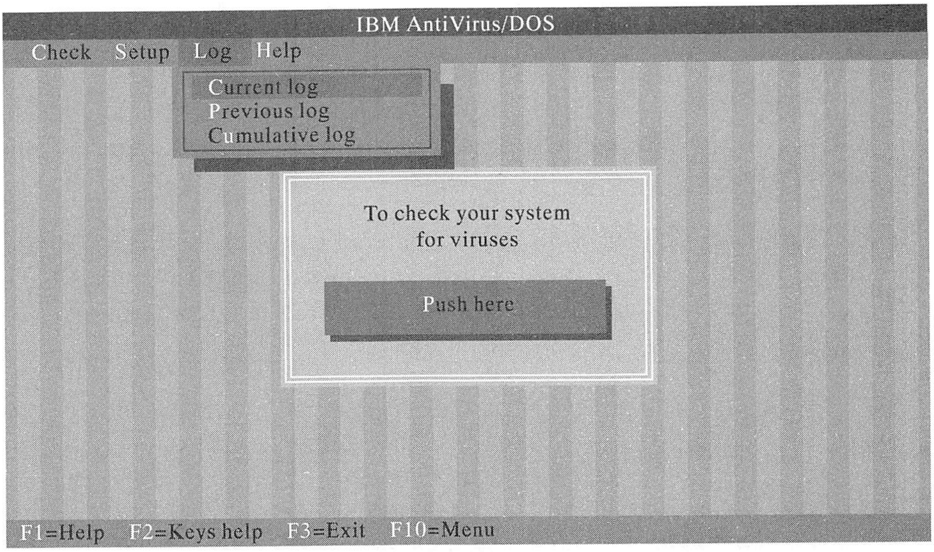
Although it is unlikely to happen, your system can be infected with a new or very uncommon virus that AntiVirus cannot positively verify.

Infected files or boot sectors that cannot be disinfected reliably, either because the virus could not be positively verified or because the virus damaged them, should be *erased/replaced*. AntiVirus overwrites and erases infected files so they cannot be restored accidentally.

Names of files you erase are written to the log, to help you in restoring them from backups if necessary. You can view any of these logs:

- Current log
- Previous log
- Cumulative log

Select the log you want to view from the **Log** menu.



Information about the current log, the previous log, and the cumulative log is stored in the files CURRENT.LOG, PREVIOUS.LOG, and the CUM.LOG, respectively, located in your \DOS directory. These are text files that can be printed directly to your printer.

Erasing/replacing the master boot record of a hard disk is required to replace it with a valid master boot record. This is almost always the right thing to do. The only exceptions are when the disk has an unusual master boot record, like those used by some DOS security products. In these cases, erasing/replacing the master boot record can leave the system in an unusable state. Contact the vendor of the security product for assistance before trying to remove an unverified virus from these systems.

System boot sectors infected with unverified viruses cannot be repaired automatically because their structure depends upon the operating system and version you are using, including Boot Manager boot sectors. In this case, use the DOS SYS command to replace an infected system boot sector. If you need information about the SYS command, refer to the *PC DOS Command Reference and Error Messages* manual, or type `help sys` for a brief explanation and command syntax.

Be sure you start your system from a write-protected DOS diskette that is the same version that your hard disk uses, that the diskette has been checked and is free of viruses, and that the diskette is write protected at all times. Start your system by turning off the power, inserting the DOS diskette in drive A and turning on the power. Do not use CTRL+ALT+DEL to start your system. Some viruses can remain active in your system if you use CTRL+ALT+DEL. Issue the SYS command to replace the system boot sector. Then restart and use AntiVirus to check your system for viruses once more, just in case.

Running the AntiVirus Stand-Alone Program

A system can be so corrupted by a virus that it is not possible to run the usual version of AntiVirus. In some cases, it can be so corrupted that it cannot even be started. In these situations, you should use the AntiVirus stand-alone program to clean up your system. This program can be run from:

- A .BAT file by adding command-line arguments.
- A diskette after starting your system from a virus-free DOS diskette. Write protect this diskette immediately to prevent it from becoming infected.

The AntiVirus stand-alone program is not intended to be used in place of the standard versions of AntiVirus. It does not have the features of automated operation, heuristic virus detection, or higher performance of the standard versions.

Make a separate emergency diskette by copying the AntiVirus stand-alone program files to a virus-free DOS diskette. Write protect this diskette immediately to prevent it from becoming infected. This AntiVirus stand-alone program can be used to check DOS and Windows systems if you have virus problems that do not allow you to access the IBM AntiVirus/DOS program on your system. The stand-alone program files consist of the following:

ADMIN.PRF Data file for profile information used to record settings in IBM AntiVirus/DOS. Do not change this file.

IBMAVSP.EXE The AntiVirus stand-alone program itself. It can be run directly from a DOS command prompt.

LOCAL.MSG A message that is displayed if a virus is detected.

VERV.VDB Data file used by the stand-alone program to verify the identity of viruses and disinfect them. Do not change this file.

VIRSIG.LST Data file used by the stand-alone program to scan for indications of viruses. Do not change this file.

If you create a batch file as discussed in "Running the Stand-Alone Program from a BATCH File" on page 307, place a copy of this batch file on the diskette also.

To run the AntiVirus stand-alone program:

1. Type the following from the drive A prompt:

   ```
   ibmavsp
   ```

2. When you use the AntiVirus stand-alone program, specify whether to check all local fixed drives for viruses or only selected drives. You can check diskettes by specifying their corresponding drives.
3. You are then asked if you want to check only files that usually contain programs, or all files on the drive. Because you already suspect that there are viruses on the system, you should check all files because viruses can infect files that are not normally thought of as program files.

When a virus is detected, you are given the opportunity to remove it.

If AntiVirus can determine that it is safe to disinfect the boot sector or file, you will be given the opportunity to do so. Otherwise, you are asked if you want to have the file erased or the boot sector replaced. Respond in one of three ways:

Yes To perform the operation on this file or boot sector.

No To skip this file or boot sector. It remains infected. It is important not to do this because the infection can continue to spread.

Go To perform the operation on this file or boot sector and perform it without asking about any others that are detected to be infected. Use this option if there are many infected files and you do not wish to respond to them individually.

Running the Stand-Alone Program from a BATCH File

You might prefer to run the AntiVirus stand-alone program interactively as outlined previously. However, because the stand-alone program is a utility that protects your system, incorporate this program into a batch file so that it monitors for viruses automatically.

If you use this stand-alone program in .BAT files, you are able to specify command-line options. For example, to scan all programs on all local hard drives and place the log into the file IBMASVP.LOG on drive C, you would type the following command:

```
c:\dos\ibmavsp * -programs -logc:\ibmavsp.log
```

This method of operation is useful in .BAT files and whenever user interaction is not desired.

For more information about the IBMAVSP command, refer to the *PC DOS Command Reference and Error Messages* manual, or type `IBMAVSP /?` for a brief explanation and command syntax.

Using the AntiVirus Stand-Alone Program on an Infected System

Starting from an infected diskette or hard disk can cause the virus to become active and to spread. Some viruses remain active even after restarting with CTRL+ALT+DEL.

To start an infected machine safely, follow this procedure:

1. Turn off the computer's power.
2. Insert a write-protected DOS diskette that has been checked and is free of viruses into drive A. Make sure the diskette is write protected or you might infect it accidentally.
3. Turn on the computer's power. Let it run from the diskette.
4. After the computer has started, type:

   ```
   ibmavsp
   ```

   at the command line to run the AntiVirus stand-alone program and check the system for viruses.

Systems that Use Resident Data Compression

Some systems use resident data compression software to allow them to store more data on the hard disks. This software operates by intercepting read and write to the disk, compressing data as it is written, and uncompressing it as it is read back. Although the data is stored in compressed form on the disk, most programs only see it in uncompressed form.

If you start from a diskette, you might not have the necessary software resident to access the compressed data correctly. In particular, the AntiVirus stand-alone program might not be able to correctly check or repair your disk if you have started such a system from a diskette.

In these cases, consult the product documentation for your data compression software to determine proper operation after starting from a diskette, or contact the data compression software vendor for assistance.

Systems that Use Security Software

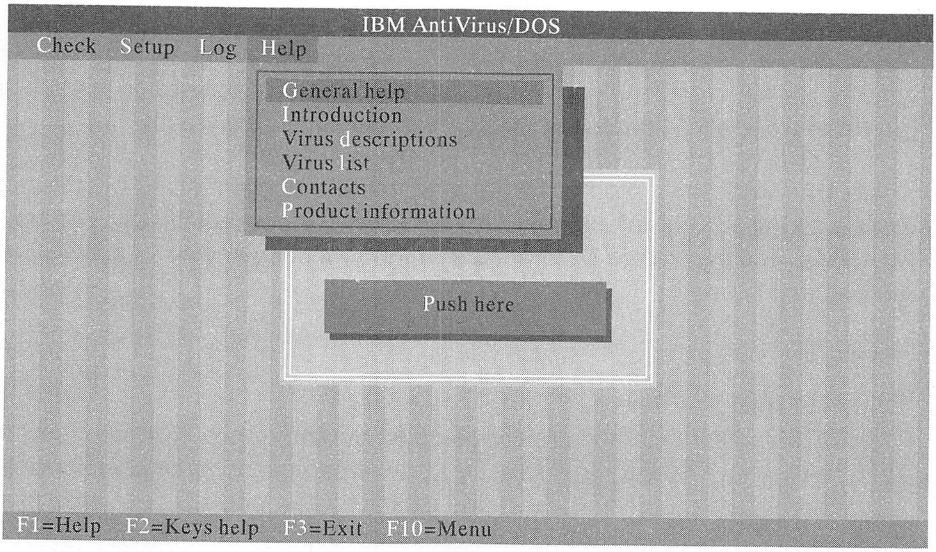
Some systems use security software that is designed to prevent unauthorized users from accessing individual files, disks, or the entire system. In some cases, this software modifies the hard disk so that it cannot be accessed without going through the security software. In particular, such disks might not be able to be accessed correctly when your system is started from a diskette. This can cause the AntiVirus stand-alone program to be unable to check or repair your disk if you started from a diskette.

In these cases, consult the product documentation for your security software to determine proper operation after starting from a diskette, or contact the security software vendor for assistance.

Troubleshooting

Every effort has been made to ensure that AntiVirus is compatible with your system. The following is a description of problems that can be encountered and how you can deal with them.

New viruses continue to be written and released. A small fraction of them become widespread problems. To deal with these new viruses most effectively, any antivirus software should be kept up to date. Refer to **Contacts** for more information on how to obtain updates to IBM AntiVirus/DOS.



Problem with the AntiVirus Program

When AntiVirus is loaded, it performs a self-integrity test and warns you if something has changed one of the AntiVirus programs. If you get this warning, it indicates that a virus is active or that some accident has corrupted the program.

Problems with DOS Systems

On DOS systems, you might get the message `Abnormal program termination` when first loading AntiVirus. This indicates that insufficient memory is available to run the program. Remove some of your resident programs and try again, add more memory to your system, or use the AntiVirus stand-alone program instead. This message can also occur if a virus has corrupted the AntiVirus program files.

Problems with Windows Systems

On systems using Windows 3.0 or later with SHARE installed, Windows locks some files and prevents them from being checked by the Windows portion of AntiVirus. If you want to check these files, exit from Windows and use the DOS portion of AntiVirus (IBMAVD).

On Windows systems, the Windows portion of AntiVirus (IBMAVW.EXE) is installed as a read-only file. This is to permit it to do a self-integrity check under Windows even if the SHARE program is loaded. If you need to delete IBMAVW.EXE for some reason, you will need to make this file read-write before doing so. You can do this with the ATTRIB command.

On Windows systems, you only can have one copy of AntiVirus open at a time. If you try to open a second session of AntiVirus, the second session will not start; you only can work with AntiVirus in the session that is already open.

While the Windows portion of AntiVirus correctly detects infected boot sectors, it is not always able to disinfect them. If your system has infected boot sectors, exit Windows, and invoke the DOS portion of the product by going to a DOS command prompt and typing:

```
ibmavd
```

Diskette Image Files

Viruses that infect boot sectors are detected by AntiVirus only in boot sectors, not in files. If you have a diskette-image file you want to check for viruses, create a diskette from the image and check the diskette. The only exceptions to this rule are the files BOOT.DOS and BOOT.OS2 that hold boot-sector images when you use the Dual Boot utility. If AntiVirus finds a virus that infects boot sectors in one of these files, it will warn you and offer to erase the file. Obtain a clean copy of the file from a similarly configured machine or from a service center before using the Dual Boot feature again.

Problems with Shield DOS

Normally, Shield DOS tries to install itself into expanded memory if it is available on your DOS system. If this causes problems on your system, edit the file IBMAVDR.BAT in the \DOS directory, and remove the **/x** switch from both lines that call IBMAVSH (the DOS shield program). This tells Shield DOS not to install itself in expanded memory.

Normally, the DOS shield in AntiVirus checks high memory (memory above the 640K DOS limit) for resident viruses. This causes problems on some systems, especially where adapters are sensitive to having their memory space read. A common symptom of this problem is that the adapter (often a communications adapter) does not function properly when the DOS shield is installed.

To fix problems with your hardware caused by the installation of the Shield DOS:

1. Uncheck the **Check high memory** check box on the Shield DOS pop-up window.
2. Select **OK** to save the settings.
3. Restart your system to let the new settings take effect.

Chapter 18. Using Central Point Backup

If you have ever experienced data loss, you know the value of backing up your data. Sudden power failures, software problems, mechanical failures, and user mistakes can all lead to the loss of valuable data. An up-to-date backup ensures that you can restore data quickly and resume working.

The Central Point Backup** program (Backup) provides protection against data loss by allowing you to make a backup copy of data. The options let you customize your backup using the following methods:

- **Full Backup:** Backs up all selected (highlighted) files. Because Full Backup is the default for Central Point Backup, you must *deselect* any files you do not want to back up.
- **Incremental Backup:** Backs up all files that have changed since the last full or incremental backup.
- **Differential Backup:** Backs up all files that have changed since the last full backup.
- **Unattended Backup:** Backs up your data to a tape, hard drive, or to a network volume at a time you specify.

After backing up, you can *compare and verify* data between your backup media and the source volume to ensure the backup is correct.

If you ever lose data because of a hardware failure or other problem, you can restore quickly and easily using Backup's *smart restore* capability.

The *network features* of Backup allow you to back up data to a network directory or to a SCSI device or QIC-02/36 tape device attached to a file server. If you are a network administrator, you can back up and restore the network data.

Installing Central Point Backup After Installing DOS

If you did not select Central Point Backup for DOS or Central Point Backup for Windows at initial installation, you can still install these optional tools by rerunning DOS Setup.

** Central Point Backup is a trademark of Central Point Software, Inc.

The DOS Setup diskettes contain everything you need to install Central Point Backup on your system. You might want to refer to the *PC DOS Installation Guide* before you begin the installation of the optional tools.

During Setup, DOS checks whether your computer has Windows 3.1 installed. If you do not have Windows 3.1 installed and want to use the optional tools provided with DOS for Windows, you should make sure you install in this order:

1. Install DOS as you normally would, selecting the optional tools you want from the list provided. You will not see any of the optional tools for Windows listed.
2. After you have installed DOS, install Windows 3.1 as you normally would.
3. Install DOS again using the **/e** switch after DOS and Windows have been installed.

To install Central Point Backup using the DOS Setup /e switch:

1. Insert diskette 1 of the DOS Setup diskettes into drive A or B.
2. At the DOS command prompt, type:

   ```
   a:setup /e
   ```

   or

   ```
   b:setup /e
   ```

   The **/e** switch allows you to return to the optional tools selection menu without having to do a complete reinstallation of DOS. At this point, only the necessary files for the optional tools are installed.
3. After Setup for DOS begins, follow the instructions displayed on the screen. Make sure you specify the same "Install to PATH" as you did when you did the initial DOS installation.

   At the Optional Tools screen, you will see `NO` next to Central Point Backup.
4. Press the UP ARROW or DOWN ARROW until you highlight Central Point Backup.

   You can also select any of the other optional tools, such as Central Point Backup for Windows, that you want to install by highlighting each tool and then pressing ENTER for each item.

   You now see `YES` next to all the optional tools you selected.
5. Move the cursor to highlight the following:

   ```
   The listed options are correct.
   ```
6. Press ENTER to accept the optional tool selections.

7. Continue following the instructions on the screen until the optional tools are installed.

Configuring Central Point Backup

The following procedure assumes you already have Central Point Backup installed on your computer by using the DOS Setup diskettes. See "Installing Central Point Backup After Installing DOS" on page 313 if the program is not installed. During configuration, the program guides you through the process and saves your choices in a file called CPBACKUP.CFG.

To start configuring Central Point Backup from the DOS command prompt:

Type `cpbackup` and press ENTER.

To start configuring Central Point Backup from DOS Shell:

If you are using a mouse, double-click on **Central Point Backup** in the Main program group. Or, if you are using a keyboard, press the TAB key until you highlight Main. Use the UP ARROW or DOWN ARROW to highlight Central Point Backup and then press ENTER.

To start configuring Central Point Backup for Windows:

You can start Central Point Backup for Windows by double-clicking on the Backup icon located in the IBM Tools program group.

Performing the Initial Confidence Test

The *first time* you use Backup, you must configure the program to work optimally with your system. The type of drives you want to use, the choice of media, and a backup test are all part of the configuration process.

Follow the instructions on the screen. During the confidence test, you must respond to:

- Define your equipment and choose a tape type.

  If you are backing up to a tape device connected to a network file server, a confidence test is not needed.

- Choose a drive and media.

  If you want to back up or restore using diskettes assigned to drive letters other than A or B and you do not have the CPBACKUP command in your AUTOEXEC.BAT file, you must use low speed. A confidence test is not required in that case.

If at any time you need help, press F1.

Backup tests your computer for the speed setting that gives you the best performance and reliability. This eliminates guessing whether your machine supports high-speed backups. Run this test on every computer, especially if you change the system environment in any way (such as adding or removing drives or using different media). That way, you can be sure that Backup always works with your current configuration.

To rerun the confidence test:

If you have difficulties with the confidence test during the initial configuration process and have since corrected the problem, you can run the test again by selecting choices from the Configure menu.

