Lotus

User's Guide

Lotus 1-2-3 Release 2.3

Contents

How to Use This Book

About This Book

The *User's Guide* is a comprehensive guide to using Lotus® 1-2-3® Release 2.3. It describes 1-2-3 tasks, commands, and features. The *User's Guide* consists mostly of procedures and tables that describe how to carry out particular tasks, such as copying entries or creating a database. The book also describes each command in 1-2-3 and in the add-ins included with 1-2-3 Release 2.3.

Who Should Use This Book

The *User's Guide* is designed for readers who need to learn how to carry out a particular task with 1-2-3. The *User's Guide* provides both basic and advanced material, and both new and experienced 1-2-3 users can use it for instructions on tasks.

New users should also use 1-2-3-Go!, the online tutorial provided with 1-2-3 Release 2.3. In addition, for both new and experienced 1-2-3 users, online Help provides context-sensitive reference information about 1-2-3 features and commands (press **F1 (HELP)** to display information about the command or action you are currently performing). Experienced 1-2-3 users may also find *Quick Start for 1-2-3 Upgraders* helpful.

Conventions

The following conventions are used throughout the *User's Guide*:

- Function keys and special keys are in small capitals. Keys are identified by the appropriate key sequence, followed by the 1-2-3 key name.

  Example: **F1 (HELP)**

- Key names separated by a - (hyphen) indicate that you must press and hold down the first key, press the second key, and then release both keys.

  Example: **CTRL-** →

- Arguments for macro commands, @functions, or commands you enter from the command line appear in lowercase italics. Optional arguments appear in [] (brackets). Macro commands and @function names appear in uppercase letters. Macro commands are enclosed in {} (braces).

Examples: {FORM *input-location*,[*call-*],[*include-list*],[*exclude-list*]}
@DMAX(*input*,*field*,*criteria*)
123 –c[*path*]*filename*[.*ext*]

- Key names separated by a space indicate that you must press the first key and release it, and then press the second key and release it.

  Example: **END HOME**

- Information that you type appears in a different typeface.

  Example: Expenses

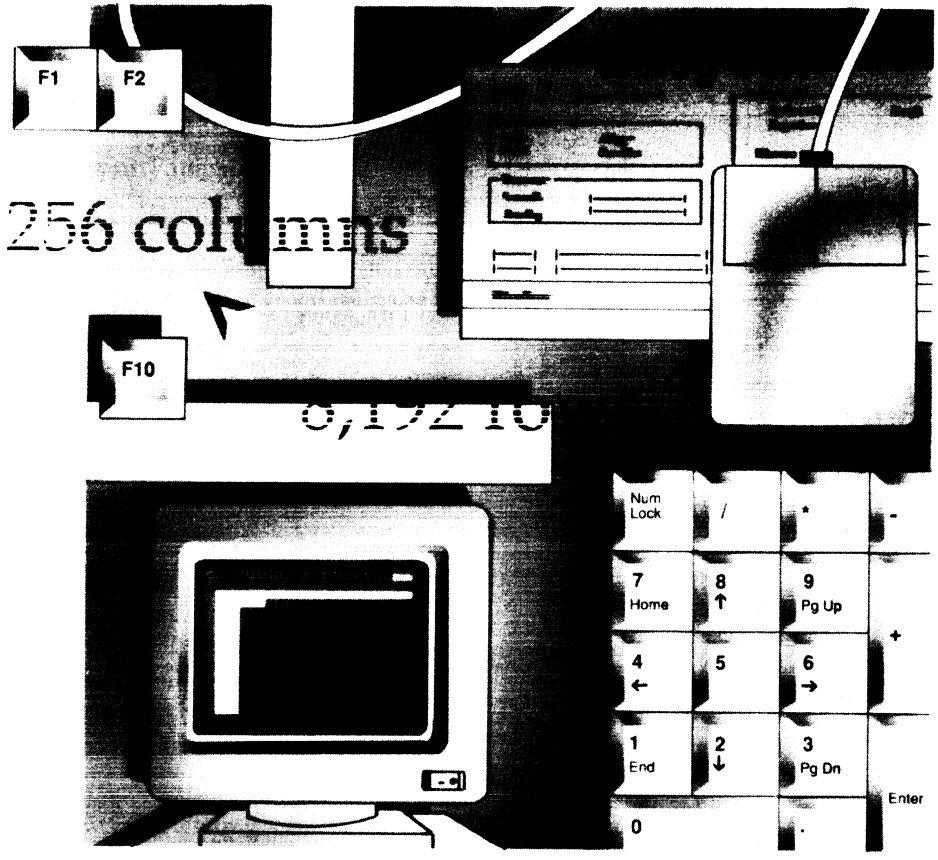
- Indicates that the topic applies to a network.
- Indicates that you can use the mouse to perform the task.
- Indicates that you cannot undo the command or action.
- Indicates that Wysiwyg must be attached for the task.
- Words that are in bold are defined in text where they appear.

