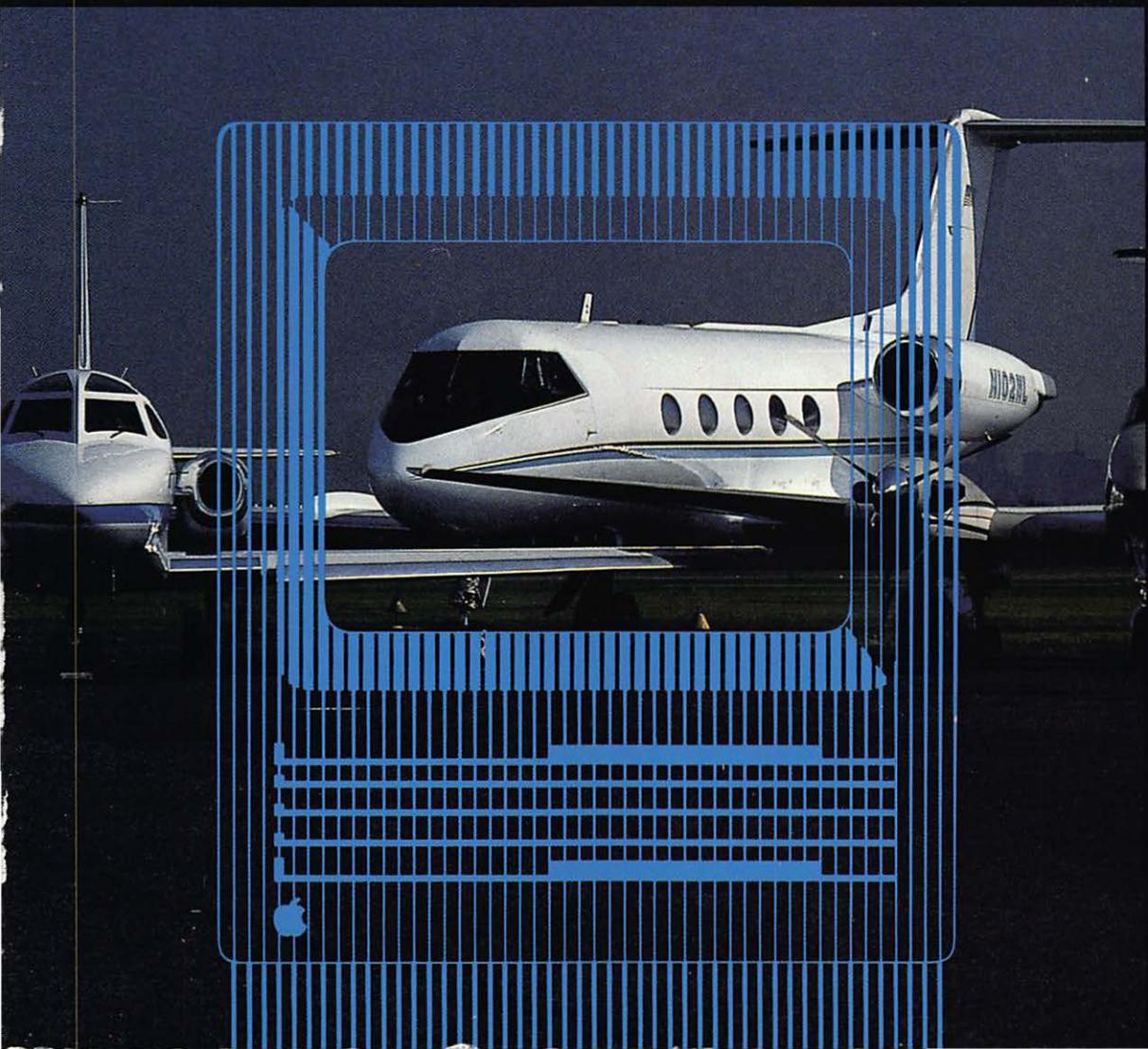




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INSIDE MS WORKS 2 FOR THE MACINTOSH® HIGH PERFORMANCE TECHNIQUES FOR BUSINESS

GORDON McCOMB



Inside MS Works 2 for the Macintosh

Inside MS Works 2 for the Macintosh

High Performance Techniques for Business

Gordon McComb



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INSIDE MS WORKS 2 FOR THE MACINTOSH

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To Mike and Maureen—

New Jersey isn't so bad after all

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Introduction

Let's skip the lofty phrases normally reserved for book introductions and get right to the point: This is a book about applying real power to Microsoft Works 2.0 for the Apple Macintosh. But that's not all. This is also a book for stretching Works to its design limits, squeezing out every last byte, and making it do things you may not have thought possible. And, this is a book on using Works as a dependable productivity tool in business.

With *Inside MS Works 2 for the Macintosh*, you'll find concrete hints and tips for getting the most from Microsoft Works, handy shortcuts for saving time, useful recommendations for adapting Works to *your* work environment, and clarifications of many of Works' more ambiguous features and commands.

Microsoft Works is a multifaceted program, combining four of the most commonly used business productivity applications in one easy-to-use package:

- Word processing
- Electronic spreadsheet calculation
- Data management
- Communications

You'll learn how to get the most from these four core Works modules, as well as how to use them effectively to create a complete Works power system.

What Works can do, it does with simplicity and grace. But Works can't do *everything*—you've probably realized that by now. If you are like most Works users, you may often find yourself frustrated and stymied by one of

the program's many "limitations." *Inside MS Works 2 for the Macintosh* provides guidance, suggestions, and "work-arounds" for many of the most troublesome limitations, offering step-by-step help for setting up a functional "Works station," using optional utilities to boost the power of Works, and customizing Works to your own specifications.

WHO SHOULD USE THIS BOOK

This is not a beginner's book on Microsoft Works. It does not teach the fundamentals of Works and how to use its basic features, but it does review some of these features as they relate to advanced Works use.

You should have at least a rudimentary working knowledge of Works before you use this book. You needn't be a Works wizard, but you should know how to write and edit text, how to format text using Works commands, how to enter data in the spreadsheet and database modules, and how to conduct a conversation with another computer user with the communications module.

Knowledge of the program's more advanced features, such as the spelling checker, homonym finder, spreadsheet functions, database report generator, and drawing tools is also valuable.

New to Microsoft Works? Then you are urged to read the manual that accompanies the program. The Works manual isn't large, but if you don't want to wade through it, use the Works tutorial to learn the basics. Works also comes with a guided tour that will help you get acquainted with the rudimentary capabilities of the program.

If you are familiar with Works, but are not an expert user, you'll want to keep a copy of the manual beside you as you read this book. If you come across a technique or concept that is unfamiliar, pause to read about it in the manual before proceeding.

As of this writing, the latest release of Works is version 2.0. This book offers hints, tricks, and shortcuts as they apply to version 2.0, but many of the techniques will also work, with some modification, when using versions 1.0 and 1.1.

HOW THIS BOOK IS ORGANIZED

Here is a brief summary of the contents of each chapter.

- *Chapter 1—General Tips for Using Microsoft Works.* Mastering Works by learning keyboard shortcuts, effectively using on-line help,

optimizing Works windows, sharing data between Works modules, saving and maintaining documents, using the Works Desktop file.

- *Chapter 2—Writing with Works.* Methods and shortcuts for writing, editing, and selecting text, formatting the document, sharing data between Works word processing documents, using the Works speller, preparing boilerplate text.
- *Chapter 3—Drawing with Works.* All about the Works drawing tool, using the tools to create shapes, enhancing word processor text with drawn boxes and rules, using the drawing tools for writing in columns.
- *Chapter 4—Spreadsheet Strategies.* Spreadsheet tips and tricks, formatting the worksheet, manipulating cell contents, a simplified approach to writing formulas, working with number formats.
- *Chapter 5—Charting Your Course with Works.* How to effectively use charts (created with spreadsheet data), simplified chart making, changing appearance of charts, editing charts.
- *Chapter 6—Keeping Tabs on Data.* Setting up a Works database form, shortcuts for entering and manipulating data, effective organization of database records, using calculated fields, formulas, and functions, using database selection criteria, effective form layouts, formatting database records for forms and presentations, principles and practice of merge printing.
- *Chapter 7—Communicating with Works.* Applications for computer communications, hardware requirements, technical overview of communications standards and protocols, sending and receiving files, using Works modem commands, controlling a modem manually, using Works with non-Hayes compatible modems.
- *Chapter 8—Saving Time with Macros.* What is a macro, how to record and play back macros, creating macro “sets,” gallery of useful Works macros, special uses for macros.
- *Chapter 9—Managing Works.* Using Works with your Macintosh, floppy and hard disk management, methods of starting Works, using RAM disk and RAM cache, applying Finder macros with Works, explanation of Works files. Using “add-ins” with Works, desk accessories, RAM-resident utilities, FKEYs, some popular add-ins and how to get the most out of them, guidelines for using add-ins.
- *Chapter 10—Customizing Works.* You can customize Works using readily available Macintosh editing utilities, changing menus, altering pointer shapes, working with icons, reorganizing dialog boxes, attaching special fonts and desk accessories directly to Works.
- *Chapter 11—Using Works with Other Programs.* Importing and

exporting word processing, spreadsheet, and database data, copying and editing chart graphics, using stand-alone drawing programs with Works, importing graphics to Works.

- *Chapter 12—Printing with Works.* Using Works with all popular types of Macintosh printers, selective printing, understanding and using the Print and Page Setup dialog boxes.
- *Appendix A—Sources for Products and Information.* Names and addresses of companies mentioned in this book.
- *Appendix B—Table of Character Sets.* Complete printable character sets for four common Macintosh fonts.
- *Appendix C—Editable Works Resources.* Brief description of editable Works program resources.
- Index

CONVENTIONS USED IN THIS BOOK

This book uses several conventions to make your reading go faster. You should know the basic functions of the Macintosh before using this book, and understand instructions such as click, double-click, drag, and so forth. If you are unfamiliar with any of these terms, take a moment to study the Macintosh user's manual.

Many of Works' features, such as its drawing tools, are referenced by their function names and are treated as if they are real-life objects. In text, you may see, *Click the arc tool* or simply, *Click the arc*.

Menus and commands vary from module to module. If you cannot find the proper command or menu, check to be sure you are using the correct module.

Keyboard shortcuts and some supplementary commands are invoked by pressing two or more keys at the same time. In text, instructions on which keys to press will be indicated by a phrase like *Press the Command, Option, and S keys* or, more simply, *Press Command-Option-S*. In both cases, you depress all the keys simultaneously to achieve the desired effect. From now on, keys you press will be shown in bold, such as **Command**.

The labeling of keys on various versions of Macintosh keyboards may differ. This book uses these standard references for the keys.

Key	Meaning
Esc	Escape
Tab	Tab express
Command	Command (may be marked with cloverleaf and/or open apple symbol)
Option	Option
Shift	Key shift
Spacebar	Spacing bar at bottom of keyboard (usually unmarked)
Return	New line key, at right edge of alphabet keys
Enter	Enter key, in numeric keypad
Delete	Delete key, usually key on top row, next to “+/=” (called “Backspace” in MacPlus and older Macintosh models)
Right cursor	Right cursor key, marked with right arrow
Left	Left cursor key, marked with left arrow
Up cursor	Up cursor key, marked with up arrow
Down cursor	Down cursor key, marked with down arrow

Works does not make specific use of the function keys (F1 through F12) found on extended keyboards. However, you may use these keys with various desk accessories and utility programs, such as Quickeys. In text, the control key is noted by **Ctrl**; the function keys are noted by **F1** through **F12**.

Inside MS Works 2 for the Macintosh

General Tips for Using Microsoft Works

Microsoft Works is comprised of four modules: word processor, electronic spreadsheet, database, and communications terminal, plus two additional “mini-modules” for free-hand graphics and business charting. Works combines these capabilities into one package that permits text and numbers created in one module to be readily exported and used in another.

Works is known for its simplicity and ease-of-use; unlike some other programs for the Macintosh, Works doesn't provide a half-dozen ways to accomplish the task or invoke a command. This isn't to say that Works is without its shortcuts, or that all of Works' features are equally logical and understandable.

In this chapter, you'll learn about many shortcuts that apply to Works in general—some you may have found on your own, and some may be completely new to you. And, you'll discover how Works best shares data between modules, how to properly save and maintain documents from within Works, how to set up Works Stationery, and how to assemble Works document sets.

BASIC WORKS REVIEW

Following is a basic review of Works icons and startup procedures. If you are already familiar with this information, you may want to skip directly to the section on keyboard shortcuts.

Meaning of Works Icons

Works creates files with up to 16 different icons, some of which are very similar to one another. Here's a rundown on Works icons, and the meaning of the files they represent.



Main Works program—Contains all of the Works applications.



Works on-line Help—Provides help summary when using Works. If this file is not available, Works can't provide help.



Works Desktop document set—Works remembers up to 16 previously saved documents so that you can easily open them again at a later time. The default name for this file is Works Desktop, but there can be any number of Desktop files on the disk, each with a different name.



Word processing document—Created with the Works word processing module, and saved in the Normal file format.



Database document—Created with the Works database module.



Spreadsheet document—Created with the Works spreadsheet module.



Communications document—Created with the Works communications module. Can contain communications setup parameters and/or text.



Word processing Stationery document—Word processor template document.



Database Stationery document—Database template document.



Spreadsheet Stationery document—Spreadsheet template document.



Communications Stationery document—Communications template document.



Text-only file—File saved either with the word processor using the Export or RTF options, or with the Save Text command in the communications module. Also used to save homonym and user dictionary files.



Spelling dictionary—Contains the main Works spelling words.



Preference file—Record-keeping preference file used to monitor and remember certain options with the spelling checker.



Macro file—One or more recorded Works macros.



Undefined file—One of many types of undefined files Works creates. The homonym table is one example. Others are PostScript files saved to disk (instead of printing directly on the LaserWriter). One or more of Works, other icons may take this form after a serious disk error, although the program will usually continue to function.



HyperCard stack—A programmed application in HyperCard as a guided tour for using Works. The HyperCard program is required to use this file.

Starting Works

You may start Works in a number of ways. As an application on the Desktop, you can click on the Works icon to select, then choose the Open command from the File menu. Or, more simply, just double-click on the Works icon. If Works is the main program you use, you should consider making it the Startup application. This is done with the Set Startup command in the Special menu (at the Desktop). See Chapter 9, “Managing Works,” for more information on this topic.

Opening Documents

When Works loads, it first displays a copyright page, pauses, then displays its Open File dialog box, as shown in Figure 1-1. There, you can open an existing Works document, or create a new one.

- To open an existing Works document, find it in the file list window (click one of the icons once to identify a document type; All Works Types displays all Works documents, except Text-only files).
- To open a new Works document, double-click on one of the application icons (word processor, database, spreadsheet, communications).

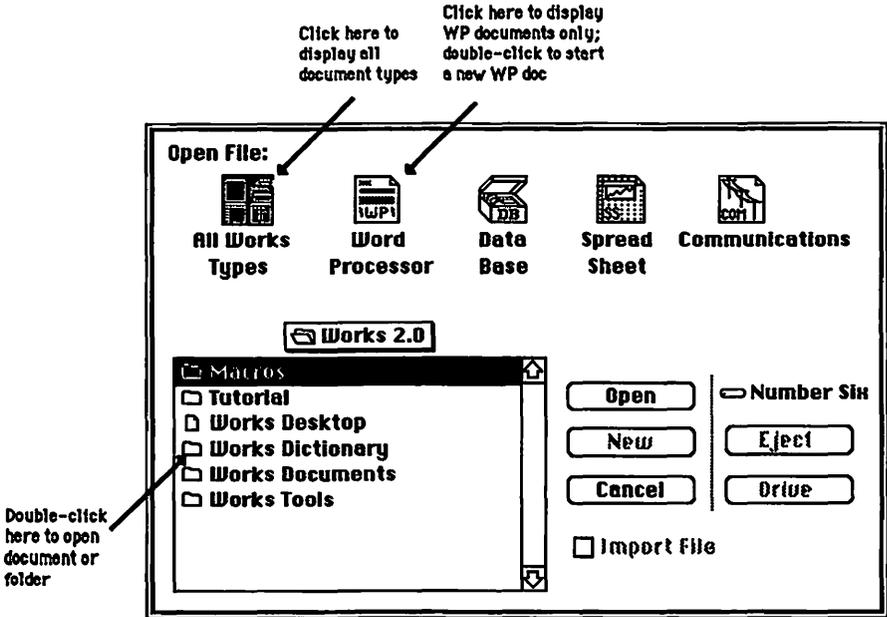


Figure 1-1 *Open Dialog Box with Callouts for Shortcuts*

The Open File dialog box automatically appears when all document windows are closed in Works.

KEYBOARD SHORTCUTS WITHIN DOCUMENTS

Works is designed for almost total mouse control, an unusual characteristic since Microsoft has made considerable efforts to imbue keyboard equivalents for mouse commands in all its other Macintosh applications. Though Works lacks a great number of keyboard equivalents for mouse commands, those it does have can, over the long run, save you a great deal of time.

Keyboard Shortcuts for the Document Window

Works provides no direct means of manipulating the currently active document window by keyboard control. You must use the mouse to move, resize, or scroll windows. However, Works *does* let you easily cycle through several open documents using just the keyboard, and permits use of a few keyboard “modifiers” that change the way mouse movements affect the window.

- When more than one Works document is open, pressing **Command-**, (**Command** and **comma** key together) activates the next available window. “Next available” means the window immediately below the currently active one. The **Command-**, shortcut is an alternate method of activating the specific window you want from the Window menu. Note that the currently active window is shown with a striped title bar, shown in Figure 1-2. The Works menu bar changes depending on the type of document currently active.
- Pressing and holding the **Shift** key while you click the up or down scroll arrows in the Works word processor scrolls the window in “micro steps.” Normally, pressing the up and down scroll arrows moves the document 1/2 inch. With the **Shift** key depressed, scrolling is limited to 1/6 of an inch, or approximately one line. The technique can also be used when using the right and left scroll arrows. Normally, horizontal scrolling moves the contents of the window one inch at a time; with the **Shift** key, scrolling is limited to approximately 1/16th inch movements.
- Enhanced keyboards contain additional keys that Works uses in many of its modules:

<i>Key</i>	<i>Action</i>
Home	Moves mouse pointer to top of scroll bar. Makes mouse pointer disappear, but scrolls to top of document.
End	Moves mouse pointer to bottom of scroll bar. Scrolls window to bottom of document.
Page Up	Moves insertion point up one page.
Page Down	Moves insertion point down one page.

Keyboard Shortcuts for Menus and Commands

Works offers keyboard equivalents for some of its menu commands. These are invoked by pressing the **Command** key with a letter key. The equivalent keys change depending on the currently active module. Table 1-1 presents a list of the command key equivalents using the various modules of Works (note that Draw is treated as a separate module).

In addition to these keyboard shortcuts, Works supports special command equivalents when using the macro and communications tools.

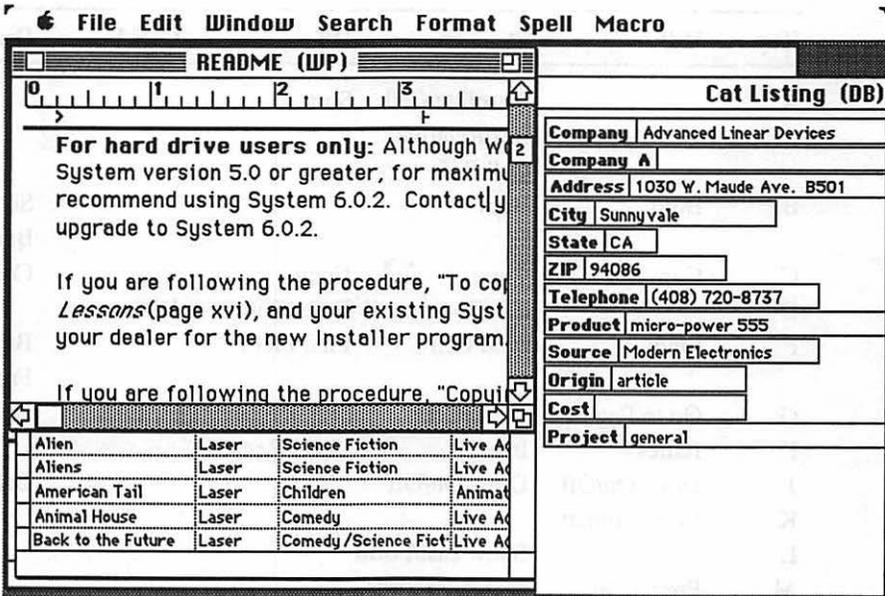


Figure 1-2 Windows with Title Bars Active and Inactive

Macro Key Equivalents

Key	Result
Option-= (equal)	Start recording
Option-- (hyphen)	Stop recording
Option-Delete	Play back macro
Command-. (period)	Stop macro in progress

Communications Key Equivalents

Command-Option-3	Break
Command-Option-Delete	Delete
Command-Option-[	Escape

Additional information on the use of these command shortcuts, and what they do, can be found in Chapter 7, "Communicating with Works," and Chapter 8, "Saving Time With Macros."

Key	WP	SS	DB	COM	Draw
A		Absolute Cell Ref/Relative Cell Ref	Sort		
B	Bold	Bold			Send to Back
C	Copy	Copy	Copy	Copy	Copy
D		Fill Down	Enter Date	Dial	
F	Find	Find Cell	Find Field		Bring to Front
G	Go to Page #	Go to Cell			Group Pic
I	Italics	Insert	Insert Record		
J	Draw On/Off	Draw On/Off			Draw Off
K	Copy Format				
L		Show List/Form			
M	Prepare to Merge	Match Records			
N	Normal Text	Normal Text			
O	Open	Open	Open	Open	
P	Print	Print	Print	Print	
Q	Quit	Quit	Quit	Quit	
R	Replace	Fill Right			
S	Save	Save	Save	Save	
T			Enter Time		
U	Underline	Underline			Ungroup Picture
V	Paste	Paste	Paste	Paste	Paste
W	Close	Close	Close	Close	
X	Cut	Cut	Cut	Cut	Cut
Y	Paste Format				
Z	Undo	Undo	Undo		
=		Calculate Now		Hang Up	
"			Duplicate field in previous record		
+				Hang Up	
,	Switch Doc	Switch Doc	Switch Doc	Switch Doc	

Table 1-1 *Command-Key Equivalents, All Modules*

Keyboard Shortcuts for Dialog Boxes

Unlike many other Microsoft applications for the Mac, Works lacks the fundamental ability to control dialog boxes via the keyboard. Even so, Works does support some keyboard shortcuts, many of which are standard to just about any Macintosh program. They are worth reiterating here.

- Pressing the **Return** or **Enter** key selects the the action button, typically labeled OK or Cancel. The default action button is normally shown with a double-outline.
- Pressing the **Tab** key expresses the insertion point to the next text field box, if any. Text field boxes hold text you write from the keyboard.
- The text field boxes support traditional Macintosh writing and editing standards. That is, use the mouse to indicate a new insertion point, select text, delete text, or backspace over previously written text.
- Pressing **Command-O** from within the New dialog box (from the File menu) displays the Open File dialog box, where you can choose from among Works documents you've already created.
- Pressing **Command-Q** from within some dialog boxes (like Open and New from the File menu), activates the Quit command. So be careful!
- In a few dialog boxes, pressing **Command-.** (**Command** and period) is the same as selecting the Cancel button. These dialog boxes are:

General Menus (all applications)

- Open (File menu)
- Save (File menu)
- Save As (File menu)
- Delete (File menu)
- Save Works Desktop (File menu)
- Playback And (Macro menu)
- Open Macro File (Macro menu)
- Save Macro File (Macro menu)
- Save Macro File As (Macro menu)

Word Processor

- Dictionary (Spell menu)

Communications

- Capture Text (Communications menu)

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- Send Text (Communications menu)
- Receive File (Communications menu)
- Send File (Communications menu)

Additional keyboard shortcuts are available in Open and Save dialog boxes, which show a list of folders and files saved on disk.

- Press the **Left** and **Right** arrow keys to move the insertion point right or left in the Text Entry box (Save Files dialog boxes only, such as Save, Save As, Save Macro, etc., when there are already characters in the box).
- Press **Up** (Up arrow) to move up one file or folder in the List File box.
- Press **Down** (Down arrow) to move down one file or folder in the List File box.
- Press **Command-Up** to move up one level of folders.
- Press **Command-Down** to move down one level of folders (open the folder).
- Press a letter key (**A** through **Z**) or a number key (**0** through **9**) and the first available file or folder that begins with that letter is selected. Press additional keys within the delay time you have set in the Control Panel desk accessory (usually 1/4 of a second or faster), and you can narrow the selection to the specific file or folder you want.
- Press **A** or the **Spacebar** to shuttle to the beginning of the list; press the **** (backslash) character to go to the end.
- Press **Tab** for the same effect as pressing the Drive button.
- In an Open Files dialog box, the **Return** and **Enter** keys are equivalent to the Open button.
- In a Save Files dialog box, the **Return** and **Enter** keys are equivalent to the Save button.
- Press **Command-Shift** and number **0**, **1**, or **2** to eject disks from one of the floppy disk drives, depending on the model of Macintosh (the Mac beeps if the computer lacks the drive specified; for example, pressing **Command-Shift-0** when using a Macintosh SE without an external drive causes an error beep):

Command-Shift-#	MacPlus	SE	II/IIx
0	n/a	External	n/a
1	Internal	Lower	Right
2	External	Upper	Left

Although not a keyboard shortcut, clicking on the disk icon above the Drive and Eject buttons in Open and Save dialog boxes brings you directly to the top of the disk folder hierarchy.

OPTIMIZING DOCUMENT WINDOWS

Moving through the various Works documents involves almost exclusive use of the mouse. Depending on available memory, you can have up to 16 windows open at the same time. Critical components of Works windows are shown in Figure 1-3.

Each window is initially opened to “98 percent” full size; that is, the edges of the window almost touch the borders of the screen. Clicking in the zoom box of the window (upper right corner) enlarges it to 100 percent. The zoom box actually toggles between full-size and one preset size (the preset size is initially preset by Works as “98 percent”). Double-clicking the window title bar or within the size box (lower right-hand corner) also zooms the window.

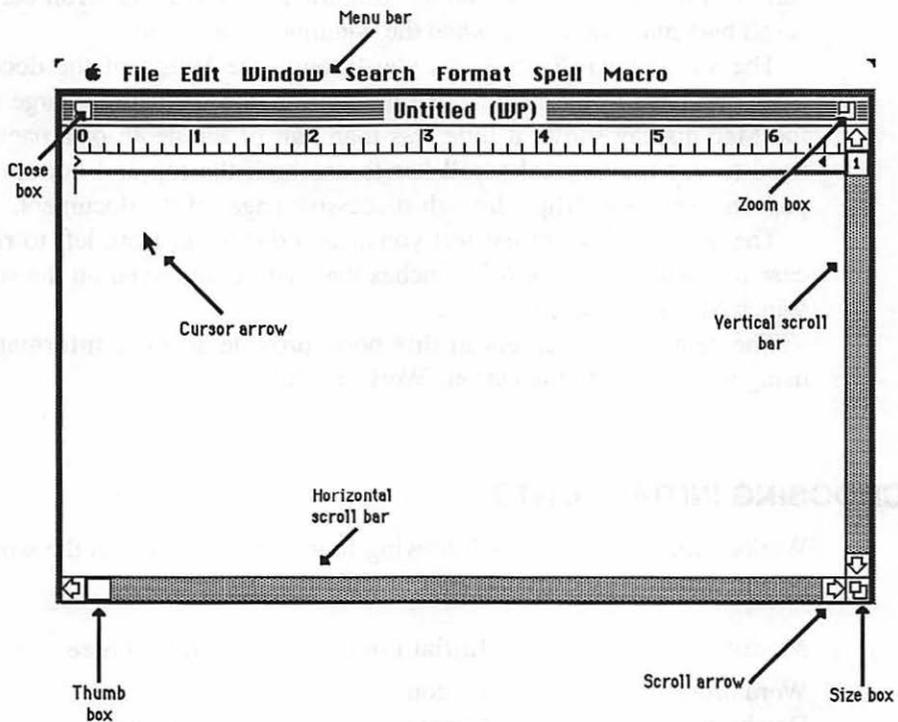


Figure 1-3 Sample Window with Callouts

You can manually resize any window by dragging in the size box, located in the lower right corner. Then, you can click the size box to toggle between full-size and your preset size. You can also tug the window to a new location by dragging it by the title bar. Works remembers both the size and placement of the window.

You can use this feature to toggle between full-size and a preset size and position. With four word processing windows open, you can adjust their size and position so that each takes up one quadrant of the screen. Because the windows are no longer stacked on one another, it can be difficult to tell which one is currently active. But one indicator will never let you down: the currently active document is the one with the striped title bar. To activate a different window, simply click anywhere on it with the mouse. Alternatively, you may select the document you want to use from the Window menu, or press **Command-**, (**Command** and comma key) until the desired document is active.

When you wish to work with a window full-size, click the zoom box and the document will return to fill the entire screen.

Usually, you will have only one window open and it will fill the entire screen. Assuming there is already text in the document, the most basic form of moving around within the window is by using the scroll bars. The scroll bars may not appear when the window is very small.

The vertical scroll bar takes you through the length of the document, from one page to the next. Note that unless you are using a large screen, the Mac display shows a little less than half of the depth of a page. You need to use the vertical scroll bar to see both the top and bottom of the page, as well as to “flip” through successive pages of the document.

The horizontal scroll bar lets you scan a document from left to right, in case it is wider than the 6 3/4 inches that can be displayed on the standard 9-inch Macintosh screen.

The remaining chapters in this book provide specific information on using windows with the various Works modules.

CHOOSING INITIAL FONTS

Works initially chooses the following fonts when working in the word processor, database, and spreadsheet modules:

Module	Initial Font	Initial Size
Word processor	Boston	10 point
Database	Geneva	9 point
Spreadsheet	Geneva	9 point

If Boston is missing from your System file, Works selects Geneva instead.

Works uses these initial fonts for each new document you open. Works also initially selects Boston 10 point when using Draw, but remembers your font choice if you turn Draw off and on during a single editing session.

Boston is a special font that has been optimized for best appearance on both the Macintosh screen and on paper when printed with the ImageWriter. It comes on the Works distribution disk from Microsoft. If you don't use the system file supplied with the distribution disk on your Works setup, Boston will be missing from the available fonts, and Works will default to Geneva 10 point instead. You can always transport Boston to your working disk with Apple's Font/DA Mover. The Boston font is not designed to be used with the LaserWriter, and has no direct substitution. You should designate either a LaserWriter font (such as Times or Helvetica) or use a substitutable font (New York, Geneva) when printing with a LaserWriter.

You can change the initial font selected by application by using a suitable utility program, such as ApFont (Shareware). Application font changes, like ApFont, provide a means to designate any currently installed font as the default font. To work with Works, you must remove all Boston fonts; otherwise, Works overrides the application font information and uses Boston for the word processor module. Assigning a new application font affects the word processor module only. The Geneva fonts specified for the other modules are not changed. Be sure to use application font changers carefully; the effects may be unpredictable.

ACCESSING HELP

Although the Works on-line help is a basic feature that needs little explanation, many users are confused about how to use it best.

Module-Specific Help

Pressing **Command-?** (or **Command-/** activates Works' on-line help system (there's no need to depress the **Shift** key to obtain the question mark). Alternatively, you can access help by choosing the Help command in the Window menu.

The general help topic reflects the current Works module you're using. When using the word processor, for instance, Works opens the WP Help window.

You'll note that the individual help topics are arranged in menu/com-

mand order (starting from the Apple menu), and start with a brief introduction on using the help feature. The help topics are not organized in alphabetical order.

You may review the contents of the Help window by using the scroll bars. To see more of the help text, click the zoom box in left upper right corner of the window. You can also manually adjust the size of the window with the size box, located at the lower right corner of the window.

At any time, you can quickly go to a specific help topic by choosing a menu command with the mouse (within Help, the pointer is shaped like a question mark, as shown in Figure 1-4). You can also go to a specific help topic if the desired command has a key equivalent. Press the appropriate keys (such as **Command-N** for new), and the desired help text will be displayed in the window.

To close the Help window, click the close box (upper left corner of the window). You can also switch to another open Works window by clicking outside the Help window, or by activating another window in the Window menu.

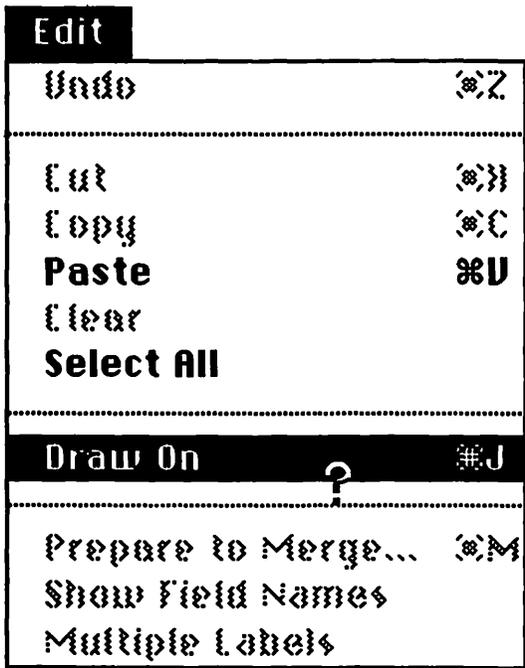


Figure 1-4 Accessing Help with Question Mark Pointer

Command-Specific Help

If you already know the command you want help on, you can activate the Help window and go directly to the desired topic. Here's how:

1. Highlight the command with the mouse.
2. Press **Command-?**.

For example, to find help on the Close command, highlight the command in the Edit menu (to highlight, keep the menu drawn down; don't release the mouse button). Then, press **Command-?**.

Many Macintosh keyboards have only one **Command** key located to the left of the **Spacebar**. This can make it tough for people with small hands to press the **Command** and **?** keys together. But with a bit of practice, you should be able to master it.

SHARING DATA BETWEEN MODULES

The ability to share data among the various Works modules is perhaps the program's strongest feature. Sharing data within a particular module is a rather simple task of copying and pasting. But because each Works module generates data in a unique format, transferring data between modules requires a bit of planning and careful execution.

Within a Document

Follow the standard procedure for copying and pasting data within a single document. Before you can issue the Copy command, you must first indicate the data (word processor text, graphics, spreadsheet formula, etc.) you want to duplicate. The exact method of selecting data differs from Works module to module.

Once the desired data is selected, issue the copy command (press **Command-C** or choose Copy from the Edit menu). Select an insertion point elsewhere in the document, then paste (**Command-V** or choose Paste from the Edit menu).

As with most Macintosh applications, Works maintains a single Clipboard that can hold one clipping. Once the data is in the Clipboard it can be pasted as many times as you like. The Clipboard can hold a maximum of 32K of data at one time.

If you wish to move data within a Works document rather than copy it from place to place, use the Cut command instead (**Command-X** or choose Cut from the Edit menu).

Between Like Documents

Transferring data between like Works documents (word processor to word processor, for example), requires that you cut or copy the desired data from one document, open or activate a different document, then issue the Paste command. You might use this method to transfer standard “boilerplate” text from a glossary document into the current document (such a method is fully explained in Chapter 2, “Writing with Works”). As long as the data remains in the Clipboard, you can paste it into as many documents as you wish.

Between Unlike Documents

The format of text created in the word processor is significantly different than the format of data created in the spreadsheet. Though Works allows you to cut and paste data between modules, you must account for the variance in formats.

In general, Works creates three different types of data:

- Non-delimited text, as created in the word processor and communications terminal.
- Tab-delimited text, as created in the spreadsheet and database.
- Object-oriented graphics, as created with the Draw and business graphics “sub-modules.”

Figure 1-5 shows the interaction of these data types and Works modules. Data transfer isn’t always a two-way street. Charts can be copied from the business graphics component to the word processor, but text from the word processor can’t be pasted into a chart.

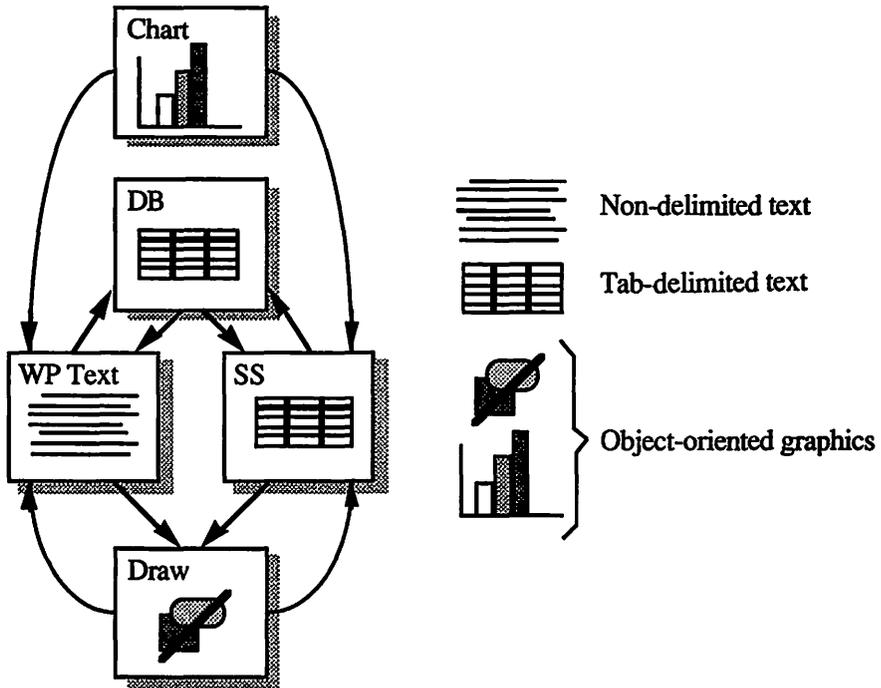


Figure 1-5 *Chart of Data Types and Relationships*

An Explanation of Data Types What is “non-delimited” text? In certain data formats, individual pieces of information are divided into compartments or parcels. The parcels are separated by *delimiters*, usually either commas or tabs (Works uses tabs). Text in the word processor may contain commas or tabs, but neither serves to compartmentalize the text you write. In other words, non-delimited text is simply a set of characters that flow from the beginning of the document to the end.

Tab-delimited text, on the other hand, is divided into discrete units, each unit separated by an invisible tab character. Tab-delimited text is used most often to mark the boundaries of cell contents in spreadsheet or database applications. If more than one cell in a particular row of cells is selected, the spreadsheet program separates the contents of each by automatically inserting invisible tab characters.

This maintains the compartmentalization when the data is copied into other cells, and produces tab spaces when the data is copied to a word processor, as shown in Figure 1-6. Further, the individual rows of cells from the spreadsheet are separated by invisible return (new paragraph) characters.

Expenses	May	Percent	June
Basic Food	\$30000		\$10000
Special Food Requests	\$0		\$6000
Lodging	\$6000		\$20000
Bicycles	\$20000		\$5000
Promotions	\$12000		\$12000
Total Expenses	\$122000		\$53000
Total Budget Available	\$135000		\$67500
Under (Over) Budget	\$13000		\$14500

Figure 1-6 Data from SS to WP

When spreadsheet data is transferred to a word processor, cell rows are separated by hard returns. Works uses tab-delimited formats with both its spreadsheet and database modules.

From Spreadsheet to Word Processor If you're pasting tab-delimited data from the Works spreadsheet or database to the word processor, set up the ruler with tabs where you want the contents of the cells to be positioned. When the data is pasted, it will conform to the tabs you set. If you like, once the data has been transferred, you can adjust the positioning of the data by shifting the tabs along the ruler. The formatting may be disrupted if one or more of the cells contains more text than will fit between the tab markers.

You can also apply these instructions for transferring text from the database to the word processor module. View the database document in List form, and select the fields and records from there.

From Word Processor to Spreadsheet Going from the Works word processor requires you to prepare the data before cutting and pasting. Attempting to transfer unformatted text to the spreadsheet module results in a hodgepodge, as shown in Figure 1-7, allowing only about 65 or 70 characters to be placed in each cell. Prior to selecting the data, add tabs and hard returns so that Works will correctly transfer the data into individual columns and rows in the spreadsheet.

	A	B	C	D	E	F
1	ExpensesMay	PercentJune				
2	Basic Food\$30000	\$10000				
3	Special Food Requests\$0	\$6000				
4	Lodging	\$60000\$20000				
5	Bicycles\$20000	\$5000				
6	Promotions\$12000	\$12000				
7	Total Expenses\$122000	\$53000				
8						
9	Total Budget Available\$135000	\$67500				
10						
11	Under (Over) Budget\$13000	\$14500				
12						
13						
14						
15						
16						
17						

Figure 1-7 *Hodgepodge Transfer into SS*

Data tables are perhaps the most common data you'll be transferring from word processor to spreadsheet. These tables may have been drafted in the word processor, or captured from an on-line information service using the communications module. In any case, before attempting to transfer the table from the word processor to spreadsheet, be certain that it is in the correct tab-delimited format. Even though the table may appear in table form, the columns of data may not be separated by tabs.

Here's a real-world example. Let's say you've downloaded a set of financial quotes from Dow Jones News and Retrieval. The individual parts of each quote are separated by a blank space, not true tabs. In order to transfer the data to the spreadsheet, you must edit the downloaded document with the Works word processor and replace the spaces between each part of the quote with a tab. (Note: Works will also treat two or more spaces as the equivalent of tabs, but you may still want to exchange the spaces for tabs to make formatting in the word processor easier.) You can do this manually by selecting the blank spaces between quotes and pressing the Tab key, or by taking advantage of the word processor's Replace command. Specifically:

1. Count the number of spaces between two quotes.
2. Choose the Replace command from the Search menu.
3. Type the desired number of spaces into the Find What: entry box.

4. Move the insertion point to the Replace With: entry box (use the mouse or press the **Tab** key).
5. Enter a Tab character by pressing the Tab insert button, located above the Cancel button (alternatively, press **Option-t** (lowercase t) to manually enter the Tab character.
6. Click the Replace All button. Works beeps and displays a dialog box when it has found all occurrences of x number of spaces.

Remember that Works replaces the indicated number of spaces with Tab characters throughout the entire document, even if the table is only a small part of a larger document. You can limit the replace range by selecting just the table.

If necessary, you may replace each occurrence of spaces under your control. Instead of choosing Replace All, click the Find Next button while in the Replace dialog box. This finds the next occurrence of the spaces, but doesn't replace anything. You can skip the spaces by pressing Find Next again, or substitute the spaces for a Tab character by pressing the Replace button.

You can also apply these instructions for transferring text from the word processor to the database module. View the database document in List form.

From Graphics to Word Processor Charts made with the spreadsheet module can be readily copied to the word processor or over spreadsheet cells. To copy a chart into the clipboard, display the chart, then choose the Copy command from the Edit menu (or press **Command-C**). Note that the contents of entire chart window are copied, including chart elements, text, and legends.

To paste the chart, open a word processor or spreadsheet document, turn Draw on, select a location for the graphic by setting an insertion point, and choose the Paste command from the Edit menu (or press **Command-V**). Note that all of the chart elements are grouped together, and that one of the chart elements is an invisible white background. This background corresponds to the size of the chart window, as shown in Figure 1-8.

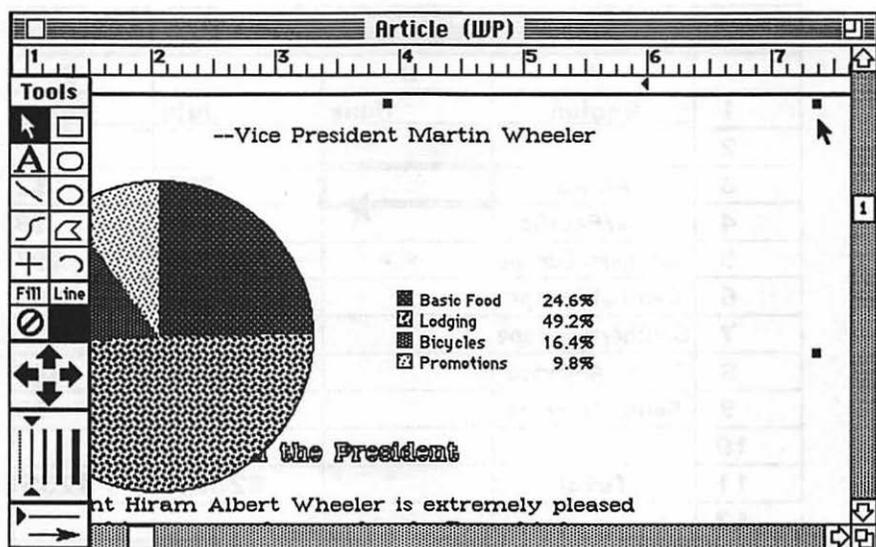


Figure 1-8 *Chart Transfer, with Background, to Word Processor (black squares indicate edge of background)*

You can now use the Draw tools to edit, move, or resize the pieces of the chart. Specific details on working with and editing charts can be found in Chapter 5, "Charting Your Course with Works." You'll also want to refer to Chapter 3, "Drawing with Works," for more information on the Draw feature.

Between Spreadsheet and Database The spreadsheet and database modules share the same type of data format: tab-delimited. You can readily transfer data between spreadsheet and database documents. For ease of use, view the database as a list, not as a form (choose Show List from the Format menu).

When transferring data from the database, select just the fields and records you want to move. Don't try to include the field headings in the selection; Works won't let you, and in any case, will automatically add them when the text is copied to the Clipboard.

To paste the data into the spreadsheet, select just one cell (the upper left cell of the pasted range, as shown in Figure 1-9), then invoke the Paste command. Note that if you paste data over filled cells, Works will erase the old data. If necessary, insert new columns or rows to make room for the pasted data.

When transferring data from the spreadsheet, Works automatically adds the required number of new records to hold the pasted data. There is no need to create new, blank records first.

Sales Projections				
	A	B	C	D
1	Region	June	July	August
2				
3	Africa		\$23	\$2
4	Asia/Pacific		\$74	\$8
5	Northern Europe		\$883	\$97
6	Central Europe		\$738	\$81
7	Southern Europe		\$192	\$21
8	North America		\$384	\$42
9	South America		\$33	\$3
10				
11	Total		\$2327	\$255
12				
13				
14				
15				

Sales Projections				
	A	B	C	D
1	Region	June	July	August
2				
3	Africa	\$80	\$23	\$2
4	Asia/Pacific	\$100	\$74	\$8
5	Northern Europe	\$99	\$883	\$97
6	Central Europe	\$200	\$738	\$81
7	Southern Europe	\$70	\$192	\$21
8	North America	\$95	\$384	\$42
9	South America	\$105	\$33	\$3
10				
11	Total		\$2327	\$255
12				
13				
14				
15				

Figure 1-9 *Readying Spreadsheet for Pasted Text, and Result*

Using Draw Pictures you create using the Works Draw tools aren't really pasted from Draw to another module. Rather, Draw paints graphic images over word processing and spreadsheet documents. That is, you enter Draw from within either the word processor or spreadsheet modules. You then compose squares, circles, and other shapes over a document. When you exit Draw, these shapes remain but you can't edit them. In fact, you can't even select them with the mouse unless you turn Draw back on.

The pictures created using Draw are technically known as object-oriented graphics. An object can be a line, circle, square, or other shape. It can also be one or more lines of text. These graphic objects, also called elements or shapes, are created inside the Macintosh, through a set of QuickDraw software routines in the Macintosh's read-only memory (ROM) chip. Works Draw serves to pull the objects out of the computer and lay them on the electronic drawing surface of the video screen. Each object is defined mathematically.

Object-oriented graphics are different from the way pictures are made in programs like MacPaint. In MacPaint, images are defined by their position on the screen. They are produced with paintbrushes, spray cans, pencils, and other tools that lay down an *ink* composed of small dots. These dots are akin to the grains of sand in a sand painting.

To change a picture using MacPaint, you dust off sand or add more on top, using the program's various tools. In computer parlance, MacPaint is referred to as a bit-mapped graphics program, because its pictures are a map of the bits on the screen.

Object-oriented graphics you create with the Works Draw feature can be edited by other object-oriented programs, such as MacDraw. Likewise, pictures produced by these programs can be imported directly into Works (more on this in Chapter 11). Even though these imported graphics were not produced using the Draw tools, pasting them into a word processor or spreadsheet document automatically invokes the Draw mode. You then use the Draw tools to edit and position the imported graphic.

Note that Works also uses Draw when importing bit-mapped graphics. However, these bit-mapped graphics cannot be edited—other than simple resizing—using the Draw tools. See Chapter 3 for more information about using Draw.

USING UNDO

When you tell a computer program to get rid of a sentence, it does so leaving no trace of the unwanted words. But what if you didn't really want to delete that sentence? What if you issued the delete command by

accident, and you can't remember the wording of the sentence to type it back in again?

Works provides a handy undo feature that reverses the previous action. To undo, choose Undo from the Edit menu (or press **Command-Z**) immediately before doing anything else. Works keeps only the last activity in its undo memory, so you can undo only the *very last action*. To Works, an action is:

- Typing text (almost any length).
- Pressing the **Enter** or **Return** keys.
- Issuing a command from the keyboard or mouse.

Note that scrolling windows, setting a new insertion point, and pressing the **Delete** key are not considered actions, so Works doesn't undo them.

Unlike some other Macintosh applications, the Undo command is not context sensitive, so you have no idea exactly what Works will undo when you issue the command. The Works undo feature is also not as sophisticated as you'll find in some other Mac programs. For example, activating Undo after typing a line or two of text erases the line. If that's not what you had in mind, you're out of luck: Undo removes the text you wrote and fails to remember it. When the Undo command is shown dimmed in the Edit menu, it means there is no action to undo.

More surprisingly, Works doesn't consider the **Delete** key an undo-able action. This can cause some serious side effects if you're not careful. For example, let's say you write a couple of lines of text, then use the **Delete** key to erase the word you just wrote. Then you decide you really want that word, so you try the Undo command. Bad news: Works misunderstands your intentions and undoes all of the lines of text you just wrote. Once erased with Undo, you cannot retrieve the text. Perhaps this more-than-serious fault in the Undo command will be repaired in a future revision of the program.

Works doesn't undo all keyboard or mouse commands, such as any command in the File menu. Fortunately, such commands can often be reversed simply by clicking the Cancel button in a dialog box.

SAVING AND CLOSING DOCUMENTS

Works can keep up to 16 documents open at the same time, depending on the length of the documents and the amount of free memory in your Macintosh. You'll most likely want to save your Works documents onto

disk for later recall or when Works can no longer support all the documents you have open.

Choosing the Save command from the File menu saves the currently active document only (the currently active document is always shown with a striped title bar, and is the first one listed in the open documents tally in the Windows menu). If you are saving the document for the first time, Works asks you to provide a name. You can optionally designate a different folder or disk to hold the file. Works automatically updates previously saved documents without asking for the file name or storage destination.

Works won't let you unintentionally close a document without first saving it (unless, of course, there have been no changes to a previously saved document since you opened it). Works will ask if you want to save the document before closing the window. The dialog box that appears provides three choices:

- *Yes* tells Works you do want to save the document before closing it. If the document has not been previously saved, Works asks for a name and destination; otherwise, the file is updated with the changes you've made. The previously recorded file (the version before you made the changes) is lost.
- *No* closes the window without a second chance. There is no way to retrieve the contents of the document if you accidentally press No instead of Yes (Undo won't work).
- *Cancel* returns you to the document.

Use the Close All command from the File menu if you have many documents open and don't want to close and save each one manually. A dialog box appears (see Figure 1-10) that asks if you really want to close all the currently open Works documents. Answer OK or Cancel, accordingly. Normally, Works will prompt you at each document and ask if you want to save the document before closing. You can bypass the prompt by clicking the Save All Changed Files Without Further Prompting option before pressing OK.

If you are saving a document for the first time, Works will prompt you to name it and indicate where you want the file saved. Note that pressing the Cancel button in the Save file dialog box will cancel the Close All command, not just the document saving routine for the current document. Works doesn't allow you to skip a file without saving it. If you are closing any files without saving them, you need to close them one at a time.



Figure 1-10 *Close All Dialog Box*

FILE MANAGEMENT FROM WITHIN WORKS

Works allows a rudimentary form of file management. This is particularly handy if you do not wish to return to the Finder to delete or move files between disks and folders.

Saving Routine

When saving a file, you have a choice of selecting a different disk or directory than the one that holds the Works program and its support files. To choose a different disk, click on the Drive and Eject buttons as necessary. Note the currently active drive is listed above the Drive and Eject buttons.

You'll be saving most of your Works documents in folders. The current folder (the one that the saved file will be placed inside) is identified at the top of the dialog box, over the File List window. You can easily have folders within other folders, for a hierarchy of document storage. Clicking on the folder name over the File List window shows the hierarchy of folders, with the innermost folder on top. The name of the disk is listed last.

Choose the folder you want to place the file in by selecting it with the mouse. Should you wish to place the document in a folder that is not yet open, find it in the File List window and double-click on it.

Once the proper disk and folder is selected, enter a name for the file in the Text Entry box and click on the Save button.

Renaming or Copying Documents

Once a document has been saved, Works no longer asks for a name, or for a disk or folder for storage. Occasionally, however, you may wish to rename the file, or move it to another disk or folder. The Save As command performs the same function as Save, but allows you to store a document under a new name, as well as on a different disk or folder. Initially, Works offers the same name as the document, but you are free to edit it as desired.

Though you will probably want to use the Finder to copy many files between disks and folders, the Save As method is particularly handy to move or copy one or two documents to another location.

When transplanting a document from one disk or another, or from one folder to another, you'll probably want to delete the original after making the copy. Works lets you remove unwanted files with the Delete command, found under the File menu. The dialog box for Delete lists all of the files available on the current disk/folder, as shown in Figure 1-11, whether or not they are Works documents.

Beware of using the Delete command. Although the command gives you one last chance to change your mind before the file is erased, disposing of a wanted or needed file can cause a grand headache. And while some Macintosh utilities, such as MacTools, can be used to revive previously lost files, such utilities are not foolproof, nor are they always easy to use. Your best defense is to use the Delete command wisely, and with prudence.

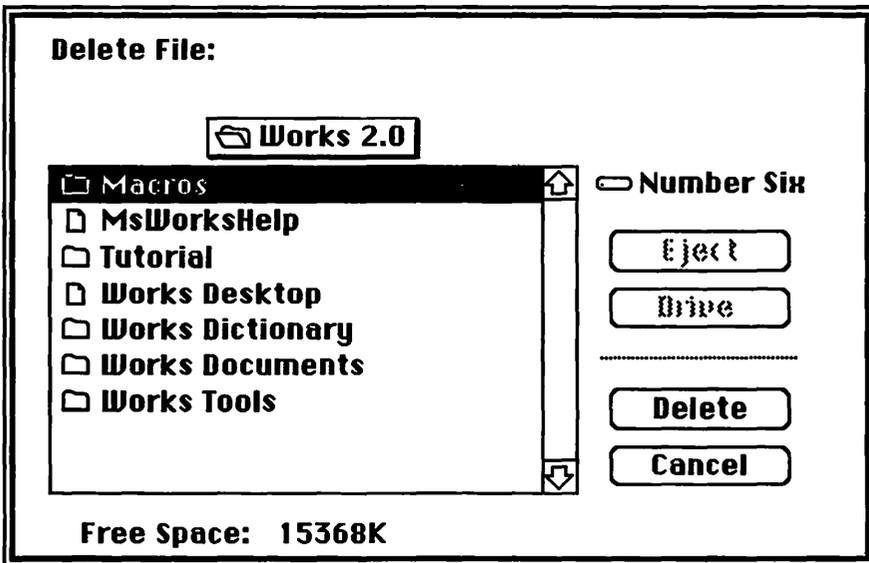


Figure 1-11 *Delete Dialog Box*

WORKS DESKTOP FILES

Works allows a convenient method of recording a set of open documents for later retrieval. The Works Desktop file contains the names of up to 16 documents. When the Desktop file is opened, Works searches for these documents and opens them. You can use this feature to quickly and effortlessly open commonly used documents, or to effortlessly return to a set of documents that you were working with in the last session.

You must first make a Works Desktop file before you can use it and that's easy. With the documents you want named and open within Works:

1. Choose the Make Works Desktop command from the File menu.
2. Provide a name for the file. Works initially offers the name Works Desktop.

Note: Works won't record any untitled documents in the Desktop set.

You can readily locate the Works Desktop file from the Finder; it's shaped like an office desk. Keep in mind that the Works Desktop file simply records the name and location of the files in the set; it doesn't record the actual contents of the documents. Therefore, if any of the documents are subsequently renamed, moved, or deleted, Works won't be able to find them. The program will indicate that one of the files in the Desktop set can't be found, then open the rest.

To open the documents in the set, simply open the Desktop file. You can do this in two ways:

- From the Finder, locate the Desktop file and double-click it. Works starts, and all the documents in the set are loaded.
- From within Works, choose the Open command and be sure that the All Works Types icon is selected. Locate the Desktop file within the list and double-click on it. Previously opened documents are unaffected, but note that Works can open only a maximum of 16 document windows, depending on available memory.

Being able to "instantly" open a set of Works documents is power enough. But Works Desktop files go beyond that. By simply giving different names to the Desktop files, you can create as many document sets as you like. The names of the Desktop files can be as descriptive as you like, as shown in Figure 1-12.

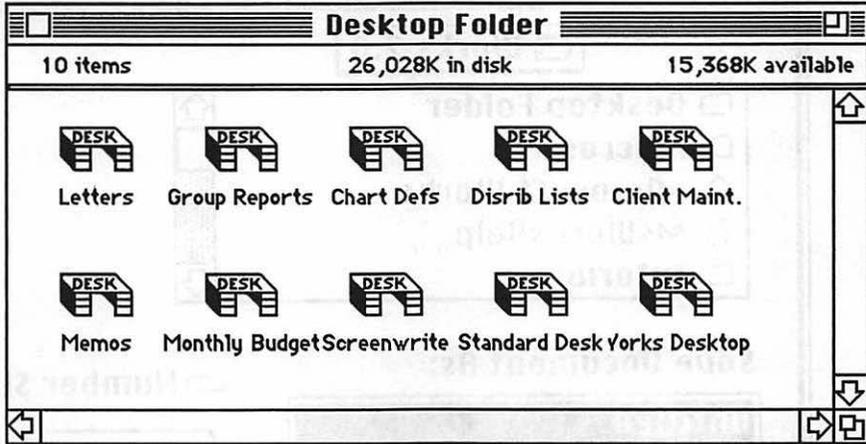


Figure 1-12 Folder of Desktop Files

USING STATIONERY

Blank Works documents can be saved as Stationery, and used as templates for subsequent documents. Stationery can contain character, paragraph, and page formatting, standard text (like common headers or footers), spreadsheet formulas, communications settings, graphics, and anything else you care to throw in. Works Stationery files also remember the position of the insertion point when the document is saved. When the Stationery file is reopened, the insertion point flashes where you left it.

To create Works Stationery:

1. Make the desired formatting and setting changes and write the text you want to serve as standard *boilerplate* elements.
2. Choose the Save command from the File menu.
3. Enter a name for the document, such as "Letter/Form."
4. Click the Stationery button at the bottom of the dialog box, as shown in Figure 1-13.
5. Click the Save button; the Stationery file is recorded on disk.

The original document window remains untitled. Works never lets you edit Stationery files. Close the window without saving it again.

Works uses a slightly different Desktop icon for Stationery than it does for regular documents: you can always tell a Stationery file by its upturned lower right corner.

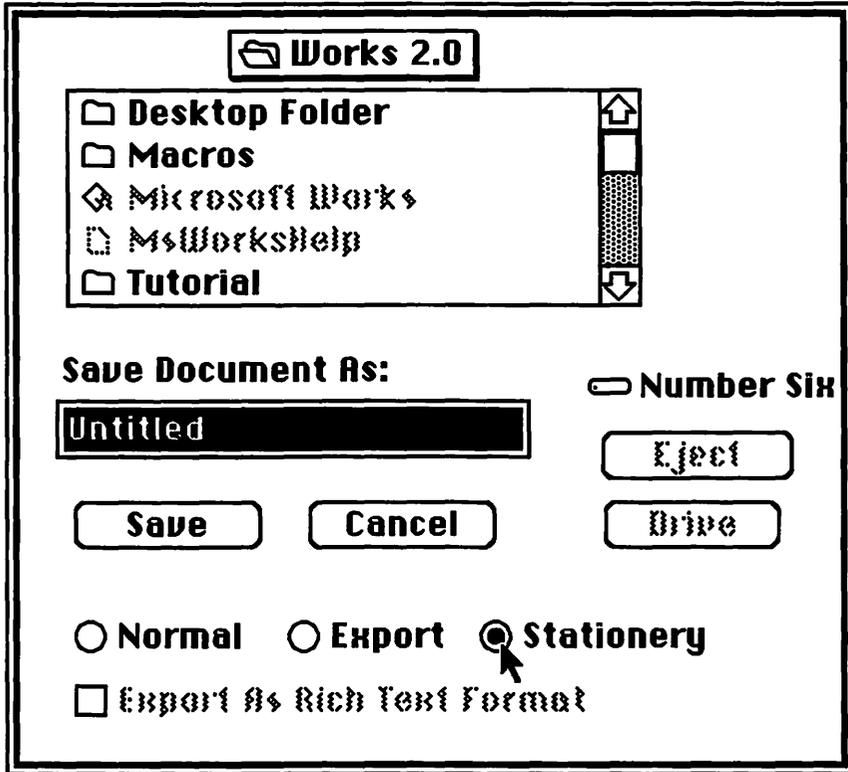


Figure 1-13 Save Box with Stationery Clicked

Stationery files can be opened in either of two ways:

- From the Finder, locate the Stationery file and double-click it.
- From within Works, choose the Open command. Locate the Desktop file within the list (select a document type to help narrow the search, if desired) and double-click on it.

Even though you have opened a Stationery document, Works only uses a *copy* of it, so the original is never altered. If you *do* need to change the original, open the Stationery document as described above, make the desired changes, and save the document under the same name. Works double-checks to make sure you really want to overwrite the old file. Answer Yes to the prompt.

Writing with Works

Word processing is the cornerstone of many businesses. With a word processor, the once tiresome chore of writing memos and letters becomes a simple effort. Granted, the Works word processor is not the most powerful word processor in the world. It lacks many of the finer features found in stand-alone programs. Yet it provides more than 90 percent of the most often desired features of a word processor, and even offers some powerful graphics and layout tools for creating desktop published documents.

While there are few truly “hidden” features of the Works word processor, there are a number of fine-tuning adjustments you can make to use the word processor more efficiently. In addition, you’ll be pleased to discover many gimmicks and work-arounds for adding power to the Works word processor—capabilities that you may not have thought possible.

WORD PROCESSOR BASICS

Figure 2-1 shows the basic function of the Works word processor scroll bars. Note the different actions of the scroll boxes and arrows. Works also has a nifty feature for “micro-scrolling,” introduced in Chapter 1. When holding down the **Shift** key, clicking the scroll arrows moves the contents of the window just a fraction of an inch at a time. This feature is most helpful in the word processing module.

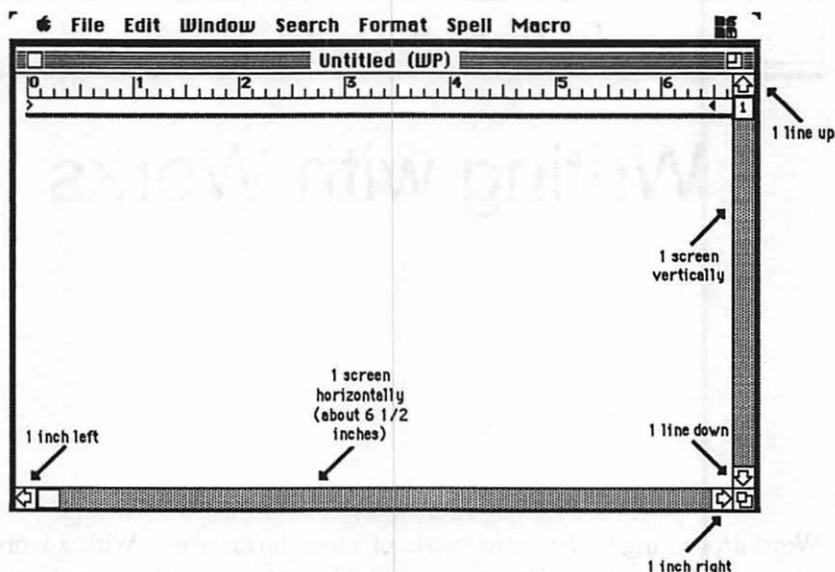


Figure 2-1 WP Window with Callouts for Operation

Selecting Text

In Works, as in most other Macintosh applications, you first select the text you want to manipulate, then you specify what you want to do. Works lets you select text in a variety of ways. Some of these methods require that you click in the *selection bar*, an invisible section on the far left side of the document window. The pointer must be arrow shaped for the selection to work.

To select

- An insertion point
- One or more characters
- A whole word
- One line
- One paragraph
- A range of text
- Entire document

Do this

- Click at the desired spot.
- Drag over them.
- Double-click on the word.
- Position the pointer in the selection bar next to the line and click.
- Double-click in the selection bar next to the paragraph.
- Position the pointer at the start of the section of text and drag to the end, or, click at the beginning section of text, press and hold the **Shift** key, and click at the end.
- Choose Select All from the Edit menu.

Using Shift-Click

Shift-clicking is one of the most convenient ways to select text. You click once to set a starting point (called an *anchor*), press and hold the **Shift** key, and click at the ending point. The second click can actually be before or after the anchor.

To see exactly how this works, click within a paragraph of text. This sets a new insertion point and also the anchor for the Shift-click selection method. Press and hold down the **Shift** key (remember to keep it depressed during all this), then click a few lines below the anchor. Notice the text is selected from the anchor point to where you clicked a second time.

You can extend or retract the selection by holding down the **Shift** key again and clicking somewhere else. You can actually keep the mouse button depressed as you extend or retract the selection so that you can visually see the effect of the highlighted text.

Another way to select text using Shift-click is to extend a selection one word, line, or paragraph at a time. Let's say you have highlighted one word by double-clicking on it. Depressing the **Shift** key while clicking on adjacent words selects these words as well (the entire word is automatically selected).

The process also works when extending a selection by lines or paragraphs. To extend by lines, select one line (by clicking within the selection bar next to the paragraph, as outlined above), press **Shift**, and click adjacent lines. Conversely, to extend by paragraphs, select one paragraph, press **Shift**, and click other paragraphs. Remember to select words, lines, and paragraphs using the methods described earlier, or this technique won't work.

Insertion Point Shortcuts

Normally, you'll use the mouse to scroll through a document or to select a new insertion point. But Works also supports the cursor arrows, found on enhanced and extended keyboards, and on the separate Macintosh numeric keypad available for earlier Mac models.

- Pressing the **Right** and **Left** cursor keys moves the insertion point one character at a time.
- Pressing the **Up** and **Down** buttons moves the insertion point one line at a time.

You may wish to use these keys to maneuver the insertion point over a

small area instead of grabbing the mouse and carefully setting a new insertion point manually.

Using Go To Page

The current page number of the word processing document is shown in the scroll box in the vertical scroll bar. The number reflects the page as viewed in the window, *not* the current location of the insertion point, as shown in Figure 2-2. As you scroll the document with the vertical scroll bar, the number changes as each new page advances in the window.

You can use the scroll box page number to find a specific page you want, but an easier way is to use the Go To Page command in the Search menu. Choose the command (by the menu or by pressing **Command-G**), then enter a page you want to shuttle to.

The page range must be between 1 and 2000. If you exceed the total number of pages in the document, Works will respond with the appropriate range to use, such as "Document contains pages 1 through 5." When shuttled to the desired page, Works leaves you at the very top of the page. Clicking the Up arrow once reveals the page break, indicated either by you or by Works.

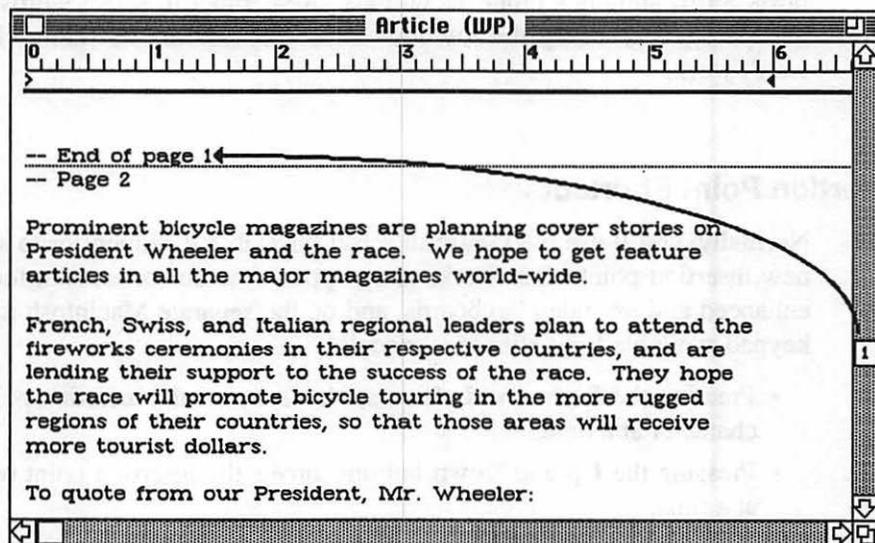


Figure 2-2 *Concept of Page Number and Current Insertion*

Saving Documents

Works word processing documents can be saved in any of four formats:

- Normal
- Export Text-only
- Export RTF
- Stationery

You select the file format you wish to use when saving a document with the Save and Save As commands in the File menu.

Normal

The Normal file format saves word processing documents with all text and formatting intact, just as you wrote it. Works automatically selects the Normal format when saving a document.

Export Text-only

The Export Text-only format is used with documents you expect to use with other word processors or Macintosh applications. Works saves all text (including special characters), but ignores formatting.

Export RTF

RTF stands for Rich Text File, a file format pioneered by Microsoft for easier conversion of documents between applications and computers. Export RTF documents contain the text of the document, as well as English-like formatting instructions, as shown in Figure 2-3. Programs that support RTF reconvert the RTF file, exchanging the instructions with the proper on-screen formatting. To save a file in Rich Text File format, click the Export button in the Save or Save As dialog box, then check the RTF box.

Stationery

Stationery documents contain all the text and formatting of a Normal file, but in a special read-only document that Works opens as a template. You can use the text and formatting of the template to write and edit another

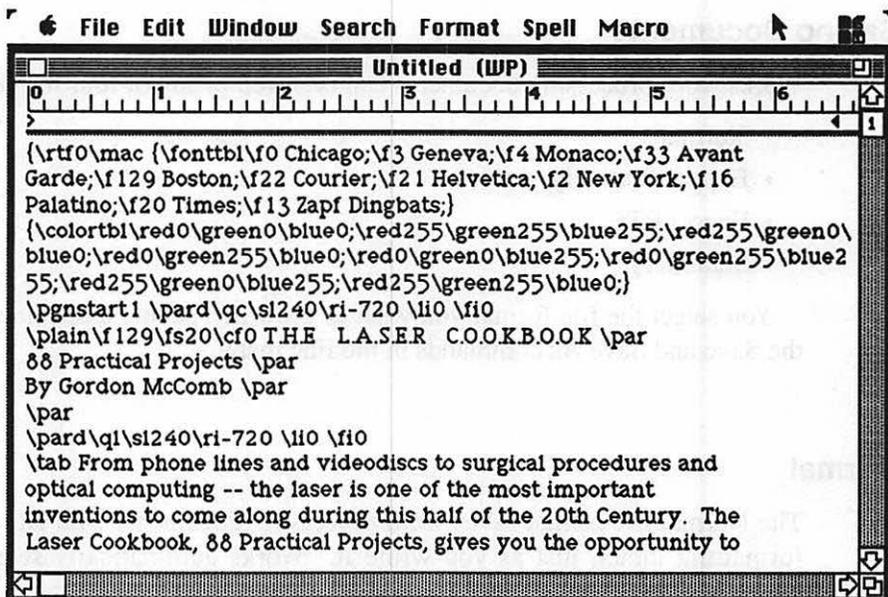


Figure 2-3 Sample RTF File

document. Stationery files can't be edited unless you specifically save a new document (Stationery or otherwise) with the same name as the original.

SETTING PLACE MARKERS

Not all reports, articles, and novel chapters are written in one sitting. Sometimes, you must leave your writing in mid-thought, then pick up again at some later time. Returning to the right spot in the file is no trick when you are simply adding more text at the end of the document. But what if you want to return to the middle of the document, and you are afraid of forgetting where you were? Simple. Set a place marker before you quit the document, then use Works' search feature to find the marker on your subsequent return.

Works lacks a place marker feature (such as that found on WordStar for the IBM PC), but you can readily improvise one of your own. Here's how to do it:

1. Select one or more characters for your place marker, such as @@ or ~. The characters should not normally appear in your document, but should be simple enough so that you won't forget them.
2. Type the characters at the spot to which you want to return.

3. Save the document and quit Works.
4. On your return to Works, open the document and choose the Find command from the Search menu.
5. Enter your place marker characters in the Find What box (such as @@).
6. Press Find Next and Works takes you to the location of the place markers.
7. Press the Cancel button to exit the Find dialog box.

Works automatically highlights the place marker text; press the Delete key to erase the marker text.

Setting place markers is an excellent application for Works macros. You can find full details on macros, as well as how to build a set of macros for setting place markers, in Chapter 8.

SPLIT WINDOW TRICKS

The Works word processor has no provision for split windows. That is, you can't divide one word processing document into two discrete views, and toggle between them. However, you can approximate a split document by creating two separate documents filled with the same text. There are several limitations to this approach—edited text in one window is not reflected in the other, for example—but it can do in a pinch. It is particularly helpful if you need to examine two physically distant parts of the same document.

Suppose that you are writing a business review, and you want to conclude the review by summarizing the main points you've discussed in the article. By copying the article to a second document, you can scroll through the document and examine portions of it while writing the summary. You can keep full paragraphs in full view during writing, so you can capture entire thoughts at a time.

Ideally, Works ought to let you save your document on disk, then open a second copy of it. Alas, it does not allow you to do this. Instead, you must copy the contents of the document to a second, separate window.

1. With the original document in view, choose the Select All command from the Edit menu.
2. Adjust the size of the window so that it fills just the top portion of the screen.
3. Press **Command-C** to copy the document to the Clipboard.
4. Press **Command-N** to open a new document.

5. Click the WP icon to open a new word processing document.
6. Adjust the size of the new document so that it fills the bottom of the screen.
7. Press **Command-V** to paste the contents of the Clipboard into the new document. This may take a while, depending on the size of the original document.

An example of a “split-screen” Works window is shown in Figure 2-4.

Another method for copying the contents of the original document into a new window is to use the Save As command. This method records the document with a new name. You then retrieve the file again by opening the original document.

1. Make any desired changes or editing to the original document and save it. Provide a name if you haven't done so already. Let's say, for example, that the name is *Test*.
2. Choose the Save As command from the File menu and resave the document, this time under a different name. For the example, we'll call the file *Test-1*.
3. Adjust the size of the document so that it fills just the bottom portion of the screen.
4. Press **Command-O** to open a document.

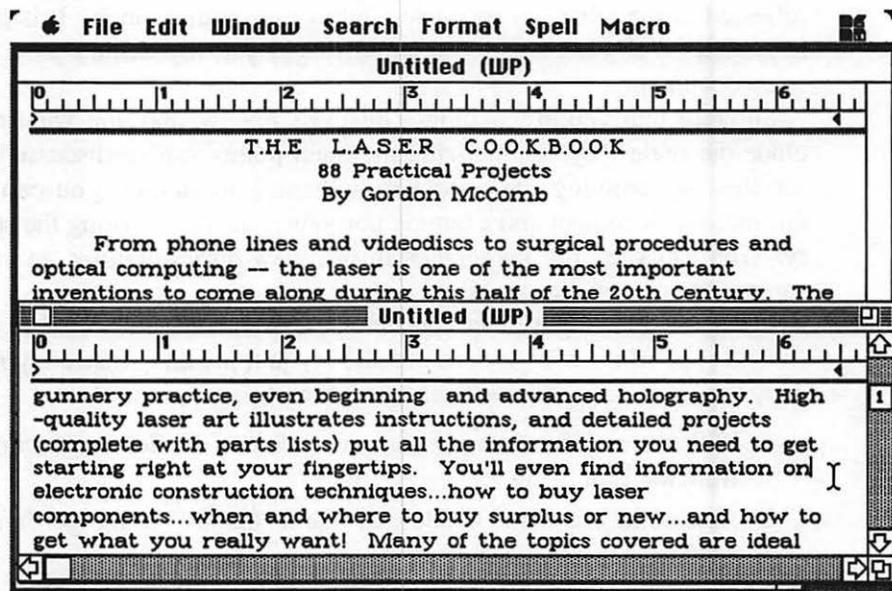


Figure 2-4 Example of Split-screen Window

5. Locate *Test* from the file list and double-click on it.
6. Adjust the size of the document so that it fills just the top portion of the screen.

Use the mouse to move back and forth between the windows, or use the **Command-**, shortcut.

THE WORKS CAST OF CHARACTERS

The keyboard of your Macintosh is your gateway to entering characters into Works. The keyboard represents the alphabetic, numeric, and punctuation characters that appear on any typewriter keyboard.

However, Works offers many special characters that a typewriter and many other word processors don't. Here is an overview of producing special characters in Works, and how to enhance them by taking advantage of the program's font and style features. Though these characters can be produced in any of the Works modules, they have their primary use in the word processor.

Special Font Characters

Works comes with several fonts (also called typefaces) that comprise standard alphabetic, numeric, and punctuation characters, plus some additional ones. Use the Key Caps desk accessory to view the characters in a given font. When Key Caps is open, a new menu appears in the menu bar where you can choose the font you want to examine. Only those fonts currently installed in the System file are shown in the font list.

With the Caps Lock key up (deactivated) and no other keys depressed, the Key Caps window shows unshifted or lowercase characters (for all keys, including the number keys on the top of the keyboard). Press the Shift key (or tap on the Caps Lock key) and the window shows shifted or uppercase characters.

To see the special characters, hold down the **Option** key or the **Shift** and **Option** keys, as shown in Figure 2-5. Almost every font has slightly different special characters so you may not see the same characters as those shown in the figure.

The boxes are not true characters, but undefined keys. Pressing one of these keys will enter a box in the Works document, but the box may not appear when using some printers, especially the LaserWriter. If you need a

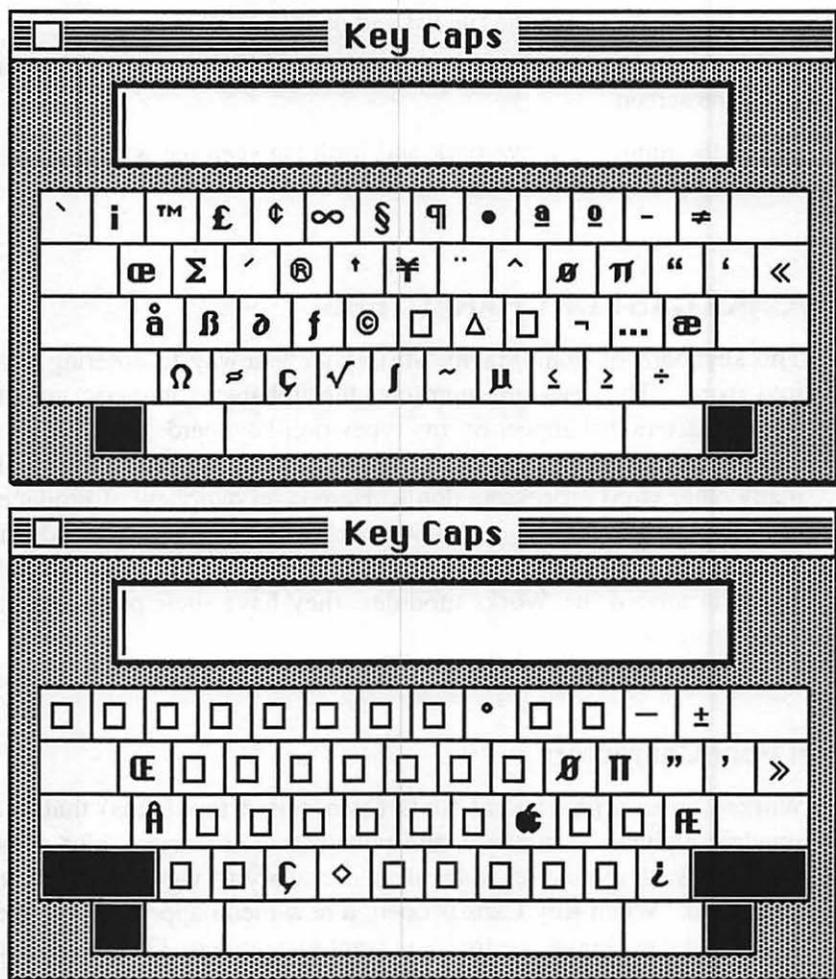


Figure 2-5 Key Caps Option and Shift Option Windows

character that looks like a box, use one of the many symbol fonts, such as Symbol, Zapf Dingbats, Cairo, or Taliesin.

Diacritical Characters

Works—and the Macintosh—are designed for international use. You can readily add accent (diacritical) marks to certain characters by pressing the following key combinations. The accent is added to the next character typed; pressing the **Option** key combination twice creates only the accent character.

<i>Press</i>	<i>To get</i>
Option-`	` (grave accent)
Option-e	´ (acute accent)
Option-i	^ (circumflex or caret)
Option-n	~ (tilde)
Option-u	¨ (umlaut)

These special accent keys produce diacritical marks only on those characters where it is appropriate to do so. For example, pressing **Option-e**, then a lowercase l will not add an acute accent over the letter, because there is no language that uses this character (instead, Works prints 'l'). The list in Appendix B shows all of the possible accented characters you can create on the Macintosh, as well as the keys you press to get them.

If you absolutely must create a non-standard diacritical character you can purchase fonts with zero-width characters, such as the foreign language fonts offered by Ecological Linguistics and Linguists' Software. Typing one of these characters produces a symbol that overlays the next character typed. These can be helpful if you need to create an obscure or special-purpose character that Works otherwise doesn't support.

If you can't locate any zero-width fonts that suit your tastes, a last resort is to create your own using a font editing program. The editing program must match the type of font you are using, either LaserWriter or ImageWriter. Basic editing instructions for ImageWriter fonts are provided in Chapter 10, "Customizing Works."

Ligature Characters

Akin to diacritical characters is the ligature—two characters spaced closely together so that they look like one. Ligatures are rarely used today except in special circumstances and Works and Macintosh routinely support only four: *Æ*, *æ*, *Œ*, and *œ*.

Hidden Graphics Characters

Nearly all Apple-provided ImageWriter fonts also include a couple of "hidden" graphics characters. The chart in Figure 2-6 shows some of the characters found in common fonts (special graphics characters are also sometimes included with third party fonts). You obtain these graphic characters by pressing **Shift-Option-`** (grave accent). As the chart shows, the actual

	9	12	14	18	24	36	48	72
Seattle								
New York								
Geneva								
Monaco								
Chicago								
Venice								
Athens								

Figure 2-6 *Hidden Font Characters*

graphic, as well as its size, depends on the font and font size you have currently chosen.

Non-alphabetic characters are also available in so-called picture fonts, such as Cairo, Taliesin, Symbol, and Zapf Dingbats (both Cairo and Taliesin are Apple fonts; Taliesin is no longer distributed with the Finder and System, but you can occasionally find a copy of it at Macintosh users groups and public domain exchanges).

Hyphens and Dashes

Use hyphens to join two or more words together or to hyphenate words at the ends of lines. Works recognizes one hyphen character, the -, produced by pressing the hyphen/underline key, located next to the zero key on the top row of the keyboard.

Works will never chop up a word if the word is too long to fit at the end of the current line. Instead, it wraps the entire word to the beginning of the next line. Works considers a complete word any set of characters that doesn't include a space, punctuation mark, or hyphen. Therefore, you can use the hyphen character to break a word at the end of the line, such as:

knock-

down

or

**He was wearing a three piece all-
season suit.**

You do not need to manually type a space character to force Works to break the word after the hyphen.

Unlike some other programs, Works will not remove the hyphen if you subsequently edit the line and make it shorter. For ease of use, you should always write, edit, and spell check the entire document before hyphenating it. Otherwise, you may end up with words in the middle of lines that are separated by an unwanted hyphen.

Similar to hyphens are the typographical en (-) and em (—) dashes. The en dash, so called because it is the approximate width of the letter *N*, is often used to hyphenate compound words, and finds its usual application in desktop publishing. The em dash (the approximate width of the letter *M*) is generally used to separate parenthetical phrases, such as:

And the writer—altogether out of his mind—decided to do a book on mastering the fine points of using Works.

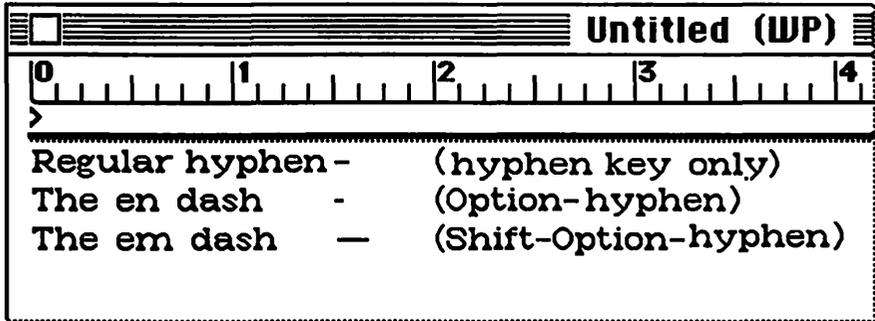


Figure 2-7 Examples of Hyphens, EN and EM Dashes

Examples of the differences among hyphens, en dashes, and em dashes, are shown in Figure 2-7.

- To create an en dash, press **Option- -** (Option and hyphen).
- To create an em dash, Press **Shift-Option- -** (Shift, Option, and hyphen).

Works considers the en and em dashes real characters. The program will not break a word at the end of a line at an en or em dash.

Spacing and Microspacing

Pressing the spacebar prints an invisible space in the document. The actual width of this space is dependent on the font you are using, as well as other variables such as font size and style.

You can force Works to print a “mini-space,” or a microspace, by pressing the **Option** key and tapping on the **Spacebar**. The resulting space is only about a third the width of a regular space. You can use this technique to add slight spaces between characters (for added impact, for example), or to indent text a specific distance from the left indent or a tab stop.

The actual distance of the microspace depends on the font, size, and style you are currently using, but with a normal font such as Boston 12 point, you can pack about 72 microspaces into one inch (compared to 12 regular spaces, as shown in Figure 2-8). The size of the microspace increases as you select larger fonts, but in direct proportion to the size of the font. For example, with 24 point Boston, you can squeeze 36 microspaces into one inch.