1. Select **Backup Speed** from the Configure menu.
2. Select **Test**.
3. Select **OK** when the test is complete.
4. Select **Save as Default** from the File menu to save the new information.

To skip the confidence test, select **Skip**. Backup sets the speed to High automatically.

Warning: Skipping the confidence test can result in unreliable backups.

Understanding the Results of the Confidence Test

Backup always tests your system at high speed first. If the test fails, it repeats automatically at medium speed. However, at times, some computers fail the high-speed test in such a way that prevents testing at medium speed.

To change the Backup Speed if your machine fails the high-speed setting:

1. Turn your machine off and then back on to reset the hardware.
2. Select **Backup Speed** from the Configure menu.
3. Select **Medium**.
4. Select **OK**.
5. Select several files to back up for the test.
6. Select **Start Backup**.

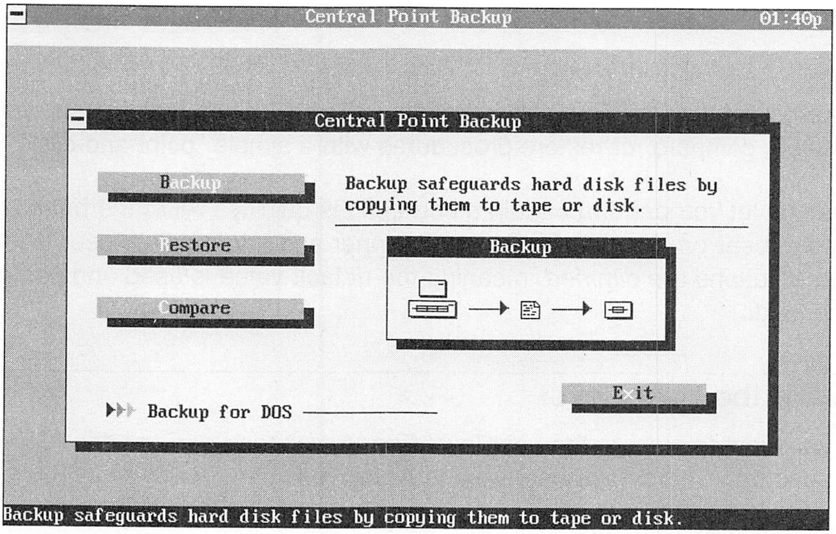
   When the test is complete, a pop-up window informs you of the results. The backup speed is set automatically to the fastest speed as determined by the test.
7. Select **Compare** when the backup is complete.

If all files compare, your computer can do safe, reliable backups at the chosen speed.

Note: The confidence test only checks the drive and media you selected. If you change the drive or media you use for backing up, test the new drive and media combination. Some systems can run at high speed with one type of media but might need to use medium or low speed with other media to be reliable.

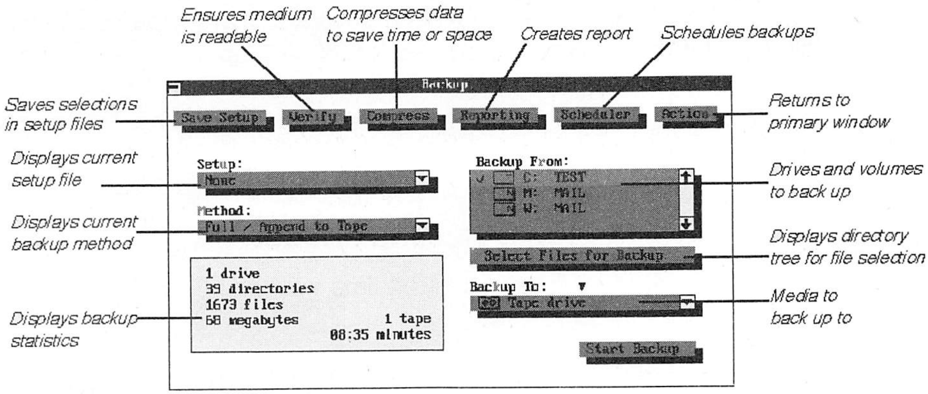
Viewing the Main Central Point Backup Window

After you have configured Backup, the next time you load Backup the main Backup window appears.



Central Point Backup has an extensive online help facility for your use. If at any time you need help, press F1.

When you select Backup, Restore, or Compare from the main Backup window, the following Express window appears:



Backup defaults to this Express Window. This *Express feature* simplifies your backup, compare, or restore procedures with a simple "point-and-click" interface.

Buttons let you perform certain menu options quickly. All of the button commands also appear on the menus. At the Beginner and Intermediate user levels, some of these buttons are *dimmed*, meaning the default value is used and cannot be changed.

Changing the User Level

If you want to change the user level from Advanced user, use the following procedure. The default user level is Advanced.

To change the user level:

1. Select **User Level** from the Configure menu.
2. Select the level you want.

Beginner:	If you are not concerned with options you are not familiar with or just want to do a backup as easily as possible, use the Beginner level. Central Point Backup automatically defaults to the options that reflect the highest degree of safety, security, and ease of use for the Beginner level.
Intermediate:	If you want to perform backups as quickly and easily as possible, but need additional control over file selection and backup methods, then use the Intermediate level.

Advanced: For maximum control over all aspects of your backup, use the Advanced level. If you are familiar with previous versions of Backup, use the Advanced level.

3. Select the check box to password-protect the user level so it cannot be changed without the proper password.

   An "X" appears, indicating that password protection is on.

4. Select **OK** to continue or **Cancel** to retain the current user level.

The following table shows the commands available in each level:

Menu Command	Beginner	Intermediate	Advanced
File menu			
Load Setup	X	X	X
Save Setup		X	X
Save Setup As		X	X
Save as Default	X	X	X
Print history	X	X	X
Exit	X	X	X
Action menu			
Start Backup	X	X	X
Backup From	X	X	X
Select Files...		X	X
Schedule Backups		X	X
Restore	X	X	X
Compare	X	X	X
Options menu			
Backup Method		X	X
Reporting	X	X	X
Compress			X
Data Encryption			X
Verify			X
Media Format			X
Format Always			X
Error Correction			X

Menu Command	Beginner	Intermediate	Advanced
Virus Detection			X
Save History			X
Overwrite Warning		X	X
Time Display			X
Selection Options		X	X
Display Options		X	X

The Configure, Tape Tools, and Help menus remain the same for all user levels.

Making a Backup

This section explains how to do a full backup of your hard drive using the *default settings* of Backup. If you are unfamiliar with backing up data see "Selecting Files" on page 323 first.

The following procedure assumes you have installed and configured Backup and are now ready to do a backup.

You can start Central Point Backup by:

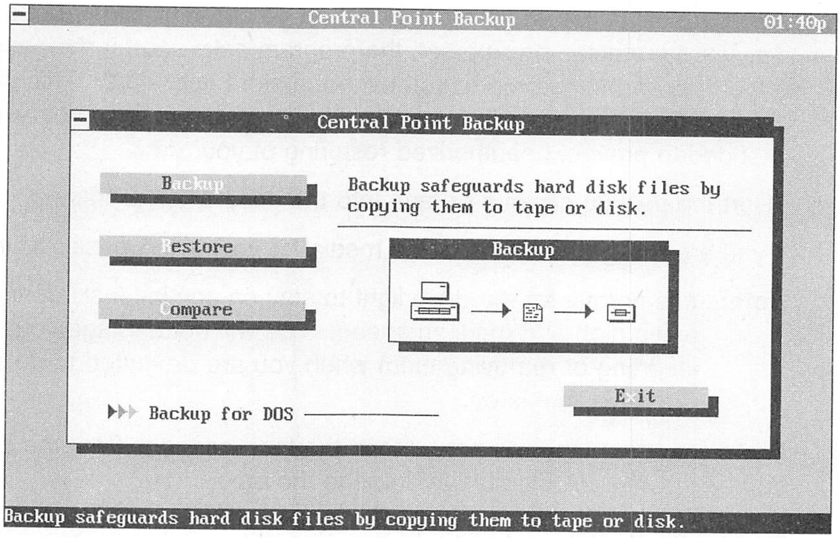
- Selecting Central Point Backup from the program area of DOS Shell. If you want to know more about DOS Shell, refer to the *Everyday DOS for PC DOS 6* manual.
- Typing a command at the DOS command prompt.

To start Central Point Backup:

1. From the DOS command prompt, type:

   ```
   cpbackup
   ```

2. Press ENTER and the main Backup window appears.



3. Select **Backup**.

Backing Up All Files

Backup performs a quick scan of each local hard drive when you select it. This scan identifies problems that could potentially interrupt the backup or cause data distortion.

1. Select a drive to back up in the **Backup From** list (also available as **Backup From** on the Action menu).

   By default, all files on a drive are selected, as indicated by a checkmark to the left of the drive icon. If you would rather not scan each drive when selected, you can turn off the scan by selecting **Drive Integrity** from the Configure menu.

   or

   Select specific directories and files to back up by choosing the **Select Files for Backup** button or double-clicking on the drive icon in the **Backup From** list.

2. Select a backup destination in the Backup To drop-down list box (also available as **Choose Drive and Media** from the Configure menu).
3. Select **Start Backup** (also available from the Action menu).
4. Type a descriptive name of up to 30 characters, press the TAB key, and type an optional password; then select **OK**.

   Describe your backups uniquely. This description is what appears in the History list, Select Directory, or Search History files pop-up window when you do a compare or restore, and it can help you remember the correct history file to use.

Warning: Remember your password. If you attempt to restore a password-protected backup set, the program asks you for the password. If you forget or lose the password, you cannot restore your data. This password is different than the user-level password. It is specific to each backup, and is intended to prevent unauthorized restoring of your data.

5. Insert the backup diskette or tape into the drive when prompted.

   If you are using diskettes or fixed media for your backup, skip ahead to step 6.

   Note: It is normal for the drive light to stay on continuously during a backup using high and medium speed. You will not damage your disks by inserting or removing them when you are prompted to do so, even when the drive light is on.

   If you are using tape, do not remove the tape cartridge from the drive when the tape is moving. Doing so can damage the tape.

   A list of all the backups made to this tape appears in the Tape Directory box. The list contains the descriptions entered at the beginning of each backup. The list also includes the date and time of the backup, the size of the files on the tape, and the original size of the files. These sizes can differ because of data compression and error correction code. Unless you are backing up to a tape device connected to a file server or using a local SCSI tape drive, skip ahead to step 6.

   Remote or SCSI Tape

   Only if you are backing up to a tape device connected to a file server or using a local SCSI tape drive will a list of all the backups made to this tape appear.

   - Choose either the OK button to append to the tape, the Erase button to overwrite the tape, or the Cancel button.

     Note: If you are sharing a SCSI tape with other users, or backing up to a network tape, select the **Catalog** button to scan the tape for all backup sets and update the tape directory on your hard disk. See "Synchronizing the Volume Tape Content (VTC) Files" on page 353 for details.

   - If you select **Erase**, you might be prompted to enter the tape password (if it is password-protected). This prompt for a password is a security measure to prevent deletion of other backups on that tape.

6. After the backup begins, press ESC any time you want to pause or cancel the backup.

   A pop-up window displays options to Resume, End, or Quit the backup.

Warning: If you are using a SCSI tape, quitting the backup results in an unusable tape. The data can be recovered from the tape, but the tape must be erased before future backups can be written to it. Use the End option instead of Quit so the proper end of data markers are written to the tape.

When the backup is complete, the backup statistics appear.

Perform a comparison at this point to be absolutely sure your backed-up data matches the original data exactly.

7. Select **Compare** to begin the comparison process.

   See "Comparing Data" on page 338 for further details.

Selecting Files

By default, Central Point Backup performs a full backup of your system. However, you can *deselect* files and directories.

To deselect files:

1. Select **Select Files for Backup** from the Backup window (or select **Select Files for Backup** from the Action menu).

   Note the number of files and directories selected at the bottom of the Directory and Files Lists window.

2. Highlight either a directory in the Directory Tree or a file in the Current Directory list.
3. Press ENTER and note how the number of directories or files decreases as you deselect items.

Or, you can use one of the following two ways of selecting files:

- Automatically with file filter commands.

  For information about file filter commands, refer to page 324.
- Manually from the tree.

  For information about the directory tree, refer to page 328.

By default, all files on a drive are selected, as indicated by a checkmark to the left of the drive icon. If you would rather not scan each drive when selected, you can turn off the scan by selecting **Drive Integrity** from the Configure menu.

or

Select specific directories and files to back up by choosing the **Select Files for Backup** button or double-clicking on the drive icon in the **Backup From** list.

After you make your selections, you can save the information in a setup file, saving time because you do not have to repeat selections every time you back up. You also have the flexibility of defining multiple setups with different selections.

Selecting Files Automatically

There are several options that affect selected files: the backup method, manual file selections, and the following automatic file selection filters, grouped under the command Selection Options from the Options menu. These file filter commands are:

- Manual subdirectory inclusion
- Include/exclude files
- Attribute exclusions
- Date range selection

Manual Subdirectory Inclusion

This command is on by default. This means any time you click a directory to select or deselect it (or press ENTER when the cursor is on it), all subdirectories are also selected or deselected.

Including and Excluding Files

Include/exclude files is a very powerful, yet flexible command. Choosing it displays a text window where you can enter the list of drives, directories, and files to include or exclude for a backup. The default is *.* (all files selected).

Backup processes the files on your drive by looking at the include/exclude list and then the backup method. Then it selects files to back up accordingly.

Because the include/exclude list allows over 100 specifications, this is the recommended way to back up because it works with all backup methods—full, differential, and incremental.

Warning: File specifications in the Include/Exclude list are ignored when you check the **Save File Selections** option in the Save Setup pop-up window. See "Knowing When to Use Automatic File Selection" on page 336.

To include and exclude files:

1. Select **Selection options ▸ Include/exclude files** from the Options menu.

   These are the guidelines for using the list:

   - Use up to 16 lines of specifications. Each line supports multiple specifications, which must be separated by a space, comma, or semi-colon. Each line can have a maximum of 64 characters. All 16 lines cannot contain more than 100 specifications total.

- If you have multiple drives selected to back up, you can enter different specifications for each drive.
- Check the Include Subdirectories box next to each line if you want to back up nested subdirectories contained in the specification. For example, if your \WORD directory contained subdirectories named \DATA and \LETTERS:

Specification	Include Subdirectories?	What is Backed Up
C:\WORD*.*	Yes	All files contained in \WORD, \WORD\DATA, and \WORD\LETTERS
C:\WORD*.*	No	Only files contained in \WORD

- For multiple drive backups, each entry must begin with the drive letter it applies to; otherwise, the entry applies globally (to all selected drives).
- You can use DOS wildcard characters (* and ?).
- To exclude files from a backup, begin the entry with a minus sign (–). For example, typing `-*.*` on the first line excludes ALL files, allowing you to select specific directories and files to back up.
- The list processes all specifications on a line before going to the next line.

2. Type the specific entries to include or exclude.

   The following table shows an example of what to type in the Include/Exclude Files pop-up window.

To:	Type This:
Include all files on all specified drives except all COM and EXE files.	*.* -*.COM -*.EXE
Log drive C and exclude all files in \TIFFS directory on drive C.	-C:\TIFFS*.*
Log drive D and include all .EXE files on drive D.	D:*.EXE
Log drive E and include all files on drive E.	E:*.*

   Warning: Do not enter mapped drive letters and server-volume names in the same include/exclude list. Errors can occur and drives might not be logged.

3. Select the **Check for Path existence and log drives** box to be sure each drive logs and contains valid paths.

When you select **OK**, each entry beginning with a drive letter is checked for validity and then selected.

4. Select **OK** to continue or **Clear List** if you want to start over with your selections.

   When you select **OK** in the text window, all entries process from top to bottom down the list. Only the selected directories and files are highlighted when you display the tree.

Root Directory Special Exception: Backup complies with the subdirectory inclusion indicator except in the following situations:

Specification	Include Subdirectories?	What is Backed Up
.	Yes or No	All directories and files are selected, regardless of the setting of the Include Subdirectories flag.
.	Yes or No	Only the files in the root directory are selected, regardless of the setting of the Include Subdirectories flag.
C:*.*	Yes or No	Only the files in the root directory are selected, regardless of the setting of the Include Subdirectories flag.

Attribute Exclusion

The Attribute exclusions command acts as a modifier to the Include/Exclude Files command. For example, when you select a directory to back up and **Exclude Hidden Files** is marked, no hidden files in that directory are backed up.

To exclude file attributes:

1. Select **Selection options ▸ Attribute exclusions** from the Options menu.
2. Select the attributes you want to exclude and select **OK**.

   Hidden Files: Hidden files (and directories) are usually a sign of copy-protection and can be position-sensitive on the hard disk. This means if you copy the files off the diskette and onto another diskette, they probably will not work because of the copy protection. In the event your hard disk crashes, you must reinstall the program from the original diskettes.

   System Files: These are your DOS system files for example, IBMBIO.COM. Because they are DOS system files, you probably do not need to back them up as they are also position-sensitive.

Tip: If you are backing up a drive prior to changing DOS versions, do not back up the DOS files. If you do, do not restore them.

Read-Only Files: Files you can open and use but not modify in any way.

Date Range Selection

Date Range Selection modifies the include/exclude entries by letting you select files by date. Files are selected if their dates are within the range set by the start and end dates you specify.

To set a date range:

1. Select **Selection options ▸ Date range selection** from the Options menu.
2. Select **On**.

   Date Range Selection is off by default.
3. Type the range of dates using double digits:

   `mm/dd/yy` or `mm/dd/yyyy`

   Backup uses the date format that is standard in your country. For example, the U.S. uses the format shown above. Enter the date as you would with the DOS DATE command.
4. Select **OK**.

Selecting Files Manually

If you are accustomed to displaying your hard drive's tree structure to select directories and files, you can pop up a directory tree from Express, or you can disable Express to use the tree exclusively.