Organization

This book contains seven parts:

- Part I, "1-2-3 Basics," describes 1-2-3 and basic 1-2-3 tasks.
- Part II, "Using the Worksheet," describes worksheet tasks and features, including entering and changing data, using Wysiwyg to add text and format data, printing data, and calculating with worksheet data.
- Part III, "Working with Graphs," describes how to create, enhance, and print a graph, as well as how to include a graph in the worksheet.
- Part IV, "Working with Databases," describes how to create, manage, calculate with, and print 1-2-3 databases.
- Part V, "Working with Files," describes how to use 1-2-3 to manage and link files, how to exchange data between programs, how to work with large files, and how to set defaults.
- Part VI, "Command Summaries," briefly describes each 1-2-3, Wysiwyg, Auditor, Macro Library Manager, PrintGraph, and Viewer command.
- Part VII, "Appendixes," includes six appendixes that describe background printing and the BPrint utility, special printing considerations for HP® LaserJet® printers, memory management, and symbols and characters. This part also includes an extensive alphabetical index of the entire *User's Guide*.

Part I
1-2-3 Basics



Chapter 1
Getting the Big Picture

This chapter provides an overview of Lotus® 1-2-3® Release 2.3. The chapter includes the following sections:

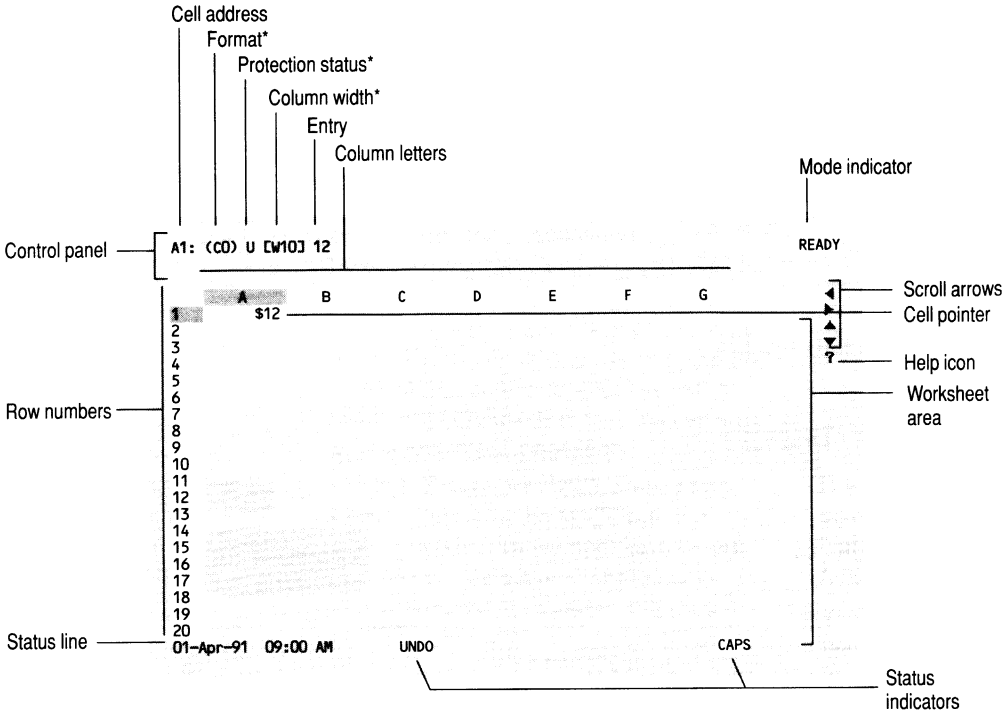
What Is 1-2-3?

1-2-3 helps you manage, develop, and present data. The basic tools of 1-2-3 are a compact, high-performance spreadsheet (the 1-2-3 worksheet), a complete graphing system for creating graphs with worksheet data, and a set of database management functions for organizing and manipulating related data. 1-2-3 Release 2.3 also includes the Wysiwyg add-in, which provides a complete set of formatting and graph editing tools. 1-2-3 Release 2.3 maintains compatibility with other releases of 1-2-3, such as 1-2-3 Release 2.2 and 1-2-3 Release 2.01.

What Is a Worksheet?

The 1-2-3 worksheet is the basic tool for all the work you do with 1-2-3 — you develop spreadsheet models, create graphs, and store and query database information using the worksheet. The worksheet consists of a grid of 256 columns (labeled A through Z, AA through AZ, BA through BZ, and so on to IV) and 8,192 rows (labeled 1 through 8192).

The 1-2-3 Screen



* Appears only if you have changed the default settings

The **worksheet area** occupies most of the 1-2-3 screen. It is where you enter and store data. The worksheet area displays only the part of the 256-column by 8,192-row worksheet that you are currently using.

Each intersection of a row and column forms a cell. A **cell** is the basic unit of the worksheet in which you store data. Each cell's **address** consists of its column letter and row number: For example, B6 identifies the cell at the intersection of column B and row 6.

The **cell pointer** is a rectangular highlight that identifies the current cell.

The **current cell** is the cell that your next entry or procedure will affect: For example, typing an entry or selecting certain commands affects the current cell.

The **control panel** is the three-line area at the top of the screen that displays information about the current cell and **commands** (actions you tell 1-2-3 to perform).

The **first line** of the control panel displays the cell address, the contents of the current cell, and information about the current cell and the current mode:

- The **cell format**, which controls the way 1-2-3 displays values in the cell.