Typographically speaking, there are 72 points to the inch, so using microspacing can prove a real boon in desktop publishing and graphics applications. (As an aside, the Macintosh screen is composed of 72 dots, or pixels, to the inch.) As long as you know the ratio of microspaces to the

Single space between words
 1 microspaces between words
 2 microspaces between words
 3 microspaces between words
 4 microspaces between words
 5 microspaces between words
 6 microspaces between words
 7 microspaces between words
 8 microspaces between words
 9 microspaces between words
 0 microspaces between words

Figure 2-8 *Comparison of Regular and Microspacing*

inch with the font you are using, you can apply microspacing in order to manually count the distance between characters, graphics, and lines.

Other Special Characters

The Macintosh is capable of producing a number of special-purpose characters. All are available by pressing **Option** or **Shift-Option**, and a letter, number, or symbol key. Appendix B provides a complete listing of all the characters available with several popular fonts, but here's a rundown of the most commonly used characters, and how to create them.

<i>Press Character</i>	<i>Character</i>
Option-]	‘
Shift-Option-]	’
Option-[“
Shift-Option-[”
Option-\	«
Shift-Option-\	»
Option-;	...
Option-8	•
Shift-Option-8	◦
Option-2	™
Option-R	®
Option-G	©
Option-6	§
Option-7	¶
Option-3	£
Option-Y	¥
Option-4	¢

FORMAT POWER

Works deals with three kinds of formatting: character, paragraph, and document. These correspond to the smallest unit your word processing documents can contain—the single character—to the largest—the entire document itself. All of the following options can be accessed from the Works Format menu.

Character Formats

Character formats are the size, shape, and features of the individual letters and numbers in your Works document. Specifically, Works lets you adjust the font, size, style, and color of each and every character in a Works word processed document. Let's take a closer look at these character formats, and what they mean to you as you build Works documents.

- **Font.** Though the Works word processor initially chooses the Boston font for all new documents, you are limited only by the number and variety of fonts installed in the System file on your Works disk or hard disk.
- **Font size.** The size of a font can vary between 4 and 72 points.
- **Font style.** You may choose from among eight font attributes, including underline, outline, bold, italic, and more. You may even combine the styles to produce up to several thousand variations.
- **Color.** If your Mac is equipped with a color monitor, you may choose from among eight colors for text display. The color choices are also retained when printing with an output device that supports color (color PostScript, ImageWriter II, for example).

Character formats are established with the Font, Size, Style, and Color commands in the Format menu, either as you write text, or after.

- When the insertion point is a single, flashing line, changes you make with the Format menu affect the text from then on. The new formats stay in effect until you change them again.
- When one or more characters have been selected with the mouse, choices you make from the Format menu affect only the highlighted text. Previously selected formats remain in effect for text you subsequently type.

The insertion point is always between two characters (even if one of the characters is a blank space and the other the invisible marker at the end of

the word processing document). The format of text you write at the insertion point is determined by the preceding character format. That is, if you click at the space *immediately after* a character formatted with the underline style, new text you enter will also be underlined.

Although there really are no restrictions as to the number of character formats you can select for a document, good design dictates that you use as few different fonts, font sizes, styles, and colors as possible. You should also consider the effect different fonts and sizes have on the way the Macintosh manages its memory. Changing fonts and sizes consumes extra memory, which you may need to create longer documents.

Fonts are provided as font resources, and are installed in the System file of your Works disk or hard disk. One font may have several resources, each with a different point size, ranging from nine to 24 points (a few specialty fonts for the ImageWriter come in sizes up to 36 and 48 point).

Most fonts, however, are not distributed in all of the common sizes (9, 10, 12, 14, 18, and 24 points), even though Works lets you use any font size from 4 to 72 points (in whole numbers). If the specific point size you want is not installed in the System file of your disk, Works scales the font to fit your request.

Scaled fonts may look jagged and uneven, as shown in Figure 2-9, because the scaling is not always perfect. To scale a font, the Macintosh takes an existing font resource, and enlarges it to the desired size. If the desired size is not an even multiple of the original font resource, the result will be jagged and sloppy. For example, a 12-point font scaled up to 24 points looks better than a 12-point font scaled to 18 points.

For speed and appearance, you should strive to use only font sizes that are installed on the disk. Scaling—sizes of even multiples—consumes valuable processing time inside the Macintosh. With only one font in a couple of sizes, the wasted time may not be noticeable.

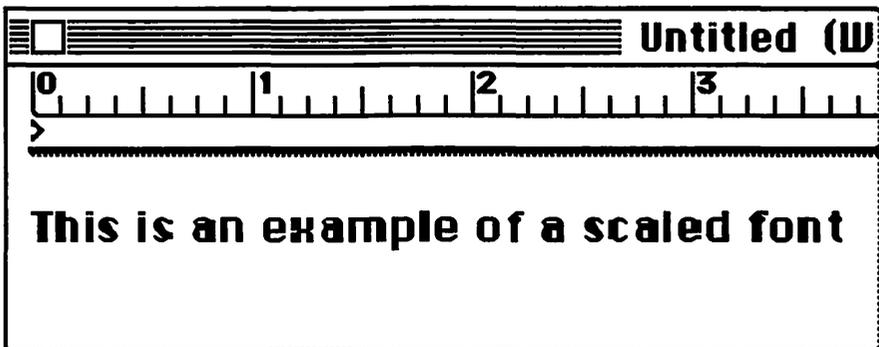


Figure 2-9 Scaled Font

But sluggish performance becomes very noticeable if you scale many fonts, in many different sizes.

Scaled fonts look somewhat better when printed on the ImageWriter than they do on the Macintosh screen. Still, you'll probably want to stick with font sizes that are installed in the System file to ensure the best quality print. Scaled fonts make little difference when using the LaserWriter because the fonts are properly enlarged or reduced with greater precision.

How can you be certain which fonts are installed in the System file, and which ones will be scaled if used? When you choose a font from the Pop-up Font menu, some of the sizes may be outlined while others are plain, as illustrated in Figure 2-10. The outlined fonts are the ones installed in the System file on your Works disk. The non-outlined fonts are *not* installed on the disk; choosing one of these displays the font scaled from one of the sizes available.

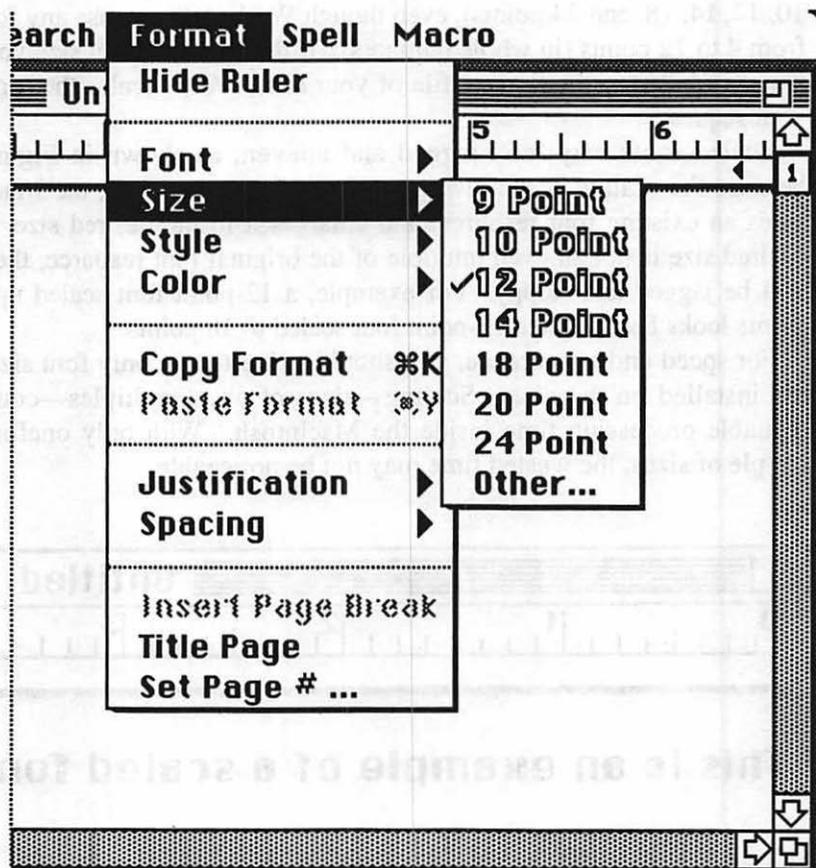


Figure 2-10 Outlined Font Sizes

If you need an in-between font size not given in the Pop-up Size menu, choose the Other command, then enter a whole number from 4 to 72.

Paragraph Format Hints

To Works, a paragraph can contain no characters, or it can contain many, spanning dozens of lines on the page. New paragraphs are created by pressing the **Return** key. Each paragraph you write with Works can contain its own distinct formatting, including indentation, tab stops, line spacing, and alignment.

- **Indentation.** Many Works users confuse indentation (or indentation) with margins. To Works, margins are set as a document format (see below), and determine the area on a piece of paper for possible printing, as illustrated in Figure 2-11. The indentation, as set by the indent markers in the Works ruler, formats the text within the boundaries of the margins.
- **Tab stops.** Works has default tab stops every half inch on the ruler, but you can add your own. You have a choice of left-, centered-, right-, and decimal-aligned tabs.
- **Line spacing.** Works permits you to control the spacing between lines: single, one and a half, and double space.

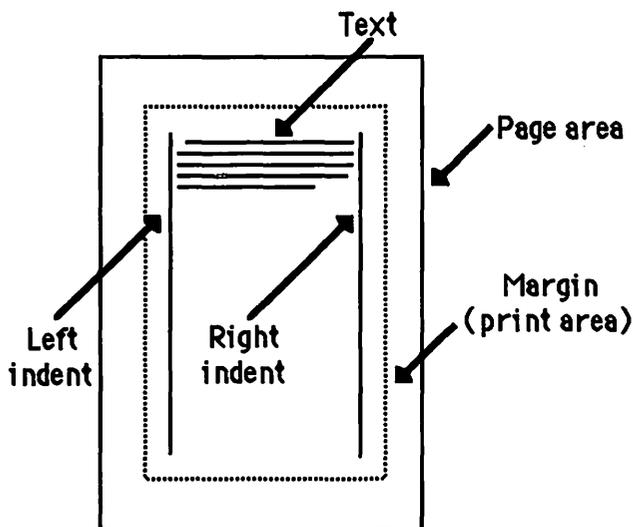


Figure 2-11 *Concept of Margins and Indents*

- **Alignment.** Alignment determines how the text conforms to the left and right page margins. Works calls alignment “justification,” but that term has a specific meaning in typography, so we’ll refer to it as alignment. Four choices are available: right-aligned, left-aligned, centered, and justified (aligned on both right and left margins).

Tips for Tabs and Indents The Works ruler controls tabs and indents. Works automatically opens the ruler with each new word processing document, but you have the choice of hiding or displaying it at any time. Choose the Hide Ruler or Show Ruler command in the Format menu, as desired.

Setting Indents The ruler provides three markers for setting indents, as shown in Figure 2-12.

<i>Marker</i>	<i>Sets</i>
Left triangle	Left paragraph indent
Left square	First-line indent
Right triangle	Right paragraph indent

The purpose of these indent markers is fairly self-explanatory, but as examples, Figure 2-13 shows three possible arrangements of the markers, and their effect on text. Note that the left and right paragraph markers indent text aligned to the top and bottom points of the triangles, not to the points on the side. This factor is important when creating some types of precision documents.

While there’s no real trick to using the Works ruler and its indent markers, there are a couple of hints and tricks you may not know about.

- Many times, tugging at the left indent markers moves the wrong marker. You can be assured of moving the marker you want by following these two simple rules: Drag at the top of the left paragraph indent marker and you move that marker only. Drag at the bottom and you move the first-line indent. Practice for a few minutes and you’ll get the hang of it.
- You may, on occasion, attempt to position the right paragraph indent marker outside the boundary of the right margin (as set in the Page Setup dialog box). Obviously, this would cause Works to print text outside the margins you have set, and perhaps even off the page. Works doesn’t give a noticeable warning when you do this, but does provide a visual indication of this situation by turning the right indent marker hollow. You *will* be warned that text may be lopped off when printing or previewing the document.

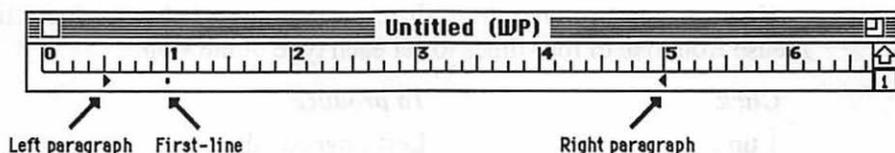


Figure 2-12 *Ruler with Indents, Callouts*

Using Tabs Tabs lets you indent text to a specified spot on the line, or to align text along some common point. As stated previously, Works assigns default tab stops every half inch along the length of the ruler, so that every time you press the **Tab** key, the insertion point is expressed one-half inch to the right (unlike some word processors for the Mac, pressing **Shift-Tab** does *not* release the left margin and express the insertion point to the left).

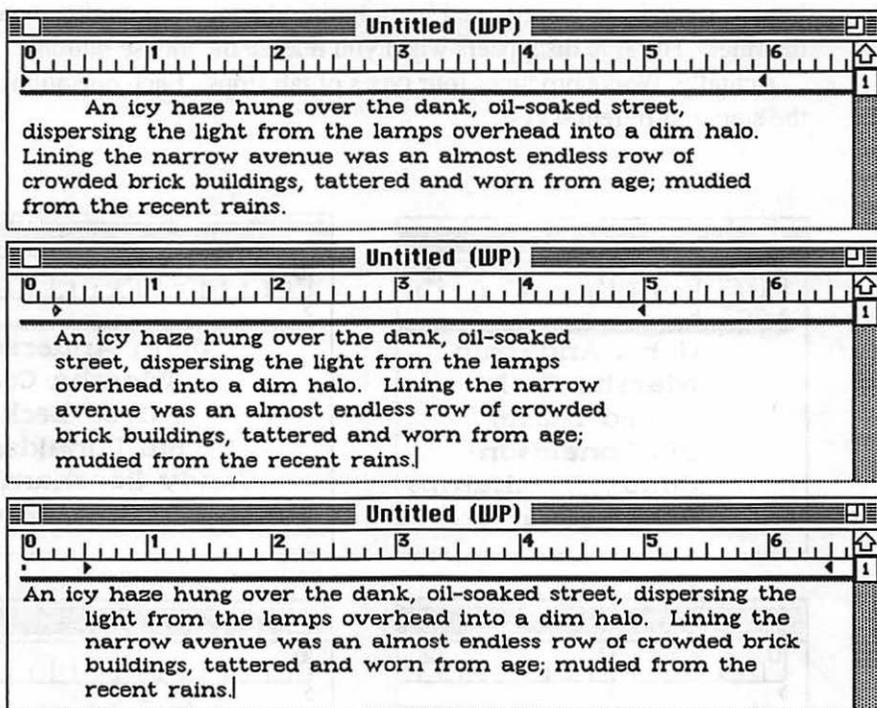


Figure 2-13 *Sample of Alignment Settings and Effects*

Obviously, Works' preset tabs may not suit your needs, so the program allows you a way to conveniently set your own. To set a tab, simply click below the tape measure part of the ruler. A tab stop appears there. Now, pressing **Tab** expresses you directly to the new tab stop. Default tabs to the left of the one you set are ignored.

How do you produce these different tab stops? Easy. Just click the mouse from one to four times to set each type of tab stop.

Click

- 1 time
- 2 times
- 3 times
- 4 times

To produce

- Left-aligned tab
- Right-aligned tab
- Decimal-aligned tab
- Centered tab

Clicking a fifth time returns you to a left-aligned tab, where you can start all over again. Each type of tab stop has its own special marker, as shown in Figure 2-14. The figure also shows the effect of tab stops on text.

Though it may not be obvious, you have complete control over tab stops. Moving a tab stop is as simple as dragging it with the mouse. Tab stops no longer needed can be removed by dragging the tab stop marker away from the ruler. The stop disappears when you release the mouse button.

Actually, Works produces four types of tab stops. Each one aligns text to the stop in different ways:

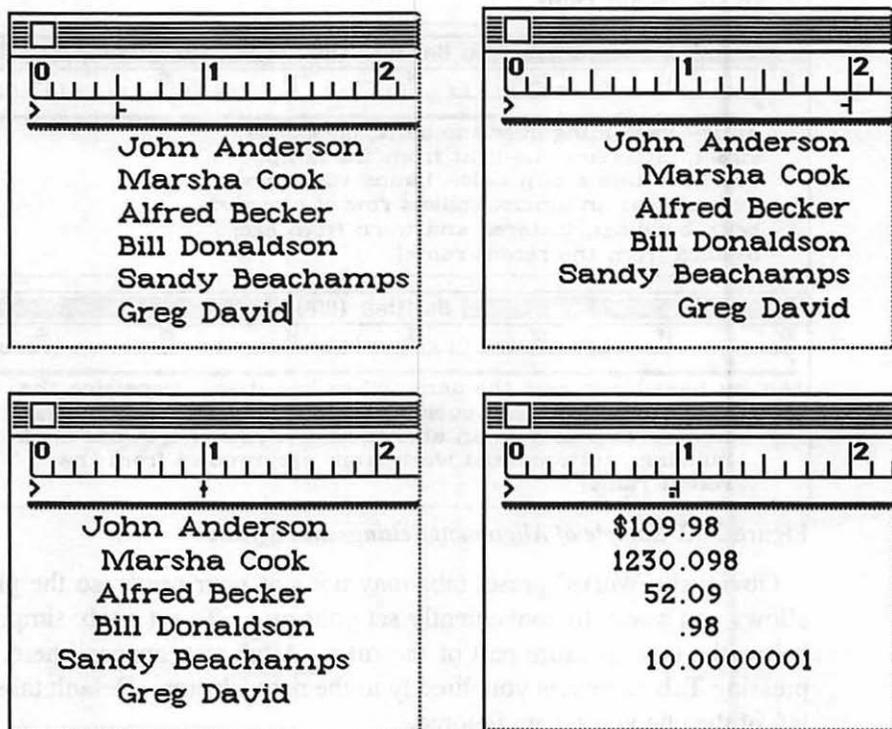


Figure 2-14 Tab Settings and Effects

- Left-aligned tabs arrange the left edge of the text to the tab stop. This is the default tab stop.
- Right-aligned tabs arrange the right edge of text to the tab stop.
- Decimal-aligned tabs arrange the decimal point (period) of numbers under the tab stop.
- Centered tabs center text evenly to the right and left of the tab stop.

You will often use centered and right-aligned tab stops to create professional-looking tables. The decimal tab stop is ideal for presenting numbers in an orderly, well-defined fashion. You can have any number of digits to the left and right of the decimal point, yet all the decimal points line up at the tab stop.

Line Spacing Works can separate lines into three distinct spacings: single-space, space-and-a-half, and double-space. The actual distance is determined solely by the choice of font, size, and style.

Line spacing is set with the Spacing command in the Format menu. Selecting this command pops up a secondary menu where you may choose among the three line spacings.

Works provides an additional spacing command useful when filling out preprinted forms designed for a typewriter. Choosing the Six Lines Per Inch command overrides normal font spacing and places lines one-sixth of an inch apart. For best results, use a font 12 points or smaller.

Alignment Alignment is how the right and left edges of paragraphs line up with the right and left indents of the document. You can choose from among four types of paragraph alignment, as depicted in Figure 2-15.

- Left aligned. Lines are even with the left indent and their right edge is ragged.
- Centered. Lines are centered over the midpoint between left and right indents.
- Right aligned. Lines are even with the right indent, and their left edge is ragged.
- Justified. Lines are even with both the left and right indents. Works expands the spaces between words to push the ends of lines to the left and right indents.

To set the alignment, choose the Justification command from the Format menu; a smaller sub-menu pops into view providing the four choices outlined above.

The default paragraph alignment is left aligned, which corresponds to the

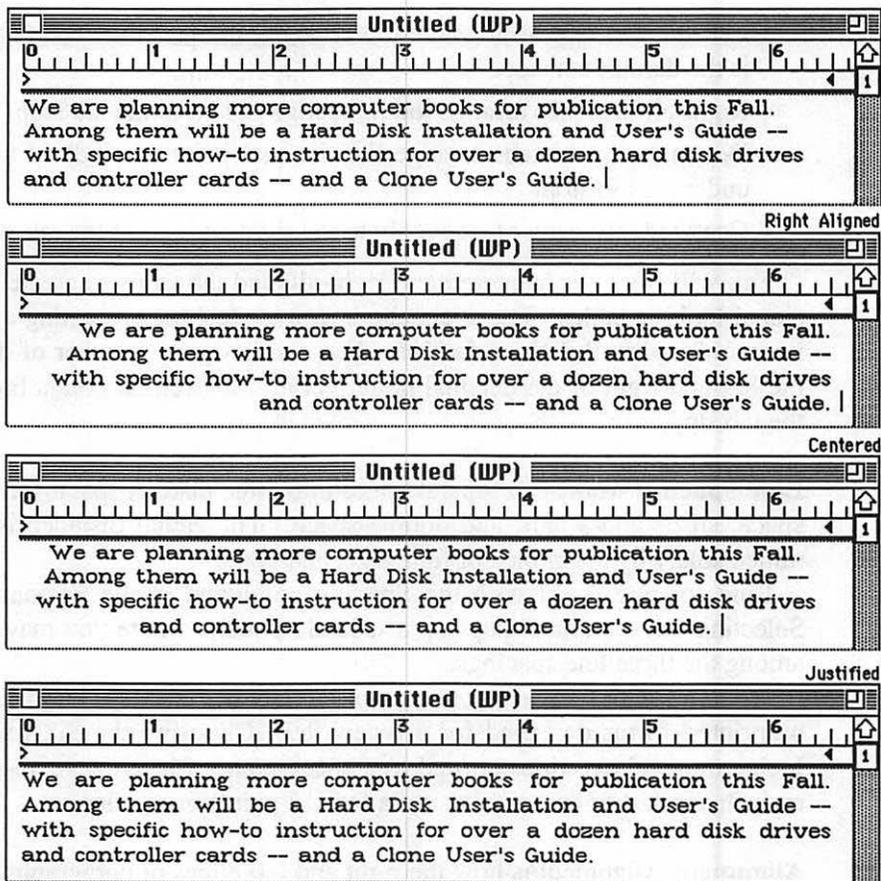


Figure 2-15 *Alignment Samples*

format of most documents, including letters, memos, and reports.

Since the advent of personal computers and word processing, many users choose the justified format for the paragraphs of their documents. While there is nothing intrinsically wrong with this, you must be careful that the printed document doesn't look stilted and awkward. Justified margins necessarily cause extra gaps between words, which can be unsightly when presented in printed form. If you wish to use justified alignment, be sure to check the document for large word spaces and make adjustments by adding hyphens, where possible. Of course, over-hyphenating a document can lead to an even worse appearance, so exercise restraint.

Works automatically left aligns paragraphs when a document is saved in Text-only (Export) format.

Different Formats Between Paragraphs Like character formats, paragraph formats can be chosen before text is written, or after. When the

insertion point is a single, flashing line within the paragraph, changes you make with the Ruler or Format menu alter the current paragraph and all those thereafter. These new formats stay in effect until you change them again. Similarly, the format of the entire paragraph already written is changed if the insertion point is flashing anywhere within the paragraph (the entire paragraph need not be selected).

When two or more paragraphs have been selected with the mouse, choices you make from the Format menu affect only the highlighted paragraphs. Previously selected formats remain in effect for paragraphs you subsequently type.

Suppose you have formatted the first paragraph in your document as double-spaced, centered. This sets the format for the first paragraph and—initially at least—sets it for subsequent paragraphs. Pressing the **Return** key starts a new paragraph, and the formats are repeated. Now suppose you change the formatting for the second paragraph. The formats in the first paragraph are unaffected, but the second paragraph is now altered.

Each paragraph you write could theoretically have a different format, though odds are you will write paragraph after paragraph with the same formats. Macros can greatly speed up the reformatting process if you need to produce documents with many formats—all of which repeat throughout the file. See Chapter 8 for more details on using Works macros.

Works lacks a means to visually display the marks that indicate the end of a paragraph (Microsoft Word, for example, allows you to view or hide paragraph and formatting marks). This is unfortunate, because it is the invisible paragraph marker that actually “holds” the formatting for the preceding paragraph. You can verify this by creating two adjacent paragraphs, each with different formats. Then place the insertion point immediately before the first character in the second paragraph, and press the **Delete** “key until” the insertion point is at the last character of the first paragraph. This erases the paragraph mark of the first paragraph, not only deleting the paragraph mark, but erasing its formatting. (Works may not always refresh the screen so the text may look distorted and some may even disappear. Manually restore the screen by scrolling down a few clicks, then back up again.)

Formats from one paragraph can be copied to another with the use of the Copy Formats and Paste Formats commands, both in the Format menu. To use:

1. Click anywhere in the paragraph you want to copy the formats from.
2. Choose the Copy Formats command from the Format menu.
3. Locate the cursor in the destination paragraph (or just click in the window if you are starting a new paragraph).
4. Choose the Paste Formats command from the Format menu.

The Copy Formats and Paste Formats commands work with paragraph formats *only*. Character formats are ignored.

Document Formats Document formats determine the overall look of a finished memo, report, or letter. Document formats consist of:

- Paper size. The size of the paper dictates how much text you can get on a single page.
- Page margins. The page margins set the boundaries for printing, usually within an inch of the edges of paper.
- Print orientation. Works lets you select between portrait (tall) or landscape (wide) print orientation.
- Headers and footers. A header is a line of text that repeats at the top of each page; a footer is a line of text that repeats at the bottom of each page.

All document formats in Works are set from the Page Setup dialog box (choose Page Setup from the File menu), as shown in Figure 2-16. The exact contents of the dialog box varies somewhat depending on the version of System software you are using, as well as whether you are using a LaserWriter or ImageWriter printer. Works stores all the page setup settings you specify in the dialog box with the document.

Additional special effects options are available when formatting documents for printing by a LaserWriter or ImageWriter. As these options affect all modules of works, they are discussed in Chapter 12, "Printing With Works."

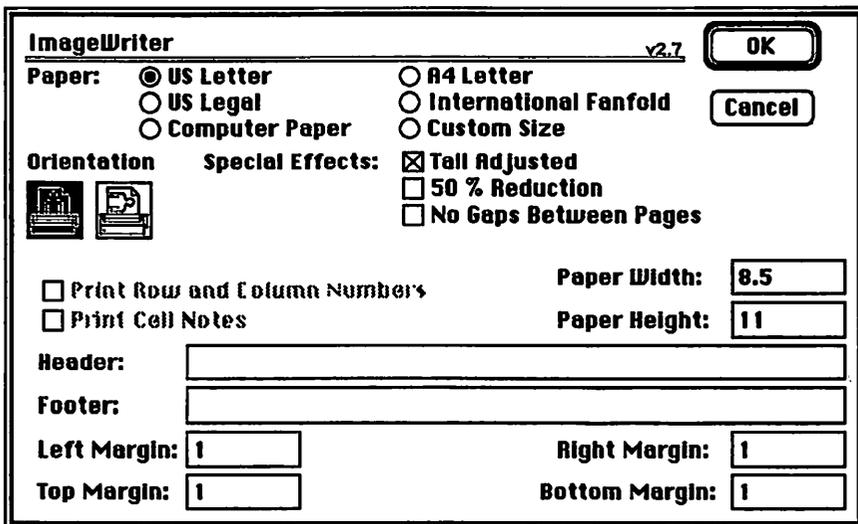


Figure 2-16 Page Setup Dialog Box

Paper Size Works offers five paper sizes, chosen by clicking one of the radio buttons in the top of the Page Setup dialog box. When using the ImageWriter printer, you also have a choice of defining a custom page size by entering a new paper width and height in the entry boxes provided (the Custom option is automatically selected). You can specify custom page dimensions of 273 inches wide by 273 inches high (assuming all margins are set to 0), but the word processor will accommodate documents up to 15 inches wide.

The minimum height for printing is one inch (with 0 top and bottom margins), meaning you can use Works to prepare labels on inch-high label stock. See Chapter 12 for more information on printing with Works.

With the exception of Custom, the five Paper options have preset dimensions, all of which are applicable to word processing. Clicking one of these options places the following dimensions into the Width and Height edit boxes.

<i>Paper</i>	<i>Width</i>	<i>Height</i>
US Letter	8.5	11
US Legal	8.5	14
A4 Letter	8.25	11.66
International Fanfold	8.25	12
Computer Paper	14	11

Page Margins Works calculates margins from the edges of the paper. Margins set the printing area for the body text (minus header and footer) of the document. With one-inch margins all around, the main body text of the document is printed no closer than one inch all around the paper. The printing area on 8 1/2-by 11-inch letter-size paper using standard one-inch margins is 6 1/2 by 9 inches. Headers and footers are placed 1/2-inch from the top and bottom of the paper, so they are effectively outside the margin area.

Setting new margins is easy: Simply click in one of the margin editing boxes in the Page Setup dialog box, and enter a new number. By double-clicking within a box, you select the number, so anything you type from the keyboard completely erases the old entry before adding the new one.

Print Orientation The two unmarked icons in the Page Setup dialog box determine the orientation of the finished document on the page. Clicking the Portrait (or Tall) icon prints the document in normal fashion, lines of text parallel to the short edge of the paper. You'd use the Landscape (Wide) orientation when printing with computer paper (using a printer with a wide carriage), or when you need to create a turn page for reports or presentations.

Headers and Footers Works accepts only one line of text (no graphics) for headers and footers. Still, the header and footer options offer extra flexibility that you will want to use from time to time.

In addition to the text of the header and footer, you may enter special codes to automatically print such things as page numbers, dates, and times. These codes are preceded by an ampersand, which tells Works to treat the character that follows as a formatting instruction, not as a letter to print in the header or footer.

<i>Type</i>	<i>To</i>
&L	Align the characters that follow at the left margin.
&C	Center the characters that follow.
&R	Align the characters that follow at the right margin.
&P	Print the page number.
&D	Print the current date.
&T	Print the current time.
&F	Print the name of the document.
&B	Print the characters that follow in bold.
&I	Print the characters that follow in italics.
&&	Print a single ampersand character.

Though the list shows the formatting codes as capital letters, you can use upper- or lowercase. Feel free to use any combination of formatting codes within a single header or footer, but note that some combinations (like centering and right alignment) may cause Works to overprint some of the text.

In addition to these codes, you can use the Format, Style, and Color commands from the Format menu to specially format the header and footer text. Actual format changes aren't shown in the entry boxes in the Page Setup dialog, but you can double-check that the formatting is acceptable to you by using the Print Preview feature available in the Print dialog box.

GETTING THE MOST FROM THE WORKS SPELLER

Misspellings and typographical errors are unnecessary as long as you have the Works spelling checker to rely on. Because the spelling checker is a part of Works, you don't have to quit the program and start up another application in order to check for spelling and typos. This means you can call up the spelling checker at a moment's notice and quickly check your document, or even parts of the document or single words.

The Works spelling checker is not complicated, but it does have several features that are not intuitive, as well as a number of capabilities that aren't obvious. You can perform a spelling check and not use the advanced

speller features or capabilities, of course, but that would be wasting a great resource.

About the Speller

The speller needs a main dictionary, called MSWorksDict, to operate. This file contains more than 100,000 words Works uses to check for errors. Works assumes the MSWorksDict file is on the same disk as Works, and in the same folder. If this is not the case, the first time you use the speller you are asked to help Works locate the file. This location is stored in the MsWorksPref preference file (which is tucked inside the System Folder on your Works disk or hard disk.

Works records the location in the preference file when you quit the program, so if you use the speller more than once in the initial editing session, you'll need to relocate the speller file each time.

Setting Options

The preference file also contains the settings you choose in Options command (under the Spell menu), as shown in Figure 2-17. The Options dialog box offers the following choices. Activate those options you desire and turn off those you don't want.

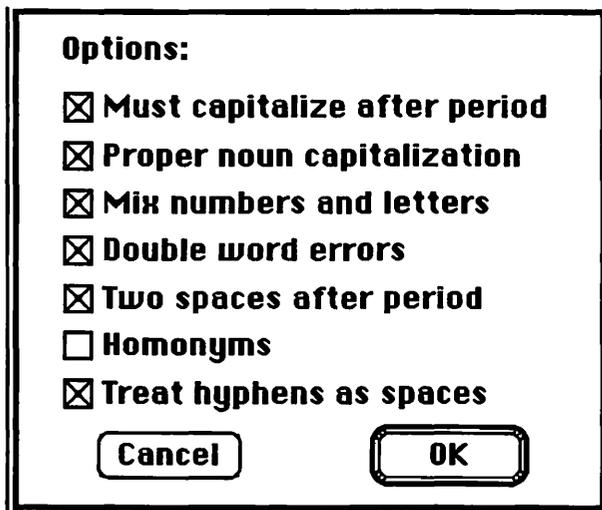


Figure 2-17 *Spelling Options Dialog Box*

- **Must capitalize after period (initially on).** Works questions any uncapitalized word that follows a period, question mark, or exclamation point.
- **Proper noun capitalization (initially on).** Works questions proper nouns, such as names and places.
- **Mix numbers and letters (initially on).** Works questions words that have numbers in them, such as *Wo5rks*.
- **Double word errors (initially on).** Works questions double words, such as *the the*.
- **Two spaces after period (initially on).** Works questions sentences (period, exclamation point, question mark) that aren't followed by two spaces (typing standard, but not desktop publishing standard).
- **Homonyms (initially off).** Indicates sound-alike and spell-alike words as possible errors, such as *their, there, and they're*.
- **Hyphens as spaces (initially on).** When turned on, Works questions each part of the hyphenated word independently, but doesn't question proper hyphenation. When turned off, Works checks for proper hyphenation.

Performing a Spell Check

After selecting the spell options (which remain until you change them again), you are ready to check the spelling of your document. Follow these basic steps:

1. Choose the Correct Spelling command from the Spell menu. Works will then scan the entire document. If the document is large, this could take some time.
2. After scanning is complete, Works presents the first word it finds as potentially misspelled (called a "suspect" word). You have three choices: a) skip the word (it's spelled correctly), b) replace the word with the entry currently in the Replace With text box, or c) add the word to the Works dictionary file.
3. Continue the process until all words have been verified.

Works normally offers a suggested correct spelling when it encounters a suspect word. The Correct Spelling dialog box is shown in Figure 2-18. The suggestion is automatically inserted in the Replace With text box. If you want to use the suggestion, simply click the Replace button. The initial suggestion by Works is the word closest to the spelling of the suspect word.

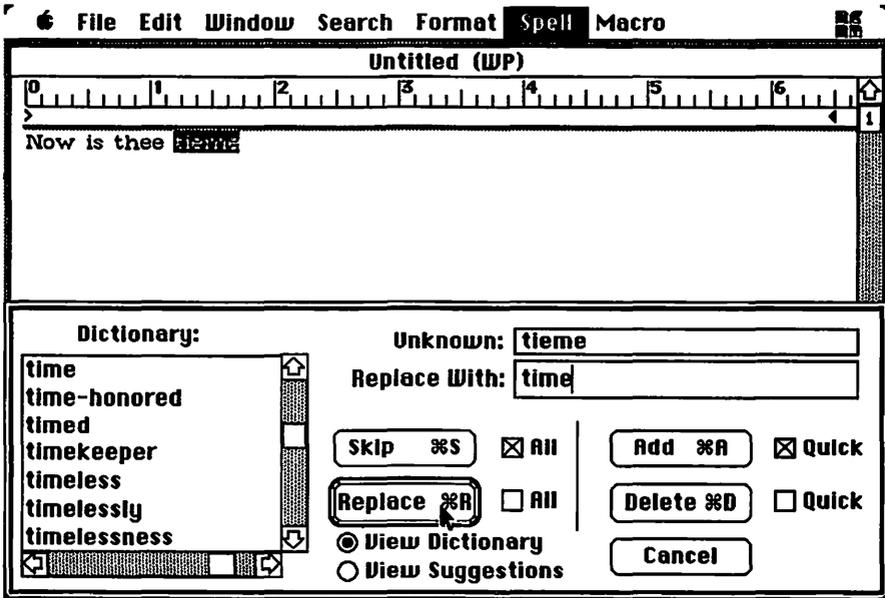


Figure 2-18 *Correct Spelling Dialog Box*

Adjacent words in the speller are shown in the Dictionary window on the left side of the Spelling dialog box. If you see another word in the window that you want, double-click on it and it will be entered into your document. Use the scroll bars to leaf through the dictionary:

- The vertical scroll bar scans through the closest 100 or so words.
- The horizontal scroll bar scans the dictionary through about 400 words at a time.

Works can also make suggestions based on sound-alikes and likely misspellings. You can view a more extensive set of suggestions by clicking the View Suggestions button. Works then analyzes the suspect word and finds words in its dictionary that it believes are close to the one you want. The suggested alternatives are shown in the word list (in some cases, Works cannot provide a suggestion, particularly if the suspect word is totally unintelligible). Double-click on the one you want and it is inserted into the document.

Double-clicking within the word list (when viewing either the dictionary or word suggestions) places the selected word in your document. But what if the word in the list is close, but not exactly the one you want? Simply click once to place the word in the Replace With text box, then make any changes you like. Press the Replace button to transfer the corrected word to the document.

In some cases, the word is misspelled only slightly, missing just a character or two. Rather than spend time looking for a replacement in the word list window, click the misspelled word in the Unknown text box; this transfers the word to the Replace With box. Once there, you may make your changes.

Of course, there will be times when the suspect word is grossly misspelled, and Works can't find a suitable replacement. In these cases, it is easiest to completely rewrite the word in the Replace With text box.

Works double-checks the spelling of the new word you have provided in the Replace With text box. If the word doesn't match one Works has in its spelling file, the program asks if you want to add the word to the dictionary. This is a clue that the new word may itself be misspelled. You have two choices: either add the word to the dictionary, or do not. But in both cases, Works inserts the word in the document.

Unfortunately, Works does not provide a means to cancel word replacement so that you can reenter a corrected spelling. If you notice that you added an incorrect word to your document, make a note of it and correct the misspelling after spell checking is over.

Adding and Deleting Dictionary Words

You can add a new word to the Works dictionary at any time. Press the Add button when you are presented with a word you want to add to the dictionary. Works inserts the word in the MsWorksDict file for use in subsequent spell sessions.

Conversely, you may delete any word (including those you didn't enter) by selecting the word in the word list window, then clicking the Delete button. The Add and Delete buttons have additional options you may want to use; see the section below for more information.

Using Add and Quick Options

The Skip, Replace, Add, and Delete buttons in the Check Spelling dialog box have additional options. These options are set for each word checked.

- The All box next to the Skip button lets you choose to skip all the occurrences in the document of the suspect word, or just the current one. The Skip All option is normally on unless you turn it off.
- The All box next to the Replace button lets you choose to replace all the occurrences in the document of the suspect word, or just the current one. The Replace All option is normally off unless you turn it on.

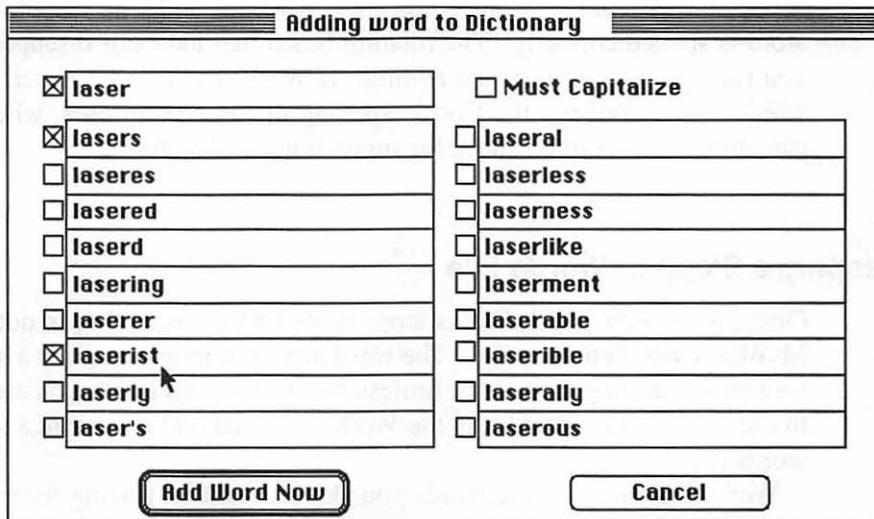


Figure 2-19 Add Dialog Box

- The Quick box next to the Add button lets you choose to add just the current word to the dictionary, or the base word and some or all of its possible suffixes (see Figure 2-19). The Add Quick option is normally on (no suffixes) unless you turn it off.
- The Quick box next to the Delete button lets you bypass the prompt Works presents to ask if you really want to eradicate the word. Be sure that the exact word you want to delete is shown in the Replace With entry box, including proper capitalization. The Delete Quick option is normally off unless you turn it on.

Checking a Portion of the Document

Works will normally check the entire document, even if the insertion point is at the end of the file when you begin the spelling check. You can narrow the check by selecting text with the mouse, then choosing the Check Spelling command. This may be helpful if you have added or edited just a few paragraphs of a large document and you don't want to take the time to check the whole file.

Checking One Word

At times, you may want to check the spelling of one word that you've just typed. You can test the single word by double clicking on it, then

choosing the Check Spelling command. Works provides no response if the word is spelled correctly. The rotating beach ball indicator disappears and you can continue writing and editing. If Works can't find a match for the word in its dictionary, the Check Spelling dialog box appears, where you can correct the spelling, check for suggestions, and so forth.

Keeping a Skipped Words File

Often, a term on which Works stops is spelled correctly but is not in the MsWorksDict dictionary file. The word may be a proper noun or a specialized term used in your field or profession. If the word is one you are likely to use again, you can add it to the Works dictionary, or store it in a skipped words file.

Works remembers those words you skipped, and on leaving the program or closing the document, you are asked if you want to save the bypassed words in a skipped words document. Answer Yes and Works saves the file under the same name as the document you checked (therefore, the file should be named and saved before exiting), along with a *.dict* file extension.

Skipped words files are stored as Text-only (Export) documents, which means you can open and edit them with Works. The data format of skipped words files is simple: each word is separated by a return, with no spaces or other special characters in any lines, as shown in Figure 2-20.

You may even create a skipped words file from scratch, and use it during spell checking. Just enter the words one at a time, each on a separate line. If the word requires capitalization, type it that way. You may wish to generate the list using the spreadsheet module, then alphabetize the list for easier lookup. Once sorted, select the words and transfer them to an empty word processing document. Save the document using the Export option (this is very important) and add a *.dict* file extension at the end.

To use a skipped words file, choose the Dictionary command from the Spelling menu before starting a spell check. Locate the file you want to use and double-click on it to load it into memory. You can repeat this process to load into any of several skipped words documents. For example, if you know the document you are checking contains legal and technical terms (a patent application, for example), load both the *Legal.Dict* and *Technical.Dict* files.

Should you find you have too many skipped words files, you can consolidate them into one easy-to-handle document.

1. Open one of the skipped words files.
2. Open another skipped words file and select all of the words.

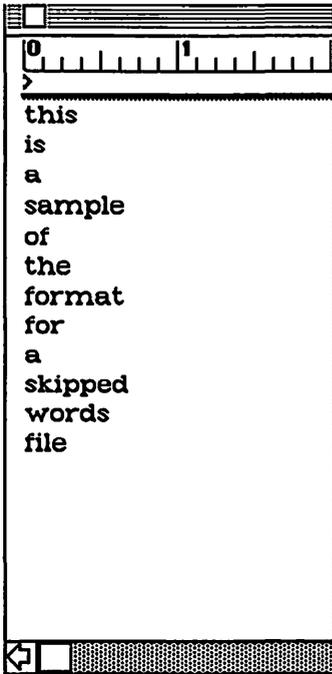


Figure 2-20 *Sample Skipped Words File*

3. Press **Command-C** to copy the words into the Clipboard.
4. Switch to the first skipped words file and move the insertion point immediately after the last word in the document.
5. Press **Command-V** to paste the words into the document.

Repeat the process for each additional skipped words file you want to merge.

Since you can readily edit skipped words files, you'll want to maintain them so they don't contain any duplicates or unwanted words. This is most easily done by transferring the word list to a blank spreadsheet document, sorting the list, and looking for duplicates. When you are satisfied the list is in the form you want, transfer the words back to the word processing document and save it.

Skipped words files are opened in a new, untitled document. Works does not load the original because it thinks you don't want to edit it. When re-saving a skipped words file, you must go through the extra steps of naming the file and clicking the Export option.

Works uses the same basic format for skipped words files as other spelling checkers. Word files for special applications, such as medical, dental, or legal fields, are available from many sources. As long as these files are saved in Text-only (Export) format, and lack special formatting codes, Works will be able to use them as skipped words files.

Using the Homonym Option

Not all writing errors are misspellings. Some are legitimate words, but used in the wrong context. Homonyms are words that sound the same, but have different spellings. Click Homonym in the Spell Options dialog box, and Works checks for homonyms along with other typographical errors.

When using homonyms, Works requires the file MsWorksHymn, which it expects to find with the Works program. If it can't locate the file, you are asked to help find it. As with the speller file, Works records the location of the homonym file for future reference in the MsWorksPref file.

The MsWorksHymn file can be edited, if desired, by following the format conventions shown in Figure 2-21. Each homonym group entry is bounded by a set of two asterisks, and each spelling is on a single line (with variations, when applicable), a tab, and a short sentence showing the proper usage of the words. The MsWorksHymn document is a text-only file, so you must click the Export button in the Open dialog box to find it.

After you've added your own homonyms, or edited the existing ones, save the document in Export format, with the name MsWorksHymn. Works creates a compiled version of the MsWorksHymn document as MsWorksHymn Table. After editing the MsWorksHymn text file, you should delete the existing MsWorksHymn Table so that Works won't use it. The program automatically creates a new MsWorksHymn Table using the updated homonym file.

When Works spots a homonym, it displays a dialog box where you can review the word, and make changes if necessary, as shown in Figure 2-22. The controls in the homonym dialog box are self-explanatory, but note these shortcuts and observations:

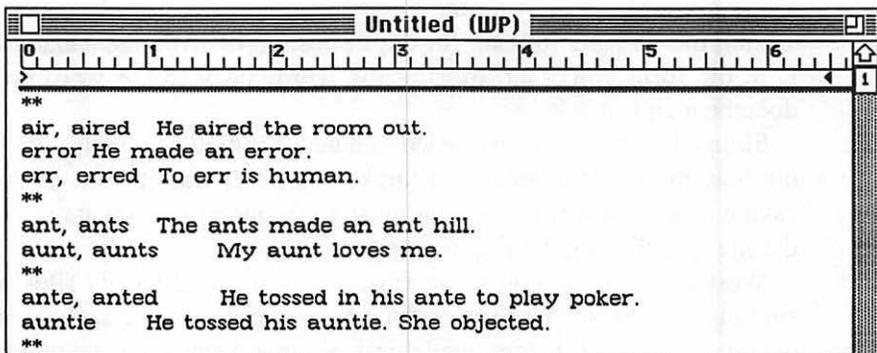


Figure 2-21 *Format of Homonym File*

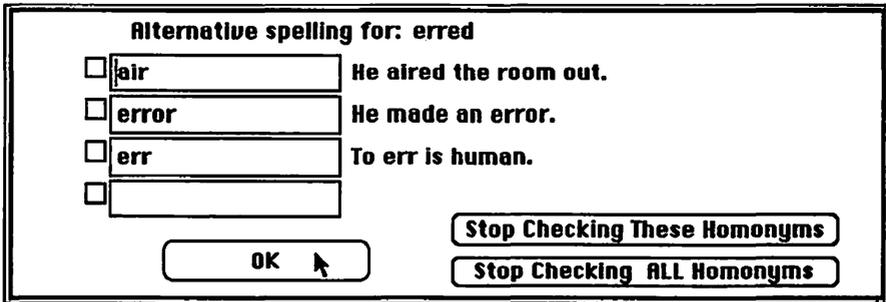


Figure 2-22 *Homonym Dialog Box*

- If the suspect word is correct, do nothing; press **Return** to continue.
- To select another word in the list of homonyms displayed, click anywhere on the word or in the check box. Click **OK** or press **Return**.
- An additional control button is displayed to the left of the homonym list if there are more than four works. Click the button to see more words.
- If one of the homonyms is the correct usage of the word you need, but lacks the proper prefix or suffix, edit the word by clicking anywhere in the text entry box.

Speller Keyboard Shortcuts

The Works speller includes several handy keyboard shortcuts that will help simplify your proofreading chores. Note that these shortcuts are available only when the Correct Spelling dialog box is displayed:

<i>Key</i>	<i>Shortcut</i>
Command-A	Same as Add button
Command-C	Same as Cancel
Command-D	Same as Delete button
Command-G	View Suggestions
Command-H	Options help screen
Command-O	Displays Spelling Options dialog box
Command-R	Same as Replace button
Command-S	Same as Skip button

SAVING TIME WITH BOILERPLATE TEXT

In the old days, when steam boilers were common, manufacturers found that they could use the same basic metal sheets—known as boilerplates—to construct boilers of all sizes and types. The term *boilerplate* was later used in the newspaper industry to mean any journalistic material in readily available form.

In word processing, as it relates to Microsoft Works, *boilerplate text* is any collection of characters—words, phrases, common sentences, paragraphs, even whole reports—that you can easily insert into a document. You can save generic text, such as your name and address, and call it up as needed.

Works lacks a convenient *glossary* feature in which you can store pieces of text for instant recall into a document. But you can approximate the function of glossaries by storing common text in separate documents, and either accessing the text manually, or using the Works macro feature to automate the process.

Inserting boilerplate characters from some common “text storage tank” involves the following steps:

1. Switch to the boilerplate document.
2. Find the text you want.
3. Select it.
4. Switch back to the document you were writing.
5. Paste the captured text into the document.

The same general techniques can be invoked for commonly used graphics that you store as boilerplate picture elements. For example, suppose you have the job of preparing a four-page newsletter each month. The newsletter uses the same basic format from month to month, and you find you reuse a number of the graphic elements, such as logo, rules, table of contents box (with drop-shadow), and more. Rather than generate these each time you prepare a new newsletter, you store them in a common boilerplate graphics document. Retrieving them is a simple matter of copying and pasting.

Boilerplate text can be held in a word processing document, in a spreadsheet document, or in a database document. Each method has its distinct advantages. Only the amount of available RAM in your computer limits the amount of text you can enter into a word processing document. You can store individual words, lines, or paragraphs, and access as much of the text at one time as you like. If desired, you can also include character and paragraph formatting with the boilerplate text. The formatting is

included with the text when pasted into the destination document.

Spreadsheet cells can contain no more than 238 characters, so that limits boilerplate text to about 37 words per cell. Database fields can contain no more than 250 characters, which equals about 40 words. However, each cell or field may contain one complete paragraph, and all the text for the paragraph appears on just one line. Finding and selecting the paragraph you want is somewhat easier than the steps involved in finding and selecting paragraphs in the word processor.

Word Processor Boilerplate Storage

While you can have any number of documents designated as boilerplate files, let's assume that you are using just one. Using default formatting (single-spacing, standard margins, etc.), type the boilerplate text as single words, lines, sentences, or complete paragraphs (see Figure 2-23). Separate each entry with an empty space (two returns). Save the document with a descriptive name, such as Text.Boil (the .Boil extension identifies the file for what it is). If you don't want to risk accidentally altering this file, save it as stationery.

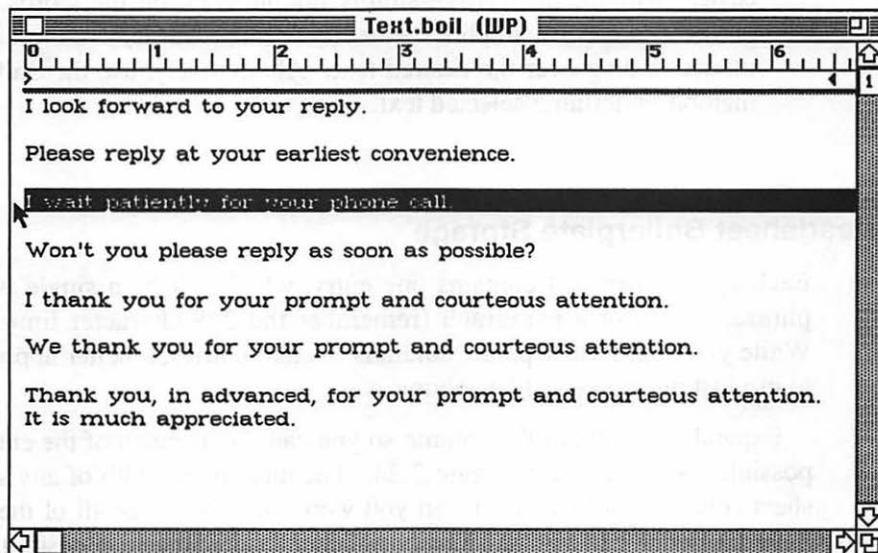


Figure 2-23 Boilerplate WP Example

To use the boilerplate file:

1. Open it and locate the text you want (or switch to it if it's already open).
2. Use the selection techniques described earlier in this chapter for highlighting single words, lines, and paragraphs.
3. Press **Command-C** to copy the selection into the Clipboard.
4. Switch to the destination document, make sure the insertion point is located as the spot you want to paste the text.
5. Press **Command-V** to paste the text into the document.

Since each entry ends with a paragraph mark, you must be careful about copying the invisible paragraph mark with the rest of the text. If you capture the paragraph mark at the end of the selection, it will be pasted with the rest of the text and the insertion point will appear on the next line. This is not desired when pasting single words, sentences, or lines (but is when you want to include a complete, stand-alone paragraph). There are two ways to overcome the paragraph mark:

- Copy the entire entry as a paragraph (double-click in the Selection Bar), and paste the text as is. After pasting, press the **Delete** key to backspace over the paragraph mark.
- Select just the text you want, and exclude the paragraph mark. This is easiest with single words—simply double-click on the words. With phrases, sentences, and lines with two or more words, you must use the mouse to drag over the desired text. Alternatively, use the **Shift-click** method of defining selected text.

Spreadsheet Boilerplate Storage

Each spreadsheet cell contains one entry, whether it be a single word, a phrase, a line, or a paragraph (remember the 238 character limitation). While you could use separate columns to store entries, a better approach is to use just one column, like column A.

Expand the width of the column so you can see as much of the entries as possible, as illustrated in Figure 2-24. The maximum width of any spreadsheet column is 40 characters, so you won't be able to see all of the entry. Save the document with an identifying name (as stationery, if desired).

To use the boilerplate file:

1. Open it and locate the text you want (or switch to it if it's already open).

	A	B	C	D
1	I look forward to your reply.			
2	Please reply at your earliest convenience.			
3	I wait patiently for your phone call.			
4	Won't you please reply as soon as possible?			
5	I thank you for your prompt and courteous attention.			
6	We thank you for your prompt and courteous attention.			
7	Thank you, in advance, for your prompt and courteous attention. It is much appreciated.			
8				
9				

Figure 2-24 Boilerplate SS Example

2. Click on the cell to select it.
3. Press **Command-C** to copy the cell into the Clipboard.
4. Switch to the destination document, make sure the insertion point is located as the spot you want to paste the text.
5. Press **Command-V** to paste the text into the document.

There is no way to avoid including the paragraph mark with imported spreadsheet data. Use the **Delete** key to remove the mark should you not want it.

Database Boilerplate Storage

Database boilerplate storage functions almost identically to the spreadsheet method, especially if you view the database as a List rather than a Form (choose View List or View Form from the Format menu). The boilerplate database contains one field for text entries. Expand the width of the column as much as possible. When typing entries, remember the 250 character limit.

When using the database boilerplate storage system manually, it's best that you view the text entries as a list.

MERGE TECHNIQUES

Print merging is the process of combining a form letter word processing document with the data in a database document. Each record of the database creates a separate personalized letter. One letter may be addressed to Joe Smith, and include various information about Mr. Smith that you included in his record in a database file. Another letter may be addressed to Jane Brown, and so forth.

Print merging need not be limited only to creating personalized form let-

ters. You can use print merging to produce several versions of any kind of document. For example, suppose you need to produce a dozen instruction manuals for a product you manufacture for retailers. Although each instruction manual includes the same information, you have to change the retailer name in each one. The process is simple: write one instruction manual where the retailer name is a placeholder, or variable, and create a database that includes, as separate records, the name and particulars of each retailer. When merged, Works creates separate printed instruction manuals for every retailer in your database.

Print merging (also called mail merging) is child's play with Microsoft Works. Unlike many word processors, Works greatly simplifies and automates the print merging process. Here are some details on print merging you will want to consider.

Setting up for Print Merge

Before you can actually merge a word processor document and database records, you must create a merge template. This merge template is a word processing document that contains the basic text that will be repeated in each document, as well as placeholders that indicate where variable data from the database is to be entered.

To enter placeholders, open the database document that contains the records you want to use. Then open a new word processing document and write the basic text (or open an existing document if the text already exists).

With the database document open and available, and with the word processing document active, choose the Prepare To Merge command from the Edit menu. A dialog box appears that allows you to select the merge database (this shows all of the actively open and named database documents), and merge fields for the selected database.

To enter placeholders, merely click on the merge field you want, and press the Merge button. The placeholder is entered at the current insertion point position in the word processing document.

Initially, Works enters the contents of the first record of the selected field. You'll probably want to view the placeholder as a field name, so choose the Show Field Names command from the Edit menu.

Note that you cannot edit the text in placeholders, whether the text shows a field name or actual field contents. Database placeholders are treated as complete units, and when you select even one character in the placeholder, the entire placeholder is highlighted. You can use this to your advantage to

copy and paste the placeholder to other parts of the document, delete placeholders you don't need, and so forth.

The font, size, and style of placeholder text can be changed just like any other text. If you want to see how the merged text will look with the surrounding word processor text, choose the Show Field Data command in the Edit menu to display the actual text from the database records.

When selecting merge fields from the Prepare To Merge dialog box, you needn't use all the fields, nor do you need to use them in any specific order. You can also use merge fields as many times as you like in the same document. Of course, the same database fields can be used in many separate word processing merge documents.

Performing a Print Merge

With the basic text and placeholders set in the word processing document, you now have a print merge template ready for printing. Choose the Print Merge command from the File menu, make the desired changes in the Print dialog box, and printing will commence. As with printing of regular word processing files, you can preview the merged document by clicking the Preview button inside the Print dialog box.

Missing Database Files and Records

You may have occasion to reprint a word processing merge document, using the same database document and placeholders you entered in a previous session. Before reprinting, be sure the database document is on the desktop, or Works will not be able to find the data. When printing, Works extracts the data directly from the selected database file and enters the information at the appropriate places in the word processing document. If you have since edited the database document—you've added some records, for example—these new records will now print.

While there's nothing wrong with adding new field columns to database files used in merge printing (they are ignored along with any other fields you didn't use in the document), you should avoid deleting field columns that you have used as placeholders.

Obviously, Works cannot enter non-existing text into a placeholder that no longer corresponds to a working database field column, so if a necessary field has been selected, Works displays a warning box and cancels merge printing. When viewing the word processing template file, Works displays a "Field Not in DB" error in the appropriate placeholder.

Selecting Database Records

You can choose only certain records to merge by first setting up a selection criteria in the database. See Chapter 6, “Keeping Tabs on Data,” for more information on database selection criteria. With only some records selected—for example, only those records with the STATE field equal to California—Works will only print the records that match your criteria. This is an excellent way, for instance, to prepare form letters for customers who live in certain parts of the country, or have a balance due on their charge accounts, or meet any other criteria you have chosen.

Multiple Labels

Ordinarily, Works starts a new page for each record it merges in from the database—helpful when preparing form letters for individual customers. Multiple Labels is an optional command (found in the Edit menu) that allows you to turn off the new page function every time Works starts a new record. While the main use of this feature is to prepare mailing labels on continuous form stock, you can also use it to prepare customer lists, catalogs, and formatted database reports. Works lacks a means to format reports in anything but simple rows and columns; you can position placeholders anywhere on the page and use the Multiple Labels command to design just about any type of unique form you desire.

Drawing with Works

Although Microsoft Works is neither a graphics nor a desktop publishing program, its built-in drawing features allow you to use it as both. With just a few simple sketching tools and commands, you can transform lines, squares, and shapes into a myriad assortment of professional-looking, top-quality documents. With Works and its Draw “sub-module,” you can create:

- Forms
- Newsletters
- Signs and labels
- Stationery (including logos, letterheads, business cards, envelopes, and personalized note pads)
- Reports
- Booklets
- Electronic circuit board layouts and schematics
- Architectural drawings (including renderings, elevations, and floor plans)
- Product sketches and patent drawings

In addition, you can use Works’ Draw tools to enhance and embellish charts created with the spreadsheet chart tools feature. This technique is discussed in detail in Chapter 5, “Charting Your Course with Works.”

By itself, Works Draw is capable of little more than drawing lines, circles, and squares on the Macintosh screen. Your creativity and skill transform these simple objects into pictures and images, whether they be a page of your in-house company newsletter, a report for the boss, or a schematic for the latest electronic marvel.

The creative part of designing graphics with Works Draw is up to you. You have to provide the brain power. The skill part you can develop with the help of this chapter, and others throughout this book. In this chapter, you'll learn what the Draw feature is, how to use it, and the secrets of its various tools.

DRAW BASICS

Works' drawing feature is a "sub-module" of the word processor and spreadsheet. Draw is available only when using either the word processor or spreadsheet. Pictures created with Draw are pasted over the text of a word processor or spreadsheet document in a special *drawing layer*.

Draw works with *objects*. An object can be a line, circle, square, or other shape. It can even be a line or two of text. You create a complete picture by combining these objects into something meaningful, as shown in Figure 3-1. You edit the picture by changing the shape of the objects, by moving them around, or by removing them altogether.

The advantages of an object-oriented program like Works Draw is the ease of editing and changing. Once the shapes are on the Draw electronic vellum, they can be manipulated as if they were made of rubber. You can even individually edit objects that are partially covered by other objects.

While the dots in a MacPaint picture are all scrambled together on the same plane, each of Draw's objects occupies a plane of its own. This concept is called *stacking*, and it allows you to precisely position and overlap any object in the drawing window. Objects are placed on the top of the stack as they are created.

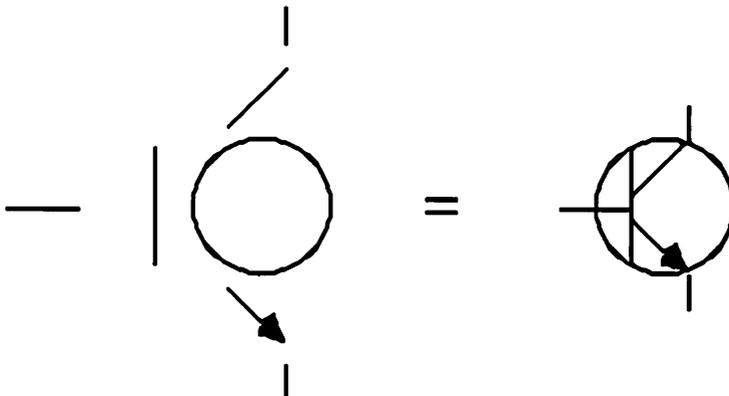


Figure 3-1 *Assembling Objects to Make Complete Pictures*

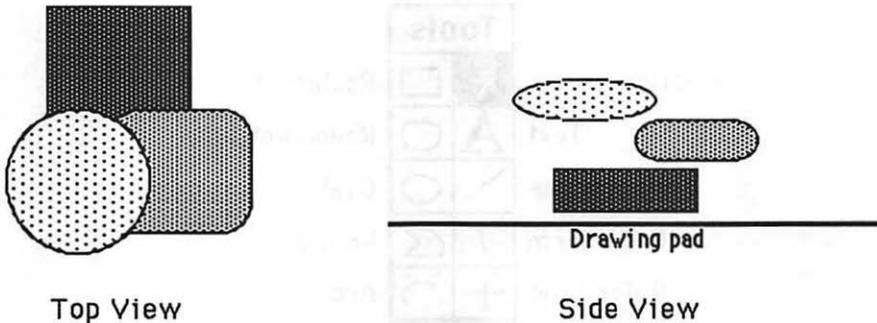


Figure 3-2 *Concept of Stacking*

The final view of the Draw graphic is two-dimensional, of course, but if you were to turn the picture on its side, you'd see objects stacked on top of one another. An example is shown in Figure 3-2. As you will see later in this chapter, Draw allows you to control the stacking order of the objects.

Activating Draw

To activate Draw, choose the Draw On command in the Edit menu (or press **Command-J**). Remember: this command is available only when working in the word processing and spreadsheet modules; the command is dimmed in the menu when working with other Works modules. To deactivate Draw, choose the Draw Off command.

Works lets you draw only on the portion of the word processing document that has text written on it. The exception to this is the first window of a new WP document. You may draw pictures anywhere in this window, up to the width of the current margin settings.

If you'd like to draw on more of the page, but don't want to write any text, press the **Return** key the desired number of times to create blank lines. Assuming single spacing, Boston 10 point font, and one inch top and bottom margins, you need to press the **Return** key 45 times to create a complete page of blank lines.

DRAW TOOLS

Works Draw has a relatively small collection of drawing tools, located in a movable Tool Palette, normally placed on the left side of the drawing window. If the palette, shown in Figure 3-3, gets in the way of your drawing, drag it to a new place with the mouse.

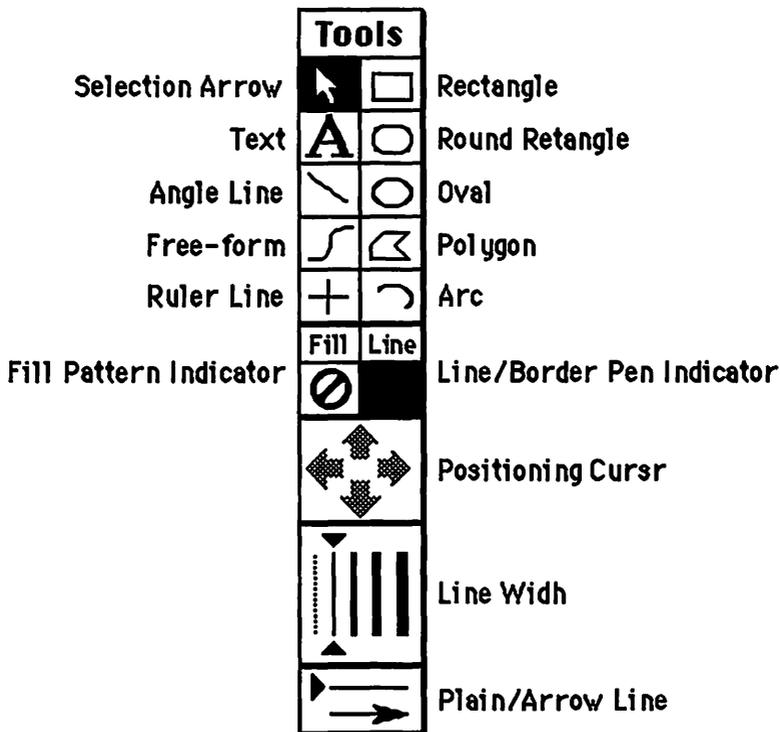


Figure 3-3 *Tool Palette, with Callouts*

The drawing tools are selected by clicking on their icon. When selected, tools appear with a gray background. The pointer takes the shape of a small cross when using all but the text and Selection Arrow tools. And as shown in Figure 3-4, the pointer appears as the standard arrow when using the Selection Arrow; a large I-beam when using the Text tool.

After you have used a tool, the object you've created is automatically selected, and *handles*—small black squares—appear around it. The object remains selected until you click in another part of the document or choose another tool to use (a small “bug” in Works 2.0 sometimes prevents the

-  Selects objects
-  Draws objects
-  Sets text insertion

Figure 3-4 *Shapes of Pointers and What They Do*

handles from disappearing completely; you can make them vanish by clicking once or twice in the vertical scroll bar). Once the object has been created, Draw reverts to the Selection Arrow.

If you want to continue using the same tool to make additional objects, hold down the **Command** key while using the tool. As long as you hold down the **Command** while making shapes, the same tool will remain active.



Selection Arrow

The Selection Arrow tool lets you point and click on Draw objects to select them. Selected objects appear surrounded by handles. Once an object has been selected, it can be deleted, moved, or edited. To select most objects, click anywhere within them. For lines or arcs, click directly on the line. For objects filled with the transparent pattern, click on a border (see Figure 3-5 for examples). To deselect an object, click anywhere on a blank portion of the drawing window, or select another tool.

Selecting Several Objects Selecting more than one object lets you work with them together. It also lets you take advantage of Draw's more advanced features, like grouping. There are several ways to select more than one object:

1. Hold down the **Shift** key while clicking each object. To dismiss a selected object, **Shift**-click on it again.
2. Use the Selection Arrow to enclose the group of objects you choose with a selection rectangle, as shown in Figure 3-6. Start from one corner of the group, and drag to the opposite corner. Keep in mind that you must drag *completely* around the boundaries of each object that you select. If you wish, **Shift**-click on any object to deselect it. You can also use this method to select stubborn objects (like oddly shaped objects with thin borders).

Moving Objects To move objects to other parts of the drawing, place the selection arrow within the object and drag (by the border on unfilled objects). When moving objects, don't drag by a handle, or you'll change the object's shape.

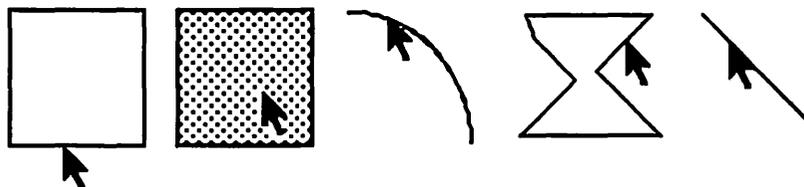


Figure 3-5 *Where to Click to Select*

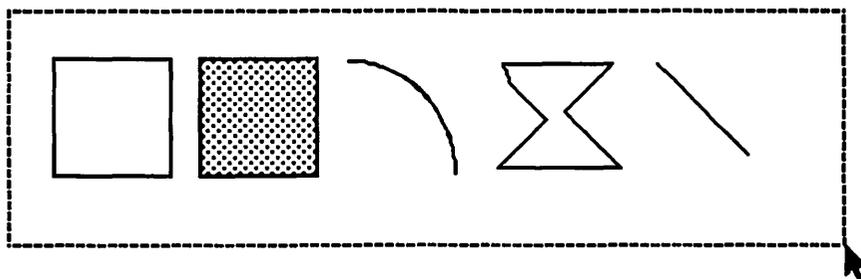


Figure 3-6 *Selecting Around Objects for Grouping*

Reshaping Objects Drag a handle to reshape an object. Lines and arcs have two handles (one at each end); as shown in Figure 3-7, all other objects have four or more handles. When reshaping an angled line, you can change its length or angle. You cannot change the angle of a horizontal or vertical line made with the Ruler Line tool.

Arcs, polygons, and freeform objects can be totally reshaped by dragging at their handles.

Deleting Objects There are two ways to delete an object:

- Select it and press the **Delete** key.
- Select it and choose the Clear command in the Edit menu.

You can delete several objects at once by selecting all of them, then pressing **Delete** or choosing the Clear command.

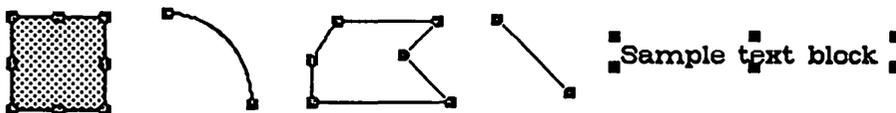


Figure 3-7 *Handles and Assorted Objects*

Text

Use the Text tool to add or edit text. The text can be any:

- Font that's currently installed on the Works disk.
- Size from 4 to 72 points.
- Of six font styles.
- Of eight foreground or background colors.

Text can also be right justified, left justified, or centered, but can only be single-spaced.

To write text, simply click the Text tool and click the I-beam pointer anywhere in the window. A three-inch-wide, one-line box appears on the screen (see Figure 3-8), with an insertion point blinking at the left edge. Text writing and editing is similar to the Works word processing module; words that are too long to fit a line are wrapped to the next. Pressing the **Return** or **Enter** keys moves the insertion point to the next line. When you are finished writing, select another tool or click anywhere outside the text box.

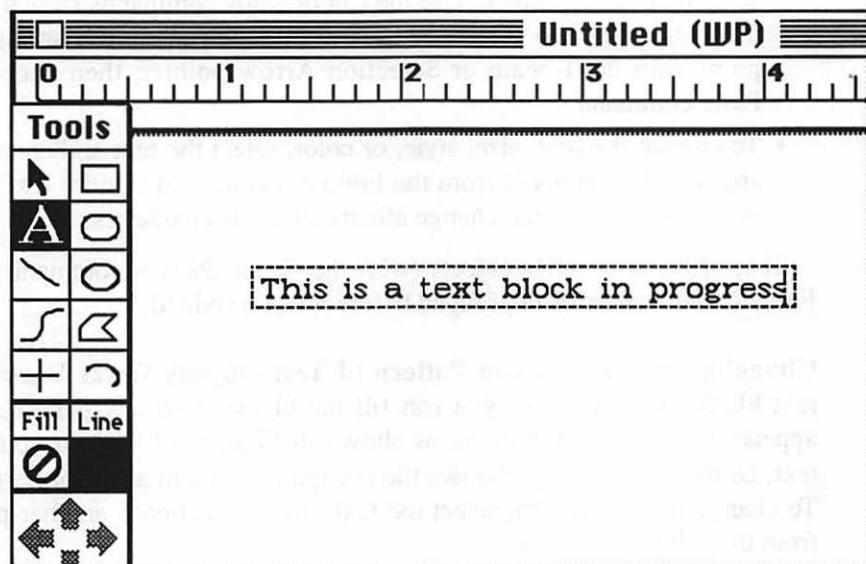


Figure 3-8 *Writing Text in Text Box*

Works initially provides a three-inch-wide text box, but you can make it any width you like. There are two ways to change the width of a text box:

- Select the Text tool, click on a starting point for the box in the document window, and drag to the opposite corner until the box is the desired dimension. The length of the box is really unimportant, as Works will adjust it after you finish writing.
- After writing, choose the Selection Arrow and click anywhere on the text. Handles will appear that denote the boundaries of the text box. Lengthen or shorten the width by pulling at the center right handle.

Works also has a hidden text feature called column text, used to create multiple-column documents such as newsletters and menus. See the section “Working with Column Text” later in this chapter.

Editing Text Editing text in Draw is simple and straightforward.

- To add characters to a text block, click where you want the characters inserted with the Text tool I-beam pointer. Start typing.
- To delete characters, set an insertion point and press the **Delete** key, or drag the I-beam pointer across the text to be deleted, *then* press the **Delete** key.
- To cut and paste text, select the text block by clicking it with the Selection Arrow, or select the portion you want by dragging over it with the I-beam pointer. Use the Cut or Copy commands from the Edit menu as usual. To paste text back into the document, set an insertion point with the I-beam or Selection Arrow pointer, then choose the Paste command.
- To change the font, size, style, or color, select the text and choose the appropriate command from the Format menu. If the entire text object is selected, the format change affects all of the characters.

Text grouped to other objects (with the Group Picture command in the Format menu) must be ungrouped before it can be edited.

Changing the Background Pattern of Text Objects Works Draw treats text blocks as objects, so you can fill the blocks with any pattern. Text appears on top of that pattern, as shown in Figure 3-9. When you write text, Draw automatically chooses the transparent pattern as the background. To change the fill pattern, select the text block and choose another pattern from the Fill Pattern menu.

**Now is the time
for all good Macs
to come to the
aid of their
owner.**

Plain text,
no background

Now is the time
for all good Macs
to come to the
aid of their
owner.

Plain text,
gray background

Now is the time
for all good Macs
to come to the aid
of their owner.

Outline text,
gray background

Now is the
time for all
good Macs to
come to the
aid of their
owner.

Shadow text,
hashed background

**Now is the
time for all
good Macs to
come to the
aid of their
owner.**

Bold text,
dotted background

Now is the
time for all
good Macs to
come to the
aid of their
owner.

Outline text,
light gray background

Figure 3-9 Sample Background Patterns Under Text



Lines

The Ruler and Angle Line tools both make lines, and they work in much the same way, except for one major difference: The Angle Line tool draws lines at any angle; the Ruler Line tool draws lines horizontally or vertically only. Constraining the Angle Line tool provides the same results as using the Ruler Line tool (see “Constraining Shapes,” below, for more information on constraining Draw objects). With both tools, the width of the lines can be changed at any time.

To draw with either tool, click it, then position the shape at the start of the line. Drag to the end of the line and release the mouse. With the Ruler Line, the direction of the line (vertical or horizontal) is determined by the first movements of the pointer.

Resizing a Line The length and angle of lines can be altered. Change the length or angle of the line by selecting it, then pulling on a handle. The line will be anchored at the other end. You can’t change the angle of a line made with the Ruler Line tool.

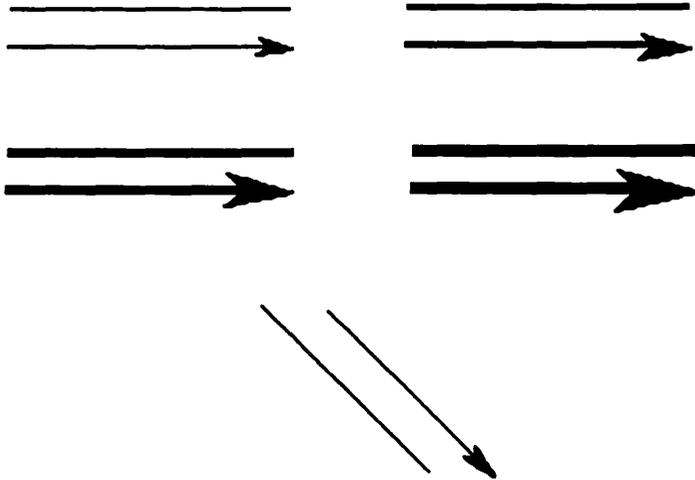
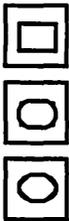


Figure 3-10 *Lines with Arrows*

Making Arrows with Lines Besides offering different line widths, the line selection options in the Tools Rack lets you turn lines into arrows. You can put arrowheads on either or both ends of the line by clicking one of the line options at the pattern of the tool palette. The size of the arrowhead depends on the width of the line. Figure 3-10 shows some examples.



Rectangles and Ovals

The rectangle and oval tools can make boxes and circles of all sizes and shapes. One of the rectangle tools is for creating boxes with square corners; the other makes rounded corner boxes (see Figure 3-11).

To make a rectangle or oval, click the tool you want, position the pointer where the object is to start, then drag the mouse.

Resizing a Rectangle or Oval The size and shape of rectangles and ovals can be altered once they are made. To reshape or resize the object, select it by clicking it (click the border of the object if it is not filled with a visible pattern). Drag one of the eight handles that appear. The object is anchored

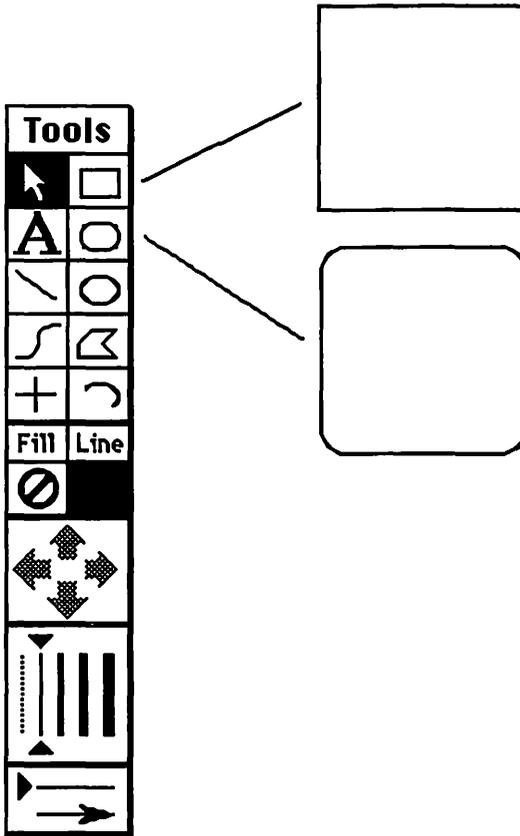


Figure 3-11 *Square and Round Rectangle*

at the handle opposite the one you're pulling. The object is extended or retracted from this anchor point.



Free-form and Polygon Tools

The Free-form tool makes closed or open objects of your own design. The Polygon tool makes multi-sided shapes. Using the choices in the Line Pattern menu and line/border width options in the Tool Palette you can vary the border thickness and border pattern of free-forms and polygons.

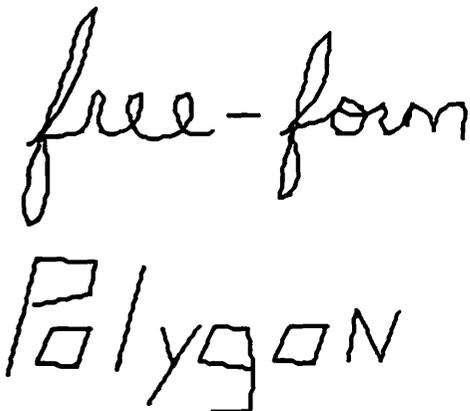


Figure 3-12 *Samples of Free-forms and Polygons*

Patterns can be used to fill the contents of the drawn shapes, as selected with the Fill Pattern menu.

Free-form To make a free-form shape, click the Free-form tool, position the pointer where the object is to start, then drag the mouse around the drawing window to construct the object. The shape is completed when you release the mouse button.

Polygon To make a polygon, click the Polygon tool and position the pointer where the object will start, then click and drag the mouse. A line will extend from the start point. To start a new line, click the mouse button again. Draw finishes the polygon when you return to the start of the shape, double-click the mouse button, or click twice on the same spot. Figure 3-12 shows examples of a polygon and free-form in progress.

Although you do not need to close polygons or free-forms, you will want to if the object is filled with a pattern.

Resizing and Reshaping a Free-form or Polygon To change the shape of a free-form or polygon, select the object, then drag one of the handles that appear. The object is reshaped at the point of the handle only.

To resize a free-form or polygon, first choose the Group Picture command from the Format menu, then drag one of the eight handles that appear around the boundaries of the object. The object is anchored at the handle roughly opposite the one you're pulling, as shown in Figure 3-13. You grow or shrink the object from this anchor point.

If you'd like to reshape a grouped free-form or polygon, you must first choose the Ungroup Picture command from the Format menu.

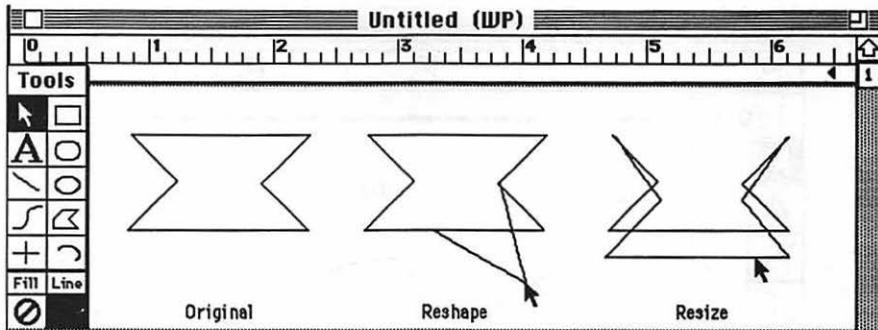


Figure 3-13 Differences Between Reshaping and Resizing Polygons



Arc Tool

The Arc tool creates quarter-circles of any size or angle. To make an arc, click the Arc tool and place the pointer where the object is to start. Drag the mouse until the arc is the right size and shape. The direction of the curve of the arc is determined by the direction you first move the mouse.

Extending or Retracting the Arc Arcs made with the arc tool comprise a quarter of a circle, or 90 degrees. You can extend or contract the arc, from 0 degrees to a full 360 degrees—by selecting the arc, then tugging on one of the handles that appear on either end. You can drag either handle to extend or contract the arc (see Figure 3-14). Use this feature to make any angle of arc you wish, up to a complete circle.

Resizing the Arc The size and shape of arcs can be altered once they are made. To resize an arc, choose the Group Picture command from the Format menu, and drag one of the handles that appear. The object is anchored at the handle opposite the one you're pulling. You grow or shrink the object from this anchor point.

If you'd like to reshape a grouped arc, first choose the Ungroup Picture command from the Format menu.

Pattern Settings

The current pattern settings fill the inside and border of objects, and are shown with the Fill and Line indicators in the middle of the Tool Palette.

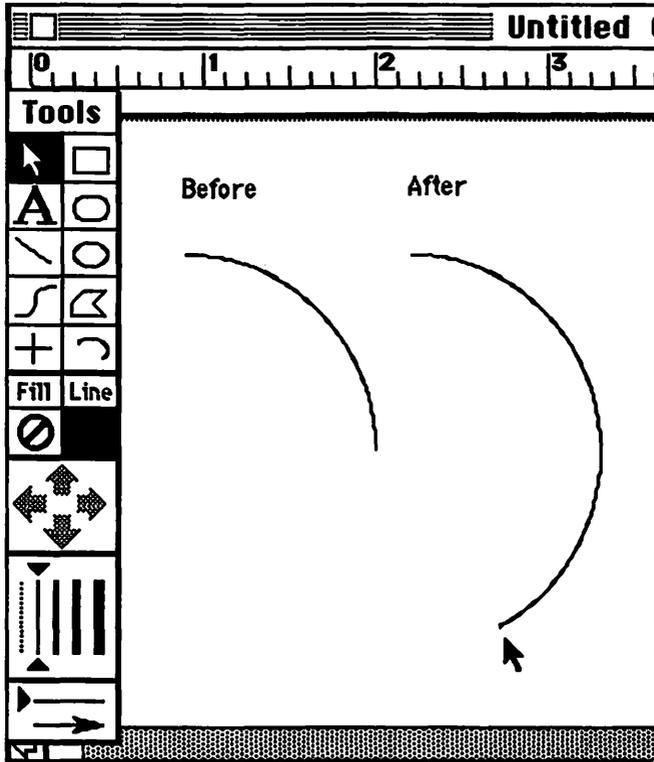


Figure 3-14 *Extending Arc with Handle*

Patterns indicated for Fill or Line are the ones that will be used for the next object you create. The circle-and-slash represents transparent (no) pattern.

Positioning Pad

The positioning pad in the Tool Palette helps you precisely place one or more selected objects in the drawing window. Each click of one of the arrows moves the object one pixel (one screen dot) in the direction indicated. There are 72 pixels to the inch, so by pressing one of the arrows 72 times, you move the object precisely one inch. (The cursor keys on the keyboard have the same effect.)

Setting Line and Border Widths

The width settings in the Tool Palette set the thickness of lines and object borders. You can select four border and line widths, corresponding to one, two, three, and four pixels wide, as well as invisible (no line or border).

To change the thickness of a line or border, select the drawing tool to use, then choose a new width from the Tool Palette. The dotted line makes the line or border invisible. The currently selected line width is marked. The preset line width is used for all new objects you create, until you change it to a new line width.

To change the thickness of lines and borders of objects you've already made, select the object, then choose a new line width. When done this way, the preset line width does not change.