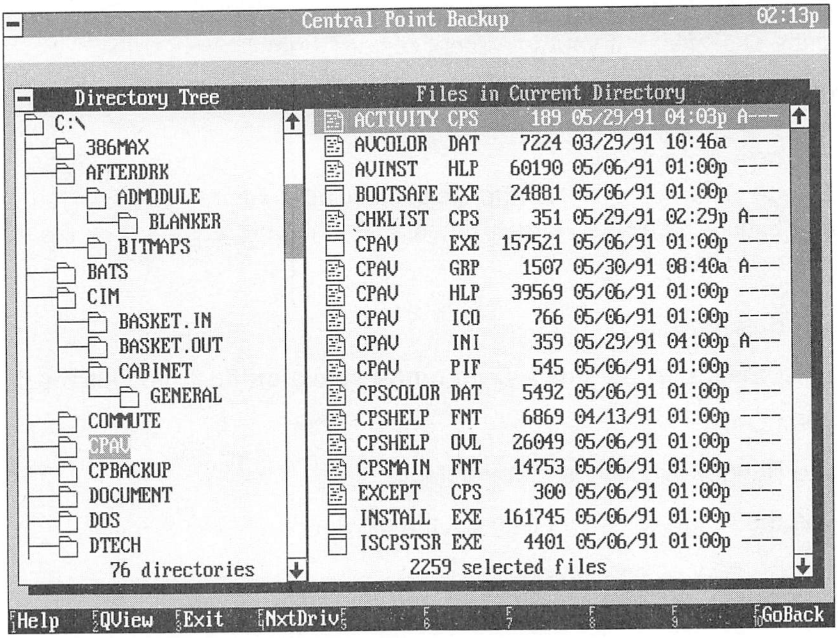
Note: Displaying the tree is not available at the Beginner user level.

The Tree List lets you select directories and files by clicking on each with the mouse, or using the TAB, ENTER, UP ARROW, DOWN ARROW, LEFT ARROW, and RIGHT ARROW to navigate around the tree and select files.

To display the Express Tree:

1. Double-click on the drive icon in the **Backup From** list box. (Or press ENTER when the highlight bar is on the drive.)

   or
2. Select **Select Files for Backup** from the Action menu or click the button.



When a directory is active in the Tree List, the files contained in that directory appear in the File List on the right. You can select or deselect individual files with the mouse by clicking, or with the keyboard.

3. Select the directories you want to back up with the mouse by clicking on them or by using the keyboard:
   - Use LEFT ARROW to move to the previous directory at the same level as the current directory.
   - Use RIGHT ARROW to move to the following directory at the same level as the current directory.
   - Scroll the lower-level directories with the UP ARROW and DOWN ARROW.
   - To deselect all files in the subdirectory, press ENTER. Note that the number of directories begins to diminish. Press ENTER again when the directory you want is highlighted to select all files in that directory.

The number of selected directories appears at the bottom of the Tree List and the number of selected files appears at the bottom of the File List if you are using the Express Interface.

Press ESC or F10 to return to the Express selection window.

Note: For monochrome users, a bullet appears to the left of each file that is selected.

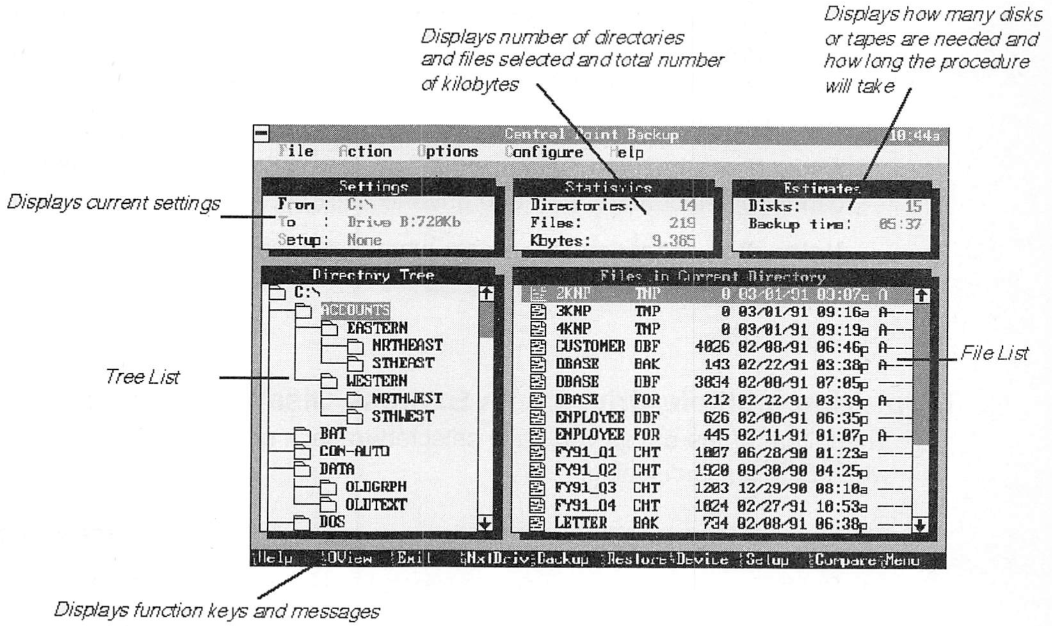
Disabling Express

The directory tree always appears when you turn off the Express interface. If you prefer, you can disable Express so the tree always appears.

To disable Express:

1. Select **Express Interface** from the Configure menu.

   The Tree List appears for the currently selected drive.



   The number of selected directories in the Tree List and the number of selected files in the File List appears at the top if you are not using the Express Interface.

2. Select **Save as Default** from the File menu. This makes the Tree and File Lists always visible for future sessions.

Selecting Drives to Back Up

Backup displays all the storage devices it finds (such as hard drives, network drives, and Bernoulli** drives) in the **Backup From** list. You can select multiple drives to back up at one time. A checkmark appears next to each selected drive in the **Backup From** list.

** Bernoulli is a trademark of Iomega Corp.

Selecting Local Drives

1. Select the drive or drives you want to back up in the **Backup From** list box.

   or

   Select **Backup From** from the Action menu.

2. Select the drive or drives to back up.

   When Express is disabled, additional options appear:

   Allow Single Drive Backups: When selected, all drive icons dim except for the currently selected drive. The path box appears so you can type a specific path (for example, E:\ACCOUNTS). The drive letter appears in the path box if you select the drive icon first.

   Allow Multiple Drive Backups: When selected, the path box disappears. You can then select more than one drive to back up.

   Note: You cannot specify a path when the drives are displayed as server volume names.

3. Select **OK**.

Displaying Multiple Drives with Express Disabled

The letters of the drives you have selected to back up appear in the Settings box when Express is disabled.

The currently selected drive's directories appear in the directory tree window.

- Press F4 or + on your numeric keypad to display the next drive.
- Press SHIFT+F4 or – on your numeric keypad to display the previous drive.

Note: You will only see the next drive displayed with F4 if you have more than one drive selected.

Multiple-Drive Backups

If your system consists of multiple drives, you might want to back up all of them during the same backup session. Backup processes each drive of a multiple-drive backup as separate backup sets.

For example, if you select drives C, D, and E to back up, Backup prompts you to insert diskette #1. After drive C is backed up and the history file is written, you are prompted again to insert diskette #1 of set #2 . *Do not insert diskette #1 of your just-completed backup. Use a new diskette.* This diskette becomes the first of the backup set for drive D. This process repeats for each drive of a multiple-drive backup.

Similarly, if you use tape, each drive creates a separate backup set on the tape.

Note: If you are using low speed, the Fixed or Removable Drive and Path options, and backing up multiple drives, each drive creates a subdirectory named *X*_DRIVE on the destination media (where *x*=drive letter) that contains the data for each drive.

Displaying Novell Network Drives

If you are connected to a Novell network, you can select how you want local and network volumes displayed in the **Backup From** list. Backup defaults to displaying drives by drive letters.

Many network volumes are mapped to a drive letter that is actually a specific path on a particular volume of a particular file server. For example, if you map drive G to the directory NOVELL\SYS:ACCTS\RECEIVE, you access that directory whenever you type `G:` at the DOS command prompt.

You can select to display the server and volume name instead of a drive letter. By referencing network servers by name, you avoid confusion if the network drive mappings change.

For example:

This Drive	Indicates
Drive C	Local DOS drive.
Drive G	[SYS:ACCTS\RECEIVE] Mapped drive.
NOVELL\SYS: ACCTS	Single volume on a network drive.

Note: Be careful when backing up and restoring files that appear as mapped drive letters. If the mappings change after the files are backed up, the files might not be restored.

To select to display the server and volume name instead of a drive letter:

1. Select **Novell Network ▸ File Selection** from the Configure menu.
2. Select from the following:

   Drive Letter: Displays logical drive letters, assigned by the NetWare Map command to a network volume.

   Server\Volume: Displays network drives as true network volumes, rather than as logical drive letters.

If you want to back up an entire volume on a server, select the **Server\Volume** option, or make sure that the drive mapping for the backup is mapped to the root of the volume. Backup allows up to 10 server volume drives in a setup file.

Viewing Files

Backup features viewers for many popular applications. The viewer automatically adjusts to display the correct file format (a spreadsheet display for spreadsheet files, for example). However, the viewer cannot let you edit the contents of the file.

Viewing a file can be especially useful if you have multiple files with the same names in different directories, or you cannot remember the contents of a file. Backup can view word-processing files; spreadsheet files; database files; graphics files, and binary files, which contain executable code.

To view specific files:

1. Select the file you want to view.
2. Press F2 (QView).

Function Key	What It Does
F1 Help Information	Displays help information.
F2 File Information	Displays information such as the name of the file, its size, and date.
SHIFT+F2 Database/ Spreadsheet Information	Displays the name, type, and length of each field or cell in the current file. Select a field or cells to move the highlight in the View window to that location.
F3 Exit	Closes the View window and returns to Backup.
SHIFT+F3 Wrap	Allows you to scroll the display of the pop-up window to the right.
SHIFT+F4 ASCII	Displays in ASCII format.
F5 GoTo	Lets you specify the line number you want to go to in the file you are viewing.
F6 Viewer	Displays a list of available viewers from which you can select a new viewer for the current file.
F7 Search	Searches the viewed file for specific characters.
SHIFT+F7 Search Again	Looks for the next occurrence of the search text.
F8 Unzoom/Zoom	Unzoom shrinks the View window to a smaller size. Zoom returns it to its previous size.

Function Key	What It Does
F9 Next file	Views the previous file (if any) in the directory of files being viewed.
F10 Previous file	Views the next file (if any) in the directory of files being viewed.
SHIFT+F10 About	Displays copyright information.

Working with Setup Files

Backup comes with several preconfigured setup files. One, named WEEKLY.SET, does a full backup of all files on the first hard drive of your computer system, which is usually drive C. Other preconfigured setup files include SPREAD.SET, which backs up Lotus 1-2-3**, Excel**, and Quattro** files on your first hard drive; and WORDPROC.SET, which backs up many word-processing documents from applications such as Microsoft Word**, WordPerfect**, Lotus Write/Ami**, and Lotus Ami Pro** The database set, DATABASE.SET, backs up files with extensions .DB, .DBF, .NDX, .IDX, .PX, and .DTF.

Select the setup file you want to use from the Setup Files drop-down list. You can modify the setup file to further customize it for your system and backup needs. If you make changes, select the **Save Setup** button to save the new information.

Follow steps 3 through 7 beginning in "Backing Up All Files" on page 321.

See "Working with Setup Files" for more information.

Setup files offer a way to save your selections for future use without having to go through repetitious configurations. You can load these setup files from the command line or from within Backup.

Note: You must have setup files to schedule unattended backups with the Scheduler.

** Lotus 1-2-3, Write/Ami, and Lotus Ami Pro are trademarks of Samna Corporation.

** Quattro is a trademark of Borland International, Inc.

** Microsoft is a trademark of Microsoft Corporation.

** WordPerfect is a trademark of WordPerfect Corporation.

** Excel is a trademark of Microsoft Corporation.

You can use setup files with all operations—backup, compare, and restore—to instantly configure Backup to the specifications contained in that setup file. This is especially important if you want to compare or restore a backup where you might not remember all the details about the setup you used at the time.

A setup file processes the files on your hard drive according to the criteria contained in that setup file. Although you can always see all files and directories on your hard drive when the Tree List is displayed, only the highlighted ones are used during a backup, compare, or restore.

The information contained in a setup file includes the settings for the following commands:

- Setup description
- Backup from (drives and directories)
- Back up to (media size)
- Server/volume or Drive Mappings display
- Backup speed (high, medium, or low)
- Backup method (full, incremental, differential, full copy, separate incremental, or virus scan)
- Reporting (on or off)
- All directory and file selections
- Attribute exclusions
- Date range selections
- Overwrite warning (on or off)
- Compression Display options
- Error correction (on or off)
- Data encryption (on or off, and the type)
- Formatting options
- Save history (on or off)
- Verification option
- Central Point Anti-Virus** detection (on or off)
- Exit when complete

Defining and Saving Setup Files

The Save Setup commands let you define and save multiple backup types and options.

Save Setup As: Saves the selections you make during a backup session with a specific file name and the .SET extension.

** Central Point Anti-Virus is a trademark of Central Point Software, Inc.

Save Setup: Saves all current settings without prompting you for a setup name (thus overwriting the current setup file).

Note: The Save Setup commands are not available at the Beginner user level.

If you save setup files with specific file selections, using the Save File Selections option, another file with an .IE*x* extension (where *x*=drive letter) is also saved with its parent .SET file. The .IE*x* file includes all directory and file selections, and there is one .IE*x* for each drive saved.

Backup allows up to 10 server\volumes in one setup file. The naming convention for these setup files is slightly different, depending on whether you log network drives as drive letters or server volumes. Network volumes logged as drive letters appear with an .IE*x* extension (where *x*=the drive letter). Network volumes logged as server volumes appear as .IE*a*, (where *a*=a number from 0 to 9). The server volume name is saved in the setup file itself.

Note: If you are backing up server\volumes to a QIC-format tape, be sure to turn on the Save History command. This ensures the name of the server\volume is saved with the backup information on your hard disk. Because of the QIC-format design, server\volume names cannot be saved on the tape itself.

Saving Setup Files

1. Select **Save Setup** (also available as **Save setup As** from the File menu).
2. Enter the name to use for this backup configuration.
3. Enter a description of this setup file, using up to 32 characters.
4. Select the **Save file selections** check box if you made specific file selections.

   Two options then become available:

   Save to include all future directories and files on drives: Automatically backs up any new directories or files you add anywhere on your hard disk.

   Save to exclude all future directories and files on drives: Prevents automatic backup of any new directories and files added to your hard disk.
5. Select **OK**.

Note: If you are using or plan to use the differential, incremental, or separate incremental backup method, use the Include/Exclude Files command to select the files you want to back up. See "Knowing When to Use Automatic File Selection" on page 336.

Loading Setup Files

Load Setup lets you select and load a previously saved backup configuration. If you have saved setup files from previous versions of Backup, you can load and use them with this command.

To load setup files:

1. Click on **Setup**.

   or

   Select **Load setup** from the File menu.

2. Select the setup file to use for this session, and select **OK**.

Using Preconfigured Setup Files

Backup includes several preconfigured setup files. One, named WEEKLY.SET, does a complete backup of all the files on the first hard drive of your computer system, which is usually drive C. Another file, DAILY.SET, backs up only those files that have changed since the last full backup.

The following table shows other preconfigured setup files:

Preset File Name	Files Backed Up	
DATABASE.SET	*.DB *.DBF *.NDX *.IDX	*.DTF *.RBF *.PX
SPREAD.SET	*.XL* *.WK*	*.CAL *.WQ*
WORDPROC.SET	*.DO* *.STY *.WP* *.WRI	*.JW *.SAM *.TXT

Use these setup files as a foundation to customize for your particular needs and system. Be sure to save any modifications you make.

Knowing When to Use Automatic File Selection

Backup processes the files on your drive by looking at the include/exclude list, and then the backup method. Then it selects files to back up accordingly.

File specifications in the Include/Exclude Files list are ignored when the Save File Selections option is on. You must use one option or the other in a specific setup file.

Include/Exclude Files

Because the include/exclude list allows over 100 specifications, this is the recommended way to back up because it works with all backup methods—full, differential, and incremental.

Use the include/exclude list until your list gets so specific that it hits the 100 specification limit, then use **Save File Selections**.

Save File Selections

If there are specific files that you always want to back up, regardless of the setting of the backup method, use **Save File Selections** in the Save Setup pop-up window.

Scheduling Backups

The **Scheduler** button and the Schedule Backups command use Central Point Scheduler, which is an application that lets you schedule backups without monitoring the procedure. Scheduler can also be used whenever you want to schedule any program to run automatically at a specified time. For example, you might want to run a program that has to be compiled. You can set up a batch file first and then schedule it to run automatically when you are not using your computer. This is especially useful for backing up to tape drives, removable cartridges, or to a network volume.

Note: The Schedule Backups command is not available at the Beginner user level.

Scheduler provides a 15-second warning before it runs the scheduled backup in case you are in the middle of an application that you do not want interrupted. When the backup is complete, Scheduler returns to the application you were running.

The memory-resident program, CPSCHED, must be resident in order to launch CPBACKUP at the scheduled time. You can arrange to have CPSCHED load each time you start your computer by placing this statement in your AUTOEXEC.BAT file. If you chose not to have CPSCHED automatically load when you installed CPBACKUP, you must load CPSCHED prior to any scheduled backups.

To load CPSCHED, from the DOS command prompt, type:

```
cpsched
```

For complete instructions on how to schedule events, such as scheduling a backup, see Chapter 13, “Using Central Point Scheduler” on page 227.

Unattended Backups

When you want the backup to run, be sure the computer is on, CPSCHED is loaded, and a tape is in the drive. Backup performs the backup at the specified time, and returns the machine to the state it was in prior to the backup.

Note: If the setup file used in the scheduled backup has a description, that description also becomes the description of that backup. Otherwise, the backup has the name "Unattended Backup."

- If Backup is launched from a batch file and the backup progresses without interruption, control is returned automatically to the batch file to execute the next command.
- If Backup is launched from the command line with a setup file or from Scheduler, then Express is automatically disabled to conserve memory. This means the directory tree and file list is always visible on screen. Any automatic backup (scheduled or run from the command line) answers the default button in any pop-up window that appears. At the beginning of tape backups, a pop-up window appears, showing the tape contents and offers options to **Append** or **Erase** the tape. For all backup methods, except **Full/Erase Tape**, the default button is **Append**, which is what happens in automatic tape backups.

Comparing Data

After performing a backup, compare your hard disk data with the data contained on your backup media. This comparison is an extra measure of security so that you are sure the data contained on your backup disks or tapes matches the files on your hard drive and is restorable.

Use Compare whenever you make changes to your hardware configuration or backup settings, or when you use new media.