- The cell's **protection status** (U if the cell is unprotected, PR if the cell is protected and protection is on, or nothing if protection is off).
- The cell's **column width**, or number of characters 1-2-3 displays in the cell, if you have changed the initial setting.
- The **mode indicator**, which indicates the **mode**, or state, of 1-2-3. For example, 1-2-3 is in MENU mode and the mode indicator reads MENU after you press / (slash).

The **second line** of the control panel displays the current entry when you enter or edit data, and the main menu if you press / (slash) or < (less-than symbol) in READY mode.

The **main menu** is a list of commands.

Submenus are commands that appear when you select a command from the main menu.

Prompts are requests for information 1-2-3 needs to complete a command.

The **third line** of the control panel displays either submenu commands for the highlighted command or a description of the highlighted command.

The **icon panel** contains **scroll arrows** and **? (Help icon)** for moving within the worksheet and using Help with the mouse.

The **status line** is at the bottom of the screen. 1-2-3 uses the status line to display the date-and-time indicator (or the file name) and status indicators (such as CAPS when the CAPS LOCK key is on).

Mouse and Keyboard

In 1-2-3 Release 2.3, you can use a mouse for many common tasks, including selecting commands from a menu, specifying ranges, selecting and marking items in dialog boxes, selecting Help topics, and moving the cell pointer. When Wysiwyg is attached, the mouse has additional capabilities, including changing the column width or row height, and editing graphics.

When you use a mouse, you must know the following terms:

- **Click** — Press the mouse button and release it. Do not hold the mouse button down for longer than a fraction of a second. Click the left button to select something; click the right button to cancel (equivalent to pressing ESC).
- **Drag** — Hold down the mouse button and move the mouse, then release the mouse button.
- **Press** — Click and hold the mouse button without moving the mouse.
- **Double-click** — Press the mouse button twice in rapid succession.

Throughout this book, instructions assume you use the left button to select items unless the right button is specified. If you switched mouse buttons with the Install program, use the right button when instructions do not specify a button or when the left button is specified; use the left button when instructions specify the right button. To switch mouse buttons, select Change Selected Equipment in the Install program. For more information, see Chapters 2 and 3 of *Getting Started*.

The mouse icon indicates special information or instructions for using the mouse.

Getting Help

1-2-3 provides context-sensitive Help that describes your current action. Help includes a series of procedures (How Do I...?) and a glossary of 1-2-3 terms. For example, if you highlight a command or type an @function name and then press **F1 (HELP)** or click ? (Help icon), 1-2-3 displays Help text about that command or @function. The Help Index provides access to any topic. Within Help, cross-references to additional Help topics appear in a brighter intensity or in a different color. The following table describes how to use the online Help system.

To	Press	Click
Start Help	**F1 (HELP)**	? (Help icon)
Display the last Help topic you used (without starting Help)	**CTRL-F1 (BOOKMARK)**	
Display the Help Index (when Help is active)	**F1 (HELP)**	The F1 box at the bottom of the Help window
Display a list of Help keys	**F3**	The F3 box at the bottom of the Help window
Display Help text for highlighted topic	**ENTER**	The topic
Display previous Help topic	**F8** or **BACKSPACE**	The F8 box at the bottom of the Help window
Leave Help	**ESC**	The right button or the ESC box at the bottom of the Help window
Scroll through the current Help topic and cross-references	← → ↑ ↓, **PG UP, PG DN, TAB, SHIFT-TAB**	A scroll arrow at the side of the Help window
Move to the beginning or end of the current Help topic	**HOME** or **END**	

Chapter 2
Basic 1-2-3 Tasks

This chapter explains the basic procedures you need to know in order to use 1-2-3 Release 2.3. The chapter includes the following sections:

Starting 1-2-3

If you have not used the Install program, see *Getting Started* before you start 1-2-3.

You can start 1-2-3 from the operating system prompt or from the Lotus Access system. Starting 1-2-3 directly from the operating system prompt gives you more of your computer's memory for work (about 2KB), and saves the step of going through the Access system. When you start 1-2-3 from the operating system, you return to the operating system prompt when you end 1-2-3.

The Access system lets you start 1-2-3 by selecting the program's name from the Access menu. Access makes it easy to switch between 1-2-3 and the 1-2-3 utility programs (Install, Translate, and PrintGraph). When you start 1-2-3 from the Access system, you return to the Access system when you end 1-2-3.

To start 1-2-3, make sure the operating system prompt is displayed. The instructions in the following table assume that 123R23 is the name of the directory that contains the 1-2-3 Release 2.3 program files. If it is not, substitute the correct directory name.

If you are using 1-2-3 on a network, substitute your personal directory for the program directory in the following instructions.

To start 1-2-3	Do this
From the operating system	Type cd \123r23 and press ENTER to make the 1-2-3 Release 2.3 program directory the current directory. Type 123 and press ENTER.
From the Access system	Type cd\123r23 and press ENTER to make the 1-2-3 Release 2.3 program directory the current directory. Type lotus and press ENTER. Select 1-2-3 from the menu by highlighting it and then pressing ENTER or by typing 1.

1-2-3 displays a logo screen, which contains the information you entered with the Install program, and then displays the worksheet.

You can configure your computer so you can start 1-2-3 or the Access system from any directory. You do this by adding the name of your Release 2.3 directory to the PATH statement in your AUTOEXEC.BAT file. For more information about PATH, see your operating system manual.