Line and Arrow Settings

Draw makes either plain lines or lines with arrowheads. Click the plain line at the bottom of the Tool Palette to make just lines; click the arrowhead line to make lines with an arrow on one end. The arrow appears on the opposite end of the line where you started drawing; that is, if you draw the line from left to right, the arrow is placed on the right end.

To add arrowheads after a line is made, select the line, then click on the arrow line. The arrow is always placed on the right end. If you want the arrow on the other end, drag one end of the line around 180 degrees, as shown in Figure 3-15. Adjust the line until it is the proper angle and length.

DRAW MENUS

The following menus and commands are available when Draw is turned on:

Format Menu

The Format menu contains all of the Draw power controls. Within this menu are commands for selecting different fonts, font sizes, styles, and colors, grouping or ungrouping objects, alignment, controlling the invisible Works grid, and more.

Justification The alignment commands let you control how Draw positions the characters within the text block. You have four choices: left, centered, right, and justified.

Font The Font Pop-up menu lets you change the font of text. Previously written text can also be changed by first selecting it, then choosing the commands in the menu.

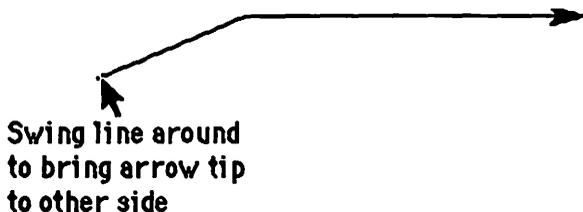


Figure 3-15 *Stretching Around Line to Bring Arrow to Other Side*

The number and variety of fonts shown in the menu may vary, depending on the fonts you have installed on the Works disk. You can add or delete fonts using the Apple Font D/A Mover utility.

Size Text can be written in any size from 4 to 72 points. The Mac follows standard typesetting convention where 72 points equals one inch. The point size takes into consideration the blank area between lines (called leading). There, actual character of a font is slightly smaller than the specified point size. See Figure 3-16 for details.

Style Select one or more items from the Style Pop-up menu to change the appearance of any font. Styles can be mixed or you can cancel all styles by choosing Plain. Or, to cancel a single style, choose it again.

Color-White Dots The Color-White Dots command selects the color for the white (off) dots on the screen, as depicted in Figure 3-17. You have eight colors, including black and white, to choose from.

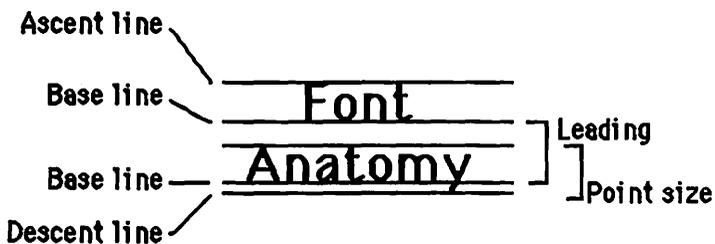


Figure 3-16 *Font Anatomy*

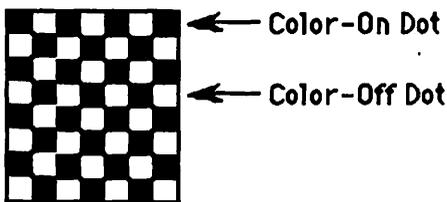


Figure 3-17 *Explanation of Off/On Pixels and Colors*

Color-Black Dots The Color-Black Dots command selects the color for the black (on) dots on the screen. You have eight colors, including black and white, to choose from.

Group Picture The Group Picture command ties several objects together, so that you can handle them as one object. Select the objects to group by holding Shift while clicking on object borders, then give the command. When grouped, you work with the selection the same way you work with individual objects—grouped objects can be moved, resized, deleted, copied, and so forth.

Note: Some operations, like polygon or arc reshaping and text editing, can't be done when objects are grouped. You must ungroup them first with the Ungroup Picture command (see below). You can also “nest-group” objects by combining two or more grouped selections.

Ungroup Picture The Ungroup Picture command unties objects grouped together with the Arrange-Group command. If you've nest-grouped several grouped selections, ungrouping undoes the first tier of grouped objects only. Continue ungrouping to untie all of the tiers.

Grid Settings The Works grid is used to place all objects along common lines of an invisible network of evenly spaced horizontal and vertical lines. Draw offers a number of sizing increments for its internal, invisible grid. To choose a different grid size, choose this command, then click one of the size options in the dialog box (see Figure 3-18).

Grid Setting

<input type="radio"/> 1/2 inch	<input type="radio"/> 1/9 inch	<input type="radio"/> 1 centimeter
<input type="radio"/> 1/3 inch	<input type="radio"/> 1/12 inch	<input type="radio"/> 1/2 centimeter
<input type="radio"/> 1/4 inch	<input type="radio"/> 1/18 inch	<input type="radio"/> 1/4 centimeter
<input type="radio"/> 1/6 inch	<input type="radio"/> 1/24 inch	<input type="radio"/> 1/7 centimeter
<input checked="" type="radio"/> 1/8 inch	<input type="radio"/> 1/36 inch	<input type="radio"/> 1/14 centimeter

OK

Cancel

Figure 3-18 *Grid Settings Dialog Box*

You may prefer using the points and pica system when producing desktop publishing documents. Use the table that follows as a handy reference guide for converting fractional inches to points and picas.

Grid Setting	Points	Picas
1/2 inch	36	5
1/3 inch	24	3.33
1/4 inch	18	2.5
1/6 inch	12	1.67
1/8 inch	9	1.25
1/9 inch	8	1.11
1/12 inch	6	0.83
1/18 inch	4	0.56
1/24 inch	3	0.42
1/36 inch	2	0.28

The centimeter option offers some useful “in-between” grid sizes. The following values are approximate.

Centimeter Setting	Inches	Equivalent in	
		Points	Picas
1 cm	3/8	27	3.75
1/2 cm	3/16	14	1.88
1/4 cm	3/32	7	0.93
1/7 cm	1/17	4	0.54
1/14 cm	1/35	2	0.27

Grid On/Off When Draw is first turned on, the grid is off. It can be turned on by choosing the Turn Grid On command.

Objects you make, move, or resize with the grid off will likely not line up with the grid, and they may not be aligned to one another when you turn the grid back on. Use the positioning pad in the Tool Palette or cursor keys to manually “nudge” objects into alignment.

Bring to Front The Bring to Front command is used to change the stacking order of objects. It brings an object from any place in the stack to the very top. To use, select the object you want, then give the command. Grouped objects are handled similarly. All the objects in the group are brought to the front as a whole. The order of the objects in the group is retained.

You can also restack two or more ungrouped objects at a time. Shift-click all the objects you want, then give the command. The objects retain their respective order.

Send To Back The Send To Back command is used to change the stacking order of an object. It brings an object from any place in the stack to the very bottom. To use, select the object you want, then give the command. Grouped objects are handled similarly. All the objects in the group are sent to the back as a whole. Their order is retained.

You can also restack two or more ungrouped objects at a time. Shift-click all the objects you want, then give the command.

Show Column Boxes Column boxes are normally shown around column text (see the section “Working with Column Text,” below, for more information on column text). The column boxes are dotted outlines that show the boundaries of the text, as illustrated in Figure 3-19. The boxes do not print or show up in Print Preview.

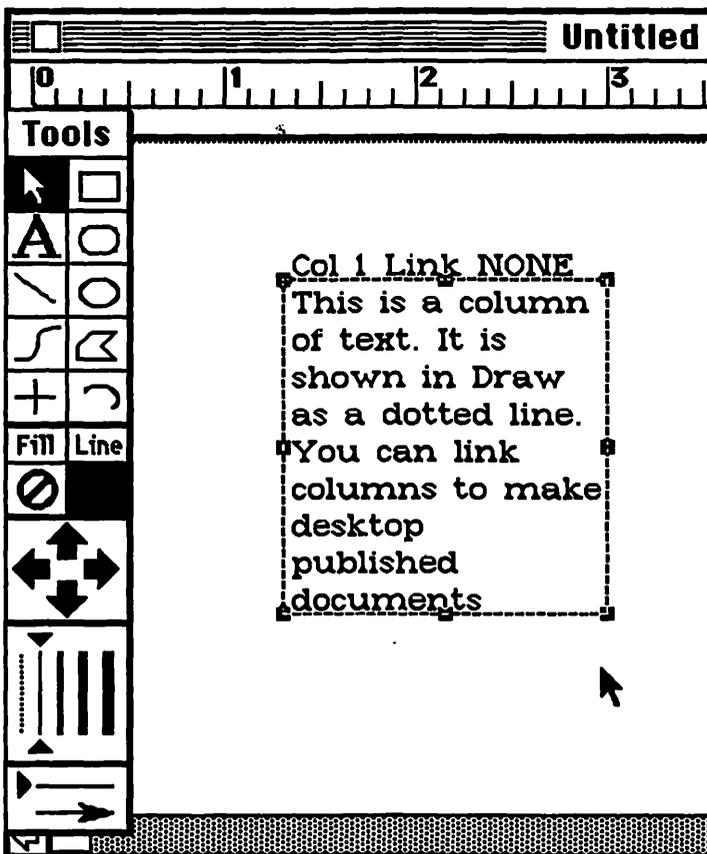


Figure 3-19 *Column Boxes*

Spread Text The Spread Text command places text along the path of lines and arcs. To create spread text:

1. Write a line of text in the font, size, style, and color you want to use.
2. Select the text with the mouse and copy it into the Clipboard.
3. Create a line or arc (if you haven't done so already) in the desired size and shape.
4. Select the line or arc object, and choose the Spread Text command from the Format menu.

The text appears over the object, stretched from one end-point to the other, as shown in Figure 3-20. Each character of the pasted text is an individual text object, and can be moved and formatted independently.

With all characters selected, dragging by any handle serves to shrink or stretch the text along the path, as shown in Figure 3-21 (the size of the characters is not affected). You can use this method to compress or expand the spacing of characters along the line or arc.

To delete the underlying arc or line you can do one of two things:

- With all the characters still selected, group the text (with the Group Picture command) and drag it away from the arc or line. Manually delete the arc or line.
- Select the arc or line, then choose the white pattern from the Line Pattern menu *before* choosing the Spread Text command. That makes the object invisible, as long as the background is white.

Fill and Line Pattern Menus

The patterns in the Fill Pattern menu are used to fill the inside of objects; the patterns in the Line Pattern menu are used to change the texture of lines and borders. Both pattern menus work with all objects except text. You have 39 fill patterns to choose from, including transparent (no pattern, marked as a circle-and-slash).

When Draw is first turned on, it automatically selects the transparent fill pattern and a black line pattern. These *current pattern settings* are shown in the pattern boxes within the Tool Palette. You can change the fill or line pattern of objects before or after you make them.

Changing Fill or Line Patterns Before an Object Is Made

To use a new fill or line pattern before an object is made, choose one from

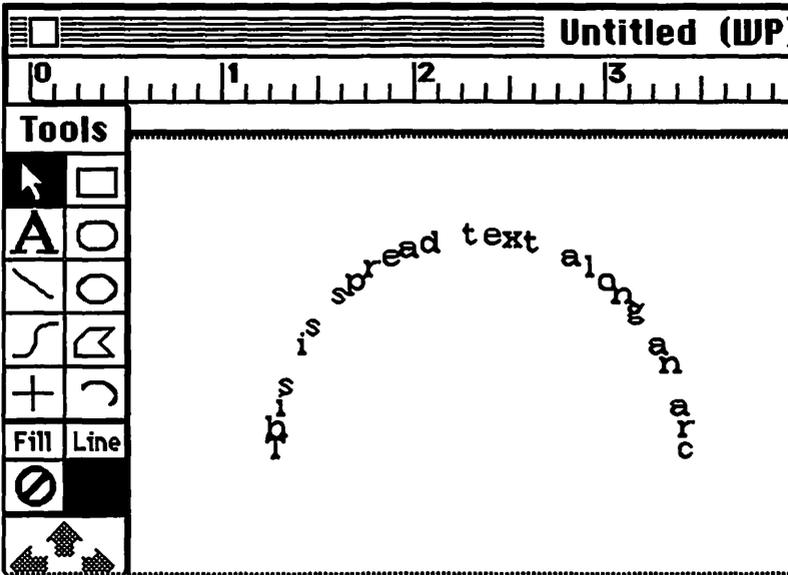


Figure 3-20 *Spread Text on Arc*

the Fill or Line Pattern menus. Choosing a new pattern without an object selected will change the current pattern selection for all subsequent objects. New patterns are shown in the pattern boxes in the Tool Palette.

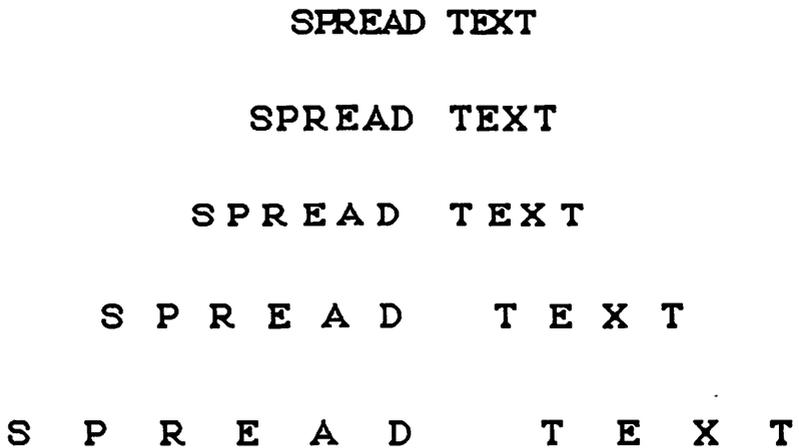


Figure 3-21 *Expanding Spread Text*

Changing Fill or Line Patterns After an Object Is Made

To pick a new pattern for an existing object only (the current pattern setting is not changed), click on it, then make a selection from the Fill Pattern or Line Pattern menus. When filling an open free-form or polygon, Draw will close the object with the pattern, taking the shortest path between the endpoints. Unusual effects can be created this way.

PASTING OBJECTS

The Paste command retrieves objects placed into the Clipboard. You can control the placing of the pasted selection by:

- Clicking on the drawing pad. The pasted object will appear there (if no spot on the drawing has been clicked, Draw puts the selection in the center of the window).
- Selecting an object. The pasted selection will be placed slightly down and to the right of the object.

If more than one object is pasted, the objects will retain the same stacking order they had when they were originally cut or copied. Objects pasted from the Clipboard appear over the original object, but under any other objects that were on top of the original. Refer to Figure 3-22 for a visual representation of this.

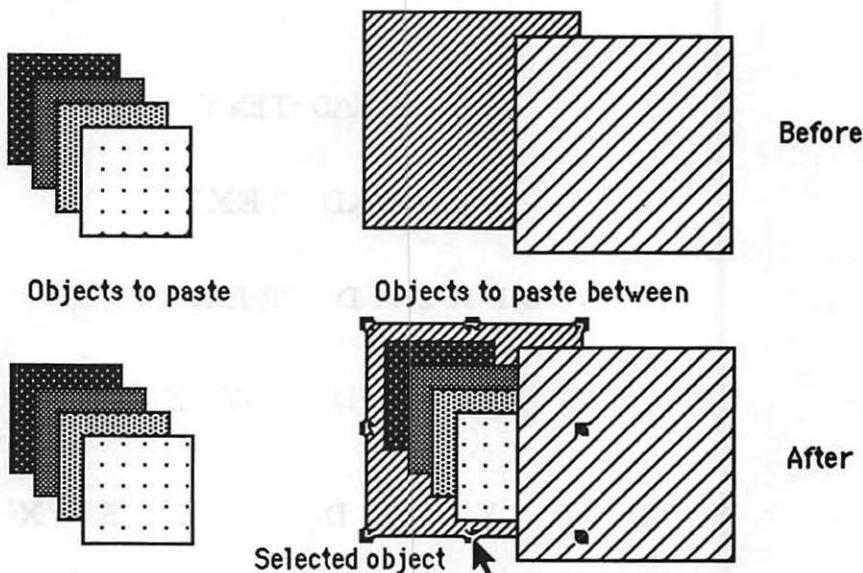


Figure 3-22 Pasting Under from Clipboard

IMPORTANT ASPECTS OF DRAW

Keeps these points in mind when using Works Draw.

Borders and Bounds

Draw objects have two kinds of boundaries: visual and physical. The visual boundaries are the borders of the object. The physical boundaries are the ones Draw uses to maintain the shape and parameters of an object, and these boundaries, or “bounds,” are used for many of its operations, such as aligning objects to its invisible grid. The handles that appear around a selected object show the actual bounds of that object. An object’s borders and its bounds may not coincide with one another. Some bounds of objects extend with wider borders. Two rectangles may be the same size, but if they have different border widths, one appears larger than the other, even though the bounds of the two shapes are exactly the same (see Figure 3-23). These shapes will not align as expected when using Draw’s internal grid. The bounds of an object always go through the border of the object, even if the border is invisible.

Constraining Shapes

Most of Draw’s tools can be constrained, that is, limited to making only certain types of shapes. To constrain a tool, hold down the Shift key while dragging the mouse. The effects of constraining vary with each tool, as noted below. When using the Angle Line, Polygon, or Arc tool, the direction of constraining (horizontally, vertically, or diagonally), is determined by the first movement of the pointer. Depress the Shift key only after you have pressed the mouse button, and are about to create the object.

<i>Tool</i>	<i>Constrained Effect</i>
angle line	Draws lines at 0, 45, or 90 degrees only.
rectangle	Draws squares.
round-rect	Draws rounded-corner squares.
oval	Draws circles.
arc	Draws quarter circles.
free-form	Draws straight lines at 0, 45, or 90 degrees only.
polygon	Draws lines at 0, 45, or 90 degrees only.

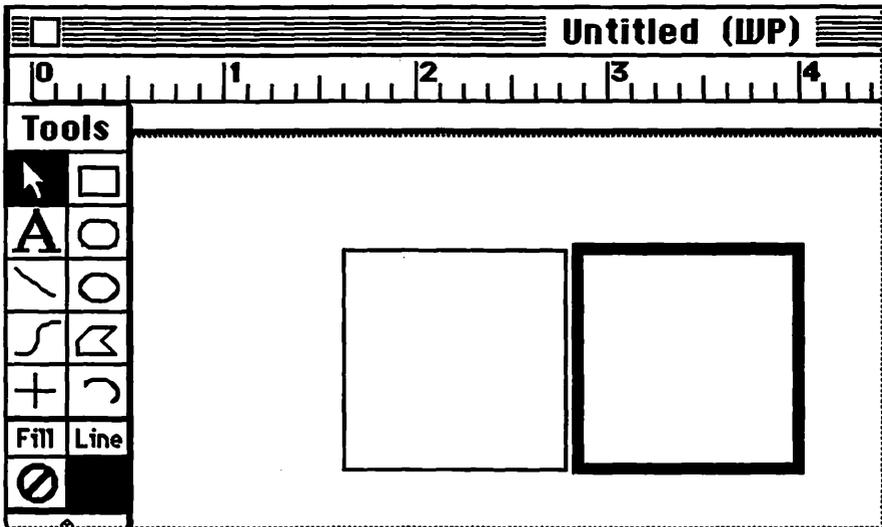


Figure 3-23 *Bounds with Thin and Thick Borders*

Hidden Keyboard Features

Works Draw behaves differently when you press certain keys on the keyboard while doing an action with the mouse.

For example:

- If you hold down the **Shift** key *before* you depress the mouse button, the pointer turns into a pointing hand. You can use the hand to select several objects at once. Drag the hand around a group of objects to make a selection rectangle. Be sure to drag **COMPLETELY** around the bounds of the objects (identified by the blank handles). Otherwise, one or more objects may not be selected.
- If you hold down the **Shift** key *after* you depress the mouse button, Draw constrains the movement of the mouse. Constraining lets you move the mouse in a horizontal, vertical, or diagonal plane only. Constraining works when creating objects and when moving objects (see Figure 3-24). As long as you keep the mouse button down, you can release and press the **Shift** key to turn constraining on and off. This can be used effectively when generating unusual polygons, for example. When used with the Polygon tool, you must also hold down the **Option** key. Release the **Option** key when you are done making the shape.

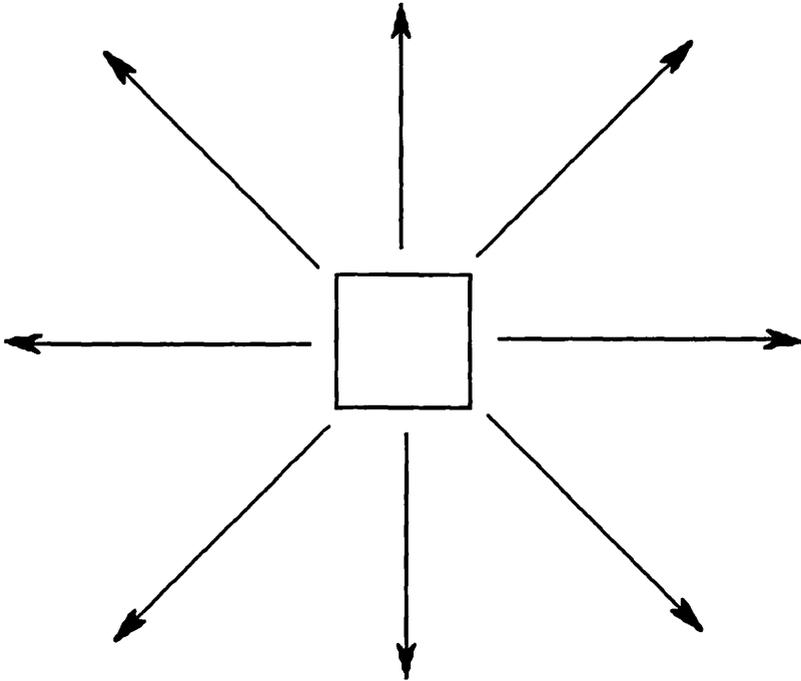


Figure 3-24 *Examples of Constrained Movement*

- Pressing the **Shift** key while you are resizing a rectangle or oval, and the object constrains to a perfect square or circle.
- Holding down the **Command** key reselects the last tool used.

Controlling Size and Placement of Objects

Draw has an internal and invisible alignment grid, which you can use to accurately size and place objects on a drawing. When Draw is first turned on, this grid is initially off. The size of the grid is determined with the Grid Setting command in the Format menu.

The standard grid setting is 1/8th of an inch. Therefore, the grid is a matrix of horizontal and vertical lines spaced 1/8th of an inch apart. Objects will have sizes in 1/8th inch increments, and will be placed in the drawing window in 1/8th inch increments.

WORKING WITH COLUMN TEXT

Works has a hidden text writing feature called column text. You'll want to

use column text when preparing multiple-column documents such as newsletters, reports, and scientific papers. To create a column of text:

1. Click the Text tool.
2. Hold down the **Option** key and drag the mouse inside the document window to describe the size and shape of the column. You can always resize and reshape the column later on.

Text columns are normally displayed with a dotted outline. This outline appears when working in Draw or the word processing and spreadsheet modules, but doesn't appear when the document is printed. The outline helps provide a visual border of the boundaries of each column, but you may want to turn them off. To do so, choose the Show Column Boxes command in the Draw Format menu.

When Works creates a column of text, it displays a name and link header at the top of the column (see Figure 3-25). This header is used to create a continuous "chain" of columns. With such a chain, text that won't fit in one column is automatically *flowed* to the next. This is particularly helpful when producing multiple-column documents.

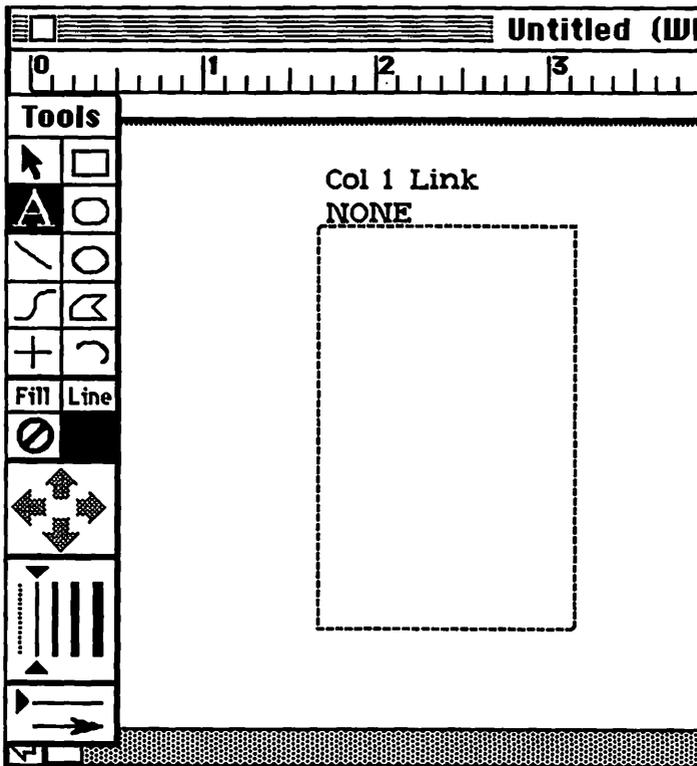


Figure 3-25 Column Box with Header

Initially, Works names each column *Col 1*, *Col 2*, and so forth, with no columns linked to one another. To create a link, edit the header as desired. For example, to link column 1 to a column named NEXT, edit the header of column 1 so that it reads **Col 1 Link NEXT**.

You can continue linking in this fashion as long as you want. The last column in the chain should not link to any column, such as **Col x Link NONE**.

Works column numbers aren't very descriptive, but you can change them if you'd like. Column names can be any reasonable length (the shorter the better to avoid errors), but they should not have spaces, punctuation, or special characters. For example, **Col LeadArticle Link LeadArticle_cont** is a proper column header, but **Col Lead Article Link LeadArticle (Con't)** is not. Column headers must also be followed by a Return, to separate them from the body of the column text.

Once a link is established, it stays established until you edit one or more column headers, or delete one of the columns in the link. Text that overflows one column is added to the next. If the second column overflows, that text is then added to the third column in the link, and so forth. Text will overflow the last column of the link because it will have nowhere to go.

You are limited to 32K (about approximately 5,000 words) of text in one chain of columns, but you can have any number of column chains in a single word processing document, up to the maximum memory capacity of your computer.

The text does not reflow until you have finished writing or editing the column. To force Works to flow the columns, click the Selection Arrow or click anywhere outside the column.

Columns are also reflowed when they are resized. If the column is enlarged, it can accept more characters, and will "siphon" text from the next column in the link. If the column is reduced, it will force the excess text to flow to the second column.

Each text column may contain its own unique set of character font formats. Text that is flowed from one column to the next takes on the formatting of the destination column.

Automatic Linking

Editing column headers to establish a chain of text columns is tedious, and an easier and quicker method is to hold down the **Option** key and click on each column in the link in the desired chaining order. This method works with either the default column names (*Col 1*, *Col 2*, etc.), or with your own column names.

Converting Text Blocks into Columns

You can convert regular object text (text blocks you make with just the Text tool) into column text in two ways:

- Add a column header, using the header format described earlier.
- Click the Selection Arrow, hold down the **Option** button, and click on the text object you want to convert.

To convert column text back to a regular text object, simply delete the header.

ADVANCED DRAW TECHNIQUES

A few moments spent experimenting with Draw reveal a number of hidden capabilities that bare tools and commands don't convey. This section details special tips, techniques, and traps of Works Draw. Get to know these secrets and you are well on your way to mastering Works.

Grouping Objects to Make Graphics Compounds

As its very basic level, making pictures with Draw is creating and compiling objects laid out on a page in a particular fashion and order. You can prepare elaborate drawings more quickly and easily if you logically separate objects that would be moved or resized together into linked clusters. Each cluster of objects is a definable *graphic compound*—a kind of subsystem of the complete picture. Graphic compounds may be landscape figures, nuts, bolts and other hardware, a letterhead logo, or whatever. Objects in a self-contained graphic compound can more readily be manipulated in your drawing.

To make a graphic compound, position the various objects that go into a drawing. Once the objects are composited, use the Group Picture command from the Format menu to lump them together. Now the graphic compound can be moved, resized, copied, pasted, and otherwise manipulated as a whole.

Grouping is especially important if you rearrange the stacking order of your objects. If you move a grouped compound from the back to the front of the stack, the individual objects in the compound will retain their stacking order relative to one another. If the objects are not grouped, and you merely select each object to bring to the front, the layering order of the objects relative to one another may not remain consistent.

Template and Forms Documents

Works' built-in Stationery feature lets you create template documents filled with ready-to-use graphic shapes and images. You can use this feature, for example, to create the basic design of a newsletter. All the graphic components (called *standing elements*) used for each issue are included in the template. (Refer to Chapter 1, "General Tips for Using Microsoft Works," for more information on the Stationery feature.)

Saving Common Graphics Compounds

Graphic compounds can be saved in the Scrapbook file or in a special "forms" document, a repository of Draw clip-art. You can reuse the compounds whenever you need them. If you access the graphic compounds only occasionally, they can be kept in the Scrapbook. If you have many graphic compounds to store, you may want to use one of the Scrapbook alternative desk accessories, as described in Chapter 9, "Managing Works."

The Scrapbook, or a scrapbook alternative accessory, is not convenient, however, if you access the graphic compounds on a regular basis. Instead, store them in a form document and keep the document open while drawing. When you need to access a graphic, click on the form document window to make it active, and bring it in view (or position the form document to make it readily accessible). Then:

1. Select the graphic compound.
2. Copy it using the Copy command from the Edit menu.
3. Reactivate the drawing window.
4. Paste the compound into the drawing with the Paste command.

Erasing with Works Draw

If you've used a bit-mapped graphics program like MacPaint, you learned to delete portions of the picture by erasing the dots. Since Draw is object-oriented, its drawings are not composed of small dots. Therefore, to erase a part of the drawing in Works Draw, you cover it up with another object called a *block-out object*. The object is made invisible by choosing a fill and line pattern that matches the background (usually white).

For example, to hollow out a section of a black circle that rests on a white background, create a small white circle and place it inside the black

one, as shown in Figure 3-26. Choose a white line pattern to eliminate the border.

For irregularly shaped erasures, use the Free-form or Polygon tools. Draw the block-out object over the part you want to delete. Shape the object, then tug on the handles to reshape it into the form needed. Select the block-out object, and define the fill and line patterns so that it blends in with the background, and obscures the object underneath. Complex erasures may require you to make several block-out objects, and to selectively choose the line and fill patterns to match the immediate surroundings of your drawing.

The block-out erasure technique also works when creating cut-away drawings (see Figure 3-27). The cut-away is actually a block-out object (or series of objects), over which is placed the various elements that make up the interior view. The block-out hides the exterior contours of the drawing, providing a white or other even-patterned background.

Minimizing Screen Redrawing Time

Each time an object is displayed on the screen, the Macintosh recreates it. The drawing time for simple objects is a fraction of a second. Complex objects, like filled polygons and free-forms, may take considerably longer to draw and to appear on the screen.

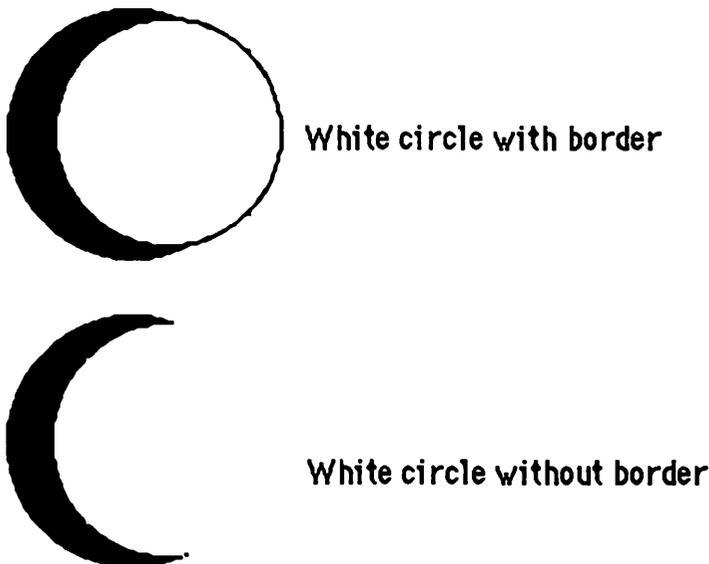


Figure 3-26 *Erasing Sample with Draw*

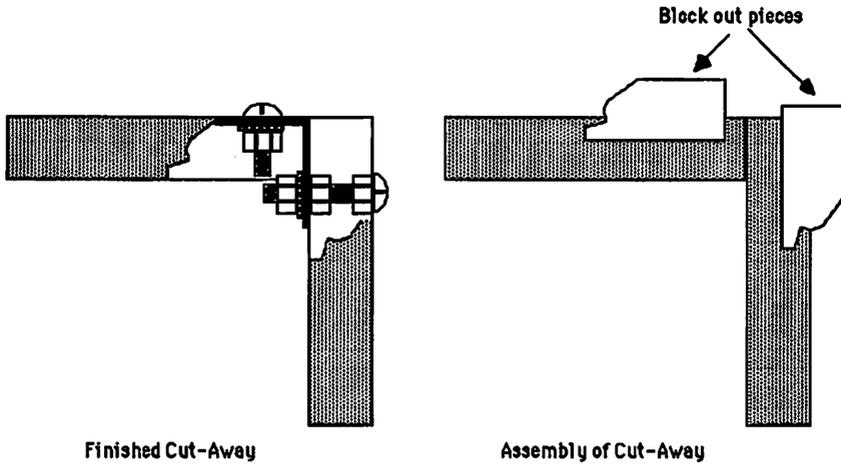


Figure 3-27 *Block-out for Cutaways*

If your drawing consists of many complex objects, it may take several seconds to redraw the screen. This can become annoying when scrolling through the document and when examining the drawing in reduced view. Nothing can be done to speed up the drawing time. You can, however, avoid redrawing objects unnecessarily.

- Refrain from scrolling the drawing one small section at a time. Don't use the arrows to scroll the document. Use the thumb box or click in the gray portion of the scroll bar. These methods help you reach the part of the document you want much faster.
- If your drawing is very complex, create it in small chunks and keep the chunks in individual documents. Then, when you are done and ready to print the drawing, merge the chunks together into one document.
- If you are printing with an ImageWriter, you may convert portions of an elaborate drawing into a bit-mapped picture. The Macintosh redraws bit-mapped images almost instantaneously. Use the techniques covered in Chapter 11, "Using Works with Other Programs," for more information. You should not use this method if you are printing with a LaserWriter, as bit-mapped graphics are not printed with the same high resolution as object-oriented graphics.

Text Effects

Since a text block is an object, you can change the background by choosing a new pattern from the Fill menu. The text appears on top of the pattern. Choose the patterns carefully, since many patterns are too "busy" or dense,

making the text characters hard to read. Choose another font style, such as bold or outline, for unusual effects. The Outline and Shadow styles usually produce pleasing results with any background pattern.

The Line Pattern menu and line thickness options in the Tool Palette don't work with text blocks. You cannot change the pattern of the text itself, nor place a border around the text block. If you need a border around the block, draw an unfilled rectangle and size it to match the text.

Use a separate box if you want to add a larger or smaller background under the text.

Mixing Fonts, Sizes, Styles, and Colors

Draw lets you freely mix fonts, sizes, styles, and colors within any single text block or text column. Follow the standard Works procedure for choosing a new format while writing text or when reformatting selected text.

To return all the text in a block or column to a single font, size, style, or color, click the block or column with the Selection Arrow, then choose the desired commands from the Format menu.

Works normally retains character formatting of the original text when pasting it into a new text block, regardless of the current formatting of the text block. If you want the pasted text to take on the character formatting of the text you're pasting into, hold down the **Option** key while pasting. This technique works whether you invoke the Paste command from the Edit menu, or press **Command-V**.

Insuring Proper Text and Graphics Proportions

The ImageWriter prints graphics and text in slightly different resolutions (72 dots per inch for graphics; 80 dots per inch for text). This can alter the expected size and proportions of text and graphics.

If your drawing contains only graphics, you can print without much worry of altered proportions. But if your drawing also contains text, you should make sure the Tall Adjusted option (in the Page Setup dialog box) is turned on. With Tall Adjusted switched on, the ImageWriter will print text *and* graphics at 72 dot-per-inch resolution. You do not need to turn on Tall Adjusted when printing the document sideways (Landscape) or when printing with the LaserWriter.

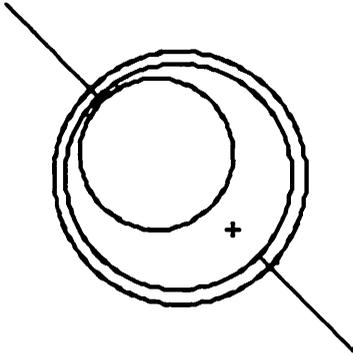


Figure 3-28 *Drawing Concentric Circles*

Starting Point for Circles and Squares

With Works Draw, objects grow from the point where you first begin dragging the mouse. You can use this common point to your advantage when creating certain effects and when making concentric circles or squares.

To make concentric circles, for example, draw the outer most object first. Next, use the Angle Line tool to draw a diagonal line from the upper left handle of the object. Depress the **Shift** key to make sure you get a perfect 45 degree line. To make the inner circles, line up the pointer along the line, as shown in Figure 3-28. When you are done, select the diagonal line and delete it.

Aligning and Centering Shapes

Works provides rudimentary features for aligning objects to one another, centering them, and snapping already made objects to the grid.

Snapping Objects to the Grid Objects may not coincide with the grid when they are made with the grid off. Works Draw lacks an “Align To Grid” or “Snap To Grid” feature found on stand-alone graphics programs like MacDraw, but it does provide a semi-manual method of accomplishing the same thing.

1. Draw the object, as usual.
2. Set the grid to the spacing you want (such as 1/8 -or-1/4-inch), but make sure the grid is *on*.
3. Press and hold the V, H, or B keys, depending on how you want the

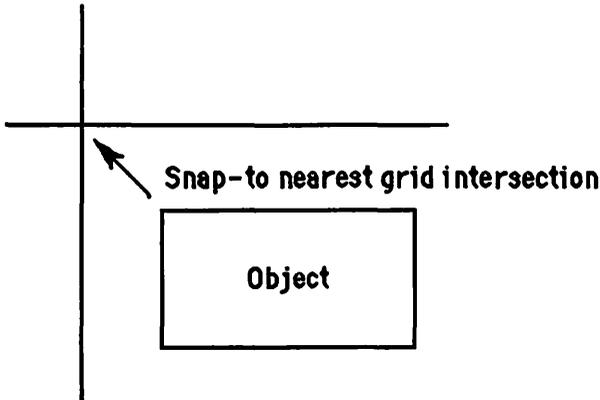


Figure 3-29 *Sample Object-to-Grid Alignment*

object aligned—vertically, horizontally, or both horizontally and vertically.

4. Click on the side or corner of the object you want snapped to the grid. The object snaps to the nearest grid line or intersection as shown in Figure 3-29.
5. Release the V, H, or B key, then release the mouse. The object is snapped to the nearest grid line or intersection.

Note: The entire object may not be aligned to the grid, just the side you indicated in Step 4.

You can use the same basic procedure when resizing objects to align to the grid. Hold down the appropriate key (V, H, or B), and drag one of the handles of the object. The object is aligned to the grid only on the side(s) of the object resized. The opposite side(s) are not affected.

To align an object that you are about to draw to the grid—even when the grid is off—select the tool you want to use, press and hold V, H, or B, and draw the object. Release the mouse, then the key. Use this approach to “temporarily” turn the grid on for just one or two objects.

Centering Objects Centering two objects is perhaps the easiest task of all.

1. Select the object you want centered.
2. Cut it using the Cut command (from the Edit menu).
3. Select the object you want to center over.
4. Choose the Paste command from the Edit menu. The previously cut object is pasted from the Clipboard, and is automatically centered over the selected object.

Repeat the process for other objects you want centered.

You may need to use the Bring To Front or Send To Back commands to properly set the stacking order of the centered objects.

Aligning Objects to One Another Works automatically centers the pasted object both vertically and horizontally within the bounds of the selected object. But suppose you want to align the objects along one of the sides, such as the top or bottom.

To center the objects either horizontally or vertically, align the objects by one of their sides, follow the steps above for centering, then use the positioning keypad in the Tool Palette menu to nudge the pasted object to the desired alignment (see Figure 3-30).

If precise alignment is not required, you can use the mouse to “eyeball” the proper alignment. Use the approach detailed above to center the objects, if desired, then use the **Shift** key to constrain movement either horizontally, vertically, or diagonally. Remember to press the **Shift** key after clicking on the object you want to move.

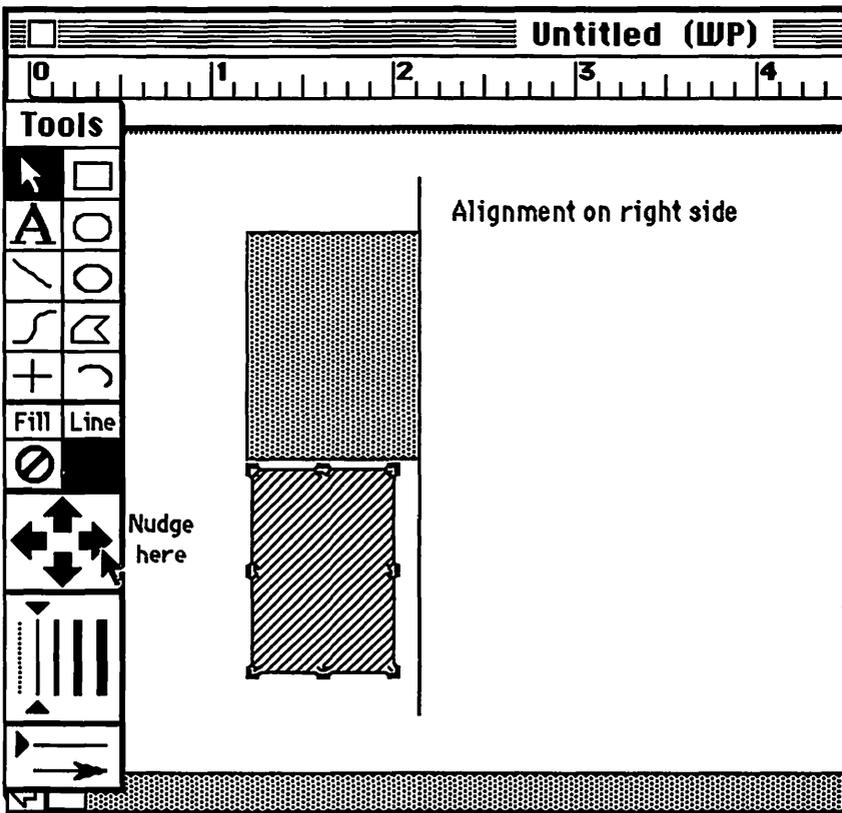


Figure 3-30 *Nudging to Align*

Another approach is to use the V, H, and B snap-to keys, detailed in the previous section. Follow the instructions given to align an object to a common grid line. Do the same for the remaining objects in the set. With each object, drag it close to the others, then release the mouse button. The objects will align themselves as specified. When all objects are properly aligned, select them (and group them if desired), and move them to the desired location in the drawing.

Measuring Objects

Draw lacks a means to precisely measure objects. You could try to compare the size of a line or square to the ruler that sits over the window, but the results aren't always accurate or easy to obtain.

Another way is to create your own "rulers" that you can use to measure the width or length of any object you create. One of the easiest ways to make a ruler is to create small squares with the grid feature turned on. These squares represent accurate 1/8-inch spacings. Here are step-by-step instructions for making a Draw ruler:

1. Make sure the Grid Setting is at 1/8 inch, and turn the grid on.
2. Click the Rectangle tool and draw the smallest square you can.
3. Repeat the process seven times (for a total of eight squares), making the sides of each square touch one another.
4. Click the Ruler Line tool and make a straight line from one end of the boxes to the other. This line will be exactly one inch long.
5. Select the Ruler Line tool again, and make small 1/8th-inch-long hash marks at the intersection of each square. Make the last hash mark 1/4-inch at the outside border of the last square.
6. Select all of the boxes and delete them.
7. Select all of the lines and group them with the Group Picture command.
8. Extend the length of the ruler by copying the lines and pasting them alongside the original. A four- to six-inch ruler should suffice for most applications.
9. When all of the one-inch segments have been copied and positioned, select them and group them together.
10. Click the Text tool, choose a small, easy-to-read font, and add labels to the tick marks.
11. Group all of the ruler elements to keep them together.

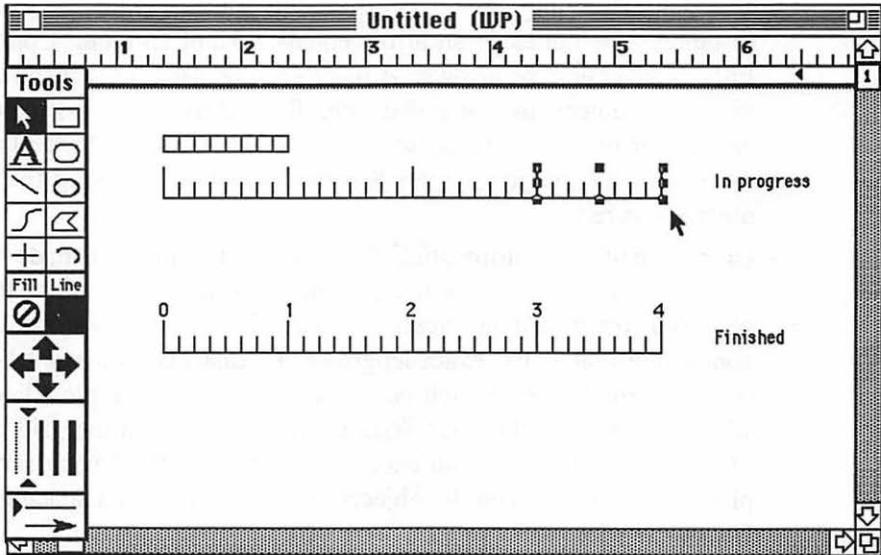


Figure 3-31 *Finished Ruler and Ruler-In-Progress*

The ruler-in-progress, and the final result, is shown in Figure 3-31. Store the ruler in the Scrapbook or other safe place so you can use it when you need it.

These instructions are for a horizontal ruler. Use the same basic steps to make a vertical ruler, except line the boxes and squares vertically instead of horizontally.

Use a smaller Grid Setting to make smaller boxes should you need a more accurate ruler.

Note: Even though the elements that make up the ruler are grouped together, each element is a separate object, and the many objects may cause a general slowdown of operation within Works. You can help speed things up by converting the object-oriented ruler into a bit-mapped graphic. Refer to Chapter 11, "Using works with Other Programs," for an explanation of how to do this.

Spacing Objects

There are many occasions when you may need to accurately space objects a specified distance apart. You can use the ruler described in the previous section for spacing objects, or apply one of the methods outlined here.

- Select a grid size (with the Grid Settings command) that equals the distance you wish to space objects. Turn the grid on, and use the mouse to move the objects the designated distance.

- Use the positioning cursors (in the Tools Rack) to move objects a set distance. Each click of an arrow equals 1/72 of an inch. Count carefully as you click the arrows. A macro can be used if you need to position many objects the same distance. Record the macro with the proper number of arrow clicks, select the object to move, then play back the macro. (Refer to Chapter 8 for information on using the Works macro feature.)
- Create small “measuring sticks” with the aid of the self-made ruler or grid. You can then leave the grid off as you use the sticks to place objects a certain distance apart. A measuring stick is a vertical or horizontal line that is the exact length of the distance you want between objects. For 1/2 of an inch between objects, for example, choose the 1/2 inch option in the Grid Settings dialog box, turn the grid on, and make the smallest line you can. Turn the grid off (if necessary), and place the stick between the objects, using the stick as a spacing guide. Delete the stick when you are done with it.

Freezing Objects

You can secure any object so that it can't be moved or resized with a hidden freeze feature. To freeze an object:

1. Select the object.
2. Press and hold the F key.
3. Click on the object once more.

With the object frozen, you won't be able to move, resize, or even select it. You can freeze a group of objects by selecting all of them and following the steps given above. You need to click only one of the objects when pressing the F key. To unfreeze an object so that you can edit it, press and hold the F key while you select the object.

Arrowhead Effects

Any line can be made into an arrow with the line selector options in the Tool palette. You can place the arrowhead on either side of the line; to make double-ended arrows, you must create two lines with arrowheads on each end, then butt the lines together, as shown in Figure 3-32.

The size of the arrowhead depends on the thickness of the line. If you would like a smaller arrowhead with a thick line, create the line, then add a



Figure 3-32 *Butting Lines Together*

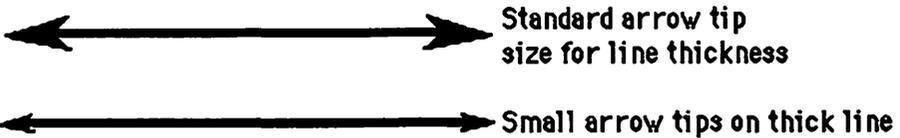


Figure 3-33 *Standard Arrow Thickness and Custom Arrow*

smaller line at the end. Make this small line thinner, and select an arrowhead for it. An example is shown in Figure 3-33.

An arrowhead may not appear on very short lines. To make one appear, you must enlarge the length of the line a small amount. If necessary, cover the extra portion of the line with a block-out object, such as a line or small box.

If an arrow crosses over an object, it may blend with the object, and if the arrow line is completely over a dark object, choose a lighter pattern from the Line Pattern menu. If the line goes partly off the object and onto the white background, add a short length of black line to “fill” it in (see Figure 3-34). Another technique is to white out the area directly beneath the arrow. Here’s how to do it:

1. Draw the arrow at the length and angle you want.
2. Duplicate the arrow by copying it and pasting it.
3. Be sure the new pasted arrow line is selected, then choose a heavier line width from the Tools Rack.
4. Select the white pattern from the Lines Pattern menu.
5. Click on the original black arrow and bring it to the top with the Bring To Front command.
6. Place the original arrow evenly over the white background, as shown in Figure 3-35, and group them together.
7. Drag the arrow into place.

If you don’t like the arrowheads that Works Draw provides, you can make your own. Use the polygon and rectangle tools to fashion a wide variety of arrow shaped objects. The arrow heads turn out better if you constrain the polygon to straight and diagonal lines only. Use the Fill Pattern and Line Pattern menus to choose different patterns for the insides and borders.

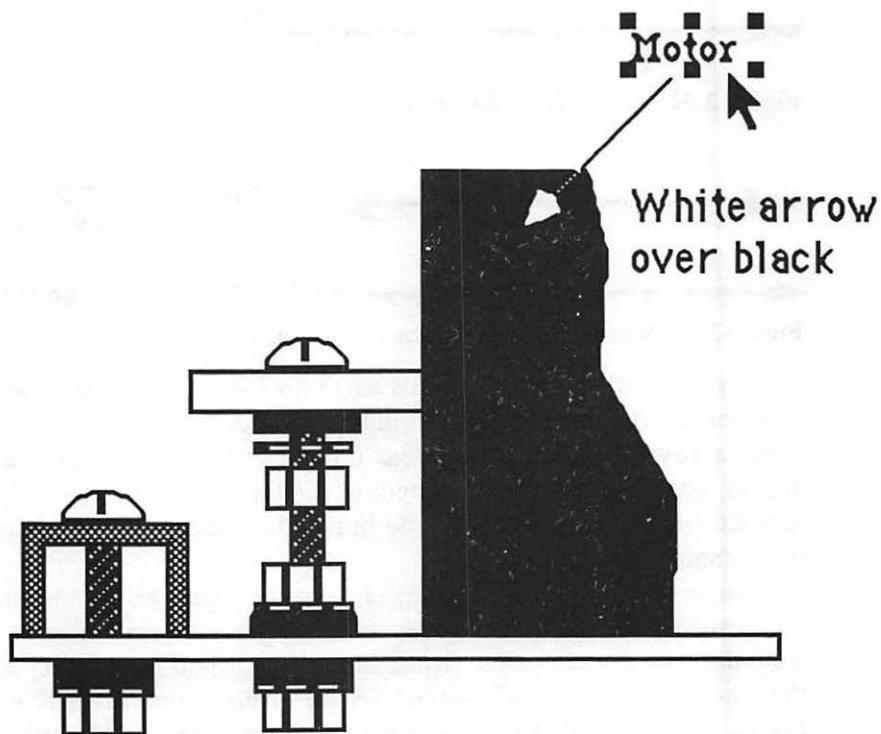


Figure 3-34 Adding Line over Arrow

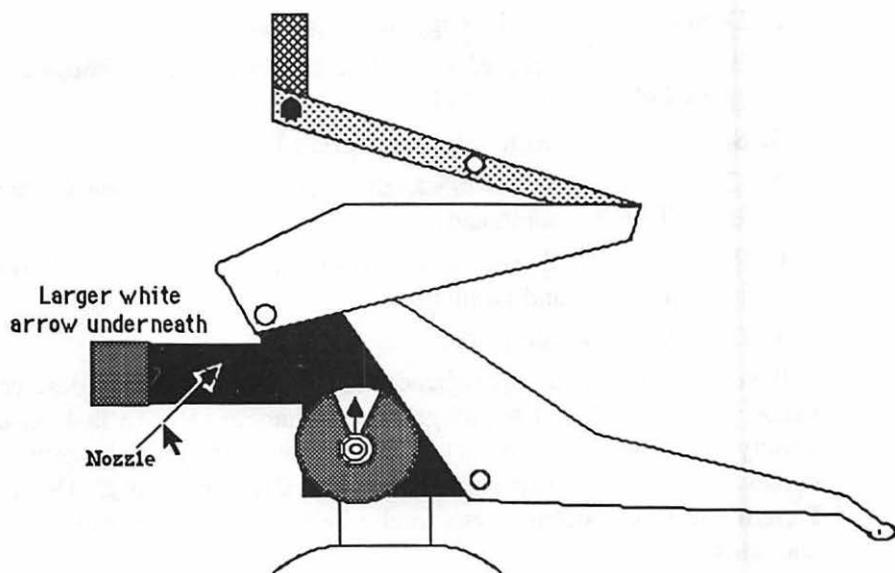


Figure 3-35 Using White-out Under Arrow

Maintaining Proportion when Resizing

Draw has no simple way of maintaining the proportion of an object or group of objects while resizing. If the object is a perfect square or circle, you can guarantee the correct proportion by depressing the **Shift** key while resizing (start resizing, *then* press the **Shift** key).

If the object does not have even proportions, you can still maintain those proportions during resizing by drawing a square around the object and grouping the object with the square. When you resize the square, hold down the **Shift** key. That keeps the correct proportions of the square, and hence any object grouped with it.

Complex Polygons and Free-forms

The Polygon and Free-form tools provide a great deal of flexibility, but they take the longest to master. Here are some tips:

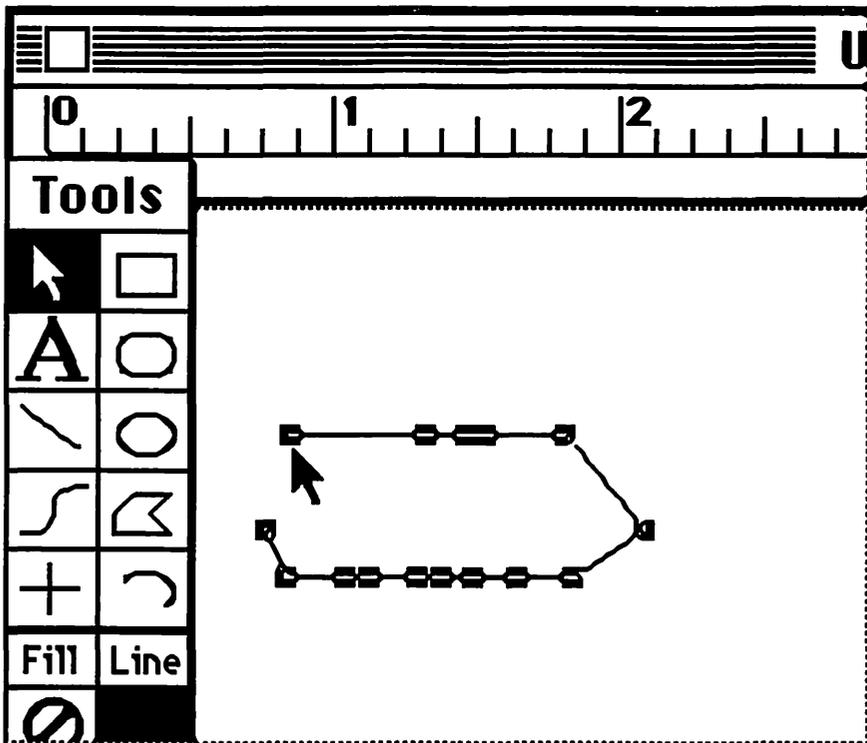


Figure 3-36 *Additional Handles Along Polygon Line*

- You can turn constraining on and off while using the Polygon tool. Hold down the **Shift** key to turn constraining on; release it to turn it off.
- You can reshape a polygon by dragging at a handle. If there is no handle along a portion of polygon, you can't reshape it there. If you think you need greater control over the reshaping of polygons, add handles when creating the shape (see Figure 3-36). You do this by clicking the mouse along the length of a side. Each time you click adds a new handle, as long as you don't click twice at the same spot. Move the mouse at least one pixel (1/72-inch) to make each new handle.
- Draw lacks a way to smooth free-forms that have been reshaped. You may need to use a stand-alone, object-oriented drawing program (such as MacDraw) if you need to create and edit elaborate, smooth free-forms. Free-form shapes from another program can be copied into Works easily.

Tracing Graphics

Complex graphics can be difficult to create from scratch in Draw. For better results, use a bit-mapped image of the drawing you want to duplicate. The bit-map serves as a kind of tracing template. Import the bit-map from MacPaint or similar painting program, as described in Chapter 11. Use the various tools to trace over the picture. When you are done, select the bit-map picture, unlock it, and delete it. You can now fine-tune the Draw image as required.

If the original bit-map is small, such as a letterhead logo copied into MacPaint with the use of a video digitizer, enlarge it in Draw before tracing. That will make it easier to work with and you will obtain better results. When done, reduce the traced image by grouping it, then shrinking it to the desired size.

Spreadsheet Strategies

Before the proliferation of personal computers, the concept of keeping track of finances on an electronic version of an accountant's ledger was heresy. In the days of massive micro- and mainframe computers, calculating net worth, budgets, and financial projections required special programming and a full-time keypunch operator to enter all the data.

Crunching numbers is second nature to the Macintosh and Microsoft Works. Part of Works is an electronic spreadsheet that mimics the functionality of a multiple-column ledger pad, but offers more than pencil and paper ever could.

Converted to real terms, the Works spreadsheet pad measures 256 rows by 16,382 columns—4,193,792 cells to enter text, values, or calculation formulas. Assuming 8 1/2- by 11-inch ledger pads with seven columns by 40 rows per page, one Works spreadsheet can measure 26 by 375 feet. Granted, that's assuming your Macintosh has the RAM to accommodate that much data, but the possibilities are there.

This chapter details the finer points of the Works spreadsheet. In the pages that follow, you'll learn the ropes for moving easily throughout the spreadsheet, formatting cells, when and how to use relative and absolute referencing, and a simplified approach to writing formulas.

SPREADSHEET BASICS

Figure 4-1 shows an empty spreadsheet window. The main components of the spreadsheet are:

- The cells, labeled by letter for columns and by number for rows.
- The edit bar (the Enter and Cancel icons are only present when entering data).
- The scroll bars, for moving through a spreadsheet larger than one screen.
- The menu bar, on top of the screen, for issuing various commands.

Data you enter from the keyboard is placed in the *current cell selection*. The current cell selection—cell A1 in the figure—is shown highlighted. Furthermore, Works reports the current cell selection in the edit bar above the document.

Moving the Cell Selection

You can move the current cell selection in three ways.

- Click on a new cell with the mouse.

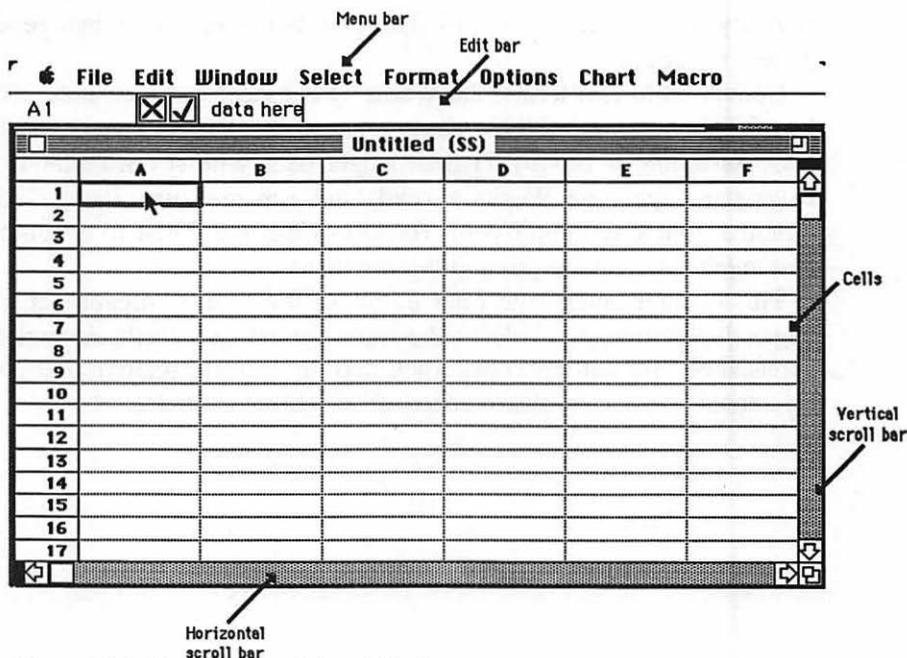


Figure 4-1 Empty Spreadsheet Window

- Press one of the arrow keys on the keyboard (or numeric keypad, if your computer is so equipped). The current cell selection will shift in the direction indicated on the key.
- Press the **Return**, **Tab**, and **Shift** keys to move up, down, left, and right, as follows:

<i>Key</i>	<i>Direction</i>
Return	Down
Shift-Return	Up
Tab	Right
Shift-Tab	Left

Using the Mouse

The mouse is the most intuitive method of moving the current cell selection. But if you are entering lots of data in many cells, it's not the quickest or easiest approach. You'll want to alternate between mouse and keyboard control for best efficiency.

There are few caveats when using the mouse to select cells, but one stands out: Be sure you have "pasted down" (entered) data into the cell before clicking on another. You can always tell if cell entry is incomplete when you see the Enter and Cancel icons in the edit bar. To paste down the data, click the **Enter** icon, or press one of the cell selection keys as outlined above (cursor keys, **Tab**, **Return**, etc.). You'll see why this is important in the section on writing formulas, later in this chapter.

Role of Enter and Return Keys

The **Return** key serves to enter data into the current cell selection, then move the cell selection up or down. The **Enter** key (on the keypad, if your computer is so equipped) only enters data into the current cell. It does not move the cell selection. The **Enter** key functions the same as the Enter icon in the edit bar.

SELECTING MULTIPLE CELLS

Works lets you make only one cell the current cell selection. That's the cell that you are currently writing or editing. But you can select any number of cells for other tasks, such as formatting, cutting, deleting, and so forth

	A	B	C
1	current cell	E1	
2	A2	E2	
3	A3	E3	
4	A4	E4	
5	A5	E5	
6			
7			
8			

Figure 4-2 Selected Range of Cells

Selected cells are shown highlighted, as in Figure 4-2; the current cell selection is not highlighted, but is identified with a heavy outline.

With multiple cells selected, you can now choose from among commands in the various menus, and the action affects all of the selected cells. For example, with cells A1 through A5 selected, you can change the cell formatting to Bold with the Style options in the Set Cell Attributes dialog box. This all-at-once approach relieves you of selecting each cell in the range individually, and choosing the desired formatting options.

You can, however, select only one contiguous (all together) range of cells at a time. You can't select cells A1 through A5 in one range, then B2 through B7 in another. The cell selection also must take the shape of a square or rectangle, and you can't leave off a cell in one corner of the rectangle. This may seem obvious, but it's a point that confuses many Works users.

Follow these procedures for selecting multiple cells:

To select

A small range

A large range

An entire column

Two or more columns

An entire row

Two or more rows

All active cells

Complete spreadsheet

Do this

Drag over the desired cells with the mouse.

Click in the upper left cell of the range, hold the **Shift** key, then click the lower right cell of the range.

Click in the column heading.

Drag over the column headings.

Click in the row heading.

Drag over the row headings.

Choose All Cells from the Select menu.

Choose the Select All command from the Edit menu.

Untitled (SS)					
	A	B	C	D	E
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Pressing Tab moves left
to right, and down the
selection

Figure 4-3 *Action of Return and Tab Keys in Selection Range*

Use the Shift-click method to extend or retract a selection. Hold the **Shift** key and click outside the range to extend a selection, and hold the **Shift** key and click inside the range to retract it.

When the cell range is selected, pressing the **Tab**, **Return**, and arrow keys moves the current cell selection *within* the selected range only. You can use this to confine the current cell selection to the highlighted range, as illustrated in Figure 4-3. By pressing the **Command** key along with **Tab** and **Return**, you limit movement of the current cell selection in single rows or columns only.

To deselect a range of cells, click anywhere outside the range.

SPREADSHEET CONCEPTS

Keep these concepts in mind when using the Works spreadsheet module.

Active Area

The Works spreadsheet contains 256 columns by 16,382 rows, but your spreadsheet models will likely be far smaller than this. Realistically, a spreadsheet module with all 4,193,792 cells filled would require more memory than the Macintosh can currently accept, and would easily take up an entire 20 megabyte hard disk! The part of the spreadsheet that is actually filled with data is the *active area*.

Works reserves blocks of the Mac's memory depending on the extent of the active area. To conserve memory, you should strive to make the active

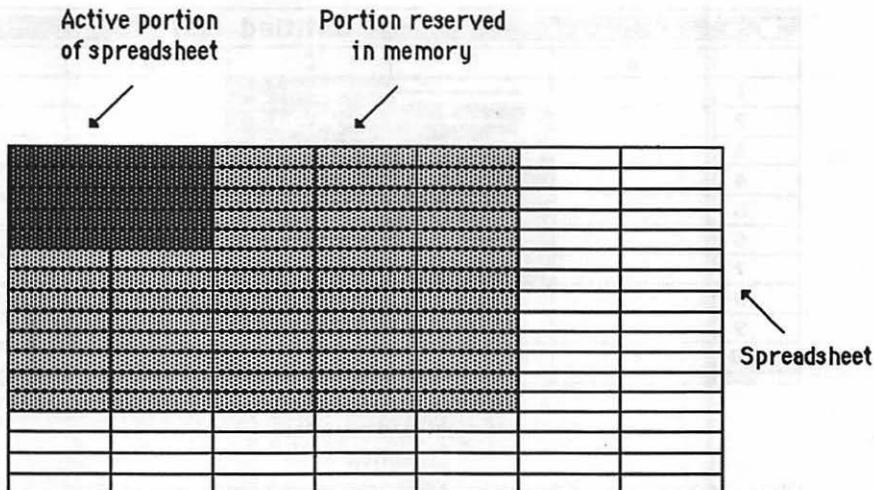


Figure 4-4 *Memory Management and Empty Rows and Columns*

area as compact as possible. Even if you leave several rows or columns empty, Works still reserves memory space for them, as shown in Figure 4-4.

Of course, there is a fine balance between memory conservation and spreadsheet aesthetics. On one hand, a spreadsheet shouldn't be distributed carelessly among dozens of columns and rows, but on the other, the data shouldn't be so crammed that the spreadsheet is difficult to view. Use your best judgment.

The intersection of the bottom right-most cell that contains data is the so-called *last cell* of the spreadsheet. You can readily find this cell with the Last Cell command in the Select menu. Works remembers this cell even if you erase its contents. If you reduce the size of your spreadsheet by moving or erasing cells, you may need to manually reduce the active area by clearing the blank columns and rows with the Clear command. That way, they no longer consume extra memory.

To clear unneeded columns and rows, select them by clicking within the column and row headers along the top and left side of the spreadsheet (see below for more information on selecting columns and rows, as well as other parts of the spreadsheet). Then choose the Clear command from the Edit menu.

Spreadsheet "Layers"

As with many electronic spreadsheet programs for computers, the cells in the Works spreadsheet are composed of "layers," superimposed over one another. Works has four cell layers.

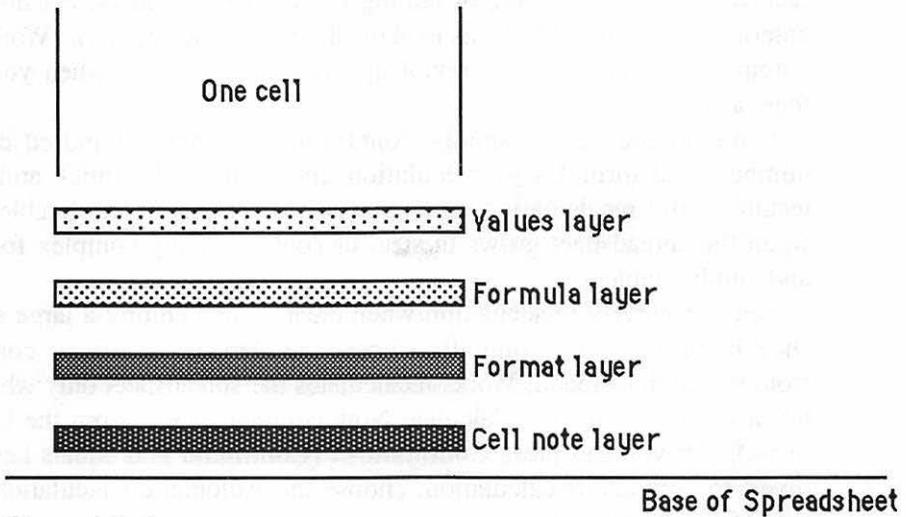


Figure 4-5 *Layers*

- The bottom layer, as shown in Figure 4-5, is Layer 1. It contains the cell note (if any), and a maximum 511 character “note-pad” used to annotate the cell.
- Layer 2 is the format layer, containing the formatting of the cell. The format (or attributes) of a cell determine how it looks on the screen and on paper. Among the variations in cell formatting are centered numbers and text, bold, and italics.
- Layer 3 is the formula layer, used for computations.
- Layer 4 is the values layer, which represents the results of formulas, as well as numbers and text you enter directly through the keyboard.

Normally, Works displays the values layer, showing the calculated results of formulas, but not the underlying formulas themselves. You can view any formula in a cell by selecting the cell; the formula appears in an editing area above the spreadsheet window.

Sometimes, it is necessary to view all formulas at once, to review the construction of the spreadsheet or to look for errors. Works provides a means to display the formula layer with the Show Formulas command in the Options menu. To revert to values display, choose the Show Values command from the Options menu.

Automatic vs. Manual Recalculation

Formulas in the Works spreadsheet are normally recalculated every time you enter new information or change old information. Specifically, Works

recalculates when entering or editing formulas or numbers, but not when entering text (called labels, as explained later in this chapter). Works also automatically recalculates previously saved spreadsheets when you open them again.

If the spreadsheet is small—containing less than a hundred cells of numbers and formulas—recalculation time is normally quick and undetectable. But recalculation time stretches to sometimes intolerable limits when the spreadsheet grows in size, or contains many complex formulas and number tables.

You can prevent recalculation when creating and editing a large spreadsheet by turning calculation off. Choose the Manual Calculation command from the Options menu; Works recalculates the spreadsheet only when you tell it do to so with the Calculate Now command (also from the Options menu). Or you can press **Command+=** (**Command** and equals key). To revert to continuous calculation, choose the Automatic Calculation command from the Options menu.

Works remembers the setting of calculation when you save a document. That is, if you select Manual Calculation, Works records your choice with the document. Manual Calculation is still selected the next time you open the document. Remember that in this case Works won't automatically recalculate the spreadsheet when it first appears on the screen; you have to do that yourself.

Circular References

A *circular reference* occurs when two or more cells in a spreadsheet refer to each other. Suppose, for example, that you enter the formula **=A1+A2** in cell A1 of your spreadsheet, and the number **10** in cell A2. Obviously, Works can't calculate a meaningful result because it has no beginning value in cell A1. A value is entered into cell A1 only after the first calculation; that value is 10, provided by cell A2. Subsequent recalculation provides different results, because the value of A1 changes each time—first 10, then 20, then 30, and so forth.

Though there are some times when you need to build a formula that relies on itself, circular references are usually made in error, and Works prompts you of this fact.

When Works finds a circular reference, it displays a dialog box like the one shown in Figure 4-6, but the program still attempts to provide a meaningful answer. Be wary! The answer will, in all likelihood, be incorrect. And if you leave it there, it could cause a rippling effect that will make other results in the spreadsheet inaccurate.

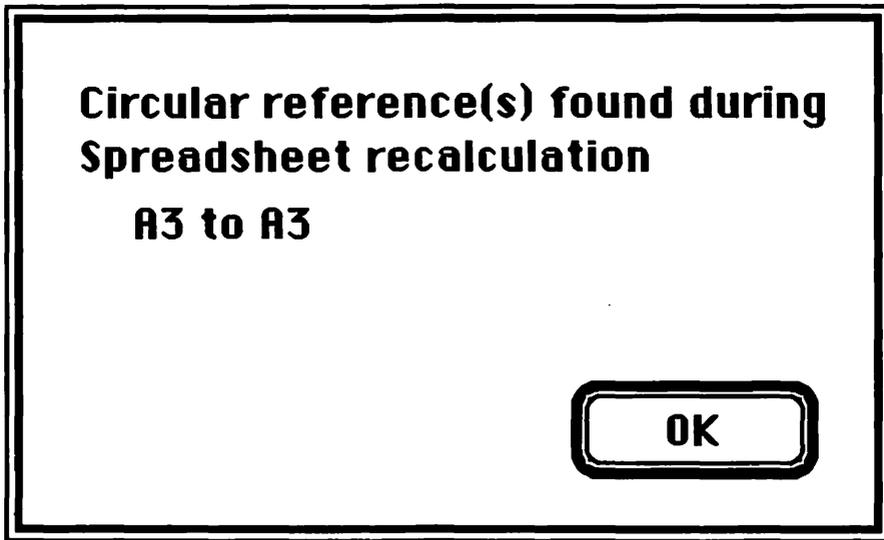


Figure 4-6 *Circular Reference Dialog*

Iteration

A few of Works' built-in formula functions require repetitive calculations to ensure accuracy. These multiple calculations are iterations. Works has a limit of 20 iterations; if its formulas are not resolved after 20 recalculations, Works presents an error. Iteration is used only with some of Works' built-in financial functions, such as IRR() and Rate(), that require an "educated guess" starting point. Unlike other spreadsheet programs, such as Microsoft Excel, Works provides no way to alter the number of iterations during recalculation.

And, unlike many other spreadsheet programs, Works does not use automatic iteration to resolve circular references (see above). However, you can force manual reiterative calculation by pressing **Command-=** (this forces recalculation, whether or not you have selected Manual or Automatic recalculation). The circular reference warning dialog box appears only after you first create or edit the circular reference formula. It does not appear when the spreadsheet is recalculated, even if the circular reference condition still exists.

Table 4-1 shows the effects of reiteration of a common circular reference between two cells. Each time you press **Command-=**, Works provides a slightly different, more accurate answer. Keep pressing **Command-=** until the changes in the answer are within the range of accuracy you wish.

Iteration # Formula	Content A1 =A2+A3	Content A3 =A1*.25
Initial Value	5000	1250
1	6562.5	1640.625
2	6640.625	1660.15625
3	6660.15625	1665.0390625
4	6665.0390625	1666.2597656
5	6666.2597656	1666.5649414
6	6666.5649414	1666.6412354
7	6666.6412354	1666.6603088

Table 4-1 Sample Reiteration of Value

Recalculation Order

Works uses what's called *natural recalculation order* when resolving the formulas in a spreadsheet. The program doesn't simply start recalculation in the upper-left cell and work its way to the lower-right. Instead, Works calculates the most basic formulas first—those that don't rely on other formulas in the spreadsheet—then progressively tackles the more complicated ones.

Untitled (SS)					
	A	B	C	D	E
1	1	1	1		
2	2	2	2		
3	3	3	3		
4	4	4	4		
5	5	5	5		
6	6	6	6		
7	7	7	7		
8	8	8	8		
9	9	9	9		
10	10	10	10		
11	=Sum(A1:A10)	=Sum(B1:B10)	=Sum(C1:C10)	=Sum(A11:C11)	
12					
13					
14					
15					

Figure 4-7 Logical Worksheet Arrangement for Calculation

Although Works uses natural recalculation to compute formulas that are scattered around the spreadsheet, good spreadsheet design suggests you write formulas that logically follow one another, such as down columns or across rows, as illustrated in Figure 4-7. Not only does this approach make the task of calculation easier on Works, but it helps you better visualize the construction of your spreadsheet, allowing you to locate errors and spot better ways of doing things.

Limitation of Works Variables

A *variable* is a temporary holding tank, or repository, for data that can change from one moment to the next. Variables are an integral part of computer programming, and are used extensively in many electronic spreadsheet programs, including Works. One type of spreadsheet variable is the cell. The value of a cell can change if the contents of other cells that are used in the computations are also altered. Let's say you are adding two cells together, A1 and A2. In cell A3 is the addition formula. Change the contents of cell A1, and Works automatically provides the new answer in cell A3. Cell A3, then, is a variable.

Many of the uses of variables are invisible to you, especially when applying one of Works' many built-in formula functions. (A function is a built-in formula that performs some complex task, like averaging a group of numbers or finding the present value of an investment.) Most of these functions rely on variables to pass information from one part of a spreadsheet to another, and are limited to working with numbers only, and not text.

Using the Spreadsheet for Non-Computational Tasks

The Works spreadsheet is primarily intended to "crunch numbers," but that doesn't mean you can't use it for other chores. Though software programmers hate to admit it, most people use electronic spreadsheet programs not to calculate budgets or returns on investment, but as a convenient "structured data processor." (In fact, the much touted "what-if" capability of electronic spreadsheets, where you enter a series of numbers and view the various results, is only occasionally used by spreadsheet users.

The division of the spreadsheet into individual cells makes it ideal for preparing non-computed lists and charts, and even organization diagrams as shown in Figure 4-8. This application is also well suited to the Works database module, although the spreadsheet module offers more of an "off-the-cuff" approach to entering data.

	A	B	C	D	E	F
1	Company	Company A	Address	City	State	ZIP
2	Advanced Linear Devices		1030 W. Maude Ave. B50	Sunnyvale	CA	94086
3	Airpax Corp.		Cheshire Industrial Park	Cheshire	CT	6410
4	Allegro Electronic Systems		3E Mine Mountain	Cornwall Bridge	CT	6754
5	Allied Electronics		401 E. 8th St.	Ft. Worth	TX	76102
6	Allkit		434 W. 4th St.	West Islip	NY	11795
7	Alltronics		15460 Union Ave.	San Jose	CA	95124
8	American Design Components		62 Joseph St.	Moonachie	NJ	7074
9	Ametek Inc.	Controls Divisio	820 Pennsylvania Blvd.	Feasterville	PA	19047
10	Amperex Electronics Corp.		George Washington Highwa	Slatersville	RI	2917
11	Anchor Electronics		2040 Walsh Ave.	Santa Clara	CA	95050
12	Basic Circuit Systems		PO Box 965	Sonora	CA	95370
13	Bigelow Electronics		Box 125	Bliffton	OH	45817
14	Bodine Electric Co.		2500 W. Bradley P1	Cicago	IL	60618
15	Bomarc Services		PO Box 1113	Casper	WY	82602
16	C&H Sales		2176 E. Colorado Blvd.	Pasadena	CA	91107
17	C.M.C. Publications		565 Sinclair Frontage Rd.	Milpitas	CA	95035

Figure 4-8 Sample Non-Computational Use of Spreadsheet

KEYBOARD AND MOUSE SHORTCUTS

The Works spreadsheet provides many handy keyboard and mouse shortcuts that you can use to save time. In addition to the Command-key shortcuts detailed in Chapter 1, Works offers the following shortcuts you can execute with the mouse and keyboard:

- To select all the cells in a column, click in the column header, as shown in Figure 4-9.
- To select all the cells in a row, click in the row header.
- To select all the cells in the active part of the spreadsheet, choose the All Cells from the Select menu.
- Double-click on a cell to set its formatting. Double-clicking does the same thing as choosing the Set Cell Attributes command from the Options menu.
- Press **Command** and double-click on a cell to open its notes window. This does the same thing as choosing the Open Cell Note command from the Edit menu.
- To quickly resize a column, position the pointer inside the column header along the right edge of the column you want to resize. Drag the column to the desired size with the mouse. Columns must be between 1 and 40 units wide (or approximately three to 48 characters, assuming default Geneva 9 point, plain font).

	A	B	C	D
1				
2				
3				
4				
5				
6				
7				
8				
9				

Figure 4-9 *Clicking in Row and Column Headers*

- To delete entire columns and rows (even when they are blank), select the entire row or column using one of the methods described above, and press **Command-X** (for Cut). This method has the same effect as a Delete Column or Delete Row command, which Works lacks.
- To clear a single cell, select it, press the **Delete** key, and press **Enter**. Or, select it, and choose the Clear or Cut commands from the Edit menu. The Delete key does not erase cell notes, but the Clear and Cut commands do.
- If you know at least a portion of the contents of a cell (formula or value), you can quickly shuttle to it with the Find Cell command from the Select menu. Choose Find Cell (or press **Command-F**), enter the numbers or text to find, and press **OK**.
- You can immediately view a cell in another part of the spreadsheet with the Go To Cell command from the Select menu (or press **Command-G**). After choosing the command, enter the reference of the cell you want to go to. Works displays the cell in the top of the window, but does not select it.
- If you scrolled the current cell selection out of view in the document window, you can quickly return to it with the Show Active Cell command (from the Select menu).

TYPES OF CELL ENTRIES

To use the Works spreadsheet, you must fill its individual cells with information to be processed. There are several types of cell entries.

Values

Values are numbers, either positive or negative. A value cell can present a number as a piece of factual information, or it can be used in computations elsewhere in the spreadsheet. Because values are entered by you and can't be changed by Works, they are often referred to as *constant values*.

Values are generally entered as numbers only, without commas, dollar signs, or other symbols (of course, a period for a decimal point is acceptable). You may, if desired, enter values with commas, dollar signs, and percent signs. However, if these symbols are included as part of a formula, Works will treat the entry as text. For example, a value entry of **\$10,000** is treated as a value, but a formula entry of **=\$10,000*10** is treated as text.

Values with non-numeric characters (such as dollar signs and commas) can be used in formulas as long as the formula is located in another cell, and refers to the value by cell reference, as in: **=A1*10**. In cell A1 is the value \$10,000. See below for more information on formulas and cell references.

Cells accept and display numbers with a power-of-ten scaling factor, otherwise known as scientific notation. The format is **xxxE+nn** or **xxxE-nn** (the E can be upper- or lowercase). For example:

<i>Notation</i>	<i>Decimal Number</i>
14e+6	14000000
or	
8E-7	0.0000008

Works accepts exponents up to plus or minus 99. If you enter an exponent outside this range, Works displays an **Error** message. Works always displays very large and very small numbers in scientific notation when the cell is formatted with the default General number attribute. You can force Works to display the decimal form of the number by selecting the Fixed Number attribute. (Later in this chapter changing cell attributes is discussed further.) If the number displayed is too long to fit the current width of the column, Works displays a series of #####s in the cell. You must increase the width of the cell to see the whole number.

Formulas

Formulas are instructions that tell Works how to calculate two or more numbers. Formulas always begin with an equal sign (“=”) and must follow a particular format. If Works doesn't like the way you've written the format, it displays an error box, as shown in Figure 4-10, and allows you to change it. You can have up to 238 characters in a formula.

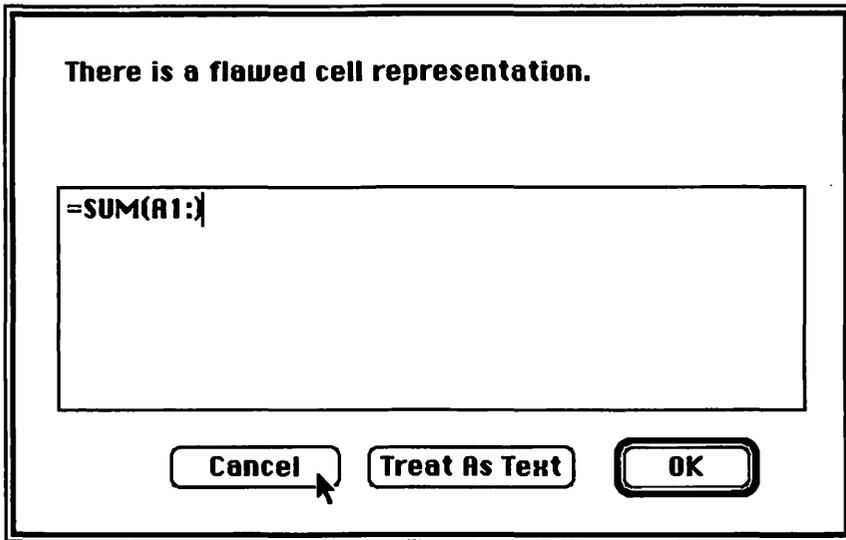


Figure 4-10 *Formula Error Dialog Box*

Labels

Labels are text, and are not included in Works' calculation process. Labels are generally used to annotate the spreadsheet with explanatory information, such as months, years, or departments. Labels can contain either letters or numbers or both and can be up to 238 characters long.

Cell References

A *cell reference* in one cell refers to the contents of one or more other cells in the spreadsheet. A cell reference is entered in a cell either by itself, or in a formula. For example, =A2 means "put the contents of cell A2 in this cell." Cells may contain a cell reference as part of a formula, as in =12+A3, which means, "12 plus the contents of cell A3." A cell reference, which can be considered a value, can be entered by typing the cell coordinates with the keyboard, or by pointing with the mouse.

Functions

Functions are built-in formula-building shortcuts. They may be entered

into cells by themselves or with another function, or they may be part of a more complex formula.

Cell Notes

Cell notes are invisible cell “note pads” where you can write up to 511 characters of explanatory text for a particular cell. You can open the cell notes for a cell in one of two ways:

- Press the **Command** key and double-click on the cell.
- Select the cell and choose the Open Cell Note command from the Edit menu.

The cell notes window is like a miniature word processor, but is only capable of rudimentary text editing. Start typing and the text appears at the flashing insertion point. Use the mouse and keyboard to edit text. You can enlarge the window by clicking within the zoom box in the upper right corner. In fact, the cell notes window behaves just like any other Works window, so you can manipulate it in the same manner.

When you’re done writing, click in the close box in the upper left corner of the cell notes window. Alternatively, you can leave the cell notes window open, and return to any other open Works window by choosing among the list in the Window menu (or, press **Command-**, to cycle to the next available open window).