Note: Backup automatically skips certain files during a comparison.

Comparing Your Backup to the Original Data

If you used a setup file when doing the backup, use the same setup file for the comparison, so all the settings are identical. You have the opportunity to start a comparison immediately after a backup is complete.

Compare saves a report of the comparison results automatically if you have turned on the Reporting command.

To compare your backup to the original data:

1. Select **Compare** from the main selection window (or **Compare** from the Action menu).
2. Select **History** and select the history file of the backup set containing the data you want to compare.

   or

   Highlight the history file you want, press the SPACEBAR to load the history file, and press ENTER to display the history tree.

   or

   Use the **Retrieve History** button if the history file you want to compare is not in the History list.

   Tip: Double-click on a drive icon in the **Compare To** list to display a text box and type a specific path to compare to, or press ENTER.
3. Select **Start Compare**.

   If you used a password when the backup was originally performed, you see a prompt to enter it now. Also, if you encrypted the data, you are prompted for the decryption key. For online help about Data Encryption, select this item from the Options menu and then press F1 for online help.
4. Insert the *first* diskette or tape of your backup set. Continue to insert diskettes or tapes as prompted.

   At the conclusion of the comparison, the results are displayed.

Displaying the Compared Files

If some of your files do not match, it is easy to see which ones they are. The icons next to each mismatched file indicate why the file did not compare. (See the symbol table that follows.)

To display the compared files:

Double-click the history file you just compared.

or

Press the TAB key until you get to the History list and then press ENTER.

Note: Windows updates certain files every time you exit from Windows. Therefore, if you back up with the Windows version of Backup, exit from Windows, and then use either version to compare the backup. Some of the backed-up files from your Windows directory will never compare with the original files on the hard disk. These files include most of the .GRP files, and some .INI files, including PROGMAN.INI.

Compare Symbols: The symbol next to each file icon indicates how that file compared with the original file.

Symbol	What it Means
=	The backup file was identical to the hard disk file.
x	The backup file did not match the hard disk file, although the date and time stamps matched.

The following symbols can appear (in addition to the above symbols) if you are doing a comparison at a time other than immediately after a backup

Symbol	What it Means
<	The backup file did not match the hard disk file, and the date/time stamp was older.
>	The backup file did not match the hard disk file, and the date/time stamp was newer.
s	The backup file matched the hard disk file, but the date/time stamp was different.
-	The backup file was missing from the hard disk.

No symbol next to a file means that the file has not been compared (for example, if you are not comparing all files on your hard disk).

Restoring Data

Backup can restore an entire hard disk or specifically selected files and directories. You can restore files that were backed up on one machine to a different machine, or restore files to a previous state.

Note: The Overwrite Warnings command is on by default at all user levels. However, if you turned it off during a backup, turn it on for a restore so you are notified if any files on the hard disk will be overwritten by older versions of the same files in the backup set.

All the restore functions available in Express are also available when Express is disabled. For each command button of Express, there is a corresponding menu command on the Action menu when in Restore mode. To perform a restore or search a history file, select the appropriate command from the Action menu. To retrieve, rebuild, or print a history file, select **Choose directories** from the Action menu.

Full Restore

If you have experienced a hard disk crash and need to reformat, you must install DOS and Backup again before you can start your restore. If you need to, you can refer to the *PC DOS Installation Guide* for instructions on how to install DOS.

If you are restoring multiple drives, you must restore each drive individually. If you are restoring network volumes, see "Performing Network Backups" on page 343.

Notes:

1. It is important to restore your files using the same speed as the original backup. For example, if you backed up your files using low speed, you must restore your files at that speed.
2. If you are accustomed to using a mouse, reinstall your mouse drivers before running Backup.

To perform a full restore of your system:

1. From the DOS command prompt, type:

   ```
   cpbackup
   ```

   and then press ENTER.

   Because this is the first time you are using Backup after installing it on your hard disk, you must configure it again.
2. Select **Restore** after configuration.
3. Select **Retrieve History**.

   or

   If Express is disabled, select **Choose Directories** from the Action menu.
4. When prompted, insert the last diskette or the requested tape of the backup set.

   The history file is read from the backup and the history name and backup date appear in the History drop-down list.

   Tip: To select the restore destination, double-click a drive icon in the **Restore To** list box to display a text box. Then, type a specific path to restore to, or press ENTER.
5. Select **Start Restore**.
6. When prompted, insert the first diskette or tape of your backup set.

   The progress of the restore process appears on the screen.
7. Continue to insert disks or tapes until the restore is complete.

Note: It is normal for the drive light to stay on continuously while restoring at high and medium speed. You will not damage your disks by inserting or removing them when you are prompted to do so, even when the drive light is on.

Overwrite Warning: If this warning is on, a pop-up window appears when the directory containing your newly restored Backup files is detected. Select **Skip this file** and **Repeat for all Later Files** to avoid overwriting the files.

Be especially careful if you are restoring a backup that might contain an older version of DOS than what is currently on your hard drive.

If you are restoring a directory with attributes that are different than the existing directory, an overwrite warning appears.

If your backup method is incremental, you only need to do a single restore because all incremental backups are appended automatically to the parent full backup, and only the most current files are selected to restore.

Printing a Directory from a History File

Use the Print History command from the File menu to print the directory of a backup set to a disk file or to a printer.

If you send the directory to a file, you can view the directory when the File List is displayed in Backup mode, or you can use the View command at the DOS command prompt. The file is named HST.RPT.

To print a directory from a history file:

1. Select the history file you want to print from the History list.
2. Select **Print History**.

Performing Network Backups

Central Point Backup allows you to back up files between your personal workstation, Local Area Networks (LANs), and networks such as Novell NetWare.

Backing Up the Local Area Network

If you are connected to a Local Area Network and have write access to the LAN, you can back up your workstation files to the LAN drives (if backups are permitted).

Or, you can back up LAN drives the same way you back up your own workstation drives, by specifying the full path of the LAN drive.

Before you back up files from a specified path, make sure that the Express Interface is disabled and there are no Novell Network Server/Volumes designated. If the pop-up box does not provide a path, select **Allow Single Drive Backups** because you cannot specify a path with a multiple drive backup.

Backing Up Workstation Data

This section explains how a workstation user can back up the data on his or her local hard drive to a directory on the network, or to a tape device connected to the server.

The following procedure assumes you have already configured to back up to a remote device. If you have not done so, see "Configuring to Use a File Server Tape Device" on page 345.

To back up to a file server tape device:

1. Select the files to back up, and set any other options you want.
2. Select **Save Setup** to save your settings and file selections for future use.
3. Select **Start Backup**.

If you select **Full Backup/Erase Tape**, enter the password for the tape.

This is a safety measure so no one else's data is erased. The same message appears if you try to erase the tape using the commands on the Tape Tools menu.

If Backup determines the tape is empty, you are still prompted for a password, but then you become the "owner" of that tape. You can erase that tape because you know the password. Others can only append to the tape.

You can back up the data from your workstation to a specific network directory. Each user must back up to a unique path, otherwise each subsequent backup overwrites the previous backup.

To back up to a network directory:

1. Create a subdirectory named FULL on the network and do a full backup, either weekly or monthly, to that directory. This subdirectory should be a subdirectory of your \HOME directory.
2. Create two subdirectories named DAILY1 and DAILY2 on the same volume.

   Alternate daily differential or separate incremental backups to the two DAILY directories.

By creating the three directories, you avoid the problem of overwriting the three files that Backup writes that contain your data and information about the backup. These three files are:

- CPBACKUP.001, which contains your backed-up data.
- CPBACKUP.DIR, which contains the directory of the backed up data.
- CPBACKUP.INF, which contains boot record information.

Note: Normal network security is in effect during a backup. This means each user must have rights to read from and write to the drive and directory specified.

3. Select the data you want to back up.
4. Click the **Backup To** drop-down list and select **Fixed Drive**.

   or

   Select **Choose Drive and Media** from the Configure menu and then select **Fixed Drive and Path**.
5. Enter the path as a destination, and select **OK**.

   To enter a server\volume name, turn on the Server\Volume option in the File Selection pop-up window, which is under **Novell Network** from the Configure menu.
6. Select **Save Setup** to save the settings for future use.
7. Select **Start Backup**.

Tip: You can use the Scheduler command to schedule a backup of your data to the network after you go home for the day. See "Scheduling Backups" on page 337.

Backing up Novell Networks

Backup can back up data to a network directory or to a SCSI device or QIC-02/36 tape device attached to the server. You can display server\volumes by name or as drive letters mapped to specific paths.

As a network supervisor, you can back up and restore the network data.

Configuring to Use a File Server Tape Device

If your personal computer is on a network that is running server-based software, you can back up to a tape drive that is connected to the network server. If you are running Backup for the first time, the following pop-up window appears automatically. If you have already configured the program for use with another device, select **Define Equipment** from the Configure menu.

To configure to back up to a tape drive that is connected to the network server:

1. Select **Remote**.
2. Select the server you want to access from the list and select **OK**.

   Only the servers that are actually running the server-based software appear in this box. Also, the list of servers can change, based upon the availability of the servers.
3. Select the tape device you want to use.

   You can select only one device from the list.
4. Select **OK**.

   A pop-up window asks you to remove the tape from the drive. In many cases, this is impossible to do because your server can be inaccessible to you, or the tape can be in use by someone else. In any case, select **OK** to continue.
5. Select **Save as Default** from the File menu to save the configuration information.

Tape Drive Information

Backup supports a variety of tape drives, ranging from those that connect to a floppy controller card to multiple-gigabyte SCSI drives. The most common type of tape drive for single-user PCs is the mini-cartridge drive, which encompasses the QIC standard as well as proprietary formats. Mini-cartridges are quarter-inch tapes, generally known as DC-2000, and can hold up to 250 megabytes of compressed data.

Many drives that are sold as 120MB or 250MB capacity actually are referring to the capacity of the tape when data compression is used. How much the data is compressed depends a great deal on the data itself.

Floppy or Secondary Controller Card and QIC Drives

Backup is compatible with the following tape drives:

Aiwa 80MB
Alloy 120
Alloy Retriever 40/60
Alloy Retriever 60e
Alloy Retriever 125c
Alloy Retriever 250c
ArchiveXL 80 Model 5580 Internal
Archive 5540 (1991 model)
ArchiveXLe 5580e External
Backtrax 80MB
CMS Tape 40/INT
CMS T2120AT
Colorado DJ-10 (Jumbo 120)
Colorado DJ-20 (Jumbo 250)
Colorado KE-10 External 40MB
Colorado KE-15 External 40MB
Colorado KE-15 External 80MB
Compaq**
Internal 40MB Tape
Compaq Internal 80MB Tape
IBM PS/2 Internal Tape Backup Unit
Identity 120
Identity 120e
Identity 80i
Iomega** Tape 250MB
Irwin 485 (external 80MB)
Irwin 745 (external 40MB)
Irwin 785 (external 80MB)
Irwin Accutrac A120
Irwin Accutrac A250
Irwin DC 2000 Series: Model 2040 (40MB)
Irwin DC 2000 Series: Model 2080 (80MB)
Irwin SXe 120 and 250
Irwin SX 5540 and 5580
Mountain Filesafe TD-4000
Mountain Filesafe TD-8000
Mountain 4400
Procomm 80MB
Summit Express SE 120
Summit Express SE 250
Tallgrass FS120
Tallgrass FS300
Tallgrass TG1140
Tallgrass Filesafe Series 80
Tecmar MiniVault 120i
Tecmar MiniVault 120e
Tecmar MiniVault 250i
Tecmar MiniVault 250e
Irwin 445 (external 40MB)
Tecmar QT-40e
Tecmar QT-40i
Tecmar QT-80e
Tecmar QT-80
Wangtek 3040
Wangtek 3080
Wangtek FAD 3500 Internal 40MB
Well-Tech (Colorado drive for Toshiba** T5200)

Note: If you use a tape drive that is connected to your high-speed floppy controller card, you cannot access the floppy drives during the tape backup.

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Certain tape drives only work with specific-density controller cards. A drive requiring a high-density floppy controller card normally found on AT-class machines will not work on an XT-class machine with a low-density floppy controller card. However, that same drive might work on an XT if a secondary high-speed controller card is used for the drive. Be sure you know the type of controller card your system has and if the tape drive you want to use is compatible with it.

Note: Both 80MB Irwin and QIC-80 drives can read, but not write, a 40MB formatted tape. Neither 40MB Irwin nor QIC-40 can read or write 80MB formatted tapes. Irwin drives can read only Irwin tapes (except for the SX series), as Irwin uses a servo-technique that is not compatible with other tape drives.

SCSI Tape Drives

Backup is compatible with the following SCSI tape drives:

Archive Python DAT (1.3GB)
Archive Viper 2060 (60MB)
Archive Viper 2150 (150MB)
Archive Viper 2525 (525MB)
Archive Viper 5250 (250MB)
Cipher ST150 (150MB)
Compaq 320/525 (525MB)
Exabyte 8200C (2.5GB)
Exabyte EXB-8500 (5GB)
Exabyte EXB-8200SX (2.5GB)
Exabyte EXB-8200 (2.5GB)
Hewlett Packard C1502A DAT (1.2GB)
Hewlett Packard C2224 DAT (1.2GB)
Maynard** 250Q (250MB)
Maynard 525Q (525MB)
Maynard 1300+ (1.2GB)
Maynard 2200+ (2.2GB)
Mountain 2100 (2.2GB)
Mountain 7150 (150MB)
Mountain 7250 (250MB)
Mountain 7500 (500MB)
Mountain 1200 (1.2GB)
NCR** 6100 (150MB)
NCR 6300 (525MB)
NCR 2101 (2.2GB)
Tandberg 3600 (150MB)
Teac MT-01 (250MB)
Tecmar THS-2200 (2.2GB)
Tecmar ProLine 250 (250MB)
Tecmar ProLine 525 (525MB)
Tecmar ProLine Data Vault (1.2GB)
WangDAT 1300 (1.3GB)
WangDAT 3100 (1.3GB)
WangDAT 3200 (1.3GB)
Wangtek 5099ES (60MB)
Wangtek 5150 (150MB)
Wangtek 5150ES (150MB)
Wangtek 5525ES (525MB)
Wangtek 7200HS (2.2GB)

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Tape Formatting (non-SCSI)

Formatting a tape is a process that is required only once; however, it is a good idea to purchase preformatted and certified tape cartridges. This is not only more convenient for you, but also saves time during a backup. Backup can format a tape during a backup, if necessary, but the time involved is considerable. Use **Format** on the Tape Tools menu to format a tape before you use it.

Note: Most SCSI tapes are already formatted when you purchase them; however Backup can format a SCSI tape as necessary.

Every tape must have two things done to it before it is ready to use:

- **Formatted (initialized):** Formatting lays out data tracks and maps them for the read/write mechanism. This process is very similar to formatting a diskette. Formatting a tape is not the same as erasing a tape. Erasing deletes data from the tape; formatting lays out the data tracks that the data is stored on.
- **Certified:** Verifies the tape by checking for bad blocks and locking them out (similar to DOS locking out bad sectors on a diskette). This is done last.

An Irwin-formatted tape has one additional process done to it before it is formatted and certified:

Servo-written: Writes permanent information to the tape. This information is precisely placed along the track so the tape drive's read/write mechanism is guided along the proper data tracks. This is usually a one-time-only procedure. If a tape ever needs to be servo-written again, bulk-erase the tape first.

The following table shows the approximate time it takes to fully format various non-SCSI tapes. The third and fifth columns refer to special tapes that can be formatted to greater capacity. These tapes are marked "XL," which means they have extra length. If you buy a 40MB tape marked XL, you can format it to hold 60MB of data. Similarly, if you buy an 80MB XL tape, you can format it to hold 120MB of data.

Procedure	**40MB non-SCSI tape**	**40MB XL non-SCSI tape**	**80MB non-SCSI tape**	**80MB XL non-SCSI tape**
Servo-written (Irwin only)	36 min	54 min	51 min	76 min
Formatted	18 min	27 min	33 min	50 min
Certified	18 min	27 min	33 min	49 min
Totals:	36 min	54 min	66 min	99 min
Totals with servo-write:	72 min	108 min	117 min	175 min

These times are based on a 500 Kbps (kilobits per second) data rate that a high-density diskette controller uses, such as those found in AT-class machines. All times should be doubled if done at the 250 Kbps rate used by low-density diskette controllers, such as those found in XT-class machines. All times should be halved if using a high-speed 1000 Kbps controller card.

If you insert a blank tape, Backup first rewinds the tape and attempts to read the tape header. If that is unsuccessful, the tape is retensioned and you have the opportunity to format the tape, insert a new tape, or cancel.

QIC Format and Full-Screen Backup Format

Backup supports the standard QIC-40/80 format for tapes and the proprietary Full-Screen Backup format. There are some differences between the Full-Screen Backup format and QIC, which are summarized in the following table.

QIC	Full-Screen Backup
Freely interchangeable with other QIC format backup programs.	Proprietary format can only be restored with Backup
Writes directory information at the beginning of the backup set.	Writes directory information at the end of the backup.
Supports all backup methods but incremental because of placement of directory.	Supports all backup methods.
Might have to insert every tape of a multiple-tape backup to restore a single file.	Only needs the specific tape of a multiple-tape backup to restore a single file.
If the first tape (where directory is stored) of a multiple-tape backup is lost, no data is recovered from any of the remaining tapes (even if a history file exists on the hard disk). You cannot restore any data contained on tapes beyond the missing tape. (Example: If tape #3 of a six-tape backup is lost, only the data on tapes 1 and 2 can be restored.)	If last tape (where directory is stored) of a multiple-tape backup is lost, but the history is on the hard disk, all data up to the missing last tape is recovered. As long as a directory exists (on tape or hard disk), all data is recovered except what was contained on the missing tape.

There is no significant performance increase of one format over the other, and both formats use about the same amount of space on the tape (all things being equal such as method and compression).

After a tape is formatted as QIC, it does not need to be reformatted as Full-Screen Backup because the low-level formatting is identical. There is one exception to this—non-SX Irwin tape drives. These drives use special servo-writing (described previously) which is not QIC-compatible. The Irwin SX series of tape drives is QIC-compatible.

* Micro Channel is a trademark of IBM Corporation.

Be aware that using encryption on a backup set written to a QIC tape makes that backup set unrestorable by other QIC-compatible backup programs.