Selecting a Command

To tell 1-2-3 what you want to do, you select a series of commands from menus. In 1-2-3, a **menu** is a series of choices in the second line of the control panel. When a menu is displayed in the control panel, the mode indicator changes to MENU. The third line of the control panel describes the highlighted command. You select commands by highlighting (with the rectangular highlight called the **menu pointer**), by typing the first character of the command (each command in a 1-2-3 menu begins with a different character), or by clicking the command.

Selecting a command by highlighting it or by clicking it is useful while you are becoming familiar with 1-2-3 because you can see the description or submenu 1-2-3 displays for each command. Selecting a command by typing the first character is faster than the highlighting method and is useful once you are familiar with the commands in each 1-2-3 menu.

Often when you select a command, 1-2-3 requires you to supply more information. Sometimes you provide this information through additional menu choices. In many cases, however, 1-2-3 displays a **prompt**, or message, asking you to provide specific information in the second line of the control panel. What information you provide depends on the command. For example, 1-2-3 requests a file name when you select /File Retrieve, text to find when you select /Range Search, or a range address when you select /Copy.

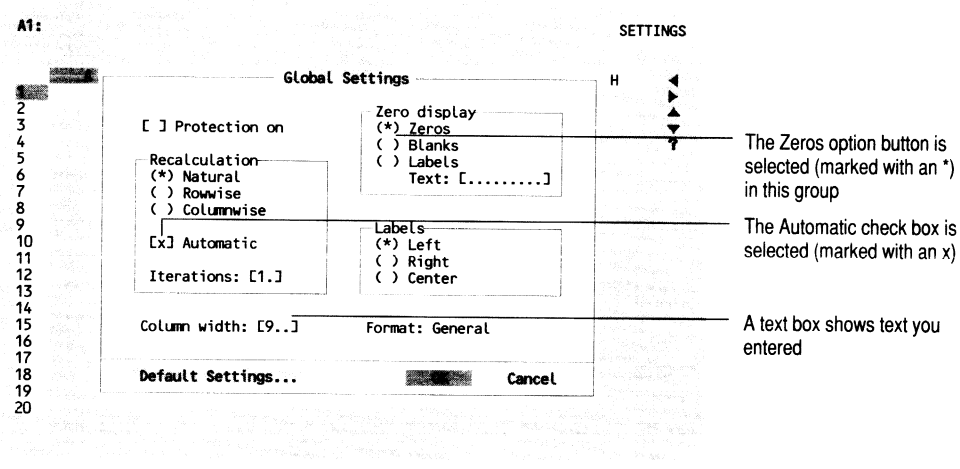
Some 1-2-3 commands, such as /Worksheet Global, /Graph, or /Data Query, require you to select additional commands to specify a number of settings. In such cases, 1-2-3 displays a dialog box.

1-2-3 Dialog Boxes

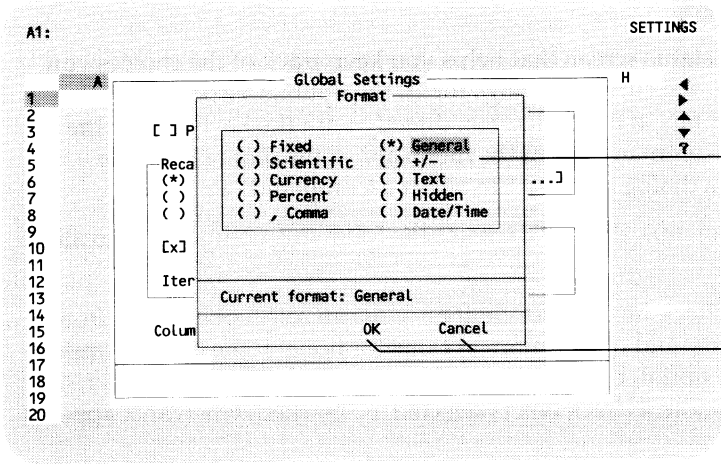
A **dialog box** is a special status screen that helps you keep track of the choices you are making. It shows you the current settings for all the options associated with a task. You can specify settings in the dialog box directly with the keyboard or the mouse, or you can select commands from the menu above the dialog box. For information about using a dialog box, see "To Select a Command" on page 11.

Instead of commands in menus, dialog boxes use the following components to allow you to select settings:

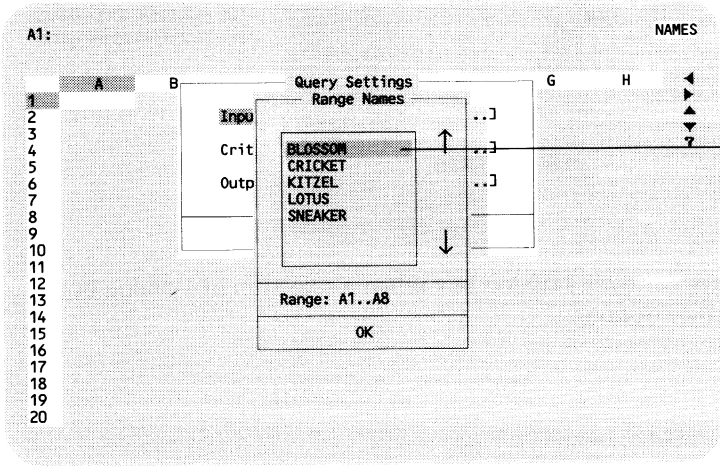
- **Option buttons** and **check boxes** offer choices: you can select one option from a group of option buttons, and one or more options (or none) if the options appear with check boxes. An option button is selected, or marked, when an * (asterisk) appears next to the option; a check box is selected, or marked, when an x appears next to the option.
- **Text boxes** accept whatever type of entry is required, including numbers, cell addresses, range names, or text.