Cells that contain a cell note are identified by a small, black flag in the upper right corner, as shown in Figure 4-11.

You may have occasion to copy a complete cell note from one cell to another, and though you can manually copy the text from one cell note and paste it into another, an easier approach is to use the Paste With Options command, which lets you copy and paste entire cell notes at a time. Follow these steps:

	A	B
1	No note	
2	Note	
3		
4		
5		

Figure 4-11 *Cell with Note Attached*

1. Select the cell to copy.
2. Press **Command-C** to copy the cell and cell note into the Clipboard.
3. Select the destination cell.
4. Choose the Paste With Options command from the Edit menu.
5. Click the Both Values and Formulas option, and press the **OK** button.

Cell notes are normally not visible when previewing or printing a spreadsheet document. To see or print the notes, first choose the Page Setup command from the File menu and click the Print Cell Notes option. Cell notes are shown on their own page.

Cell notes are erased only with the Clear or Cut commands in the Edit menu.

ENTERING VALUES, FORMULAS, AND LABELS

Works differentiates values (and cell references), formulas, and labels using simple definitions.

- If the cell entry contains only numbers, it's a *value*. Numbers started with a minus sign (-) are considered negative. Unlike some electronic spreadsheets, you can't indicate negative numbers by enclosing them in parenthesis, such as (100). Values are normally shown flush to the right side of the cell.
- If the entry starts with an equal sign ("="), Works considers it a *formula* or a cell reference. Unless you choose to view the spreadsheet as formulas instead of values (using the Show Formulas command in the Options menu), the equivalent value of the formulas is shown and not the formula itself. Values are normally shown flush right to the side of the cell, as shown in Figure 4-12.

Untitled (SS)					
	A	B	C	D	E
1		Text	Numbers		
2		A	1		
3		B	2		
4		C	3		
5		D	4		
6		E	5		
7					

Left Aligned Right Aligned

Figure 4-12 Alignment of Different Types of Cell Entries

- In most cases, adding even one non-numerical character into the cell forces Works to consider the entry a *label*. Exceptions are noted below. Labels are normally shown flush to the left side of the cell.

Values Using Non-numerical Characters

Certain non-numerical characters may be used in value entries, shown here:

<i>Entry</i>	<i>Result in Cell</i>	<i>Application</i>
\$10	10	Dollar display
10%	0.10	Percentage
10,000	10000	Thousands separator
10.000	10.000	Decimal point

Works does not generally allow the use of commas in numbers, reserving them to separate the arguments of its built-in functions. When Works shows the entry as a value without a comma, the number can't be used in a formula.

Sometimes, you may wish to enter a number, formula, or cell reference and have Works treat it as label text. You can always force label text by starting the entry with a double-quote, as in "A3 or "32 + 43.

The quote doesn't appear in the edit bar over the spreadsheet window, nor does it appear when the spreadsheet is printed. If you'd like the quotes to appear around a label, add two double-quotes at the beginning of the entry, and one double-quote at the end. For example, ""10" prints "10" in the spreadsheet.

USING THE EDIT BAR

The edit bar is empty when no cell is selected. When a cell is selected (either by clicking it with the mouse or moving to it with the keyboard), the edit bar displays the cell reference and the contents of the cell.

When creating or editing a cell entry, two additional icons appear in the edit bar.

- The Enter icon is the same as pressing the Enter key: it completes the entry and places it in the cell.
- The Cancel icon cancels any typing or editing you have done. Press this icon if you make a mistake and want to start over.

EFFECTIVE USE OF MOUSE AND KEYBOARD

Effective application of the Works spreadsheet calls for a structured use of the mouse and keyboard. Some tasks are more suited to the mouse (indeed, many operations are only possible with the mouse), while other tasks are better handled with the keyboard. Specifically, you'll want to consider the use of the keyboard and mouse when entering cell references and one or more of Works' built-in formula functions.

Entering Cell References by Keyboard or Mouse

As noted briefly earlier in this chapter, Works offers a variety of ways to enter cell references:

- *Keyboard entry.* Most Works users prefer to enter cell references by selecting the desired cell and typing the reference (with formula, when necessary) directly from the keyboard. This method is the most straightforward, but can be awkward and time consuming when building spreadsheets with many complex formulas.
- *Mouse entry.* Cell references can be entered by clicking on other cells in the spreadsheet with the mouse. When building formulas, for example, you have merely to click on another cell to enter its reference into the formula. You can add a series of cells together simply by clicking each cell in turn; Works automatically adds the "+" sign between cells, indicating that it will add the contents of these cells together. If you desire another operator, such as "*" for multiply, you must enter it yourself via the keyboard.

WORKSHEET FORMATTING

Works lets you tailor the appearance of the spreadsheet as you see fit. You can change the width of columns, split windows (to see different parts of the spreadsheet at once), alter formatting of cells, and prescribe new page breaks.

Changing Width of Columns

Works normally sets all spreadsheet columns to 12 units (12 units is equal to approximately 14 characters, when using Geneva 9 point, plain). Most

often, you'll need columns of varying widths to adequately show the information in the cells. Column widths can be changed in two ways:

- Select the column to change and choose the Column Width command in the Format menu. Enter a new width (from 1 to 40, in even numbers only), and press **OK**.
- Move the mouse pointer into the column header and position it along the right edge of the column you want to resize. Drag with the mouse to set a new width.

You can change a number of adjacent columns all at once by selecting them all, then choosing the Column Width command (resizing by dragging with the mouse doesn't work when multiple columns are selected).

Splitting Windows

The Works spreadsheet window may be split once vertically and once horizontally.

- To split the window vertically (across the middle), drag the split bar located on the top of the vertical scroll bar.
- To split the window horizontally (down the middle), drag the black split bar located at the far left end of the horizontal scroll bar.

While split, the scroll bars present two sets of arrows and thumb boxes. Use them independently to move each side of the split as desired. Splitting windows is helpful, for example, when you need to view the names of the columns while entering data into cells deep within the spreadsheet, as shown in Figure 4-13.

To remove the split, drag the split bars back to their original positions.

You can lock the split window into place with the Freeze Titles Horizontal and Freeze Titles Vertical commands in the Option menu (one or both of the commands will be dimmed if the window is not properly split). These commands are useful for keeping row and column heads in view while you scroll to distant parts of the spreadsheet.

- With Freeze Titles Vertical selected, the upper part of the split is frozen, and you can scroll only the lower part.
- With Freeze Titles Horizontal selected, the left part of the split is frozen.

When the window is frozen, using the scroll bars moves both portions of the split simultaneously.

Budget (\$\$)						
	A	B	C	D	E	F
1	Alpine Race Budget					
2	Expenses	May	Percent	June	Percent	
3	Basic Food	\$30000		\$10000		
4	Special Food Requests	\$0		\$6000		
5	Lodging	\$60000		\$20000		
6	Bicycles	\$20000		\$5000		
1	Alpine Race Budget					
2	Expenses	May	Percent	June	Percent	
3	Basic Food	\$30000		\$10000		
4	Special Food Requests	\$0		\$6000		
5	Lodging	\$60000		\$20000		
6	Bicycles	\$20000		\$5000		
7	Promotions	\$12000		\$12000		
8	Total Expenses	\$122000		\$53000		
9						
10	Total Budget Available	\$135000		\$67500		
11						

Figure 4-13 Window with One Split

Cell Formatting

The cells of a Works spreadsheet may be formatted in different ways. You have full control over:

- Border
- Font
- Size
- Color
- Cell attributes (including number format, date/time format, alignment, style, and number of decimal places)

All cell formatting is made through the commands available under the Format menu.

Setting Borders Borders are single-width lines that appear all around a cell, or along certain sides. You can set borders along the top, bottom, left, or right sides of the cell, as shown in Figure 4-14. If you select a range of cells and set an outline border, the border line appears completely around the range, not around each individual cell. Use this technique to add emphasis to certain cells or cell groups, or to separate portions of your spreadsheet.

	A	B	C
1		line below	
2			
3		line rt side	
4			
5		line lt side	
6			
7		line above	
8			
9		outline	
10			
11			

Figure 4-14 *Sample Borders*

You can use borders with multiple cell selections to create all sorts of useful formatting effects, as shown in Figure 4-15 (with the exception of the Outline option, the border effects can be combined as desired).

<i>Border option</i>	<i>Creates</i>
Outline	Line around the outermost edges of the cell or selection
Left	Line on the left edge of the cell or every cell of the selection
Right	Line on the right edge of the cell or every cell of the selection
Top	Line along the top edge of the cell or every cell of the selection
Bottom	Line along the bottom edge of the cell or every cell of the selection
None	No border

When the border commands won't do, you can add lines and boxes using the Draw feature, available in the spreadsheet module. See Chapter 3 for more information on using Works Draw.

Setting Fonts Spreadsheet data can be displayed in any font currently installed in the System file of your hard disk or Works disk. The selected font affects all of the cells in the spreadsheet. Different fonts (and font sizes) alter the number of cells that are visible in one spreadsheet window. The default Geneva 9 point font allows a display of six columns and 18 rows at a time, for a total of 108 cells at a time.

Untitled (SS)					
	A	B	C	D	E
1					
2		line		line	
3		to		to	
4		the		the	
5		right		left	
6					
7		line	underneath	cells	
8					
9		line	overhead	cells	
10					
11					
12			border multiple		around cells
13					
14					
15					
16					
17					

Figure 4-15 *Unusual Outline Effects with Borders*

Table 4-2 lists other common fonts and font sizes, and the number of visible cells obtained with them. Some suggestions for the use of different fonts and sizes follows.

- Use smaller fonts as a means to view more of the spreadsheet document at once (unlike Page Preview, viewing the document in 4 or 5 point type still allows you to edit the spreadsheet, even though it's a little difficult to see the contents of each cell).
- Use larger fonts if you have vision problems or have trouble seeing small type.
- Use LaserWriter fonts (Times, Helvetica, Courier, etc.) to avoid font substitution and to ensure proper printing of the spreadsheet.

Setting Size Each font can be displayed in sizes ranging from 4 to 72 points. The selected font size affects all of the cells in the spreadsheet.

Setting Color You may set a different color for the text in each cell with the Color command. The normal setting is Black.

Setting Cell Attributes Each cell may contain its own unique attributes, or formatting. The Set Cell Attributes dialog box provides a number of

Initial Size

Font	Columns	Rows	Total Cells
Geneva 9	6	17	102
Geneva 10	5	17	85
Geneva 12	4	13	52
Times 9	7	17	119
Times 10	7	17	119
Times 12	6	17	102
Helvetica 9	7	16	112
Helvetica 10	6	16	96
Monaco 9	6	16	96
Monaco 12	5	12	60

Full Size

Font	Columns	Rows	Total Cells
Geneva 9	6	18	108
Geneva 10	5	18	90
Geneva 12	4	14	56
Times 9	7	18	126
Times 10	7	18	126
Times 12	6	18	108
Helvetica 9	7	18	126
Helvetica 10	6	18	108
Monaco 9	6	18	108
Monaco 12	5	14	70

Table 4-2 *Screen Display with Different Fonts and Sizes*

number of options from which to choose (the alignment and style commands are particularly helpful in “dressing up” your spreadsheets). As a shortcut to the Set Cell Attributes command, you can access the dialog box simply by double-clicking on the cell you want to reformat. Should you wish to change the format of many cells at once, select them all and the Set Cell Attributes command.

Samples of cell formats using the options in the Set Cell Attributes dialog box are shown in Figure 4-16.

Untitled (SS)			
	A	B	C
1	1234	General	
2	1234.00	Fixed, 2 digits after decimal	
3	\$1234.00	Dollar	
4	123400.00%	Percent	
5	1.23E+03	Scientific	
6	1,234	Commas	
7	1234	Bold	
8	<u>1234</u>	Underline	
9	1234	Center	
10	1234	Left	
11			
12			

Figure 4-16 Cell Format Examples

Setting New Page Breaks

Normally, Works tries to fit as much of the active area of the spreadsheet on a single page as it can. The natural spreadsheet page breaks may not always occur at the most convenient rows and columns, however, so you may want to set one or more page breaks yourself. Follow this simple procedure to set a page break:

- To set a new page break at a column (a vertical page break), select the column you want to begin on the next page, and choose the Set Page Break command from the Options menu.
- To set a new page break at a row (a horizontal page break), select the row you want to begin on the next page, and choose the Set Page Break command.

Page breaks are shown with a heavy dashed line.

Follow these steps to remove your own page breaks (natural page breaks that Works provides cannot be removed in this fashion):

- To remove a vertical page break, select the column to the immediate right of the break, and choose the Remove Page Break command from the Options menu.
- To remove a horizontal page break, select the row immediately under the break, and choose the Remove Page Break command.

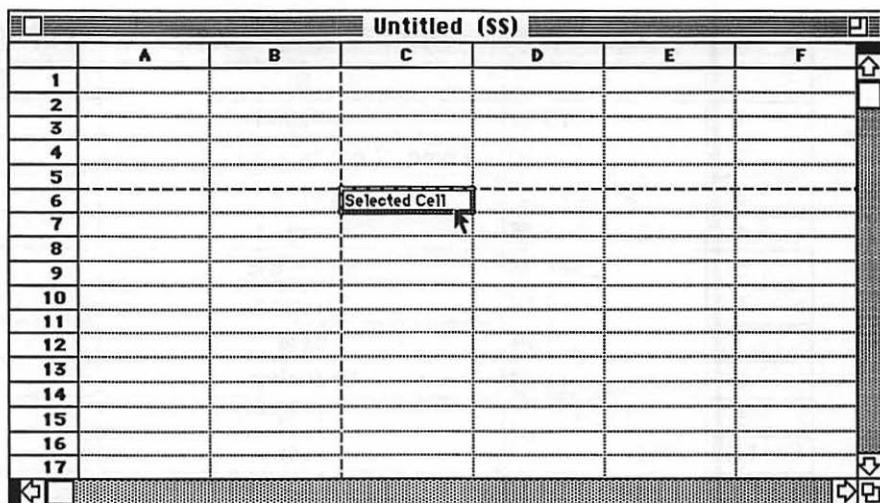


Figure 4-17 *Setting New Page Breaks*

You can also set both a horizontal and vertical page break simultaneously by selecting a cell anywhere in the spreadsheet, and choosing the Set Page Break command. The new page breaks will appear to the left and above the cell selection, as shown in Figure 4-17.

COPYING AND MOVING CELLS

You'll often have reason to cut or copy a set of cells from one portion of the spreadsheet and transplant them to another. The procedure is straightforward.

To cut or copy one cell:

1. Select the cell to cut or copy.
2. Choose the Cut or Copy commands as desired (or better yet, press **Command-X** for Cut or **Command-C** for Copy).
3. Select the cell you want to contain the copied or cut data.
4. Choose the Paste command from the Edit menu (or press **Command-V**).

To cut or copy more than one cell:

1. Select the range of cells to cut or copy.
2. Choose the Cut or Copy commands as desired (or press **Command-X** for Cut or **Command-C** for Copy).

3. Select the same number of cells in the destination range as you did when you originally cut or copied the cells, or, select the upper-left cell of the destination range you want to contain the copied or cut data.
4. Choose the Paste command from the Edit menu (or press **Command-V**).

You can apply the same multiple-cell cutting and copying techniques to entire rows and columns.

Remember that Works erases any old contents of cells when new data is pasted in from the Clipboard, so if you don't want to lose what you've already labored on, provide enough room in the spreadsheet for the transplanted material. This is particularly important when pasting a range of cells.

Works retains the original formatting of the cut or copied cell, even if the destination cell contains other formatting. The program provides no means of not pasting cell formatting.

Using Move

Moving cells with the Cut and Paste commands is time consuming, but Works offers a little-known Move command that performs the procedure with one less step. To use Move:

1. Select the cell(s) you want to move.
2. Choose Move from the Edit menu.
3. Enter the destination cell in the edit box, and press the **OK** button or the **Return** key. If you are moving more than one cell, the Destination Cell box indicates the top left cell in the range.

As a shortcut to the Move command, you can transfer information from one cell to another by selecting the original cell, holding down **Command-Option**, and clicking in the destination cell. Works moves the entire cell contents, including values, formulas, formatting, and cell notes.

Note: The Move command works a little differently than standard cutting and pasting. First, Move can only be used within a single spreadsheet document. If you wish to move cells from one document to another, use the standard Cut, Copy, and Paste commands. Second, Move doesn't alter relative cell references, as the Cut and Copy commands do. (Relative and absolute cell referencing is discussed in the next section.) With Move, relative cell references still refer to the same cell value as before the move.

Before transpose

	A	B
1	100	
2	200	
3	300	
4	400	
5	500	
6		
7		

After transpose

Untitled (SS)						
	A	B	C	D	E	F
1	100	200	300	400	500	
2						
3						

Figure 4-18 Effects of Transpose Command

Using Paste With Options

You can instruct Works to paste cut or copied cells with either values, or formulas and values. Cut or copy the original cell, as above, but instead of using the standard Paste command, choose the Paste With Options command, in the Edit menu.

- Click Values Only to paste just the value of the cell. Any underlying formula is ignored.
- Click Both Values and Formulas if you want the entire cell, including formatting, cell notes, and formulas.

The Transpose option in the Paste With Options dialog box lets you convert column-oriented cells into row-oriented cells, and vice versa (see Figure 4-18). The Transpose option only works when you have previously cut or copied a range of cells.

Using Fill Down and Fill Right

The Fill Down and Fill Right commands from the Edit menu are similar to straight copying, but with an added twist. They are used to ... (fill in). You select one or more cells as “clone masters,” along with additional blank cells that you want to contain the same data.

One application of the Fill Right command is shown in Figure 4-19. Here, a basic “add-the-numbers-above” formula is placed in cell A5. That cell, plus four others to the right, are selected with the mouse. Choose Fill

Right, and the contents of cell A5 are copied to cells B5, C5, D5, and E5.

Fill Down can be used to create a number series, as shown in Figure 4-20. Cell A1 contains a “seed” number for starting the series. Cell A2 contains a basic formula for continuing the series: $=A1+1$. By selecting A2 and a range of cells below it, then using the Fill Down command, the formula is repeated, and a number series is produced.

File Edit Window Select Format Options Chart

A6 =Sum(A1:A5)

Untitled (SS)					
	A	B	C	D	E
1	1	2	3	4	
2	2	4	6	8	
3	3	6	9	12	
4	4	8	12	16	
5	5	10	15	20	
6	15				
7					
8					
9					
10					

Figure 4-19 Basic Use of Fill Right

File Edit Window Select Form

A2 =A1+1

Untitled		
	A	B
1	1	1
2	2	2
3		3
4		4
5		5
6		6
7		7
8		8
9		9
10		10
11		
12	Before	After
13		
14		

Figure 4-20 Using Fill to Create a Number Series

Overwriting Cells

Pasting and filling with any of the methods described so far erases the previous contents of cells. If a cell contains data you want to keep, be sure the paste range won't overwrite it. This is particularly important if the overwritten cells are used in formulas elsewhere in the spreadsheet.

Relative vs. Absolute Cell References

There are two types of cell references: relative and absolute. *Relative cell* references relate to cells a certain distance away—two cells up and two three cells over, for instance, as diagrammed in Figure 4-21. When pasting or filling, Works updates these references to reflect their positions in the spreadsheet. For example, suppose cell A6 contains the formula $=A5+2$. You then copy and paste this formula into cell B6. The formula in cell A6 is unaffected, but instead of the formula $=A5+2$ in B6, Works alters it to become $=B6+2$.

To enter a relative cell reference, simply type the desired coordinates (or use the mouse to “point” at the cell you want).

Usually, this automatic cell adjustment comes in handy, especially when using the Fill Right and Fill Down commands. Here, a formula that adds the values above it is filled across to adjacent columns. With each fill, Works adjusts the formula so that it adds the cells directly above it.

Sometimes, the adjustment of relative cell references is not desired, so you must indicate to Works that the cell reference is absolute. *Absolute cell* references relate to cells at a particular column and row intersection, such as cell A4 or cell C9, and are indicated with a dollar sign (\$) prefix in

	A	B	C	D	E
1					
2					
3					
4		Referenced cell			
5					
6					
7				Referencing cell	
8					
9					
10					
11					
12					

Figure 4-21 Representation of Absolute Cell References

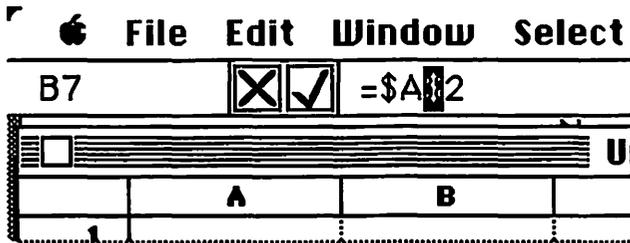


Figure 4-22 Changing Just One Reference in Formula Entry

front of both the column letter and row number. Works makes no adjustment to absolute cell addresses when copying or moving them to other cell locations.

Cell references that are half relative, half absolute are called *mixed*. A mixed cell reference contains a dollar sign (\$) in front of either the row or column designator, but not both. To enter a mixed cell reference, type a \$ before the row or column that is to be absolute.

Works permits a keyboard shortcut when entering absolute cell references. To change a cell reference from relative to absolute, enter the reference in the edit bar (by typing or pointing), then, with the insertion point *immediately after the cell reference*, choose the Absolute Cell Ref command in the Edit menu (or press **Command-A**). Works automatically places the required dollar signs in front of both the row and column designators. You can switch back to relative cell referencing by choosing the command again.

Should you want a mixed cell reference, simply remove one of the dollar signs. Pressing **Command-A** with a mixed cell reference reverses each part of the reference: A\$1 becomes \$A1, and vice versa.

If the cell contains a formula with many cell references, and you want to make only one of them absolute, select the desired reference with the mouse in the edit bar, as depicted in Figure 4-22, then press **Command-A**.

SORTING

Works provides a convenient method of sorting individual cells or rows of cells, helpful when preparing lists, charts, budgets, and many other forms of spreadsheets. Works sorts only by row, but you can apply the Transpose feature from the Paste With Options dialog box (see above) to invert columns of data into rows. Once in rows, you can sort the data, then re-convert it back into columns.

The important thing to remember about sorting is that Works sorts *only those cells you have selected*. If a row contains cells not selected

when you give the sort command, the cells not selected will remain unaffected! To make matters worse, Works offers no undo for this action, so once you sort a spreadsheet, you're stuck with it. As an added precaution, get into the habit of saving the spreadsheet prior to sorting. That way, you can always revert to the old version if something goes awry.

How to Sort

To sort a series of cells, select them, then choose the Sort command from the Edit menu. Works allows you to choose sorting keys to avoid ties (although you will most often sort on just one key). The sorting keys identify columns of most-to-least importance.

For example, suppose you want to sort a range of cells first by last name, then by first name and ZIP code. This data is stored in cells B, A, and D, in that order. That makes the first sort key B, the second A, and the third D, as shown in Figure 4-23. The spreadsheet is sorted primarily by column B, but columns A and D serve as record-breakers, in case of ties. Note that the Works spreadsheet module offers a somewhat more elaborate sorting routine than the Works database module. You may wish to use the spreadsheet to sort complex data, then cut and copy the cells to the database.

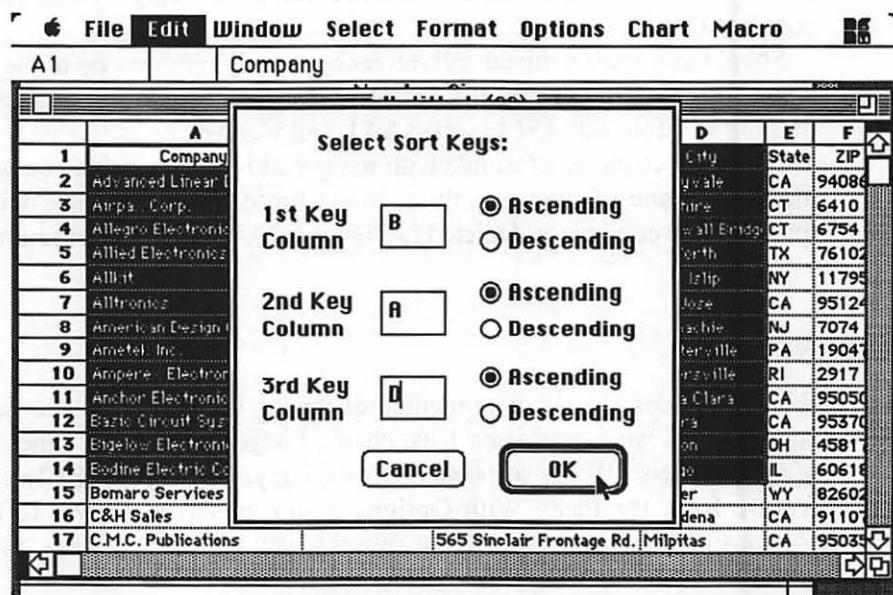


Figure 4-23 *Sorting Keys*

Works sorts either in ascending (A to Z, or 1 on up) or descending order. Click the appropriate choice beside each sorting key, then press the **OK** button.

Works places blank cells and rows at the end of the sort.

Sorting Order

Numbers are sorted with the smallest negative value to the largest positive value (assuming ascending sort order). Text is sorted in alphabetical order. There is no difference between accented, upper-, and lowercase letters—*A* is sorted the same as *a* and *á*.

WRITING SPREADSHEET FORMULAS

One of the most dreaded experiences in life, apart from watching TV reruns of *Hogan's Heroes* and *Gilligan's Island*, is writing spreadsheet formulas. They seem complicated and difficult to decipher, requiring—sometimes seems—a background in mathematics, computer programming, or both.

But with a little patience and practice, you can be writing formulas with the best of them. By starting small and simple, you can learn to build upon “basic” formulas, and create complex routines for calculating just about anything you choose.

Basic Formula Unit

Even the most complex formulas are composed of small chunks, pieces that calculate just a portion of the spreadsheet at a time. This is the *basic formula unit*—my term, for the lack of a better one. The basic formula unit can stand by itself in a cell, or be a part of a more complex formula, such as:

Basic Formula

=2+2

=A1+A2

Within Complex Formula

=A3/44.98-(32*2^(2+2))

=Sum(B1:B3)*Pi()/((A1+A2)-1)

The complex formula contains the basic formula shown, plus a number of others. The complex formula is simply a series of basic formulas strung along in the correct order to produce the desired result. For example, the complex formula **=Sum(B1:B3)*Pi()/((A1+A2)-1)** contains basic formula

units (the example values show how the formulas might be used to calculate actual spreadsheet data). Cells A1 and A2 both contain the value 2, and cells B1, B2, and B3 contain the values 4, 4, and 2, respectively.

<i>Basic Formula</i>	<i>Example Result</i>
A1+A2	4
4-1	3
Pi divided by 3	1.047
Sum of cells B1, B2, and B3	10
10 times 1.047	10.47

Although it takes up more spreadsheet space, you can just as easily construct this complex formula using several cells, as shown in Figure 4-24. You can use the technique of building formulas in separate cells until you get the formula working the way you want. Then, when you are satisfied that the results are accurate, you can combine the basic formula units into one complex formula.

Notice that the complex formula above uses parentheses around some of the basic formula units. As explained in more detail below, the parentheses tell Works to calculate those basic formulas first. If the parentheses are missing, Works calculates the formula using its own rules of precedence, which may have unexpected results if you're not accustomed to the way Works operates. See Rules of Precedence, below, for more details on this topic.

Note: Works formulas may contain spaces between the various elements, such as =A1 + A2 or =3 + 2 * 7.

The spaces are ignored when the formula is calculated. Works removes the spaces after you complete the formula and press the **Return** or **Enter** keys. The spaces are removed to save memory.

Untitled (SS)				
	A	B	C	D
1	2	4	=A1+A2	
2	2	4	=C1-1	
3		2	=PI()/C2	
4			=B1+B2+B3	
5			=C4*C3	
6				
7				
8				

Figure 4-24 Using Several Cells for Complex Formula

Formula Operators

An *operator* is a mathematical symbol that tells Works how to compute two or more numbers (these numbers are technically called *operands*). Works uses both arithmetic and comparison operators.

Mathematical Operators A formula may contain one or more of the following *mathematical operators*:

<i>Operator</i>	<i>Function</i>
+	Addition
-	Subtraction and negative numbers
*	Multiplication
/	Division
()	Ordering of operations; these calculations are performed first
^	Exponentiation (raise to the power of)

The minus sign is used for both subtraction and negation. Formulas with negative numbers can be confusing when you need to review the construction of your worksheets. For best results, enclose the number and sign in parentheses; this indicates both to you and Works that you want a negative number instead of subtraction. For example:

<i>Without parentheses</i>	<i>With parentheses</i>
$-10^2 = -100$	$(-10)^2 = 100$

If you don't type an operator after an operand (whether it be a number or cell reference), Works automatically inserts a plus sign (“+”) before the next cell reference. You can use whatever operator you want by typing it from the keyboard.

Comparison Operators *Comparison operators* compare two operands with the aim of figuring out which value, if any, is higher or lower than the other one. The result is shown as a 1 for *TRUE* and a 0 for *FALSE*. A formula may contain one of the following comparison operators:

<i>Operator</i>	<i>Function</i>
=	Equals
<	Less than
<=	Less than or equal to
>	Greater than
>=	Greater than or equal to
◇	Not equal

Comparison operators are designed to work with just two operands at a time, in a single cell. That is, $10=10$ produces (or “returns”) a result of **1** (TRUE), but $10=10=10$ results in an error. Why? Works first computes the first two comparisons, $10=10$. That results in **1**, which Works stores in memory. The last part of the formula then tries to compare **1** with **10**. That returns a **0** (FALSE), even though all three operands are equal to one another.

While you could theoretically build formulas that compare values in this way, there’s not much benefit from it. This isn’t to say that you can’t compare two or more *sets* of numbers and arrive at a single result. For example, let’s say you want to compare these values:

<i>Comparison</i>	<i>Result</i>
$10 = 10$	1
$20 = 10$	0

Now compare the two final results: $1 = 0$. In this case, the result is **0** (FALSE), because the two aren’t equal. You can write the formula that checks these two comparison sets in any of several ways:

- Put the first set in parentheses, so that Works treats the set as a separate entity (Works also calculates the numbers within the parentheses first, based on its rules of precedence, discussed below). For example: $=20=10=(10=10)$. A quick study of the formula reveals how it works.
- Put each set in a separate cell, then use a third cell for the final comparison. For example, in cell A1 you place $=10=10$, and in cell B1 you place $=20=10$. Finally, in cell C1 you place the cell reference formula $=A1=B1$.
- Use the AND logical function (see later in this chapter for more details on functions). The AND function returns a **1** (TRUE) only if all of its arguments are TRUE; otherwise it returns a **0** (FALSE). For example, $=AND(10=10,20=10)$.

This may seem like a lot of hassle just to find out the obvious: that numbers are or aren’t equal to one another. But the technique of using comparison operators is an important one to keep in mind when building larger, more complex spreadsheets. For instance, you may want to find out easily if one group of numbers is higher or lower than a “set price” you have previously provided. Or, you may want to prepare an inventory report that constantly monitors minimum inventory levels, and shows you when a particular item should be reordered.

Rules of Precedence

Precedence is the order in which Works tackles formulas that contain multiple operators. When the formula contains only one type of operator—like addition—Works simply goes from left to right, calculating each number in turn. But when the formula contains many different types of operators, Works follows a prescribed order of precedence. These rules help you in designing formulas that will provide the correct answer. Works performs its mathematical and comparison operations in this order:

<i>Operator</i>	<i>Description</i>
^	Exponentiation
-	Negation (negative numbers, not subtraction)
* and /	Multiplication and division
+ and -	Addition and subtraction
= < <= > >= <>	Comparison

You can readily see how the precedence of calculation affects formulas by writing a few compound equations.

<i>Formula</i>	<i>Result</i>
=10*2-4	16
=10-4*2	2

In the first example, the equation reads **10 times 2 (20) minus 4 (total: 16)**. The formula reads properly left to right because it happens to reflect Works' rules of precedence. In the second example, the equation looks like it might read **10 minus 4 (6) times two (total: 12)**, but that's not correct. Instead, it's **4 times 2 (8) from 10 (total: 2)**.

It's not always possible (or convenient) to remember how Works is going to calculate a given formula. The parentheses provide an easy method of specifying an exact precedence of calculation. Works decipheres the formulas inside the parentheses first, then finishes the rest of the formula. Parentheses can be used within other parentheses (nesting), in which case Works processes the innermost formula first, then moves outward; for example: **=134^(2*(4+2))**. Works first calculates 4 plus 2, then multiplies the result by 2, then uses that number as an exponent to 134.

Using the Built-in Functions

Functions are used as formula-writing shortcuts, and enable Works to calculate complex mathematical, financial, and statistical problems with a minimum of programming by you.

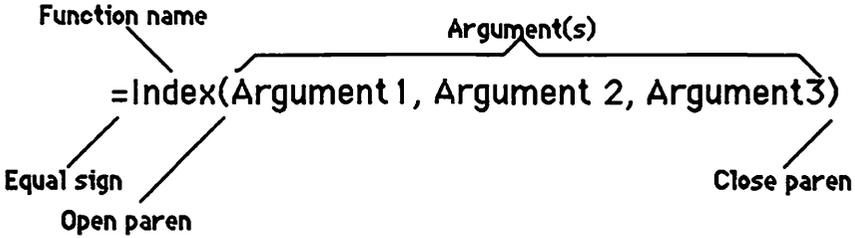


Figure 4-25 Basic Parts of Function

The basic parts of a function are shown in Figure 4-25. All functions are specified by name, and use parentheses to enclose one or more arguments. While most functions require some type of argument, a few—such as `Pi()`, `Rand()`, `True()`, and `False()` do not. However, the parentheses are still required.

The vast majority of functions require just a single value for an argument. That value can be a number, a cell reference, and sometimes another function. When more than one argument is required, they are separated from one another within the parentheses by commas.

Some Functions, such as: `Sum()`, need a range of cells, identified by a colon. For example, the range of cells between A1 and B5, as shown in Figure 4-26 would be indicated as a function argument as: `A1:B5`.

Works provides two ways of entering functions:

- Type the function explicitly from the keyboard. You may use upper- and lowercase letters for the function name; Works will automatically format the function name with an initial cap, then all lowercase. Don't forget the parentheses and arguments.

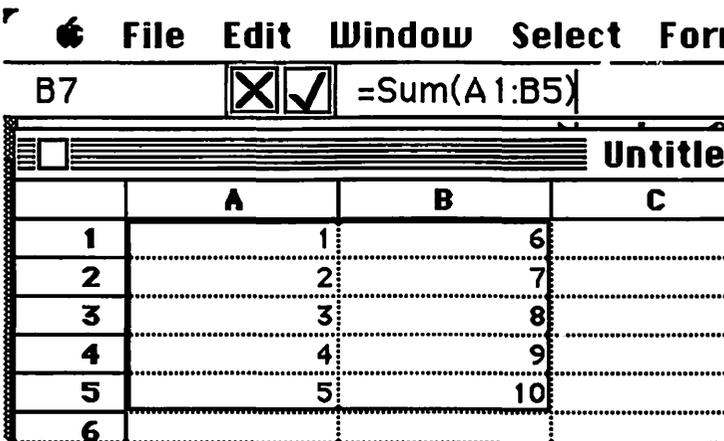


Figure 4-26 Adding Range of Cells with Sum

- Choose the Paste Function command from the Edit menu, and scroll through the list that appears. Double-click on a function to enter it into the spreadsheet. Unlike the list windows that appear in the Open and Save dialog boxes, pressing a letter key on the keyboard does not advance you to the first function that starts with that letter. Use the scroll bar to quickly shuttle through the list. You may wish to compose a small function-entry macro if you find that you frequently use a particular function. Once the function has been pasted into a cell, the insertion point is automatically placed between the two parentheses of the function. Complete the function by entering the required arguments (if any).

Works offers 64 built-in functions. Many are obscure, with special purposes that you may not require, especially if you are involved solely in financial or statistical vocations. You'll find that you use about ten percent of the built-in functions 90 percent of the time.

The commonly used functions are those that sum a range of numbers, display and calculate dates and times, round numbers, and provide basic financial calculations, such as internal rate of returns, and present value of investments. Let's take a closer look at these functions, and how they are used.

Sum a Range of Numbers By far, the most widely used spreadsheet function is **Sum()**, which sums two or more cells. The function is designed to accept cell references as a range, so you merely indicate the start and stop cells of the range you want to sum, and Works does the rest. By adding a comma between ranges, you can add together many non-contiguous ranges.

Here are some examples. Suppose cells A1 through A5 contains the numbers, 10, 20, 30, 40, and 50. In cell A6, you want to add them all together and show the result. While you could write a formula in cell A6 that reads **=A1+A2+A3+A4+A5**, that's the hard way to do it. With **Sum()**, the formula becomes **=Sum(A1:A5)**.

Now suppose you always want to add the contents in cells B1 through B5. Write the formula as follows: **=Sum(A1:B5)**.

Cells A1 through B5 comprise a contiguous (all together) range, so you can write the range in one step in the **Sum()** function; that is, **=Sum(A1:B5)**. But suppose you want to add yet another set of five cells that are not contiguous to cells A1 through B5, such as D1 through D5. Use the same structure as above, but add a comma (as an indicator to Works that you are providing another argument), and the second range. The formula would read **=Sum(A1:B5,D1:D5)**.

Finally, suppose you want to add one more cell to the argument list. That cell is E10. The formula becomes **=Sum(A1:B5,D1:D5,E10)**.

A cousin to the Sum() function is SSum(), which is designed to give the sum of numbers in the list of arguments as they are displayed on the screen. This maintains the desired number formatting throughout the spreadsheet. For example, let's say you have formatted a range of cells as fixed with two digits after the decimal point.

Regardless of the actual numbers you enter into the cells, the values are shown in the cells with only a maximum of two digits to the right of the decimal point. The SSum() function adds the values actually displayed on the screen, not the ones stored in each cell. This can be helpful when you want to calculate fractional numbers and don't want to get bogged down with multiple digits to the right of the decimal point.

Using Functions for Dates and Times Works offers ten functions for calculating and showing dates and times (and some are rarely used). These functions are somewhat difficult to master because they don't produce a recognizable date or time, but a serial number that represents the date or time.

You can appreciate the use of serial numbers for dates and times when you consider that Works is often called on to perform calculations on those dates and times. For example, you may wish to subtract 30 days from the current date as part of a spreadsheet that calculates aged receivables. To accurately subtract 30 days from the current date, Works must take into account the starting date, the number of days in the month, whether or not it's a leap year, and so forth. Serial numbers make the task easier.

The date/time serial number is composed of two parts.

- The numbers to the left of the decimal point represent the number of days since January 1, 1904 (the start of the Macintosh's internal clock). The maximum number is 49710, which represents February 6, 2040 (the end of the Mac's internal clock).
- The numbers to the right of the decimal point represent the number of minutes since midnight of the current day.

Here are some examples:

Serial Number	Day	Time
31423	1/12/1990	n/a
31423.0145833333333	1/12/1990	12:21 am
31423.5145833333333	1/12/1990	12:21 pm
0.71875	n/a	5:15 pm

The basic date/time function is Now(), used without an argument. The Now() function returns the current date in serial number format. Use the Set Cell Attributes command from the Format menu to convert the serial number to a date or time. Click the appropriate radio button in the dialog

Untitled (SS)		
	A	B
1	31119.557962962963	Serial date
2	3/14/89	Date, short form
3	Mar 14, 1989	Date, medium form
4	March 14, 1989	Date, long form
5	Tue, Mar 14, 1989	Date, short form; with day
6	Tuesday, March 14, 1989	Date, long form; with day
7	1:21 PM	Time
8		
9		

Figure 4-27 Samples of Date and Time Formats

box, then click OK. Figure 4-27 shows a series of examples using different cell formatting for the date and time.

Often, you will want to furnish Works with some particular date or time, so that you can perform calculations with it. Works has several functions that accept English-like date and time nomenclature, and convert it to serial format.

Function

What It Does

Date()

Converts specified date into serial number

Time()

Converts specified time into serial number

The **Date()** and **Time()** functions expect you to enter the date and time arguments in a specific manner. The result could be in error if you get the arguments mixed up. The proper format for the **Date()** function is **Date(year, month, day)**, which is in reverse of the customary date format. The proper format for the **Time()** function is **Time(hour, minute, second)**. You can add spaces between each argument, but they aren't needed. Some examples:

Entry

Equivalent Date

=Date(1990,1,10)

January 10, 1990

=Time(5,1,10)

One minute after 5 AM, and 10 seconds

=Time(5,1,0)

One minute after 5 AM, and no seconds

The **Date()** and **Time()** functions are actually redundant; Works doesn't need them to convert a date or time into the proper serial format. As long as you enter the date or time in one of the accepted formats, Works accepts it and automatically converts the entry into serial form. The exception is when working with seconds. Works won't allow you to enter a time, such as **12:21:30** for 21 minutes after 12, and 30 seconds.

Works accepts any of the following time and date formats as text entries. The entry will be converted automatically to serial time/date format.

<i>Accepted Format</i>	<i>Format Type</i>
1/90	Short form date; month/year only
1/1/90	Short form date
Jan 1	Medium form date; day/month only
Jan, 1988	Medium form date; month/year only
Jan 1, 1990	Medium form date
January 1, 1990	Long form date
1 Jan	European medium form date, day/month only
1 Jan, 1990	European medium form date
1 January, 1990	European long form date
20:15	24-hour time
3:30 AM	12-hour time, with AM
3:30	12-hour time, AM assumed
3:30 PM	12-hour time, with PM

Works also accepts these format entries:

- Date format with a period after the month abbreviation, such as **Jan. 1, 1990**.
- Spaces, dashes, and slashes between the day, month, and year.
- Use of 12- or 24-hour formats for time, although Works always displays 12-hour format.
- Either upper- or lowercase for AM and PM, but Works displays in upper case. Note that Works assumes AM if you leave off AM or PM.
- **p** for PM and **a** for AM when indicating time.
- Deletion of the "19" in front of the year; Works assumes you are working in the 20th Century and adds the 19 automatically.

You can't calculate dates before 1904, so an entry such as **1/1/1875** forces Works to consider the date as text.

You can manually enter a time and date (using the accepted formats shown above), then use the Set Cell Attributes options to convert the serial form to a recognizable date and time.

Sometimes, you may want to enter a date or time and *not* have Works convert it to serial format. As long as you don't want to perform any calculations, you can force Works to treat the date or time as text by adding a double-quote at the beginning of the entry.

Other Works date/time functions perform the opposite of Date() and Time(). They convert serial numbers into legible time and dates. These offer more flexibility than the options in the Set Cell Attributes dialog box.

<i>Function</i>	<i>What It Does</i>
Day()	Converts serial number into a day of the month (1 through 31)
Hour()	Converts serial number into an hour of the day (1 to 12)
Minute()	Converts serial number into a minute of the hour (0 to 59)
Month()	Converts serial number into a month of the year (1 through 12)
Second()	Converts serial number into a second of the minute (0 to 59)
Weekday()	Converts serial number into a day of the week (1 through 7); the weekday starts on Sunday (Sunday=1)
Year()	Converts serial number into a year

The Now() function can be combined with other date/time functions for enhanced utility, as shown in Figure 4-28. Here's how the formulas work: The Now() function first calculates the current date and time, and provides Works with the equivalent serial number. That serial number is then used to display the desired hour, minute, day, and so forth.

You can also extend the formula to add a certain number of days or hours to the date or time. For example, to compute the date from 30 days from now, use the formula =Now()+30.

Format the cell so that it displays the date in the desired format. Instead of today's date, it will be the date in 30 days. All of the other date and time functions can be used in similar formulas. For example, use =Now()-32 to find those accounts that are more than 31 days past due.

Untitled (SS)				
	A	B	C	D
1	31119.5625	=Now()	Serial format	
2				
3	14	=Day(Now())	Day	
4	3	=Month(Now())	Month	
5	3	=Weekday(Now())	Weekday	
6	1989	=Year(Now())	Year	
7	13	=Hour(Now())	Hour	
8	30	=Minute(Now())	Minute	
9	0	=Second(Now())	Second	
10				

Figure 4-28 Samples of Now() Function in Spreadsheet

When using the Now() function, the current time and date are not updated until the spreadsheet is recalculated. You can always force recalculation by pressing **Command-=** (or by choosing the Calculate Now command in the Options menu).

The Paste With Options command in the Edit menu offers a useful trick for transferring date and time information to other cells in the spreadsheet. The Paste With Options command lets you paste either the displayed value of a cell (in this case, a formatted date/time, or a serial number), or the date/time formula.

1. Select the cell to copy.
2. Press **Command-C** to copy the contents of the cell to the Clipboard.
3. Select a destination cell.
4. Choose the Paste With Options command from the Edit menu.
5. Select the Values Only option if you want to transfer just the serial number or formatted date/time, or, select Both Values and Formulas if you want to transfer the entire formula and value intact.
6. Click the **OK** button.

Dates and times transferred with the Values Only option lose their connection to Mac's internal clock. However, you can convert the time and date back to their equivalent serial form by choosing the General format option in the Set Cell Attribute dialog box.

Number Format Functions Works offers a number of useful functions for setting numerical formats. These functions are Round(), Int(), Sign(), and Abs().

Round(). The Fixed number format (in the Set Cell Attributes dialog box) lets you set the number of digits to the right of the decimal point. Another method accomplishing the same goal is the Round() mathematical function. Round() uses two arguments: the number itself (or a cell reference), and the number of digits you want the number rounded to. Works follows standard rounding conventions: digits 0 through 4 are rounded down, and digits 5 through 9 are rounded up. For example:

<i>Original Number</i>	<i>Rounded Number</i>
10.9873	11
1384.13	1384

Int(). The Int() (integer) function simply lops off any digits to the right of the decimal. The integer function does not round up or down. For example:

<i>Original Number</i>	<i>Integer</i>
10.9873	10
1384.13	1384

Sign(). The Sign() function reports the sign of a number—either positive or negative. If the number is positive, the function returns a 1; if the number is negative, the function returns a -1.

Abs(). The Abs() (absolute) function translates any negative number to a positive number. That is, -123 becomes 123.

Rand(). Works can provide a 16 digit random fractional number between 0 and 1 with the Rand() function. You can use this function to set a guessing range for the IRR() and Rate() financial functions, or to generate lucky numbers for the next Lotto game. The function produces a new random number every time the spreadsheet is recalculated.

Statistical Functions Two statistical functions often come in handy no matter what kind of spreadsheet work you do.

Average(). This averages a list of numbers and displays the result. You can use either single values, cell references, or cell ranges, such as:

<i>Formula</i>	<i>What It Computes</i>
Average(A1,B2,D5)	Average of values in A1, B2, and D5
Average(A1:A5)	Average of values in cells A1 through A5
Average(A1:A5,B6)	Average of values in cells A1 through A5, plus cell B6

Count(). This gives the count of numbers in a list. If you specify a range of cells, Works counts only those cells that contain real numbers, not blanks, labels, or formulas.

Financial Calculations Financial calculations are the backbone of the Works spreadsheet, although not everyone uses the spreadsheet to calculate profit, loss, and other such money matters. The eight financial functions use similar arguments and are constructed in much the same way, so after you get used to one function, the others come more naturally.

<i>Function</i>	<i>Arguments</i>	<i>What It Calculates</i>
FV	rate,nper,pmt,type	Future value of investment
IRR	range,guess	Internal rate of return
MIRR	range,rate,risk	Modified internal rate of return

<i>Function</i>	<i>Arguments</i>	<i>What It Calculates</i>
Nper	rate,pmt,pv,fv,type	Number of payments of investment
NPV	rate,val-1,val-2,...	Net present value
Pmt	rate,nper,pv,fv,type	Periodic payment of investment
PV	rate,nper,pmt,fv,type	Present value of investment
Rate	nper,pmt,pv,fv,type,guess	Rate returned on investment

Following are the definitions of the arguments used in these functions. (Works assumes standard accounting cash flow procedures where cash received is represented by a positive number, and cash paid out is represented as a negative number.)

- *fv*—Future value of some asset. A positive number.
- *guess*—Guess specifies a starting number for calculation, and is used to help Works zero in on the target range. If you omit *guess*, Works assumes it is 0.1 or 10%. A starting value of 0 to 1 will yield meaningful results.
- *nper*—The number of payments (or periods) for payback of the loan. If paying by the month, a five-year loan has 60 periods.
- *pmt*—Payment amount, each period.
- *pv*—Present value of some asset. A negative number.
- *range*—The IRR function gives the internal rate of return for a series of cash flows; the range represents the cells that contain those cash flow numbers.
- *rate*—Interest rate for loan, in percent. The rate must reflect the period specified in *nper*; otherwise, the calculation will be in error. For example, don't mix a yearly interest rate of 10 percent with monthly payments, and vice versa.
- *risk*—Risk is the rate at which the positive cash flows can be reinvested.
- *safe*—Safe is the rate returned by an investment that will successfully finance the negative cash flows.
- *type*—Indicates whether payments are made at the beginning or ending of the period. A type of 0 means payments are assumed to be made at the beginning of the period; a type of 1 means payments are at the end. When no type is given, Works assumes 0.
- *val-1, val-2, etc.*—Each value is a cash flow amount. You can have as many values as you wish; separate each with a comma.

Shortcuts to Building Formulas

Works supports a couple of time-saving shortcuts when building formulas. These shortcuts apply only when actually writing or editing a formula—the formula appears in the edit bar above the spreadsheet window.

- Click on a cell and the cell reference is added to the formula.
- Drag around a group of cells and the cell range is added to the formula (as in **A1:A10**).
- Use the Fill Down and Fill Right commands to quickly copy formulas as desired. Remember the rules of absolute vs. relative cell referencing.
- Re-use formulas when possible, instead of typing them in again. Use the Copy and Paste commands to make the duplicates, then edit the formula as required.

Works always places a plus sign (+) between successive cells that you select with the mouse when building formulas. Works assumes you want to add the cells together, but you can always choose another operator instead. Before selecting the second cell, type an operator, then click on the cell. Works understands you have added your own operator, and won't provide the plus sign.

The built-in functions require commas to separate each argument. You can use the point and click method of indicating cell references to use as arguments, but remember to manually type a comma between cell references, or Works will add the default plus sign.

SAVING SPREADSHEETS AS EXPORT FORMAT

Most of the spreadsheets you create will be saved in Normal format. But Works also lets you save in in Export or Text-only format. This allows you to trade complete spreadsheets with the word processing and database modules of Works, or with a completely different application.

Before clicking the Save button to record a spreadsheet onto disk, click the Export button in the Save or Save As dialog boxes. Works then presents a dialog box where you can choose from three different Text-only formats: SYLK, Text With Values Only, and Text With Values and Formulas.

SYLK Format

SYLK stands for SYmbolic LinK, a file format pioneered by Microsoft for use with electronic spreadsheet and database programs. All of Microsoft

spreadsheet programs, including Multiplan and Excel, support the SYLK format. You save a file in SYLK format only if you are transferring it to Multiplan, Excel, or some other application (on the Macintosh or another computer) that supports SYLK. Files stored in SYLK format are composed of special code words that only SYLK-compatible programs can understand.

SYLK files store:

- Values
- Labels
- Formulas
- Cell formatting, such as centering and boldface
- General worksheet formatting, including column width

Text With Values Only

Use the Text With Values Only option for true Text-only export of a Works spreadsheet. Files saved in this format are converted to straight text with tabs separating columns and returns separating rows. Only the values of formulas are saved; the formulas themselves are not.

Use the Text With Values Only option when transferring whole spreadsheets to some other application where only the data of the spreadsheet counts, and not the formatting or formulas. For example, you can open a Text With Values Only document with the Works word processor or database. In the word processor, columns are separated by tabs and rows by returns. In the database, columns become fields and rows become records. You can similarly move entire Works spreadsheets to other Macintosh applications, such as Microsoft Word. Text With Values Only files store:

- Values
- Labels

Text With Values and Formulas

The Text With Values and Formulas option is the same as the Text With Values Only option, explained above, but formulas also are stored, instead of just their numeric values. A major application of the Text With Values and Formulas option is when moving Works spreadsheets to other

Macintosh applications that understand spreadsheet formulas, but don't support SYLK.

Text With Values and Formulas files store:

- **Values**
- **Labels**
- **Formulas**

Both Text With Values Only and Text With Values and Formulas files appear as Text-only files on the Macintosh Desktop. To open one of these files in any of the Works modules, click the Export option first in the Open file dialog box.

Charting Your Course with Works

Is there truth in the old adage that “a picture is worth a thousand words”? It’s easy enough to find out.

The average person can speak about 115 words per minute. In about 8 1/2 minutes, that person will have spoken 1,000 words. A chart can contain most, or all, of the information in the same 8 1/2-minute speech, but be completely absorbed in 30 seconds or less. So not only is a picture worth at least a thousand words, it’s a far more efficient story-teller.

This chapter examines the charting features built into the Works spreadsheet module. The chart-making commands are simple enough to use, but good graphs require more than just entering a few numbers into the spreadsheet and selecting a couple of options. If you want your charts to communicate, you need to carefully select the graph type best suited for your message and data. You may also wish to import the chart into a word processor or spreadsheet document, or edit it with the Works Draw tools. This chapter details these topics as well.

WHEN TO USE CHARTS

Charts can be used to dramatically increase the effectiveness of your presentations.

Use charts to:

- Show and tell facts quickly and efficiently in order to cut down on valuable presentation time.
- Sell a point of view by way of visual reinforcement.

- Provoke faster decisions at a company meeting.
- Increase mental retention of the facts so that your ideas stay with the audience as long as possible.
- Save the reader's or viewer's time by packing dense statistics into one or more charts.
- Show how numbers and other statistics relate to one another.
- Compare two divergent statistics, and plot a comparison that would otherwise be difficult to mentally perceive.
- Demonstrate non-visual concepts and ideas visually.
- Focus the reader's or viewer's attention on certain facts or figures.
- Provide "visual relief" in an all-word report or oral presentation.
- Add credence to facts and figures.
- Attract attention by using the "novelty" of business graphics.

WHEN NOT TO USE CHARTS

Charts may not always be the answer you're looking for. Sometimes, it's better not to create a chart than to try and use charts to bend the facts, or muddle an otherwise adequate presentation.

If your aim is to impress somebody, but you don't have impressive figures to work with, don't make matters worse by showing off the poor numbers in a chart. Resorting to graphics trickery—manipulating the perspective, scale, or proportion—rarely pays off. The more sophisticated the audience, the more likely they are to catch you trying to fool them.

Your concept may also be too abstract to be effectively converted into a chart. Though you may have lots of numbers, those numbers may not compare to anything. The purpose of a chart is to show some type of numerical comparison, so a graph that compares nothing is meaningless.

Concepts that are too simplistic, specific, or familiar are also not good candidates for charting, such as a chart that shows no growth. The chart adds nothing to the perception of the data being presented.

Charts force approximation of numbers, and specific data, particularly if it will be used by someone other than yourself, may be best left in tabular form. You probably wouldn't want to provide your accountant with a line chart that shows your aged accounts receivables, for instance. Your accountant needs the actual numbers to work with.

Data that's familiar to your audience also needn't be charted. If it's widely held among your group that it's doing 20 percent less business than

other departments within the company, a chart pointing up this fact is hardly necessary.

PICKING THE RIGHT CHART TYPE

On the outside, numbers look much the same. A stack of figures showing a rise in interest rates may look the same as a stack showing a fall in grain production. But on the inside, the numbers may tell a different story. It is this story and how you want to tell it that dictates the type of chart you should use.

Picking the right kind of chart makes a lot of difference if your message is to come through to your audience. Even if the charts you make are for your own use, you'll want to choose the right kind so you can more easily and accurately analyze the numbers.

Process of Elimination

There are five major types of business graphs, with variations of each. Picking the right one out of all the possible choices can seem a monumental task. Fortunately, the job is made easier by a process of elimination.

For every chart you want to make, follow these three steps:

1. Identify the message.
2. Determine the comparison.
3. Select the chart.

Don't forget the first step: identify the message. It's the key to creating successful business graphics. You'd be surprised how many charts are made each day that don't have a meaningful message.

Why is it so critical to have a message? Because a message enables you to pick a suitable chart for your numbers. More importantly, your audience is more likely to perceive the purpose of the chart, and readily accept the information contained within it. Without a firm message in mind, you run the risk of your audience misinterpreting the chart, which can lead to disastrous results.

Identify the Message Let's say you want to create a chart showing the performance of three divisions in a company. There are several ways you could reveal the facts, depending on the message you want to convey. Table 5-1 shows the data that each of the next three charts will use.

Company Sales				
	A	B	C	Total
1983	325	119	84	528
1984	330	156	81	567
1985	319	171	87	577
1986	328	181	93	602
Total	1302	627	345	

Table 5-1 Data for Message Chart

Figures 5-1 through 5-3 show the different interpretations of the data:

- In Figure 5-1, the message says that the total overall performance for the company is going up. The chart includes each department, and the contribution it makes to the revenue of the company.
- Figure 5-2, though made from the same data as the previous chart, looks completely different. Now, the message has changed from showing increasing revenue to comparing the three departments to one another, ranking them in order of performance.

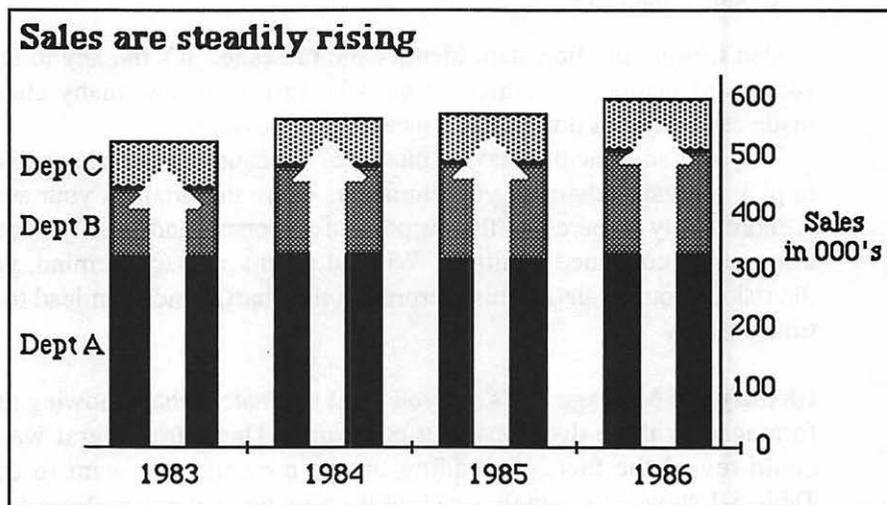


Figure 5-1 Total Performance

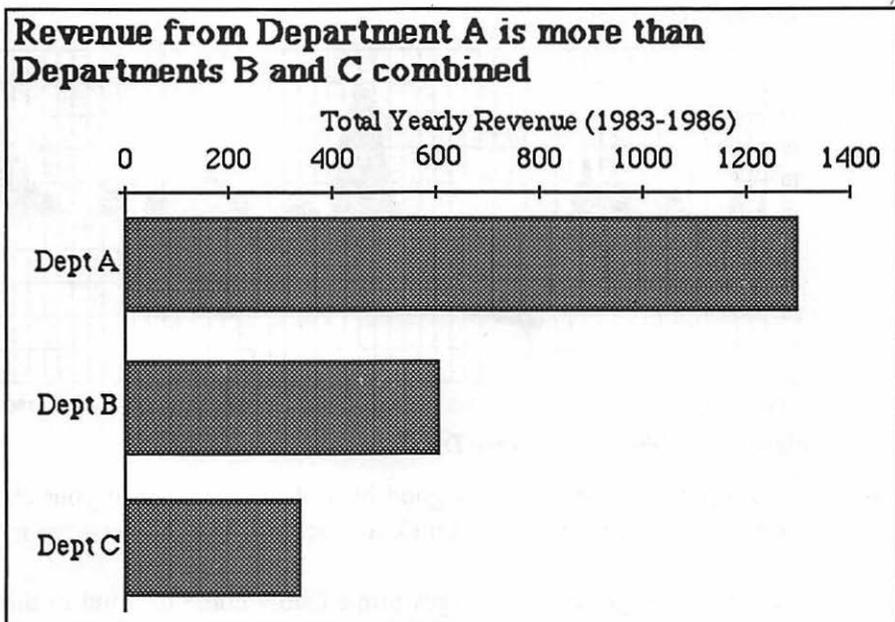


Figure 5-2 *Department Ranking*

- Figure 5-3 shows that department B has slowly improved its performance during the past several months, while the other two have remained fairly static.

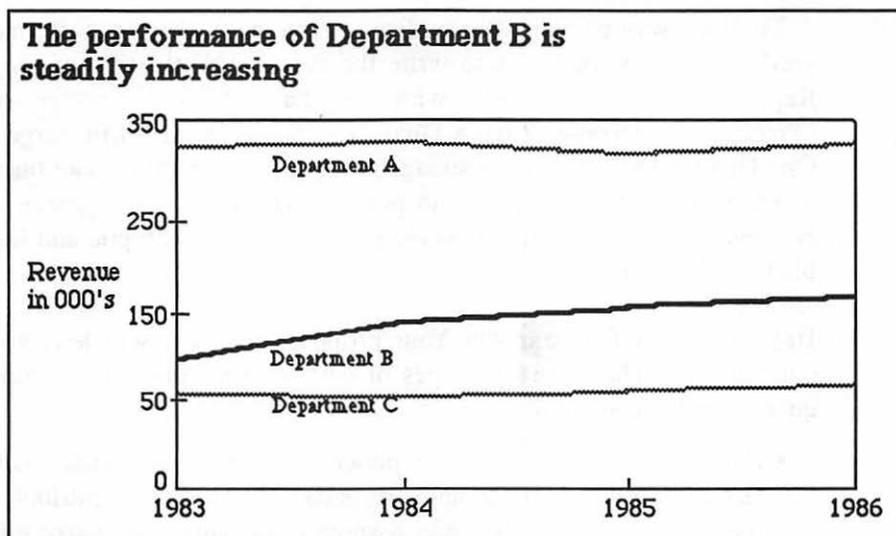


Figure 5-3 *B Improvement*

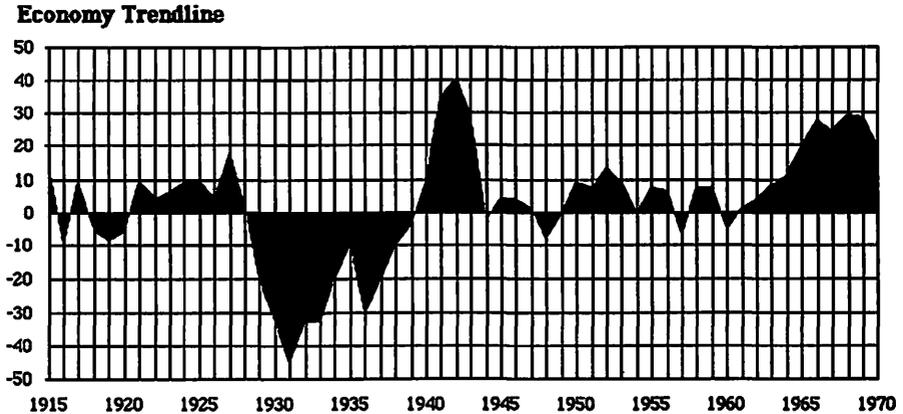


Figure 5-4 *100-Year Economy Trendline*

Sometimes *you* may have a good idea of the message in your chart, but your audience may not be so quick to catch on, like the message in Figure 5-4.

A couple of possible messages immediately come to mind in this chart, none of which may be the message you are trying to get across:

- The 1929 Depression was the lowest point in the U.S. economic history.
- Wars stimulate the economy.
- Minor depressions follow all major wars.
- The economy is more stable and prosperous now than ever before.

The best way to help your audience zero in on the particular message you're trying to convey is to write the message as the title of the chart. Replace non-descriptive titles with ones that state your message, such as "Profits and Revenues Take a Dive," or "Our Annual Profit Surge Came One Quarter Early." If the message is too long for a title (more than eight or ten words), it is acceptable to pare it down into a manageable chunk. However, don't reduce the message so much that it is cryptic and impossible to understand.

Determine the Comparison Your proposed message will lead you to a comparison. There are five types of comparisons: parts, item, time, frequency, and correlation.

- *Parts*—The percentage of components that make up a total. Shows the size of individual components (or parts) and how they contribute to the total picture. As an example, assume five components make up a finished product. The cost of manufacturing that product is a known value, say five dollars. Each component or part contributes some per-

centage to the total cost—some more; some less. To find out if your proposed chart compares parts as they relate to the total, look for these key words in the message: percentage, share, contribution, total, sum, ratio, and proportion.

- *Item*—The ranking of items. This comparison may show that the items in the chart are less than, more than, or equal to one another. You'll know you're looking at an item comparison if you encounter these key words (or their synonyms) in the message: more than, less than, equal to, ranks, higher, and lower.
- *Time*—Change over time. Compares how a person gets tall as she grows up, for example. This time can be in hours, days, weeks, months, years, etc. You can tell you're dealing with a time comparison if words such as change, increase, decrease, grow, decline, rise, fall, and fluctuate are in your message.
- *Frequency*—The number of items that fit into pre-determined categories. One good example of a frequency comparison shows how many students in a class got As, how many got Bs, and so forth. Key words to look for: frequency, distribution, range, fall into, how many, and how often.
- *Correlation*—The relationship between two sets of numbers. The correlation comparison pits two sets of numbers together, to see if there is a relationship between them. For example, there would likely be a comparison between car sales and the selling price of the car. The lower the price, the more people are likely to buy it. Key words to consider are: related to, changes, increases/decreases with, and varies.

Don't worry if your message doesn't include one of the key words mentioned above. Write down the message (so you can study it), and consider alternative words for it. Consult a thesaurus and dictionary if you need help.

Select the Chart You've done most of the work already in deciding which chart to use. Once you know the message, and what you're comparing, you have arrived automatically at the the correct type of chart to use. Although there are many varieties of business graphics, 80 percent of charts you will use will fall into one of the following three types shown in Figure 5-5: pie, column, and line.

Selecting the appropriate chart is even easier if you refer to the table in Figure 5-6, which was adapted from the excellent tutorial on business graphics, *Say It With Charts* (Gene Zelazny, 1985, Dow Jones-Irwin). The five types of comparisons are listed on the top; the main chart types along the side. Keep in mind that the table represents the recommended choice; it is not meant to be an absolute authority. Microsoft Works can't create

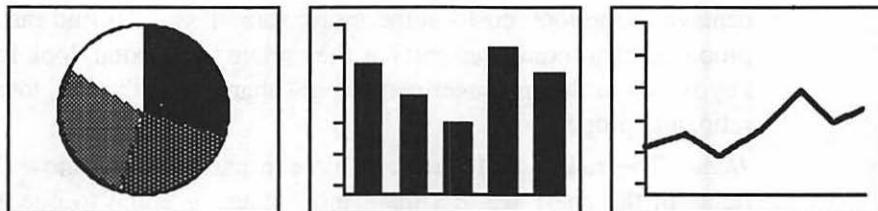


Figure 5-5 Chart Types, Plain Examples

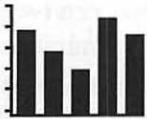
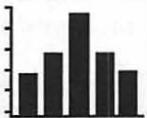
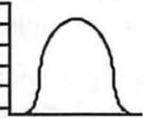
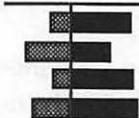
	Pie	Column	Bar	Line	Dot
Parts					
Item					
Time					
Frequency					
Correlation					

Figure 5-6 Chart Matrix

some of the charts, including dot and bar (in this case, “bar” means horizontal bar), but they are shown in the table in case you wish to use a standalone graphing program.

PIE CHARTS

Pie charts are popular because they're easy to make and easier still for an audience to comprehend. They're used almost exclusively in parts comparisons. The pie is a finite circle, and is divided into portions, or slices. Each slice represents an individual component, a percentage or share of the total. That's perfect for a parts comparison. As you can see in Figure 5-7, the larger the part, the bigger the percentage, so the thicker the slice.

Pie charts suffer from some limitations. By their nature, pie charts can't show the parts of more than one total at a time. You can't, for example, show the totals of office expenditures for two separate years in the same chart. Pie charts should be limited to fewer than eight slices. With more slices, it's difficult to compare how the parts relate. Combine some of the smaller parts in a miscellaneous or other grouping.

Here are some general notes about pie charts.

- The most important slice should start at the 12 o'clock position. Position the remaining slices in descending (largest-to-smallest) or ascending (smallest-to-largest) order.
- If there is no single important slice, order all the slices in descending or ascending numerical order.

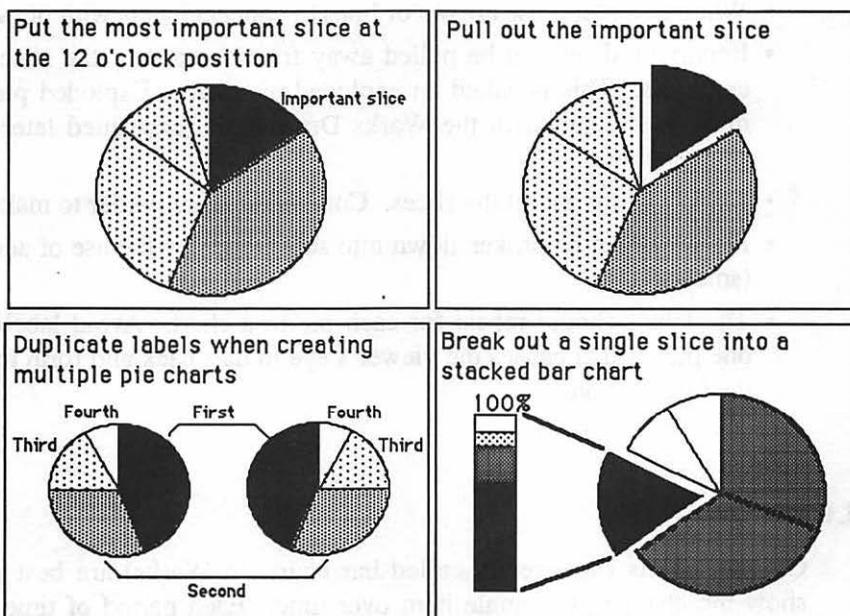


Figure 5-7 Pie Chart

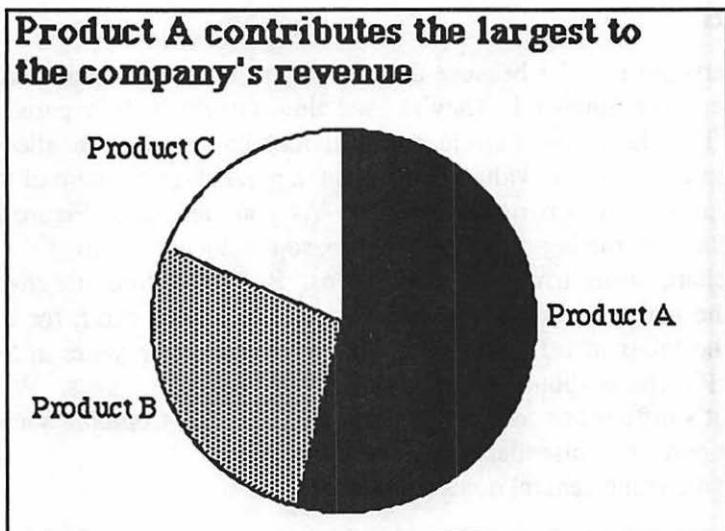


Figure 5-8 *Pie Chart*

- Pie charts suffer from three problems: lack of accuracy, difficulty in comparing small or closely related items, and difficulty in labeling. If these problems can't be overcome, choose a stacked column chart instead.
- When necessary, use arrows or lines to connect labels with pie slices.
- Important slices can be pulled away from the rest of the slice to add emphasis. This is called an exploded pie chart. Exploded pie charts must be created with the Works Draw tools (explained later in this chapter).
- Avoid pulling out all the slices. Comparisons are harder to make.
- Pie slices can be broken down into sub-groups by the use of additional (smaller) pies.
- The labels should repeat for each pie in a chart. Avoid labeling just one pie, as that causes the viewer's eye to dart back and forth to get all the information.

COLUMN CHARTS

Column charts (incorrectly called bar charts in Works) are best used to show the change of a single item over time. Each period of time has its own column. As you can see in Figure 5-9, the taller the column, the greater the value of the item. Because of their design, column charts

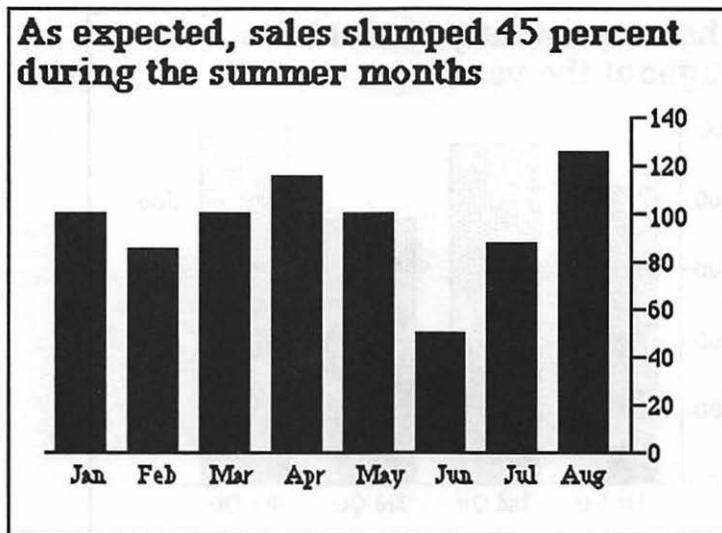


Figure 5-9 *Basic Column Chart—One Series*

emphasize levels of magnitude. Differences from one time period to another are easy to spot.

It's possible to compare an item during several sets of time in one column chart. Each set is called a series. For example, say you are plotting the quarterly sales of a company. The columns for the four quarters in the current year are shown in black. The columns for the quarters of last year are shown in gray. You can use patterns, stripes, or colors to differentiate each series. See Figure 5-10 for an example.

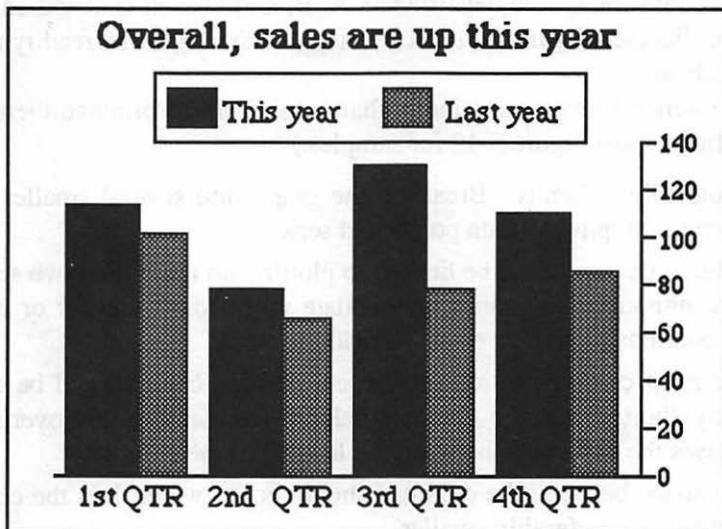


Figure 5-10 *Multiple Series Column Chart*

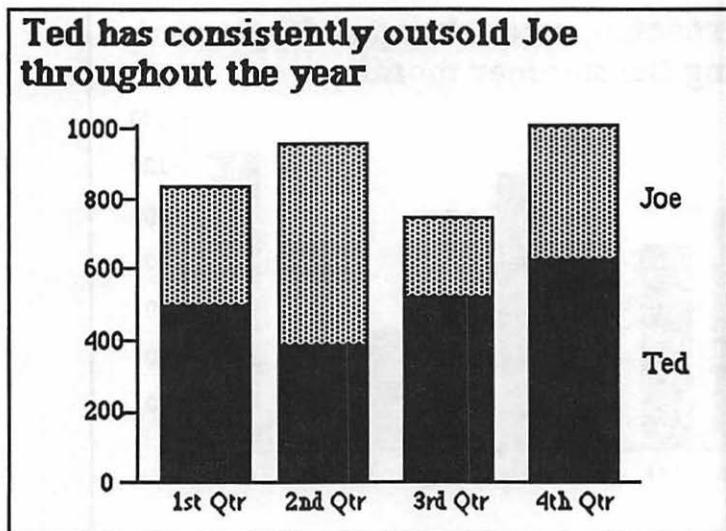


Figure 5-11 *Stacked Column Chart*

You should limit yourself to stuffing no more than four series in one column chart. And, avoid plotting no more than six or eight numbers for each series. Too many columns make the chart difficult to understand.

Stacked column charts are an effective alternative to the multi-series column chart. These charts are composed of several columns—one for each time period—but the series are shown stacked on one another. Each segment is a different series. The stacked column chart is useful when you need to see how the various series are contributing to the whole. For example, you could show how departments A, B, and C each contributed to last year's profits (see Figure 5-11). The length of the segments readily reveals a comparison.

These general notes on column charts will help to produce them more successfully. (See Figure 5-12 for samples.)

- Avoid thin columns. Break up the graph into several smaller charts when plotting many data points and series.
- Column charts should be limited to plotting no more than two series of data, although they can accommodate up to four. Cluster or overlap the columns to make it easier to read the chart.
- The front columns in an overlapped grouped chart should be consistently shorter than the columns behind. Remember that overlapping stresses the difference between the lengths of the columns.
- The space between the columns should be no wider than the columns themselves, preferably smaller.

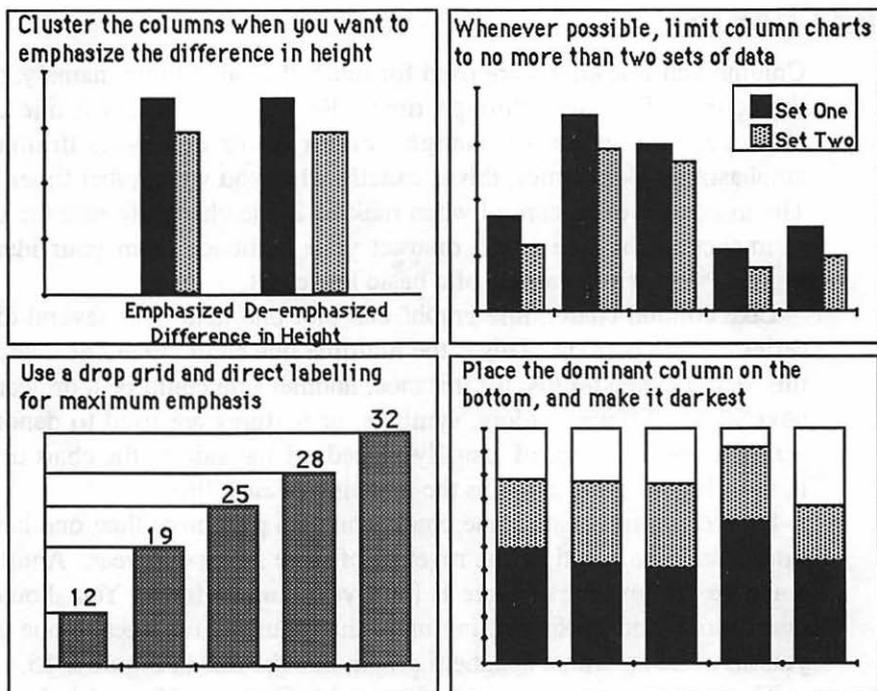


Figure 5-12 Column Chart Gallery

- Column charts designed primarily to point up a comparison don't require a grid. A grid should be added when it's important to show the actual values represented by the columns.
- A drop grid can be used to emphasize the data, or to show the absolute values of the columns. Absolute values can also be presented by labeling inside the columns.
- When creating a stacked (or subdivided) column chart, place the dominant or most important element on the bottom. Use different colors or patterns to help distinguish each of the segments.
- Join the tops of segments in a grouped column chart to emphasize the trend or relationship between similar items.
- When plotting a histogram, choose the proper number of ranges to adequately reveal the frequency distribution. Too few or too many ranges hide the pattern. All the ranges should be of equal size, and all ranges should be clearly labeled.

LINE CHARTS

Column and line charts are used for much the same thing, namely, plotting the course of an item through time. Because the line of a line chart is unbroken, the effect of change—either up or down—is dramatically emphasized. Sometimes, this is exactly what you want; other times it isn't. The moral: Be extra careful when making a line chart. Be sure the dramatic impact of the line won't distract your audience from your idea. See Figure 5-13 for an example of a basic line chart.

Like column charts, line graphs can plot one item over several different series of time periods. This is the multiple line chart. One line could be for this year's expenditures, for instance; another line could be a projection for next year. Different colors, symbols, or textures are used to denote each series of data. A legend, usually placed off the side of the chart or within it, as in Figure 5-14, explains the meaning of each line.

Unlike column charts, line charts can also plot more than one item over time. One line could be the revenue of store A for one year. Another line could be the revenue of store B for a year, and so forth. You should exercise caution and avoid plotting more than four or five lines in one chart or you may end up with a spaghetti graph, like the one in Figure 5-15.

The following suggestions, along with Figure 5-16, will help you use line charts effectively:

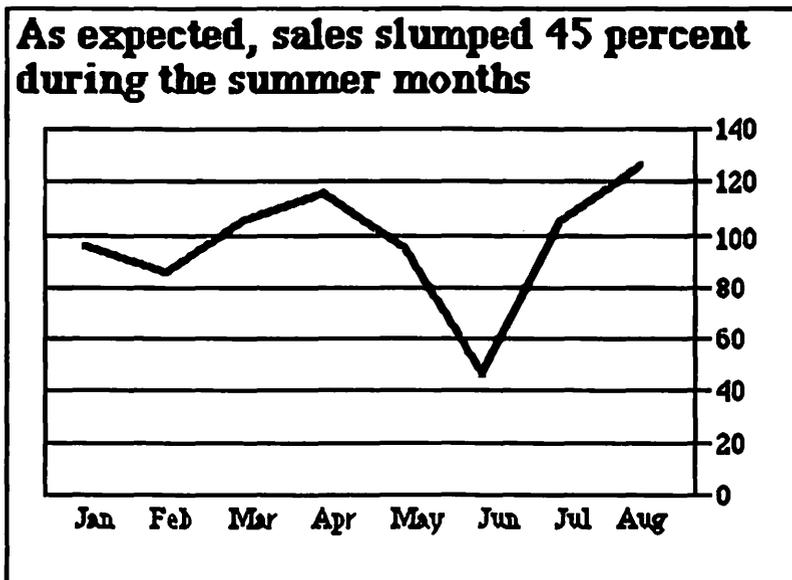


Figure 5-13 *Basic Line Chart*

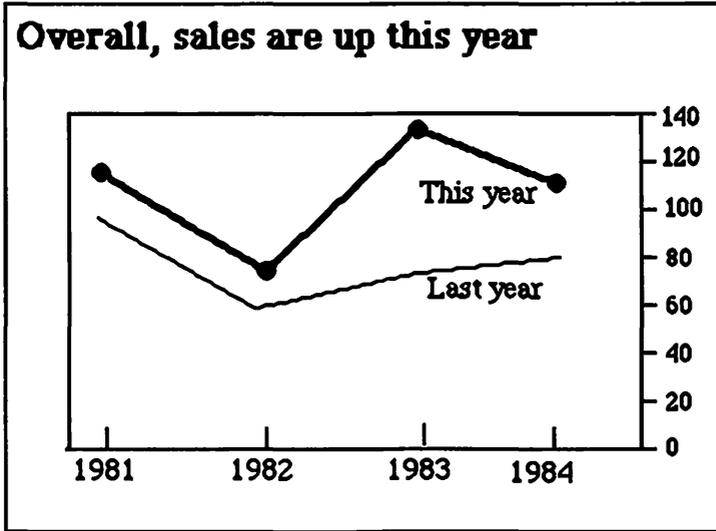


Figure 5-14 Multi-Series Line Chart

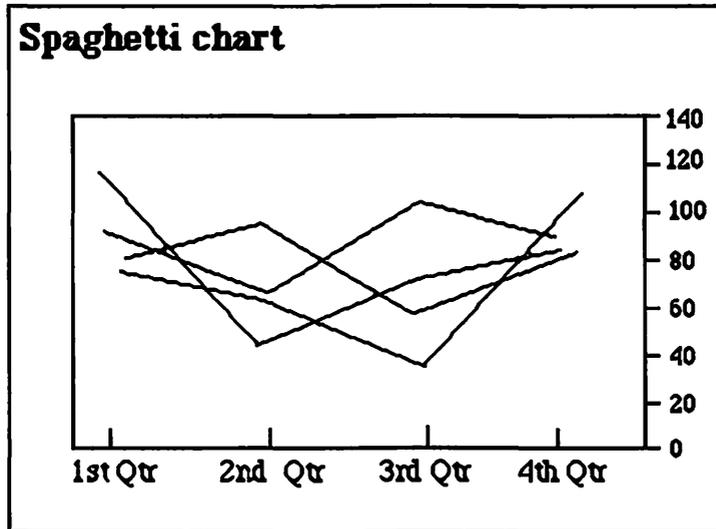


Figure 5-15 Spaghetti Graph

- Lines in a multiple line chart should have different weights, patterns, colors or symbols. The lines should be keyed directly on the chart or in a legend.
- Grouped lined charts should not have more than four or five trendlines, especially if the lines cross each other. If the chart is difficult to decipher, break it into multiple charts.
- A line chart can be combined with another chart for trend analysis.

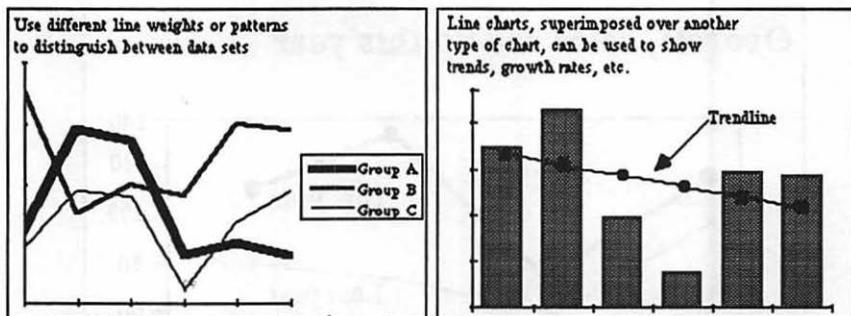


Figure 5-16 Line Chart Gallery

- The plotted line should always be thicker than the grid and axis lines, but not excessively thick.
- When plotting a histogram, choose the proper number of ranges to adequately reveal the frequency distribution. Too few or too many ranges hide the pattern. All the ranges should be of equal size, and all ranges should be clearly labeled.
- Area charts are not line charts with coloring added below the lines. Area charts show cumulative effect—Area B is physically stacked on top of Area C; Area D is stacked on top of Area C, etc.
- The bottom band of an area chart should be the most dominant or important element. When there is no dominant element, place the least fluctuating band on the bottom. Why? The excessive fluctuations on the bottom band incorrectly influences the appearance of the rest of the bands.