Note: If you are backing up server\volumes to a QIC-format tape, be sure the Save History command is on. This ensures the name of the server\volume is saved with the backup information on your hard disk. Because of the way QIC format was designed, server\volume names cannot be saved on the tape itself.

Tape Controller Card Technical Information

Backup supports various manufacturers' floppy and tape controller cards. In many cases, the card is recognized and used with no information required from you. However, some cards require special parameters to be set the first time you use Backup so the card is recognized for future backups. This is saved in the default configuration file. This section details the various cards that require this special information.

Adapter cards connect between the primary diskette controller and the diskette and tape drives. Backup automatically detects the following cards when you select **Search** with the Define Equipment command.

- Archive XL20A
- Colorado AB-10
- Irwin 4251

Secondary Tape Controller Cards Supported (Micro Channel): It is not necessary to specify any address information for these cards:

- Irwin 4100MC
- Mountain MACH2 (Micro Channel*)
- Tecmar MCA Floppy Tape Controller

Secondary Tape Controller Cards Supported (ISA): The following tape controller cards, which are Industry Standard Architecture (ISA) must have the I/O port address, IRQ channel, and the DMA channel specified.

Tape Drive	ADDR	IRQ	DMA
Alloy FTFA Controller	340	3	2
Colorado FC-10	180	3	2
Colorado TC-15	180	3	2
Compaq Expansion Chassis #1075-70-001	370	6	2
Iomega IHA-10p	370	3	1
Irwin 4100	370	3	2
Mountain File Safe 8500	130	E	0
Mountain MACH2	3E7	5	3
Summit Accelerator	3E7	5	3
Summit SE 305	130	E	0
Tecmar QT	300	3	1
Wangtek Lightning Thunderbolt	300	3	1

The addresses listed are the factory settings of the cards. If you have altered these settings in any way, you must specify the values you have set so Backup can recognize the card.

You can specify settings by entering the correct values in the Tape Configuration pop-up window, which you access with the Define Equipment command.

Synchronizing the Volume Tape Content (VTC) Files

During the SCSI configuration of Backup, a pop-up window appears.

The options that appear in this pop-up window can vary, depending on the type of SCSI adapter card you have.

A *.VTC (volume tape catalog) file is written to your hard disk after the backup process for each SCSI tape used, and is subsequently updated after each backup.

When the Resync Volume Table before each Backup option is on, which is the default setting, the *.VTC file on your hard disk is updated with the *.VTC file on the tape before the tape directory appears on your screen. This process is time-consuming because the tape must be rewound and searched for the last *.VTC file.

If you use a tape for a single PC, and you are the only one using that tape, you can safely turn off the Resync Volume Table before each Backup option because your *.VTC files are always identical. Turning off this option saves time by not having to rewind the tape and search for the last *.VTC file.

However, if multiple users are backing up to the same tape, it is essential that the Resync Volume Table before each Backup option is on. This ensures that the *.VTC file on each user's hard disk always displays the actual directory of the tape.

If there is any doubt about the contents of a SCSI tape, select the **Catalog** button in the Tape Directory pop-up window, which automatically compares and updates the VTC files.

Backup Strategies

Backing up your data depends in good measure on how frequently that data changes. Consider the following questions:

- How valuable are my files to me or my business?
- How many of my files change on a daily basis?
- How long would it take to replace those files if something happened to them?

Backup offers several methods of backing up your data, depending on drive, media, and speed. Each method is explained in "Backup Methods" on page 358.

Diskette Backup Strategy

Make and use setup files for different backup methods, or use the WEEKLY and DAILY setup files that came with Backup. Use at least two sets of backup disks so that you are never overwriting your last backup with the current backup.

Using a Preconfigured Setup File

Backup ships with a preconfigured setup file (WEEKLY) that is set to back up all files on your first hard drive (usually C) and another one called DAILY that backs up only the changed files since the last full backup.

To back up only changed files on a weekly basis:

1. Start Backup on Friday by typing:

   ```
   cpbackup weekly
   ```

2. Begin your backup using the first set of diskettes.
3. Label each diskette with its backup sequence number, name, and set number.

   For example, `#1, Friday backup, Set A`. The next diskette would be `#2, Friday backup, Set A`, and so on.
4. Start Backup on Monday through Thursday by typing:

   ```
   cpbackup daily
   ```

   When prompted, insert the last diskette of your backup set (if doing an incremental backup). For example, if you used 25 disks for your Friday backup, you would insert diskette #25 of backup set A. When prompted, insert additional diskettes as needed.
5. Label each diskette with its proper sequence number (#26 of Set A, #27 of Set A, and so on).

Each day, you back up and append the changed files to the Friday full backup set. By the end of Thursday's daily backup, you might have several disks beyond the original 25 you used on Friday.

Conversely, if you do a differential backup, you are prompted to insert a new diskette each day. If the need to restore ever arises, you restore the full backup and the last differential diskette.

To back up on even-numbered weeks starting on Friday:

Repeat the above steps, using the second set of diskettes. Be sure to label these as Set B.

Using Different Backup Methods

For many people, a monthly full backup is sufficient, coupled with daily backups of the changed files. Use one of the following methods, depending on your particular needs, every day:

- Do a daily differential backup to diskettes. Alternate between two sets of disks for safety. When the sets use more than six diskettes, do another full backup. The differential method does not save multiple daily versions of the changed files. It only saves the latest versions.
- Do a separate incremental backup on Monday (which starts a new backup set), followed by daily incremental backups to diskettes. This keeps daily versions of the files that change but creates less backup sets than using separate incremental exclusively.

Tape Backup Strategies

A tremendous advantage to using a tape drive for your backup is its ability to totally automate your backups. A simple strategy is to use at least two tapes so you are never writing over your last backup with the current backup.

To back up using the two-tape strategy:

1. Schedule a weekly full backup using the WEEKLY setup file and Tape #1.
2. Schedule a daily backup using the DAILY setup file and Tape #1.
3. Use Tape #2 the second week, and continue alternating tapes each week.

Another popular backup strategy, referred to as "Grandfather, Father, Son," uses 10 tapes and gives you a complete backup of 12 weeks' data.

To back up using the ten-tape strategy:

1. Label the tapes as follows:

1 - Monday	6 - 2nd Friday
2 - Tuesday	7 - 3rd Friday
3 - Wednesday	8 - 1st Month
4 - Thursday	9 - 2nd Month
5 - 1st Friday	10 - 3rd Month

2. Use tape 5 on the first Friday and back up your entire system.

3. On the following Monday, use tape 1, labeled Monday, to do a separate incremental or differential backup of the changed files. Repeat this every weekday using the appropriately labeled tape.
4. On the second Friday, use tape 6 (2nd Friday) for another full backup, and repeat the Monday through Thursday backups, using the corresponding tapes (you will overwrite these tapes).
5. Repeat step 4 for week 3, using tape 7 (3rd Friday).
6. Repeat step 4 for week 4, and use tape 8 (1st Month) on the fourth Friday.
7. Repeat steps 2 through 6, using tape 9 (2nd Month) on the fourth Friday of the second month, and tape 10 (3rd Month) on the fourth Friday of the third month.

In subsequent months, recycle the three "Month" tapes, always overwriting the oldest tape.

To back up using the combined diskettes and tapes strategy:

Do full backups to tape, with subsequent differential or separate incremental backups to diskettes. This saves the expense of purchasing a lot of tapes (as in the above strategy).

Use this method if you are backing up to a removable cartridge, such as a Bernoulli or SyQuest drive, or to a directory on a network.

To back up using the removable media or network backup strategy:

1. Create a subdirectory named FULL on the network or cartridge and do a full backup, either weekly or monthly, to it.
2. Create two subdirectories named DAILY1 and DAILY2 on the same drive.

   Alternate daily differential backups to the two DAILY directories.

By creating the three subdirectories, you avoid the problem of overwriting the three files that Backup writes that contain your data and information about the backup. These three files are:

- CPBACKUP.001, which contains your backed-up data.
- CPBACKUP.DIR, which contains the directory of the backed up data.
- CPBACKUP.INF, which contains boot record information.

Backup Methods

This information is provided for those who would like to know the different ways to back up data, how to use each method, and why you would want to use it. The Archive Bit Backup can detect what files have changed between backups by the status of the archive bit. The archive bit is a special status bit that is contained in the directory entry for every file on your hard disk. This bit determines if a file has changed since the last backup. When you change or create a file, DOS sets the archive bit. Backup uses the archive bit as an indicator of whether a file has been added or changed since the last backup. The method you choose to back up your files determines how Backup uses the archive bit.

To see which files in a tree have their archive bit set, select **Display Options ▸ Long Format**, and then display the tree. You can see the "A" attribute for every file that has it set.

The following table explains each backup method and the effect each has on the archive bit of a backed-up file:

Backup Method	How it Backs Up Your Hard Disk
Full	Selects all files specified by Selection Options, regardless of the setting of the archive bit. A full backup is the default setting. A full backup clears the archive bit after the backup is finished. This marks each file as being backed up.
Full Copy	The same as a full backup except that it does not change the archive bits. All files are backed up and their corresponding archive bits remain in the same state they were in prior to the backup.

The next two options are available only if you have your drive and media set to a tape drive.

Backup Method	How it Backs Up Your Hard Disk
Full/Erase Tape	This is a full backup to tape, starting the backup at the beginning of the tape, regardless of any previous backups that might be on it.
Full/Append to Tape	This is a full backup to tape, starting a new backup immediately after the last backup on the tape.

Note: Start with a full backup to set the archive bits before using any of the following three methods.

Backup Method	How it Backs Up Your Hard Disk
Incremental	Selects only files specified by Selection Options that have their archive bits set. A history file of all backed-up files is stored on the backup media. An incremental backup writes the new backup data to the end of a previous backup (usually a full) and then merges the history file of the incremental with that of the full backup, making one backup set and history file. Multiple incremental backups are appended to a full backup. After backing up the new or changed files, it clears the archive bit.
Separate Incremental	Selects the same files as incremental, but does not append to a previous backup. It maintains its own history file within each backup set. After backing up the new or changed files, it clears the archive bit. Each separate incremental backup starts on a new diskette and overwrites any data on the diskette. When making multiple-drive incremental backups to a tape, you must use the separate incremental method.
Differential	Selects the same files as incremental, but the archive bits for the files it backs up remain in the same state they were in prior to the backup. Each differential backup starts on a new disk. You can also reuse previous differential disks, which overwrites any data on the disk.

The following section discusses the advantages and disadvantages of each backup method, giving an example of how each method works.

Full Backup

Advantages: This method is safest because everything is backed up. If your hard disk experiences a problem after your backup, then restoring all or some of the files, as well as the entire directory structure, from a full backup is easy. A full backup is contained in one set of disks or tapes.

Disadvantages: Doing full backups exclusively can be time consuming and use many disks or tapes.

Example:

Day	**Files Changed**	**Files Backed Up**
Friday	A B C D	A B C D
Monday	A B	A B C D
Tuesday	A B C	A B C D

In the above example, the letters represent files that are backed up and demonstrate how they get backed up into different backup sets.

Full Copy Backup

Advantages: You can back up files from a write-protected device, such as a CD-ROM drive or network drives. You can make multiple backups for off-site storage. You can back up a hard disk that is experiencing problems without writing to it. When you are having hard disk problems, writing to it can cause even worse problems to happen. You can make a "copy" of the hard drive at the office to take home to "restore" on your home computer without affecting the archive bits for future incremental or differential backups.

Disadvantages: Subsequent incremental, separate incremental, or differential backups are redundant if based on a full copy backup. The reason is that some of the same files are backed up because the archive bits were not set.

Example:

Day	**Files Changed**	**Files Backed Up**
Friday	A B C D	A B C D
Monday	A B	A B C D
Tuesday	A B C	A B C D

The following methods are partial backups that only back up changed or new files since the last full or incremental backup. Each handles the backup disks or tapes in different ways.

Incremental Backup

Advantages: This form of backup provides a daily version of your files by appending the changed files to the full backup. In the event of a restore, all the files needed to restore your system to the point of your last backup are in one backup set of disks or tapes. You can also restore just one day's version of your files. This method is usually much faster than doing a full backup every day.

Disadvantages: If you change large files daily, you have multiple copies of that file on your disks or tapes, which takes up space. If you make multiple-drive full backups to one tape, you cannot do incremental backups to that same tape (only to the last backup on the tape, and the tape must be in CPS-format).

Example:

Day	Files Changed	Files Backed Up
Friday	A B C D	A B C D
Monday	A B	A B
Tuesday	B D	B D

In the above example, there are three versions of file B in the backup set.

Separate Incremental Backup

Advantages: This is the same process as the incremental backup described previously. However, a separate incremental backup does not append itself to the parent full backup. You can lock the full backup disks or tapes away for safe-keeping, and use different disks or tapes for daily backups of changed files using the separate incremental method. If you are using tape, you can make multiple full and separate incremental backups to the same tape.

Disadvantages: Having multiple sets of disks or tapes with daily changes can lead to confusion or lost disks. Each separate incremental backup requires a separate diskette or set of diskettes. If you have to rebuild your hard disk, each separate incremental backup must be restored in reverse order, followed by the full backup.

Example:

Day	Files Changed	Files Backed Up
Friday	A B C D	A B C D
Monday	A B	A B
Tuesday	A B C	A B C

In the previous example, there are three versions of files A and B on three different sets of disks.

Differential Backup

Advantages: If you are working with large files that change frequently, then a differential backup saves media by allowing you to use the same disks or tapes over and over for the daily backup. In the event that you need to restore your hard disk, you would restore your latest differential set first, and then the full backup. As soon as you complete a new differential backup, the older differentials are no longer needed and can be reused.

Disadvantages: You do not have daily versions of files if you are using the same disks for backing up every day and the disks are likely to wear out faster as they are used more often. If you are using tapes and doing unattended differential backups, you end up backing up the same data multiple times, because each differential backup is appended to the tape. Do not use a tape for unattended differential backups for this reason.

Example:

Day	Files Changed	Files Backed Up
Friday	A D	A D
Monday	B	A B D
Tuesday	A B C	A B C D

Note: Never mix the partial backup methods you use after a full backup unless you are very sure of what you are doing. If you start with the incremental method, then continue to use that until your next full backup. The same is true for using the differential method because one method clears the archive bit and the other leaves it alone.

The following table summarizes each backup method and what it does:

Backup Method	Changed files only	Resets archive bit	Selected files	Creates new set	Appends to a previous backup
Full		X	X	X	
Full Copy			X	X	
Incremental	X	X			X
Separate Incremental	X	X		X	
Differential	X			X	

The CPBDIR Program

The CPBDIR program determines the number of disks and the correct order of a high- or medium-speed diskette backup (very helpful if you forgot to label the disks in their proper order) as well as information about how the backup was made.

Note: Use the DOS DIR command on low-speed disks to find out the diskette number and date of backup. There will be two files on the diskette:

- CPBACKUP.INF
- CPBACKUP.*nnn* where *nnn* is the diskette number of the set.

There will also be a CPBxxx.DIR on the last diskette of the set (this is the history file).

CPBDIR is a stand-alone application that you run by typing the following at the DOS command prompt. If you want to read a backup diskette from a different drive, type:

```
cpbdir d:
```

where *d* is the drive letter of the drive where the backup diskette is inserted.

You must put a colon after the drive letter.

CPBDIR then displays information from the backup diskette, such as the disk number of the backup set, media used, formatting, speed used, and if a directory exists on the diskette. CPBDIR recognizes the following parameters:

d Is the drive the backup diskettes are in.

/x Shows an extended list of information about the backup disk.

Chapter 19. Using PenDOS

PenDOS** lets you use pen-based applications as well as standard mouse-based DOS applications on any 386** or higher computer. Computing has never been easier because you can write, draw, and issue commands using two skills you learned as a child: pointing and using a pen.

PenDOS lets you use the mouse as a pen. You do not need any other special equipment to try pen computing. To get you started, PenDOS lets you use the mouse as a pen. For instructions, see "Using the Mouse as a Pen" on page 368.

Using a pen tablet computer or externally attached digitizer tablet, you can write naturally because PenDOS includes CIC's Handwriter** Recognition System. To introduce you to pen computing, this version of Handwriter recognizes numbers and symbols only. A full version of Handwriter that recognizes uppercase and lowercase letters, numbers, punctuation marks, and symbols is available separately from IBM.

Installing PenDOS after Installing DOS

If you did not choose to use pen-based applications at initial setup, you can still install PenDOS by rerunning DOS Setup using the **/e** switch.

The DOS Setup diskettes contain everything you need to install PenDOS. You might want to refer to the *PC DOS Installation Guide* before you begin the installation of optional tools.

To install PenDOS using the DOS Setup /e switch:

1. Insert diskette 1 of the DOS Setup diskettes into drive A or B.
2. At the DOS command prompt, type:

   ```
   a:setup /e
   ```

   or

   ```
   b:setup /e
   ```

** PenDOS is a trademark of Communication Intelligence Corporation.

** 386 is a trademark of Intel Corporation.

** Handwriter is a trademark of Communication Intelligence Corporation.

The **/e** switch allows you to return to the optional tools selection menu without having to do a complete reinstallation. At this point, only the necessary files for the optional tools for Windows will be installed.

3. After Setup for DOS begins, follow the instructions displayed on the screen. Make sure you specify the same "Install to PATH" as you did when you did the initial DOS installation.

   At the Optional Tools screen, there is a `NO` next to PenDOS.

4. Press the UP ARROW and DOWN ARROW until you highlight PenDOS.

5. Press ENTER.

   You now see a selection of pen and mouse tablet drivers. Look for the name of the tablet or pen computer you will use with PenDOS and select one of the following:

   - Your computer's tablet driver if you have a pen tablet computer with a self-contained digitizer.
   - The proper tablet driver for your digitizer if you have an externally attached digitizer.
   - The Digitizing Pad Emulation via Mouse tablet driver if you will be using your mouse as a pen.

   Use the arrow keys to scroll up or down until your selection is highlighted, and then press ENTER.

   When you return to the optional tools selection menu, you now see `YES` next to PenDOS.

6. Select any other optional tool you want to add at this time by highlighting an optional tool and pressing ENTER. Repeat this step for each optional tool.

   You now see `YES` next to the optional tools you want to install.