- **Popup dialog boxes** appear over a dialog box when a selection in a dialog box leads to a series of further options.



- Dialog boxes include at least one **command button**. Command buttons appear when the dialog box is active; they carry out the action of the command. OK is the most common command button; it confirms the current selections and completes the dialog box. Some command buttons, such as the Printer command button on the /Worksheet Global Default Settings dialog box, have ellipses (...) following the label; these command buttons produce another dialog box.
- **List boxes** let you select from many choices, such as a list of range names displayed by pressing F3 (NAME).



To use a dialog box, you must first activate the dialog box by pressing F2 (EDIT) or by clicking anywhere in the box with the mouse. (The mode indicator changes to SETTINGS.) Then select dialog box components with the pointer-movement keys, by typing the highlighted character, or by clicking the component with the mouse.

If you prefer using the menu and do not want to use the dialog box, you can press F6 (WINDOW) to turn off display of a dialog box when it appears. This lets you see the worksheet as you select commands from the menu. Pressing F6 (WINDOW) again redisplays the dialog box.

To Select a Command

To	Do this with the keyboard	Do this with the mouse
Activate the 1-2-3 main menu	Press / (slash) or < (less-than symbol).	Move the mouse pointer to the control panel. If Wysiwyg is attached, click the right button to switch menus if necessary.
Activate the Wysiwyg main menu	Press : (colon).	Move the mouse pointer to the control panel. Click the mouse button to switch menus if necessary.
Move the menu pointer	Press ← → or the space bar to move left or right, or HOME or END to move to the first or last command.	Drag the menu pointer. Release the button to select the highlighted command. (If you decide not to select a command, move the menu pointer out of the control panel before you release the button.)
Select a command	Move the menu pointer to the command and press ENTER to choose the highlighted command *or* type the first character of the command.	Click the right button to switch menus if necessary. Click the command with the left button.
Respond to a prompt by selecting a name from a list	Move the menu pointer to the name and press ENTER *or* type the name and press ENTER. (To display a full-screen list, press F3 (NAME).)	Click the name. (To display a full-screen list of names, click List in the first line of the control panel.)
Accept a response to a prompt	Press ENTER.	Click the control panel.
Enter a response to a prompt	Type the response and press ENTER. You may need to press ESC one or more times to clear a suggested response before you can type a new one.	Type the response and click the control panel.

(continued)

To	Do this with the keyboard	Do this with the mouse
Specify a range	Type the address or range name and press ENTER *or* use the pointer-movement keys to highlight the range (in the Range text box in a dialog box, press F4 first) and press ENTER (see "Specifying a Range" on page 26).	Drag the cell pointer to highlight the range (in the Range text box in a dialog box, press F4 first) (see "Specifying a Range" on page 26).
Select dialog box options	Select the menu option(s) *or* press F2 (EDIT) to activate the dialog box and then type the highlighted character *or* press ← → ↑ ↓, TAB, SHIFT-TAB, HOME, or END to move to an option and space bar or ENTER to select it.	Click anywhere in the dialog box and then click the option(s).
Select an item from a list box in a dialog box	Use ← → ↓ ↑, PG UP, PG DN, HOME, END, TAB, or SHIFT-TAB to highlight an item and then press ENTER to select it.	Click the item. To scroll through the list, click a scroll arrow in the icon panel at the side of the list box.
Confirm current dialog box selections	Select OK by highlighting it and pressing ENTER.	Click OK.
Reset current dialog box selections to previous settings	Select CANCEL by highlighting it and pressing ENTER.	Click CANCEL.
Cancel a command	Press CTRL-BREAK.	Click the right button as often as necessary to leave the menu.
Back up one menu level	Press ESC.	Click the right button or click CANCEL in a dialog box.

Undoing an Action

You can cancel the previous action or command in 1-2-3 by pressing ALT-F4 (UNDO) if the undo feature is on. ALT-F4 (UNDO) works only when you are working in 1-2-3 in READY mode. Initially, undo is off; to be able to undo actions, you must select /Worksheet Global Default Other Undo Enable. To change 1-2-3 so that undo is on by default, first select /Worksheet Global Default Other Undo Enable to turn undo on, and then select Update from the /Worksheet Global Default menu. When undo is on, the UNDO indicator appears in the status line when 1-2-3 is in READY mode. If the UNDO indicator is not displayed, pressing ALT-F4 (UNDO) will have no effect.

Undo cancels the most recent operation, restoring whatever worksheet data and settings existed the last time 1-2-3 was in READY mode. For example, you can undo the effects of entering data or copying data. Any series of commands you select after you press / (slash) or < (less-than symbol) (or : (colon) if Wysiwyg is attached), or after you move the mouse pointer into the control panel, is a single undoable operation. For example, if you select /Graph and then perform a series of Graph commands without returning to READY mode, pressing **ALT-F4 (UNDO)** when you return to READY mode undoes all the Graph commands. In addition, if you change your mind about what you just undid, you can press **ALT-F4 (UNDO)** again and 1-2-3 will undo the effect of the undo operation.