ANATOMY OF A CHART

With the exception of pie graphs, all charts have a horizontal and vertical axis. The horizontal axis is often referred to as “X” and the vertical axis is referred to as “Y.” In most line and column charts, the horizontal, or X, axis plots time; the vertical, or Y, axis plots value.

The parts of the typical chart are shown in Figure 5-17, and are defined in the following list:

- Title. The descriptive title of the chart.
- Subtitle. A secondary title.
- Legend. Text that identifies the data series (or categories) plotted in the chart.

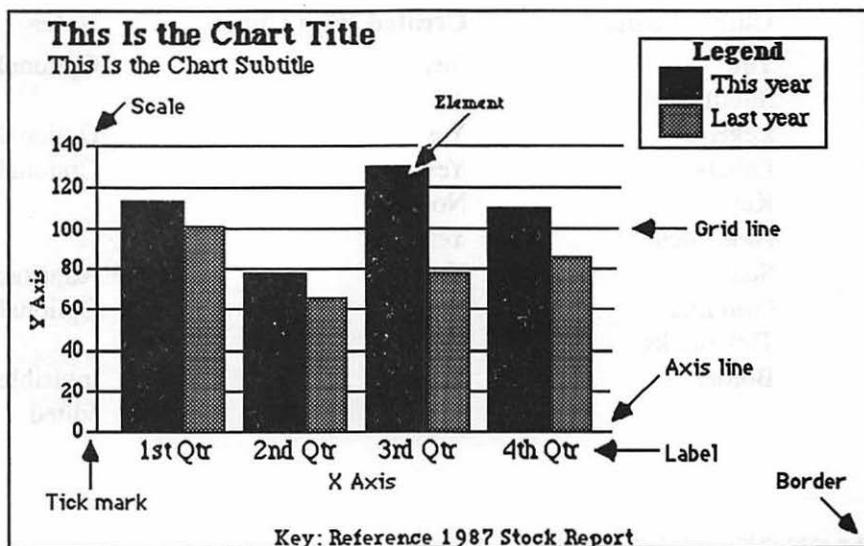


Figure 5-17 Chart Anatomy, with Callouts

- Labels. Text that identifies the purpose or meaning of a plotted element or value.
- Key (or annotation). Explanatory text, usually for references.
- Axis line. Defines the X or Y axis.
- Scale. Shows the graduations of the values plotted in the chart.
- Grid line. Major (and sometimes minor) graduations of the scale.
- Tick marks. Partial major or minor grid line.
- Element. Identifies the item of comparison and marks its value. Can be a line, bar, column, dot, pie slice, etc.
- Border. An aesthetic frame that encloses the chart.

Not all of these elements are created with the Works' chart features, but can be added using the Draw tools, available when using the word processor or spreadsheet modules. As you'll see later in this chapter, you can edit any chart by copying it from the chart window, and pasting it into a word processor or spreadsheet document. The following table shows which chart elements are created in Works, and which must be added using Draw. Note that *all* Works Draw elements can be edited with the Draw tools.

Chart Element	Created With Chart	Notes
Title	Yes	Optional
Subtitle	No	
Legend	Yes	Optional
Labels	Yes	Optional
Key	No	
Axis lines	Yes	
Scale	Yes	Adjustable
Grid line	Yes	Optional
Tick marks	Yes	
Border	Yes	Invisible unless edited

CHART DESIGN BASICS

There are a number of design elements that are basic to every chart you create. These elements can be broken down into seven categories: simplicity, unity, pattern, text, chart mechanicals, scale, and proportion.

Simplicity

The best chart is a simple chart. One of the most common flaws in chart making is trying to cram too much information in at once. A chart that tries to say too much often ends up not saying anything at all. The message isn't clear, and the chart is too difficult to read.

Unity

Charts are meant to tell a story in a short amount of time. To help convey that story, the chart should have a uniform appearance. Incongruous elements are distracting, hindering the speed at which the message in the chart can be digested.

Pattern

Empty bars, columns, and pie slices look bare and undramatic. For the greatest impact, the most important element in the chart should have the

darkest pattern (black or dark gray). Less important elements can be lighter, even white. You can use patterns for more emphasis. Patterns can also be used to differentiate or identify certain elements. Make sure that the patterns you choose don't clash. If you plan on editing the chart with Works, and your Macintosh supports a color display, you can change the colors of patterns, as well as other elements of the chart.

Text

Even though a chart may be worth a thousand words (or more), almost all charts have text of one kind or another for the title, legend, labels, and annotations.

Text Size and Placement The *title* is almost always centered over the chart, and is large and bold, to attract attention. The text style should be plain and simple.

Subtitles should be added only when the chart requires it. The best subtitles further establish the message of the chart. The subtitle can also indicate the unit of measure or the source of the chart.

Axis label text is smaller and less bold than title text, and is placed as close to the two axes as possible. Label text should be written horizontally whenever possible. When there's not enough space, it's acceptable to rotate the entire label 90 degrees so it reads bottom to top (however, Works does not currently do this). Even though Works stacks characters on top of each other, it is not very attractive, as shown in Figure 5-18. For best results, you'll want to edit the vertical axis label using the Works Draw tools.

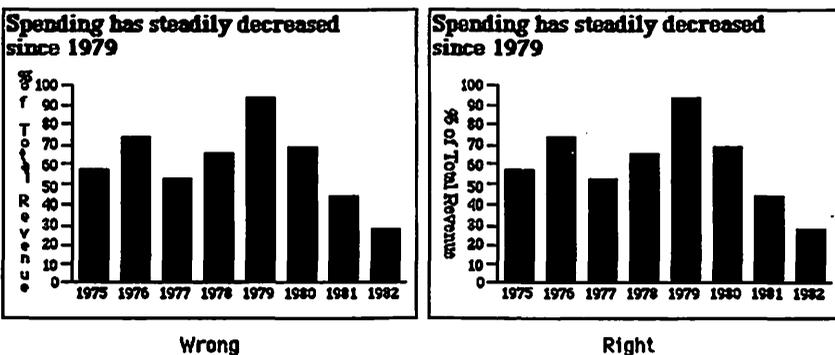


Figure 5-18 *Wrong and Right Ways for Vertical Axis*

Labels may not always fit. Writing the years from 1960 to 1980 on a column chart may make all the years run together. The alternatives? Choose different major divisions (two or five year periods, for example), or abbreviate the labels. Start with 1960, then go to '61, '62, '63, and so forth.

Legends and *annotations* are usually placed to the right or bottom of the chart (legends to the right; annotations on the bottom). A legend (also called a key) can be placed under the title of the chart, and function as a kind of subtitle. Both legends and annotations can be written in small text.

Text Style Use a plain, undecorative text style (or font) whenever possible. Fancy, curly-cue text, like Venice, is hard to read and distracts the audience's attention. If you want to highlight text, use boldface or italics.

Chart Mechanicals The grid behind a chart acts as a kind of picture frame. It draws your eye to the important parts of the chart. The grid also serves as a calibrator, to help you better visualize the relationships and values represented in the chart.

Grid Column, bar, line, and dot charts are often made with a grid background. The spacing of the grid corresponds with the major divisions in the X and/or Y scales—10s, 50s, 100s, etc.

Most line charts use both X and Y (horizontal and vertical) grid lines, so the eye can more easily see the relationship between the variables being plotted. Column charts are typically graduated with horizontal lines only, which mark off the values in the Y axis.

Linear or Log Grid Most grids are evenly spaced, because the data is plotted linearly. The progression from one number to the next is an even unit. A *logarithmic* grid, on the other hand, shows the percentage rate of change

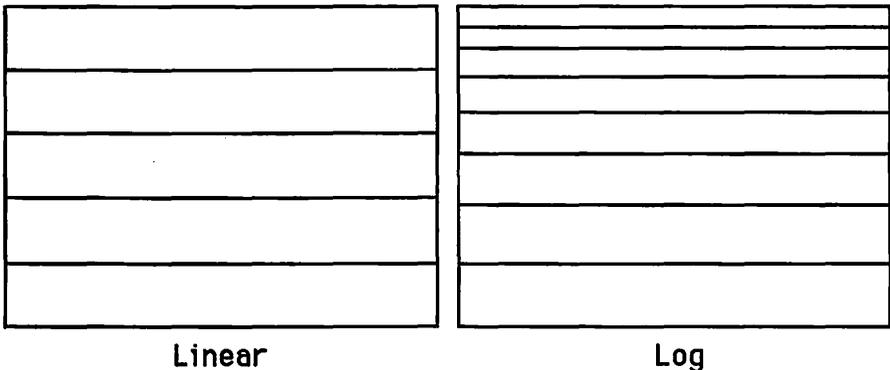


Figure 5-19 *Linear and Log Chart Scales*

(or ratios of change). With a logarithmic (or log) grid, an increase from 1 to 2 is 100 percent. So is an increase from 2 to 4, and 4 to 8. Charts created on a logarithmic scale show the rate of change, not the actual change in absolute values. Refer to Figure 5-19 for examples of both linear (called “numeric” in Works) and logarithmic grids.

Works creates only “semi-log” charts. These employ a logarithmic scale in the vertical axis only.

Scale

Since charts are used to compare numbers, a scale is used to indicate the value of those numbers. When that scale is distorted, the numbers become distorted. With very few exceptions, you should always start the scale of a chart at zero. You can occasionally bend this rule, when creating indexed or log charts, for example.

What happens when you don’t start the chart at zero? Take a look at Figure 5-20. The chart on the left begins at 400 and extends to 700. Notice the volatility of the line. The excessive movement is caused by starting the Y axis scale at a point other than zero. The Y axis in the chart on the right starts at zero and accurately represents the values compared in the chart.

A similar rule applies for the uppermost limit of the chart. You should stop the scale at an even increment just above the largest value in the chart. The chart will be improperly compressed if the upper scale limit is too high.

Manipulating the scale of a chart is probably the most common tactic people use to purposefully mislead their audience. This and other ways of false charting are described in the satirical study, *How to Lie with Statistics*, by Darrel Huff (W. W. Norton Co., 1954).

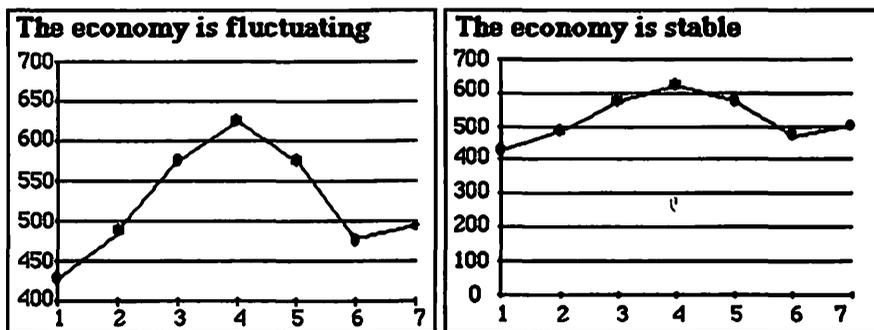


Figure 5-20 Non-zero and Zero Scale

Scale Placement Should the scale in a column chart go on the left or right side? It all depends. Convention says to put the scale on the left side of the chart. But if the values get very large on the right side, or the movement or values are more important on that side, put the scale there.

Scale or Actual Values? The X and Y axes of your charts needn't be scaled, especially if you're only interested in showing the comparison between values and not the actual values. Most viewers prefer to know the quantity expressed in the chart, however. If you don't want scaled axes, identify the values by writing them alongside the columns or lines.

Proportion Akin to scale is proportion. Line and column charts are often drawn so that they are semi-rectangular in shape. The exact aspect ratio isn't important, but the horizontal axis is usually about 1.25 times longer than the Y axis. Obviously, pie charts don't follow this convention.

WHAT TO DO WITH INCOMPATIBLE DATA

Has this happened to you yet? You enter a set of numbers into the computer, and the graph comes out looking lopsided, as in Figure 5-21. The cause? Incompatible data. The computer scales the chart according to the largest value. If the other values are considerably less, you'll end up with one tall bar, and several miniature ones. There are several solutions, discussed below.



Figure 5-21 Chart with Incompatible Data

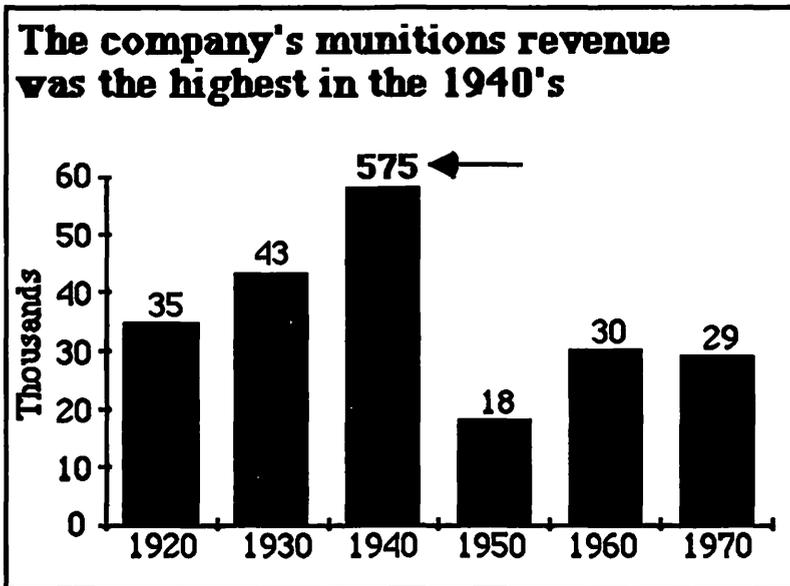


Figure 5-22 *Direct Labeling over Column*

Reduce Data Value

The best, and often easiest, way to avoid a lopsided chart is to replot the chart with a lower value for the tall column. Regraph the numbers and the other columns will be a normal height.

The tall column no longer represents the original value, so you'll have to tell your audience that the column has been chopped down to size. Use the Works Draw tools to write the actual value directly over the column, as illustrated in Figure 5-22.

Out of Scale

Here's another technique: As shown in Figure 5-23, you can extend the bar beyond the top of the chart, as if it's popping through the top. Or cut the bar in the middle, showing a break in the scale. In both cases, you should write the actual value immediately above the chart.

Convert to Percentages

Another approach to presenting incompatible data is to not plot the actual

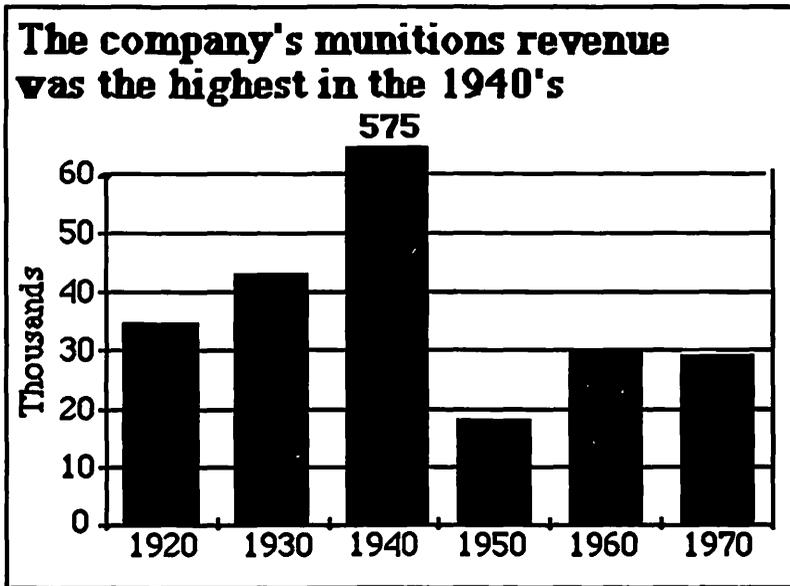


Figure 5-23 *Bar Popping Through Top*

values of the numbers. Instead, plot the numbers as percentages. Your graphics program should be able to automatically convert the numbers to percentages for you.

If the program can't do the arithmetic for you, it's easy enough to do yourself. First, add all the numbers together. The sum will represent 100 percent. Then, divide each value in the chart into the sum. Here is an example:

Numbers to chart: 950, 126, 164, 201.

Sum of numbers: 1441.

950 is 66 percent of total (1441).

126 is 8.7 percent of total.

164 is 11.3 percent of total.

201 is 13.9 percent of total.

Add up all the percents, and you get 100 (actually 99.9, because of rounding error).

But plotting these numbers on the column chart used earlier still doesn't provide a very striking chart, and in fact, it shouldn't. Since you've converted the numbers to percentages, use a pie chart. See Figure 5-24 for a before and after look.

Bear in mind that using a new scale, or plotting the numbers as percentages, may drastically alter the look of the chart. This may not be what you want. Analyze the chart in its new form before you commit to it. And remember that your audience may not understand the chart as readily.

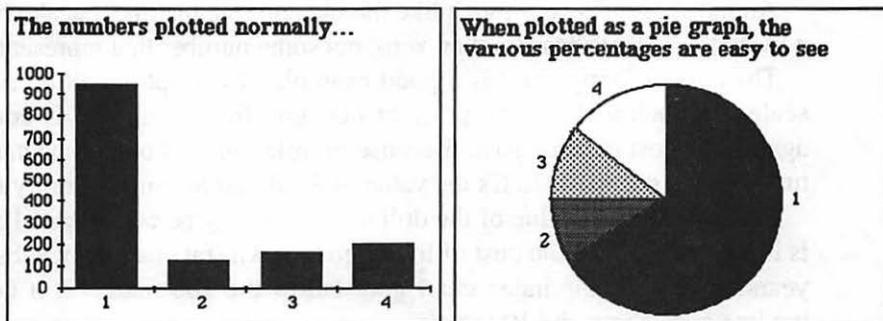


Figure 5-24 Column/Pie Chart of Given Numbers

Additional Methods

You can also use an indexed or logarithmic scale to deal with incompatible numbers. Depending on the original values, this may produce a usable chart.

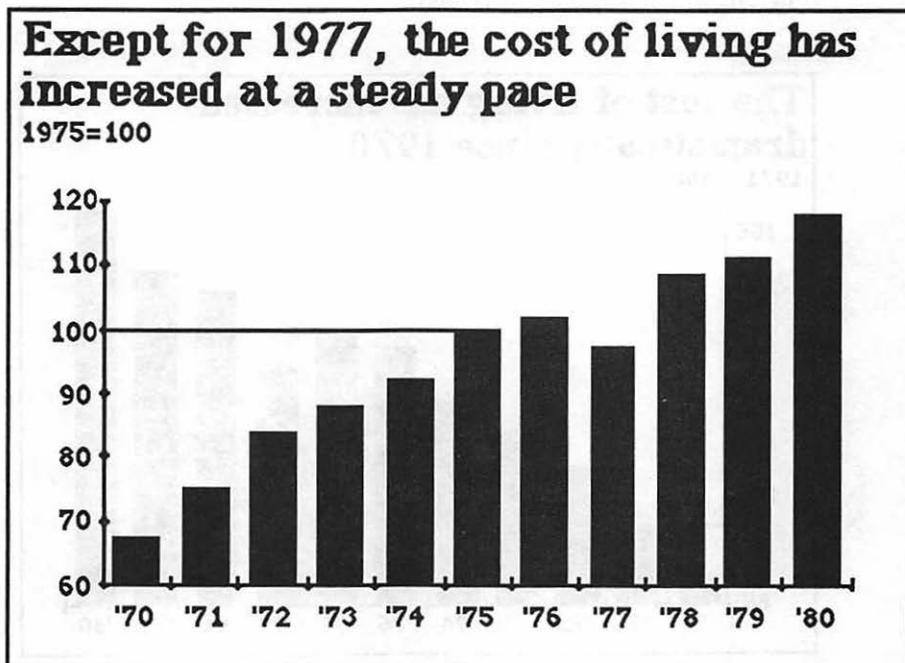


Figure 5-25 Cost of Living Index Chart

An index scale is very much like the old and reliable linear scale, but with a twist: the scale is based not on zero, but some number that represents 100.

The cost of living chart is a good example of a graph based on an index scale. In such a chart, the price of housing, food, rent, etc. is compared against the cost in years past. Because of inflation, and other monetary fluctuations, it's necessary to fix the value of the dollar at some arbitrary level.

For instance, the value of the dollar in 1975 may be considered 100, as it is in Figure 5-25. If the cost of living goes down (fat chance) in subsequent years, the line in the index chart goes below the 100 mark. If it goes up, the line goes above the 100 mark.

Index charts are helpful because they enable you to compare similar statistics. But they can also lead you into trouble. You must carefully pick an appropriate base, or the effectiveness of the chart may be diminished.

You could, for instance, pick a year when the value of the dollar was unreasonably high. Your chart would then show that the cost of living has actually gone down, compared to the inflated year. If your aim was just the reverse—to prove that the cost of living is ridiculously high—choose a base year when the dollar value was low, as shown in Figure 5-26. No matter what base you choose, you must identify it somewhere on the chart.

Although some stand-alone charting programs will index a set of numbers around a common base, Works will not. You'll have to do the math yourself, which fortunately, is easy.

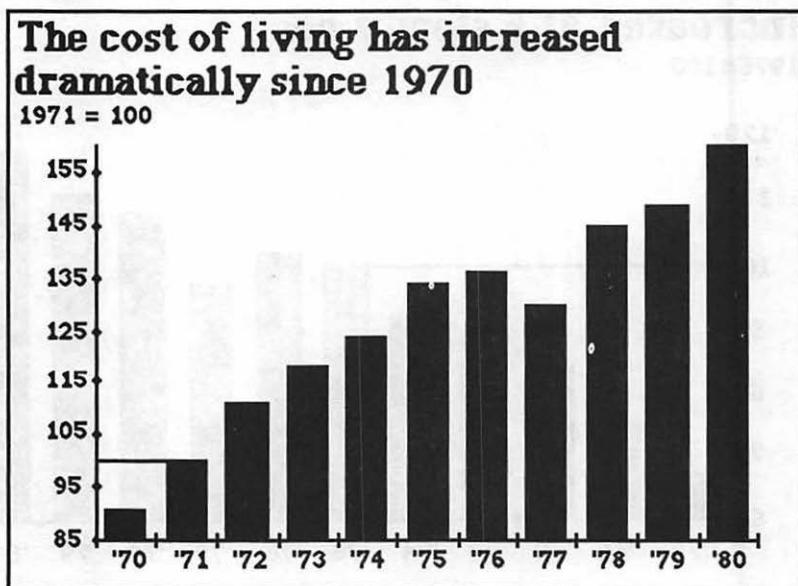


Figure 5-26 *Too High/Low Base Year*

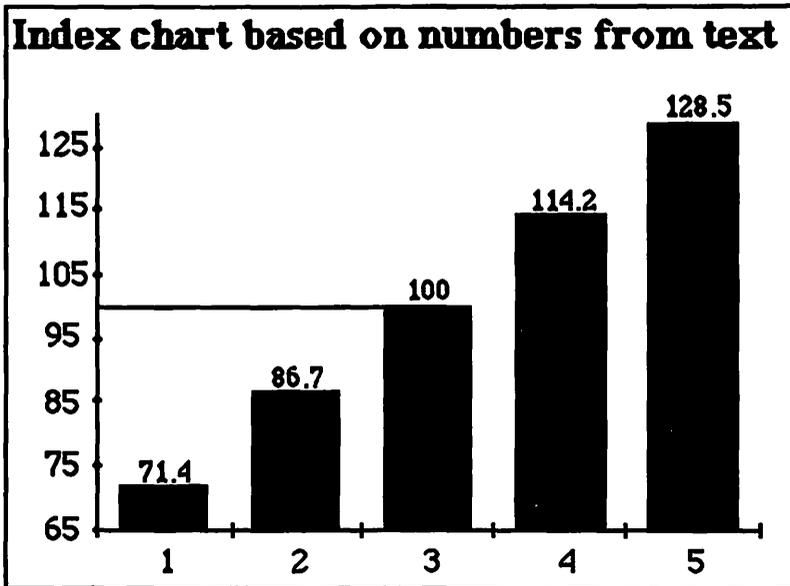


Figure 5-27 *Index of Sample Numbers*

1. Locate a value in your chart that you want to be 100.
2. Divide that number into 100. The result will be a “constant” that you’ll use for the other numbers.
3. Take each number in the chart and multiply it by the constant.

Suppose your chart consists of the values 10, 12, 14, 16, and 18. You choose 14 to be the base index of 100. Dividing by 14 gives you the constant of 7.14. Therefore:

- 10 is equal to 71.4.
- 12 is equal to 85.7.
- 16 is equal to 114.2.
- 18 is equal to 128.5.

When charting these numbers, as shown in Figure 5-27, it is necessary to override Works’ auto-scaling feature. You’ll want to choose a bottom scale limit just below the smallest index value, and the top scale limit just above the largest index value. If you can, make the 100 mark a heavy line, to highlight it for your audience.

WHAT TO DO WITH MISSING DATA

It's easy to spot missing data when you're looking at a table. There's a blank where there should be a number. But missing data can be harder to spot when the numbers are in chart form. You can easily jump from April to June, and few people will notice. You may have simply forgotten May, or the data may not have been available. Or the numbers for May were so disappointing that you decided to leave them out!

If the information you have for that month is an estimate or approximation, fill that column with a distinctive pattern, to set it off from the rest. Note on the chart that the data is approximate. You can use the same technique when projecting into the future.

Column charts are most often used to plot numbers against equal intervals of time. Notice the word *equal*. If you start the chart at 1980 and proceed to 1986, a year at a time, there should be a column for every year in between. When the data for a particular time period is missing, enter the value as zero, as depicted in Figure 5-28.

Dot and sliding bar charts suffer most from incomplete data. Both charts rely on examining the correlation between two sets of numbers. If a value from one set of numbers is missing, the corresponding value in the other set is useless. If several numbers from both sets are missing, you should steer away from making a chart. It will have little meaning.

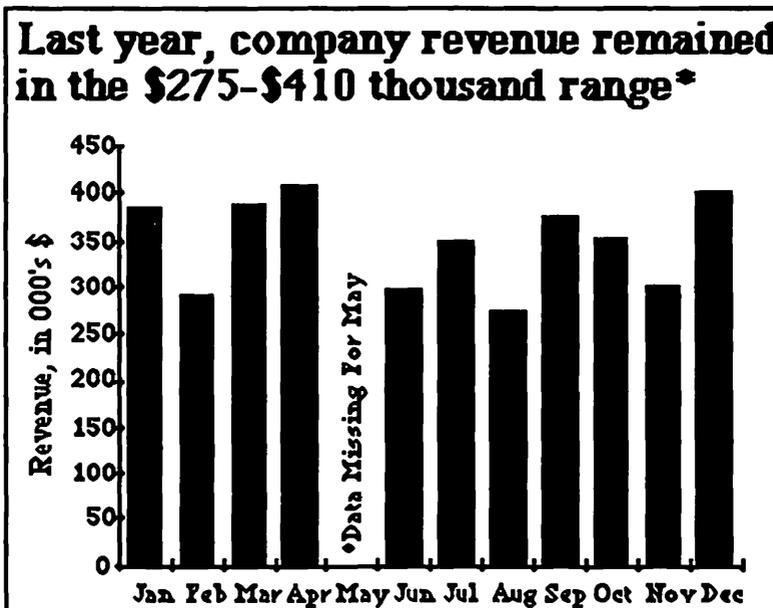


Figure 5-28 *Chart with Missing Month*

MAKING A CHART WITH WORKS

The Works spreadsheet module has its own chart making tools, where you can produce five different types of charts: pie, line, column (called “bar” in Works), stack, and combo. The stack chart type produces stacked columns; the combo chart type overlays one or more line charts over a column chart. All of the commands for making presentation graphics are in the Chart menu.

Data for charts is entered directly into the spreadsheet. You instruct Works how each chart is to use this data by entering column and row definitions. Once you define a chart, it is permanently linked to the data in the spreadsheet. Changes in the spreadsheet data are automatically transferred to the chart.

Works can support up to eight chart definitions for each spreadsheet. Because the charts are a part of the spreadsheet, they are saved along with it. To access a chart, you must first open its spreadsheet, then find the chart definition with the Select Chart Definition command in the Chart menu.

Producing a Chart

The process of making a chart is simple and straightforward, but it does require that you enter the chart information into the spreadsheet in a particular manner. Works expects you to enter data following the formats shown in Figures 5-29 and 5-30. Works considers line, column (bar), stack, and combo charts as Series charts, and treats pie charts separately. Data for series and pie charts are organized differently, as the figures show.

	A	B	C	D	E	F
1						
2						
3	One	1				
4	Two	2				
5	Three	3				
6	Four	4				
7	Five	5				
8						
9						
10						
11						

Figure 5-29 Data Entry Format for Pie Charts

Untitled (SS)						M
	A	B	C	D	E	
Data Legends →	1	One	Two	Three	Four	Twelve
	2					
Series 1 →	3	Data 1	1	2	3	4
Series 2 →	4	Data 2	1	2	3	4
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					

Figure 5-30 Data Entry Format for Series Charts

Once the data is entered, choose the New Series Chart or New Pie Chart command in the Chart menu. Enter the rows and columns that contain the data you want to plot (move the definition dialog box out of the way to see the spreadsheet data underneath, if necessary), and press the **Plot It!** button (the other entry boxes, for Scale, Chart Title, Vertical Scale Title, and so forth, need not be filled in right now).

Assuming Works finds all the data it needs to successfully build the chart, a plot of the numbers from your spreadsheet is shown in a new chart window. Works does not allow you to manipulate the chart from within this window, but you can edit it with the Draw tools from within either the word processor or spreadsheet modules.

When you are viewing the chart, click the Close button in the upper left corner of the chart window. This closes the chart from view, but doesn't erase it. You can redisplay the chart by choosing the Draw Chart command from the Chart menu, and selecting from the list presented. Alternatively, you can remove the chart from view simply by choosing another open Works document in the Window menu. You can then reactivate the chart window by selecting it from the Window menu, or with the Draw Chart command.

Changing Chart Definition

Charts can be redefined at any time. The spreadsheet data is permanently locked to the chart definition, so changes made to value and label cells are updated in the chart definition window.

Some changes used to define the values and labels of the chart may lie outside the spreadsheet cells. Follow these steps to redefine elements such as number of series, chart title, or scale:

1. If the chart is not in view, choose the **Select Chart Definition** command in the **Chart** menu. If the chart *is* currently in view, double-click anywhere on the chart window.
2. Make the desired changes in the chart definition dialog box.
3. Click **Plot It!** to replot the chart and view the changes.

Copying Chart Definition

You may wish to make several versions of one chart, using the same basic information in the spreadsheet. If each chart is fundamentally different, you're better off creating each one fresh with the **New Series Chart** and **New Pie Chart** commands. But if the charts share many of the same characteristics, such as chart type, vertical and horizontal scale titles, and cells used for data and labels, you can save much time with the **Copy Chart Definition** command.

To copy a chart definition, choose the **Duplicate Chart** command in the **Chart** menu, then select the definition you want to clone. **Works** generates a carbon copy of the original, presenting the chart definition dialog box where you can make the desired changes.

Erasing a Chart Definition

Once made, charts are permanently attached to the spreadsheet. But chart definitions consume memory space, and many are not needed after printing or copying to a word processor or spreadsheet document. To delete a chart definition that's no longer needed, choose the **Erase Chart** command from the **Chart** menu. Select the chart to be deleted.

Resizing a Chart

Charts may be readily resized by resizing the chart window. The chart window initially fills the screen, but you can make the chart smaller by reducing the size of the window. Drag the window by the size box, located in the bottom right corner, but be aware that **Works** resizes the bars, lines, pie slices, and other graphic elements of the chart only. The font (Geneva 9 point) used for chart title, legends, and labels is not resized.

When possible, be sure to resize the window so that the chart maintains the same proportions as the original. You can easily stretch or squash a

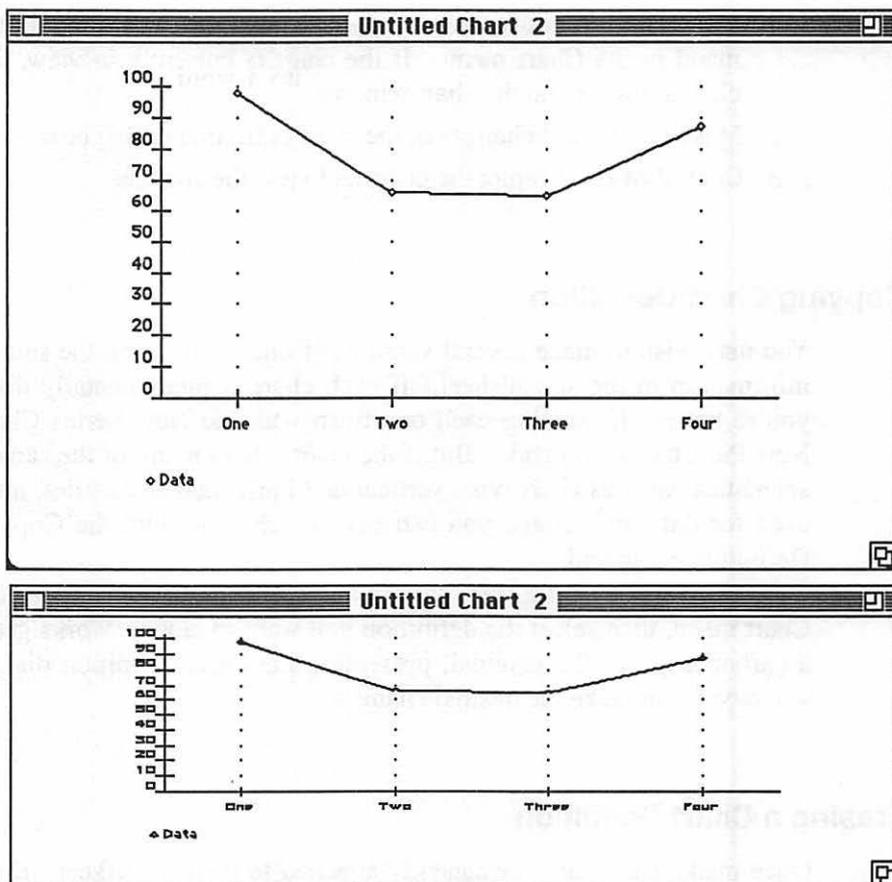


Figure 5-31 Normal and Stretched Charts with Window

chart into severe distortion by making the chart window extremely tall or wide, as shown in Figure 5-31.

Revert to the full size of the window by double-clicking on the chart window title bar.

Printing a Chart

Works provides a rudimentary method of printing charts. With the desired chart on the screen, simply choose the Print Window from the File menu. The chart is printed in the size and proportion as displayed on the screen.

Copying and Pasting a Chart

Most often, you'll want to paste a chart into a word processor or spreadsheet document, and use the chart to illustrate a point or summarize a set of numbers. Works lets you copy the entire chart only, but once you paste the chart into the destination word processor or spreadsheet document, you can only edit it with the Draw tools.

To copy a chart, view it, then choose the Copy command from the Edit menu (or press **Command-C**). Open a new word processor or spreadsheet document, or activate an already open window, then choose the Paste command from the Edit menu (or press **Command-V**).

Works pastes the entire chart as a single, grouped object. Draw is turned on automatically if it is not already on. Use the Selection Arrow to move the chart into position on the page. Add at least a half-page worth of blank lines when pasting a chart into an empty word processing document. The blank lines let you see more of the document than just the current window.

Later in this chapter using the Draw tools to edit Works charts is discussed.

ORGANIZING DATA ON THE SPREADSHEET

Although you can prepare charts from information located anywhere within Works, the program initially assumes that data is placed in specific cells. You can use this feature to more quickly format and prepare data and charts.

Initial Pie Chart Data Location

When you create a new graph, Works assumes that data for pie charts is located in the rows and cells indicated below:

<i>Data</i>	<i>Initial Location</i>
Plot values	Column B, rows 3 to 7
Value titles	Column A, rows 3 to 7

Figure 5-32 shows one way to organize data in a spreadsheet prior to generating a pie chart. Cells A1 and A2 contain a chart title and annotation; cells A3 to A7 contain value titles, and cells B3 to B7 contain plot values. Works automatically assumes you will always be creating pie charts with five segments. If you have more or less, you need only to change the notation in the Through Row edit box in the chart definition dialog.

Untitled (SS)						
	A	B	C	D	E	F
1	Sample Chart	Jan	Feb	Mar	April	May
2	For First Five Months					
3	Division 1	65	76	87	43	87
4	Division 2	76	65	56	76	56
5	Division 3	65	45	87	56	45
6						
7						
8						
9						
10						

Figure 5-32 Full Formatting of Data for Pie Chart

Initial Series Chart Data Location

When you create a new graph, Works assumes that data for series charts is located in the rows and cells indicated below:

Data

Plot values

Data legends

Horizontal titles

Initial Location

1st Row: 3, from columns B to M

2nd Row: 4, from columns B to M

Column A, rows 3 and 4

Row 1, from columns B to M

Works automatically assumes you will always be creating series charts with two sets of data with 12 data points each. Change the numbers in the 2nd, 3rd, and 4th row edit boxes, depending on whether you are plotting one, two, three, or four series or sets of data. If you have more or less than 12 data points, change the notation in the To Column edit box in the chart definition dialog.

Transposing Data Between Rows and Columns

If you know you'll be creating a chart with the data you're entering into the spreadsheet, supply that information in the proper format.

- Pie charts expect plot values and value titles in columns.
- Series charts expect plot values and titles in rows, and data legends in columns.

If the data you want to plot is not in these formats for the chart type you want to use, you can easily convert it with the Transpose option. Transpose takes a range of numbers and inverts them so that columns become rows, and rows become columns.

To transpose a range of cells:

1. Select the cells with the mouse.
2. Press **Command-X** to cut them from the spreadsheet and enter them into the Clipboard.
3. Click on a cell to establish the upper-left corner of the new, transposed range.
4. Choose the Paste With Options command from the Edit menu.
5. Click the Both Values and Formulas option.
6. Click the Transpose option, and press the OK button.

Works fills the cells with the transposed range, starting from the cell you previously selected.

Be aware that cells pasted with Transpose will overwrite other cells that still have data in them. Be sure the paste range is large enough to accommodate all of the cells, or you could lose valuable data.

EDITING CHARTS WITH DRAW

The Works Draw tools provide a convenient method of editing spreadsheet charts. All of the elements of charts are individual graphic or text objects that can be manipulated with the Draw tools.

To edit charts with Draw, you must first copy and paste the desired chart into a word processor or spreadsheet document, as detailed earlier in this chapter. When pasting a chart, Works automatically turns Draw on. The chart is pasted as one grouped picture, to make it easier to position within the document. Be sure that you don't ungroup the chart before you place the chart in the desired location on the page.

Some points to remember:

- You should avoid straddling the chart over two pages, since that will cut the graphic in two when the document is printed.
- If the graphic is too large or too small, resize it by one of the handles that appear on the right or bottom edges. Remember that only the graphic elements of the chart are resized, not the text. Resizing a chart may disrupt its appearance, causing misalignment of the text and graphic portions. If you need a larger or smaller chart, resize the chart window *before* copying the chart.

Once the chart is sized and positioned the way you want it, you can ungroup it. Ungrouping allows you to edit the individual graphic and text

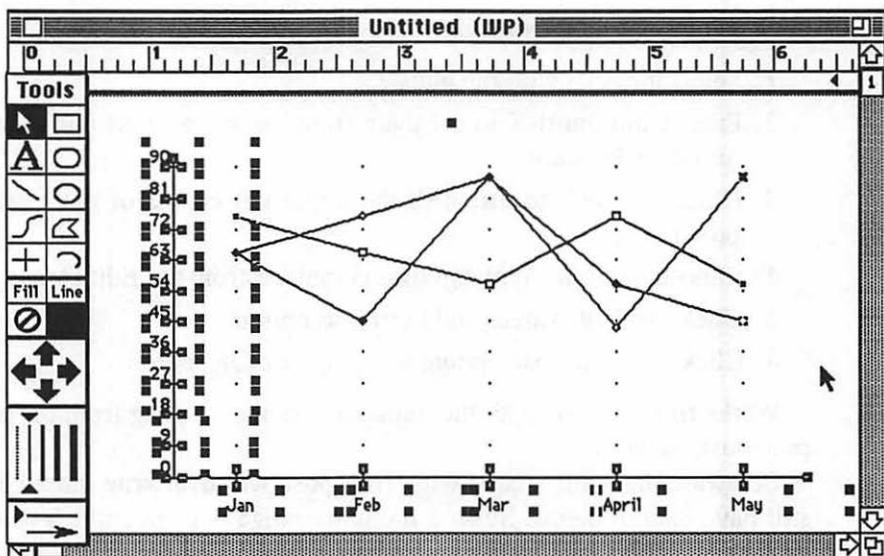


Figure 5-33 *Ungrouped Chart*

elements. To ungroup the chart, select it, then choose the Ungroup Picture command in the Format menu.

A typical ungrouped chart is shown in Figure 5-33. Notice that the chart includes an invisible “background” box that corresponds to the border of the chart window. The size and shape of this box is the same as the chart window when you originally copied the chart. You can do a number of things with the background box:

- Fill the box with a distinctive pattern. Choose a pattern carefully or the rest of the chart may be hard to see.
- Fill the box with white. This blocks any text in the word processor or spreadsheet document that appears under the chart. This is most helpful in blocking the grid lines in the spreadsheet.
- Change the border of the box to solid black or a pattern. This puts a visible box around the chart.
- Erase the box altogether.

Use the Draw tools as detailed in Chapter 3 to delete or edit the graphic and text objects of the chart. You can change the font and size of text, for example, by selecting each text object and choosing a new font/size from the Format menu. Changing axis labels may alter their alignment to the chart, so you may wish to first select and group the labels together, then alter the font and size. Reposition the entire group to realign the text to the chart.

Tick marks and background grid marks are made from small segments of lines (in fact, the background grid marks are short, one-pixel lines that appear as dots). These are almost impossible to edit, so you may want to leave them alone, or simply create new ones from scratch.

Use the cursor arrows on the keyboard or in the Tool Palette to nudge chart objects by small amounts. This technique is particularly helpful when working with small pieces, like tick marks.

Once the chart is edited as desired, select all of the graphic and text objects, then group them together with the Group Picture command. Recheck the position of the chart in the document, and move it into a better position if required.

ENHANCING CHARTS

Some charts beg for exotic treatment. You can use the Draw tools to make 3-D column and pie charts, add illustrations to nearly any kind of chart, substitute the columns in a column chart with symbols, and lots more.

Making a 3-D Pie Chart

By duplicating a two dimensional pie chart and placing the copy over, but to one side of the original, you can achieve a striking 3-D effect. You should add the 3-D before you place the text and legends on the graph. To start, position the chart where you want it, then ungroup it. Then:

1. Group just the slices of the pie chart (no text), then copy and paste the chart. Slide the duplicate to an open area of the drawing.
2. Make sure the duplicate is selected, then choose the Send to Back command from the Format menu. This pie is now the underside—the bottom crust—of the chart.
3. Slide the bottom crust under the original. Align the top and bottom crusts for the perspective you desire. Figure 5-34 shows you how the orientation of the two crusts affects the perspective of the graph.
4. Add connecting lines between the crusts to connect the slices. Depending on the pattern you used to fill the slices, you will achieve good results by using a thin line width. When heavy line widths are used on angled lines, they tend to become thicker than straight lines and borders made with the same line width.
5. When finished, group the entire pie and add the text. Figure 5-35 shows an example of a completed 3-D pie chart.

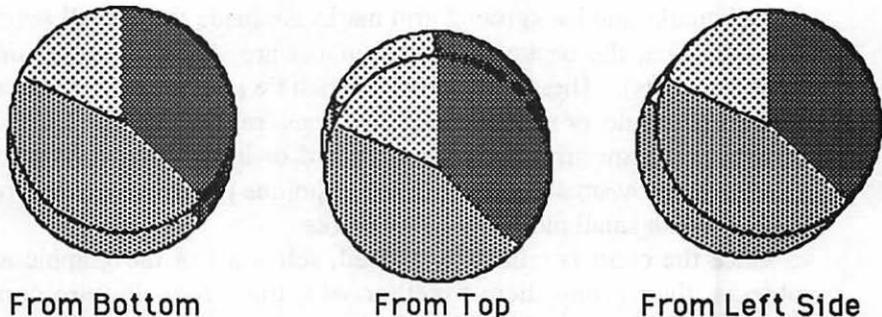


Figure 5-34 Pie Variations with Two Crusts

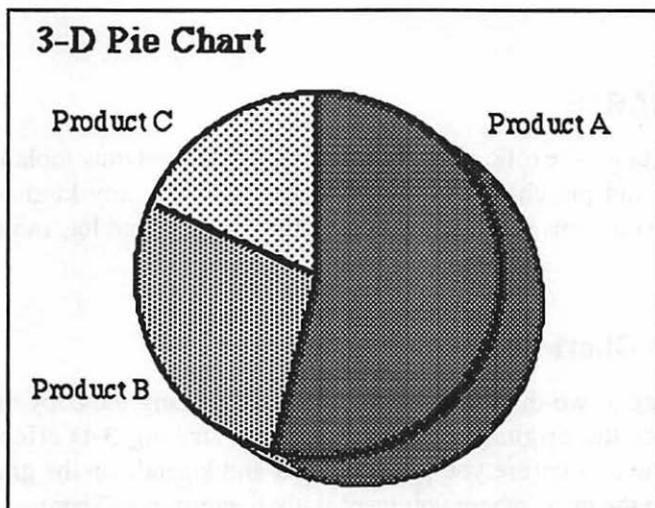


Figure 5-35 Completed 3-D Pie

Exploding a Pie Slice

You can readily pull one or more slices from the pie to make an exploded pie chart. Attention is drawn to the exploded piece (or pieces). To start, position the chart where you want it, and ungroup it. Then:

1. Remove the outer circle that surrounds the pie slices. Make sure you select and delete just the circle, and not any of the slices themselves.
2. Pull out the slice you want to explode. Don't drag the slice too far from the rest of the pie.
3. If desired, you can add borders around the unexploded slices in the pie by selecting each one, then choosing the solid black pattern from the Line Pattern menu.

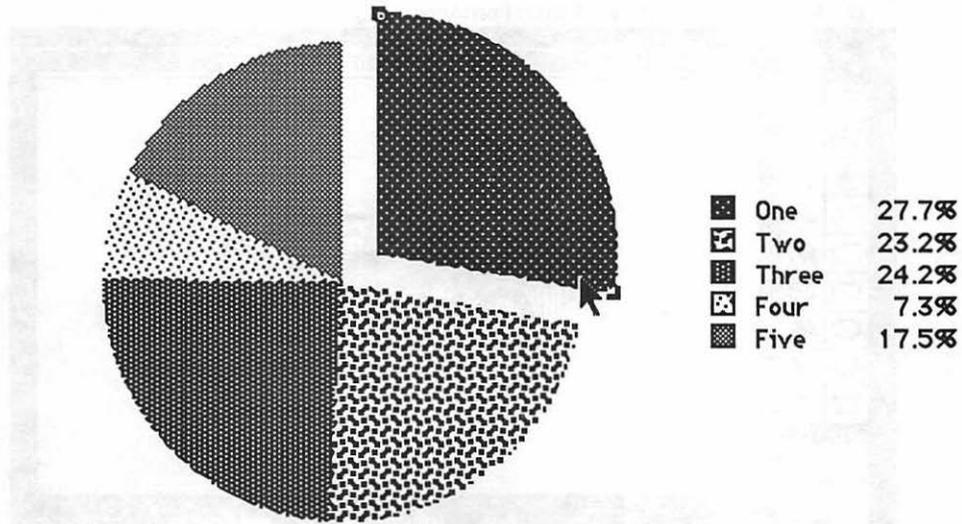


Figure 5-36 *Finished Exploded Pie Chart*

4. You can also add a border around the exploded slice by selecting it, then choosing the solid black pattern. Only the outside arc of the slice is bordered; to add a border to the inside wedge, select the polygon tool and carefully draw two lines around the outside edge of the wedge.
5. Group all of the segments of the pie chart together.

A finished exploded pie chart is shown in Figure 5-36.

Adding Illustrations to Line or Column Charts

An illustration added to a line or bar chart can help tell your story. Imagine a sketch of a newspaper behind a chart of increasing newspaper sales. Your message is more quickly grasped and your chart looks more interesting.

You can use just about any kind of illustration for your chart. The best illustrations are simple and undecorated; you don't want the picture to overshadow the graph. The illustration is placed behind the graph—an underlay. With creative use of Draw you can place the illustration anywhere—even make the chart part of the illustration.

Illustrations used for underlays should be the same size or smaller than the graph. If the chart is to be laser printed, the illustration should be object-oriented. Bit-mapped pictures are not adequately smoothed by the LaserWriter, and the picture will look jagged in comparison to the smooth contours of your Draw chart. Also, the LaserWriter tends to stretch bit-

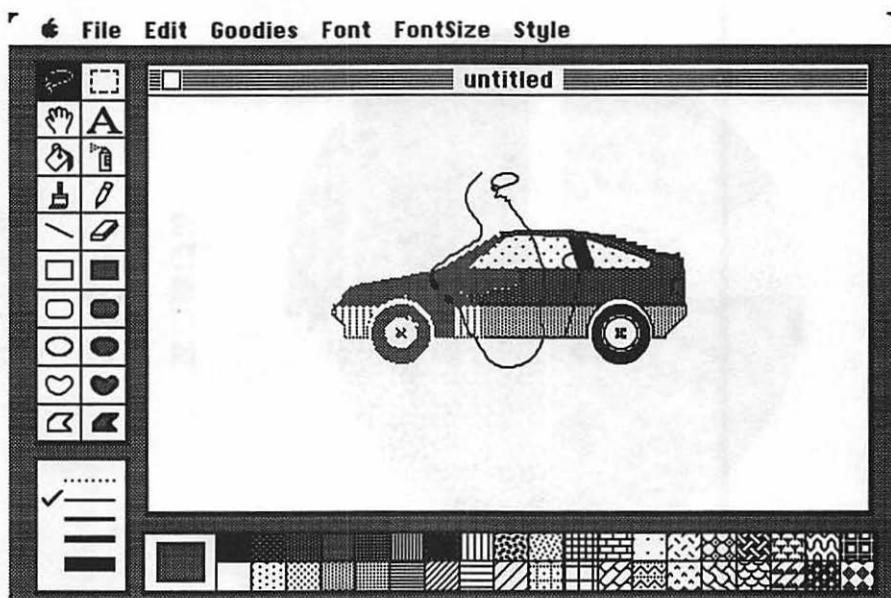


Figure 5-37 *Dimming in MacPaint*

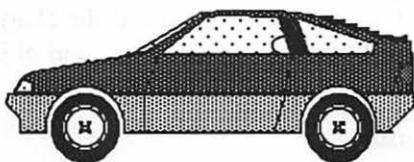
mapped pictures when printed with Works, so the image on the screen may not be exactly what you see on paper. With some experimenting, however, you can adjust the size and position of the graph and picture until you get the right effect.

The underlay picture should also be lighter than the chart. If the picture has heavy black areas, the chart will be harder to read. When working with a bit-mapped picture, you must first “dim” it to a lighter gray. Do this in the paint program, such as MacPaint or SuperPaint. One effective way to dim images in MacPaint is to lasso portions of the picture and fill (using the Fill command from the Edit menu) using a gray pattern (see Figure 5-37).

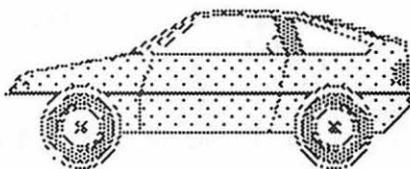
Dimming is easier with an object-oriented graphic. In Works Draw, select the picture, then choose gray patterns in the Fill Pattern and Line Pattern menus. If the fill pattern is too light, some lines and borders may disappear. Figure 5-38 shows a Draw graphic before and after dimming. The 50 percent gray fill and pen patterns were used for dimming.

With the underlay picture prepared and properly “dimmed,” copy it and paste it with the chart document. Choose the Send To Back command from the Format menu. That will place it behind your chart.

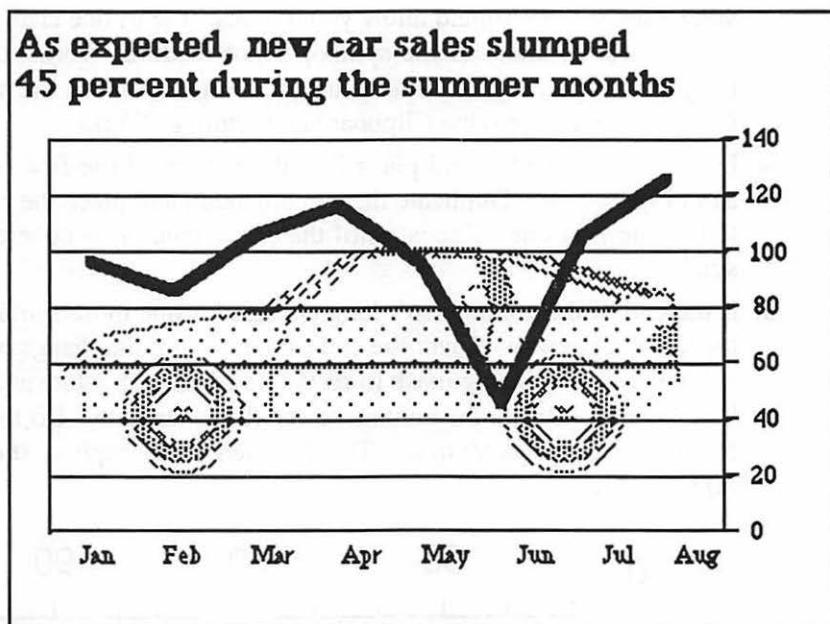
Slide the picture so that it rests under the chart, as shown in Figure 5-39. Drag the picture or chart until the two line up the way you want. If the picture is object-oriented, you can resize it to better fit the chart. If the picture



Original Draw Art



"Dimmed" Draw Art

Figure 5-38 *Dimmed Draw Graphic*Figure 5-39 *Chart with Underlay*

is bit-mapped, you should not resize it or it may be grossly distorted. Adjust the size of the chart to match the picture. After resizing the chart, rearrange the text to match.

Designing a Pictograph

A pictograph uses symbols to represent the columns of a column chart. The symbols used instead of the column help to convey the message of the chart. For example, population charts, as shown below, often use people symbols. The type and variety of symbols you use are completely up to you, and the symbol can change for each column.

For the maximum effect, however, the symbols should be simple and

immediately recognizable. The symbols can be made with Works Draw or with a bit-mapped painting program, such as MacPaint. If the chart is laser printed, the best results are achieved when using Draw-created objects. To develop a pictograph:

1. Create the column chart as usual.
2. Copy and paste the chart into a blank word processing or spreadsheet document.
3. Elsewhere in the document, create the symbol you want to use. The size of the symbol should allow you to place at least one character on the shortest column. If the symbol is not made in Works, quit the program temporarily, start the paint program, and create the symbol. Copy the symbol into the Clipboard and return to Works.
4. Duplicate the symbol and place it at the bottom of the first column, as in Figure 5-40. Duplicate the symbol again and place the copy on top of the first one. Repeat until the entire column is covered with symbols.
5. If the end of the column isn't long enough for one more symbol, add the symbol anyway. Cover the end of the symbol that hangs over the column with an erasing mask (a rectangle filled with white and white line pattern). Delete the column rectangle underneath. Do the same for the remaining columns. The finished pictograph is shown in Figure 5-41.

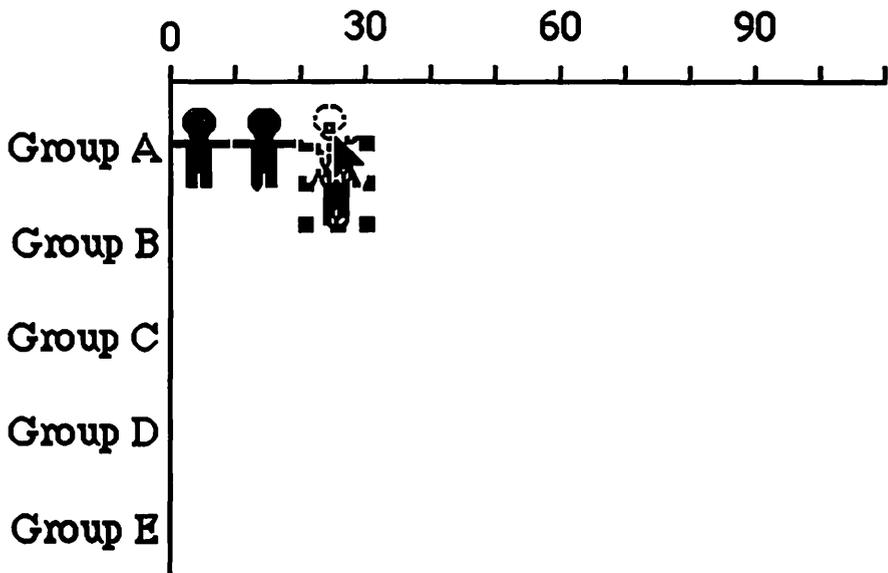


Figure 5-40 *Pasting Symbol*

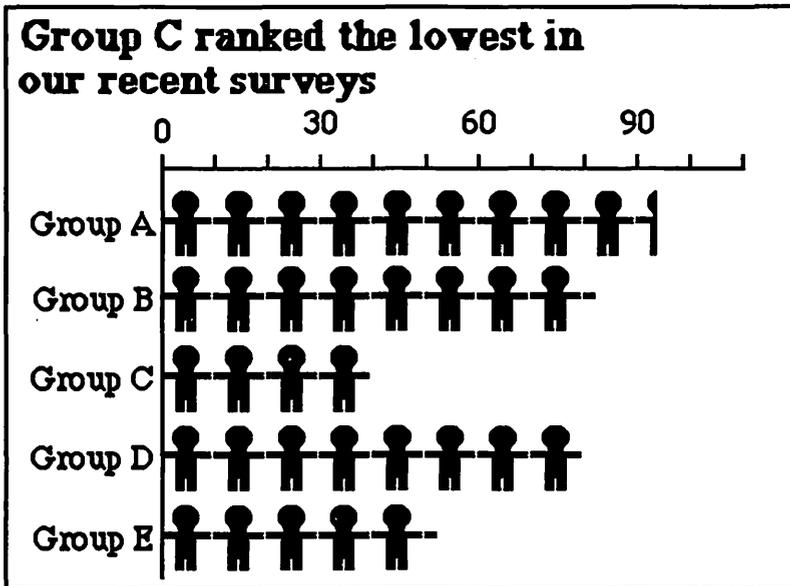


Figure 5-41 *Finished Pictograph*

Creating a Chart “Blank”

Sometimes, you may wish to create a chart entirely from scratch in Works. You can produce a chart blank—just the background and no text or chart elements—then use this blank to generate your own chart, such as an area chart, a dot chart, or a bar chart. To create a blank, open a new spreadsheet document, and choose the New Series Chart command from the Chart menu. Select the desired chart type (line, column, etc.), and click the Plot It! button. Copy the blank and paste it into a word processing or spreadsheet document.

Keeping Tabs on Data

The American Heritage Dictionary defines the word *data* as, “information, especially information organized for analysis or used as the basis for a decision.” Computers are ideally suited for both organizing and analyzing data, in ways far faster and more efficient than any one human could ever hope to achieve.

The Works database module lets you enter those tidbits of information that are so important in your life or work, organize them so you can find facts and figures more quickly, and even analyze your data to show trends, directions, and strategies. There are limits to what the Works database can do, of course, but you’ll find it ideally suited for such applications as payroll, inventory tracking, and client listings.

In this chapter, you’ll learn how to harness the power of the database module and make it work for you. And you’ll discover that a number of the most useful shortcuts and capabilities of the database module are ignored in the Works manual.

DATABASE BASICS

Figure 6-1 shows an empty database window (with the one, obligatory field column). The main components of the database are:

- The rows that denote records.
- The columns that denote fields.
- The edit bar (the Enter and Cancel icons are only present when entering data).

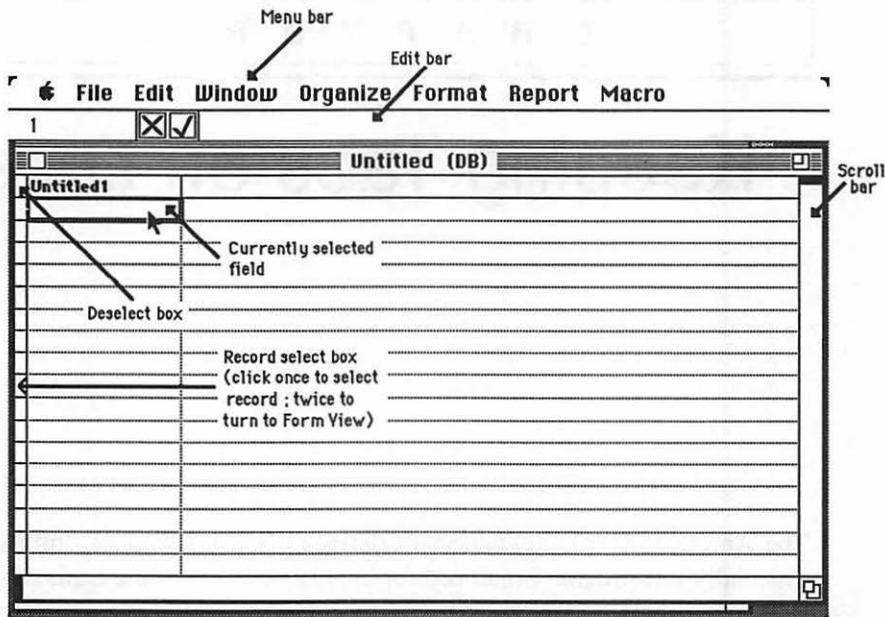


Figure 6-1 *Empty Database Window, with Callouts*

- The scroll bars, for moving through a database larger than one screen (unlike the Works spreadsheet, the scroll bars do not appear when the database is confined to one screen only).
- The menu bar, on the top of the screen, to let you issue various commands.

USING THE DATABASE

Entering and editing information in the list view of the database is identical to the way it's done in the spreadsheet. Therefore, the techniques for moving the current cell selection, entering data, and editing data won't be repeated here. (Chapter 4, "Spreadsheet Strategies," has more information on the topics of moving the cell selection, using the mouse, the role of the Enter and Return keys, and selecting multiple cells.)

Navigating in Form View

The form view of the database employs a slightly different approach to moving between fields and records. The Return, Tab, and Down arrow keys all will move you down the fields of the same record. When you reach the

bottom field, Works moves to next record. Conversely, pressing **Shift-Return**, **Shift-Tab**, or the **Up** arrow moves you up through the fields. The currently selected record number is shown in the left edge of the edit bar.

If you want to move to a new record quickly, one way is to click the up and down arrows in the vertical scroll box. You may also move to different records by pressing the following keys:

<i>Press This</i>	<i>To</i>
Command-Return	Move to next record select, top field
Command-Enter	Move to next record, select same field
Command-Shift-Enter	Move to previous record, select same field
Escape	Deselect all fields

To select the first record, click any field in the Form window, then drag the vertical scroll bar all the way up. The record number will show **1**, indicating you are viewing the first record of the database.

Conversely, to select the last record, click any field in the Form window and drag the vertical scroll bar all the way down.

There may be many times you wish to select a certain record in Form view and switch to List view, keeping the same record selected. This is possible if you select the record by clicking once in the selection box at the far left of the record, then double-clicking in the same spot.

The Form view is easiest to use when entering new records in the database. After filling all the fields in one record, pressing the **Return** or **Tab** key automatically starts a new record, and the first field in the record is selected for you.

Navigation in List View

If you are using the List view to enter new records, press the **Tab** key to move from one field to the next in a record, as well as to start a new record. Pressing the **Return** key moves you down through the field columns, but only within the existing records of the database.

KEYBOARD AND MOUSE SHORTCUTS

The Works database provides a number of helpful keyboard and mouse shortcuts that can save you time. In addition to the **Command-Key** shortcuts detailed for the database module in Chapter 1, Works offers the following shortcuts you can execute with the mouse and keyboard. **Note:** Some shortcuts depend on the current view of the database, either List or Form.

<i>Shortcut</i>	<i>Database As List</i>	<i>Database as Form</i>
Select all fields in a column header	Click in column	None
Select all fields in a record header	Click in row	None
Select all fields in active part of database	Choose All Cells from Edit menu	None
Set field formatting	Double-click in cell	Double-click in cell
Resize a field	Drag left edge of column in field header	Drag left edge of field box
Move a field	Drag middle of column in field header	Drag middle of field box
Delete field contents	Press Delete key; then Return	Press Delete key; then Return
Delete field column	Select field in field header, choose Delete Field command in Edit menu	Select field, choose Delete Field command in Edit menu
Change field name	Double-click in field header; enter new name	Double-click on field name; enter new name
Delete record	Click once in row header; choose Cut from Edit menu	None
Delete just contents of record (leave blank cells)	Click once in row header; choose Clear from Edit menu	None
To duplicate entry from previous record	Press Command-' and Enter (when in destination field)	Press Command-' and Enter (when in destination field)
Enter current date	Press Command-D	Press Command-D
Enter current time	Press Command-T	Press Command-T

In addition, you can quickly switch from List view to Form view with the following double-click shortcuts:

- From List to Form view: Double-click anywhere in the row header. This is the same as choosing the **View Form** command from the **Format** window, or pressing **Command-L**.

- From Form to List view: Double-click anywhere in a blank portion of the form. This is the same as choosing the View List command from the Format window, or pressing **Command-L**.

DATABASE CONCEPTS

The Works database is actually a specialized form of the spreadsheet. It consists of a number of cells laid out in row and column format. As with many spreadsheet-oriented databases, the individual cells are fields for recording data. One field contains one piece of information.

The rows of the database comprise records. Each record is a complete set of data on a particular person, product, or thing. Each person recorded in your database, for example, will occupy a row of his or her own. The columns represent specific fields. One column may be the Last Name field, another the Telephone field, and so forth. See Figure 6-2 for a graphic illustration of the field/record concept.

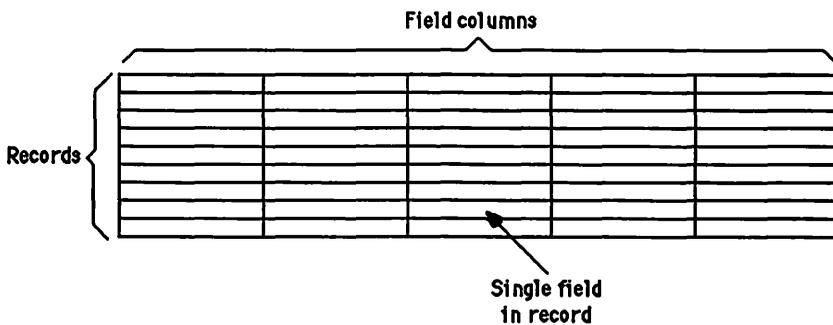


Figure 6-2 *Concept of Fields and Records*

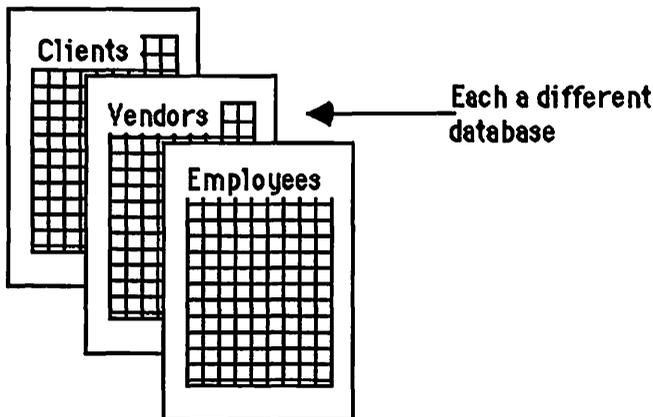


Figure 6-3 *Concept of Different Databases*

All the fields and records of a particular Works file comprise one database. You can have as many different databases as you like, each organized in ways that best suits your needs, data, and application. For instance, one database may be a list of clients, another may be a list of vendors, and a third may be a list of employees, as shown in Figure 6-3. In each case, the data contained in the three databases will be different.

Field and Record Limits

Works supports up to 60 fields (or columns) per record (or row). That should be enough for most applications. There is no limit to the number of records in a single database, other than the maximum amount of RAM in your computer. Realistically, a Mac with one megabyte of RAM can support a database roughly 12 fields by 150 records. More memory means more records per database. Remember that each field can contain up to 250 characters; the more characters per field, the faster the database is filled up, no matter how many fields or records you've added.

One Database, Two Views

The Works database can be viewed in one of two ways: as a spreadsheet list, such as the format described above, or as a form. You choose which one you want from the Format menu. When viewed as a form (see Figure 6-4), the fields of the database are displayed in a single window on the Mac screen. You see all the fields in one record.

The form view is helpful when adding new information to the database. It's particularly well-suited to those familiar with Works, as it presents a rather simple view of the entire database. You'll want to view the database as a list, however, when you are sorting the records or copying data.

The form view can contain just one screen. If you have lots of fields, you may not be able to fit them all on the screen at once. As you'll see later in this chapter, you can alter the size and placement of the fields in the form at will.

Although there are two views of the database, the data is interlinked. Changes you make to data or field names in one view are immediately reflected in the other. However, the organization of the fields in the form window have no relation to the organization of fields in the list window.

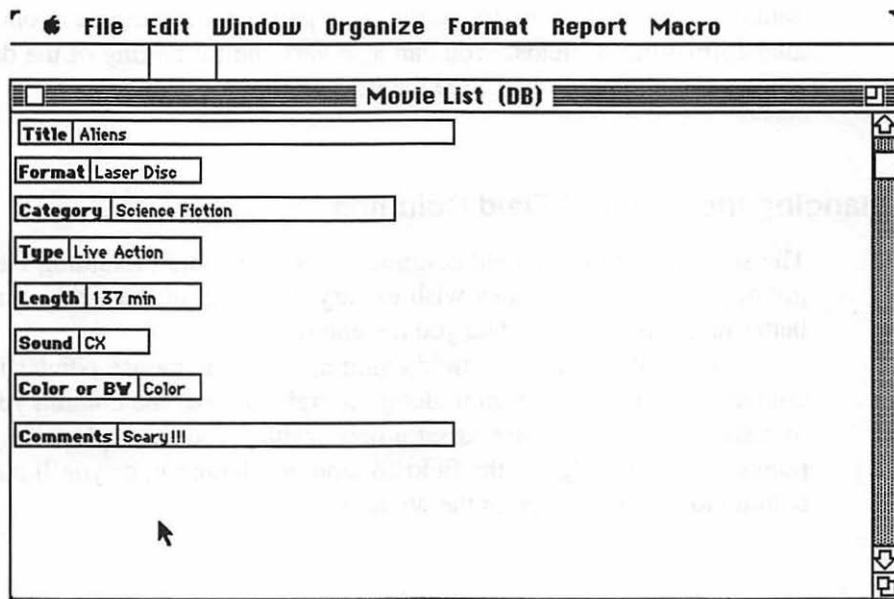


Figure 6-4 *Form View of Database*

STARTING A NEW DATABASE

A database must have at least one field column, so when you start a new database by double-clicking the Database icon in the Open File dialog box, Works displays a Field Name prompt on the screen. Simply provide a name to the field (or leave as Untitled for now), and do one of the following:

- Click the **Done** button if you are finished adding field columns to the new database. You can add field columns at any time, so there's no need to provide extra in case you need more later.
- Click the **Add Field** if you want to add another field column. Name that field as before, then click either **Done** or **Add Field**, as desired.

Works ordinarily displays the database as a list. To view the database as a form, choose the View Form command from the Format menu. To switch back to the list window, choose the View List command.

DATABASE FORMATTING IN LIST VIEW

Works lets you tailor the appearance of the database while viewing it as a list. You can change the width of field columns, rearrange fields, add hori-

zontal and vertical splits (to see different parts of the database at once), and alter formatting of fields. You can also vary the formatting of the database while viewing it as a form. See the next section for details.

Changing the Width of Field Columns

The standard width for field columns is 19 characters (assuming Geneva 9 point, plain font). You may wish to vary the width of the field columns to better match the form of data you are entering.

To change the width of a field column, move the mouse pointer into the column header and position it along the right edge of the column you want to resize. Drag the mouse to set a new width. You must place the mouse pointer along the edge of the field column, not within it, or you'll move the column to a new position in the window.

Rearranging Fields

You can easily rearrange the field columns in a Works database, as shown in Figure 6-5. Move the mouse pointer into the column header and position it along the middle of the column you want to resize. Drag the mouse until the outline of the column is located where you want it.

Title	Format	Category	Type	Color	Length	Sound
2001: A Space Odyssey	Laser	Science Fiction	Live Action	Color		
84 Charing Cross	Laser	Comedy	Live Action	Color		
Alien	Laser	Science Fiction	Live Action	Color		
Aliens	Laser	Science Fiction	Live Action	Color		
American Tail	Laser	Children	Animated	Color		
Animal House	Laser	Comedy	Live Action	Color		
Back to the Future	Laser	Comedy/Science Fict	Live Action	Color		
Beverly Hills Cop	Laser	Comedy	Live Action	Color		
Blade Runner	Laser	Science Fiction	Live Action	Color		
Blazing Saddles	Laser	Comedy/Mel Brooks	Live Action	Color		
Body Heat	Laser	Drama	Live Action	Color		
Christmas Story, A	Laser	Comedy	Live Action	Color		
Cinderella	Laser	Children	Animated	Color		
Close Encounter of th	Laser	Science Fiction	Live Action	Color		
Crocodile Dundee	Laser	Comedy	Live Action	Color		
Day the Earth Stood	Laser	Science Fiction	Live Action	BW		
Destination Moon	Laser	Science Fiction	Live Action	BW		
Diner	Laser	Comedy	Live Action	Color		

Figure 6-5 Rearranging Field Columns

Renaming Fields

Even if you named your fields when you first set up the database, you can rename them at any time. Simply double-click in the field column header, enter a new name, and press **Return**.

Splitting Windows

The Works database window may be split once vertically and once horizontally.

- To split the window vertically (across the middle), drag the split bar located in the far left of the vertical scroll bar.
- To split the window horizontally (down the middle), drag the split bar located at the top of the horizontal split bar.

While split, the scroll bars present two sets of arrows and thumb boxes. Use them independently to move each side of the split as desired. Splitting windows is helpful when you need to view the left edge of the database (listing customer name, for example), while entering cells far to the right, as shown in Figure 6-6.

To remove the split, drag the split bars back to their original positions. The split bars won't appear if the database is smaller than one window.

Title	Format	Type	Color	Length	Sound	Comments
2001 : A Space Odys	Laser	Live Action	Color			
84 Charing Cross	Laser	Live Action	Color			
Alien	Laser	Live Action	Color			
Aliens	Laser	Live Action	Color			
American Tail	Laser	Animated	Color		CAV	
Animal House	Laser	Live Action	Color			
Back to the Future	Laser	Live Action	Color			
Beetle Juice	Laser	Live Action	Color			
Close Encounter of th	Laser	Live Action	Color			
Crocodile Dundee	Laser	Live Action	Color			
Day the Earth Stood	Laser	Live Action	BW			
Destination Moon	Laser	Live Action	BW			
Diner	Laser	Live Action	Color			
Dr. Detroit	Laser	Live Action	Color			
Dr. No.	Laser	Live Action	Color			
Dr. Strangelove	Laser	Live Action	BW			
E.T., The Extra-terr	Laser	Live Action	Color			
Earth Vs the Flying S	Laser	Live Action	BW			

Figure 6-6 Use of Split Windows

Field Formatting

The fields of a database may be formatted in a number of different ways. You have full control over:

- Field type
- Computed/non-computed field
- Numeric display
- Alignment
- Style
- Number of decimal places
- Font
- Size
- Color

All cell formatting is made through the commands available under the Format menu.

Setting Fonts Database data can be displayed in any font currently installed in the System file of your hard disk or Works disk. The selected font affects *all* of the fields in the database. Setting a smaller or larger font changes the amount of information that is shown in one screen.

Setting Size Each font can be displayed in sizes ranging from 4 to 72 points. The selected font size affects all of the fields in the database.

Setting Color You may set a different color for the text in each field with the Color command. The normal setting is Black.

Setting Field Attributes Each field column (but not each field) may contain its own unique attributes, or formatting. The Set Field Attributes dialog box, shown in Figure 6-7, provides a number of options from which to choose. As a shortcut to the Set Field Attributes command, you can access the dialog box simply by double-clicking on any field in the field column you want to reformat.

Should you wish to change the format of many field columns at once, select them all and use the Set Field Attributes command. Even though you may double-click on a single field, changes you make affect the *entire* column.

Set Field Attributes For Color or BW			
Type:	Display:	Align:	Style:
<input checked="" type="radio"/> Text	<input type="radio"/> General	<input checked="" type="radio"/> Left	<input type="checkbox"/> Bold
<input type="radio"/> Numeric	<input type="radio"/> Fixed	<input type="radio"/> Center	<input type="checkbox"/> Underline
<input type="radio"/> Date	<input type="radio"/> Dollar	<input type="radio"/> Right	<input type="checkbox"/> Commas
<input type="radio"/> Time	<input type="radio"/> Percent	<input type="checkbox"/> Decimal Places	
<input type="radio"/> Scientific			
<input type="checkbox"/> Computed	<input type="checkbox"/> Show Day		
		<input type="button" value="Cancel"/>	<input type="button" value="OK"/>

Figure 6-7 *Set Field Attributes Box*

DATABASE FORMATTING IN FORM VIEW

The Form view offers many of the same formatting capabilities as detailed above, but the procedure for modifying the look of the database form is different. You have the same formatting options as in List view except for setting split screens.

Changing the Width of Field Boxes

Field boxes in Form view are normally nine characters wide (assuming Geneva 9 point, plain). To increase or decrease the width of a field box, position the mouse pointer over the right edge of the box, as shown in Figure 6-8, and drag it.

Rearranging Fields

To move a field box anywhere in the Form window, position the mouse pointer over the box (the pointer turns into a hand), and drag to a new position. Both the field name and entry box are moved together.

As described earlier in this chapter, pressing the **Return** key or **Down** arrow key steps you from one field box to another. The order in which Works selects the next field box as you press the **Return** or **Down** arrow keys is determined not by the order in which you created the fields, or their order in the List window, but a simple top-to-bottom, left-to-right sequence.

At least 50 percent of the field box must be in line with the field immedi-

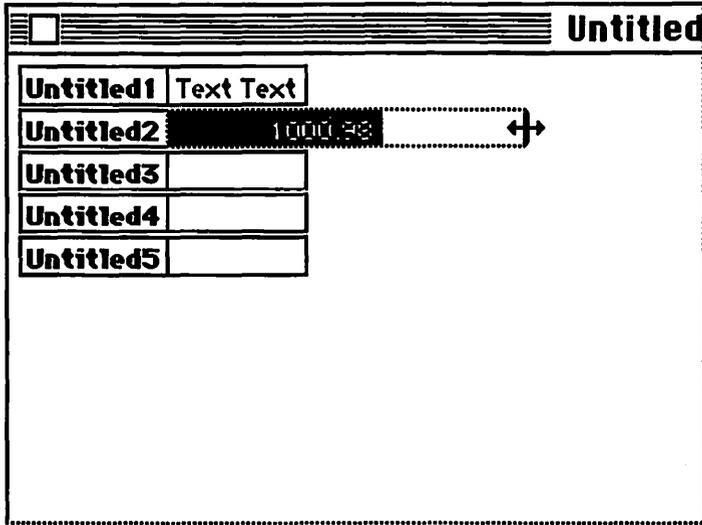


Figure 6-8 Changing Width of Form Field Box

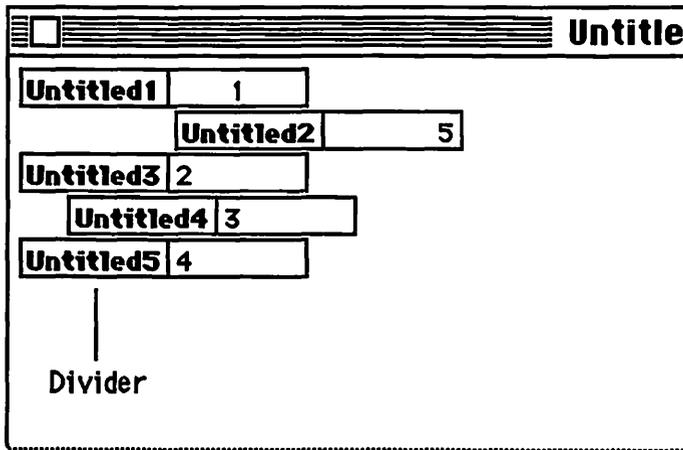


Figure 6-9 Alignment of Boxes in Form Window

ately above it, as shown in Figure 6-9, or Works will skip it and proceed to the next field box below. The skipped field box gets its turn as the program works its way left to right across the form window.

Renaming Fields

Fields are renamed in Form view in much the same fashion as List view. Double-click on the name in the field box, and provide a new one.

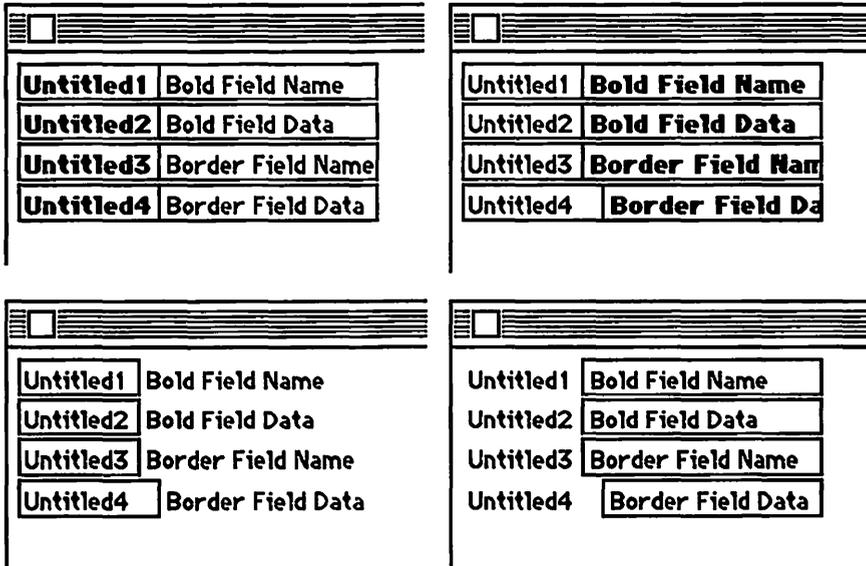


Figure 6-10 *Example of Formatting Commands*

Field Formatting

Formatting for the text in fields, as well as the field name, is controlled with options in the Format menu. You have the same field formatting options as detailed in the previous section, plus:

- **Bold Field Name.** This command in the Format menu lets you turn bold on and off for the field name.
- **Bold Field Data.** This command in the Format menu lets you turn bold on and off for data you enter into the field.
- **Border Field Name.** This command adds or removes the border around the field name.
- **Border Field Data.** This command adds or removes the border around the field data.

Examples of using these field formatting commands are shown in Figure 6-10.

REPETITIVE ENTRY

Some database information repeats from record to record; for example, zip codes for people who live in the same town. There are a number of ways that you can quickly duplicate field information:

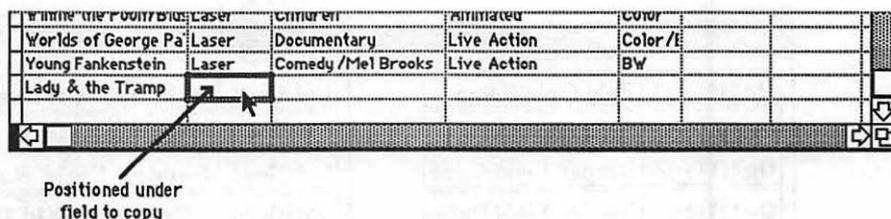


Figure 6-11 *Selecting Field for Copying*

To copy a field from the previous record:

1. Select the field in the record immediately following the field you want to copy, as shown in Figure 6-11.
2. Press **Command-?**. Note that the contents of the previous record field are shown in the edit bar, where you can modify it, if necessary.
3. Press the **Enter** key.

To copy one or more fields from the previous record:

1. Select the fields of the record you want to copy.
2. Press **Command-C** to copy the field contents into the Clipboard.
3. Select the first field of the destination record.
4. Press **Command-V** to paste in the copied fields.

You can also use this technique to copy one or more fields from multiple records.

Remember that Works erases any old contents of fields when new data is pasted in from the Clipboard. To avoid losing work you've spent time on, remember to add blank records in the database to accommodate the pasted material.

USING SPREADSHEET FUNCTIONS FOR THE DATABASE

The Works database lacks a fill down command where you can quickly enter a number of formulas, and have them copied into succeeding fields in the column. Such a command could be used to create a number series—the digits 1 through 10 in one of the field columns, for example—and would enable you to easily and automatically number the records of your database, helpful in keeping track of record numbers, invoices, and entry orders.

You can, however, use the Works spreadsheet to provide the same result as a fill down command in a database. Open a new spreadsheet document, enter a value or formula into one cell, then select it, along with a series of cells below it (see Figure 6-12). Choose Fill Down from the Edit menu, and

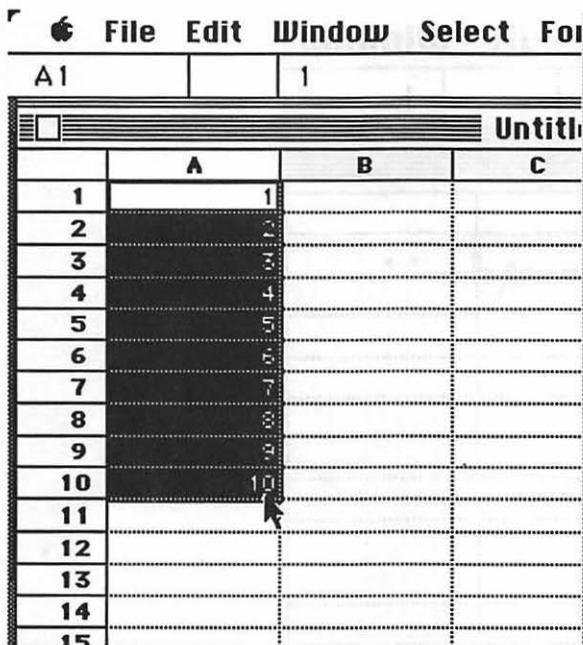


Figure 6-12 Using Fill Down in Spreadsheet

Works copies the contents of the first cell into the other selected cells. With the cells still selected, press **Command-C** to copy the cells to the Clipboard, switch to the database, and paste the values in at the desired spot.

If you'd like to create a number series, follow these simple steps:

1. Switch to a new spreadsheet document.
2. Select cell A1, and enter the number 1.
3. Select cell A2, and enter the formula: **=A1+1**.
4. With cell A2 still selected, select two or more empty cells in the same column. These cells will contain the filled data. For example, to produce a number series of 1 to 10, select cells A2 to A10.
5. Choose the Fill Down command from the Edit menu.
6. Select all the cells in the column, and press **Command-C**.
7. Switch to the database document, and set an insertion point for the start of the number series, as shown in Figure 6-13.
8. Press **Command-V** to paste in the numbers.