7. Move the cursor to highlight the following:

   ```
   The listed options are correct.
   ```

8. Press ENTER to accept the optional tool selections.

9. Continue following the instructions on the screen until the optional tools are installed.

10. After your computer reboots, you need to edit your CONFIG.SYS file and add the following lines if they are not present:

    ```
    device=c:\dos\emm386.exe ram
    device=c:\dos\system\pendev.sys
    ```

11. Press CTRL + ALT + DEL to make this change effective and restart your computer.

Starting PenDOS

Before starting PenDOS, it is important to make sure you have the proper hardware installed and the correct tablet driver selected. If you have a pen tablet computer with a self-contained digitizer, you should have chosen that computer's tablet driver during DOS Setup. Refer to "Installing PenDOS after Installing DOS" on page 365 for details.

If you have an externally attached digitizer, be sure the digitizer is connected to the proper communication port on your computer. Refer to the digitizer manufacturer's instructions for the proper installation procedure. You should have also selected the proper tablet driver for your digitizer during DOS Setup. If you will be using your mouse as your pointing device, select the Digitizing Pad Emulation via Mouse tablet driver during DOS Setup.

The DOS Setup program modifies your CONFIG.SYS file by adding the appropriate device statement when you select PenDOS as an optional tool and then select a tablet or mouse device.

If you do not want to modify your AUTOEXEC.BAT to have PenDOS start automatically whenever you start your computer, you can type the PENDOS command at the DOS command prompt each time you want to use this program.

To start PenDOS:

1. Type the following at the DOS command prompt:

```
pendos
```

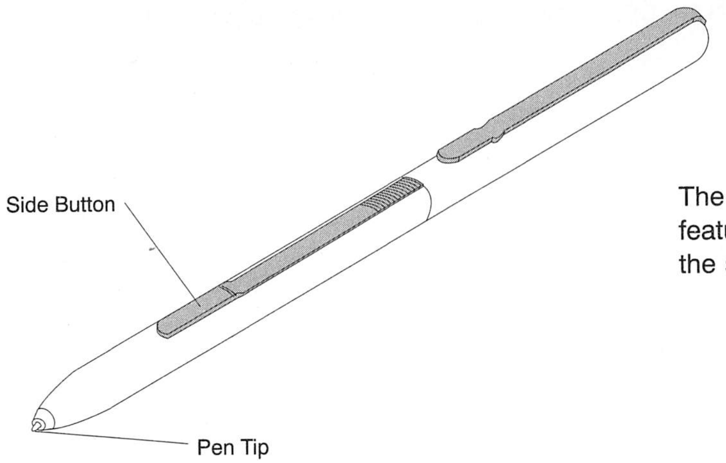
2. Press ENTER.

Using the Pen

With PenDOS, you use the pen to write, edit, draw, select text or objects, and issue commands such as saving or closing a file.

Hold the pen the same way you hold an ordinary pen or pencil.

- Rest your hand and forearm on the writing surface as you would when you write on a piece of paper.
- Press the pen tip lightly against the writing surface.



The pen has two important features: the pen tip and the side button.

- **Pen Tip:** You press the pen tip on the writing surface to write in the Writing Window, make gestures, select text and objects, choose menu commands, and tap the on-screen buttons.
- **Side Button (some pen models):** You hold down the side button with the pen close to the writing surface to display the PenDOS menu. You also hold down the side button while you make editing gestures, such as delete or insert.

  If your pen does not have a side button, tapping the extreme upper-right corner of the writing surface is equivalent to holding down the side button.

Using the Mouse as a Pen

If you have a pen tablet computer or an externally attached digitizer tablet and pen, you will not need to use your mouse as a pen. Simply install the correct tablet driver for your hardware as explained in "Starting PenDOS" on page 367.

To use the mouse as a pen, use the Digitizing Pad Emulation via Mouse tablet driver by selecting it during DOS Setup.

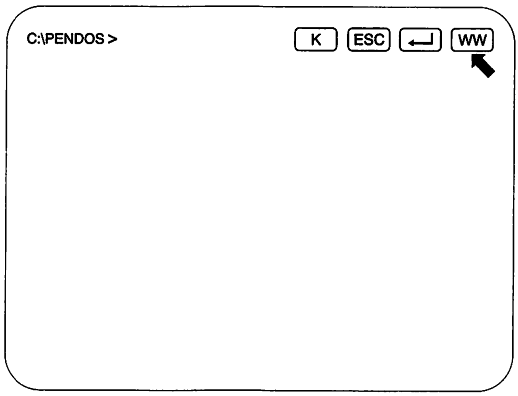
If you do not have a statement about MOUSE.COM in the DOS AUTOEXEC.BAT file, then before you start PenDOS, type `mouse` on the DOS command prompt to load MOUSE.COM.

Then, when you move the mouse in PenDOS, the special "arrow" cursor displays the location of the pen tip. To write characters, hold down the left mouse button while you move the mouse. Use the right mouse button as the pen's side button. To write gestures, hold down both buttons simultaneously.

Using the PenDOS Menu

The PenDOS menu contains buttons you can tap to display the Writing Window and the PenDOS keyboard, as well as to send ESC and ENTER to an application.

To display the PenDOS menu: press the pen tip lightly against the writing surface while holding down the side button. The PenDOS menu appears in the upper-right corner of the screen.



The PenDOS menu buttons perform the following actions:

Button	What it does
K	Displays a keyboard, used for entering all characters, including non-printable characters such as CTRL, ALT, SHIFT, and function keys.
ESC	Acts like the ESC key on a keyboard.
↵	Acts like the ENTER key on a keyboard.
WW	Displays the Writing Window.

Entering Characters

There are two ways to enter characters with PenDOS: writing in the Writing Window and tapping keys on the PenDOS keyboard.

Using the Writing Window

The Writing Window provides a pop-up window in which you can enter and edit characters, and then send them to the DOS command line or to an application. In this version of PenDOS, only numbers and symbols are recognized.

To display the Writing Window:

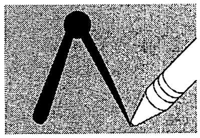
You can:

1. Press the pen tip lightly against the writing surface while holding down the side button.

   The PenDOS menu appears.

2. Tap the WW button on the PenDOS menu.

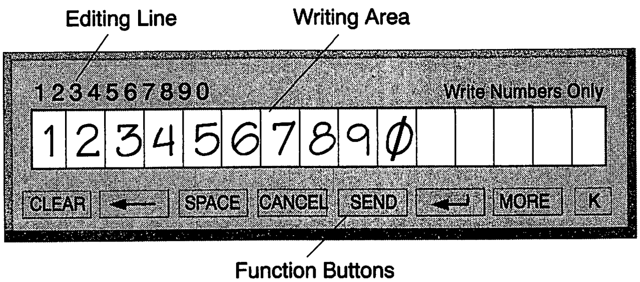
Or, you can:



- Write the Insert gesture anywhere on the writing surface.

For information about gestures, see "Editing Characters" on page 374.

The Writing Window appears:



The Writing Window has three important areas:

- The *editing line* displays the characters that were entered.
- The *writing area* contains a row of boxes. Write one number or symbol in each box.
- The *function buttons* let you edit the characters you wrote as well as send them to an application. You can also display the PenDOS keyboard by tapping the K button.

Button	What it does
CLEAR	Clears all characters in the Writing Window.
←	Deletes the last character before the cursor in the editing line, like the BACKSPACE key on a keyboard.
SPACE	Inserts a space character at the editing line cursor.
CANCEL	Closes the Writing Window without sending any characters to the application.
SEND	Sends characters to the application, closes the Writing Window, and returns to the application.
↵	Works like SEND, but it also sends a carriage return after the last character.
MORE	Sends the characters to the application and clears the editing line.
K	Displays the PenDOS keyboard.

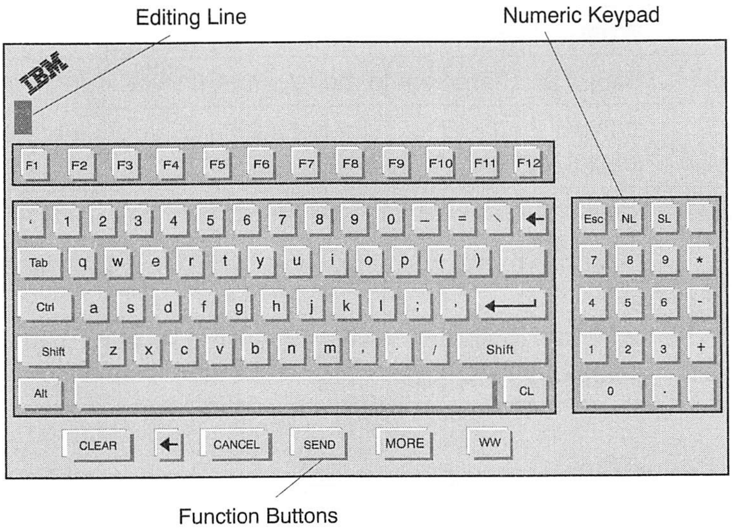
To display the PenDOS keyboard: tap the K on the Writing Window.

To return to the Writing Window from the PenDOS keyboard: tap the CANCEL button on the PenDOS keyboard.

Using the PenDOS Keyboard

If a DOS application does not provide mouse-aware menus or if you need to enter non-printable characters such as ALT+F1, use the PenDOS keyboard to issue commands. PenDOS sends the keystrokes to the application as if you had typed them on a physical keyboard.

To display the PenDOS keyboard: hold down the pen's side button and tap the K button on the PenDOS menu, or tap the K button on the Writing Window.



The PenDOS keyboard has three important areas besides the standard keys:

- The *editing line* displays the characters that were entered.
- The *numeric keypad* lets you enter ASCII values. It is only displayed when the NL (Num Lock) button is selected.
- The *function buttons* let you edit the characters you wrote as well as send them to an application, or display the Writing Window.

  The buttons on the PenDOS keyboard have the same function as the buttons on the Writing Window:

Button	What it does
CLEAR	Clears all characters in the editing line.
←	Deletes the last character before the cursor in the editing line, like the BACKSPACE key on the keyboard.
CANCEL	Closes the keyboard without sending any characters to the application.
SEND	Sends characters to the application, closes the keyboard, and returns to the application.
MORE	Sends the characters to the application and clears the editing line.
WW	Displays the Writing Window.

To use the PenDOS keyboard: use the pen to tap the keys for the desired characters. The characters appear in the editing line.

To use special keys such as SHIFT and CTRL:

1. Tap the modifier key or keys. The modifier keys on the PenDOS keyboard are SHIFT, CTRL, ALT, CL (Caps Lock), NL (Num Lock), and SL (Scroll Lock).
2. Tap the desired character that follows the modifier key.

   Note: The notation <scan> appears for some control characters, function keys, and certain instances of ALT+*character*.

For example, to enter CTRL+A, tap CTRL, and then tap A. PenDOS sends ^A to the editing line at the top of the PenDOS keyboard.

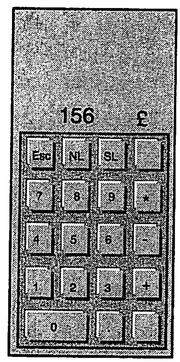
To send keystrokes to the application: tap the SEND or MORE button, or tap the ↵ key on the PenDOS keyboard. Tapping ↵ sends the contents of the editing line followed by a carriage return to the application.

To enter an ASCII value:

1. Tap NL (Num Lock) to display the numeric keypad.
2. Tap ALT.
3. Tap the numbers of the ASCII code on the numeric keypad (located on the right side of the PenDOS keyboard).

   For example, the ASCII code 156 is equivalent to the £ character.

   The ASCII code and the associated character appear above the numeric keypad.



4. Tap the ALT key again.

   The value is sent to the editing line.

To display the Writing Window: tap the WW button on the PenDOS keyboard.

To return to the PenDOS keyboard from the Writing Window: tap the CANCEL button on the Writing Window.

To remove the PenDOS keyboard from the screen: tap the CANCEL button on the PenDOS keyboard.

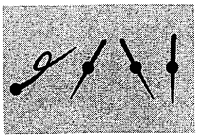
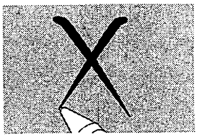
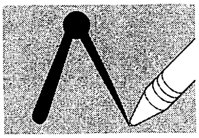
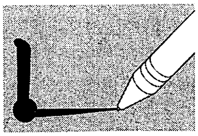
Editing Characters

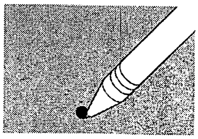
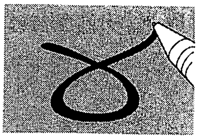
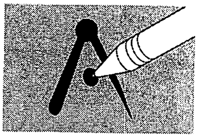
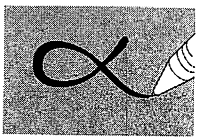
To edit the characters in the Writing Window, on the PenDOS keyboard, or in an application, you make gestures with the pen. *Gestures* are simple pen strokes that resemble proofreaders' marks.

Some gestures have the same effect in most DOS applications. These are called *universal gestures*. For example, the Delete gesture is a universal gesture for deleting a single character. Not all gestures are supported in every application. For example, if the application does not have a command for undoing the last action, the Undo gesture has no effect in that application.

Note: You can use gestures if your pen does not have a side button. Tapping the extreme upper-right corner of the writing tablet is equivalent to holding down the side button.

The following table describes the PenDOS gestures:

Gesture	What it does	Universal gesture
	Deletes a single character.	Yes
	Deletes the highlighted block of text.	Yes
	Displays the Writing Window and inserts text at this location.	Yes
	Inserts a space.	Yes

Gesture	What it does	Universal gesture
	Simulates clicking the right mouse button. To write the Tap gesture, hold down the pen's side button and tap the pen tip lightly against the writing surface.	Yes
	Undoes the last action.	No
	Pastes previously copied text.	No
	Copies the highlighted block of text.	No

Most gestures have hot spots, shown in the table as a black dot on the gesture stroke. The hot spot indicates where you want the action to occur. For example, the hot spot for the Insert gesture is at the tip; that is, when you write the Insert gesture, make sure the tip is centered on the character to the right of where you want to insert.

The following gestures do not have hot spots, so you can write them anywhere on the writing surface:

- Undo
- Delete a block
- Copy a block
- Tap

For your convenience, PenDOS provides gesture macros used by many popular applications. A *macro* is a sequence of keystrokes that executes a command.

To write a gesture:

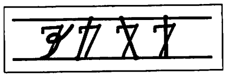
1. Press the pen tip lightly against the writing surface while holding down the side button.
2. Write the gesture.

   The gesture should remain within a 2.5 inch by 2.5 inch square.
3. Lift the pen from the writing surface.

Editing Characters in the Writing Window and PenDOS Keyboard

This section describes how to edit the characters that appear in the editing line of both the Writing Window and the PenDOS keyboard.

To delete a character: hold down the side button and write one of the delete gestures over the character in the editing line.

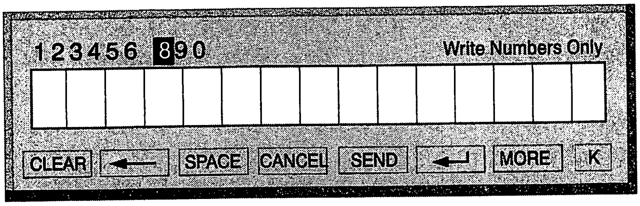


The character is deleted. Any characters to the right move over to close the space.

To insert a character:

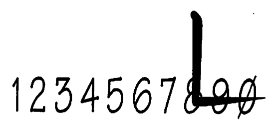
1. In the editing line on the Writing Window or PenDOS keyboard, place the cursor by tapping the character to the right of the position where you want to insert the new character.

   For example, to insert a "7" before the "8" in the following illustration, you would place the cursor on the "8."



   The insertion point is highlighted, and all characters in the writing area disappear.
2. Write the new character in the writing area, or tap the new character on the PenDOS keyboard.

To insert a space:



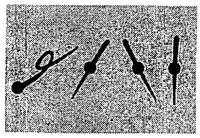
There are two ways to insert a space:

- Write the Insert Space gesture in the editing line.

  Make sure the hot spot is centered on the character to the right of where you want the space to appear.

- Tap the character in the editing line that is to the right of where you want the space to appear and then tap the SPACE button.

To clear the writing area: hold down the side button and write one of the delete gestures anywhere in the writing area:



Note: The delete gestures clear the writing area only. To clear the editing line as well as the writing area, tap the CLEAR button.

Working with Applications

This section explains how to work with standard mouse-aware applications using PenDOS.

Starting Applications

You can start applications whether you are using DOS Shell or not.

To start an application if you are using DOS Shell:

1. Tap twice rapidly with the pen (double-tap) on the drive that contains the application you want to start.
2. Double-tap the directory name.

   If the directory does not appear in the scroll list, scroll down by using the scroll arrows or thumb, or by making a fast, vertical pen stroke that starts anywhere and extends below the window. Do not hold down the side button when you make the pen stroke.
3. Double-tap the application's file name. Executable files normally have the extension .EXE or .BAT.

To start an application if you are not using DOS Shell:

1. At the DOS command prompt, hold down the side button and press the pen tip lightly against the writing surface.

The PenDOS menu appears in the upper-right corner of the screen.

2. Tap the K button to display the PenDOS keyboard.
3. Go to the directory that contains the file by tapping *cd \directory_name* and then tapping the ↵ key.

   If you make an entry mistake, see "Editing Characters" on page 374.

4. Start the application by tapping the keys for *filename* and then tapping the ↵ key.

   Note: You can also start applications by typing commands on a physical keyboard.

Pointing and Selecting

To position the application cursor: lightly tap the writing surface with the pen tip. Tapping with the pen tip is equivalent to clicking the left mouse button.

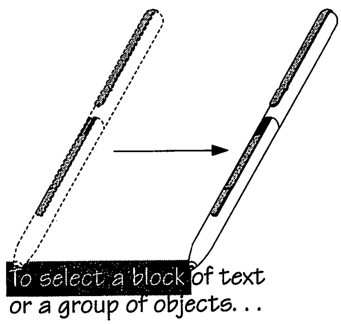
To select menu items: tap the item with the pen tip.

To select a block of text or group of objects:

1. Tap one end of the selection and keep the tip in contact with the writing surface, then drag the pen to the other end of the selection.
2. Lift the pen from the writing surface.