If you press **ALT-F4 (UNDO)** after running a macro, 1-2-3 returns your worksheet data and settings to the state they were in prior to running the macro, regardless of how many individual changes the macro made. If you did not run the macro from READY mode, 1-2-3 returns the worksheet data and settings to the state they were in the last time 1-2-3 was in READY mode, before running the macro.

If you press **ALT-F4 (UNDO)** immediately after 1-2-3 finishes running an auto-execute macro (\0 (zero)), 1-2-3 undoes the undoable effects of the macro and /File Retrieve.

To undo the last operation, 1-2-3 makes a backup copy of the worksheet each time you press any key that might lead to a worksheet change (for example, if you press / (slash) or : (colon) (if Wysiwyg is attached), type a character that begins a label or value, or press **F8 (TABLE)** or **F9 (QUERY)**). This reduces the amount of available memory. For complete details on how undo uses memory, see Appendix C, beginning on page 343.

1-2-3 does not back up the worksheet when the key you press cannot lead to worksheet changes. For example, 1-2-3 does not back up the worksheet when you press a pointer-movement key (such as ← or **PG UP**) or when you press a function key that cannot change the worksheet, such as **F5 (GOTO)**. In addition to the pointer-movement keys, 1-2-3 does not back up the worksheet if you press any of the following keys in READY mode:

ALT-F2 (STEP)	**CTRL-BREAK**	**ESC**	**F5 (GOTO)**	**INS**
ALT-F5 (LEARN)	**CTRL-F1 (BOOKMARK)**	**F1 (HELP)**	**F6 (WINDOW)**	
BACKSPACE	**ENTER**	**F3 (NAME)**	**F10 (GRAPH)**	

1-2-3 also does not back up the worksheet if you press **ALT-F7 (APP1)**, **ALT-F8 (APP2)**, **ALT-F9 (APP3)**, or **ALT-F10 (APP4)** and no add-in program is assigned to the key.

To turn undo off to save memory, select /Worksheet Global Default Other Undo Disable. When undo is off, the UNDO indicator in the status line disappears. If you do not have expanded memory, you will probably want to turn undo off before using Wysiwyg. Together, undo and Wysiwyg use much of your computer's available conventional memory, so you could run out of memory while you are formatting a worksheet.

In the *User's Guide*, the  icon appears when you cannot undo a procedure. You cannot undo the actions described in the following table.

If the last action	Pressing ALT-F4 (UNDO)
Changed data on a disk (/File Save, /File Erase, /File Xtract, :Special Export)	Undoes changes to the worksheet, but not to the disk.
Changed printer settings (setup strings sent with /Print Printer Go)	Undoes changes to /Print options (such as the setup string, margins, or footers), but does not undo changes to printer settings that were already made by the setup string. To restore the printer settings, turn off the printer or send a new setup string.
Suspended 1-2-3 so you could use the operating system (/System, {SYSTEM})	Does not undo the effects of the operating system commands.
Changed the default directory setting (/File Directory, /Worksheet Global Default Directory) instantly	Does not undo the action.
Changed the Help access method (/Worksheet Global Default Other Help)	Does not undo the action.
Changed the Wysiwyg display mode (:Display Mode) or adapter (:Display Options Adapter)	Does not undo the action.
Changed a file's reservation status	Does not undo the action.
Enabled undo	Does not undo the action.
Attached, invoked, or detached an add-in	Does not undo the action.
Occurred while an add-in other than Wysiwyg or Auditor was invoked	Does not undo the action.
Occurred in READY mode when the UNDO indicator wasn't visible (undo was off)	Does not undo the action (ALT-F4 (UNDO) is not available).
Was within a utility (PrintGraph, Translate, Access, or Install)	Does not undo the action (ALT-F4 (UNDO) is not available).

Saving Work

Because 1-2-3 does not automatically save your work, you must use /File Save to make a permanent copy of your work on disk before you erase the worksheet, end the 1-2-3 session, or turn off the computer. Also, you should save your files frequently so you do not lose work in the case of a power failure or a problem with your computer system. Save a file before you try a new command or macro you aren't sure of, particularly if undo is off — if the worksheet is damaged, you can restore it by retrieving the saved copy.

You use /File Save to create new files on disk and to update existing files. 1-2-3 assigns the file extension .WK1 to files you create with /File Save unless you enter a different extension when you name the file (if you change the extension, 1-2-3 will not display the file in most file name lists unless you specify the new file extension). You can change the file name or extension when you save it. W /File Save stores Wysiwyg formatting (if any) in a separate file with the extension .FMT.

The following section describes saving your work in a file. For complete information about saving files, see "Saving a File" on page 225.

To Save Your Work

1. Select /File Save.
2. Specify the name of the file.

   To use a new file name, type the file name and press ENTER or click the control panel. To use an existing file name, type the file name *or* select the file name from the list, and then press ENTER or click the control panel. For complete information about saving with existing file names, see "Saving a File" on page 225.

   CAUTION You cannot undo the changes that saving a file makes to a file on disk. Saving a file using an existing file name permanently changes the file on disk.