Other spreadsheet functions can be put to good use as well. For example, you may wish to use the more advanced formula features of the spreadsheet (the database repeats the same formula for each row).

You may find it necessary to create the basic data in the database first,

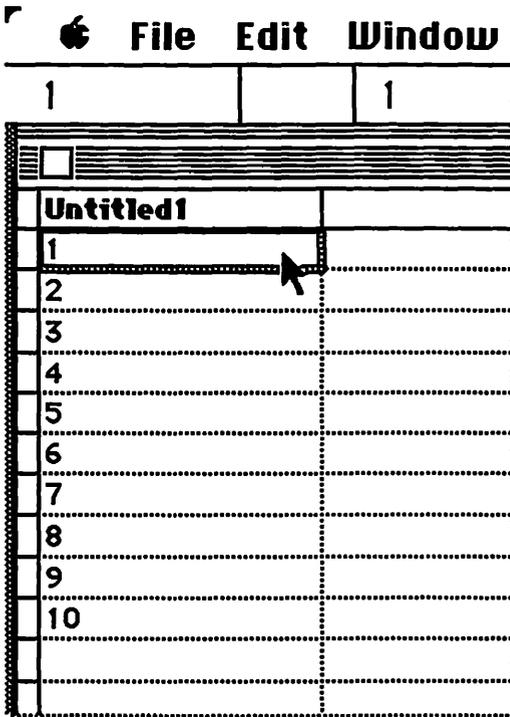


Figure 6-13 *Pasting Number Series in Database*

transfer it to the spreadsheet, manipulate it there, then copy it back to the database. Be aware that when you copy database fields, the titles for field columns are included, **UNLESS** you hold down the Option key while pasting. You should use the Option key method when transferring data between database and spreadsheet, and back again, to avoid copying and pasting the field column titles.

The Option key method works when using the Paste command from the Edit menu, or with the paste command keyboard shortcut, **Command-V**.

SORTING

Works provides a convenient method of sorting records. Works sorts only by record, so if you want to rearrange the field columns, you must do so manually using the technique described earlier in this chapter.

Unlike the Works spreadsheet, Works sorts all the fields of a record, not just the fields you have selected. That prevents you from jumbling a database you have spent hours creating.

How to Sort

To sort a set of records, first identify which field column you want to use as the “sorting key.” The sorting key determines which field column Works will use to sort either alphabetically or numerically. For example, if you use the field column that contains the last names of your clients, Works will sort the database alphabetically by last name.

Click the column you want as the sort key; there is no need to select specific rows to sort (Works will sort ALL records regardless). Then:

1. Choose the **Sort** command from the Organize menu.
2. Click the sort order you desire, in either ascending or descending order. Works senses the type of data contained in the field column, and offers you the choice of selecting alphabetical, numerical, or chronological (for dates and time).
3. Click **OK** to initiate the sort.

Numbers are sorted with the smallest negative number to the largest positive number (assuming ascending order). There is no difference between accented, upper-, and lowercase letters.

Setting Multiple Sort Keys

The database module does not offer sort on more than one field column at a time. But you can duplicate multiple-key sorting with this simple routine:

1. Identify the field columns you want as sorting keys.
2. Decide which columns take precedence over the others; that is, the field column for last names is more important than the field column for ZIP codes.
3. Select the column of least precedence first, and sort by it.
4. Select the next column of least precedence, sort by it.
5. Repeat the process until all field columns are sorted.

USING COMPUTED FIELDS

A computed field is a field that holds a spreadsheet-like formula. Database fields are normally set up to accept just text or numbers. If you want your database to be semi-intelligent, you can assign the calculated field attribute to a column (you must assign the entire column as computed fields; you

Scores (DB)			
Population	Income	GNP	Total
92	97	1.23	189.00
91	92	4.32	183.00
89	91	2.39	180.00

Figure 6-14 Sample Calculated Field

can't set just one field as computed).

To set computed fields for a column:

1. Select the column.
2. Choose the Set Field Attributes command from the Format menu.
3. Click on the Numeric option (alternatively, you can also click the Date and Time options if you plan on using dates and times in your calculations).
4. Click the Computed option to place a check in the box, then click the OK button.

Calculated fields accept either numbers or formulas. Formulas take the same form as in spreadsheets, but lack cell references. To build a formula in a database, you refer to the name of the field column (such as **=Population+Income**, shown in Figure 6-14). The formula is placed in its own column. "Population" and "Income" are headings for field columns, and contain numbers. The formula adds the contents of the Population fields with the contents of the Income fields.

You enter the formula only once for an entire column of fields, and Works automatically copies the formula to all the fields in the column. The database works only with relative references. Each field in a calculated column refers to the contents in its own row.

You can use most of Works' built-in spreadsheet functions with the database, except:

- IRR
- MIRR
- HLookup
- VLookup
- Index
- Match

Furthermore, those functions that require a range of cells in the spreadsheet work only with single references in the database. These are:

- Statistical functions: Average, Count, Max, Min, SSum, StDev, Sum, and Var.
- Financial functions: FV, NPV, Pmt, PV, and Rate.
- Logical functions: And, Choose, If, IsBlank, and Or.

As with spreadsheet formulas, Works updates the numerical values in calculated fields whenever you change the numbers in the rest of the database. You can “lock down” values in computed fields by converting them back to standard fields.

1. Click the column.
2. Choose the Set Field Attributes command from the Format menu.
3. Click on the Computed option to remove the check mark, and click the OK button.

You can't clear or cut (using the Clear and Cut commands from the Edit menu) the contents of calculated fields (exception: when the fields have been formatted as Time or Date, instead of Numeric). If you need to delete the fields, turn the Calculated Field option off first.

SEARCHING AND MATCHING DATA

Part of the work of any database is sifting through the data and finding information for you. The Works database offers three ways to search for data:

- Finding Single Records—Finds a single record with a field that matches a string of characters.
- Matching Records—Finds all records with fields that match a string of characters.
- Matching Records with Selection Criteria—Finds all records with fields that meet specific criteria.

Finding Single Records

The Find Field command in the Organize menu searches the entire database for any field that contains a certain set of characters. You enter the characters to search in the dialog box that appears when you choose the Find Field command, as shown in Figure 6-15. The Search Text Fields Only

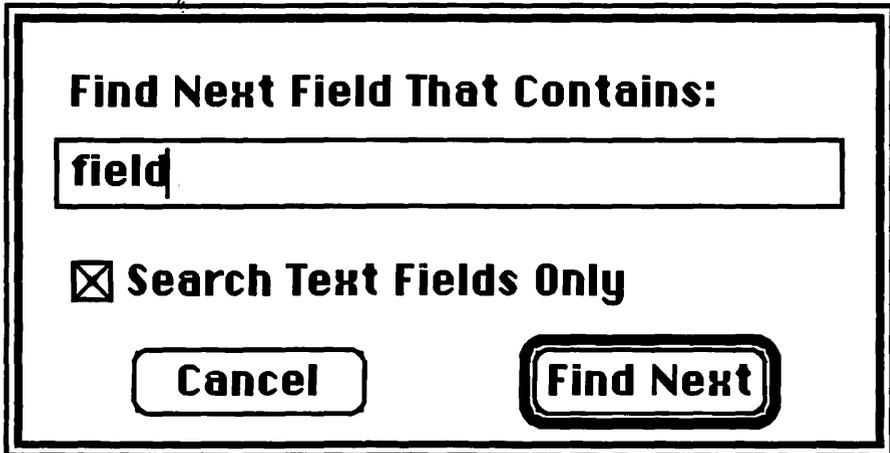


Figure 6-15 *Field Search Dialog Box*

option skips Numeric fields; it makes searching through a database with many Numeric fields quicker.

Works will repeat the search, using the same character string you previously entered, by choosing the Find Field command again. You can search through a database to find all matching fields by using the **Command-F** and **Return** keys. Press **Command-F** (for the Find Field command), then **Return** to accept the character string you previously entered. Works prompts you when it can't find any more occurrences of the string.

Matching Records

If you know the database contains many instances of the character string you are looking for, and you want to find them all at once, use the Match Records command (also in the Organize menu) instead.

Enter the character string you are looking for in the dialog box, as described above for the Find Field command. Works then finds only those records that contain fields with the character string you specify, and displays only them instead of the entire database. Of course, the original database is still there; to return to the database, select the Match Records command again.

The Match Records command is particularly helpful when using the database with the merge printing features of the word processor. You can use Match Records to find only those records that conform to a certain criteria, like ages, ZIP codes, or cities. If you want to keep a permanent record of the matches, save them in a separate file, and use that file for merge printing. More specifically:

1. Select the Match Records command.
2. Choose the Save As command.
3. Enter a new name for the file, but before clicking Save...
4. ...Click the Save Selected Records Only option.
5. Click Save.

Both the Find Field and Match Records commands find fields (anywhere in the database) that contain the character string you are looking for, even if the string is part of a larger number or word. For instance, if you are looking for the number 92, Works will match 92, 922, 192, 1922 and other variations. Use the selection criteria method if this is not acceptable.

In addition, the Find Field and Match Records commands are not case sensitive, so they will find all occurrences of *the*, even if the word appears as *THE*, *The*, or another form.

Matching Records with Selection Criteria

Matching records with selection criteria makes use of the record selection feature of the Works database. With selection criteria (discussed in more detail in the next section), you have much more control over the record matching. For example, you can find all records that DON'T match the selection criteria, or only records that match exactly—92 and NOT 922, 192, or 1922.

USING DATABASE RECORD SELECTION CRITERIA

The Record Selection command in the Organize menu presents the “thinking” portion of the Works database. With Record Selection, you can ask Works to find specific entries for you, excluding some and including others.

Record Selection makes use of selection “rules,” which are rules you impose on Works to locate and display only the information you want. Though most selections will contain only one rule, you can assign up to five rules at a time.

The rules are used with field names, which appear on the left side of the Record Selection dialog box; the rules appear on the right. To impose a rule, select a field name and the appropriate rule, such as **Name** for the field and **Does Not Begin With** for the rule.

Finally, enter in the Record Comparison Information box the specific text or numeric value that you want the rule to apply to, such as “Smith.” The rule just established says, “Name Does Not Begin With

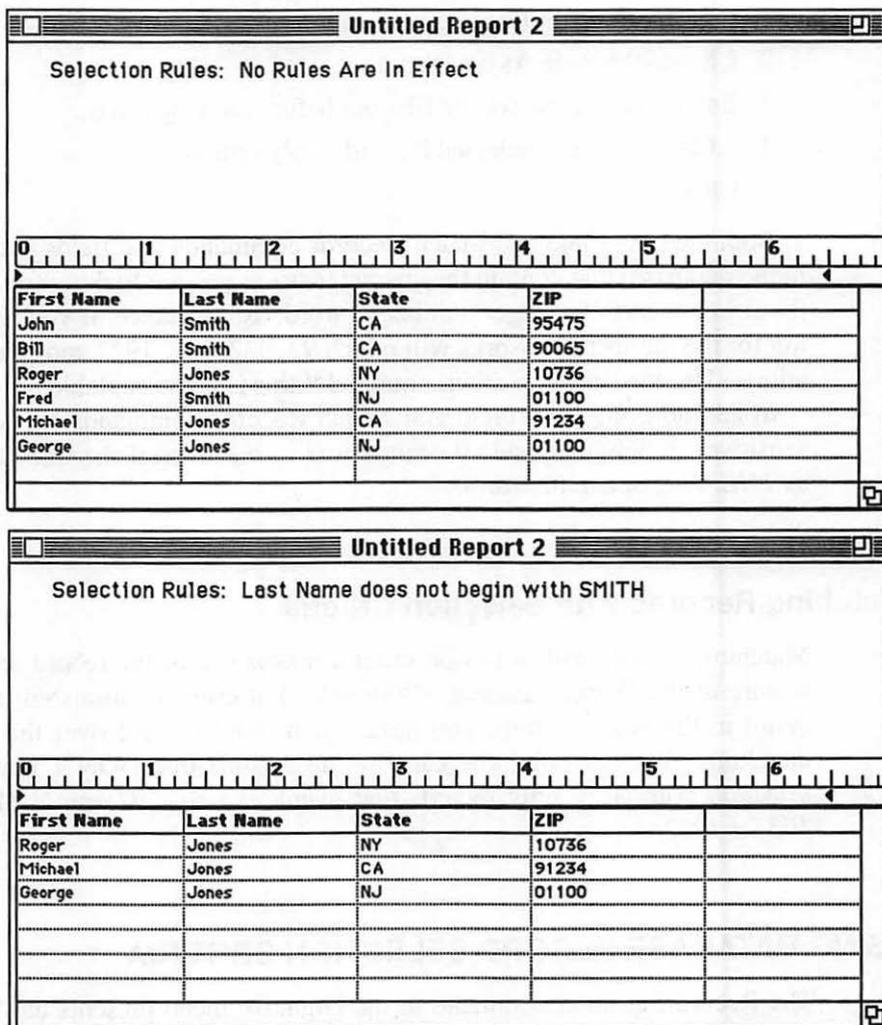


Figure 6-16 Sample of Before/After Database with Records

Smith.” When you press the Select button, Works will find all records where Smith does not begin the entry in the Name field. An example is shown in Figure 6-16.

Works offers 14 rules, all of which can be used to compare against numbers, but only eight to compare against text, as shown here.

Rule	Works With Numbers	Works With Text
Equals	X	X
Contains	X	X
Begins With	X	X
Is Greater Than	X	
Is Greater Than or Equal To	X	
Is Less Than	X	
Is Less Than or Equal To	X	
Is Not Equal To	X	X
Ends With	X	X
Does Not Contain	X	X
Does Not Begin With	X	X
Does Not End With	X	X

In addition, two special purpose rules check to see if a particular field is empty or not. The Is Blank and Is Not Blank rules can be used with either numeric or text fields.

Once a selection has been made, Works presents the records it has found in the database window. This window looks identical to the main database, but only lists those records that meet the criteria you have set up. To return to the original database, choose the Show All Records command from the Organize menu.

You may wish to record the record selections you make for future reference. You can do so by making a report of the record selection. Reports are record selections that you can save along with the database file. You can “attach” up to eight reports to any one database file, and access them through the Report menu, where you can duplicate them or delete them. The Works manual provides sufficient information on using the Works database report feature, so it won’t be repeated here.

Using AND and OR

AND and OR are concepts used in logic, including the inner workings of the Macintosh computer. Works uses AND and OR (which are technically called “Boolean Expressions”) as *connectors*, ways to add two or more rules to one selection.

- The AND connector used between two rules forces Works to find only those records that conform to BOTH rules. If the record fails either rule, it does not pass the test. Of course, if more than two rules are

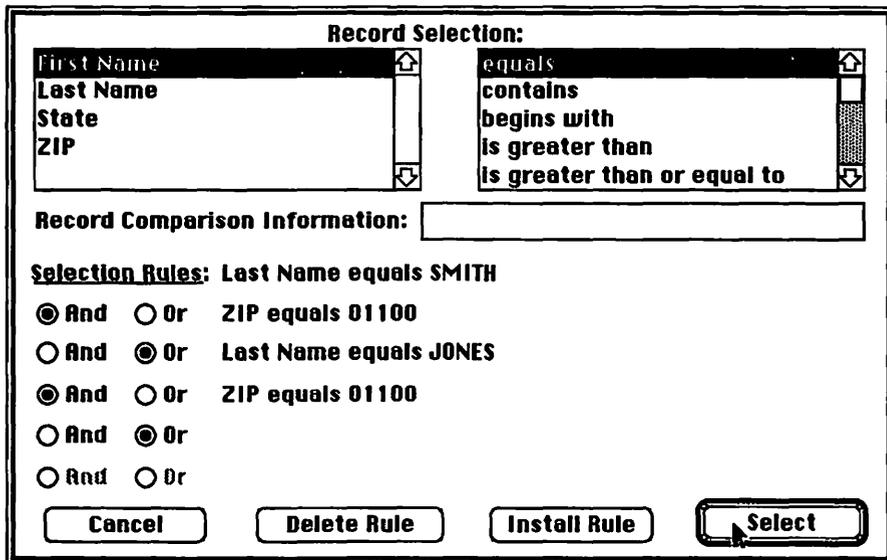


Figure 6-17 Record Selection Box with Smith/Jones Rules

used, and each one is separated by an AND connector, then ALL rules must be met, or the record fails.

- The OR connector used between two rules enables Works to match records that meet EITHER of the rules (or both). When more than two rules are used, with each one separated by an OR connector, the record passes if it meets even one rule.

You can, if you wish, use a combination of AND and OR connectors to develop a set of rules to find very specific information in your database. For example:

Field	Rule	Information	Connector
Name	Equals	Smith	Or
Name	Equals	Jones	And
ZIP Code	Equals	01100	

This combination of rules finds records with Smith OR Jones in the Name field, but only if the ZIP code field equals 01100. The Record Selection dialog box for this rules set is shown in Figure 6-17.

Saving Record Selections

Works keeps track of only one record selection at a time, unless you develop the selection as a report (choose New Report from the Report

menu, then choose the Record Selection command from the Organize menu). As a report, you can create up to eight record selections, and choose among them at will. Remember that Works attaches records with the database file, so when you save the database, you also save any records you may have created.

Reports Feature and Relational Database

A relational database is one that uses a “core” of records, and many ancillary database documents that access those records. When you add or change records in one database document, the core is changed so the information is simultaneously updated for all other database documents that use those records.

Works is not a relational database, but its reports feature closely mimics one. The basic database file is the core of records you keep on your clients, friends, projects, or other information you are tracking. Each report is a different selection of that same data. One report may show clients that live on the East Coast, another those who live on the West Coast.

Works doesn't allow you to edit or sort records when viewing them in reports, but you can print reports for future reference. You can also reposition field columns in each report, and adjust printing margins to include only those fields you want in the printout.

SAVING DATABASES AS EXPORT FORMAT

Most of the database documents you create you'll save in Normal format. But Works also lets you save in Export or Text-only format. This allows you to trade complete databases with the word processing and spreadsheet modules of Works, or with a completely different application.

Before clicking the Save button to record a database onto disk, click the Export button in the Save or Save As dialog boxes. You can additionally choose to save only those fields and records currently selected. Use this feature to save records for merge printing, for example.

OPENING TEXT-ONLY FILES

The Works database doesn't take much for granted when opening files saved in Text-only format (such as those created when you click the Export option). To open a Text-only document:

1. Click the database icon in the Open Files dialog box.
2. Click the Export option at the bottom of the dialog box.
3. Choose the file you want to open and double-click on it.
4. In the dialog box that appears (as shown in Figure 6-18), select how the text is to be converted into database record/field format.
5. Click OK; Works converts the file to database format.

The Separate Database Fields dialog box provides three options for formatting the file for the database module.

- *Tabs*: Each tab starts a new field. A new record starts when Works encounters a return (new paragraph) character.
- *Spaces*: Two or more spaces start a new field. A new record starts when Works encounters a return (new paragraph) character.
- *Return*: A return (new paragraph) character starts a new field, and a new record. You can specify the number of fields contained in each record.

SYLK files should not be opened by the database module. All you get is gibberish. If you accidentally open a SYLK file, just close it without saving and open another.

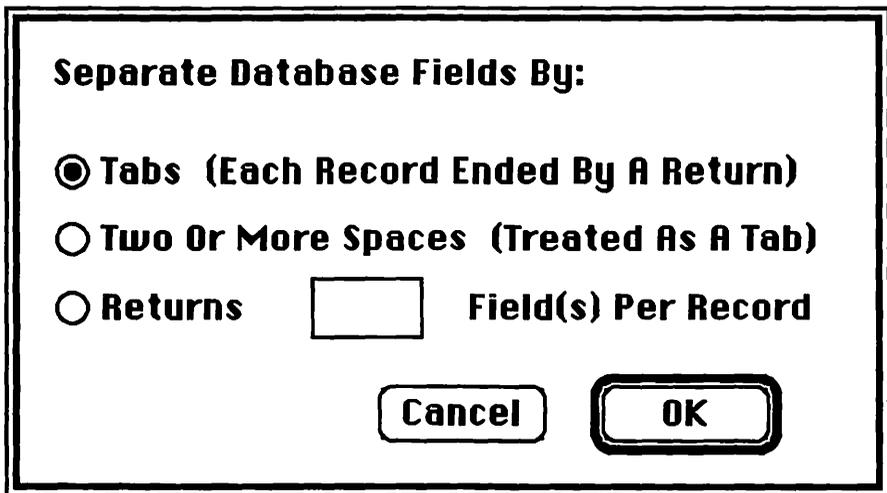


Figure 6-18 *Import Text Conversion Dialog*

Communicating with Works

Name three important inventions over the past 150 years, and you're apt to say the television, the automobile, and the telephone. It's the last innovation, the telephone, that has particular importance to personal computer owners.

With a modem attached between your computer and the household or office telephone lines, you can contact computers worldwide, and tap into their vast resources and capabilities. Among the possibilities:

- Chat with friends and associates electronically.
- Obtain up-to-the-minute Dow Jones stock reports.
- Make plane reservations to anywhere in the world.
- Receive free or nearly free public domain and Shareware software.
- Contact your office computer while you're at home or away on a long-distance trip.

This chapter covers telecommunications from start to finish, including the basics of modems and communications standards, setup and operation of the Works communications module, and manual operation of your modem to make it do what Works alone can't.

ABOUT COMPUTER COMMUNICATIONS

For years, audiences gathered at the local cinema to watch their favorite stars on the silver screen. But when television came along, the idea of having a cinema at home was even more appealing. Despite the lack of many

television stations to beam programs into homes, television sales rose sharply after World War II.

Like the television, the Macintosh was designed to be more personal. Computing brings number crunching close to those sitting behind the keyboard. Rather than one large computer serving the needs of many—the neighborhood cinema—why not an army of small computers, one on each desk.

There are times, however, when the Macintosh (and all personal computers, for that matter) suffers from provincialism. It needs input from other computers to complete a task, or to perform a calculation, or to make a decision.

Fortunately, the design of the Mac is such that connecting two of them together—for the purpose of sharing data—is not an extremely difficult task. It doesn't matter if the other computer is one mile or one thousand miles away; the techniques and the results are the same.

Modem Basics

Modems are used to connect two distant computers, for the purpose of sharing data, programs, or both. This connection is most often made through standard two-wire telephone lines.

Most modems attach to the computer via an RS-232C serial port. They are powered by one of three possible sources: the electricity flowing through the telephone line (about minus 6 volts when the phone is off the hook), a separate AC power cord, or an internal battery.

Modems connect to the telephone in one of two ways: directly or acoustically. *Direct-connect* units run in-line between the telephone wall jack and the telephone instrument. Most direct-connect modems available today can be programmed to place and answer calls, and are aptly designated “smart” modems. Most smart modems are *Hayes “AT” compatible*, using the same “AT” command set as the popular Hayes models. This compatibility assures that the modem will work with a variety of software, including Works.

Acoustic-connect modems, which are no longer made in any quantity but sometimes available as close-out merchandise, cannot dial or answer the phone. Direct-connect modems have a pair of rubber cups that accept the handset of a standard desktop telephone. Acoustic-connect modems are generally used when you can't tap directly into the phone line—with a public phone, or a telephone in a motel room.

Connecting a modem to your computer and phone isn't enough to establish a communications link. Your computer must be told it's having a con-

versation with another computer, for which a communications program is needed. At one end of the spectrum are simple software packages that instruct the computer to send and receive data, and nothing more. At the other end are sophisticated *terminal* programs that let you save the data received by your modem, or command a smart modem to dial the phone or answer a call. The Works communications module belongs to the second group, though it is not as refined as some stand-alone terminal programs.

Modems transmit and receive data at a variety of standard speeds, all expressed in *baud* (the term baud is often used interchangeably with *bits per second*, or *bps*, but the two are actually different; for our application, however, we'll assume they mean the same thing). The slowest standard speed is 300 baud, which roughly equals 30 characters per second. Most modems in use today operate at 1200 or 2400 baud (120 to 240 characters per second). To work properly, the modem on the other end of the phone line must be capable of sending and receiving data at the same speed.

Most modems have one of two operating modes: full-duplex or half-duplex. In *full-duplex* mode, the modem can receive and transmit data at the same time. In *half-duplex* mode, the modem receives or transmits, but not simultaneously. The Macintosh, and Microsoft Works, are designed for use with modems capable of full-duplex operation.

The two modems in a link send and receive data in two discrete sets of tones. These two tone sets are referred to as *answer* and *originate*. All modems sold today are capable of both answer and originate operations, but some older models operate in originate mode only. If you use such a modem, you must connect to a distant modem capable of answer operation, or the link cannot be established. With most smart modems, you can force them to operate in answer or originate mode, whether or not you initiate the call.

Using the Proper Cables

No matter what brand or type modem you use, it must connect to your Macintosh via a cable. This cable serves to route the signals between modem and computer, and the cable must be constructed so that it matches both the Mac and the modem you are using. The cable connectors on most modems follow a standard format. You are fairly assured of successful results with a standard Mac-to-modem cable, available at most computer dealers.

Note that different Macintosh models use two different connectors for the printer and modem jacks, and many modems use a third type of connector. The three connector types, as shown in Figure 7-1 are:

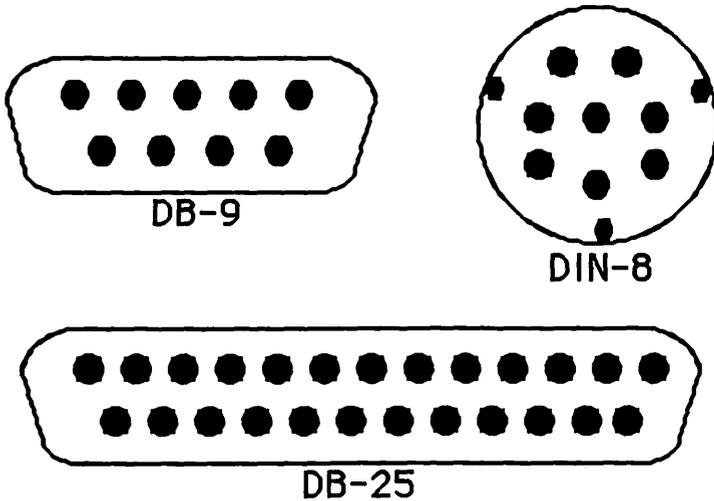


Figure 7-1 *Three Connector Types*

- *Mini-DIN* plug—matches the modem/printer jacks on the Mac Plus, Mac SE, and Mac II.
- *9-pin “D”* plug—matches the modem/printer jack on the original Macs, including the 512K, as well as the IBM PC/AT.
- *25-pin “D”* plug—used with many modems, and also the the IBM PC and most other personal computers.

Macintosh modems may use any of the three connector types detailed above. The cable you use must properly bridge the modem and Macintosh. Use suitable adapters, as necessary, to mate a mismatched cable to the Macintosh or modem.

Besides using the proper connector ends, the wiring of the interconnection between computer and modem must match. Why? Many modems require specific signals for proper operating. These signals are detailed in Table 7-1. The Macintosh does not provide some of the signals normally needed for modem communications, requiring instead that the interconnecting cable be specially wired to force proper operation. If you can't find the right cable for your needs, you'll need to make it yourself or have one made for you.

For example, some modems (particularly those designed to be connected to an IBM PC or other computer) require a DTR, or Data Terminal Ready, signal on pin 20 (assuming the modem is equipped with a 25-pin “D” connector). The Macintosh does not support this signal line; rather, the DTR line from the modem is permanently grounded when used with the Macintosh. Using a modem that requires the DTR signal with a cable that doesn't ground the line can cause the modem to hang up before calls are completed.

Pin	Function
1	Frame ground
2	Transmitted data
3	Received data
4	Request to send
5	Clear to send
6	Data set ready
7	Signal ground
8	Data carrier detect
9	Reserved
10	Reserved
11	Unassigned
12	Secondary data carrier detect
13	Secondary clear to send
14	Secondary transmitted data
15	Transmit clock
16	Secondary received data
17	Receiver clock
18	Unassigned
19	Secondary request to send
20	Data terminal ready
21	Signal quality detect
22	Ring detector
23	Data rate select
24	External transmit clock
25	Unassigned

Table 7-1 *Modem Signal Lines*

Typical connection diagrams for Hayes and Hayes-compatible modems appear in Figure 7-2. The ImageWriter cable—which has either a 9-pin “D” or Mini-DIN connector on one end, and a 25-pin “D” connector on the other—is not designed for modem use. However, this cable can often be used as a “null-modem,” for the purpose of directly connecting a Macintosh and IBM PC or XT together. There’s more information on null-modems and direct connections to other computers later in the chapter.

Communications Protocols

Works can send and receive data at six different speeds: 300, 1200, 2400, 4800, 9600, and 19200 baud. These speeds assume that the modems connected to the computers on both ends of the phone link can keep up with

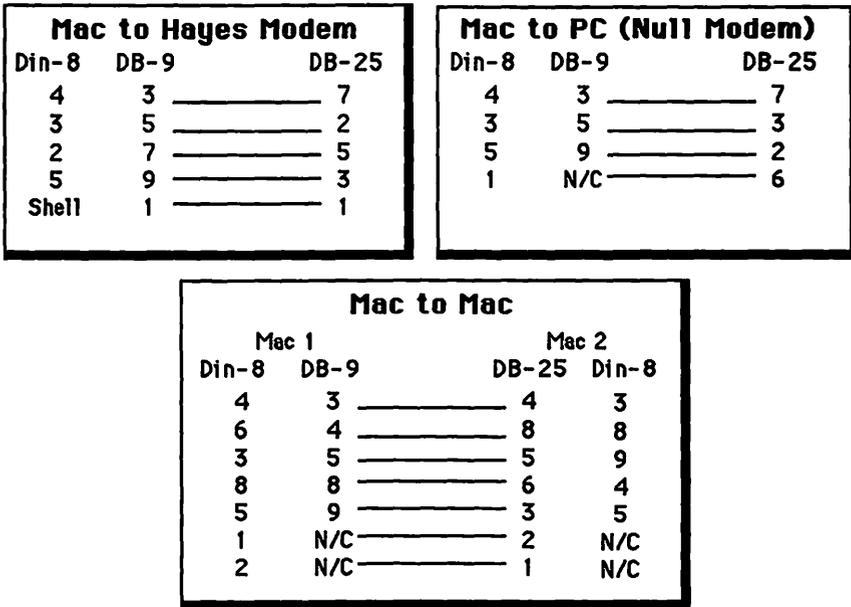


Figure 7-2 Typical Modem Connections

the data transfer rate. Most modems have top speeds of 1200 and 2400 baud. Of course, the speed limitation of the modem is not a consideration when transferring data directly from computer to computer, with no modem connected (see "Hard-Wired Transfers," later in this chapter). However, both computers must be capable of transferring data at the same speed.

Works is normally set up to operate at 1200 baud, but you can readily change the speed in the Settings window (either when Works communications module first starts, or by choosing the Settings command from the Communications menu). The choice of baud rate is dictated by the speed limitations of your modem, the speed limitations of the modem on the other end of the phone line, and the quality of the phone connection. Normally, you should select the fastest baud rate possible.

Syncing Up

Most modems for personal computers operate asynchronously. With asynchronous communications, the signals that tell the receiving computer when a new character begins are embedded within the data as *start* and *stop* bits, as shown in Figure 7-3. The transmitting and receiving computers are not synchronized to one another. This is the simplest form of modem communications, but it isn't always reliable.

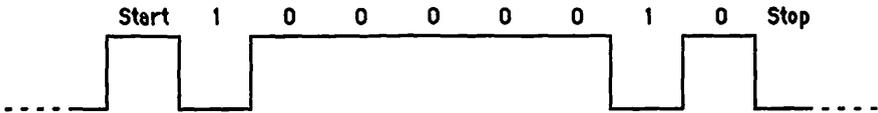


Figure 7-3 *Basic Serial Data Frame, with Start and Stop Bits*

Modems for larger computers, those most often used by corporations or professional database services, operate synchronously. With synchronous communication, which is less prone to error but can be slower overall, the transmitting and receiving computers are synchronized by the use of special timing signals.

A good number of 2400 baud and faster modems operate in synchronous or asynchronous mode, assuring you of being able to communicate with most computers. This is an added feature not found in most of the previous 300 or 1200 baud modems, even the expensive ones. If you're going to be contacting a variety of computers, synchronous operation is a good feature to have.

Modem Protocols

Modems transmit and receive data following standards developed by consultation groups from around the world. Two competing groups are Bell (part of AT&T), and CCITT, or Consultative Committee on International Telephone and Telegraph. The data transmission standards from these two groups are not generally compatible with one another. One standard is selected over another because of technical restrictions, capabilities, or cost.

Transmission standards for computer communications can be compared to standards for radio transmissions. An AM radio is designed to receive amplitude modulated (AM) stations; an FM radio is designed to receive frequency modulated (FM) stations. Only a radio capable of both amplitude and frequency modulation reception can receive both AM and FM stations. Table 7-2 lists the data transmission standards for the most often used baud rates. *Italicized entries indicate the data transmission standard used most often in Macintosh communications, whether in the United States or throughout the world.*

For any one baud rate, there are other standards used elsewhere in the world, so even though you may have a modem capable of 2400 baud transmission, it may not properly communicate with all 2400 baud modems everywhere. Nearly all commercially available modems for use in the United States conform to the CCITT V.22bis data transmission standard. This standard is also used by most 2400 baud modems, regardless of where they are used in the world.

The same isn't true of 300 and 1200 baud modems. Almost all 300 baud modems used in North America follow the Bell 103 standard. Likewise, almost all 1200 baud modems used in North America follow the Bell 212 standard. These two standards are used mostly in the United States, but see little application in other parts of the world.

Protocol	Data Rate	Synchronization	Line Type*	Usage
Bell 103	300	Async	Reg	N.America
CCITT V.21	300	Async	Reg	Europe/Japan
Bell 202	1200	Async	Reg	N. America
Bell 212	1200	Async/Sync	Reg	N. America
CCITT V.22	1200	Async/Sync	Reg	Europe/Japan
Bell 201	2400	Sync	Reg/Leased	N. America
CCITT V.22bis	2400	Async/Sync	Reg	All
CCITT V.26ter	2400	Async/Sync	Reg	All
Bell 208	4800	Sync	Reg/Leased	N. America
CCITT V.32	9600	Async/Sync	Reg	All
Bell 209	9600	Sync	Leased	N. America
CCITT V.29	9600	Sync	Reg/Leased	All

Table 7-2 *Transmission Standards*

* Line Type refers to Regular or Leased lines. Regular lines suffer from greater noise than Leased lines. This noise can prevent high-speed data transfer.

Data Transfer Protocols

Beyond data transmission standards are data transfer protocols. These protocols dictate how information is "packaged" before it is sent through a modem. By organizing the data in a specific way, communications programs can check for accuracy of the transmitted information.

Unlike data transmission protocols, which are determined by the electronics in the modem, data transfer protocols are determined by the communications program running on the computer. Microsoft Works accommodates three data transfer protocols: ASCII, XMODEM, and MacBinary.

The most basic form of data transfer is *ASCII*, a system where both computers send and receive each character one at a time. ASCII (pronounced "ask ee") transmissions are best suited for word processing documents, where you only want to send the words of a file, and not its various formatting instructions. In fact, Works only allows ASCII transfers to send regu-

lar word processing documents. With version 2.0 of Works, you cannot use ASCII data transfers for sending Text-only (Export) files, spreadsheet documents, or database documents.

Works, however, *does* let you receive ASCII Text-only documents from another computer. These files are then opened as export documents (within the word processor, database, or spreadsheet, as desired).

Another application of ASCII data transfers is chatting with other computers “on-line,” or accessing dial-up communications services such as The Source and CompuServe. What you type on the keyboard is instantaneously transmitted over the phone lines to the destination computer.

The *XMODEM* data transfer protocol dates back to the years before the Macintosh, when computers used the CP/M operating system and came with a whopping 64K of memory. Despite its age, *XMODEM* is one of the most versatile data transfer protocols around, and just about every communications program for any computer supports it.

XMODEM uses a system of sending data in discrete chunks, called blocks. Once transmitted through the phone lines, the *XMODEM* protocol then tests the electronic fingerprint of the blocks to ensure the data was received properly. If *XMODEM* detects an error, the block is sent again (Works allows 10 retries of the same block; if the transfer is still faulty after 10 tries, Works gives up and displays an error message). With Works—and other Macintosh communications programs—each *XMODEM* block contains 128 bytes of data.

The most common use of *XMODEM* is to send and receive data that must remain accurate and intact. These include spreadsheet and database files, where even one small error can totally corrupt the entire document.

XMODEM is a “universal” data transfer protocol, and can be effectively used to communicate with most any other brand of computer, including the IBM PC.

XMODEM sends the *contents* of the file, not the complete file as it resides on your hard disk or Works disk (here, the contents refer to the part of the file you actually see in Works, including text and formatting instructions).

Conversely, the MacBinary data transfer protocol provides a means to send and receive entire Macintosh files, complete with file name and icon. Because MacBinary allows you to send the complete file, and not just its contents, you can use it to send and receive whole Works files, including Macintosh applications (you can even send the Works program file through the phone, but even at 2400 baud, it would take more than 50 minutes to complete the transfer).

MacBinary is unique to the Macintosh, so it cannot be used to communicate with other brands of computers.

WORKS COMMUNICATIONS MODES

The Works communication module has three general modes of operation: terminal, data receive, and data transmit. The mode dictates the data transfer protocol.

- You are automatically placed in *Terminal mode* when starting the Works communication module. You are able to send or receive characters to and from a distant modem, as if your keyboard is connected to that computer (hence the word “terminal”). Terminal mode supports only the ASCII data protocol.
- *Data Receive mode* allows you to capture (or *download*) information sent to you by a distant computer. Once captured, that data can be used by one of the other Works modules (or even another Macintosh application). Data Receive mode supports ASCII, XMODEM, and MacBinary protocols.
- *Data Transmit mode* allows you to send (or *upload*) information to a distant computer. Depending on the data transfer protocol used (ASCII, XMODEM, or MacBinary), you can send documents created in Works as well as other Macintosh documents and applications. Data Transmit mode supports ASCII, XMODEM, and MacBinary protocols, but you cannot send Text-only (Export) documents.

Data Format

Data is passed between modem and computer following a specific format. You can alter some of the variables in this format, as long as both you and the remote computer are set up the same way. The data format encompasses three variables, which you can change in the Communications window:

- *Data Bits*. Each character sent through a modem can comprise either seven or eight bits. Seven-bit communication allows you to send and receive normal alphanumeric characters, but not special formatting or font characters. If your document contains special font characters, use an eight-bit transfer.
- *Start and Stop Bits*. These are clock bits that surround the data bits. The start bit is always included, and you can select either one or two stop bits. Generally, use one stop bit when transferring eight-bit data; two stop bits when transferring seven-bit data.
- *Parity Bit*. The parity bit helps ensure accuracy in the transmission. The computer uses the parity bit in a mathematical formula to detect

when data bits have been received properly. If the parity bit doesn't match up to the sum of the data bits, an error has occurred. Most often, you can turn the parity check off (select None). Parity is generally only used with seven-bit transfers.

For general communication, whether between two Macs or between a Mac and another computer (including a dial-up service like CompuServe), use the following default data format settings:

Data Bits	Parity	Stop Bits
8	None	1

With the necessary start bit added, this data format contains 10 bits per character. The 10 bits per character format is standard among 300, 1200, and 2400 asynchronous communications.

Data formats are often indicated in shorthand notation, as **8N1**, for eight data bits, no parity, and one stop bit. Other formats of the shorthand are easy to decipher.

Problems of Call Waiting

Progress can sometimes get in the way of itself. One example of a good thing taken too far—at least where modems and computer communications are concerned—is call waiting. With call waiting, you can be on the phone to one person, but still keep your phone free for other calls. It's a great convenience but it wreaks havoc on telecommunications: receiving a call during telecommunications can cause the modem to hang up!

Most (but not all) phone companies that offer call waiting also provide a means to temporarily defeat it. Use this feature to turn off call waiting for the next call you make. Some phone companies use the following convention for suspending call waiting:

- On Touch Tone phones, dial ***70**, then wait for the dial tone. Without hanging up the phone, dial the phone number you want.
- On rotary phones, dial **1170**, then wait for the dial tone. Without hanging up the phone, dial the number you want.

If you're using Works to dial the number for you, you can add the suppress-call waiting code to the number to dial. Add ***70**, or **1170**, to the beginning of the phone number. The comma instructs Works to wait two seconds before sending the rest of the number. If you need more of a pause between the suppress-call waiting prefix and the phone number, add more commas. For example:

<i>Entry Number</i>	<i>Effect</i>
*70,555-1212	Touch Tone dialing: Suppress call waiting, pause two seconds, then dial number.
1170,555-1212	Rotary dialing: Suppress call waiting, pause two seconds, then dial number.
*70,,555-1212	Touch Tone dialing: Suppress call waiting, pause four seconds, then dial number.

Unfortunately, there is no sure way of turning call waiting off when you have instructed Works to listen for an incoming telecommunications call. If you use your computer to receive calls from other computers often, and are plagued by call waiting interruptions, consider removing the call waiting or adding a second, dedicated modem line.

Noise on the Phone Line

Some phone connections, even local ones, are better than others. And you never know when the connection will be good or bad. You may have called across country and talked to someone who sounded like they were in the next room. That's a good connection. Then the next call, to the same person on the same phone, sounded like it was beamed half-way out of the solar system before returning to earth.

Noise on the telephone line is annoying in conversations, but troublesome in telecommunications. If the noise is above a certain threshold, it impairs the normal communications between computers. This threshold, called signal-to-noise ratio, decreases as the data transfer speed increases. That is, if the noise only marginally affects data transfer at 1200 baud, the noise may make communications impossible at 2400 baud.

Noise is characterized by a garbled transmission of lost, misplaced, and incorrect characters. If you are simply conversing with someone behind another computer, an occasional glitch is merely an annoyance. But if you are transferring entire Works documents from one computer to the next, any lost characters may spell doom to the entire procedure.

Fortunately, the Works communications module provides two popular error-correction protocols to ensure that data is received intact. These two protocols, MacBinary and XMODEM, are discussed earlier in this chapter.

What can you do if you're plagued by noisy phone lines? First, inspect the phone wiring in your home or office, including the jacks where your phone is plugged into the wall. A loose or dirty wire may be causing the problem. You'll also get the best lines during off-peak calling hours, from about 6 pm to 7 am weekdays, and all hours on the weekends.

Economy long distance phone lines are typically noisier than their full-priced cousins, so you may want to talk to your phone company about what measures you can take to obtain better results. Or, switch long distance carriers.

Many companies that use telecommunications extensively lease special *conditioned* lines, at extra cost. These lines are engineered for cleaner, less noisy operation, and are generally used with super-fast modems—4800 baud and higher. Conditioned lines are effective only for local dialing, though some phone companies offer conditioned long distance lines at a substantial surcharge.

As an added safeguard against marginal phone lines, most 2400 baud and faster modems automatically fall back to a slower speed if they encounter an especially noisy phone line. Modem manufacturers bill this as *adaptive call sequencing*—the ability to automatically adapt to the limitations of the phone line. The fallback process usually occurs before actual data transmission begins, so valuable data is not lost.

USING THE WORKS COMMUNICATIONS MODULE

The Works communications module provides all the necessary commands for operation in one main menu, so talking with other computers is a relatively painless operation.

When you open a new communications document, Works automatically presents the Settings dialog box. This dialog box is also available by choosing the Settings command from the Communications menu. With few exceptions, you can change the settings at any time, even during transmission. However, doing so is not recommended as changes while on-line can cause data loss.

This dialog box, shown in Figure 7-4, allows you to:

- Select the type of terminal emulation, if any. The Works communication module can force the Macintosh to behave like a standard teletype, or TTY, machine (the standard setting), a DEC VT-100 terminal, or a DEC VT-52 terminal. The VT-100 or VT-52 terminal modes, which offer special display capabilities, should be set only when you know the computer on the other end can accommodate the emulation. These modes are used most often when connecting to a larger computer, such as the corporate mainframe or CompuServe.
- Set automatic line feed and auto-wrap. These options are active only under VT-100 and VT-52 emulation. They force Works to automatically wrap words that won't fit on the next line, and to begin each successive line under the previous one.

Communications Settings:

Type: TTY VT-100 VT-52 Auto-wrap NewLine

Baud Rate: 300 2400 9600 1200 4800 19200 **Delete Key Means:** Delete Backspace

Data Size: 8 Bits 7 Bits

Stop Bits: 1 Bit 2 Bits **Number of screens:**

Parity: None Odd Even

Handshake: None Hon/Hoff Hardware Both

Phone Type: Touch-Tone® Rotary Dial

Line Delay: **Character Delay:**

Capture Text When Document Opens

Connect To:  

Figure 7-4 *Communications Dialog Box*

- Choose the baud rate. Select a baud rate according to the capabilities of your modem, the capabilities of the distant modem, and the quality of the phone connection.
- Select the number of data bits per character. Works permits characters with either seven or eight bits; eight is the standard and should be used unless you are instructed otherwise.
- Set the number of stop bits per character. Determines the number of clocking bits that follow each data byte. Available choices are one or two; one is standard.
- Set the parity, for rudimentary error correction. Determines the type of error-catching parity bits that follow each character. Available choices are None, Odd, or Even. None is standard.
- Determine the action of the **Delete** key (marked **Backspace** on Mac Plus and earlier models). When **Backspace** is selected (default), pressing the **Delete** key moves the cursor one character to the left, but doesn't erase any character there. When **Delete** is selected, pressing the **Delete** key moves the cursor one character to the left, and erases any character there. Note that the action of the **Delete** key, regardless of the setting in the dialog box, may have a different effect on the distant computer. The action of the **Delete** key will differ in other computers depending on how the communications program running on them is set up.

- **Number of screens.** Sets the amount of memory reserved in the Macintosh for remembering data you sent or received. Each screen contains approximately 2,000 characters, or about 315 words. The default screen setting is four pages (8,000 characters), but you can increase or decrease it as desired. Works accommodates up to 100 screens of data, depending on available memory.
- **Select type of handshaking.** Handshaking, or flow control, determines how the two computers in the link control the flow of data between them. The idea of handshaking is to keep one computer from sending data faster than the other can accept and store it. Available choices are None (normal); XON/XOFF (called software handshaking, where codes sent with the data stream are used for flow control); Hardware (otherwise known as ETX/ACK, where special lines in the interconnect cable carry flow control information); and Both.
- **Determine the dialing system when using the communications module to place calls.** Select either Touch Tone (normal), or pulsed, depending on the capability of your phone system. Works doesn't allow you to mix dialing types when calling a number unless you control the modem manually (more on this topic later in this chapter).
- **Set a delay between successive transmitted lines.** Permits a crude form of flow control where extra time is allowed between each line of transmitted data. Normally set to 0, or no wait.
- **Set a delay between successive transmitted characters.** Permits a crude form of flow control where extra time is allowed between each character of transmitted data. Normally set to 0, or no wait. Using a delay between lines and characters greatly impedes data transmission, however, and it does not guarantee error-free transmission. Delays should be used only if there is no other means of getting two computers in the link synchronized to one another (be sure to try the handshaking options first).
- **Indicate if text received and transmitted should be automatically stored in a WP document.** When checked, Works asks for the name of the document after you press OK in the Settings dialog box.
- **Select a serial connection for the modem.** Select either Printer or Modem, depending on which port connects to the modem. The standard setting is Modem.

Once you have established the communications parameters, click OK to place Works into terminal mode (if the default settings are to your liking, simply click OK or Cancel to start). If the Capture Text When Document Opens option is checked, Works first asks for a name for the captured data

before starting terminal mode. If you decide you don't want to capture any data, click the Cancel button.

Once in terminal mode, you can dial the number of another modem, wait to receive calls, or immediately begin conversing with a distant computer.

Dialing the Phone

To make a connection with another computer through a modem, you'll need to either dial the number to establish the link, or wait for the other computer to call you. Works provides a convenient way to dial numbers; it even remembers eight numbers for future reference (the numbers are saved when the communications document is stored on disk).

To dial a number:

1. Choose the Dial command in the Communications menu. An eight-number telephone directory dialog box appears, as shown in Figure 7-5.
2. Enter a number in the Phone Number entry box.
3. Click the Dial button opposite the number.

If the telephone directory already contains the number you want to dial, you don't need to enter it again. Just click the Dial button opposite the number you want to call. Assuming the modem is properly connected to the Macintosh and your phone, Works places the call and waits for the call to be answered.

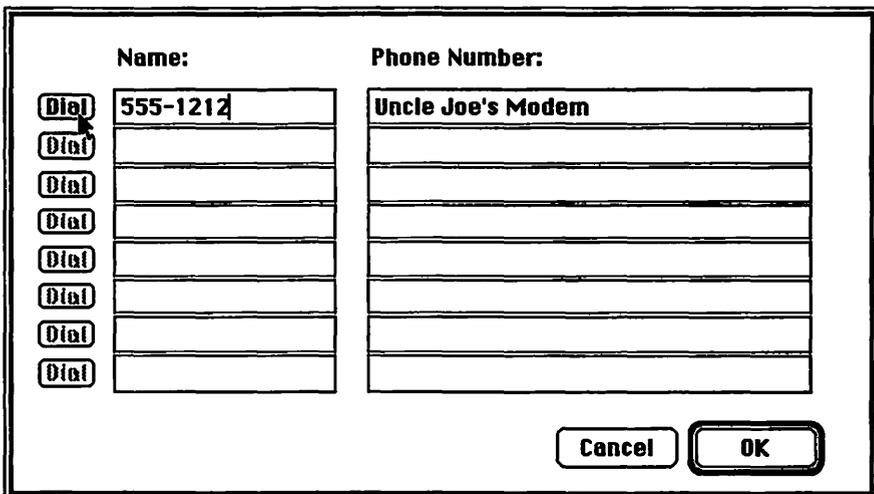


Figure 7-5 Phone Dial Box

During dialing, Hayes and Hayes-compatible modems provide a visual indication of the progress of the call (this is named, appropriately enough, call progress monitoring). Depending on how the modem is configured, the progress of the call is printed on the screen, either in full-English words or as codes. The most common call progress prompts are:

- OK—General acknowledgment of a command, such as a number to dial.
- DIALTONE—Dial tone detected.
- DIALING—Phone being dialed now.
- CONNECT—Phone answered (usually slow 300 baud speed).
- CONNECT 1200/2400—Phone answered at 1200 or 2400 baud.
- ERROR—A command could not be executed.
- RING—Your telephone is ringing. Only appears when you command Works to answer the phone.
- BUSY—The telephone dialed is busy.
- NO CARRIER—Phone link terminated.

Under software or hardware control, you can force the modem to provide these prompts as a single digit code. Most Hayes and Hayes-compatible modems use the following codes for call progress prompts:

<i>Code</i>	<i>Prompt</i>
0	OK
1	Connect
2	Ring
3	Busy or No Carrier
4	Error
5	Connect Hi-Speed (1200 or 2400 baud)

Waiting for a Call

To wait for an incoming call, choose the Answer Phone command from the Communications menu. Works will answer the next incoming phone call on the first ring.

Works has no menu command to alter the number of rings until the phone is answered. Should you wish to wait more rings until Works picks up the phone, you'll have to control the modem manually, as detailed later in this chapter.

Capturing (Receiving) Text and Files

You'll spend many communications sessions capturing data sent to you through the phone lines. Here are some tips:

- To save just the text of files transmitted in ASCII (text only) mode, choose the Capture Text command from the Communications menu. Provide a name for the captured text. The data is saved in Text-only (Export) document format. To end text capture, choose the End Text Capture command from the Communications menu.
- To save the text (and not formatting instructions) of files transmitted with an error-checking protocol, choose the Receive File command from the Communications menu, and click the XMODEM Text option. Provide a name for the captured text. The data is saved in Text-only (Export) document format.
- To save the text *and* formatting of files transmitted with an error-checking protocol, choose the Receive File command from the Communications menu, and click the XMODEM Data option. Provide a name for the captured text.
- To save the entire file, complete with icon and other Macintosh file resource information, choose the Receive File command from the Communications menu, and click the MacBinary option. Provide a name for the captured file. The file is saved in the same format as it was sent.

You do not have to use the Receive File command when receiving a MacBinary file. Works will automatically receive a file sent in the MacBinary format, saving the file on the current disk drive and directory, using the same name as the original, transmitted file. If a file already exists on your disk with the same name, Works adds a digit to the received file, in order to differentiate it from the one you already have. Works never erases a file and replaces it with another.

Sending Text and Files

Works allows you to send text and files in the same manner as it receives them. Therefore:

- To send the text (with formatting) of a Normal word processing document, choose the Send Text command from the Communications menu. Select the file to send and double-click on it. Works only sends text files of documents saved in the Normal word processing format (not Export).

- To send the text (minus formatting) of word processing, spreadsheet, and database files with error-correction, choose the Send File command from the Communications menu, and click the XMODEM Text option. Select the file to send and double-click on it. Works sends XMODEM text of files saved in any format (including Export).
- To send the text and formatting of word processing, spreadsheet, and database files with error-correction, choose the Send File command from the Communications menu, and click the XMODEM Data option. Select the file to send and double-click on it. Works sends XMODEM data of files saved in any format.
- To send an entire Macintosh file, choose the Send File command from the Communications menu, and click the MacBinary option. Choose the file to send and double-click on it.

Hang up the Phone

When the current communications session is over, you should instruct the modem to terminate the call; otherwise, the connection may not be broken. If the call is long distance, you may be charged extra for the connect time you didn't use.

To hang up the phone, choose the Hang Up command from the Communications menu. It takes a few seconds for the modem to respond and terminate the call.

Saving and Opening Communications Documents

Changes you make in the Settings dialog box can be saved in a communications document. You can use this document to quickly start a new communications session with the parameters you previously specified.

Save the document in the usual manner. You can then open the document from within Works by double-clicking it in the Open Document dialog box window. You can have only one communications document open at a time.

Both the Normal and Stationery file formats save similar communications documents. Normal documents are opened with their name in the title bar. Works prompts you to resave the document after you have finished the session. Stationery documents open as Untitled, even though Works changes the Setting parameters as you specified. Works prompts you to save the document after you have finished the communications session.

Other Communications Settings and Features

Works includes a couple of other settings and features you may want to know about.

Echo Off/Echo On The Echo Off and Echo On commands in the Communications menu determine whether Works repeats characters you type from the keyboard. In most cases, the distant computer will repeat (or echo) the characters you send to it. These echoed characters appear on your screen. Sometimes, the remote computer will not echo the characters you type, so as you write you won't be able to see what you are sending.

Note:

- If you type and nothing appears, turn Echo On.
- If you type and two characters appear for every one you write, turn Echo Off.

Most Hayes and Hayes-compatible modems also include an echo capability, which is separate from the Echo Off and Echo On commands. You can turn modem echo off and on via manual control, as detailed later.

Keypad The Macintosh keyboard lacks the keys normally found on DEC VT-100 and VT-52 computer terminals. When using Works under VT-100 or VT-52 emulation, you can access the special keys with the Keypad menu, shown in Figure 7-6. Apart from the number keys, which you can enter using the numerical keypad on your computer (if so equipped), the Keypad menu provides four programmed function keys (PF1 through PF4) as well as special functions assigned to the number and character keys of the keypad.

Non-Modem Calls

What happens when you use Works to dial a number, only to find a real person answers and says "Hello." Depending on the features of your modem, it will:

- Turn itself off and indicate a voice has answered the phone and not a modem.
- Make squealing and squawking sounds and the person on the other end gets an earful of electronic gibberish.

In either case, it pays to make sure that the number you are dialing is attended by a modem, not a human being. Prior to calling any number with your Macintosh, make it a habit to audition it first yourself, and do so only

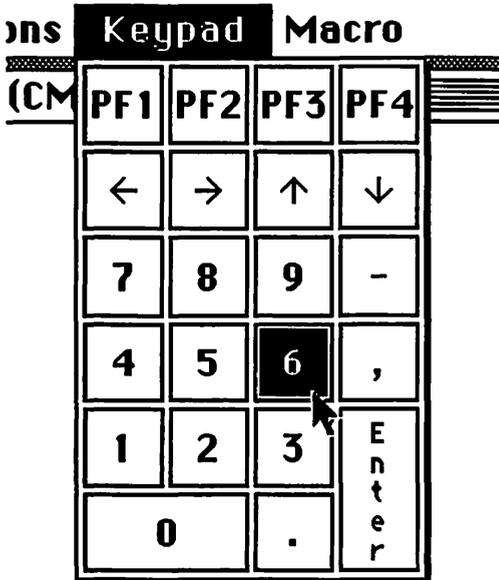


Figure 7-6 Keypad Menu

at regular business hours (remember to take into account time zones). If you hear the telltale sounds of a modem carrier, you know you've got the right number. If a bewildered human answers the phone, and you're sure you dialed correctly, you know the number was given to you in error.

If you have a single phone line for both voice and modem use, be sure to disable the modem to prevent it from prematurely answering the phone on non-computer calls. You can disable the modem in any of three ways:

- Turn it off.
- Disconnect it from the phone line.
- Turn the Answer Phone command off, or manually instruct the modem to ignore incoming calls (see below for more details on manual modem control).

Control Code Commands

Many commercial communications systems, like CompuServe, The Source, and Dow Jones News/Retrieval, can be commanded with the use of control codes. Control codes are special characters created by pressing **Command-Option**, and a letter, number, or symbol key (extended and enhanced keyboards have a Control key that you can use instead of the Command-Option pair). Control codes generally occupy the beginning of

the ASCII character table. Note that the letter A doesn't begin until ASCII character 65.

Specific control code sequences vary from system to system, and you should obtain the instruction manual for your system for complete details. Here is a list of the most commonly used control code sequences, and their usual effect on communications systems and other terminals (even other Macintoshes running Works).

<i>Command</i>	<i>Effect</i>
Command-Option-3	Break
Command-Option-Del	Delete
Command-Option-[	Escape
Command-Option-G	Sound tone
Command-Option-H	Backspaces cursor one space
Command-Option-I	Tabs cursor five to 20 spaces (depending on communications program)
Command-Option-J	Moves cursor down one line
Command-Option-M	Moves cursor to beginning of line

Works allows you to record control code sequences in a macro *only* when you use the **Control** key, not the **Command-Option** key pair. For example, you can record **Control-G** in a macro to sound a tone, but not **Command-Option-G**. If your keyboard lacks the **Control** key, you won't be able to record control code sequences in macros.

Action of Delete Key

The **Delete** key (or **Backspace** key on the Mac Plus and earlier models) can serve double-duty. Ordinarily, pressing **Delete** moves the cursor one space to the left, but doesn't erase any character there. With the **Delete** key option in the Settings dialog box, you can change the action of the key so that pressing **Delete** moves the cursor *and* erases the character.

The action of the **Delete** key affects text only on your computer; text on the other computer may not be affected the same way. With the **Backspace** option selected in the Settings dialog box, Works sends a 08 code (**Control-H**) through the communications line to the other computer. Most terminal programs, including Works, accept the code, and obeys by backspacing the cursor. But with the **Delete** option selected, Works sends a 127 code, which many communications programs ignore. Pressing **Delete** may have an effect on your computer, but not on the one at the opposite end of the phone line. To summarize:

Delete Key Setting	Local Action	Remote Action
Backspace	Backspace	Backspace
Delete	Delete	None

The Works manual states that the **Delete** key setting applies only in VT-100 or VT-52 modes, but also appears to work in TTY mode.

Special Escape Key and ANSI Commands

The **Escape** key on an enhanced and extended keyboard is fully functional in the Works communications module. Pressing **Escape** sends the ASCII character 27, and is equivalent to **Command-Option-[** (or **Control-[**). The **Escape** key is often used to send special code sequences (called escape sequences) for controlling the display of the terminals connected in the communications link.

As with most other communications programs, Works responds to many of the special American National Standards Institute (ANSI) escape sequences developed for manipulating the screen. ANSI codes are most often provided by commercial communication services, like CompuServe, as a way to provide a less cluttered and more presentable video display. Among the capabilities of ANSI escape sequences are:

- Clearing the whole screen at once.
- Moving the cursor a specific number of spaces, in any direction.
- Setting unique display attributes, including high intensity (alas, display attributes are not visible in Macintosh Works, but seen on other computers).
- Selectively erasing lines, characters, and parts of the page.

The ANSI escape sequences require that Works be in VT-100 or VT-52 emulation mode (VT-100 offers more escape sequences, so use that when possible). The opposite computer in the link must also emulate an ANSI terminal.

An appendix in the Works manual lists the ANSI escape sequences that Works responds to (there are many others in the ANSI code set). You can send nearly any sequence to another computer by pressing the **Escape** key (or **Command-Option-[**), then following it with the appropriate codes. For example, pressing the **Escape** key, and following with **[2J** erases the screen on both computers (assuming both are emulating ANSI terminals, such as a VT-100).

While you probably won't have much cause to work directly with ANSI escape sequences, some may come in handy even during routine chit-chat with another computer. The escape sequences are best implemented with macros, discussed in more detail in Chapter 8. There, you'll find specific details for recording the following ANSI escape sequences for later playback.

In the escape sequences that follow, the {Esc} entry indicates the **Escape** key; do not type the characters "{Esc}." Entries within angle brackets show variable information, such as number of rows or columns. Be sure to type letter characters in upper-or lowercase, specifically as indicated. For example, type {Esc}[2J to clear the screen, not {Esc}[2j.

Sequence

Function

Cursor Movement

{Esc}[<rows>A	Moves cursor up indicated number of rows; Example: {Esc}[5A moves cursor up five rows.
{Esc}[<rows>B	Moves cursor down indicated number of rows; Example: {Esc}[5B moves cursor down five rows.
{Esc}[<chars>C	Moves cursor right indicated number of character spaces; Example: {Esc}[5C moves cursor right five spaces.
{Esc}[<chars>	Moves cursor left indicated number of character spaces; Example: {Esc}[5D moves cursor left five spaces.
{Esc}[<cols>Z	Moves cursor left indicated number of tab columns; Example: {Esc}[2Z moves cursor left two columns.
{Esc}[<cols>I	Moves cursor right indicated number of tab columns; Example: {Esc}[2I moves cursor right two columns.

Line Editing

{Esc}[<lines>M	Deletes one or more lines starting from the current position of the cursor; Example: {Esc}[3M deletes next three lines.
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Line Editing cont.

{Esc}[<lines>L	Inserts one or more lines starting from the current position of the cursor; Example: {Esc}[3L adds three new lines.
{Esc}E	Adds new line (carriage return and line feed).

Cursor Position Save and Restore

{Esc}[s	Stores current position of cursor, for later recall.
{Esc}[u	Recalls previously stored cursor position; places cursor at that spot.

Screen and Line Erase

{Esc}[0J	Erases to end of page.
{Esc}[1J	Erases entire screen from cursor.
{Esc}[2J	Erases entire screen.
{Esc}[0K	Erases from cursor to end of line.
{Esc}[1K	Erases from start of line, including character at the cursor.
{Esc}[2K	Erases entire line.

Character Display Attributes

{Esc}[0m	Turns off all character display attributes.
{Esc}[1m	Turns on high intensity character attribute (not shown on Macintosh display).
{Esc}[4m	Turns on underline character attribute (not shown on Macintosh display).
{Esc}[7m	Turns on reverse character attribute (not shown on Macintosh display).

Mode Selection

<code>{Esc}[?20l</code>	Disables auto line feed on carriage return.
<code>{Esc}[?20h</code>	Enables auto line feed on carriage return.
<code>{Esc}[20h</code>	Sets carriage return on line feed.
<code>{Esc}[20l</code>	Resets carriage return on line feed.
<code>{Esc}[?7l</code>	Disables auto-wrap mode (or use Settings dialog box).
<code>{Esc}[?7h</code>	Enables auto-wrap mode (or use Settings dialog box).
<code>{Esc}[>7h</code>	Sets modes, alternate keypad mode.
<code>{Esc}[>9h</code>	Sets modes, auto carriage return on line feed.
<code>{Esc}[>8h</code>	Sets modes, auto line feed on carriage return.
<code>{Esc}[>5h</code>	Sets modes, cursor off.
<code>{Esc}[>1h</code>	Sets modes, enables 25th line.
<code>{Esc}[>7l</code>	Resets modes, no alternate keypad.
<code>{Esc}[>9l</code>	Resets modes, no auto carriage return on line feed.
<code>{Esc}[>8l</code>	Resets modes, no auto line feed on carriage return.
<code>{Esc}[>1l</code>	Resets modes, disables 25th line.
<code>{Esc}[?25h</code>	Disables cursor.
<code>{Esc}[?25l</code>	Enables cursor.
<code>{Esc}=</code>	Enables alternate keypad mode.
<code>{Esc}></code>	Disables keypad alternate mode.

Note: The final character codes in the preceding examples end with either lowercase H or lowercase L (not a numeral 1 or an uppercase i).

CONTROLLING A MODEM MANUALLY

Many of the commands you give Works during a communications session are actually carried out by the modem. Works assumes you are using a Hayes or Hayes-compatible modem, and communicates with this modem using special command codes. Among the command codes Works sends out to the modem include:

- Instructions for dialing a number, including dialing type (Touch Tone or pulse), and pauses between numbers.
- Instructions for answering the phone.
- Instructions for hanging up the phone.

Why would you want to control a modem manually? One reason is to use Works with a non-Hayes-compatible modem, especially one of the older “direct-connect” types. Another reason is to access a modem command not supported by Works, such as wait xxx rings before the modem answers.

Hayes AT Command Set

Hayes modem commands are prefixed by the letters AT (for ATtention), so they are often called AT-commands. With most Hayes and Hayes-compatible modems, the modem determines the speed of data transmission with the letter A, and the parity with the letter T. With this system, you needn't set baud rate on the modem itself, just within the Word communications module.

To enter a command, you type AT, followed by the command you want. Some commands—most notably the commands for dialing the phone—are comprised of several parts. For example, to dial the phone, you enter ATDT999-0000 and press Return. Broken down:

- The AT calls the modem “to attention.”
- The D commands the modem to dial the phone.
- The T instructs the modem to use tone dialing.
- The 999-0000 is the number to call.

The standard Hayes AT command set is shown in Table 7-3. You can use either upper- or lowercase to enter modem commands.

Operational Commands

Command	Function	Default
+++	Escape On-Line	
O	Return on-line	
AT?	Menu (some modems only)	
A	Answer phone w/o waiting for ring	C0
C0	Modem carrier off	
C1	Modem carrier on	
E0	Inhibit echo of commands	
E1	Permit echo of commands	E1
F0	Select half-duplex operation	
F1	Select full-duplex operation	F1
H0	Telephone on-hook	H0
H1	Telephone off-hook	
I0	Interrogate modem/product code	
I1	Interrogate modem/self-test	
Q0	Send result codes to DTE	G0
Q1	Do not send codes to DTE	
Sx?	Ask register contents (x is 0 thru 5)	
V0	Send result codes as digits	
V1	Send result codes as works	V1
Z	Software reset	
Dx	Dial number (x is number to dial)	
P	Selects pulse dial type	

Command	Function	Default
T	Selects tone dial type	
,	Wait two seconds	
;	Return to command mode after dialing	
Set Registers		
Register	Function	Default
S0	Sets number of rings before answer	001
S1	Number counter, increments as phone rings	000
S2	Holds ASCII number for Escape code character	043
S3	Holds ASCII number for Return code character	010
S4	Holds ASCII number for Line Feed code character	010
S5	Holds ASCII number for Backspace code character	008

Table 7-3 *Standard Hayes Command Set*

Testing with AT Command

When directly communicating with the modem, you can test that it is connected to your computer properly by typing AT directly into the terminal, and pressing Return (you should not be connected to another computer through the phone lines during this). The modem responds with an OK.

Using Direct Commands

You may use a direct modem command any time you are not actively sending or receiving text or files.

The modem automatically falls into a *command mode* when first turned on, and with no computer on the other end of the phone line. You may enter any AT command when in the command mode. However, after the modem establishes connection with the other computer, it places itself in *on-line mode*, sending what you type through the phone line instead of intercepting it as a command. The modem therefore now ignores AT commands. To issue a modem command, you must first enter an **interrupt sequence** consisting of three plus signs in a row—+++ (you don't need to

type AT first). When interrupted, the modem goes back into command mode. After a second or two delay, you may enter an AT command. To exit command mode, type ATO (the letter O, not the numeral zero). Here's a summary:

<i>Mode</i>	<i>Condition</i>
Command	Connection to another computer <i>not</i> established (phone on hook).
On-line Command	Connection to another computer established. Type +++, wait one or two seconds before entering AT command.
On-line	Type ATO (must be connected to another computer or modem returns an ERROR message).

More Useful Manual Modem Commands

Here are some manual modem commands you may find useful when communicating with Works:

- *Mixed dialing*: Mix the T and P dialing commands with the number to dial if you must use both Touch Tone and pulse (a PBX system, for example). For instance: ATDP9,,T555-1212 starts pulse dialing with a digit 9, pauses four seconds for the PBX system to grab an outside dial tone, then finishes the call with tone dialing.
- *Return to command mode after dialing*: Sometimes, you may wish to force the modem into command mode after dialing a number (the default automatically changes to on-line mode). Place a semicolon (;) after the number to dial, which causes the modem to return to command mode after dialing without disconnection.
- *Set number of rings*: To force your modem to answer the phone after a certain number of rings, add S0=# (# is the number of rings from 0 to 255) before waiting for the call (by the way, don't use the Answer Phone command in Works, as it will override your number of rings setting). To answer the phone on the fifth ring, for instance, enter ATS0=5, then press Return. When the number of rings is set to 0, auto-answer is disabled and the modem won't answer the phone. You can test the number of rings setting by typing ATS0? and pressing Return. The standard default of most modems, and used by Works, is one ring.

- *Immediately answer the phone:* You can force the modem to pick up the phone without waiting for a certain number of rings by typing **ATA**, then pressing **Return**.
- *Telephone on-hook:* You can force the modem to hang up the phone with the **H0** command. If you are conversing with another computer, remember to first return to command mode (type **+++**, then pause for a second or two), before typing **ATH0** and pressing **Return**.
- *Telephone off-hook:* Normally, your modem seizes the phone line immediately before dialing a number or going on-line. For special applications, you can force the modem to pick up the phone with the **H1** command. Type **ATH1**, then press **Return**.
- *Return to default settings:* Most modems have initial or default settings, either set at the factory, set by a series of switches, or encoded in a battery backup RAM chip. You can return to these default settings by typing **ATZ**, and pressing **Return**. This command is helpful if you have changed the parameters of the modem during a session, and want to start all over again from scratch.
- *Redial the last number or repeat a command:* Typing **A/**, and following with a **Return** causes the modem to repeat the last command you gave it. This is most helpful in redialing the last number.
- *Turn off/on modem speaker while dialing:* Turn off the speaker in the modem (if so equipped) during dialing with **M0** and **M1** commands. **M0** turns the speaker off; **M1** turns it back on. An additional command, **M2**, turns the speaker on during the entire use of the modem, even during data transfer.

Command Name	Command Code	Example
Speaker off during dial	M0	ATM0DT555-1212
Speaker on during dial	M1	ATM1DT555-1212
Speaker on continuously	M2	ATM2DT555-1212

USING A NON-HAYES COMPATIBLE MODEM

Modems that use an operating command structure other than Hayes may require you to enter different operating commands. While Works will operate with any modem, even an acoustic-connect modem that lacks any intelligence, the Dial, Hang Up, and Answer commands in the Communications menu will not work. Consult the instruction manual that came with your modem for special command sequences.

HIGH IQ MODEM—EXTRA COMMUNICATIONS POWER

Computer-to-computer communication can be complex business, particularly if you want the process automated. Most of today's modems (whether they operate at 1200 baud, 2400 baud, or some other speed) have a good deal of built-in intelligence, making it a lot easier for you to converse with distant computers. This intelligence goes beyond being able to automatically dial and pick up the phone.

Some of these smarts are transparent to you—they operate without any assistance from you or Works. Other operations require help from you. Works itself doesn't provide a means to control these higher levels of operation, but you are always free to interact with the modem manually, as detailed above. Consider these extra features to make your job with the Works communications module simpler and more enjoyable.

Adaptive Dialing

Most so-called smart modems can dial the phone for you. The majority can be used with either Touch Tone or rotary pulse phone lines. The better modems can automatically select which type of dialing mode is required. This is called *adaptive dialing* and is useful when both types of dialing are required in one call (which is often the case with certain PBX systems).

The average smart modem has limited dialing capabilities. Give it a number to dial and it does it, with no questions asked. Phone systems aren't foolproof, however, and there are plenty of circumstances that prevent even routine calls from going through. It's often handy to have a modem that can quickly realize when something has gone wrong, and terminate the call and try again.

This is where a power modem (like the venerable Hayes Smartmodem 2400) comes in. Let's say, for example, that you are dialing out from your place of business. You have a centralized PBX phone system, one where you must dial a certain digit to get an outside line. With the Smartmodem 2400, you can instruct it to listen for the second dial tone before completing the call. This way, no matter how long it takes for the outside line dial tone to come, the modem will patiently wait for it.

Many of the latest modems can listen for several successive dial tones while calling. This can be particularly handy when using one of the economy long distance services like Sprint and MCI. Just make sure that the modem you pick can dial from a non-standard dial tone (*called blind dialing*), which Sprint and MCI use.

Increasing the Dialing Directory Power

A good number of smart modems have their own built-in phone directories. Rather than store the numbers in Works, the modem itself carries the numbers in its memory banks. While this may seem like an unnecessary feature—given Works' ability to record frequently used phone numbers—smart modems have a variety of ways to extend the usefulness of their internal directories.

For example, some smart modems let you type in a name instead of a code when selecting a number to dial. To call your work computer, for example, you can simply type "W-O-R-K." Such modems also store log-on sequences (user I.D. and password) and automatically provide all the necessary information after the connection has been made. Works offers a similar approach to log-on sequences with macros, but macros currently cannot be made to wait for user input or provide the proper character and code sequences in response to prompts.

Most power modems can also link stored numbers. If you get a busy signal on one number, the modem will automatically dial an alternate number (or, you can program the modem to repeatedly redial one number until it rings through).

Who's Calling, Please?

Once the call has been made, a good smart modem can distinguish which type of answer it gets: type of dial tone, a busy signal, no answer, and even voice. The modem displays the dialing progress on the screen for you.

An intelligent modem, such as the Hayes Smartmodem 2400, goes one step further, and is able to detect a "quiet answer," a short period of silence which follows a connection to many PBX phone systems in use today. The modem can then dial an access code needed to get a dial tone for connecting to a specific extension.

"Multi-tasking" with Modems

Modems are used in tandem with a computer, the latter of which often has its own memory. Putting memory inside a modem for use other than to store phone numbers may seem like a daft idea at first, but there are plenty of good reasons for doing it. With extra memory, the modem can act as an electronic mail center, sending and receiving messages without involving the computer.

This can be handy when the host computer is disconnected, busy, or turned off and messages come in (the Works communications module can work in the “background” while you’re busy crunching numbers or processing words, but communications halt when the mouse button is depressed or when the Macintosh accesses its disk drives).

Another use for internal memory is keeping track of your modem calls. At any time, you can display the calls you made, along with the duration in hours, minutes, and seconds. This is useful for audit or time billing purposes.

DATA TRANSFER SPEED

When sending and receiving files it is often handy to know how long the process will take. You can estimate roughly how long it takes to send a certain file through the phones by dividing the number of characters in the file by the characters per second speed of the modem transmission. For example, if the file you’re sending contains 5,000 characters and you are using a 2400 baud modem, approximate transfer time is 21 seconds—5,000 divided by 240 (240 is the number of characters sent per second with a 2400 baud modem).

<i>Modem Speed</i>	<i>Divide Character Number by</i>
300	30
1200	120
2400	240
4800	480

You can also use the table that follows to estimate transfer times when working with files from 5K to 50K.

File Size	300 baud	1200 baud	2400 baud
5K	2.7 minutes	42 seconds	21 seconds
10K	5.6 minutes	1.4 minutes	42 seconds
15K	8.3 minutes	2.0 minutes	1.0 minute
20K	11.2 minutes	2.8 minutes	1.4 minutes
25K	13.9 minutes	3.5 minutes	1.7 minutes
30K	16.6 minutes	4.0 minutes	3.0 minutes
35K	19.4 minutes	4.9 minutes	2.4 minutes
40K	22.4 minutes	5.6 minutes	2.8 minutes
45K	25.0 minutes	6.3 minutes	3.1 minutes
50K	27.8 minutes	7.0 minutes	3.4 minutes

Data transmission using XMODEM or MacBinary takes about 10-15 percent longer than plain ASCII transfers. This extra time is caused by the

data overhead needed to properly transfer error-corrected files, but it does not take into account blocks of data that must be re-sent because of errors caused by noisy phone lines or other denizens.

When sending and receiving XMODEM and MacBinary files, use the table above to compute the duration of transmission, and add 10 to 100 percent, depending on the quality of the phone connection.

<i>Connection Quality</i>	<i>Base Time Plus</i>
Excellent (no errors)	10 percent
Good (infrequent errors)	25 percent
Fair (occasional errors)	50 percent
Poor (constant errors)	100 percent

DEALING WITH TRANSMISSION ERRORS

Transmission errors during normal terminal use of the Works communications module, or during plain ASCII transfers, appear as occasional garbled characters, as shown in Figure 7-7. This is in contrast to a completely garbled screen, which typically indicates incorrect terminal settings, such as baud rate or number of data bits.

If at least some of the transmission is legible, the Works communications module is set up properly to receive the other computer's transmissions, but the phone link may be excessively noisy. Try making a new connection, or decrease the speed of transmission.

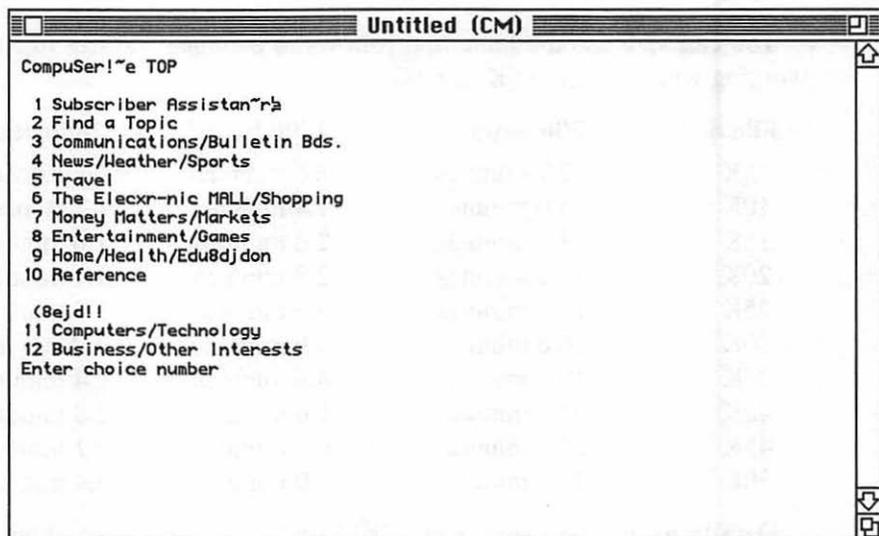


Figure 7-7 Errors Caused by Noise

Transmission errors during XMODEM and MacBinary transfers aren't shown as garbled characters, but Works provides a dialog box that shows you the progress of the transfer. If you notice Works must resend the same blocks over and over again, and the transfer is not progressing as quickly as you'd like, cancel the transfer and make a new connection, at a slower baud rate if necessary.

HARD-WIRED TRANSFERS

Hard-wired transfers dispense with the modem and connect two nearby computers by wire only. You can use this technique to transfer data between two computers in your office that don't share the same disk formats—a Macintosh and an IBM PC, for example.

Although there are a number of special-purpose terminal programs for connecting the Mac to an alien computer and transferring data, you can readily accomplish the same task with the proper cable and Works. The connected computer on the other end of the cable must likewise be outfitted with a communications program, so that it can send and receive data. Most communications programs will work.

The cable connected between the two computers must be wired appropriately for the transmission of data. Such a cable is often termed a “null modem” cable, meaning that the cable is meant for use in serial communications between computers, but without a modem. Generally, a null modem cable is the same as a regular modem cable, except that the data transmit and data receive lines are reversed on one end.

As it turns out, the ImageWriter I cable is constructed as a suitable null modem cable, so you can use it to connect a Mac to an IBM PC or other computer that is equipped with a DB-25 25-pin “D” connector.

Once the cable is in place, you can set up Works and the terminal program on the other computer so that they share the same communications settings. Since a hard-wired connection is not susceptible to noise in a phone line, or the speed limitations of a modem, you can choose the fastest baud rate you wish. However, if the cable stretching between the computers is more than about 50 feet along, you may find it necessary to reduce the transmission speed to 4800 baud or slower. Longer cables exhibit higher capacitances, which act to distort the data signals. The distortion is decreased when transmitting at a slower speed.

COMMUNICATIONS GLOSSARY

Consult this glossary if you encounter a mystifying word or two on the subject of modems and telecommunications.

Adaptive Call Sequencing—A feature of some modems to automatically switch to a slower data transmission speed when using noisy phone lines.

Adaptive Dialing—The ability of a modem to sense the type of dialing method to use for a particular phone line or service—either pulse or Touch Tone.

Answerback—A short message sent by a modem upon answering a call.

Asynchronous Communications—Data transfer from one modem to another with start and stop framing each character. The start and stop bits tell the receiving modem when one character ends and another begins.

AT Command—An operating command used by the Hayes family of modems; also used by Hayes-compatible modems. A typical AT command might be to dial a number or hang up the phone.

Autobaud—The ability to automatically detect and match the data transmission speed being used by the other modem on the line.

Baud—Data transmission speed; same as bits per second.

BPS—Stands for bits per second, often used to indicate data transmission speed of a modem.

Bell Compatible—A modem that follows the standards set by Bell Labs with their original 300 and 1200 baud modems. The North American standard for 300 baud modems is Bell 103; the North American standard for 1200 baud modems is Bell 212A.

Blind Dialing—The ability to detect a non-standard dial tone and dial from it.

Buffer—A memory holding tank inside a modem.

Call Progress Monitoring—A feature found in some modems where the progress of a call (dial tone, dialing, ringing, etc.) is relayed to the computer electronically or played through a built-in speaker.

Callback Security—A security system where, after the caller presents a valid password, the modem automatically hangs up and redials the caller using a predetermined phone number.

CCITT Compatible—A modem that follows the standards set by the Consultative Committee on International Telephone and Telegraph. The CCITT standard for 300 baud modems is V.21; 1200 baud is V.22; 2400 baud is V.22bis. The CCITT also has standards for auto dialing and other modem operations, but few U.S. manufacturers follow these.

Chaining—A feature of some modems to automatically dial a standby number in case the primary number is busy.

Fallback—The ability of a modem to automatically switch to a lower operating speed to compensate for excessive noise in the phone line or to match the speed of the modem on the other end of the line.

Number Storage—A small portion of memory built into the modem for telephone number storage, used for fast dialing.

Secure Modem—A type of modem with its own built-in password security system, which can be used to deny unauthorized users access to the host computer. See also “Callback Security.”

Smart—A modem that, at the very least, can dial or answer the phone following computer command.

Synchronous Communications—Data transfer from one modem to the other using special synchronizing pulses. These pulses put both transmitting and receiving computers “in sync” so characters can be properly recognized.

Transparent—The ability of a smart modem to turn off its intelligence, for manual call processing and data transfer.

Saving Time with Macros

To paraphrase Thomas Edison, word processing is composed of one percent inspiration and 99 percent perspiration. With judicious use of Works macros, you can reduce the perspiration to a much more comfortable level. Macros record the keys you press and mouse actions you make when using Works. Played back, macros replicate your actions automatically, and in the wink of an eye.

This chapter details the finer points of creating and using macros. You'll learn how to store macros in easily usable "sets," how to record pauses with macros, and how to keep a running log of the macros you've created. The chapter also provides several useful applications of macros.

MACRO BASICS

Though macros provide a great deal of versatility, many Works users neglect to learn how to use them. Here's a quick rundown on how to apply the macro feature.

Recording Macros

Follow these steps to record a new macro:

1. In any Works module, turn the macros feature on by choosing the Macros On command from the Macro menu. This is akin to turning on the power switch to a tape recorder.

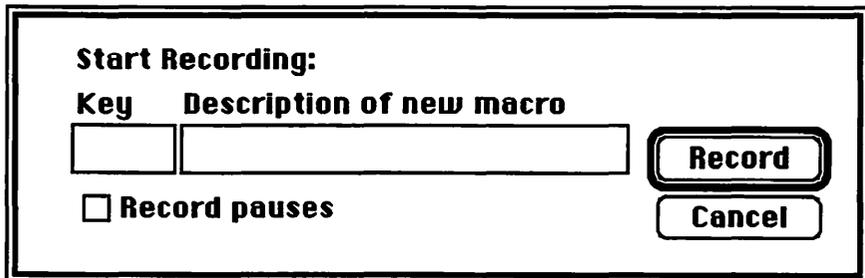
- To record a new macro, choose the Start Recording command from the Macro menu. The dialog box in Figure 8-1 appears. Enter a number or letter key to identify the macro. When used with the Option key, this key will be used to quickly start macro playback directly from the keyboard. The following list shows the keys you *can't* use to identify a macro:

<i>Key Types</i>	<i>Examples</i>
Accent	E, I, N, U, ~
Modifier	Shift, Caps Lock, Option, Command
Reserved	Delete (or Backspace), ', =, -, +, _

- Enter a short description of the macro in the Description editing box. If you want to record pauses click the Record Pauses option (if you need to see the execution of the macro; for example, when creating a recorded presentation). Press **Record** to continue.
- From this point on, keys you press and menu commands you choose are recorded in the macro. Be careful! There is currently no way to edit a macro, so any mistakes you make will also be recorded, and will be a part of the macro. If you make a big mistake, you'll have to start over.
- When recording is done, choose the Stop Recording command from the Macro menu. Works double-checks that you want to stop macro recording with the dialog box shown in Figure 8-2. To stop macro recording, press the Stop button.

If you choose to assign a single digit number to a macro (such as 1, 2, 3, and so forth), you must enter the number in the Key box using the keys along the top of the keyboard, not the ones in the numeric keypad.

Be aware that you cannot start a macro when in the New or Open files dialog box. In addition, you cannot use a macro to record a free-hand Draw object. Macros can only record the points on the screen where you



The dialog box is titled "Start Recording:". It contains two input fields: "Key" and "Description of new macro". Below the "Key" field is a checkbox labeled "Record pauses". To the right of the input fields are two buttons: "Record" and "Cancel".

Figure 8-1 Start Recording Dialog Box

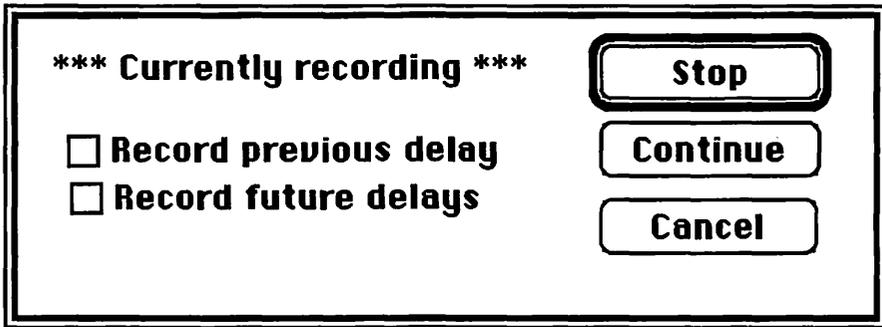


Figure 8-2 *Stop Recording Dialog Box*

click the mouse, not the space between the points of a free-hand object where you drag the mouse.