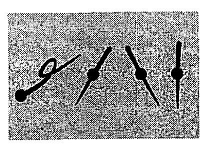
   This is equivalent to holding down the mouse button and dragging the mouse.

Note: These instructions apply only to mouse-aware applications that support block highlighting.

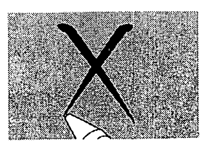


Editing Characters in the Application

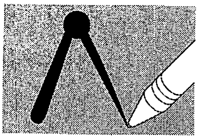
To delete a character: hold down the side button and write one of the delete gestures. Make sure the hot spot is centered on the character you want to delete.



To delete a highlighted block or group of objects: hold down the side button and write the Delete Block gesture.



To insert a character using the Writing Window:

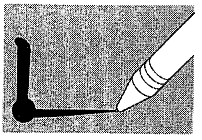


1. Hold down the side button and write the Insert gesture in the application file. Make sure the hot spot is centered at the location where you want to insert the character.

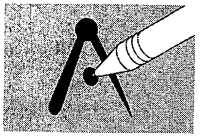
   The Writing Window appears.
2. Write the character or characters you want to insert.
3. Tap ↵, SEND, or MORE.

To insert a character using the PenDOS keyboard:

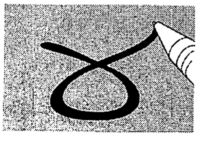
1. Place the cursor by tapping the character to the right of the position where you want to insert the new character.
2. Display the PenDOS keyboard by holding down the pen's side button and tap the K button on the PenDOS menu.
3. Use the pen to tap the keys for the desired characters.
4. Tap the ↵ key, the SEND, or MORE button.



To insert a space: hold down the side button and write the Insert Space gesture. Make sure the hot spot is centered at the location where you want to insert the space.



To paste previously copied text or objects: hold down the side button and write the Paste gesture in the application file. Make sure the hot spot is centered at the location where you want to paste the text or objects.



To undo the previous command: hold down the side button and write the Undo gesture anywhere on the writing surface.

Note: The Undo gesture is not a universal gesture; it might not work in all applications.

Using an Off-the-Shelf Application

You can use PenDOS with most of the DOS applications you already have.

** Quattro Pro is a trademark of Borland International, Inc.

For example, to use PenDOS with Borland's Quattro Pro** spreadsheet application:

1. In Quattro Pro, tap a cell to highlight it.

   To select a group of cells, drag the pen.

2. Hold down the side button with the pen close to the writing surface to display the PenDOS menu.

3. To enter characters in the highlighted cell, write the Insert gesture, or tap WW or K on the PenDOS menu.

   - In the Writing Window, write numbers in the boxes and then tap ↵, SEND, or MORE.
   - On the PenDOS keyboard, tap the keys of the characters you want to enter and then tap the ENTER key (↵).

4. To clear a cell, highlight the cell and write one of the delete gestures.

5. To delete a cell or several cells, highlight the cells and write the Delete Block gesture.

6. To copy a cell or several cells, highlight the cells and write the Copy gesture.

7. To undo the last action, write the Undo gesture.

   Note: Undo must be enabled.

Aligning the Tablet

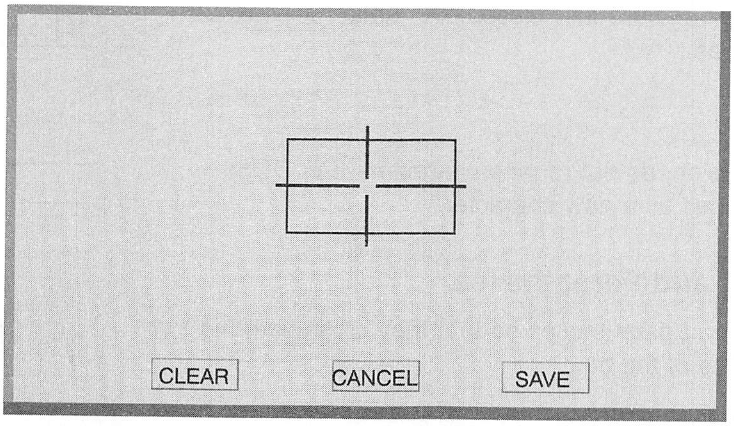
If the ink does not seem to line up with the tip of your pen, you can align the tablet.

To align the tablet:

1. Start the PSETUP.EXE file.

   Note: Follow the instructions in "Working with Applications" on page 377. You will find the PSETUP.EXE file in the C:\DOS\SYSTEM directory.

The following window appears:



2. Use the pen to tap the center point of the cross-hairs.

   Hold the pen at the same angle you do when you write.

3. Test the alignment by writing anywhere outside the box that contains the cross-hairs. To clear the ink, tap the CLEAR button.
4. If the alignment is still not precise, tap the center point again.
5. When the tablet is aligned to your satisfaction, tap the SAVE button to save the new alignment and exit the program.

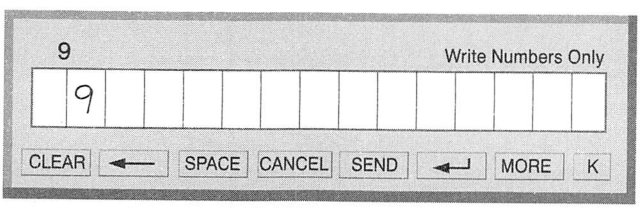
   To exit the alignment program without saving any changes, tap the CANCEL button.

Recognition Tips

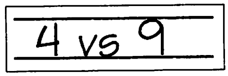
This section contains tips to help you ensure that PenDOS recognizes all of your characters.

Separate Your Characters

The Writing Window contains boxes to help you separate the characters. Write one character in each box.

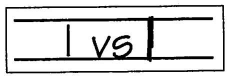


Closing Loops



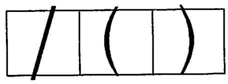
Make sure the loops are fully closed. An open "9" could be misinterpreted as a "4."

Retracing



To avoid confusion, do not retrace characters. PenDOS interprets retraces as a new character.

Writing Slashes and Parentheses

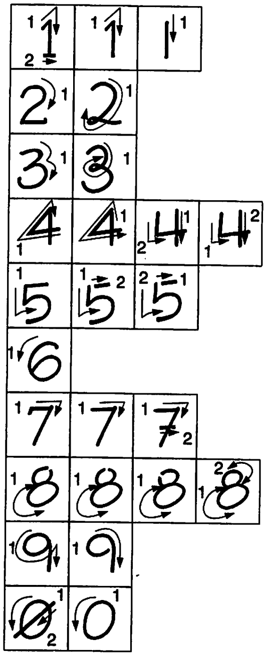


Write slashes and parentheses so that they cross both the top and bottom lines of the box.

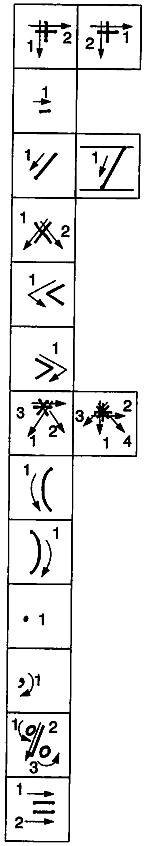
Character Variations

PenDOS uses CIC's Handwriter Recognition System. This section lists the characters that this version of Handwriter recognizes and how to write them. When the direction and sequence of the pen strokes is important, arrows indicate the direction of the pen stroke and numbers indicate the sequence of the strokes. Horizontal lines represent the top and bottom lines of the boxes in the PenDOS Writing Window.

Numbers



Symbols



Chapter 20. Using Phoenix PCMCIA Support

A computer having Personal Computer Memory Card International Association (PCMCIA) support provides sockets into which you can insert credit card-sized devices called *PC Cards*. PC Cards let you extend the capabilities of your computer by adding functions, such as:

- Communications (modems, Token Ring, Ethernet, 3270, and 5250)
- Memory (DRAM, SRAM, and EPROM)
- Rotating media (ATA disk drives)
- Solid state disk drives

The PCMCIA sockets are numbered 1 through *n* where *n* is the number of sockets on your system. You insert a PC Card by aligning it with a PCMCIA socket and sliding the card into the socket. You remove a card by pressing the eject button (or by some other ejection means provided by your system vendor) on the PCMCIA socket to eject the card. Refer to your hardware documentation for details.

After the PC Cards are installed and operating, you can interchange PCMCIA PC Cards in the PCMCIA PC Card slots (adhering to certain precautions) with little or no knowledge of the technology involved in the inner workings of the software. This ability to easily insert and remove PC Cards means you can move function and data from one computer to another.

The PCMCIA standard allows for the uniform development of PC Cards for portable, laptop, some desktop, and palmtop PC accessories, such as memory expansion cards, fax and modem attachments, and interfaces to corporate networks.

The PCMCIA standard defines both the hardware and software interfaces for PCMCIA sockets and cards. The Card Services module is the operating system software layer for PCMCIA. It defines a set of application programming interfaces (APIs) that system and application software can use to communicate with PCMCIA sockets and cards.

This chapter provides a description of each of the following components of PCMCIA Support:

Description:	Device Driver Name:
Card Services 2.0	PCMCS.EXE
Super Client Driver	PCMSCD.EXE
Virtual driver for FAT-structured devices (FAT Block Device Driver)	PCMATA.SYS
FAT diskette emulation	PCMFDD.EXE
Memory Technology Driver	PCMMTD.EXE
Information utilities	PCMINFO.EXE (for DOS) WPCMINFO.CPL (for Windows)
Windows VxD driver for fax or modem cards	PCMVCD.386
SRAM format utility for drive A or B	PCFORMAT.EXE

Installing Phoenix PCMCIA Support

The DOS Setup diskettes contain the modules required to provide PCMCIA support on your system. You might want to refer to the *PC DOS Installation Guide* before you begin the installation of the optional tools.

To use the Setup /e switch to install Phoenix PCMCIA Support:

1. Insert diskette 1 of the DOS Setup diskettes into drive A or B.
2. At the DOS command prompt, type:

   ```
   a:setup /e
   ```

   or

   ```
   b:setup /e
   ```

   The **/e** switch allows you to return to the optional tools selection menu without having to do a complete reinstallation. At this point, only the necessary files for the optional tools will be installed.
3. After Setup for DOS begins, follow the instructions displayed on the screen. Make sure you specify the same "Install to PATH" as you did when you did the initial DOS installation.

   At the Optional Tools screen, you see a `NO` next to Phoenix PCMCIA Support.
4. Press the UP ARROW or DOWN ARROW until you highlight Phoenix PCMCIA Support. You can also select Phoenix PCMCIA Support and any other optional tools at this time by highlighting and pressing ENTER to select each item.

You now see YES next to Phoenix PCMCIA Support and the other optional tools you selected.

5. Move the cursor to highlight the following:

   `The listed options are correct.`

6. Press ENTER to accept the optional tool selections.

   Continue to follow the instructions displayed on the screen until the optional tools are installed.

Getting Started with PCMCIA Support

As a notebook, laptop, palmtop, or desktop personal computer user, you can take full advantage of many of the functions of PCMCIA Support software. Using Phoenix PCMCIA Support, the installation and operation will seem almost transparent.

However, in order to install, modify, and maintain PCMCIA Support software, it is important that you have an understanding of DOS, Windows, and the ability to modify the CONFIG.SYS and SYSTEM.INI files that are necessary for adaptation or modification of the many drivers and utilities that are managed by PCMCIA Support.

Drivers are ordinarily included in either CONFIG.SYS (DOS drivers) or SYSTEM.INI (Windows drivers). Both DOS and Windows executables can reside on any disk to which the system has access. You can locate the DOS drivers on any drive; however, you must specify the full path for DOS drivers. For DOS to find and process a file, the .EXE or .COM file must reside in a directory specified using the PATH command, the current directory, or be executed using the full path name.

Windows drivers must reside in the \WINDOWS\SYSTEM directory. You can run Windows executables from any directory as long as you specify the full path when you run the program, or when you create or define a Windows icon.

The Phoenix PCMCIA components must be loaded for you to have PCMCIA Support available. These components can be loaded:

- As a device driver in your CONFIG.SYS with either the default options or modified options.
- As a terminate-and-stay-resident (TSR) program with options by either:
  - Typing the command from the DOS command prompt.
  - Entering the command in your AUTOEXEC.BAT where it is automatically loaded whenever you start your computer.

Instructions on adding the device driver statement in the CONFIG.SYS file or adding the command in the AUTOEXEC.BAT file (or typing it from the DOS command prompt) are given for each Phoenix PCMCIA Support component.

Modifying the CONFIG.SYS File for Use with PCMCIA

Use a text editor (such as E Editor or a similar text editing program) to make changes to your CONFIG.SYS file. You must restart your system for any changes to your CONFIG.SYS to become active. However, because you will be changing your AUTOEXEC.BAT file as well, you can wait until you have completed making your changes in both files before restarting your system.

Note: If you are using an editor other than the E Editor, be sure that the changes to the CONFIG.SYS, or AUTOEXEC.BAT files are entered in ASCII or an unformatted .TXT mode.

Modifying the AUTOEXEC.BAT File for Use with PCMCIA

Use the E Editor (or similar edit program) to make changes to your AUTOEXEC.BAT file. When you are finished changing your AUTOEXEC.BAT file (and CONFIG.SYS file) and all changes have been saved, you must restart your system by pressing CTRL+ALT+DEL in order for any changes to become active.

Card Services (PCMCS.EXE)

PCMCS.EXE is a Card Services 2.0 driver that interfaces directly with Socket Services 2.0, which meets the Intel Exchangeable Card Architecture (ExCA) socket compliance test criteria.

PCMCS.EXE is responsible for coordinating access to the PC Cards and allocating system resources among Card Services client drivers. A *client* driver is a device driver, utility, or program designed to support a particular or multiple PC Cards. Card Services 2.0 is only provided as a driver loaded by DOS. This driver can be loaded by the CONFIG.SYS file or can be run as a terminate-and-stay-resident (TSR) program from the DOS command prompt. You must load Socket Services before you load Card Services.

Add the following device driver to your CONFIG.SYS file for Card Services:

```
device=[drive:][path]pcmcs.exe
```

where [*drive*:][*path*] specifies the location of the device driver file.

From the DOS command prompt, type:

`[`*drive*`:]` `[`*path*`]pcmcs`

Note: Socket Services is not installed with DOS. This software is provided with your system. If an error occurs while attempting to load Card Services, refer to the README.TXT file in your \DOS directory for information about Socket Services.

When Card Services is loaded, default values for command-line options are available.

You can use command-line switches to determine the Card Services options you want. Precede all command-line options with a forward slash (/). Or, you can add the command and options to your AUTOEXEC.BAT file. For a complete explanation of each option, type `pcmcs /?` for on-line help or, refer to device driver information in the *PC DOS Command Reference and Error Messages* manual.

Super Client Driver (PCMSCD.EXE)

The PCMSCD.EXE is a super client driver that supports the configuration of several PC Cards. After configuration, the PC Card operates as an integral component of the system.

The PCMCIA Super Client Driver is intended to work only with the Phoenix PCMCIA Card Services and does not operate on Card Services furnished by third party suppliers.

You can either load the Super Client Driver as a device driver from the CONFIG.SYS file or run it from the DOS command prompt loaded as a TSR. You must load the Card Services driver before the Super Client driver.

Add the following device driver to your CONFIG.SYS file for the Super Client Driver:

`device=[`*drive*`:]` `[`*path*`]pcmscd.exe`

where [*drive*:][*path*] specifies the location of the device driver file.

From the DOS command prompt, type:

`[`*drive*`:]` `[`*path*`]pcmscd`

When the Super Client Driver is loaded, default values for command-line options are available.

You can use command-line switches to determine the Super Client Driver options you want. Precede all command-line options with a forward slash (/). Or, you can add the command and options to your AUTOEXEC.BAT file. For a complete explanation of each option, type `pcmscd /?` at the command line to view the syntax and options available for this command or, refer to the device driver information in the *PC DOS Command Reference and Error Messages* manual.

Virtual Driver for PCMCIA ATA Fixed Disks (PCMATA.SYS)

The PCMCIA virtual driver supports PCMCIA-ATA compatible fixed disks and SRAM cards formatted in a FAT structured format. This device driver, called PCMATA.SYS, registers as a bulk memory client to Card Services.

The PCMCIA virtual device driver also supports read/write operations for SRAM cards formatted in an DOS FAT structured format. You can also use the DOS FORMAT command to format SRAM PC Cards for read/write operations. Supporting this format also allows you to use data stored in other computers in the system with the PCMCIA Support software.

You can either load PCMATA.SYS as a device driver from the CONFIG.SYS or run as a terminate-and-stay-resident (TSR) program from the DOS command. PCMATA.SYS must be loaded after Card Services.

Add the following device driver to your CONFIG.SYS file:

```
device=[drive:][path]pcmata.sys /1|/2|/3|/4 [/addr=nn]
```

where:

[*drive*:][*path*]	Specifies the location of the device driver file.
/1|/2|/3|/4	Specifies the socket (1, 2, 3, or 4) to which drive emulation is assigned.
/addr=*nn*	Specifies the system window base address of 16KB for memory card emulation. The base address must be on a 16KB boundary, where *nn* ranges from C0 to E0 (C0 is equivalent to C000H and E0 is equivalent to E000H). The default value is D0.

When PCMATA.SYS is loaded, default values for command-line options are available.

Using the DOS FORMAT Command to Format PCMCIA PC Cards

PCMATA.SYS allows you to format PC Cards using the DOS FORMAT command. Use one of the following with the FORMAT command, where *drive* is the drive assigned to the socket.

For SRAM Cards:

For this size:	You would type:
256K	FORMAT *drive:* /U /T:64 /N:8
512K	FORMAT *drive:* /U /T:128 /N:8
1MB	FORMAT *drive:* /U /T:256 /N:8
2MB	FORMAT *drive:* /U /T:512 /N:8

For IDE Fixed Disks, you use the same command. However, the parameters must correspond to the size of the fixed disk. The parameters are:

/U Performs an unconditional format.

/T:*n* Represents the number (*n*) of tracks on the IDE Disk.

/N:17 Represents 17 sectors per track.

The following is an example using the FORMAT command to format an IDE Disk with 600 tracks and 17 sectors per track:

```
format f: /u /t:600 /n:17
```

For ATA rotating drive cards and SunDisk cards, use `format d: /u` to format the entire card.