3. If you selected an existing file name, specify one of the following options:

   Cancel to return 1-2-3 to READY mode without saving the current worksheet, leaving the file on disk intact.

   Replace to replace the contents of the file on disk with the contents of the current worksheet.

   Backup to save the current worksheet and keep a copy of the previous version of the file.

1-2-3 saves the file and returns to READY mode (unless you selected Cancel). If the file is protected with a password, you need to specify the password before 1-2-3 will save the file; see "Limiting Access to Files" on page 228.

If you share files on a network, you need a **reservation** to save an existing file with the same file name. When you have the file reservation, other users may use the worksheet, but only you can save changes to it using the same file name. If you don't have the reservation, you can save the file only if you change the file name. For more information about sharing files, see "Using Files on a Network" on page 234.

Starting a New Worksheet

You don't need to start 1-2-3 again to use a new, empty worksheet. Whenever you need a new worksheet, use /Worksheet Erase to replace the current worksheet with a new one. 1-2-3 restores the default Global settings when you select /Worksheet Erase. For more information about default settings, see Chapter 23, beginning on page 271.

To Start a New Worksheet

1. Select/Worksheet Erase.
2. Select one of the following options:

No	Leave the current worksheet intact.
Yes	Erase the current worksheet and replace it with a new, empty worksheet.

If the current worksheet contains unsaved changes, select No to cancel and save the changes, or select Yes to start a new worksheet anyway (the new file will replace the current worksheet and changes will be lost).

Using an Existing Worksheet

To use a worksheet file from a disk, you retrieve the file, or read it into memory. The retrieved worksheet replaces the current worksheet. Use /File Retrieve to retrieve a worksheet file. To revert to the last saved version of a file, abandoning any changes since you last saved the file, retrieve the file without saving the worksheet first.

When you use /File Retrieve, 1-2-3 uses the settings in the retrieved file. These may be different from the settings you were using.

If you retrieve a file from a network, 1-2-3 automatically gets the reservation if it is available, and releases any previous reservation. When you have the file reservation, other users may use the worksheet, but only you can save it using the same file name.

If 1-2-3 does not have enough memory to read a file when you select /File Retrieve, 1-2-3 cannot retrieve the file. For information on memory management and regaining memory for 1-2-3, see Appendix C, beginning on page 343.

To Retrieve a File

1. Select /File Retrieve.

   If the current worksheet contains unsaved changes, 1-2-3 prompts you to save the worksheet first.

2. Select one of the following options:

No	Return 1-2-3 to READY mode so you can use /File Save to save the worksheet.
Yes	Retrieve the file anyway (the new file will replace the current worksheet and changes will be lost).

   If you select Yes, or if the current worksheet does not contain unsaved changes, 1-2-3 displays files with .WKS, .WK1, and .WK3 extensions in the current directory. (You cannot retrieve files saved in the .WK3 worksheet file format.)

3. (Optional) Display files in a different drive and/or directory, with a different extension, or display a full-screen file list.

To	Do this
Display files with a different extension	Press ESC *or* click the right mouse button. Type *. followed by another extension and press ENTER.
Display all files in the current directory	Type *.* and press ENTER.
Display files in a different drive (including a diskette drive) and/or directory	Press ESC *or* click the right mouse button until you clear the file names (and directory if needed), edit the drive and/or directory, and then press ENTER. You can also click .. (directory icon) or the drive letters to switch directories or drives.
Display file names in a full-screen list	Press F3 (NAME) *or* click List in the first line of the control panel.
Display all files in the directory above the current directory	Press BACKSPACE *or* click .. (directory icon) in the first line of the control panel.

4. Specify the name of the file to retrieve.

   Select the file name from the list or type the file name.

1-2-3 replaces the current worksheet with the worksheet from the disk. If the file is protected with a password, you need to specify the password before 1-2-3 will retrieve the file; see "Limiting Access to Files" on page 228.

If you share files on a network, you may need to retrieve the file without a reservation. For more information about sharing files, see "Using Files on a Network" on page 234 and "Retrieving a File" on page 230.

Using DOS from 1-2-3

You can temporarily suspend 1-2-3 and return to the operating system without clearing the worksheet from memory. Use /System when you want to use operating system commands without ending the current 1-2-3 session. For example, you may want to copy some files or create a new directory during the current session.

Before you use /System, select /File Save to save your work.

You cannot undo any changes made while you are in DOS.

To Use DOS Without Ending the 1-2-3 Session

1. Select /System.

   1-2-3 temporarily replaces the worksheet with the operating system prompt. You can perform many operating system tasks after selecting /System, including running other programs.

   CAUTION Do not load memory-resident or terminate-and-stay-resident (TSR) programs such as Norton Utilities®, do not use BPrint (see "Printing with 1-2-3" on page 79 and Appendix E, beginning on page 369), and do not use the operating system PRINT command. If you do, you will not be able to resume the 1-2-3 session.

2. To return to the 1-2-3 session, type exit and press ENTER at the operating system prompt.

Using an Add-In

Add-ins are programs, created by Lotus and other software developers, that you can run while you are using 1-2-3. Add-ins provide 1-2-3 with additional capabilities. You never have to leave the worksheet to use an add-in — the add-in actually becomes part of 1-2-3.