Playing Macros

Previously recorded macros can be played back in either of two ways:

- Press **Option** and the key used to identify the macro. For example, if you identified the macro with the letter F, then press **Option-F**.
- Choose the Playback And command from the Macro menu, select the macro you want to play, and click the Play button.

SPECIAL IDENTIFICATION KEYS

You can assign macros to the Tab key, as well as the 10 function keys (F1 through F10) on an enhanced Macintosh keyboard.

- To assign a macro to the Tab key, type the word "Tab" in the Start Recording dialog box. To play the Tab key macro, press **Option-Tab**.
- To assign a macro to a function key, press F1 through F10 while the Start Recording dialog box is open. To play a function key macro, press **Option-F#**, where # is one of the function keys.

SAVING MACROS

Macros are really document files. You can use any recorded macro for as long as you're in Works, but if you want it for your next Works session, you must remember to save it first. Macros are stored in special macro files.

Each file can contain only one macro per available key (one for each letter and number), but you can create as many macro files as you want, each with a different definition for the available keys. For example, in one macro file, **Option-N** may type your name and address, and in another macro file, **Option-N** may open a new word processing document.

To save the macros you have created so far:

1. Choose the Save Macro File command from the Macro menu.
2. Enter a name for the macro file, and press OK when finished. You can also select a drive and directory for storing the macro file. Alternatively, just press OK to use the default macro file named "Microsoft Works(keys)."

OPENING SAVED MACRO FILES

If you have already recorded one or more macros in a macro file, access those macros by opening the file using these steps:

1. Turn macros on (if they aren't already) with the Macros On command from the Macro menu.
2. Choose the Open Macro File command from the Macro menu.

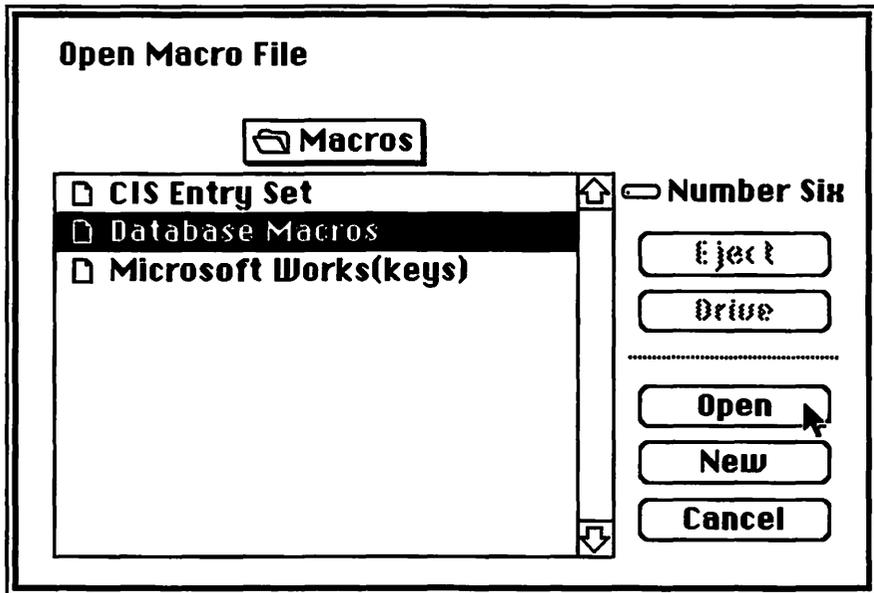


Figure 8-3 *Selecting Macro File in Open Macro File Box*

3. From the list directory that appears, choose the macro file you want, as shown in Figure 8-3, and click the Open button (or press **Return**).

Note: You can have only one macro file open at any time. If you try to open another macro file before saving any macros recently created, you are asked if you wish to save them first.

ADDING MACROS TO A MACRO FILE

Often, you'll want to add a macro to one of your existing macro files. Be sure to open the desired macro file first, then record the macro. After recording is finished, save the macro file again.

MERGING MACROS

Works provides no easy way to combine two or more macros from one macro file into another file. However, you may wish to merge macros—to consolidate files, for instance. The best approach is to open the macro file you wish to keep and re-record those macros you want to add to it.

USING THE PLAYBACK AND COMMAND

The Playback And command provides most of the functions found in the Macro menu. You can delete macros, save macro files, open macro files, start recording, and more with the dialog box that appears in Figure 8-4:

- The **New** button lets you clear the slate of all macros and start over. If you have created any new macros, or erased old ones, you are prompted to save the file.
- The **Open** button lets you open a new macro file. It is the same as the **Open Macro File** command.
- The **Save** button saves the existing macros in a macro file. If the file has not been previously saved, you are asked to provide a name for your macro file. The **Save** button is the same as the **Save Macro File** command.
- The **Save As** button saves the macros under a new macro file name. It is the same as the **Save Macro File As** command.
- The **Play** button plays the currently selected macro (from the macro list on the left).

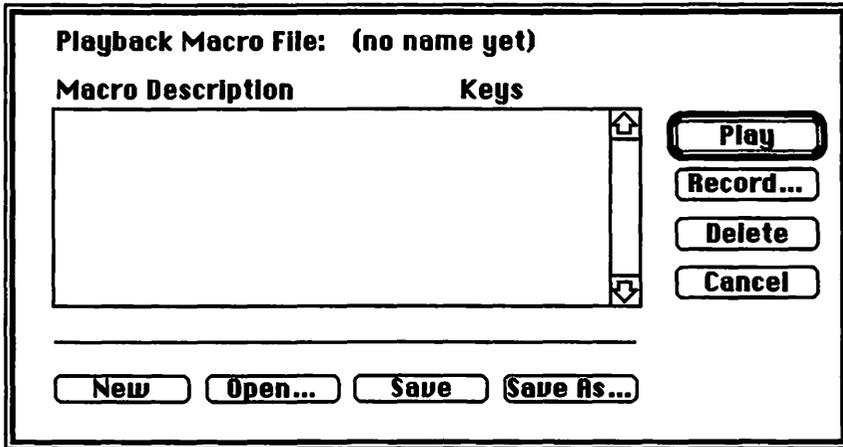


Figure 8-4 *Playback and Dialog Box*

- The Record button records a new macro. It is the same as the Start Recording command.
- The Delete button erases the currently selected macro (from the macro list on the left). Works does not let you undo the deletion, so be careful with this button. However, if you accidentally delete a macro that has been previously saved in a macro file, open the file again. Works will ask if you want to save the changes to the macro file; click the No button. Beware! All other changes you have made, including new macros you created, will not be saved, either.
- The Cancel button cancels the Playback And command and returns you to Works.

PAUSES

Normally, macros play back at only a fraction of the speed it took you to record them. A macro with pause on (as indicated with the Record Pauses option in the Start Recording dialog box) plays back in roughly the same speed it took to record. Pauses in a macro are most useful as a presentation tool. You can use the feature to prepare a guided tour of a document, for example, highlighting a series of facts and figures for a client or associate.

You can also use pauses as a means to "debug" a Works macro. Debugging means to locate a fault in programming—in this case, the programming of a Works macro. If a macro doesn't seem to be operating properly, re-record it, this time with pauses on. Play it back and watch its progress carefully. You should easily find the cause of the problem. Once

the error has been corrected, record the macro once more, this time with the pauses off.

LIMITATIONS OF MACROS

Macros are great productivity tools, but Works macros are more limited than the macro function found in some other Mac applications, such as Microsoft Excel or WingZ.

Macros merely repeat your actions with the keyboard and mouse. Works macros are not intelligent, and they can't determine the type of document currently open. For obvious reasons, using a macro designed to draw a series of boxes in any Works module other than Draw will result in an error. Be sure to double-check that you are using the proper macro, and that the correct Works module is active. If the macro requires a specific document be opened, check that the document is on the screen and active.

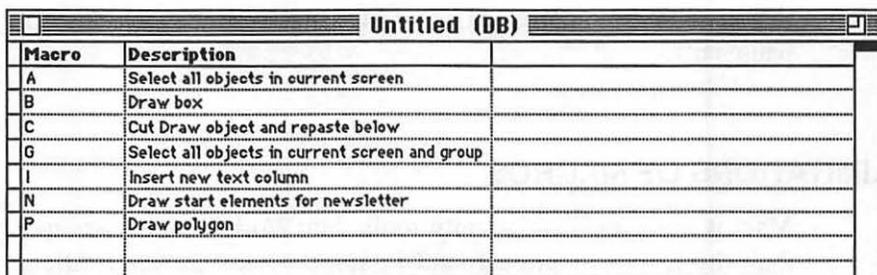
Macros work best when the document window you used to create the macro is the same size as the document window during playback. Otherwise, the macro may not work properly. Get into the habit of expanding windows to their full size before recording and playing back macros. If only one window is open at a time, you can include expanding the window as the first step of a macro.

Macros operate in an "absolute" world where mouse actions are replayed in the *exact same place* as they were recorded. For best results, use the mouse only for choosing commands from a menu or options from a dialog box; avoid using the mouse for controlling windows (opening them, closing them, and so forth), scrolling through documents, and editing. Why? The macro replays the recorded mouse action in the same place as the original; if the window during playback is in a different place than it was during recording, you could end up with a terrible mess.

You must access the Macro menu to stop recording a macro; there is no command key shortcut to do it from the keyboard. This presents a serious limitation: Works macros can't be stopped at dialog boxes.

PRINTING THE MACRO LIST

Unless you use the same macros several times each day, you will invariably forget which macro does what, and which keys you must press to invoke a particular macro. Unfortunately, Works doesn't provide a way to print macro definitions. If your macro files each contain eight or more macros, write them down by hand and make a paper copy for your own reference.



Macro	Description
A	Select all objects in current screen
B	Draw box
C	Cut Draw object and repaste below
G	Select all objects in current screen and group
I	Insert new text column
N	Draw start elements for newsletter
P	Draw polygon

Figure 8-5 Sample Works Macro Database File

If you regularly update or add new macros, keep a running tally in a Works database file. Update the file as needed, and print a new one. Figure 8-5 shows how you might construct a macro-tracking database file.

If you have fewer than eight macros, you can make a quick printout of the Playback And dialog box that lists the available macros. To make a direct print of the dialog box to an ImageWriter, press **Command-Option-4**. You can also make a MacPaint document of the dialog box and screen by pressing **Command-Option-3**. Documents created in this fashion have the name *Screen0* through *Screen9* (you can only make 10 screens at a time). Use MacPaint, or any other application that can open MacPaint documents, to edit and print each file.

MACRO EXAMPLES

No doubt you'll have little trouble dreaming up practical uses for Works macros, but here are some applications you may want to try. Feel free to modify these macros as you see fit.

Spreadsheet Number Series Macro

With a number series, you indicate the start of a number range, the intervals (by 1s, 2s, 5s, 10s, and so forth), and the end of the number range. A number series macro approximates a real number series spreadsheet function. Here's one approach, using cell A1 as the start of the range, and counting by 1s to 10.

1. Select cell A1.
2. Start a new macro, providing it with a key and description.
3. Enter a numeral 1 in cell A1.
4. Make cell A2 current.

5. Write the formula **=A1+1**.
6. Press **Return**.
7. Select cells A2 to A10.
8. Choose the Fill Down command from the Edit menu.
9. Stop the macro.

If you need to make the number series longer (up to 25, for example), play back the macro, then manually select the last cell in the series. Extend the selection to the end of the desired range, and choose Fill Down. If the number series is too long, simply select the numbers you don't need and Clear.

You can make similar macros for other number series intervals, such as by 2s, 5s, and 10s. To count by 5s, for example, enter a 5 in cell A1, and write the formula as **=A1+5**.

Place Marker Macro

A place marker is a special code you insert in a word processing document to help you at some later date return to a specific location in the text. The marker should be a character or series of characters you don't often use, for example,

<i>Code</i>	<i>Example</i>
Tilde	~
Double ampersand	&&
Backslash	\

Follow these steps to prepare the macro that will find the place marker:

1. Start a new macro, providing it with a key and description.
2. Choose the Find command from the Search menu.
3. Enter the code in the Find What: box.
4. Press the **Return** key.
5. Click the cancel button in the Find dialog box.
6. Stop the macro.

To use this macro, open the document (if it isn't open already), and make sure the insertion point is at the very beginning. Start the macro. It will find the code (assuming it is in the document), and highlight it. If you always plan on finding the code and erasing it, include an additional step after Step 5, above. Press the **Delete** (or Backspace) key to erase the highlighted code.

Get into the habit of running this macro before you print your documents, or else you run the risk of printing the place marker code with the rest of the text.

Spreadsheet Month Column Headers

The spreadsheet module is often used to track monthly income and expenses throughout the year, and spreadsheets commonly have headings for the individual months of the year. Instead of manually writing each month over and over again for each spreadsheet you make, create a macro that will do it for you.

1. Select cell A1 (on playback, you can start the month entry at any cell).
2. Start a new macro, providing it with a key and description.
3. Type the word January, and press the **Tab** key.
4. Type the word February, and press the **Tab** key. Repeat for the rest of the months in the year. After entering December, press **Enter** instead of **Tab**.
5. Press **Shift-Tab** 12 times to return to January.
6. Stop the macro.

CompuServe Communications Scripts

CompuServe (and other computer on-line services like it) can be greatly automated with the use of macros. Although Works macros cannot be made to wait for a specific CompuServe prompt, you can create a set of scripts designed for manual activation at the appropriate times. Here are some examples.

- *Log-on script.* Provide your ID and password at the "User ID" prompt. Although CompuServe normally asks for the ID and password separately, you can provide them both on the same line. Record a macro that includes your ID number, a backslash (\), your password, and a Return, such as **12345,0987\password*here. <Return>**. Activate the log-on script after connecting with CompuServe and pressing **Control-C**, or **Command-Option-C**.
- *GO SIG script.* A primary application of the CompuServe network is its many special interest groups, or SIGs. These SIGs go by such names as MACPRO (for Macintosh productivity forum), CEFORUM

(for consumer electronics forum), and MSAPP (for Microsoft applications forum). You access these forums by entering a GO command at any ! prompt, such as **GO CEFORUM**. Construct a series of scripts for each forum you regularly visit. If desired, also include instructions for playing back new messages posted at the forum.

- *Message tag script.* Many users of the various SIGs, as well as the public CB "gab" section of CompuServe, develop special signatures and sign-offs for their messages. It may be as simple as your name, or it may be a crude "electronic" version of your handwritten signature (composed of letters and numbers carefully placed across the page). Obviously, manually typing your sign-offs for each message can be time-consuming and prone to error, but a macro converts the task to child's play. The technique works whether you enter your messages on-line, or compose messages in Works and upload them to CompuServe.

Other Ideas for Macros

Here is a list of additional uses for Works macros:

- Start spelling check.
- Select specific options in the Spell Options dialog box.
- Open new document (one macro each for word processor, database, spreadsheet, and communications).
- Set new justification or spacing (for instance, one macro for single space, and another for double space).
- Go to the beginning or end of the database records.
- Sort database.
- Change attributes of spreadsheet cells or database fields.
- Create a spreadsheet chart.

Managing Works

Works requires no special setup or installation before you can use it, but effective results with Works demand that you think about how you have the Works files organized on floppy or hard disks, how much memory you have available for Works operation, and the variety of Macintosh system resources you are using concurrent with running Works.

This chapter details the effective supervision of Works, including hardware you need to use Works, minimum required memory and system resources, and disk management. You'll also learn about the minimum files you need to use Works, how to set up unique working disks for using Works, and how to start Works automatically when you turn on the Macintosh each day.

Works requires a minimum of one megabyte of system memory, most of which it uses for its own gluttonous program resources. This limits the variety of Mac models that can use Works to:

- Mac Plus
- Mac SE
- Mac II

You can also use Works with a Mac 512KE that has been outfitted with at least one megabyte of memory. Memory upgrades for the older 512KE machines are performed by third-party companies not generally recognized by Apple or Microsoft, so compatibility problems may occasionally arise. The computer may not operate properly with future versions of the Macintosh System, Finder, or with Works.

Works operates more smoothly and efficiently with additional memory,

especially if you use MultiFinder. Memory upgrades in the Mac Plus require hard-wiring, and like the modified Mac 512KE, the implementation of extra memory may not be compatible with future releases of Macintosh System and application software. The Mac SE and Mac II models incorporate sockets for simple and straightforward memory upgrades.

If you are contemplating a memory upgrade for your Macintosh, consider the type and variety of software you wish to run on it. Assuming Works is your main application, you can consider the following memory capacities adequate for typical applications:

Memory Amount	Application	Document Size
1 MB	Works with Finder.	Small to moderate
2 MB	Works with Finder or MultiFinder.	Moderate
2.5 MB	Works with MultiFinder, and one or two other moderate-size applications loaded into memory at once (such as MacDraw or SuperPaint).	Moderate
4 MB	Works with MultiFinder, and up to four other applications loaded into memory at once.	Moderate to large
8 MB	Works with MultiFinder, and up to 10 other applications loaded into memory at once.	Large

As noted in the table above, document size pertains to the amount of characters in documents, though Works keeps in memory all documents currently open. For the sake of estimating memory requirements, assume that only one or two documents are open at any one time.

Document Size	WP	SS	DB
Small	15 pages	300 cells	10 fields/30 records
Moderate	40 pages	2,000 cells	10 fields/1,000 records
Large	100 pages	8,000 cells	10 fields/4,000 records

SOFTWARE CONFIGURATIONS

Works takes up to a maximum of 768K of memory when loaded in the Mac, even though the application size is only 587K. The extra memory is reserved for internal use by Works and includes working space for documents.

When used with the Finder and a one megabyte Mac, Works leaves just enough space for the required system resources. You may not be able to use some applications and utilities that consume extra memory, such as RAM cache and RAM disk (both of which are detailed later in this chapter). Use the following table as a guide for setting up Works with various system and software configurations. Here's what the entries under the headings mean:

- **R** means the recommended configuration.
- **NR** means not recommended.
- **O** means optional.

Note: Recommendations consider available memory, software flexibility, and efficiency. Of course, you are free to formulate your own custom software configuration to best suit your needs. The use of MultiFinder, RAM cache, and RAM disk is really a personal decision, depending on your working habits, level of general Macintosh knowledge, and the tasks you need to perform.

Available Memory	Finder	MultiFinder	RAM Cache	RAM disk
1 MB	R	NR	NR	NR
2 MB	R	O	O	NR
2.5 MB	O	R	O	O
4 MB	O	R	R	R
8 MB	O	R	R	R

The Macintosh lets you vary the size of RAM cache and RAM disk. With less than 2.5 MB of memory, RAM cache should be 128K or smaller, and RAM disk should be 400K or smaller. You can assign RAM cache and RAM disk sizes up to the maximum allowable limit if your computer is equipped with 4 MB or more of memory.

MAXIMIZING YOUR PERFORMANCE WITH SYSTEM RESOURCES

System resources help the Macintosh function. Among the vital System

resources are fonts, desk accessories, printer drivers (for the ImageWriter and LaserWriter), and basic operating instructions for keeping the Macintosh on an even keel. All System resources consume memory, whether you are actively using them or not.

Some System resources are not absolutely necessary for the Macintosh to function, and you may prefer to trim certain resources in order to gain extra operating space for Works. This is particularly important if you use Works with MultiFinder and a marginal one megabyte of RAM (such a setup is not strictly recommended, but you *can* do it).

All System resources are contained in the System Folder of your hard disk or Works disk (in fact, all startup disks for the Macintosh contain such a System Folder). System resources come in a variety of forms. Among the most common are:

- Resources forming the System file
- Independent INITs (Resources loaded into memory on startup)
- Independent CDEVs (Special utilities for the Control Panel)

System File Resources

The System file contains many “packets” of information. Macintosh programmers and software developers call packets resources. These resources can often be individually edited (as detailed in Chapter 10, “Customizing Works”), and perform a variety of useful functions. Most System file resources cannot be removed; doing so would cause the Macintosh to fail. But some resources are not absolutely critical to the operation of the Mac, and consume valuable disk space.

The two main System file resources that you can eliminate are installed fonts and desk accessories (DAs). “Installed” means the resources for the fonts and DAs have been converted to packets that reside in the System file; they are not individual font or DA files residing on the disk.

The Macintosh requires the following fonts for operation, and these cannot be removed:

- Chicago 12 point
- Geneva 9 and 12 point
- Monaco 9 point

Ordinarily, the Macintosh loads into memory only fonts (and sizes) it requires to display the text on the screen (this includes text for icon names, windows, menus, commands, and so forth). Since Works keeps all its open documents in RAM—rather than shuttling parts of documents to the disk to

make extra working space—the more fonts you use in a document, the more memory is consumed. You can combat this by using fewer fonts in the document. If disk space is your problem, removing unneeded fonts reduces the size of the System file.

Desk accessories consume RAM only when you open them, but also take up valuable disk space. Remove those desk accessories you don't need.

Both fonts and desk accessories are installed and removed using Apple's Font/DA Mover. If you decide to remove fonts and DAs from your Works disk System file, make it a point to save them first in separate files, just in case you need them at some later date.

Independent INITs

An INIT is an initialization resource that loads into the Mac's memory when you first turn it on. INITs are disk dependent; every startup disk can contain different INITs.

The System file has its own INIT resources, but INITs can also be independent files stored in the System Folder. On power-up, the Macintosh loads these INITs in the same manner as the ones in the System file. A number of specialized utility software, such as print spoolers, are distributed as INITs. Because INITs are loaded into memory when the Macintosh starts, they consume memory that might otherwise be used to hold Works documents. Check the INITs in the System Folder and determine their usefulness to you. To deactivate an INIT, remove it from the System Folder (you can store it in another folder for safe keeping). Restart the Macintosh and the extra memory will be available.

If and when you want to use one of the removed INITs, simply re-place it in the System Folder and restart the Macintosh.

The Macintosh System/Finder software comes with only a few INITs. The most notable is Easy Access, which modifies the operation of the keyboard. If you're not sure which files in the System Folder are INITs, while at the Desktop select the unknown file and choose the Get Info command from the File menu. The Get Info window usually describes an INIT file as a "Startup document."

The icons for many, but certainly not all, INITs appear in the lower left corner of the Welcome screen ("Welcome to Macintosh," or a custom screen) after the Macintosh has started.

Independent CDEVs

CDEV stands for Control DEVICE, a type of INIT that handles Control Panel chores. CDEVs are set once in the Mac's Parameter Random Access Memory (PRAM), and don't depend on each system disk you own.

In the most recent releases of the Macintosh System/finder software, the Control Panel is composed of individual elements, such as General (for things like date and time, Desktop pattern, and speaker volume), Mouse, Keyboard, and Sound. Each of these elements corresponds to a separate CDEV file located in the System Folder. As with INITs, by removing unneeded CDEV files you can reclaim lost memory.

Once you make the desired changes to the Control Panel, you can close the Control Panel window, then remove its CDEVs, and restart the Mac (keep the CDEV files in another folder for safe keeping, in case you need them again).

Should you decide to change one or more of the Control Panel settings, you can return the desired CDEVs to the System Folder and restart the Mac.

Apple provides the bulk of the CDEV files used with the Macintosh, though others are available from third-party sources (including Shareware and public domain). The standard CDEV files, shown in Figure 9-1, are:

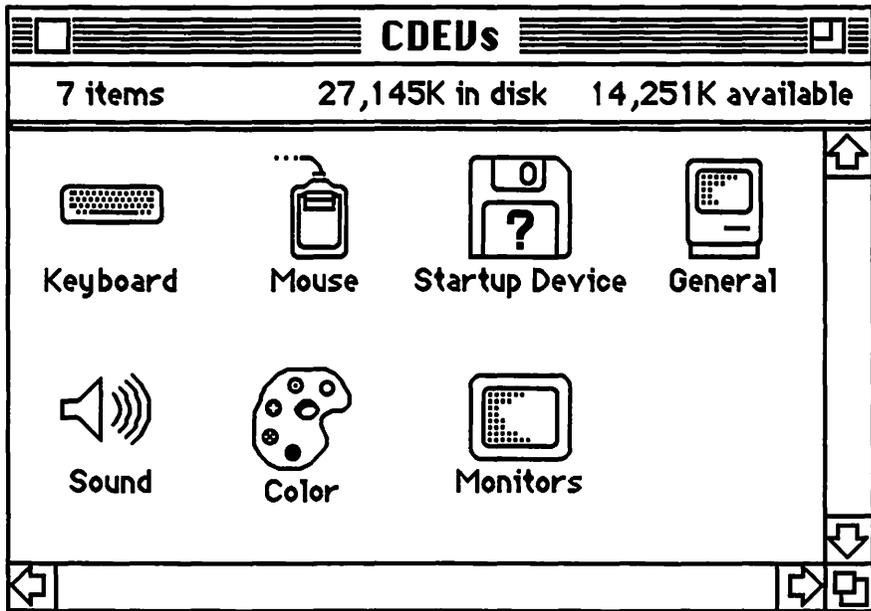


Figure 9-1 CDEV Files in Folder

- General
- Mouse
- Keyboard
- Sound
- Color
- Monitors
- Startup Device

Most, but not all, CDEVs appear in the Control Panel window.

If you're not sure which files in the System Folder are CDEVs, while at the Desktop select the unknown file and choose the Get Info command from the File menu. The Get Info window usually describes a CDEV file as a "Control Panel document."

SYSTEM VERSION AND UPDATES

Works is designed to operate with System version 6.0.2 or later. If you are using an earlier version of the System, you should upgrade before trying Works, or you could experience unexpected "bombs." If you're not sure of the System version, select the System file from the Desktop, and choose the Get Info command from the File menu. The dialog box should include a version number.

If no version number can be found, choose the About Finder (or MultiFinder) command in the Apple menu. As shown in Figure 9-2, the box includes the version numbers for both System and Finder.

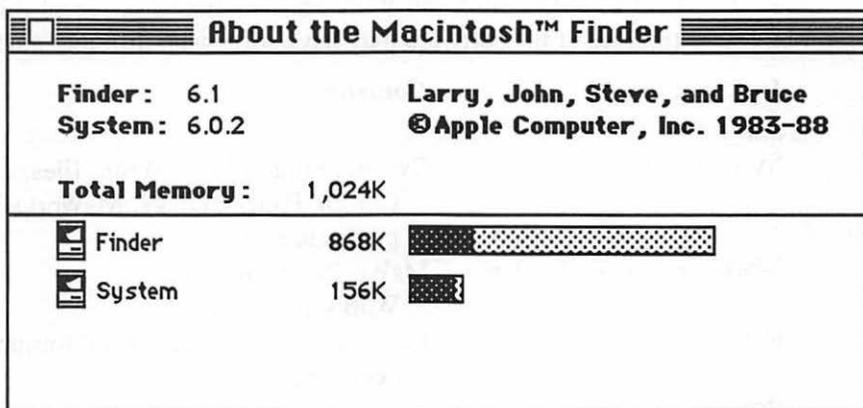


Figure 9-2 About Finder Box

MINIMUM FILE CONFIGURATION FOR WORKS

At a minimum, you need only the Works program file to use Works. As long as you don't use the spelling checker, on-line help, or homonym finder, the extra files are not required and you can remove them to make more space on your disks. The following files are required only when you specifically access them.

- **MsWorksHelp**—Only needed when you call for on-line help.
- **MsWorksDict**—Only needed when you start a spell check.
- **MsWorksHymn**—Only needed when you check Homonym option for spell checking (in addition, Works manufactures a compressed version of the MsWorksHymn file the first time you use the homonym feature; this file is also not needed).

In addition, Works come with tutorial example documents and a Hypercard guided tour stack, all of which are not necessary for day-to-day operation. The Works-Works Transporter application is used for converting Works documents to other file formats, and vice versa. It, too, is not needed for routine use of Works.

The MsWorksPref preference file (kept in the System Folder of the start-up disk) is not absolutely required to run Works, but the program will automatically create a new preference file if it can't find it. You can delete the file, but a new one will take its place after you use Works.

DISK MANAGEMENT

Works and its various support files come on three 800K diskettes. The following is a list of the files on the Works distribution disks as of this writing; future releases of the software may have somewhat different contents.

<i>Disk and Files</i>	<i>Contents</i>
<i>Startup Disk</i>	
System Folder	System, Finder, ImageWriter files, Control Panel CDEVs; MsWorksPref preference file.
Works Dictionary Folder	MsWorksDict and MsWorksHymn files.
Readme	Last-minute information (WP format document).
<i>Program Disk</i>	
Microsoft Works	Works application file.

MsWorksHelp Tutorial	Works on-line help file. Various Works documents for guided tutorial.
Works Tools	Works-Works Transporter application.
<i>Works Tour Disk</i> A Works Tour	Works Tour Hypercard stack.

Works comes on three diskettes, but you only need two—the Startup and Program disks—for everyday operation. You can use the two diskettes with either one 800K floppy drive, or two 800K floppy drives. Keep in mind that using one floppy drive means that you'll have to swap the two Works disks in and out of the drive, which can be frustrating and time consuming.

FLOPPY DISK MANAGEMENT

Though Works runs best with a hard disk drive, your Macintosh may be outfitted only with one or two floppy disk drives. Using floppy disk drives is more than acceptable of course, but you'll be constantly fighting the problem of overflowing disks and disk swapping.

Whether your computer has one or two 800K floppy disk drives (two is recommended), you should strive to keep only the required files on your Works disks. Remove unnecessary fonts and desk accessories, as well as independent INITs and CDEVs, as described earlier in this chapter. The Works on-line help file, MsWorksHelp, consumes 130K of disk space, so if you don't need to access help, remove the file.

As a starting point, construct two working disks with the following files in each disk (feel free to modify the disk contents as you see fit, but keep an eye on remaining disk space).

<i>Disk</i>	<i>Files on Disk</i>
Startup Disk	System Folder with Finder (or MultiFinder) and system files, MsWorksPref, Image-Writer <i>or</i> LaserWriter driver; optional: Works Dictionary folder with MsWorksDict and MsWorksHymn files.
Program Disk	Microsoft Works; optional: MsWorksHelp.

With the Startup disk specified (including optional files and average number of fonts and desk accessories), there is approximately 140K bytes of free space (262K without the dictionary and homonym files).

The Program disk has 192K bytes of free space without the help file;

62K with the help file (I recommend you leave the MsWorksHelp file off the disk and use the Works manual instead). You can use either disk for storing Works documents, but you may find it more convenient to restrict document storage either to the Program disk, or to a separate documents disk (the latter approach is recommended if you create lots of documents).

Mac with One 800K Drive

Works is only marginally useful with one disk drive. To use Works with a single 800K drive:

1. Start the Mac with the Startup disk.
2. Once the Desktop appears, eject the Startup disk.
3. Insert the Works Program disk.
4. Start Works by double-clicking on its icon.

The Macintosh may eject the Program disk and ask you to temporarily insert the Startup disk, only to return to the Program disk again (this process may continue for several complete disk swaps). And when using Works, the Macintosh may periodically stop and ask you to insert another disk. It's a good idea to keep all the required disks at hand so that you can feed the Mac as instructed. To minimize disk swapping while using Works:

- Avoid choosing new fonts and sizes.
- Avoid opening desk accessories.
- Avoid switching between Works modules.
- Avoid using the Works speller.
- Save documents on the Program disk.

Mac with Two 800K Drives

Having two 800K drives makes life considerably easier, not to mention making you a more content Macintosh user. As long as you store your Works documents on either the Startup or Program disks, you avoid disk swapping and the attendant inefficiency associated with it. Start with the Mac with the Works Startup disk in the internal drive (or the lower drive if you have an SE). The Works disk is placed in the external (or upper) drive.

Should you wish to store documents on a separate disk, be sure to start Works first, then open the desired document from within Works. You will

find the Mac requests you to swap disks fewer times if you eject the System disk, rather than the Works Program disk, and replace it with the document disk.

Once the Mac needs some information from the System disk, it will eject the document disk and ask for the System disk. Replace the System disk as requested and continue working. When it comes time to re-save the document, eject the System disk once again and replace it with the documents disk.

Using Folders

Folders allow you to keep like documents and files together in one, easily managed package. Works comes with several of its files tucked neatly within folders. You should retain this folder system to maintain efficient file management of your Works disks. (In any case, the System Folder on the Startup disk is required, and should never be removed.)

Folders are created at the Desktop using the New Folder command from the File menu. New folders are initially named Empty Folder, but you can rename them as you can any Desktop icon. If you plan on generating lots of documents in a single Works session, consider the types of files you will be creating, and make folders for them. You can always change the names of folders later.

Feel free to place folders within other folders, if your documenting filing system requires it. For example, suppose you have created the basic document folders shown in Figure 9-3. While not suggesting this is the

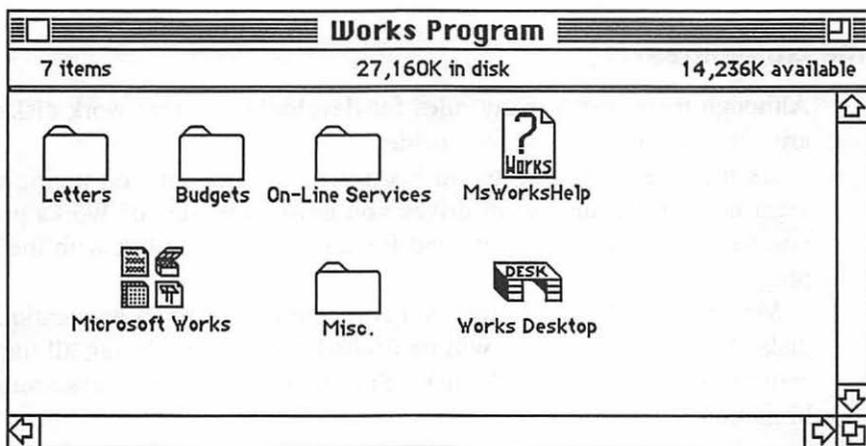


Figure 9-3 Sample Folder System

best method of storing Works documents, it is one approach you can use. Each folder contains one type of Works document—word processor, database, spreadsheet, or communications. Within each folder are additional folders that specify your individual tasks, such as *Letters*, *Budgets*, and *On-Line Services*.

Once the folders are created, you may save documents within them while using Works. Open the desired folder as usual and click the Save button. If you decide you would like a particular document in one folder instead of another, you can move it from the Desktop, or within Works, as detailed in Chapter 1.

USING CUSTOM DISKS

A custom disk is one engineered for a core task, such as creating and editing newsletters with Works. Figure 9-4 shows the basic idea of custom disks. Though Works is already an integrated program, you can enhance its effectiveness and versatility by combining it with other applications, unique desk accessories, and special fonts. You may use these additional resources only for specific tasks, so it makes no sense to build one main Works disk and mix it with ingredients for all your chores. A far better way is to build individual working disks, each customized for a specific assignment.

With a custom disk, you also avoid much of the disk swapping necessary when alternating from one application disk to another, and because all of the tools you need for the task are within easy grasp, your Mac efficiency will skyrocket.

Some Guidelines

Although there aren't many rules for developing custom work disks, there are a few tips you'll want to consider.

As much as possible, try to keep your applications on a single disk, regardless of the number of drives you have. The size of Works prohibits you from stuffing the System and Finder files on one disk with the Works program.

Most tasks will require that you combine two or more applications on a disk. Your biggest enemy will be limited disk space—fitting all the applications you want on a 800K disk. Still, there are several ways around this limitation.

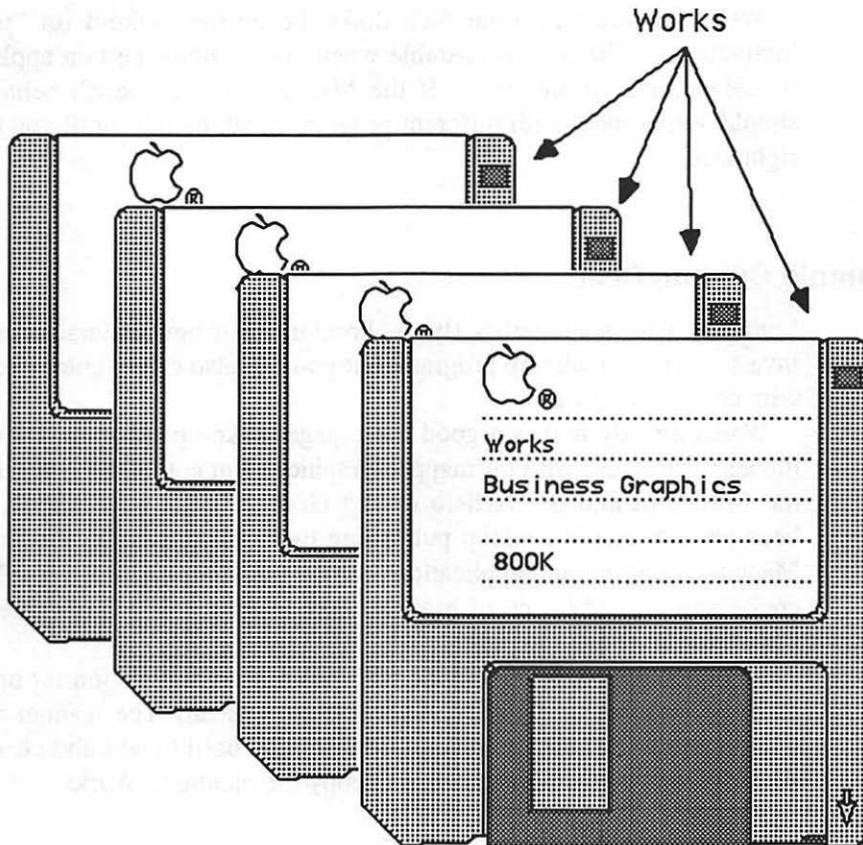


Figure 9-4 *Concept of Custom Disks*

As mentioned earlier in this chapter, you can free up some disk space by removing extraneous fonts and desk accessories from the System file. Use Apple's Font/DA Mover for this.

As a final measure, you can remove some of the more critical disk files, like the ImageWriter or Finder files. There are several desk accessories available that duplicate the function of the Finder. Bear in mind that you give up the desktop metaphor when removing the Finder.

If you've removed the ImageWriter (or LaserWriter) file from the disk, you won't be able to print documents with that disk. You can, however, use the original program disk—with its ImageWriter file intact—for printing documents.

Works isn't copy protected, but some other Mac applications are, so you can't easily make extra work copies. Backup utilities overcome most copy protection schemes so you can make additional work disks. Because of the way copy protection plans work, however, you may not be able to fit two or more protected applications on a single disk.

When constructing your own disks, be on the lookout for “program interaction.” The Mac is unstable when you combine certain applications or accessories on one disk. If the Mac bombs, or doesn’t behave as it should, experiment with different program combinations until you find the right mix.

Sample Custom Disk

Let’s say you put together flyers, brochures, or newsletters. You could invest in a page make-up program, but you can also create one of your own with cheaper applications.

Works already makes a good basic page make-up program, but it lacks the ability to work with bit-mapped graphics. But combined with the original MacPaint and the Artisto or Art Grabber desk accessories, Works becomes a versatile desktop publishing tool. (Sources for supplementary Macintosh utilities and applications can be found in Appendix A.) You can create and edit any type of graphic, and easily insert it anywhere on the Works word processing page.

You may also wish to combine with this mix an application for operating an image scanner or digitizer, such as ThunderScan. The scanner application is used to capture the picture, MacPaint is used to edit and clean it up, and Artisto or Art Grabber is used to copy the picture to Works.

HARD DISK MANAGEMENT

You can load the entire contents of all three Works distribution disks onto your hard disk if you want, but there’s certainly no need for it. Though you may have empty megabytes on your hard disk, treat each free byte of space as a valuable commodity. Place only those Works files you need on the hard disk. Your hard disk should contain only one System Folder, so don’t copy the System Folder for the Works Startup disk, or its contents, to the hard disk.

Hard disk drives can contain several thousand files, so you need to develop a file keeping system. As with floppy disks, store similar files in separate folders. One approach that works particularly well for most users is a separate folder for each Macintosh application, such as Works, MacDraw, SuperPaint, or Illustrator. Within these folders you place the files associated with each application. Again, make use of folders to keep like items together. One folder may contain Works dictionaries, another Works documents, and a third, Works utilities (including the Works-Works Transporter application).

HOW WORKS FINDS FILES

Works must be able to find certain files when you request on-line help, activate spelling, or choose the homonym option during a spell check. Works follows a certain path as it attempts to find these special files. By knowing this path, and how the program uses it, you can devise better ways of storing Works files. The path has three checkpoints:

1. The folder containing Works.
2. The root, or topmost folder of the disk containing Works.
3. The System Folder.

STARTING WORKS

There are numerous ways of starting Works. You can begin a Works session by opening the file manually, by setting the Works program file as the Startup application, or by using a Desktop macro.

Starting Works Manually

You can start Works manually from the Desktop in either of two ways:

- Select the Microsoft Works icon, then choose the Open command from the File menu.
- Double-click on the Microsoft Works icon.

Using the Set Startup Option

The Set Startup command in the Special menu (at the Desktop) allows you to select the application the Macintosh automatically runs when it is first started. Normally, the Mac runs the Finder or MultiFinder (both of which are considered applications). But by choosing Works as the startup application, the Mac automatically begins a new Works session when you turn the Mac on. The startup application can vary from one disk to the next, so if your Mac is equipped with floppy disk drives, each startup disk you use can begin a different application.

To set Works as the startup application:

1. At the Desktop, select the Microsoft Works icon.
2. Choose the Set Startup command from the Special menu.

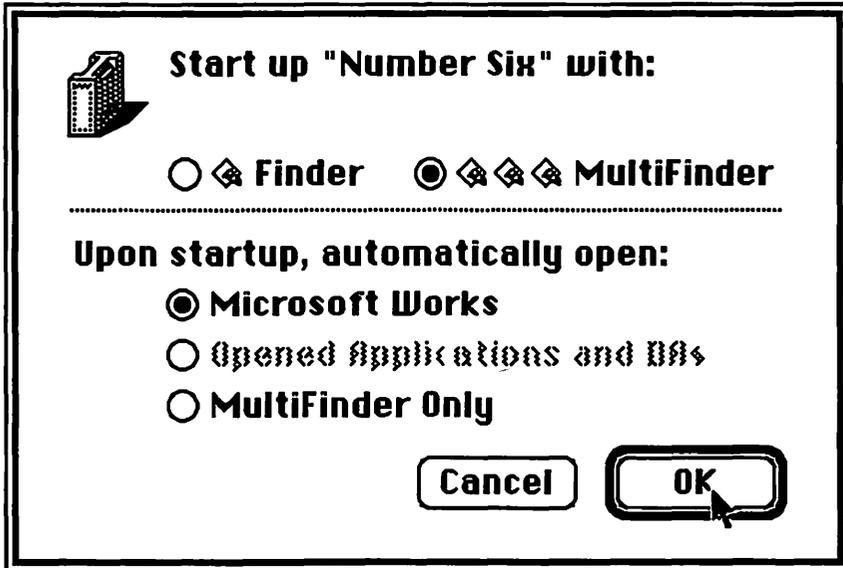


Figure 9-5 Set Startup Box

3. Select the Finder or MultiFinder option (depending on whether you want to use the Finder or MultiFinder), along with Microsoft Works, as shown in Figure 9-5.
4. Click OK.

The next time you start the Mac with your Works startup disk or hard disk, either the Finder or MultiFinder will load, followed automatically by Works.

To cancel automatic startup of Works, make sure no icons are selected, and choose the Set Startup command once more. Click on either the Finder or MultiFinder options, and click the OK button.

Desktop Macros

Versions of the Macintosh System/Finder software from 6.0 and on come with a convenient macro recording feature. Finder macros are similar to the macro function built into Works: you can record keystrokes and mouse movements for later instant replay. As of this writing, Finder macros are incompatible with Works 2.0, but you can use Finder macros to start Works. Alternatively, you can use one of the many third-part macro recording utilities, including Tempo II and Quikeys.

USING MULTIFINDER

MultiFinder is a diverse application that not only allows you to run two or more applications at one time, but to switch between those applications with a click of the mouse. Perhaps most important, applications running under MultiFinder are totally independent of one another, and share processing time. With MultiFinder, you can calculate a large Works spreadsheet, then click off to a stand-alone graphics program. While drawing pictures, Works completes its calculations.

Of course, the modularity of Works diminishes the importance of MultiFinder for many users, but you may still employ Works with other Macintosh applications. You may also like using MultiFinder because of the speed it offers in switching between Works and the Desktop. You no longer have to quit Works just to throw files away, rename files, or move files between folders.

The Finder and MultiFinder use separate application files. You can keep both in the System Folder of your Works startup disk or hard disk, but you can use only one at a time. Save space by removing the one you don't use. You specify your choice of Finder or MultiFinder with the Set Startup command, in the same manner as you set Works as the startup application (see the previous section for more information).

When using the Finder, you can switch to MultiFinder (assuming it is also present in the System Folder) by pressing **Command-Option**, and double-clicking on the MultiFinder icon. Once MultiFinder starts loading, release the **Command** and **Option** keys. This technique does not work when switching from MultiFinder to the Finder.

If you have selected MultiFinder in the Set Startup dialog box, you can start the Macintosh with the Finder by depressing the **Command** key while the Macintosh starts. Keep the key depressed until the Desktop appears.

Even if you only use Works, you can still use MultiFinder as a convenient way to switch between Works and the Desktop. Start Works from MultiFinder, and the Desktop appears "underneath" the Works windows. To switch between Works and MultiFinder, and back again, click on the icon in the upper right corner of the screen, or choose the desired application from the bottom of the Apple menu.

Many users new to MultiFinder find it difficult to use at first, but through continued practice working with MultiFinder will become second-nature. For best results, keep these points in mind:

- Keep track of which application is currently active by looking at the icon in the upper right corner, or observing which application is checked in the Apple menu (see Figure 9-6).
- Clicking on a window makes it—and its application—active. If you

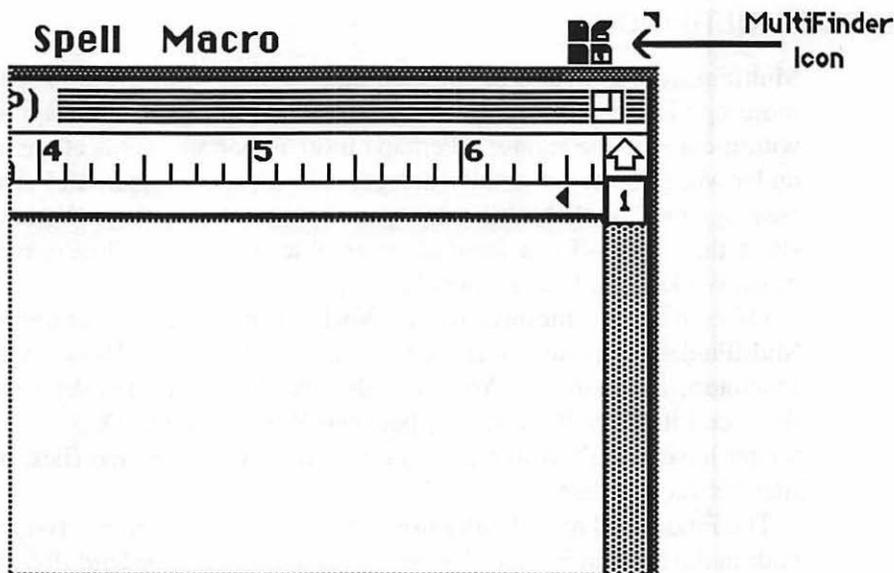


Figure 9-6 *Multifinder Screen, with Icon*

are in Works, and click inside a Desktop window, you instantly return to the Desktop.

- You can't switch between Works, MultiFinder, or another application when most dialog boxes are displayed.
- If Works "crashes" for some reason while running under MultiFinder, you are returned to the Desktop and a dialog box informs you of the trouble. Bear in mind that some portion of data in the Mac's memory may have been corrupted during the crash. You should always reset the memory by restarting the Mac after a crash.

USING RAM DISKS

RAM disk software partitions a portion of the Mac's RAM as an electronic disk drive. Data is temporarily stored in memory rather than on a disk. The benefit of a RAM disk is its speed. You can store and retrieve data on a RAM disk several hundred times faster than with mechanical disk drives. If you want to save the data in the RAM disk, you must copy it to a floppy disk before you turn the Macintosh off. Once the power is turned off, information in the RAM disk is forever lost. RAM disk software is available through most public domain and Shareware sources, as detailed in Appendix A.

USING RAM CACHES

A RAM cache is a small portion of memory (usually between 32K and 384K) reserved to hold bits and pieces of programming codes. The idea of the cache is that repetitive tasks are stored in RAM, where they can be retrieved by the Macintosh much faster than data retrieved from a disk. The performance of Works is sped up, although only marginally, since Works tries to use as much RAM in your Macintosh as it can find.

The latest version of the Macintosh System and Finder includes a RAM cache as part of the Control Panel. You can turn the cache on or off, as well as assign a specific amount of memory (up to 384K). You can increase your work efficiency with the Macintosh by five to 10 percent by turning the cache function on. For best results with Works, you need a Macintosh with at least two megabytes of memory, preferably more. You should not use RAM cache if you have only one megabyte of RAM.

As with RAM disk software, RAM cache programs are also available separately. These let you assign most amounts of memory for caching.

HELPFUL DESK ACCESSORIES

A number of desk accessory utilities offer enhancement to any Works system. However, RAM-hungry DAs could interfere with Works' operation. We therefore cannot guarantee that a 1 megabyte system will support Works and the following DAs. Generally, the more memory, the better. If you have sufficient memory, consider adding the following accessories to your System file (refer to Appendix A for a list of sources for these utilities).

Note: The programs listed as "public domain/Shareware" are offered by most public domain clearinghouses, such as Public Domain Exchange and Educomp. True public domain programs are free, except for a small distribution charge (usually \$6 to \$8). Shareware programs are not free, but are available on a "trial basis." Contact the clearinghouses mentioned in Appendix A for more information.

- **Art Grabber.** Lets you snatch a MacPaint picture from within Works. You can select as much of the 8 by 10 MacPaint document as you want.
- **Acta.** Has the same general function as Art Grabber.
- **Multi-Scrap (public domain/Shareware).** Lets you access any number of individual Scrapbook files. The files can be stored on the Works disk or any other disk.
- **Smart Scrap.** Has the same general function as Multi-Scrap.

- **Extras** (public domain/Shareware). Allows you to perform some Finder-like tasks from within Works. You can use Extras to delete files, display the amount of disk space available, and more.
- **CheapPaint**. A MacPaint-like desk accessory used to edit existing MacPaint documents, or to create new ones. The bit-mapped graphics can be pasted into Works.

Customizing Works

Before you get too involved using Works, you should first consider how to customize the program for your individual needs. Doing so can make you a better and more efficient Works user.

You can customize Works in these five ways:

- Make changes in the Macintosh Control Panel (these changes affect Works and all other applications you run on the Mac).
- Record your preferences in the MS Works Pref file (actually titled **MSWorksPref**).
- Create Works Stationery for the word processor, database, spreadsheet, and communications modules.
- Modify Works with a utility program such as Apple's Resource Editor.
- Create Works macros.

This chapter discusses three of these methods; customizing with Stationery is discussed in Chapter 1, and using macros is detailed in Chapter 8. Included are step-by-step instructions for typical Works setup configurations.

CUSTOMIZING WITH THE CONTROL PANEL

The Control Panel desk accessory, shown in Figure 10-1, controls several characteristics of the Macintosh keyboard, mouse, display, and general interface. You can alter these characteristics with the Works Startup Disk, or with any other disk that contains System and Finder resources.

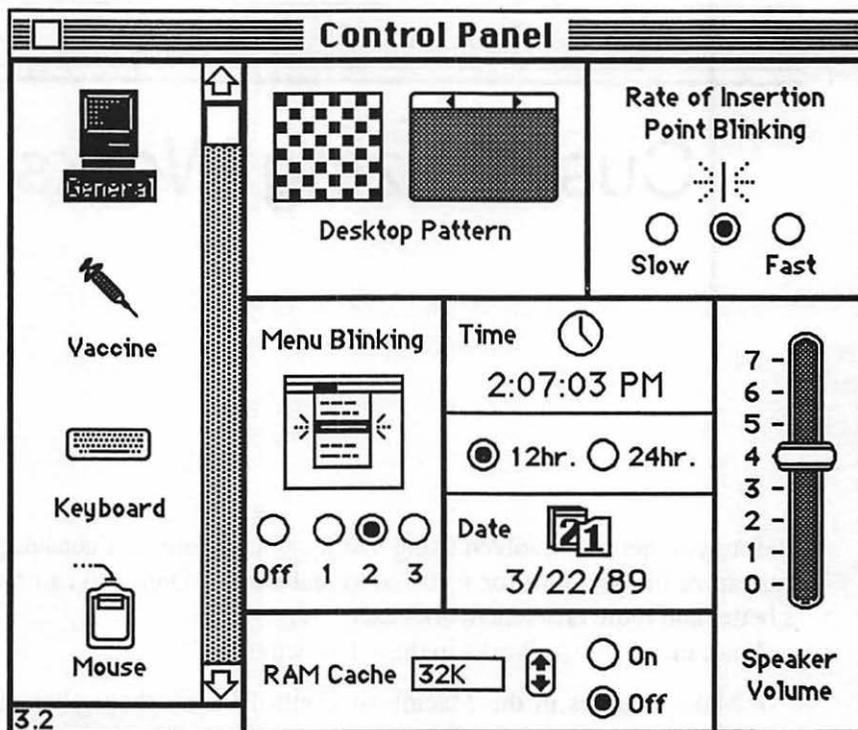


Figure 10-1 Control Panel Box

The changes to the Control Panel are stored in the Mac's Parameter RAM (PRAM) and are kept alive by the clock battery installed in the Macintosh. The changes remain in effect until you alter them again or when the battery dies or is removed. Because the Control Panel is part of the Macintosh operating system, any alterations you make to the Control Panel affect not only Works but also any other Mac application.

Before using the Control Panel, make sure you have the latest release of the Macintosh System and Finder. Works 2.0 is engineered to operate with System version 6.0.2 or later and Finder version 6.1 or later. If you are using earlier System and Finder versions, contact your dealer for an upgrade. The appearance and contents of the Control Panel may differ from version to version. The figures and examples in this chapter were made with System 6.0.2 and Finder 6.1.

The icons you see to the left of the Control Panel desk accessory are individual resources that aren't really an attached part of the Control Panel desk accessory. These files are known as CDEV resources (as discussed in Chapter 9), and appear in the Control Panel dialog box only when they are present in the System Folder. If any of the icons are missing when you

open the Control Panel, check the contents of the System Folder to be sure the desired CDEV resources are there. The most common resources are:

- General
- Keyboard
- Mouse
- Sound
- Startup Device

Only a couple of the Control Panel options are of primary interest to us in the process of customizing Works.

Key Repeat Rate

The key repeat rate (displayed when you click the *Keyboard* icon within the Control Panel dialog box) varies the speed at which the character keys repeat when they are held down (see Figure 10-2). Touch typists may want to set the key repeat fast or moderately fast. Others should keep it slow or moderate.

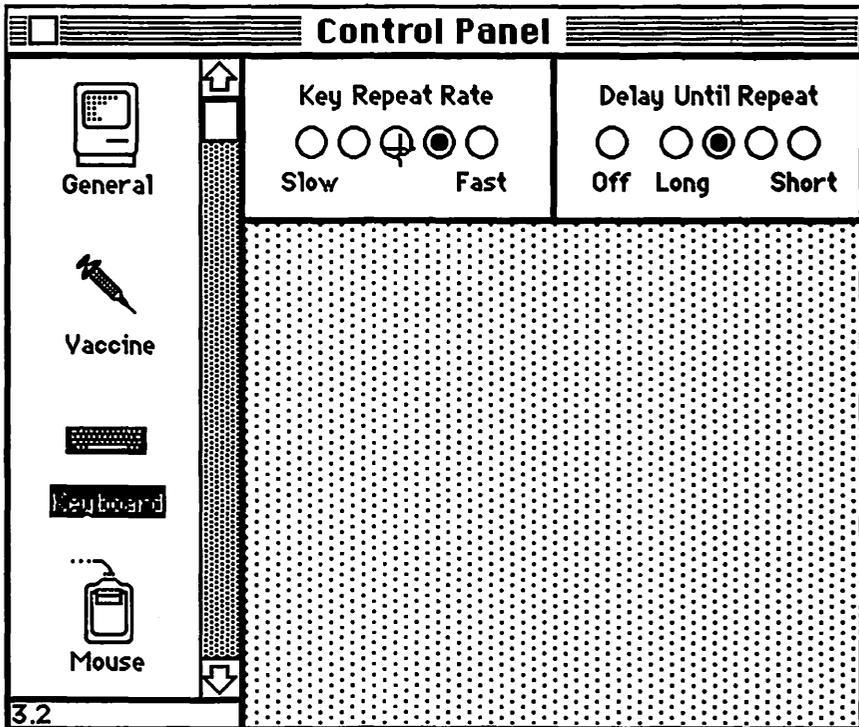


Figure 10-2 *Key Repeat Rate*

Delay Until Repeat

The delay until repeat option (also displayed when you click the *Keyboard* icon) varies the interval between the time when a character key is pressed and when repeating begins. Touch typists should choose a short delay; otherwise, keep the delay moderate or slow.

Double-Click Speed

The double-click speed (displayed when you click the *Mouse* icon in the Control Panel dialog box) varies the interval between successive clicks of the mouse button. If the clicks occur within a preselected period of time, the Macintosh treats the action as a double-click; otherwise, the action is considered single-clicks. If you're new to the Macintosh, keep the double-click speed slow, as depicted in Figure 10-3. Those comfortable with the mouse may choose a faster setting.

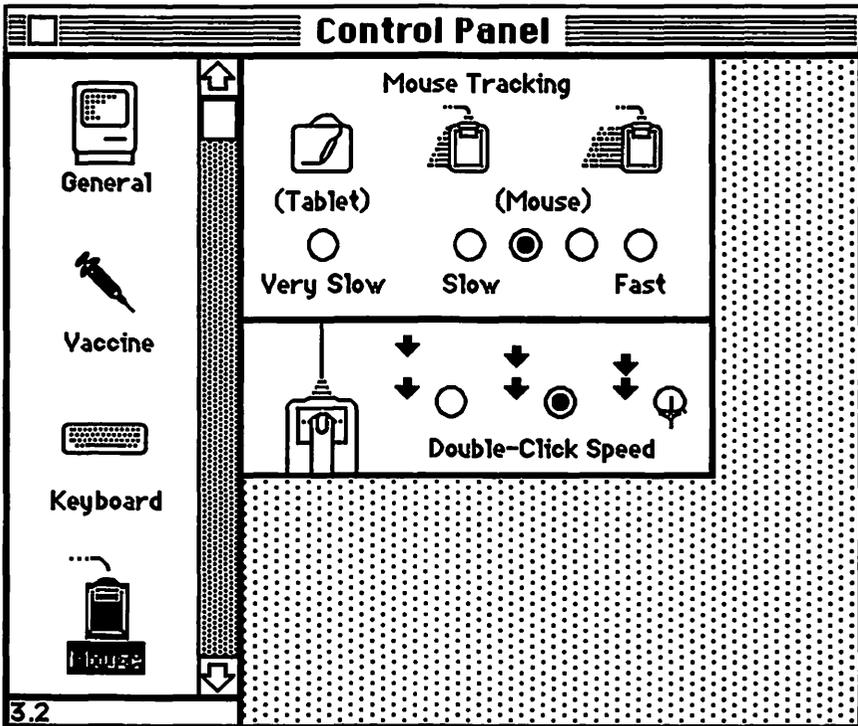


Figure 10-3 Double-Click Speed

Mouse Tracking

Mouse tracking (displayed when you click the Mouse icon) alters the tracking ratio of the mouse and pointer. When you select one of the mouse options, the pointer moves in a variable ratio depending on the speed and acceleration of the mouse. The faster the mouse moves in a particular period of time, the faster the pointer skims across the screen.

Choosing the Tablet option moves the pointer at a constant 1:1 ratio with the mouse, regardless of speed. Choose this setting if you are using a graphics tablet, having trouble positioning the pointer accurately, or creating detailed graphics (with mouse or tablet).

Insertion Point Blinking

As shown in Figure 10-4, the rate of insertion point blinking (displayed when you click the *General* icon in the Control Panel dialog box) changes the rate at which the insertion point flashes on and off. A slow blink makes the insertion point hard to see, especially in a full screen of text. Choose the medium or fast speed to enhance the visibility of the insertion point.

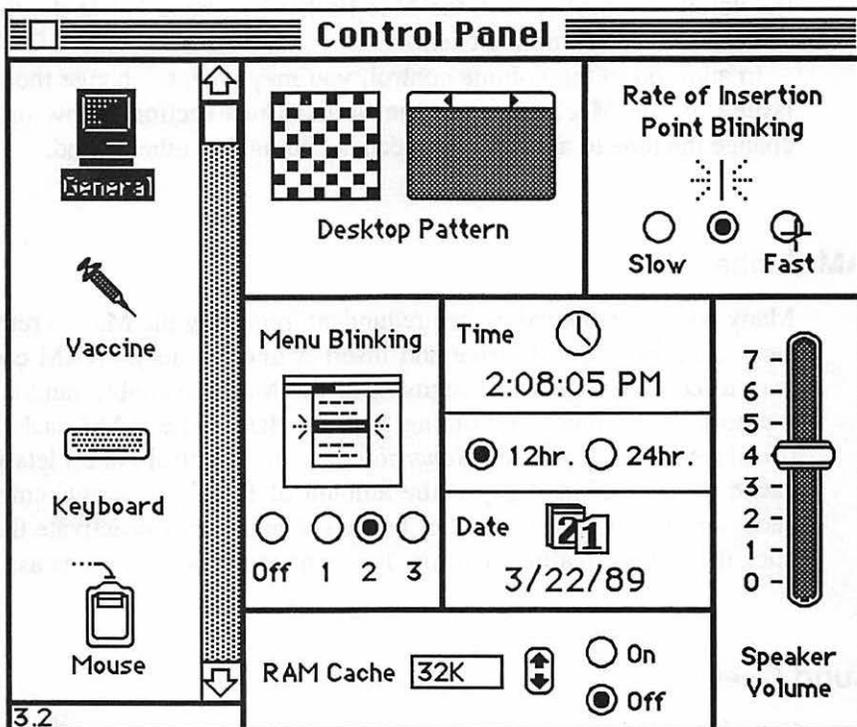


Figure 10-4 Insertion Point Blinking

Menu Blinking

The menu blinking control (displayed when you click the *General* icon) changes the number of times a chosen menu item blinks before the command is carried out. The blinks provide a form of visual feedback that a command has been selected. Most people set this at one blink to save some time.

Speaker Volume

The speaker volume (displayed when you click the *General* icon) controls the volume of the Mac's internal speaker. Works uses the speaker to sound a warning tone if there is danger of accidentally closing an unsaved document. An alert tone is also sounded in other non-warning situations: when Works can't find a specified word with the Find or Replace command, for example, or when you attempt to edit the contents of a protected spreadsheet cell.

Drag the speaker volume control up or down to adjust the volume of the alert tone. The tone increases from 1 to 7; a setting of 0 is no tone. When the volume control is at 0, the Mac flashes the menu bar at the top of the screen as a visual warning cue.

In addition to the volume control, you may wish to change the alert cue issued by the Mac. Refer to the Sound Cues section below on how to change the tone to a monkey screech, a "boing," or other sound.

RAM Cache

Many computer operations are redundant, requiring the Mac to retrieve the same data from a disk drive and insert it into memory. RAM cache is a way to cordon off a small segment of the Mac's available random access memory as a temporary holding tank for data. The RAM cache control (displayed when you click *General* icon in the Control Panel) lets you turn cache on and off, and adjust the amount of RAM you want removed for cache service. Click the On/Off buttons to activate or deactivate the cache; click the arrows to allot the desired amount of memory to cache use.

Sound Cues

Sound cues (displayed when you click the *Sound* icon in the Control Panel desk accessory) let you control the type of warning tone emitted through

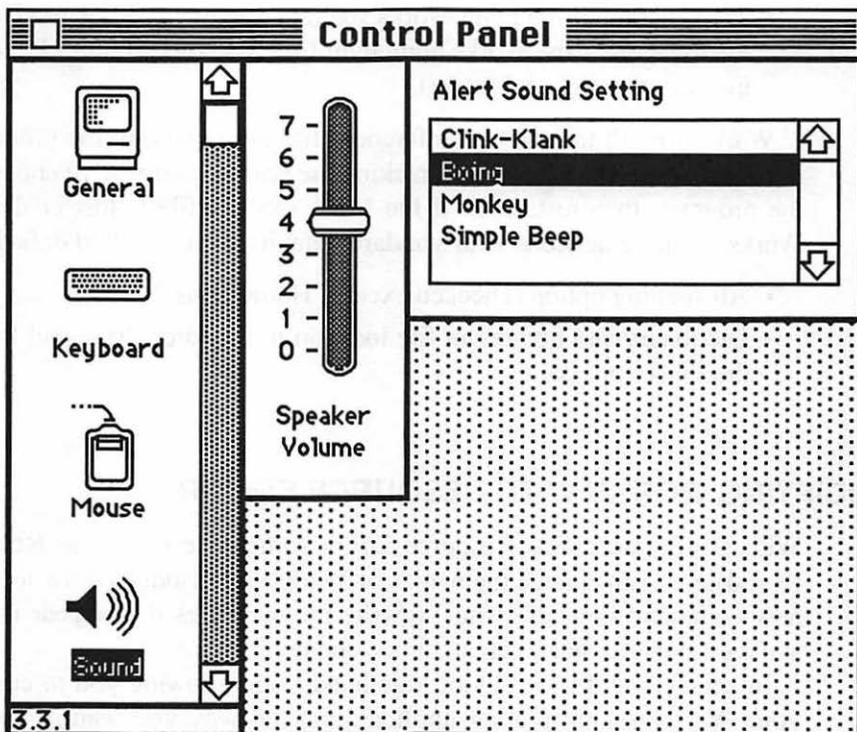


Figure 10-5 *Sound Cues*

the Mac's speaker. Apple provides four basic cues, as shown in Figure 10-5: a clank, a boing, a monkey screech, and the standard tone. Additional cues are available from third party sources and are installed in the Control Panel desk accessory as a normal CDEV resource. To select a new sound cue, click it and the Mac produces the sound through the speaker. Not all cues are at the same sound level, so you may need to adjust the speaker volume.

WORKS PREFERENCE FILE

Works remembers some of your working habits by recording certain preferences in a file called MSWorksPref. This file is normally kept in the System Folder. If the file is missing, Works starts over with the default (standard) preference options and places a new copy of MsWorksPref in the System Folder.

The Works preference file records:

- Selections in the Options command found under the Spelling menu.

- The location of the main Works spelling dictionary, MsWorksDict, and the location of the Works homonym file, MSWorksHymn (the location includes the disk and folder).

Works doesn't update the preferences file until you quit the program, so if you find that Works isn't yet tracking the options that you've chosen, quit the program, then restart it. If the MSWorksPref file is lost or damaged, Works creates a new one with standard defaults. The standard defaults are:

- All spelling options checked except "Homonyms."
- Dictionary and homonym file location in the same drive and folder as the Works program.

MODIFYING WORKS WITH RESOURCE EDITOR

With a program called Resource Editor (otherwise known as ResEdit or ResEd), you can change the names of Works commands, redraw icons, add new command keys to menus, rewrite the messages that appear in dialog and alert boxes, edit and create fonts, and much more.

In short, ResEdit is a do-all Mac handyman, allowing you to customize your Works (or most other applications) the way you want. You can't change everything with ResEdit, but it gives you far greater control over your Mac and Works than you've had before.

The instructions provided here are for Resource Editor version 1.0. You may have an earlier or later version. The general procedure for using Resource Editor may be the same, but the exact steps and menu command names may differ from version to version.

Most importantly, bear in mind that Resource Editor is a technical program, and is not designed for general consumer use. By following the instructions given below to the letter, you should have no trouble customizing Works as described in the text, but you may not understand what you are doing. If you want to know more about how programs like Works and Resource Editor operate, consult a good book on Macintosh programming.

Natural Resources

Most of the Mac's applications, including Works—as well as the System and Finder files—are made up of discrete building blocks called resources. One resource might contain all the fonts you've installed on your disk; another might hold the icons that appear on the desktop. Yet another may

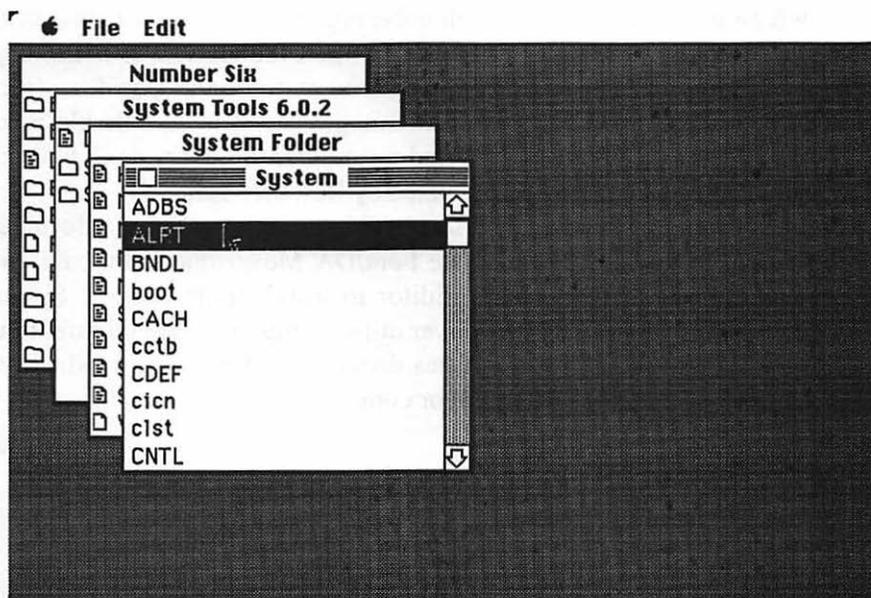


Figure 10-6 *Application Resources*

be a listing of menu commands. Resource Editor is used to open the doors to these resources, and make changes.

Here's an example (but don't try it yet, before you read the do's and don'ts on using Resource Editor). Using ResEdit, open the System file on one of your application disks, and you'll see a listing of resources like that in Figure 10-6. The resources are in code: BNDL, CURS, DITL, DRVR, and so forth.

Open the resource labeled CURS, for instance, and you access the holding tank that stores the various pointer shapes of the mouse. Double-click on the wristwatch pointer, and you can edit it. You can even redraw it completely. How does a turtle strike you? Draw one. Now, whenever the Mac has you waiting, the mouse pointer will turn into a turtle.

To keep track of the multitude of resources within each application, the Mac attaches identification numbers to each one. You can often use the ID numbers to your advantage. Instead of editing the wristwatch, make the turtle from scratch. Then, give the turtle the same ID as the wristwatch (renumber the wristwatch first so you don't overly confuse the Mac—give it a big six or seven digit number). IDs are changed by selecting a resource, then choosing the Get Info command from the File menu. A box appears allowing you to type in a new number.

When the Mac changes from an arrow to a wristwatch, it simply grabs the pointer shape with the ID number of 4—it doesn't care what the pointer actually looks like. Once again, the turtle appears. To revert back to the

wristwatch, just reverse the renumbering process. (Specific instructions on changing the appearance of Works' pointers are given later in this chapter.)

You should note that only programs and certain Mac files (including System, Finder, Scrapbook, and ImageWriter) have editable resources. Documents created by Works and most other programs don't have editable resources, and can't be manipulated by Resource Editor.

That doesn't mean that Resource Editor can't tap into *all* documents. It can easily open and manipulate Font/DA Mover documents, for example. You can even use Resource Editor to install fonts into the System file, although Apple's Font/DA Mover utility is much easier and safer to use. In addition, Resource Editor creates documents of its own, in which you can store resources that you've cut or copied.

Using the Resource Editor

Using Resource Editor is a simple process. But it's not foolproof. It can crash unexpectedly, and the hard work you've done will be lost forever. That's the *good* news. The bad news is that if the program bombs while it's saving your work onto disk, it will most likely ruin beyond salvage the file you've been editing.

You can save yourself a lot of agony if you work *only* with copies of your applications, and by editing applications *only* on floppy disks. With practice, you'll learn the limitations of Resource Editor—what it can and can't do. Another reason for working only with copies of your applications is that you may try to edit a resource that the Mac needs intact and unchanged. Altering even one seemingly innocent character can totally destroy an entire application.

To use Resource Editor, make a copy of it and the files you want to edit (in this case Works), and put everything on a separate floppy disk. Start Resource Editor, and a small window appears, displaying the editable files on the disk. To open a file, double-click on it. To get to some resources, you may have to open several windows. Quite often, resources are tucked within one another, the same way you can put folders within other folders when working on the Mac's desktop.

If the file you want to edit is on another disk, and you have a two-drive Mac, insert the disk in the other drive. The second disk's directory window will appear. To eject a disk, locate its disk window and click its close box. If you have a one-drive Mac, you can still work with two disks, but you'll have to swap them in and out of the drive.

Some of the resources you open may reveal a windowful of strange numbers. These numbers are the hexadecimal code the Mac uses to perform its

sundry tasks. While you can edit these numbers, it does you no good because without training there's no way of knowing what you're doing.

Data contained in an editable resource appear in templates, usually comprised of boxes to fill and buttons to push. If the data is a picture or icon, you'll see its image in the window. Pictures cannot be directly edited with Resource Editor, but icons can. Double-click on an icon and a handy editing template appears.

You can pass resources from one file to another (and from one disk to another) by using the Cut and Copy commands from the Edit menu. You can make a backup copy of a resource by selecting it, then choosing the Duplicate command. To delete a resource without affecting the contents of the Clipboard, choose the Clear command.

When you are done editing a resource, click the Close box in each of the resource windows that are open. As you close the window to the Works program (or other application), Resource Editor asks if you want to save the changes you've made. Click Yes, No, or Cancel, as desired.

Make it a habit of saving your changes often, especially if you are making several alterations at once. Then, try out Works to make sure it operates properly and that your changes have the desired effect. As an added precaution make a backup copy of Works each time you use Resource Editor. That way, if a problem occurs, you can go back to the most recently edited version instead of starting all over with a factory-fresh copy of Works.

Adding and Modifying Command-Key Equivalents

One of the most outstanding uses for Resource Editor is adding or editing command key shortcuts to menu items. Works already has command-key equivalents for some of its commands but you can readily add your own, or change the ones Works offers. See Table 1-1 in Chapter 1 for a list of letter keys that are already assigned to command-key equivalents within the modules of Works.

You'll see that only the letter H is not already assigned as a command-key equivalent in at least one module of Works. Of course, not all letters are used in each module. For example, Command-T is used only in the database module to enter time; you are free to use T in your own command-key equivalents in any of the other modules. Of course, you are also free to remove any command-key equivalent already provided by Works. You can make Command-T equivalent to any command in the database module.

Suppose you use a command often, like the Select All command in the word processing module, but Works doesn't offer a command-key shortcut

for it. With Resource Editor, you can apply just about any key on the Mac's key board as a command-key equivalent (assuming, of course, that the key isn't already in use by Works). Keys you can use include:

- All alphabet keys—A through Z (Works treats upper- and lowercase alphabet keys the same).
- Number keys—from the top row of the keyboard or the numeric keypad.
- Unshifted punctuation and symbol keys—those you get *without* pressing the **Shift** key.
- Shifted punctuation and symbol keys—those you get when pressing the **Shift** keys (in other words, Works differentiates between : and ;).
- Option keys—either shifted or unshifted.

Examples of command-key equivalents are shown in Figure 10-7.

To create or edit command key shortcuts in Works:

1. Double-click on Microsoft Works in the Resource Editor disk window.

File	
New...	
Open...	⌘O
<hr/>	
Close	⌘W
Close All...	⌘1
Save	⌘S
Save As...	⌘`
Delete...	⌘D
<hr/>	
Make Works Desktop...	
<hr/>	
Page Setup...	⌘[
Print...	⌘P
Print Window	⌘]
Eject Page	
Print Merge...	⌘;
<hr/>	
Quit	⌘Q

Figure 10-7 Sample of Command-Key Equivalents

2. Double-click on the Menu resource. (A full list of the Works menus appears in the table below.)
3. Double-click on the desired menu.
4. Scroll the menu window until you find the command you want. Under it will be a box labeled “key equiv,” as shown in Figure 10-8.
5. Click inside this box and type a letter. Though there is space for several characters, type only one. You can use upper- or lowercase letters, but the Mac will treat them the same. If you run out of letters in the alphabet, use a symbol or one of the Option characters.
6. Close each window in turn and answer Yes to the dialog box that asks if you want to save the changes.

An example of a Works menu with additional keyboard command equivalents is shown in Figure 10-9.

While you’ve got the Menu resource open, you can also change the names of menus and commands. Find the menu/command name in the data boxes, and edit it. Don’t worry about the length of the name; the menu will automatically expand. However, if the menu name is too long for your liking (or it goes off the edges of the screen), you can compress the text by clicking the “1” button opposite “condense.”

MENU ID = 258 from Microsoft Works	
procID	0
filler	0
enableFlgs	\$00000001
title	File

menuItem	New...
icon#	0
key equiv	
mark Char	
ignored	<input checked="" type="radio"/> 0 <input type="radio"/> 1

Figure 10-8 Menu ResEdit Dialog Box

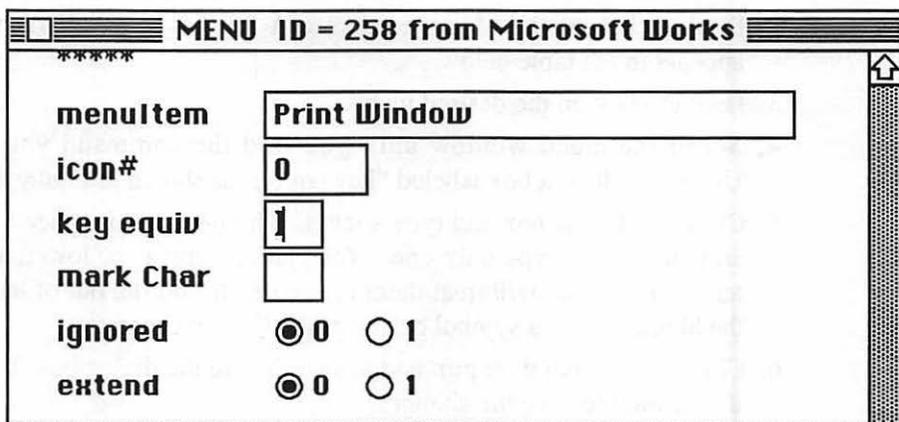


Figure 10-9 Example of Menu with New Commands

Works contains the following menus, each identified by a number, and indicating the menu ID, the menu name, the module that uses the menu, and the menu type. Menu type *Main* indicates a menu listed along the top of the Mac screen, and one you pull down with the mouse. A Menu Sub is a pop-up menu that appears when you select an entry in a main menu.

Menu ID	Name	Module	Type
257	Apple Menu	General	Main
258	File	General	Main
259	Edit	General	Main
260	Window	General	Main
261	Macro	General	Main
66	Size	Draw	Sub
67	Style	Draw	Sub
68	Color-Foreground	Draw	Sub
69	Color-Background	Draw	Sub
70 *	Line Pattern	Draw	Main
71 **	Fill Pattern	Draw	Main
72	Justified	Draw	Sub
142	Format	Draw	Main
150	Fonts	WP	Sub
151	Style	WP	Sub
152	Size	WP	Sub
153	Color	WP	Sub
154	Justify	WP	Sub
155	Spacing	WP	Sub
517	Search	WP	Main
518	Format	WP	Main

Menu ID	Name	Module	Type
519	Spell	WP	Main
775	Report	DB	Main
774	Format	DB—List	Main
776	Format	DB—Form	Main
773	Organize	DB	Main
1285	Organize	DB—Report	Main
1286	Format	DB—Report	Main
1287	TotalsPage	DB—Report	Main
128	Align	SS	Sub
129 †	Styles	SS	Sub
130	Borders	SS	Sub
131	Font	SS	Sub
132	Size	SS	Sub
133	Color	SS	Sub
1029	Select	SS	Main
1030	Format	SS	Main
1031	Options	SS	Main
1032	Chart	SS	Main
1789 ††	Keypad	COM	Main
1797	Communications	COM	Main

,* Line Pattern and Fill Pattern menus include the name of the menu only, and entries of the Blank/Transparent menu choices. The actual patterns are fetched from the pattern resource in the System file (on the Works Startup disk or your hard disk).

† The Styles sub-menu for the spreadsheet is not shown in the Format menu, but does specify keyboard shortcuts for the Normal, Bold, and Italics styles.

†† The Keypad menu includes the name of the menu only. The keys for the keypad are derived from special codes elsewhere within Works (this code can't be edited directly with Resource Editor).

Changing Patterns

Another practical application of Resource Editor is altering patterns that are used to create the Mac's desktop, along with the Fill and Line Pattern menus in Works (which are not changeable except with Resource Editor).

Changing patterns requires that you edit the System file used to run Works (this System file will be either on your Works Startup disk or on

your hard disk). Works itself does not include resources for the Fill and Line patterns.

WARNING: Never edit the System file the Mac is currently using. Make a copy of the System file on a separate disk, and use the copy to make the changes. Try out the edited System file with Works to make sure everything still works. Keep a safety copy of the original System file in case something goes wrong in the future with the edited version.

To edit the patterns in the System file:

1. Double-click on System in the Resource Editor disk window.
2. Double-click on the PAT# resource.
3. The System patterns appear in a window, as shown in Figure 10-10. Double-click anywhere in the block of patterns to “open” them.
4. To select a pattern to edit, click in the left or right side of the small boxes in the bottom of the window. Drag off the window to the left or right and you’ll “fast forward” or “rewind” through the patterns.
5. To edit a pattern, click inside the window in the upper-left corner, as in Figure 10-11. The results of your edits are shown immediately as you add and take out dots.
6. Close each window in turn and answer Yes to the dialog box that asks if you want to save the changes.

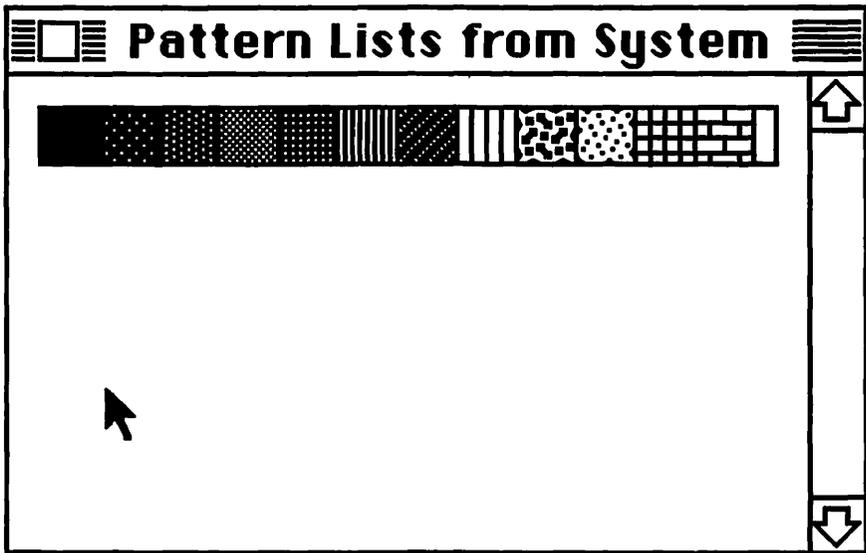


Figure 10-10 *Basic Pattern Box*

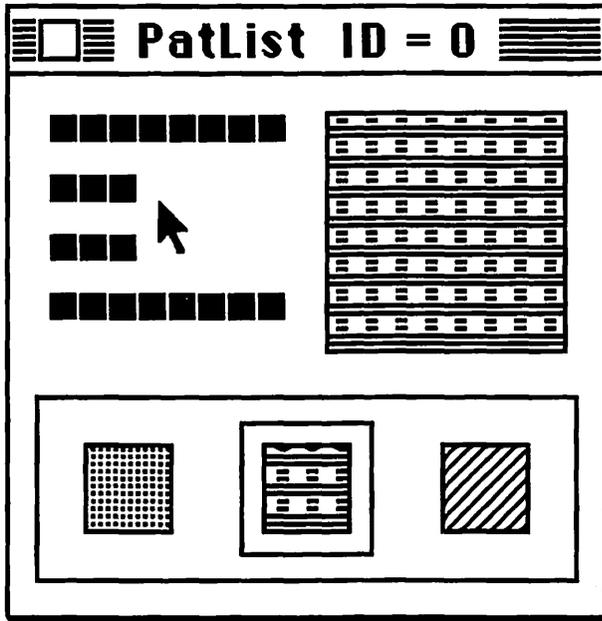


Figure 10-11 *Editing Patterns*

Use the new Works patterns just as you did the old. To keep the old patterns intact for future use, enable Resource Editor to duplicate the pattern list (use the Edit-Duplicate command) *before* you edit the patterns. Leave the duplicated set alone.

To revert back to the old patterns, reverse the ID numbers of the two sets (Works uses the set with the ID number of 0). You can use this technique to create a bevy of pattern sets, and “activate” each one by changing its ID to 0.

Editing Fonts

If you want to add a special character to one of the Mac’s fonts, Resource Editor will get the job done. All of the Mac’s writing fonts are stored in the FONT resource, which is located in the System file. To edit a font:

1. Double-click on System in the Resource Editor disk window.
2. Double-click on the FONT resource. A full listing of all the available fonts appears, in all sizes (see Figure 10-12).
3. Double-click on a font, and you’re greeted with a font editing template.
4. Click inside the large window to lay down or pick up dots, as illus-

trated in Figure 10-13. To edit another character, either type it from the keyboard, or use the mouse to shuttle up and down the list characters in the box in the lower right corner. Click on either side of the box to step up or down the alphabet, or drag off the box to quickly fast forward or rewind.