FAT Diskette Emulation (PCMFDD.EXE)

PCMFDD provides physical diskette drive emulation on PCMCIA sockets as drives A and B. PCMFDD provides INT13H emulation for drives A and B. When this driver loads, it performs diskette drive emulation on the specified socket. It is used in conjunction with static memory cards (SRAM). This driver registers with Card Services as a bulk memory client and is a completely hardware independent component of PCMCIA Support software.

After you load DOS, you can achieve diskette drive emulation by loading PCMFDD.EXE. You can load PCMFDD.EXE as a DOS device driver from the CONFIG.SYS file, from the DOS command line as a TSR, or add this command to your AUTOEXEC.BAT file. PCMFDD must be loaded after Card Services and Socket Services.

Add the following device driver to your CONFIG.SYS file:

```
device=[drive:][path]pcmfdd.exe /addr=nn /x:m
```

where [*drive*:][*path*] specifies the location of the device driver file.

From the DOS command prompt, type:

```
[drive:][path]pcmfdd /addr=nn /x:m
```

The command-line options are:

/addr=*nn* Specifies the system window base address of 16KB for memory card emulation. The base address must be on a 16KB boundary, where *nn* ranges from C0 to E0 (C0 is equivalent to C000H, and E0 is equivalent to E000H). The default value is D0.

x The emulated drive letter (drive A or drive B).

m The socket number (1 or 2).

Memory Technology Driver (PCMMTD.EXE)

PCMMTD.EXE can be loaded either as a terminate-and-stay-resident program from the DOS command prompt or as a device driver from the CONFIG.SYS file. PCMCS.EXE must be loaded prior to loading PCMMTD.EXE.

Add the following device driver to your CONFIG.SYS file to install the Memory Technology Driver:

```
device=[drive:][path]pcmmtd.exe
```

where [*drive*:][*path*] specifies the location of the device driver file.

From the DOS command prompt, type:

```
[drive:][path]pcmmtd.exe
```

Windows VxD Driver for Fax and Modem Cards (PCMVCD.386)

PCMVCD.386 is the Windows VxD (virtual device driver) for PC Card support in 386-enhanced mode. It is a replacement module for the Windows VCD (virtual COMM driver). PCMVCD.386 allows fax and modem cards inserted into a PCMCIA socket to be available to all sessions under Windows. During installation of DOS, if you select PCMCIA support, PCMVCD.386 gets copied in your DOS directory. However, if you have Windows and want Phoenix PCMCIA Support, you must manually edit the SYSTEM.INI file before you can have Phoenix PCMCIA Support under Windows.

To replace the Windows Virtual COMM driver with the PCMCIA Windows VxD driver:

1. Copy the file PCMVCD.386 from the DOS directory to the \WINDOWS\SYSTEM subdirectory.
2. Copy the files WPCMINFO.CPL and WPCMINFO.HLP from the DOS directory to the \WINDOWS\SYSTEM subdirectory. (Refer to "Microsoft Windows Environment (WPCMINFO.CPL)" on page 397.)
3. Edit the \WINDOWS\SYSTEM.INI file as follows:
   a. Locate the section label [386Enh].
   b. Add the following line anywhere in that section:

      ```
      device=drive:\windows\system\pcmvcd.386
      ```

   where *drive:* refers to the drive letter where Windows 3.1 is installed.

c. Locate the line that states `device=*vcd` and either remove the line entirely or comment it out by adding a semicolon at the start of the line, such as:

```
; device=*vcd
```

d. For each COM port that you might want to use as a PCMCIA port, add the following line to the [386Enh] section:

```
com#base=xxxx
```

where # is the number of the COM port (1, 2, 3, or 4) and *xxxx* is the hexadecimal value of the standard location of the COM port (3F8, 2F8, 3E8, or 2E8, respectively).

e. For each COM port that you want available as a PCMCIA port, add the following line to enable the PCMCIA functions of the driver:

```
pcmciacom#=true
```

where # is the COM port number (1, 2, 3, or 4).

f. If the line `COMVERIFYBASE=TRUE` is present in the file, you must remove it. This option cannot be set for Windows to handle PCMCIA ports properly.

g. If the line:

```
EMMExclude=xxxx-yyyy
```

is present, edit it as follows; otherwise add it:

```
EMMExclude=C800-DFFF
```

Other values might work but are dependent on your particular system.

h. Now add a new section to SYSTEM.INI, called:

```
[PCMCIA]
```

i. Make sure this line appears after all other items in a section. Each section starts with a name in [brackets].

j. For each COM port that you want available as a PCMCIA port, add the line:

```
com0#=true
```

where # is the COM port number (1, 2, 3, or 4).

4. Save the new edited SYSTEM.INI file.

SYSTEM.INI Example:
The following example makes COM port 4 available as a PCMCIA serial port. Your SYSTEM.INI file would end up looking like this (only those parts relevant to PCMCIA are shown):

```
[386Enh]
DEVICE=C:\WINDOWS\SYSTEM\PCMVCD.386
; DEVICE=*vcd  << commented out!
EMMExclude=C800-DFFF
COM4BASE=2E8
PCMCIACOM4=TRUE
:
[PCMCIA]
COM04=TRUE
```

Notes:

- You cannot designate a port number for a COM port that is already installed. For example, if your computer has an adapter card already configured for COM1, you cannot also designate it as a PCMCIA port.
- If there are other entries in the [386Enh] section for COM#BASE=, leave them. They are not relevant as long as the port numbers are not the same as ports you want to configure as PCMCIA ports.
- You must designate a COM port number to the PCMSCD.EXE device driver if specifying other than the default COM of 4. This is done when loading PCMSCD.EXE in your CONFIG.SYS file or from the command line as a TSR.

  The COM port specified to PCMSCD.EXE must match one of the COM#BASE=*xxxx* and COM0#=TRUE entries in SYSTEM.INI.

When you initialize PCMVCD.386 under Windows, it registers as a client to Card Services. When you install a fax and modem device, PCMVCD ensures that the device is available to the entire Windows operating system when you successfully configure the fax and modem card.

Information Utilities (PCMINFO.EXE and WPCMINFO.CPL)

The PCMCIA Support Information Utilities provide information about each PCMCIA socket and the card inserted in it. Information such as card type, card name, and so forth is displayed. This component provides the information for both the DOS and Windows environment. Two information utilities are provided with PCMCIA Support software. PCMINFO.EXE is a DOS-based utility. WPCMINFO.CPL is the utility that runs under Windows. Socket Services and Card Services must be loaded before these utilities can be executed.

DOS Environment (PCMINFO.EXE)

PCMINFO is executed in DOS and provides an array of information about each socket and any cards installed in the socket of the PC portable.

Note: PCMINFO.EXE does not operate in a Windows environment. For a Windows environment, see "Microsoft Windows Environment (WPCMINFO.CPL)" on page 397.

To run the information utility in the DOS environment, type the following at the DOS command prompt:

```
[drive:][path]pcminfo [options]
```

where [*drive*:][*path*] specifies the location of the device driver file.

You can use the following command-line options for PCMINFO.EXE:

/d This option (not case sensitive) is an interactive display mode and continuously displays the PCMINFO screen, allowing instantaneous update of the PCMCIA sockets.

/t This option suppresses the timer tick display and can be used in conjunction with the **/d** option.

/? This option displays help information.

As an example, to continuously display the PCMINFO screen, allowing instantaneous update of the PCMCIA sockets, type:

```
[drive:][path]pcminfo /d
```

To return to the DOS command prompt, press any key.

Running PCMINFO displays the following options for each socket and card:

- Number of sockets in the system.
- Number of sockets active (card/device installed) or inactive (card/device not installed).
- Card or device manufacturer's name.
- Product name.
- Device type.
- Whether the device is configured or not. This information is not displayed for memory cards.
- Last event status (available with the **/d** or the **/d /t** options).
- PCMCIA services version.
- Card services vendor version number.

On Memory Cards the following information is displayed:

- The size of the memory on the card.
- The status of the write protect switch.

For static memory cards (SRAM) and Dynamic Random Access Memory (DRAM) cards, the following information is displayed concerning the status of the battery:

- Okay
- Low
- Dead

Microsoft Windows Environment (WPCMINFO.CPL)

WPCMINFO.CPL is a Windows 3.1 icon that is placed in the Windows Control Panel, which displays information about PCMCIA sockets and cards on the host system. When you select Phoenix PCMCIA Support during installation of DOS, WPCMINFO.CPL and WPCMINFO.HLP files are copied to your DOS directory. To install the information utility if Windows is already installed or if you install Windows after you install DOS, you must copy the WPCMINFO.CPL and WPCMINFO.HLP files into the WINDOWS\SYSTEM directory. A PCMCIA icon is created in the Control Panel under Windows. To access the PCMCIA Support information utility, click on the PCMCIA icon.

When you run the information utility (in either DOS or Windows) the status of each socket is displayed. The status indicates whether a socket is empty or a card is installed and, if installed, whether the PC Card is in the process of being configured. The information utility also gives you the name and information about the installed card. If a non-configurable card is installed, a message will be displayed informing you of this status.

When you select the control panel icon in Windows, a PCMCIA icon appears. Selecting this icon produces a control panel with the following information:

- Information about the sockets.
- The PCMCIA logo and an associated help file for WPCMINFO.
- Number of sockets in the system.
- Number of sockets active (card installed) or inactive (card not installed).
- Card Manufacturer's name.
- Product name.
- Device type.
- Whether the device is configured or not. This information is not displayed for memory cards.
- The status of the write-protect switch.

For SRAM and DRAM cards the following information regarding the status of the battery is displayed:

- Okay
- Low
- Dead

Note: This icon requires an appropriately configured PCMCIA-capable system to operate properly. In particular, Phoenix Card Services and Socket Services must be loaded prior to loading Windows.

Memory Card Utility (PCFORMAT.EXE)

PCFORMAT.EXE is a utility to format a PCMCIA static memory card of any size for DOS FAT file system drivers.

Note: This utility is not for use with the Flash file system.

The PCMCIA sockets should emulate diskette drives A or B by using the FAT diskette emulation driver PCMFDD.EXE as either a device driver or as a TSR.

```
pcformat d: [/s:nnnn[k|m]]
```

The default parameters for PCFORMAT are equivalent to the 1MB Poquet format. The **/s** option can be used to specify the card size. The "K" for kilobytes or the "M" for megabytes qualifier is required.

When PCFORMAT is entered without parameters, the card is formatted according to its actual size.

(*d:*)
: Drive letter assigned to the PCMCIA slot containing the static memory card to be formatted.

/s:*nnnn***[k | m]**
: Specifies the card size in kilobytes (K) or megabytes (M). The maximum size supported is 32MB.

Appendix A. Accessibility for Individuals with Disabilities

The IBM *Independence Series**, is a family of products designed to help individuals with disabilities achieve greater personal and professional independence through the use of technology. The following products are designed specifically for improving access between individuals with disabilities and others through the use of a computer or a telephone: Screen Reader*/DOS, Screen Reader/2, VoiceType* 2, AccessDOS, KeyGuard, and PhoneCommunicator*.

There are also clinical products, designed to aid the therapy of those people with speech and attention/memory impairments. The clinical products are: SpeechViewer*, SpeechViewer II, THINKable*/DOS, and THINKable/2.

For further information or assistance with ordering any of these *Independence Series* products, call the IBM Independence Series Information Center at 1-800-426-4832 (Voice) or 1-800-426-4833 (TDD). In Canada, call 1-800-465-7999 (Voice).

IBM AccessDOS

AccessDOS is a complimentary DOS-based utility to extend keyboard, mouse, and sound access on a personal computer. AccessDOS is useful for people with mobility, visual, or hearing impairments because of the specialized control it offers. Key features include:

- **StickyKeys**
  Enables you to individually press each key for multiple key operations. For example, you can press CTRL, press ALT, and then press DEL to restart your system instead of pressing the keys simultaneously.
- **MouseKeys**
  Makes it possible to use the keys on the numeric keypad to simulate the use of a mouse.
- **RepeatKeys**
  Enables you to set the rate at which keys repeat when held down.
- **SlowKeys**
  Instructs the computer not to accept a key as "pressed" until it has been held down for a specific length of time.

* Independence Series, Screen Reader, VoiceType, PhoneCommunicator, SpeechViewer, and THINKable are trademarks of the IBM Corporation

- **BounceKeys**
  Prevents double characters from being typed if your finger bounces on the key when pressing or releasing it.
- **SerialKeys**
  Enables you to control the keyboard and mouse functions using a special input device (not included) attached to a serial port.
- **ToggleKeys**
  Causes a beep to sound when the Caps Lock, Num Lock, or Scroll Lock keys are activated.
- **ShowSounds**
  Causes the screen to blink or display a small musical note on the display when the computer makes a sound.

IBM Screen Reader/DOS

Screen Reader/DOS reads the words on a display screen to people who are blind or visually impaired so that they can use a computer as a sighted person would. It can also be used effectively by individuals who have reading dysfunctions.

Screen Reader/DOS contains prewritten profiles for many application programs. You can also modify existing profiles or write your own, using the Profile Access Language.

Some of the major functions include:

- **Autospeaks**
  Monitors the screen and alerts you when changes, such as status or error messages, occur.
- **Dedicated 18-key keypad**
  Controls Screen Reader/DOS functions to enhance productivity by reserving the keyboard for application functions. As an alternative, Screen Reader/DOS can also be controlled from the keyboard.
- **Powerful reading functions**
  Allow you to read complete screens, paragraphs, sentences, words, or letters. You read only the amount of information you need.
- **Host/LAN support**
  Enables connectivity
- **Windowing**
  Provides easy access to many display formats featured in today's popular applications.

IBM PhoneCommunicator

PhoneCommunicator brings a wide range of telephone communication options to the fingertips of people who are hearing-impaired, speech-impaired, or both.

Designed for both home and office use, PhoneCommunicator consolidates many functions in one system that is menu-driven and easy to use. Some of the key features are:

- **Telephone communications with hearing persons**
  Can be provided through the use of most touch-tone telephones.
- **Communication with both Baudot and ASCII Telecommunication Device for the Deaf (TDDs)**
  Provides a full-screen view of the dialog from both parties.

  Note: TDD is used interchangeably with TT (text telephones).
- **Auto-answer mode**
  Records messages from callers using touch-tone telephones and from TDD callers. Notes the time and date of the call.
- **Programmable modem**
  Allows communication with ASCII bulletin boards, letting you browse, inquire, and send messages.
- **Personalized messages**
  Allow you to generate and save messages for later recall and use during conversations.

IBM VoiceType 2

VoiceType 2 is a flexible speech recognition program that provides an affordable keyboard alternative for IBM personal computers. With VoiceType 2, a person can enter text and control DOS-based applications (such as word processors, spreadsheets, and databases) simply by speaking. Among its many unique advantages are:

- **Adaptive learning capability**
  Responds to your speech patterns.
- **Use of multiple-user speech files**
  Is supported on a single system.
- **Large flexible vocabulary**
  Allows for as many as 7,000 user-specified words and commands. It includes a 100,000-word backup dictionary that aids in word prediction and spelling accuracy.

- **Built-in voice commands**
  Controls popular applications and DOS.
- **Online voice-accessible documentation**

IBM KeyGuard

The IBM KeyGuard is designed for use on IBM keyboards on many IBM computer systems, including the PS/2, PS/ValuePoint*, AS/400*, and RISC System/6000*. The KeyGuard is a molded keyboard overlay with holes that expose and isolate each keytop. It attaches securely so the keyboard can be tilted at any desired angle. Features include:

- **Better keying control**
  Enables mobility-impaired users to achieve greater control by pressing keys through the corresponding holes on the KeyGuard when using a typing stick or a single finger.
- **Increased accuracy**
  Helps minimize accidental key strokes in a busy office or plant environment.
- **Hand support**
  Provides a handrest, an important feature for individuals with palsied or other coordination conditions.

The IBM KeyGuard is also appropriate for use in education and preschool environments with young children who have not yet mastered typing skills.

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MSCDEX	Microsoft Corporation
NCR	NCR Corporation
Netroom	Helix Software Company
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Novell	Novell Incorporated
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8088	Intel Corporation
80286	Intel Corporation
80386	Intel Corporation

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Special Characters

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Racine, WI 53404

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This offer is available only in the United States, Canada, Puerto Rico, and the U.S. Virgin Islands. This offer expires March 31,1995. Allow 1 to 4 weeks for delivery upon receipt of your order by IBM. Upon receipt of your new diskettes, you must destroy the high density diskettes included with the original product.

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- **DOS 5.02 Technical Reference:** This book contains information necessary for utilizing operating system features and creating DOS device drivers. This book is valid for the PC DOS 6 release.

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Switzerland	25.94	NA	Franc
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Let's talk DOS on . . . TalkLink

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Germany	Germany	DM	219	Included	219.00	Included	V, A, P, E, EC
France	France	FF	581.78	108.22	690.00	95.00(2)	V, MC, A, P
UK	UK	£	71.95	13.47	85.92	5	V, MC, A, P
Denmark, Holland Luxembourg, Belgium	UK	£	71.95	14.34(2)	96.29	10	V, MC, A, E
Finland, Norway, Sweden	UK	£	71.95	N/A	71.95	10	V, MC, A, E
Italy	Italy	Lira	159900.00	See Note(3)	159900.00	22000.00	V, MC, A, E, P
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Switzerland	Germany	DM	199.00	N/A	199.00	Included	V, A, E, EC
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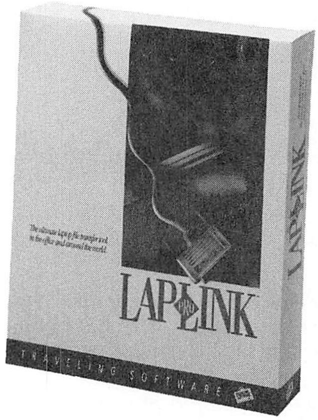

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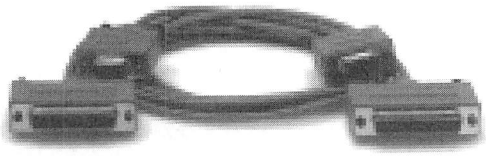

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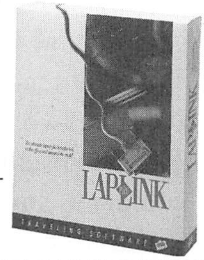

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