5. Close each window in turn and answer Yes to the dialog box that asks if you want to save the changes.

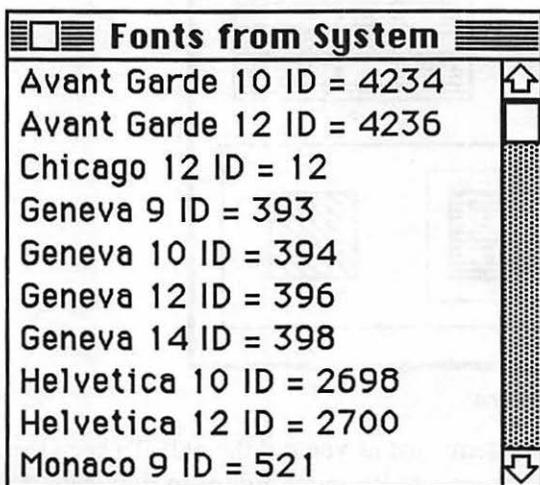


Figure 10-12 *Font Window with All Sizes*

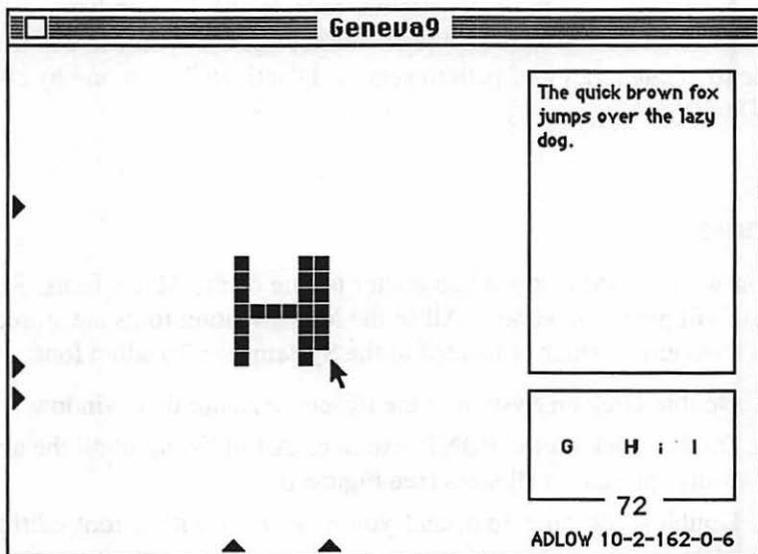


Figure 10-13 *Editing Fonts*

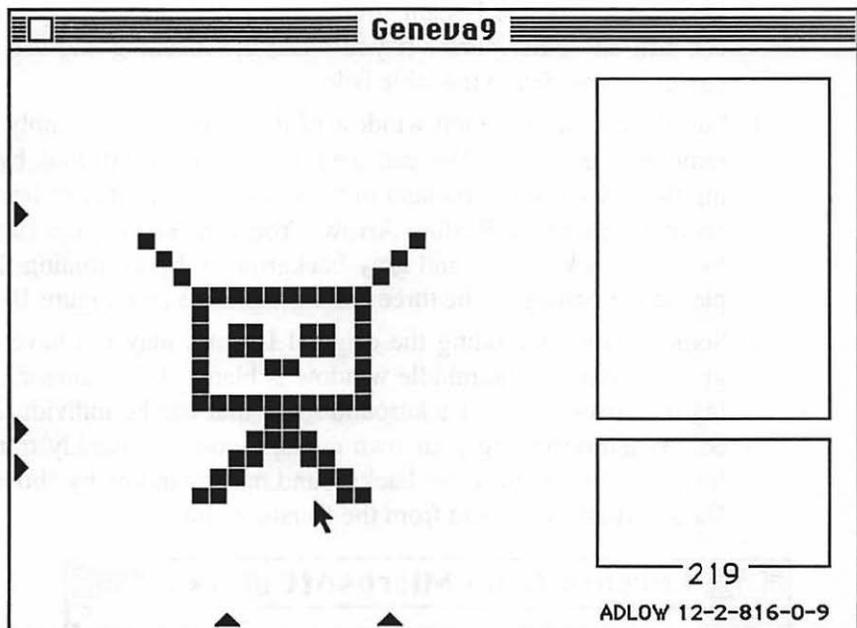


Figure 10-14 *Creating a New Font Character*

Resource Editor allows some creative freedom when working with fonts. If you want to change the horizontal spacing of the characters, drag either of the black triangles located along the bottom edge of the font window. You might use this feature to transform New York, for example, which is a proportionally spaced font (i's take up less space on the line than w's), into a mono-spaced font. If you want to add more vertical spacing, drag the black triangles that appear on the left edge of the font window.

To create an entirely new character, as in Figure 10-14, use the Key Caps desk accessory to find an unused Option or Shift-Option key (such as **Option-K** in Geneva or New York). Type it on the keyboard; the large window in the center of the template will go blank. Make the new character.

Modifying the Mouse Pointers

You can change any of the pointers (or cursors) used to indicate the position of the mouse. You might, for example, change the standard I-beam pointer to a heavy rectangle.

1. Double-click on Works in the Resource Editor disk window.
2. Double-click the CURS resource.
3. The Works cursors appear in a window (refer to Figure 10-15).

Double-click on the I-beam pointer and an editing box appears. (You can edit any other cursor if you wish; the meaning and use of each cursor is provided in the table below.)

4. Edit the cursor in the left window of the editing box. Simply click to remove or add dots. You can see how the cursor will look by choosing the Try Cursor command in the Cursor menu. Revert back to the arrow by choosing Restore Arrow. You can see how the cursor will look on black, white, and gray backgrounds by examining the samples at the bottom of the three editing windows (see Figure 10-16).
5. Some cursors, including the original I-beam, may not have a background mask, so the middle window is blank. Other cursors, including the arrow, have a background mask that can be individually edited. When designing your own cursors, you can quickly transfer an image of the cursor to the background mask window by choosing the **Data->Mask** command from the Cursor menu.

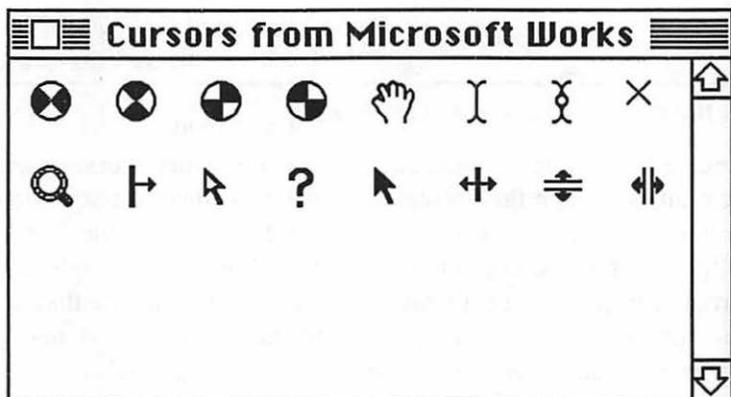


Figure 10-15 *Cursor Collection*

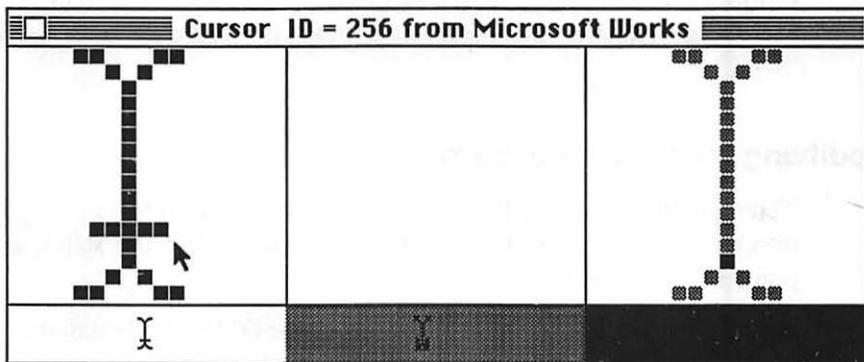


Figure 10-16 *Editing Cursor*

6. The left editing window lets you set the “hot spot” for the cursor, the exact point Works uses to define the location of the cursor. The hot spot is normally in the center of the I-beam; click any of the gray pixels to choose another hot spot.
7. Close each window in turn and answer Yes to the dialog box that asks if you want to save the changes.

<i>Cursor Looks Like</i>	<i>Application</i>
<beach balls>	Works busy, please wait.
<hand>	Scroll in Print Preview; move field in DB form.
<I-beam>	Set text insertion point in WP.
<I-beam with dot>	Set text insertion point in WP while Works is repaginating or reformatting.
<magnifying glass>	Zoom in Print Preview.
<line, single arrow>	Resize field in database form.
<hollow pointer>	Set new cell or field selection in SS or DB while Works is calculating.
<question mark>	Select on-line help topic.
<pointer>	General purpose mouse pointer.
<line, double arrow>	Resize columns/fields in SS and DB.
<horizontally split window >	Split SS and DB window horizontally.
<vertically split window >	Split SS and DB window vertically.

Both the System and Finder have additional cursors that you can edit in the same manner. One of the cursors Works regularly uses from the System file is the cross, used to create objects with Draw. To change this cursor, you must open the System file you use with Works. Be sure to follow the caution provided earlier about editing the System file without first making protective copies.

Modifying Dialog Boxes

You may not always like how some of the Works dialog boxes are organized. Resource Editor lets you change the positions of the options so they are more logically situated for you.

Dialog boxes are kept in DITL resources. You can freely change the organization of any dialog, but are limited to retaining the same size and shape for the box. To edit a dialog box, open Works with Resource Editor and find the DITL resource listing. Double-click on DITL and scroll through the ID numbers until you find one you want. Not all of the dialog boxes lend themselves to modification. Here is a list of some of the most suitable to customizing with Resource Editor.

DITL Number	Function	Module
142	Close all	General
212	New pie chart	SS
213	New series chart	SS
269	Open file	General
310	Sort field	DB
318	Set field attributes	DB
420	Paste with options	SS
422	Select sort keys	SS
431	Set cell attributes	SS
801	Find	WP
802	Replace	WP
940	Communications setting	COM
941	Dial number	COM
943	Send file	COM
947	Receive text	COM
948	Send text	COM
949	Capture text	COM
1000	Spell check	WP
7484	Grid settings in Draw	Draw
13052	Record macro	Macro
13070	Stop macro	Macro
13080	Playback macro	Macro
13081	Save macro file	Macro
13085	Open macro file	Macro
15767	Options	SS

Here's an example of how to change the organization of the Find dialog box in the word processor module.

1. Double-click on Works in the Resource Editor disk window.
2. Double-click on the DITL resource.
3. Double-click on the DITL ID=801 resource. The Align Objects dialog box appears (if ID=801 does not contain the Align Objects box, open each ID=# in turn to find it). The box is shown in Figure 10-17.
4. Turn on the alignment grid by choosing the DITL-Grid command.
5. Use the mouse to drag the options around the window. You may resize the window, if you wish, by dragging the resize box on the lower right corner. Figure 10-18 shows one way of organizing the options.
6. When finished, close each window in turn and answer Yes to the dialog box that asks you if you want to save the changes.

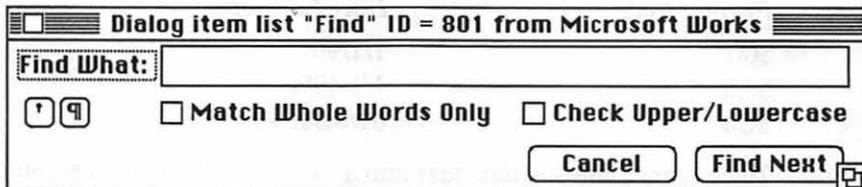


Figure 10-17 Original Find Dialog

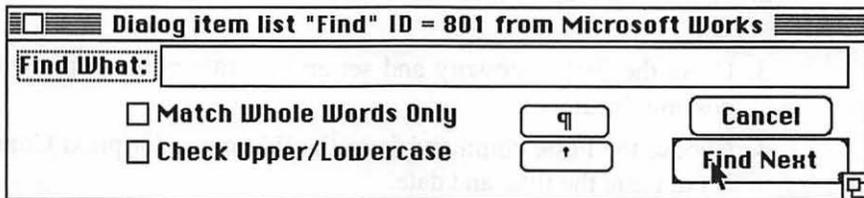


Figure 10-18 Updated Find Dialog

Changing Time/Date Separator

The Alarm Clock desk accessory lets you easily copy the current time and date, then insert it in a document. The Works spreadsheet contains its own time and date function, but the word processor doesn't. You can use the Alarm Clock desk accessory to readily insert the current time and date anywhere in a word processor document.

The Alarm Clock uses specific characters to separate the day, month, and year for the date; and the hour and minute for the time. You may, if you wish, change these separator characters to better suit your tastes.

Changing the time/date separators requires you to open the `itl0` resource in the System file, then open the `itl0=0` resource. Scroll through the window until you get to the boxes labeled `timeSep` and `dateSep`. Type a new symbol.

Resource Editor also lets you change the order and the format of the date.

To change the date order, enter a new digit in the `dateOrder` box, following these conventions:

<i>Order Number</i>	<i>Date Order</i>
0	M/D/Y
1	D/M/Y
2	Y/M/D
3	M/Y/D

To change the date format, enter a new code in the `shrtDateFmt` box, following these conventions:

<i>Format Code</i>	<i>Date Format</i>
\$00	1/1/90
\$A0	1/1/1990
\$C0	01/01/1990

To copy the time and date text into a word processing document:

1. Open the Alarm Clock desk accessory.
2. Choose the Copy command from the Edit menu (or press **Command-C**).
3. Close the desk accessory and set an insertion point in the word processing document.
4. Choose the Paste command from the Edit menu (or press **Command-V**) to paste the time and date.

The Macintosh automatically includes both the time and date; if you want only one, simply remove the other.

The Alarm Clock display is designed to work best with the standard time and date separators, and standard date format. Using different separators and formats may corrupt the display, but the actual time and date text is still properly copied and pasted.

Personal ID

Works insists that you “personalize” your copy when you first use it. This personalization includes your name and organization, and appears when you first start Works. The personal ID can’t be edited except with a utility such as Resource Editor.

But why would you want to edit the personal ID? Several reasons come to mind; the most obvious is if you get a “hand-me-down” copy of Works in your office, and it has someone else’s name on it. You may also wish to sell your copy of Works, and not be responsible if the buyer gives away unregistered copies of a program you used to own, and which still has your name on it.

Of course, you can avoid editing or removing the personal ID by using only a copy of the Works program, leaving the original unused. But suppose you inadvertently personalized your original copy of Works? Here’s how to delete or edit the personal ID.

1. Find the PSIP resource in the Resource Editor disk window, and double-click on it.
2. Double-click on the PSIP ID=257 resource.

3. Use the mouse to carefully select the name text that's located between the two boxes. Don't delete these boxes; if you do, close the windows without saving and try again.
4. To delete the name text, press the **Delete** key. To write in a new name, simply type from the keyboard (no more than about 18 characters).
5. Close the ID-257 window, and double-click on the PSIP ID=258 window.
6. Use the mouse to select the organization text that follows the box. Don't delete the box.
7. Follow the same procedures as in step 5 to delete or replace the organization text.
8. When finished, close each window in turn and answer Yes to the dialog box that asks you if you want to save the changes.

OTHER WAYS TO CUSTOMIZE WORKS

There are a number of other methods to customize Works to best suit your working habits.

New Command Keys with Menu Master

Using Resource Editor is but one method of changing command-key equivalents for Works menus. A number of stand-alone utility programs are available that make the process of adding or editing command-key equivalents easy. One such utility is Menu Master, available as Shareware. (See Appendix A for a list of sources that offer Menu Master and other helpful utilities.)

Menu Master is a desk accessory you use along with Works (or any other Macintosh application, including the Finder and MultiFinder. To add a command-key shortcut to a command, open Menu Master, choose the menu and command you want, then indicate a command-key letter.

Menu Master lets you assign any alphabetic key to a command, such as A, B, C, and so forth, as well as numerals. Unlike Resource Editor, Menu Master does not allow you to use punctuation marks or special characters, such as Ç.

Embedded Fonts and Desk Accessories

Fonts and desk accessories are normally placed as individual resources in the System file, but they can also be inserted in any applications program, including Works. Embedded fonts and desk accessories offer a number of benefits:

- Desired fonts and desk accessories are always available, even if your copy of Works is used with a different Startup disk.
- Fonts and desk accessories that you use only with Works don't get in the way of other applications.
- Specially modified versions of fonts can be implanted within Works, overriding the fonts in the System file.

Apple's Font/DA Mover offers an easy method of embedding fonts and desk accessories in applications. Here's how to do it:

1. Start Font.
2. Choose Font or Desk Accessory, depending on which type of resource you want to add to Works.
3. Close all open files (the buttons underneath the list windows should read *Open*).
4. Depress and hold the **Option** key, and click the Open button under one of the list windows.
5. Find the Microsoft Works file (use the Drive and Eject buttons as necessary, or change the levels of folders, to bring the Works file into view).
6. Double-click on Microsoft Works.
7. Click the Open button under the other list window and find the font or desk accessory you want. It may be in its own file, or it may be installed in the System file.
8. When the font or desk accessory is found, select it in the list window.
9. Click the Copy button.

Repeat steps 7, 8, and 9 for each additional font or desk accessory you want to add. Once the font is installed in Works, use Resource Editor to edit it, if desired.

Note: These instructions assume you already know how to use the Font/DA Mover. If you are unfamiliar with the utility program, consult the manuals provided with the Macintosh.

Using Works with Other Programs

In this chapter, you'll learn how to use Works with other programs, how to format and convert Works documents for use with other programs, how to cut and paste data between applications, and how to use the various Works tools for maximum efficiency. (For information about sharing data between Works modules instead of outside Works, review Chapter 1.)

REVIEW OF WORKS DATA TYPES

We covered this topic in Chapter 1, but it's worth reiterating here. There are four types of information used in Works: text, tab-delimited data, bit-map pictures, and object-oriented (or QuickDraw) pictures. The Mac works with each kind of information in a different way, and with some programs you're limited to sharing only certain types of data.

- Text documents are letters and memos. The characters form whole lines or paragraphs, and the Works word processor creates text documents. Text is also generated by the communications module, and can be saved directly to disk or by cutting and pasting.
- Tab-delimited data is composed of many discrete cells or fields, separated by rows or records. The Works spreadsheet and database create tab-delimited documents.
- Bit-mapped pictures are composed of dots, like a MacPaint image. You can erase or add dots to alter the picture. No works module creates bit-mapped images, but the word processor and spreadsheet can accept bit-mapped pictures created and pasted from other applications.

- Object-oriented pictures are composed of discrete shapes—like circles and rectangles—each of which can be separately manipulated. The Works Draw and spreadsheet charting features create object-oriented pictures, which can be exported to other Macintosh applications or pasted into a word processor or spreadsheet document.

<i>Module</i>	<i>Data Type</i>
Word processor	Text
Spreadsheet	Tab-delimited
Spreadsheet charts	Object-oriented graphics
Database	Tab-delimited
Draw (in WP and SS)	Object-oriented graphics

Keep these differences and their applications in mind as you read through this chapter.

EXPORTING WP TEXT

There are two methods of exporting text written in the Works word processor to another Macintosh word processor or application that accepts text data: through the Clipboard and with the Export (Text-only) Save option.

Exporting Through the Clipboard

The Clipboard is shared among most Macintosh applications. It holds all types of Works information, including text, tab-delimited spreadsheet data, bit-mapped graphics, and object-oriented graphics. Only one clipping can be stored at a time in the Clipboard. If you cut or copy one clipping, then another, the first one will be lost.

To export text through the Clipboard:

1. Select the text or data you want.
2. Choose the Cut or Copy command from the Edit menu, as desired. This places the selection, or a copy of it, into the Clipboard.
3. Exit Works.
4. Start the application you want to put the data into.
5. Once you're in that application, select an insertion point for the text and choose the Paste command from the Edit menu.

All this assumes, of course, that the applications you're pasting into have a Paste command; most Mac programs do, but not all. If one of your appli-

cations lacks these commands, then it probably doesn't make use of the standard Macintosh Clipboard, so you won't be able to use it for routine cutting and pasting.

When cutting and pasting a large clipping, the Mac temporarily stores the data in a special Clipboard file on disk. This file is placed onto the same disk that holds the application you're using, regardless of whether or not the application is on the Works startup disk or hard disk.

This means that if you change disks to load the application to paste to, the Mac may ask you to swap disks as it copies the Clipboard file to the new disk. If you have a two-drive Mac, you can avoid this hassle by inserting the application you've cut from in one drive, and the application you're pasting to in the other.

Be careful never to turn off the Macintosh before cutting and pasting is completed, or the contents of the Clipboard will be erased.

Clipboard vs. Scrapbook

Since the Clipboard holds only one clipping at a time, you should use the Scrapbook if you're cutting and pasting several clippings. It can hold up to 256 clippings and you can add and remove clippings individually.

The Mac uses the Scrapbook file (the file that holds all the Scrapbook clippings) on your current Works startup disk or hard disk. If the application you're pasting to is on another startup disk, copy the current Scrapbook file to it. But first check if that disk already has a Scrapbook file, or you'll erase it unless you change its name before you copy. You can have as many Scrapbook files on the disk as you want, but all of them must

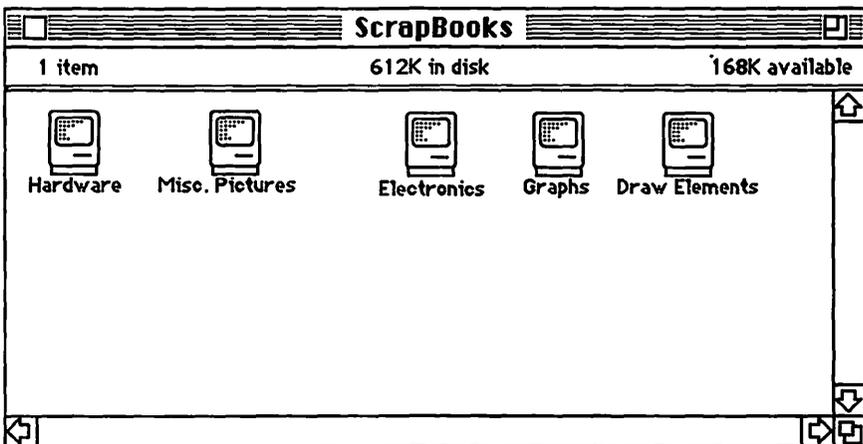


Figure 11-1 *Many Scrapbook Files, with Different Names*

have different names, as shown in Figure 11-1. The Mac always accesses the Scrapbook file named “Scrapbook file.” If it can’t find a file with that name on the current startup disk, a new, empty one is created.

Using the Export Option

The Export option is available when saving word processor files, database and spreadsheet files. Clicking the Export option before saving a file (new saves or when using the Save As command), stores the file on disk with just text characters, and no information for fonts, paragraph margins, or other formatting. Once converted to Text-only (or ASCII) format, the file can be opened by any word processor on any computer.

You can also save Works word processing files under the Export option as RTF—or Rich Text Format. The Rich Text Format, discussed more fully in Chapter 2, allows you to share Works documents with non-Macintosh word processing programs.

Some Macintosh word processors, most notably Microsoft Word, can open Works 2.0 files directly; you don’t need to convert it first to Text-only format. Check first to avoid the extra step of text conversion.

IMPORTING WP TEXT

Importing text to the word processor follows the reverse procedure as outlined above. You can paste previously captured text from the Clipboard into an open Works word processing document, or open an entire Text-only document.

To paste previously cut or copied text:

1. Open a Works WP document or create a new one.
2. Set an insertion point for the text.
3. Choose the Paste command from the Edit menu.

The imported text will take on the character and paragraph formatting of the surrounding text. If you have many snippets of text to transfer to Works, save them in the Scrapbook. See the section titled “Clipboard vs. Scrapbook,” earlier in this chapter, for more details.

To open a Text-only document:

1. Choose the Open command from the Works File menu.
2. Click the word processor icon.
3. Click the Export option.

4. Choose the file from among the list in the file list window, then double-click on it to open it.

No formatting information is saved with Text-only documents, so Works opens the file in an Untitled window, using standard character and paragraph formats. An exception to this rule is when importing Text-only documents that have been saved in RTF, or Rich Text Format. The RTF format records format settings as English commands. Works converts as many of these commands as possible into their corresponding formats, then leaves the rest as plain text.

Most Text-only files do not contain unusual codes and characters, but you may encounter one, especially if you are working with documents created on another computer. Works automatically strips most special codes or characters. Prior to formatting and printing the converting document, check for stray characters and remove them. You may need to refer to a printout of the original document in case you need to manually retype any characters that were lost during the conversion.

You are not limited to importing text to the word processor. The Works word processor also accepts tab-delimited text pasted from the Clipboard, or complete files that have been saved in Export format. Imported tab-delimited text is treated in a word processor document just like data copied from the Works spreadsheet or database. Cells (or fields) are separated by tabs, and rows (or records) are separated by paragraph returns.

The Works word processor (as well as the spreadsheet) also accepts both bit-mapped and object-oriented graphics. See the section below on "Importing Graphics" for more information.

EXPORTING SPREADSHEET AND DATABASE DATA

Works spreadsheets can't be directly read by most other electronic spreadsheet programs. If you need to export a spreadsheet for use with another program, you must convert it first using the Export option.

Before saving the file, Works asks if you want to save it as a SYLK or Text-only document. The SYLK format allows conversion of spreadsheet data, including formulas, and most formatting. You must use a SYLK-compatible electronic spreadsheet program, such as Excel. (Note: Many electronic spreadsheet programs for the Macintosh and IBM PC are SYLK-compatible.) The Text-only format converts the spreadsheet to plain ASCII text, without recording the formatting of the document.

The database module offers only Text-only conversion; the SYLK format is not available.

More specific details on using the Export option with spreadsheet and database documents can be found in Chapter 4, "Spreadsheet Strategies," and Chapter 6, "Keeping Tabs on Data."

IMPORTING SPREADSHEET AND DATABASE DATA

Both the Works spreadsheet and database use tabular data, which consists of a series of lines, with each item in a line separated by tabs. A number of programs, including Microsoft File, Excel, and Multiplan, also accept tabular data into their specialized file formats.

For electronic spreadsheets like Excel that support the SYLK document format, transferring files is a rather simple process: just save the file in SYLK format and open it within Works. (Note: The database module can't open SYLK documents, so try this technique only with the Works spreadsheet.) If the program doesn't support SYLK, or you need to transfer a file to the database, save the original document in Text-only format. Then:

1. In the Open Files dialog box of Works, click the module you want to hold the document (spreadsheet or database).
2. Choose the Export option.
3. Find the file you want to open and double-click on it.

EXPORTING GRAPHICS

Works isn't a graphics program and you wouldn't use it to draw pictures. Sometimes, however, you must transfer a block of formatted text to another program. The special formatting features of Works (like boxes and lines) are probably not shared by the other program, so the only way to transfer the text intact is to first convert it to an object-oriented picture. Consider the possibilities of this feature.

Works is fine for most routine desktop publishing endeavors, but it is not a full-fledged page makeup program. But page makeup programs aren't generally as easy to use as Works, and they aren't word processors. Works lets you have the best of both worlds. You can create your text and page formats on Works, then transfer them over, practically intact, to a page makeup program, such as PageMaker or Ready-Set-Go.

You must use the Clipboard (or Scrapbook) to transfer text and special graphics. However, Works won't let you simultaneously select and copy both text in the word processor or spreadsheet, as well as graphics from the

Draw layer. If you want to transfer both text and graphics of a word processing document, for example, you need to do it in two passes—once for the text, and once for the graphics.

IMPORTING GRAPHICS

Works accepts both bit-mapped and object-oriented graphics. From an operational standpoint, it doesn't matter which kind of graphic it is. You copy and paste both in the same fashion. Once in Works, however, the two kinds of graphics behave differently. You'll want to use object-oriented graphics if you plan to edit them with the Draw tools, or if the document is to be printed with the LaserWriter. The LaserWriter, as well as other PostScript-language output devices, "smooth" the contours of object-oriented graphics much better than the contours of bit-mapped graphics. The result is a sharper image.

You will also want to use bit-mapped graphics if you plan on resizing the graphic once in Works. Figures 11-2 and 11-3 show the effects of resizing an object-oriented graphic, and a bit-mapped graphic. Notice how the object-oriented graphic retains its smoothness and correct pattern, while the bit-mapped does not.

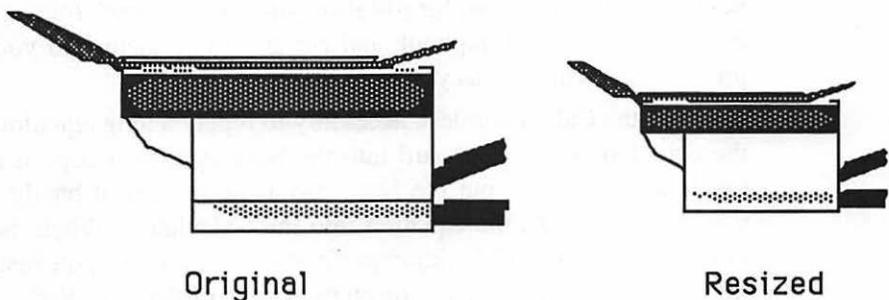


Figure 11-2 *Object-oriented Graphic, Resized*

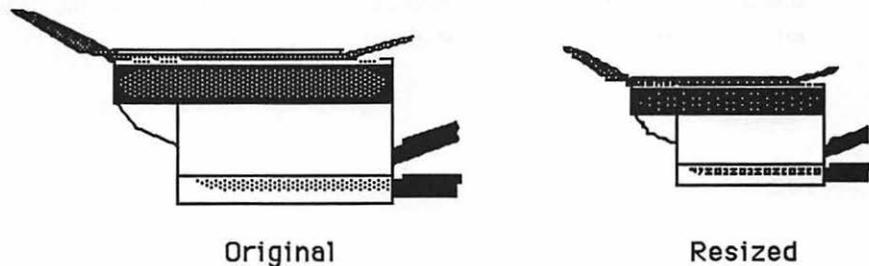


Figure 11-3 *Bit-mapped Graphic, Resized*

When copying graphics into Works via the Clipboard, Draw is automatically turned on. Object-oriented graphics are automatically grouped together, even if they weren't grouped in the original graphics program. You can position the graphic and box anywhere along the width of the document simply by dragging it in place.

OTHER THINGS TO CUT AND PASTE

The Mac offers a great deal of cut and paste flexibility. Don't forget these shortcuts:

- Plug in the current time and date by calling up the Alarm Clock desk accessory, choosing the Cut or Copy command, then pasting anywhere in the document. If you don't like the form of the time and date as pasted, use Resource Editor, as detailed in Chapter 10, "Customizing Works."
- Use the Scrapbook to keep simple form letters. Write the basic letter, select all of it, then save it in the Scrapbook. When you want to use a letter, call up the Scrapbook, select the form you want, then cut and paste it into the current document. You can also use this system to insert long passages of text that you regularly use in your line of business. If you're a lawyer, for instance, you can save boilerplate portions of contracts in the Scrapbook and cut and paste them into your word processing documents as you need them.
- Program the Calculator desk accessory to replay a long equation. Type the equation on the keyboard into the Note Pad, then copy it into the Clipboard. You can put the Note Pad away or keep it handy. When you're ready, paste the equation into the Calculator. When the equation is pasted, the Calculator performs the math, as you instructed. You can keep several equations on each page of the Note Pad.

Of course, these hints are just the beginning of the many ways you can use the Mac's cut and paste feature to make your work with the Mac easier and more productive. Don't be afraid to experiment.

Printing with Works

Only a few short years ago, computer industry pundits were forecasting a paperless office for the 1980s. The completely electronic office would conduct business through computers. Important mail, reports, and memos would be not in the form of printed papers, but as thousands of tiny bits of data sent through complex webs of computer links.

So far, the electronic office hasn't happened, nor anything closely resembling it. True, businesses today are using computers, but they are using them to produce more printed material than ever. U.S. business computers generate an estimated 600 million pages of output every day.

And that's not counting the 235 million photocopies and 76 million letters produced daily. Many of these pages are saved for future reference. File cabinets around the country hold an estimated 21 trillion sheets of printed paper, much of it generated from computers. Until the vision of the electronic office becomes a reality, we will continue to make printed copies of computer data.

The printing process is the culmination of all the labor you've put into your Works documents, the denouement that shows everyone the result of all those hours pounding on the keys and scooting the mouse around the desk. In this chapter, you'll learn all about printing with Works: how to prepare the document for printing, how to audition the printed output before committing a single letter to paper, and how to print multiple copies of your documents, or print just sections and pages.

WHAT YOU CAN PRINT

Works allows you to print any of the following documents:

- Word processor
- Database report
- Spreadsheet

Text files captured with the communications terminal cannot be printed directly from the communications module. You must save the captured text and open it with the word processor. You also cannot print records directly from the database. You must first create a report of the database records.

Works will allow you to print the current window, using the Print Window command in the File menu, regardless of the module you are using. This applies to the communications and database modules, as well as the charts made within the spreadsheet. An additional command in the File menu, Eject Page, starts a new page in the printer. Use this command to start work on a fresh, blank page after printing the contents of one or more windows.

Using the Page Setup Dialog Box

Choosing the Page Setup command in the File menu allows you to control the layout of the entire document, including the paper size, page orientation (either portrait or landscape), margins, and header/footer text. Keep these notes in mind when using the Page Setup dialog box.

- The LaserWriter and ImageWriter use different Page Setup dialog boxes, as shown in Figures 12-1 and 12-2. The currently selected printer (as defined by the Chooser desk accessory) determines the dialog box that is displayed when you choose Page Setup from the File menu.
- The Page Setup dialog box may appear in a different form, depending on the version of Finder and System you are using. The boxes in the two figures are from System 6.0.2 (Finder 6.1).
- The Page Setup dialog box also differs—slightly—depending on the Works module you are using.

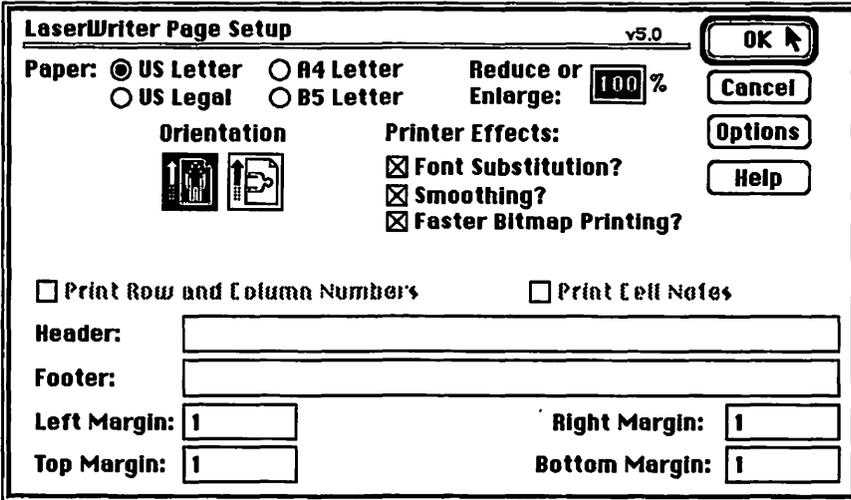


Figure 12-1 Page Setup, LaserWriter

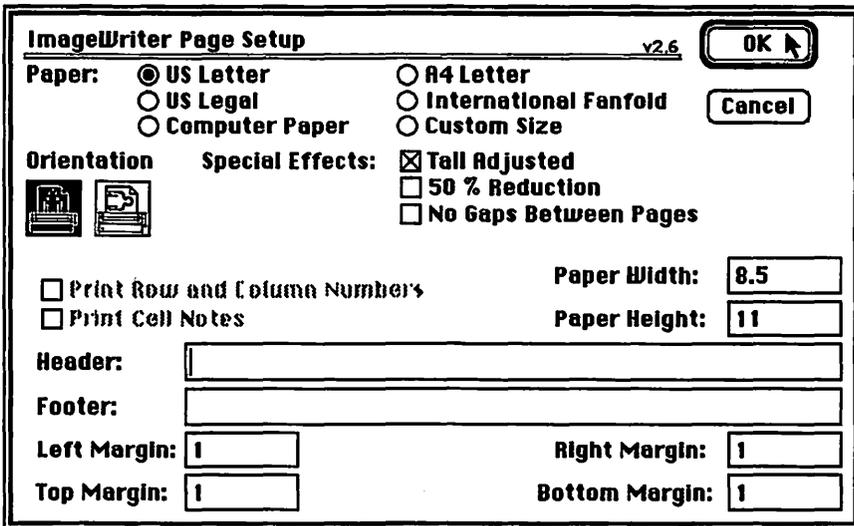


Figure 12-2 Page Setup, ImageWriter

Paper Size/Orientation

The Paper, Orientation, and Paper Width/Height options tell Works how large a canvas it has to work with. The four paper options have preset width and height dimensions. Clicking one of the options automatically places the following dimensions into the width and height boxes:

Paper	Width	Height
U.S. Letter	8.5 in.	11 in.
U.S. Legal	8.5 in.	14 in.
A4 Letter	8.25 in.	11.67 in.
International FanFold	8.25 in.	12 in.
Computer Paper	14 in.	11 in.

With the ImageWriter, you can generate documents wider than the print carriage by printing them sideways. You choose this option by clicking the Landscape (or Wide) option. Works now prints each page on the wide (lengthwise) dimension.

With the LaserWriter, you can indicate a percentage of reduction or enlargement, from 25 percent to 400 percent. The reduction and enlargement percentage relates to the size of the finished print in relation to the original. That is, a reduction of 75 means "75 percent of original size." You can use reduction to fit a large document on a small piece of paper. The original document may be 22 by 22 inches, but reduced to 25 percent the final printout takes up only 5.5 by 5.5 inches.

The paper width dimension affects the left and right margins of the page. You can see the different effects of margins depending on the module you are using.

Module	Effects
WP	Right paragraph indent marker turns hollow when moved outside the right margins.
DB	Right indent marker will not move beyond right margin.
SS	Dotted lines appear at each page break.

The paper height dimension affects the length of each page, and therefore the number of papers your document takes up. You further control the amount of text that can be placed on a page with the bottom and top margins (see below). You can increase or decrease the page length by changing the paper height, margins, or both.

Each document you create with Works stores its own unique Page Setup settings. If you want to prepare a number of documents using the same Page Setup selections, create a master of the document using the Works Stationery feature. See Chapter 1 for more information on using Stationery.

The Truth About Margins

Margin settings define the printable area for the body of a document (page numbers and headers/footers are printed outside these areas, one half-inch from the top or bottom of the page). To change a margin, choose the Print Setup command from the File menu, click in the corresponding entry box and enter a number, in inches. Enter only numbers; Works ignores symbols or text such as " or in., and resets the value in the margin box to zero.

Tall Adjusted The Tall Adjusted option corrects the discrepancy between the horizontal resolution of the Mac's screen (72 dots per inch) versus the horizontal resolution of the Imagewriter (80 dots per inch). Without Tall Adjusted, graphics that appear on the screen as round may print as ovals. With Tall Adjusted, the circle comes out as a circle. Be sure this option is on whenever you have inserted a graphic into the document.

Your graphics suffer slightly when you must compensate for different resolutions. With Tall Adjusted, text is slightly squeezed, although the effect is hardly noticeable. What you will perceive, however, is that Works can fit more text on a line, and the line breaks may not always be what they were with Tall Adjusted turned off. This has a domino effect, including throwing off paragraph breaks and page breaks. You have two options:

- Compensate for the change by adjusting the margins to return the line breaks to their previous state.
- Plan on the Tall Adjusted discrepancy from the beginning, and format the document with it turned on.

Fifty Percent Reduction When you choose Fifty Percent Reduction, documents are printed at half their normal size on the ImageWriter. (As detailed earlier in this chapter, the LaserWriter lets you set variable reductions and enlargements.)

No Gaps Between Pages The No Gaps Between Pages prints text so that you can overlap succeeding pages to make one large document sheet. The option is most often used to print large spreadsheet files.

Headers and Footers Works lets you assign headers and/or footers to word processing, spreadsheet, and database report printouts. See Chapter 2, "Writing and Works," for a complete rundown on using headers and footers.

REPAGINATION AND PAGE BREAKS

Works automatically breaks your document into pages while you write. The process is known as dynamic pagination. Page breaks appear on the screen as a light dotted line. You can force your own page break by pressing Shift-Enter. Page breaks you set yourself, called required page breaks, are shown on the screen as a heavy dotted line. You can select and delete your page breaks, but you can't get rid of the ones Works creates.

PRINT PREVIEW

Get into the habit of checking your documents before you print them. Use the Print Preview option in the Print dialog box.

1. Choose Print from the File menu.
2. Click the Print Preview option.
3. Click the OK button.

A miniature version of your document appears on the screen. To use Print Preview, click within the displayed page or one of the buttons beside the page.

- To move forward one page, click the Next button.
- To move backward one page, click the Previous button.
- To examine the page enlarged, move the mouse pointer over the spot you want to view and click.
- To see another part of the document while zoomed in, drag with the mouse.
- To return to normal magnification, double-click anywhere on the page.
- To print the document, click the Print button.
- To exit Page Preview click the Cancel button.

You can't edit the document while in Print Preview, and all commands are inaccessible. The Print Preview options, in the Print dialog box, stay selected for all documents you create or edit, until you turn it off or quit Works.

PRINTING

Now that you've set up the document the way you want it, and made sure the page breaks appear at their proper places, it's time to print.

During printing, you have the option of canceling at any time, even

before the ImageWriter actually prints a character. To cancel printing, press **Command-.** (period).

The changes you make in the Print dialog box are not stored with the document when you save it, but many are remembered during a single Works session.

Option	Stays Until Reset	Returns to Default
Quality	X	
Pages		X
Paper Feed		X
Copies		X

Printing Options

The Print dialog box lets you set options to accommodate special printing situations.

Pages The Pages options set the range of text you want scribed on paper. Normally, the All option is selected, which prints all of the document. To print a range of pages or sections:

1. Note the pages and/or sections you want to print (page numbers are displayed in the box in the vertical scroll bar).
2. Choose the Print command.
3. Click inside the From box.
4. Enter the starting page in the From box.
5. Press **Tab**, and enter an ending page in the To box.
6. Click the OK button to start printing.

Some printing shortcuts:

- To print from the beginning to a specific page, enter a page number in the To box but leave the From box blank.
- To print from some point within the document to the end, enter a page number in the From box but leave the To box blank.
- If you just want to print one page out of many, enter the number for that page in both boxes.

Copies The Copies option sets the number of copies of the document you want printed. If you know you want three original copies of your docu-

ment, it's faster to print them all at once than separately. Enter a number up to 99 into the Copies box.

Paper Feed You can instruct Works to print non-stop from beginning to end, or one page at a time. For non-stop printing, load the printer with continuous fan-fold paper and keep the selection on Automatic. For page-at-a-time, you use single sheets and click Manual.

Quality You can select the quality of print with the Best, Faster, and Draft options.

- With Best, each character is printed twice, and the look of the document turns out darker and neater (unless you use a fresh ribbon; then the print looks smeared).
- Faster is the standard setting; it prints text and graphics as they appear on the screen, but only with one pass. Faster printer is about twice as fast as Best printing.
- Draft uses the text fonts built into the ImageWriter to print your document, and does not display fonts or graphics.

When using Draft, different fonts, styles, and sizes affect the look of the print. You get more reliable results when using a monospaced font, such as Seattle, Monaco, or Courier when printing in Draft.

PRINTING WITH A LASERWRITER

The benefits of using a LaserWriter includes higher resolution text and graphics, and faster text output. Works behaves slightly differently when using a LaserWriter, and there are some tricks, tips, and caveats you should know about.

Setting up for the LaserWriter

If you haven't done so already, you must set up your Mac to use a LaserWriter. Be sure the LaserWriter printer driver (called LaserWriter) and the preparation program (called Laser Prep) are in the System Folder on the Works Startup disk or your hard disk.

With the printer connected to the Mac and turned on, select the Chooser desk accessory and click the AppleTalk Active option. Choose the Laser printer icon. If there is more than one laser printer in your AppleTalk network, you must choose the one you want. The names of

the printers are shown in the list box. Close the Chooser dialog box and you're ready to print.

LaserWriter Dialog Boxes

When printing with the LaserWriter, the dialog box for the Print command is different from the one when using an ImageWriter (see Figures 12-3 and 12-4). Additional options are:

- **Print Back to Front.** Printing starts from the back of the document and goes forward. The printed output is collated for you in the proper sequence. Printing is slower when going backwards. This option is helpful when using one of the older LaserWriter models (newer models eject printed pages so that the first page printed is on the top of the stack).
- **Cover Page.** Prints a page identifying your document. For use when a lot of Macs share one LaserWriter.
- **Smoothing.** Smooths the edges of graphics and non-laser fonts, and produces a better overall result. Printing is somewhat slower with Smoothing turned on.

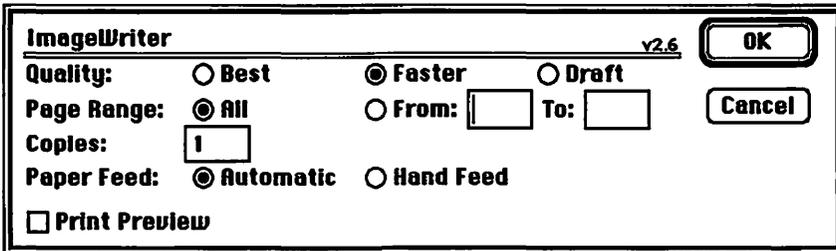


Figure 12-3 *Print Dialog Box, ImageWriter*

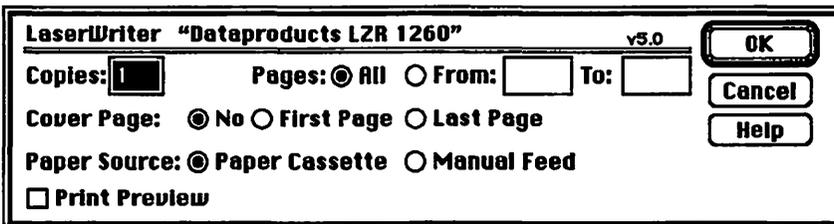


Figure 12-4 *Print Dialog Box, LaserWriter*

- **Font Substitution.** Allows the LaserWriter to automatically substitute one of its internal fonts when it encounters a matching ImageWriter (bit-mapped) font in your document. Printing is faster with Font Substitution on. The following ImageWriter fonts are substituted for built-in LaserWriter fonts:

<i>ImageWriter Font</i>	<i>Substituted Font</i>
New York	Times
Geneva	Helvetica
Monaco	Courier

- **Reduce/Enlarge.** Lets you specify the amount of reduction or enlargement for printed output. You can specify a number from 25 percent (one-quarter the size of the original you see on the screen) to 400 percent (four times the size of the original).

Print Size and Orientation

The LaserWriter does not have the same printing area as the Imagewriter. The print area of the standard carriage Imagewriter is 8 1/2 inches wide by 10 inches high (one-half an inch is cropped off the top and bottom). The print area of the LaserWriter, however, is only 7 by 10 inches. That leaves a strip of 3/4 inches on either side of the page. Keep this in mind when formatting documents.

If your documents are wider than seven inches, or go beyond the print boundary, some of the text may be cropped off. If you don't want missing text, choose a reduction percentage where the lines can be printed within the printing area, or relocate the margins so they are within the printing area.

Downloadable Fonts

Though the LaserWriter has many fonts permanently encoded in its memory (including Times, Helvetica, Bookman, and Avant-Garde), any number of specialty fonts can be downloaded to it from the Macintosh. The downloaded fonts are kept in the memory inside the LaserWriter until the printer is turned off or more fonts are loaded into it. Sources of downloadable fonts can be found in Appendix A.

Fonts for downloading come in two major parts: screen font and laser (or outline) font. The screen font is installed in the System file on your Works disk or hard disk, and is what you see when you are working with text. The laser font is the font data actually sent to the LaserWriter. Most

downloadable fonts have sundry other support files for printing on the LaserWriter. You keep the support files on the system disk with the LaserWriter driver files.

SCREEN PRINTING

Beyond printing text and graphics for a single page, you can make a paper copy of anything you see on the Mac's screen. You can use this feature, for example, to make a visual record of the settings in one or more dialog boxes.

- To make a copy of the entire screen, first press the **Shift Lock** key into **Shift** position. Then press **Command-Shift-4**. Be sure the printer is turned on, selected, and has paper, or the screen print will not turn out.
- To make a paper copy of just the currently active window, leave the Shift Lock key up, and press **Command-Shift-4**.
- To record a copy of the entire screen onto disk instead of sending it to the printer, press **Command-Shift-3** (the Shift Lock key is not used). The screen shots are MacPaint pictures, titled Screen 0 through Screen 9 (the icons may not always look like MacPaint documents until you edit or print them with MacPaint). The documents are placed on the same disk as the application. The Mac beeps at you when you have filled the disk with all 10 screen shots, or if the disk runs out of room.

PRINTING AND REPRODUCTION TIPS

If you're like most Works fans, you'll use the ImageWriter for the majority of your printing chores. ImageWriter printouts are sharp and clear, and the results are nearly identical to what you see on the Mac's screen. There are certain tricks of the trade, however, for getting the best possible results from the ImageWriter. Follow the easy steps outlined in this chapter, and you can make your printouts sharper and clearer than ever before.

The ImageWriter is the ideal choice for most printing situations, but it isn't capable of typeset-quality words and graphics. Fortunately, the Mac can be used with a variety of high-end graphics devices, including laser printers, phototypesetters, and video film cameras.

Using the ImageWriter

You can improve the quality of ImageWriter printouts by carefully selecting the best print setting, ribbon, and paper.

ImageWriter Print Settings Works has three print settings, “Best,” “Faster,” and “Draft,” as detailed earlier in this chapter. The Best and Faster print settings let you choose between standard and high quality printouts. Select one or the other as the situation demands. Because the ImageWriter prints most of the document twice in Best mode (which takes twice as long), you’ll probably want to reserve Best print quality for special occasions only.

Ribbon Freshness The age of the ribbon used in your ImageWriter has a significant impact on the quality of your printed graphics. Contrary to popular belief, a new ribbon *isn’t* always the best choice.

- When printing in Faster mode, it’s a good idea to use a fresh, well-inked ribbon. The printouts will turn out dark and easy to read. You’ll know when to replace the ribbon when the print looks gray and washed out.
- When printing in Best mode, use an older, partially worn ribbon. Since the ImageWriter goes over most of the document twice in Best mode, some characters may fill in when printed with an inky ribbon. This is particularly important if you will be reproducing the printouts on an office copier and when making overhead transparencies.

New ribbons can cause undo ink smearing. If smearing is a continual problem, you may want to make a slight adjustment to the printhead-to-platen gap on the Imagewriter. To widen the gap (so the face of the printhead doesn’t scrape across the page), locate the gap adjustment lever on the right side of the Imagewriter. Pull the lever toward you a notch or two. To narrow the gap, push the lever away from you.

ImageWriter ribbons are usually made of nylon, which lasts a long time. You can rejuvenate old ribbons by using a re-inker. Cost is about \$50. Most ribbons can be re-inked from three to five times before they become overly worn. Use caution when reusing ribbons. The threads of a frayed ribbon can become tangled with the ImageWriter’s printhead, causing considerable damage. Get into the habit of regularly inspecting reused ribbons.

Another method of rejuvenating used ribbons involves spraying with WD-40, a popular oil-free lubricant spray (available at most hardware and automotive stores). While the technique works, the design of Imagewriter ribbons makes it hard to spray inside the cartridge. Re-inking is easier and less expensive.

Another way to save money is to buy repacked ribbons—new ribbon cloth in old cartridges. Repacked ribbons are just as good as new ribbons, yet cost considerably less. Turn in your used ribbons for an even greater discount.

The ImageWriter I uses the same ribbons found in the C. Itoh Prowriter and NEC 8023A, two common printer types. If you don't see Apple Imagewriter ribbons listed in a ribbon catalog, check the availability of ribbons for the C. Itoh and NEC printers.

Print Density When printing words and pictures for reproduction on a plain paper copier, it's a good idea to go a little on the light side. The same isn't true, however, with most types of offset printing. The darker and richer the original, the better the copy.

If the blacks in the original printout aren't black but gray, most printers can darken the graphic by first making a PMT (photo-mechanical transfer). The PMT process makes a high contrast copy of the original where white and black are the only shades. There are no in-between grays.

Paper Quality The quality and texture of paper also plays an important role in print clarity. Cheap computer paper yields inferior results because the ink tends to smear and the paper doesn't hold up well to handling.

Paper that has a cotton rag content or is textured may also yield inferior results, because the surface of the paper is uneven. Whenever possible, use a high grade, smooth bond paper. It's available in both single and continuous sheet form and doesn't cost much more than regular computer paper. Shop around for a good price.

Better paper also resists excessive curling, which can cause paper jams. Paper that sits in the ImageWriter curls around the platen, so when it is advanced, it can be deflected back inside the printer. If this is a problem, lift up the clear plastic paper cover while the first page advances. You may need to help the paper along. You can also prevent paper deflection by placing a Post-It note over the paper slot.

If you are reproducing your printouts on an office copier, and need high quality, you may want to use specialty clay coated paper, available at many printing shops and art supply stores. The smooth clay coating provides a better, more stable surface for the ink.

When using a variety of paper stocks, remember to adjust the printhead-to-platen gap as necessary. Pull the lever toward the front of the ImageWriter when using thicker papers. Paper stock that is excessively thick or slick may not feed through the Imagewriter properly, so experiment with a sample piece before you buy a whole box.

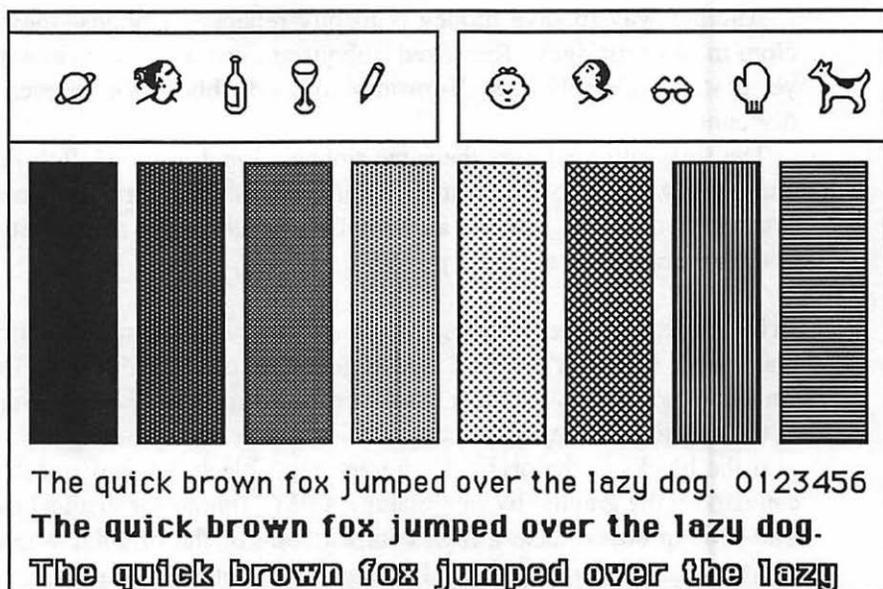


Figure 12-5 Test Pattern for Printing

Judging Ribbon and Paper Quality To make it easier to judge ribbon, paper, and printhead-to-platen gap, create a simple test pattern, like the one in Figure 12-5. Use Works Draw to create a series of patterns and shapes. (The symbols were created with the Cairo picture font.)

Keep the pattern handy whenever you try a new type of ribbon or paper stock. Pay particular attention to the 50 percent gray pattern. With some ribbons and paper, the pattern may come out overly streaked.

Image Size Discrepancies

The picture you see on the Mac's screen doesn't always represent the exact size you'll get when the image is printed. For example, a one-inch circle on the screen may actually be 7/8ths of an inch when printed. Leave the Tall Adjusted option on for best results when printing graphics.

Using the LaserWriter

Laser printers are capable of extremely fine resolution—300 dots per inch versus about 80 dots per inch with the Imagewriter. Graphics reproduced on a laser printer look clean, sharp, and professional. More importantly,

the dots that make up laser print are much finer than the ImageWriter's. Text and graphics from a laser printer look almost typeset. You can hardly see the individual dots at all unless you inspect the print closely with a magnifying glass.

Improving Laser Quality

Although the quality from the LaserWriter is good, it can be improved by following some simple guidelines. The LaserWriter uses a replaceable cartridge that contains the toner and photoreceptor drum. This cartridge is replaced as a unit every 2,500 to 5,000 pages. As the toner wears out, the printouts may become light. If your prints are excessively light, check the cartridge indicator located on the right side of the LaserWriter. Replace the cartridge if the toner level is low.

If the cartridge is still good, and shows a reserve of toner, try taking it out of the LaserWriter and lightly tapping it a few times to redistribute the toner. Rock the cartridge back and forth (not end to end). Reinstall the cartridge and try a few more test prints. The first few prints may be smudgy; this is normal. Keep in mind that the first 100 to 200 prints from a new cartridge may be light and uneven. The toner has not had a chance to be evenly distributed along the length of the photoreceptor drum.

Voids in the printout may indicate poor toner distribution (see the paragraph above), or it may mean a dirty photoreceptor drum, transfer wire, or corona wire. Clean the LaserWriter as directed later in this chapter in the section titled "Special LaserWriter Cleaning Tips," and in the operator's manual. In most cases, a dirty transfer or corona wire will cause the page to be excessively light or completely blank.

A number of paper companies, including Hammermill and James River, offer a specialty paper designed expressly for laser printers. If you have a choice, use it. Laser paper has a smooth, even finish that readily accepts the toner. The coating and paper content also prevent excessive curl, caused by the heat and pressure of the LaserWriter's fuser (the fuser bonds the toner to the paper). Lacking laser paper, you can use standard 20 lb. bright-white copier paper in your LaserWriter and achieve better than average results.

Toner cartridges for the LaserWriter may be refilled and reused (up to about three times). A number of local and mail order firms specialize in "recharging" spent LaserWriter cartridges; see Appendix A for a partial list. The recharged cartridges are about half the cost of new ones and are said to offer the same quality.

Color Output

The LaserWriter is not capable of color printing, but a unique transfer system allows you to add color to any of your printouts. The KroyKolor system (see Appendix A for the address) consists of colored dry transfer sheets and a transfer machine. After the page is printed, you place a color transfer sheet on the original. The sheet and printout are fed through the transfer machine. Color is transferred to the parts of the page that contain printing. The KroyKolor transfer sheets are available in a variety of colors, including brown, green, blue, red, yellow, pink, and orange.

PHOTOGRAPHING THE MAC'S SCREEN

There may be times when you want a photograph of the screen instead of an ImageWriter or LaserWriter printout. Just about any 35mm camera can be used to take the pictures. A close focus zoom lens allows you to aim, frame, and shoot with the greatest flexibility and without having to be too far away from the Mac's screen. Zoom lenses with 35mm to 70mm focal lengths yield the best results without undo distortion. You can also get by with a standard 50mm lens equipped with a 1+ or 2+ diopter close-up lens.

Mount the camera on a sturdy tripod and set the shutter speed at no faster than 1/8th of a second. A noticeable bar will appear across the screen with faster shutter speeds (higher numbers). Dim or extinguish the room lights and adjust the Mac's brightness control so that it's comfortable to your eyes. Use the camera's built-in exposure meter to set the f/stop, or use the recommended indoor light setting for the film you're using (see the instruction sheet packed with the film). If your camera has an automatic flash, turn it off or cover it up completely.

For slides, use either Kodachrome 40 or Ektachrome 100 (or another manufacturer's comparable slide film). Ektachrome film has a blue cast to it—especially noticeable when shooting the Mac's black and white screen—but you can have it processed anywhere. Kodachrome film needs to be processed by Kodak or some other large photographic lab, and the turn-around time can be as long as a week. If time is of the essence, use Polaroid instant-slide film. Developing time is one minute. You need the auto-processor kit to develop the slides.

Until you get to know the proper settings for the films you're using, shoot several pictures of the same screen using different f/stops. Shoot one picture normally, then two others at one half f/stop below and above the meter reading.

Perhaps the best way to shoot the Mac's screen is with a video film

camera. These have their own built-in high resolution monitors, color wheels (for adding color to the slides) and film cameras. Several models are available for the Macintosh. Some connect to the Mac via an external monitors adapter that you (or a qualified dealer) must add, while others, such as the Presentations Technologies Image Maker, connect to the Mac via a serial port.

PHOTOTYPESETTING

Phototypesetting is similar to laser printing, but the resolution is much higher. Some phototypesetting equipment, including the Linotronic L-300P, is PostScript compatible, and therefore can be used directly with Works and the Macintosh. The resolution of the Linotronic L-300P is 2,540 dots per inch, or roughly 8 1/2 times that of the LaserWriter. If you can't afford your own typesetter (a minimum \$30,000 investment), mail your MacDraw disks to a phototypesetting house (see Appendix A). Cost is between \$5 and \$10 per page.

PRINTER MAINTENANCE

Your computer is nearly all electronic, and it doesn't need rigorous periodic cleaning and maintenance to keep it in tip-top shape. But that doesn't apply to everything in your computer system. Your printer—whether it be dot matrix, daisywheel, ink jet, or laser—is mostly mechanical, and you must treat it with the same care and diligence as the family car. A clean printer is a happy printer; besides, your printer lasts longer and works better when it's clean.

There are several cleaning and maintenance steps you can take to keep your ImageWriter or LaserWriter in good working order. They're simple, don't require special tools or know-how, and the cleaning supplies are commonly available.

General Cleaning

When not in use, it's a good idea to place a dust cover over your printer. This makes sense because most printers are used a relatively short period of time each day. If you don't want to keep removing and replacing the cover every time the printer is used, at least keep it on overnight. As always, avoid smoking around your computer gear. The smoke and nicotine can

settle on mechanical and electrical parts, making cleaning that much more difficult. If you must smoke, install a filtered air cleaner near your work station or use a “smokeless” ashtray.

Even with a cover, dust can never be avoided; some always sneaks through the best protective measures. A soft painter’s brush, about 1/2- to 3/4-inch wide, can be used to wipe away the loose dust that accumulates on the exterior of the printer. Be sure to get all the nooks and crannies around the switches, ventilation holes, and levers.

Hard to reach areas can be cleaned with a can of compressed air, such as that offered by Falcon and Bib (available at most photographic and computer stores). When using compressed air, blow the dust *away* from the printer; avoid pushing dirt further inside the machine. In place of the compressed air you can use a vacuum cleaner to scoop up the dust. A household vacuum with a soft brush attachment works well, or you can use one of the miniature battery-operated vacuums.

If dirt or grime piles up on the exterior of the printer, use a household spray cleaner, like 409 or Fantastik, to wipe up the gunk. Don’t spray the cleaner directly on the printer; spray the cleaner on a sponge, then apply the sponge to the printer.

Follow the same general steps when cleaning inside the printer. Remove the various covers and hatches as needed to access the printing and platen area. Most printers have two or three covers that can be readily removed when you require access to the inside. Under most circumstances, you do not need to disassemble the printer to clean it. In fact, this may void the warranty and may cause more problems than it is worth.

After a period of use, small flecks of paper dust can gather inside the ImageWriter. For best results, this dust should be removed every week or two. Use a vacuum to suck the dust out or a can of compressed air to blow it away. However, be particularly wary of blowing the paper dust further into the printer. Aim the can so the dust is shot outside, not inside.

If you use pin-fed paper with your ImageWriter, the round “holes” from the tractor-feed edges may accumulate around the feeding mechanism. Open the mechanism and inspect carefully for bits of paper. Use a toothpick or wood manicuring pick to remove stubborn bits of paper. Do not use a sharp metal or plastic object.

Scraps of paper may also pile up around the paper-out switch, which is located to the rear left side of the paper feed area on the ImageWriter. This switch detects the presence or absence of paper. When the printer runs out of paper, the switch signals the printer, which in turn stops the flow of data from the computer.

The paper-out switch is mechanical, and can be bent out of shape if you are careless. Gently squirt the compressed air around the switch to dislodge

any foreign matter. Avoid using a pick or stick to remove the paper bits, as you may bend the lever of the switch, and throw it out of adjustment.

Avoid the use of cleaning solutions inside the printer. They act to remove necessary lubrication. Additionally, if the solution leaves a residue, it could cause problems in operation.

Cleaning the Platen

The platen is the large rubber roller that feeds the paper through the ImageWriter. The platen receives a lot of abuse during printing, but you can easily rejuvenate it and restore it to almost-new condition.

The platen is rubber and needs a special cleaner. You can buy a can of rubber cleaner/rejuvenator at most typewriter repair shops (avoid using alcohol; it dries out the rubber). The bottle will last several years if you keep the cap on tight. To use it, soak the cleaner onto a corner of a piece of cotton or other white cloth, then wipe the platen from side to side. Roll the platen around to get all of it. The cleaner will dry within seconds.

Cleaning the Printhead

Depending on the volume of printing you do, you'll want to clean the printer's printhead every six months to a year. Cleaning will remove caked-on paper dust, ink, and other foreign material.

The printhead in the ImageWriter is very prone to the effects of accumulated paper dust and dried ink. In the ImageWriter (or any dot matrix printer), the printhead is composed of small needles that selectively strike against the ribbon, making an inked impression on the paper. Through use, ink and paper dust can clog up the workings of the printhead, reducing print quality.

To clean the printhead, first remove the ribbon and blow excess particles away with a can of compressed air. Move the head-to-platen adjustment lever so that the printhead is as far from the platen as possible.

Soak a cotton or sponge swab in alcohol and *gently* scrub the printhead clean (make sure the printhead is cool before you touch and clean it). If you can't reach the front of the printhead, use an alcohol spray cleaner, the kind designed for cleaning audio and video tape heads. Repeat the process until the printhead is completely clean.

Special LaserWriter Cleaning Tips

The LaserWriter is really a plain paper copier with a laser light imaging source. You clean the LaserWriter just as you would the office plain paper copier.

Follow the manufacturer's recommended service interval for changing the drum cartridge. The cartridge lasts 2,000 to 3,000 pages. An indicator on the cartridge shows you if it needs replacing. Or, replace the cartridge if you notice consistently poor print quality. While changing the cartridge, wipe or vacuum spilled toner. This keeps the machine clean and easier to use, and helps promote better looking printouts.

Regularly inspect the insides of the LaserWriter. Use a small vacuum to get rid of paper dust and other foreign objects. Be careful with the internal parts of the printer, especially the small transfer and corona wires (these are mostly hidden, but you should be aware of them anyway). Follow the maintenance procedures provided by the manufacturer on cleaning the internal parts, including rollers, fuser, and drum.

Printer Lubrication

After cleaning, especially if you use cleaning solutions, or even after prolonged use, parts of the printer may need lubrication. Points of critical lubrication will usually be indicated in the printer's user manual. Consult the book for more information. Generally, you will lubricate the printhead running bar, which supports the printhead as it travels back and forth across the platen, and any associated gears. Do not lubricate pulleys, cables, or other components that rely on friction for proper movement or activation.

Most manufacturers suggest you use a common machine oil for lubrication. The oil should *not* have anti-rust chemicals in it, as they can cause the mechanisms to bind in unusually high or low temperatures. A graphite-based oil also should be avoided because the dark color can smudge the printouts. Suitable lubrication oils are available at Radio Shack stores, industrial outlets, and most electronic stores. Do not use an oil-free lubricant such as WD-40. The spray is non-conductive and may impair the operation of the printer.

Sources for Products and Information

Acta

A desk accessory that lets you grab MacPaint images from any disk and include them in the current application (such as MacDraw).

Symmetry Corp.

761 E. University Dr.
Mesa, AZ 85203
(800) 624-2485
(602) 844-2199 (in AZ)

Allotype Fonts

A collection of downloadable laser fonts; serif and sans-serif, in a variety of styles.

Allotype Typographics

1600 Packard Rd. #5
Ann Arbor, MI 48104
(313) 663-1989

Bullets & Boxes

Unique laser font that consists of different sizes of boxes and bullets (filled and unfilled). Included with the package is a selection of bullets that snap to the grid within MacDraw. The fonts are downloadable into the LaserWriter.

Caseys' Page Mill

6528 S. Oneida Ct.
Englewood, CO 80111
(303) 220-1463

CheapPaint

A desk accessory version of MacPaint. Use it with MacDraw to edit bit-map graphics. Spinnaker also sells ArtGrabber, a program that lets you snatch a bit-map image recorded on disk (any disk) and plant it into the current application.

Spinnaker Software Corp.

1 Kendall Sq.
Cambridge, MA 02139
(617) 494-1200

ClickArt:Letters

Mostly large, display fonts—24, 36, and 48 point. Lots of them and well done.

T/Maker Graphics

1973 Landings Drive
Mountain View, CA 94043
(415) 962-0195

Cricket Draw

Cricket Graph

Cricket Draw is a MacDraw-like program that boasts some additional features, including incremental rotation of certain object types and "pattern fountains." Cricket Graph is a business graphics program for changing numbers into charts.

Cricket Software

40 Valley Stream Parkway
Great Valley Corporate Center
Malvern, PA 19355
(800) 345-8112
(215) 251-9890 (in PA)

Desktop Art

Excellent object-oriented clip art collection (bit-mapped clip art also available).

Dynamic Graphics

6000 N. Forest Park Drive
Peoria, IL 61656
(309) 688-8800

Digit-Art Laser Graphics

Object-oriented (MacDraw) clip art collection especially designed for advertising and business. Disks come in sets.

Digit-Art Laser Graphics

2828-19th Street N.E.
Calgary, Alberta, Canada T2E 6Y9
(403) 250-1969

Fluent Fonts

Font collection of mostly decorative and occasional fonts, including computer, outline, and art deco. Most are available in a variety of sizes.

Casady Company

PO Box 223779
Carmel, CA 93922
(408) 646-4660

Fontographer

Font creation tool for creating LaserWriter fonts. Allows you to create fonts and add embellishments, such as drop shadows, slants, and rotations.

Fontastic Plus

Fontastic is a font editing program that you can use to create or customize ImageWriter fonts. Works with all fonts in all sizes. Includes some advanced features, including horizontal and/or vertical rescaling.

Altsys Corp.

720 Avenue F, Ste. 109
Plano, TX 75074
(214) 424-4888

LaserFonts

Collection of laser fonts. Includes more than 32 font families.

Century Software, Inc.

2483 Hearst Ave. #175
Berkeley, CA 94709
(415) 549-1901

LaserPaint

Drawing program that relies on the LaserWriter or other suitably equipped PostScript compatible laser printer. Intended as a high-end product and requires some technical skill to use effectively.

LaserWare, Inc.

PO Box 668
San Rafael, CA 94915
(800) 367-6898
(415) 453-9500 (in CA)

LaserWriter

Apple's own xerographic printer especially designed for the Macintosh. Has several fonts built in, but can also accept downloaded fonts. Built in is a smoothing algorithm that can take rough artwork and turn it into clean, drafting room copy.

Apple Computer, Inc.

20525 Mariani Ave.
Cupertino, CA 95014
(800) 538-9696
(408) 996-1010 (in CA)

MacDraft

MacDraw-like drafting set program with a few advanced features like incremental rotation, zoom in and zoom out, and auto-dimensioning.

Innovative Data Design, Inc.

2280 Bates Ave.
Concord, CA 94520
(415) 680-6818

MacDraw

Object-oriented drawing tool, in both original and updated (MacDraw II) versions. Claris also sells MacPaint; similar programs are available from other sources.

Claris Corp.

440 Clyde Ave.
Mountain View, CA 94040
(800) 334-3535
(415) 960-1500

MacTools

MacTools isn't a graphics program, but it's useful for reclaiming MacPaint or MacDraw documents you've accidentally thrown away, disks that have been damaged, and for generally fiddling around with Macintosh files. Comes with Copy II Mac, a diskette backup utility you can use to make duplicates of your copy protected disks.

Central Point Software, Inc.

9700 W. Capital Highway, #100
Portland, OR 97219
(503) 244-5782

Microsoft Chart

A highly useful business graphics program. Use it to create pie, bar, line, scatter, and area charts. Features include drop shadowing, built-in data sorting, and Multiplan compatibility.

Microsoft Corp.

16011 N.E. 36th Way
Box 97017
Redmond, WA 98073-9717
(800) 426-9400
(206) 882-8080

PageMaker

Sophisticated, professional electronic paste-up program that lets you combine MacPaint and MacWrite documents and produce camera-ready mechanicals. Interfaces with the ImageWriter or LaserWriter.

Aldus Corp.

411 First Ave. South
Seattle, WA 98104
(206) 622-5500

Pages (and Hot Type)

A series of fonts, downloadable PostScript files, and MacDraw images. Available in sets. Unusual and attractive laser font designs.

Image Club

#206, 2915-19th St. N.E.
Calgary, Alberta, Canada T2E 7A2
(403) 250-1969

Professional Type Fonts

Disk of well-known Mergenthaler and ITC typefaces, including Times Roman, Helvetica, and Optima. Sizes range from 12 to 24 point. If you need larger versions of these fonts, the company offers them in a separate disk, Headlines.

Kensington Microware, Ltd.

251 Park Ave. South
New York, NY 10010
(212) 475-5200

SuperPaint

A combination MacPaint and MacDraw, all in one program (you can combine bit-map and object-oriented graphics in one document, and switch between editing modes). SuperPaint offers all of MacPaint's versatility but is lacking many of MacDraw's finer points. The program can both read and write MacPaint and MacDraw files.

Silicon Beach Software

PO Box 261430
San Diego, CA 92126
(619) 695-6956

Tempo

A keyboard/mouse recorder that lets you program the Mac and have it play back your exact movements. Allows non-stop or interactive control.

Affinity Microsystems

10560 Walnut St., #425
Boulder, CO 80302
(800) 367-6771
(303) 442-4840 (in CO)

Public Domain Programs and Utilities

These clearinghouses provide public domain and "user-supported" programs for the Macintosh. Among the programs and utilities available from these sources are Resource Editor, DrawPaint (a MacDraw-to-MacPaint picture converter), Multi-Scrap, hundreds of fonts, and more.

CompuServe

PO Box 20212
Columbus, OH 43220
(800) 848-8199
(614) 457-8600

Educorp

531 Stevens Ave.
Suite B.
Solana Beach, CA 92075
(800) 843-9497
(619) 259-0255

Translatum International

1730 E. Oltorf St., #127
Austin, TX 78741
(512) 442-0266

The Mac Group

PO Box 85125
San Diego, CA 92138
(619) 747-7940

MCUS

PO Box 6963
San Jose, CA 95150
(408) 723-3388

ResEdit

An advanced version of Resource Editor, with documentation.

APDA

290 S.W. 43rd St.
Renton, WA 98055
(206) 251-6548

SmartScrap

A replacement desk accessory for the Apple Scrapbook. The Clipper, a Clipboard enhancer, is also available.

Solutions International, Inc.

29 Main St.
Montpelier, VT 05602
(802) 229-0368

Table of Character Sets

This appendix presents a table of complete printable character sets for four common Macintosh fonts: Geneva, New York, Times, and Zapf Dingbats. The first two fonts are ImageWriter fonts, and the remaining two are LaserWriter fonts. Note that each font displays slightly different characters.

The first column in the following table represents an ASCII code number from 32 to 255. These code numbers are used by the Macintosh to keep track of the characters you type. Because the Mac tracks the ASCII code numbers, and not the actual characters, the characters can change when switching from one font to another.

The Keys column indicates the keys to press to produce that character. When necessary, additional information about the character is provided in the Comments column.

With the exception of the Zapf Dingbats font, characters represented by a box are undefined, meaning there is no character for that ASCII code number. You can use these "empty slots" to include your own special characters, which can be added with the help of a font editing utility, such as Resource Editor or Fontographer.

ASCII	Times	Dingbat	Geneva	New York	Keys	Comments
33	!	✂	!	!	Shift-1	
34	"	✂	"	"	Shift-'	
35	#	✂	#	#	Shift-3	
36	\$	✂	\$	\$	Shift-4	
37	%	✂	%	%	Shift-5	
38	&	©	&	&	Shift-7	
39	'	⊕	'	'	'	
40	(	✈	(	(	Shift-9	
41	)	✈	)	)	Shift-0	
42	*	✂	*	*	Shift-8	
43	+	✂	+	+	Shift-=	
44	,	⊕	,	,	,	(comma)
45	-	✂	-	-	-	(hyphen)
46	.	✂	.	.	.	(period)
47	/	✂	/	/	/	
48	0	✂	0	0	0	(zero)
49	1	✂	1	1	1	
50	2	✂	2	2	2	
51	3	✓	3	3	3	
52	4	✓	4	4	4	
53	5	✕	5	5	5	
54	6	✕	6	6	6	
55	7	✕	7	7	7	
56	8	✕	8	8	8	
57	9	+	9	9	9	
58	:	+	:	:	Shift-;	(semicolon)
59	;	+	;	;	;	
60	<	+	<	<	Shift-,	(comma)
61	=	†	=	=	=	
62	>	†	>	>	Shift-.	(period)
63	?	†	?	?	Shift-/	(slash)
64	@	⊗	@	@	Shift-2	
65	A	☆	A	A	Shift-a	
66	B	+	B	B	Shift-b	
67	C	+	C	C	Shift-c	
68	D	+	D	D	Shift-d	

ASCII Times Dingbat Geneva New York Keys

Comments

69	E	❖	E	E	Shift-e
70	F	◆	F	F	Shift-f
71	G	◇	G	G	Shift-g
72	H	★	H	H	Shift-h
73	I	☆	I	I	Shift-i
74	J	⊕	J	J	Shift-j
75	K	☆	K	K	Shift-k
76	L	☆	L	L	Shift-l
77	M	★	M	M	Shift-m
78	N	★	N	N	Shift-n
79	O	☆	O	O	Shift-o
80	P	☆	P	P	Shift-p
81	Q	*	Q	Q	Shift-q
82	R	*	R	R	Shift-r
83	S	*	S	S	Shift-s
84	T	*	T	T	Shift-t
85	U	*	U	U	Shift-u
86	V	*	V	V	Shift-v
87	W	*	W	W	Shift-w
88	X	*	X	X	Shift-x
89	Y	*	Y	Y	Shift-y
90	Z	⦿	Z	Z	Shift-z
91	[*	[[[
92	\	*	\	\	\ (backslash)
93]	*]]]
94	^	*	^	^	Shift-6
95	-	⊗	-	-	Shift-- (hyphen for underscore)
96	`	⊗	`	`	` (grave accent)
97	a	⊗	a	a	a
98	b	⊕	b	b	b
99	c	*	c	c	c
100	d	⊗	d	d	d
101	e	⊗	e	e	e
102	f	⊗	f	f	f
103	g	*	g	g	g
104	h	*	h	h	h

ASCII Times Dingbat Geneva New York Keys Comments

105	i	*	i	i	i
106	j	*	j	j	j
107	k	*	k	k	k
108	l	●	l	l	l
109	m	○	m	m	m
110	n	■	n	n	n
111	o	□	o	o	o
112	p	□	p	p	p
113	q	□	q	q	q
114	r	□	r	r	r
115	s	▲	s	s	s
116	t	▼	t	t	t
117	u	◆	u	u	u
118	v	◇	v	v	v
119	w	►	w	w	w
120	x	|	x	x	x
121	y	|	y	y	y
122	z	■	z	z	z
123	{	‘	{	{	Shift-[
124	|	’	|	|	Shift-\ (backslash)
125	}	“	}	}	Shift-]
126	~	”	~	~	Shift-` (grave accent)
127					
128	Ä	(	Ä	Ä	Option-u Shift-a
129	Å	)	Å	Å	Shift-Option-a
130	Ç	(	Ç	Ç	Shift-Option-c
131	É	)	É	É	Option-e Shift-e
132	Ñ	(	Ñ	Ñ	Option-n Shift-n
133	Ö	)	Ö	Ö	Option-u Shift-o
134	Ü	<	Ü	Ü	Option-u Shift-u
135	á	>	á	á	Option-e a
136	à	⌘	à	à	Option-` a
137	â	⌘	â	â	Option-i a
138	ä	{	ä	ä	Option-u a
139	ā	}	ā	ā	Option-n a
140	â	⌘	â	â	Option-a

ASCII	Times	Dingbat	Geneva	New York	Keys	Comments
141	ç	⌋	ç	ç	Option-c	
142	é		é	é	Option-e e	
143	è		è	è	Option-` e	
144	ê		ê	ê	Option-i e	
145	ë		ë	ë	Option-u e	
146	í		í	í	Option-e i	
147	ì		ì	ì	Option-` i	
148	î		î	î	Option-i i	
149	ï		ï	ï	Option-u i	
150	ñ		ñ	ñ	Option-n n	
151	ó		ó	ó	Option-e o	
152	ò		ò	ò	Option-` o	
153	ô		ô	ô	Option-i o	
154	ö		ö	ö	Option-u o	
155	õ		õ	õ	Option-n o	
156	ú		ú	ú	Option-e u	
157	ù		ù	ù	Option-` u	
158	û		û	û	Option-i u	
159	ü		ü	ü	Option-u u	
160	†		†	†	Option-t	dagger
161	°	♠	°	°	Shift-Option-8	degrees
162	¢	♣	¢	¢	Option-4	cents
163	£	♠	£	£	Option-3	pound sterling
164	§	♥	§	§	Option-6	section symbol
165	•	♠	•	•	Option-8	bullet
166	¶	♣	¶	¶	Option-7	paragraph symbol
167	ß	♠	ß	ß	Option-s	
168	®	♣	®	®	Option-r	registered trademark
169	©	♦	©	©	Option-g	copyright symbol
170	™	♥	™	™	Option-2	trademark symbol
171	´	♠	´	´	Option-e Option-e	acute accent
172	¨	①	¨	¨	Option-u Option-u	umlaut
173	≠	②	≠	≠	Option=	
174	Æ	③	Æ	Æ	Shift-Option-'	(single quote)
175	∅	④	∅	∅	Shift-Option-o	
176	∞	⑤	∞	∞	Option-5	

ASCII Times Dingbat Geneva New York Keys					Comments
177	±	Ⓔ	±	±	Shift-Option-=
178	≤	Ⓕ	≤	≤	Option-, (comma)
179	≥	Ⓖ	≥	≥	Option-. (period)
180	¥	Ⓖ	¥	¥	Option-y Japanese yen symbol
181	μ	Ⓖ	μ	μ	Option-m
182	∂	Ⓖ	∂	∂	Option-d
183	Σ	Ⓖ	Σ	Σ	Option-w
184	Π	Ⓖ	Π	Π	Shift-Option-p
185	π	Ⓖ	π	π	Option-p
186	∫	Ⓖ	∫	∫	Option-b
187	ª	Ⓖ	ª	ª	Option-9
188	º	Ⓖ	º	º	Option-0 (zero)
189	Ω	Ⓖ	Ω	Ω	Option-z
190	æ	Ⓖ	æ	æ	Option-' (single quote)
191	ø	Ⓖ	ø	ø	Option-o
192	¿	Ⓖ	¿	¿	Shift-Option-/
193	¡	Ⓖ	¡	¡	Option-1
194	¬	Ⓖ	¬	¬	Option-l (lower case L)
195	√	Ⓖ	√	√	Option-v
196	f	Ⓖ	f	f	Option-f
197	≈	Ⓖ	≈	≈	Option-x
198	Δ	Ⓖ	Δ	Δ	Option-j
199	«	Ⓖ	«	«	Option-\ (backslash)
200	»	Ⓖ	»	»	Shift-Option-\ (backslash)
201	...	Ⓖ	...	...	Option-; (semicolon)
202		Ⓖ			not accessible
203	À	Ⓖ	À	À	Option-` Shift-a
204	Ã	Ⓖ	Ã	Ã	Option-n Shift-a
205	Õ	Ⓖ	Õ	Õ	Option-n Shift-o
206	Œ	Ⓖ	Œ	Œ	Shift-Option-q
207	œ	Ⓖ	œ	œ	Option-q
208	—	Ⓖ	—	—	Option-- en dash
209	—	Ⓖ	—	—	Shift-Option-- em dash
210	“	Ⓖ	“	“	Option-[open dbl. quote
211	”	Ⓖ	”	”	Shift-Option-[close dbl. quote
212	‘	→	‘	‘	Option-] open sng. quote

ASCII	Times	Dingbat	Geneva	New York	Keys	Comments
213	'	→	'	'	Shift-Option-]	Ccose sng. quote
214	+	↕	÷	÷	Option-/	
215	◊	↕	◊	◊	Shift-Option-v	
216	ÿ	↘	ÿ	ÿ	Option-u y	
217	Ÿ	→	Ÿ	Ÿ	Shift-Option-`	(grave accent)
218	/	↘	/	/	Shift-Option-1	
219	□	→	□	□	Shift-Option-2	
220	<	→	<	<	Shift-Option-3	
221	>	→	>	>	Shift-Option-4	
222	fi	→	fi	fi	Shift-Option-5	
223	fl	→	fl	fl	Shift-Option-6	
224	‡	→	‡	‡	Shift-Option-7	
225	.	→	.	.	Shift-Option-9	
226	,	↘	,	,	Shift-Option-0	(zero)
227	”	↘	”	”	Shift-Option-w	
228	‰	↘	‰	‰	Shift-Option-e	
229	Â	↘	Â	Â	Shift-Option-r	
230	Ê	→	Ê	Ê	Shift-Option-t	
231	Á	↘	Á	Á	Shift-Option-y	
232	Ë	↘	Ë	Ë	Shift-Option-u	
233	È	↘	È	È	Shift-Option-i	
234	Í	↘	Í	Í	Shift-Option-s	
235	Î	↘	Î	Î	Shift-Option-d	
236	Ï	↘	Ï	Ï	Shift-Option-f	
237	Ì	↘	Ì	Ì	Shift-Option-g	
238	Ó	↘	Ó	Ó	Shift-Option-h	
239	Ô	↘	Ô	Ô	Shift-Option-j	
240					Shift-Option-k	
241	Ò	↘	Ò	Ò	Shift-Option-l	(lower case L)
242	Ú	↘	Ú	Ú	Shift-Option-;	(semicolon)
243	Û	↘	Û	Û	Shift-Option-z	
244	Ü	↘	Ü	Ü	Shift-Option-x	
245	ı	↘	ı	ı	Shift-Option-b	
246	ˆ	↘	ˆ	ˆ	Shift-Option-n	
247	-	↘	-	-	Shift-Option-m	
248	-	→	-	-	Shift-Option-,	(comma)

ASCII Times Dingbat Geneva New York Keys Comments

249	˘	↖	˘	˘	Shift-Option-. (period)
250	·	→	·	·	Option-h
251	°	↔	°	°	Option-k
252	˘	➤	˘	˘	not accessible
253	˘	➤	˘	˘	not accessible
254	·	·	·	·	not accessible

255	˘	˘	˘	˘	not accessible
-----	---	---	---	---	----------------

Editable Works Resources

The following Works resources can be edited with Resource Editor, version 1.0 or later. The number of items may change depending on the version of Works.

Name	Description	Number of items
ALRT	Alert boxes	105 items
CURS	Cursors	16 items
DITL	Dialog item list	189 items
DLOG	Dialog boxes	79 items
ICN#	System icons	5 items
ICON	Program icons	23 items
MENU	Menus	44 items
PSIP	Personalization	5 items
STR	Strings	100 items
STR#	Strings	122 items

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- turn Works into an effective page-layout tool for desktop publishing
- integrate the database and word processing modules for powerful mail-merge applications
- use the communications module to access electronic mail services and huge databases; then import downloaded information into other Works modules
- optimize printing for high-quality hard copy
- use third-party add-in software to beef up performance
- save time with keyboard shortcuts
- customize Works for your individual needs with ResEdit

Gordon McComb has written 12 books on microcomputer topics, including *PC Presentation Graphics* and *WordPerfect 5.0 Macros and Templates*.