Many add-ins are available for 1-2-3, including programs that allow you to audit and annotate 1-2-3 worksheets, create three-dimensional graphs with your 1-2-3 data, perform word processing tasks in the worksheet, link 1-2-3 with database programs, create index files and relational databases in 1-2-3, turn your worksheet 90° for dot matrix printouts or for a specified report format, and change the size or color of the worksheet.

1-2-3 Release 2.3 includes six Lotus add-ins:

- Wysiwyg, a spreadsheet publishing add-in that lets you create presentation-quality 1-2-3 printouts and include graphs with data in your printouts. See "Using Wysiwyg" on page 19.
- The Auditor add-in, which identifies and checks formulas in the worksheet.

- The Viewer add-in, which allows you to view the contents of spreadsheet, text, and database files on disk, retrieve files, and create links between worksheet files.
- The Macro Library Manager add-in, which lets you store macros, formulas, and ranges of data in a library that you can use with any worksheet.
- 1-2-3-Go!, an online tutorial guide to learning 1-2-3 Release 2.3.
- Wysiwyg-Go!, an online tutorial guide to learning Wysiwyg.

To	Do this
Load an add-in into memory	Select /Add-In Attach, select the add-in from the list of names, and select No-Key.
Load an add-in into memory and assign it to a key you can press to invoke the add-in	Select /Add-In Attach, select the add-in from the list of names, and select the number that represents the key to assign the add-in to.
Activate an attached add-in with a key	Press the key (**ALT-F7**, **ALT-F8**, **ALT-F9**, or **ALT-F10**) to which you assigned the add-in.
Activate an attached add-in using the menu	Select /Add-In Invoke and then select the add-in from the list of names.
Remove an add-in from memory	Select /Add-In Detach and then select the add-in from the list of names.
Remove all add-ins from memory	Select /Add-In Clear.
Load an add-in into memory automatically each time you start 1-2-3	Select /Worksheet Global Default Other Add-In Set, select a number to assign the add-in to, and select the add-in from the list of names. Select No-Key or the key to assign the add-in to. Select Yes (invokes the add-in automatically each time you start 1-2-3) or No (does not invoke the add-in automatically each time you start 1-2-3). Select Quit and then select Update (/Worksheet Global Default Update) to modify the configuration file.

ALT-F10 displays the Add-In menu if no add-in is assigned to it.

Using Wysiwyg

Wysiwyg is the 1-2-3 Release 2.3 spreadsheet publishing add-in. The name Wysiwyg stands for **W**hat **y**ou **s**ee **i**s **w**hat **y**ou **g**et, because what you see on the screen when you use Wysiwyg is nearly identical to what you get when you print the worksheet.

Attaching Wysiwyg whenever you use 1-2-3 is both simple and useful. Wysiwyg makes printing worksheets and graphs easier, and improves the quality of both printed work and your on-screen display. Throughout the *User's Guide*, Wysiwyg procedures are described where they are relevant. The Wysiwyg icon means that you must have Wysiwyg attached before you can perform the procedure.

You must attach Wysiwyg before you can use Wysiwyg commands. You can attach Wysiwyg automatically each time you start 1-2-3. You do not need to invoke Wysiwyg to use it. Instead, to display the Wysiwyg menu whenever Wysiwyg is attached, you press : (colon) *or* move the mouse pointer to the control panel (click the right mouse button to switch menus if necessary).

To	Do this
Load Wysiwyg into memory	Select /Add-In Attach, select WYSIWYG.ADN from the list of names, and select No-Key.
Load Wysiwyg into memory and assign it to a key you can press to display the Wysiwyg menu	Select /Add-In Attach, select WYSIWYG.ADN from the list of names, and select the number that represents the key to assign the add-in to.
Load Wysiwyg into memory automatically each time you start 1-2-3	Select /Worksheet Global Default Other Add-In Set, select a number to assign the add-in to, and select WYSIWYG.ADN from the list of names. Select No-Key. Select No at the prompt. Select Quit and then select Update (/Worksheet Global Default Update) to modify the configuration file.
Display the Wysiwyg menu	Press : (colon) *or* press the key you assigned Wysiwyg to (**ALT-F7**, **ALT-F8**, **ALT-F9**, or **ALT-F10**) *or* move the mouse pointer into the control panel and click the right button to switch menus (if necessary). When the Wysiwyg menu is active, the mode indicator reads WYSIWYG.
Remove Wysiwyg from memory	Select /Add-In Detach. Select WYSIWYG.ADN from the list of names. **CAUTION** The current Wysiwyg formatting for the file is lost when you detach Wysiwyg. To save the formatting, select /File Save before you detach Wysiwyg.

If you do not have expanded memory, you will probably want to turn off undo before using Wysiwyg. Together, undo and Wysiwyg use much of your computer's available memory, so you could run out of memory while you are formatting a worksheet. This means you cannot use **ALT-F4 (UNDO)** to recover from a mistake.

Leaving 1-2-3

When you finish using 1-2-3, you use /Quit to end the session. To suspend 1-2-3 temporarily without ending the session so you can use operating system commands, select /System (see "Using DOS from 1-2-3" on page 18).

CAUTION Before you select /Quit, select /File Save to save your work. If you do not save changes you have made to the current worksheet before selecting /Quit, 1-2-3 will prompt you to do so before ending the session.

To Leave 1-2-3

1. Select /Quit.
2. Select one of the following options:

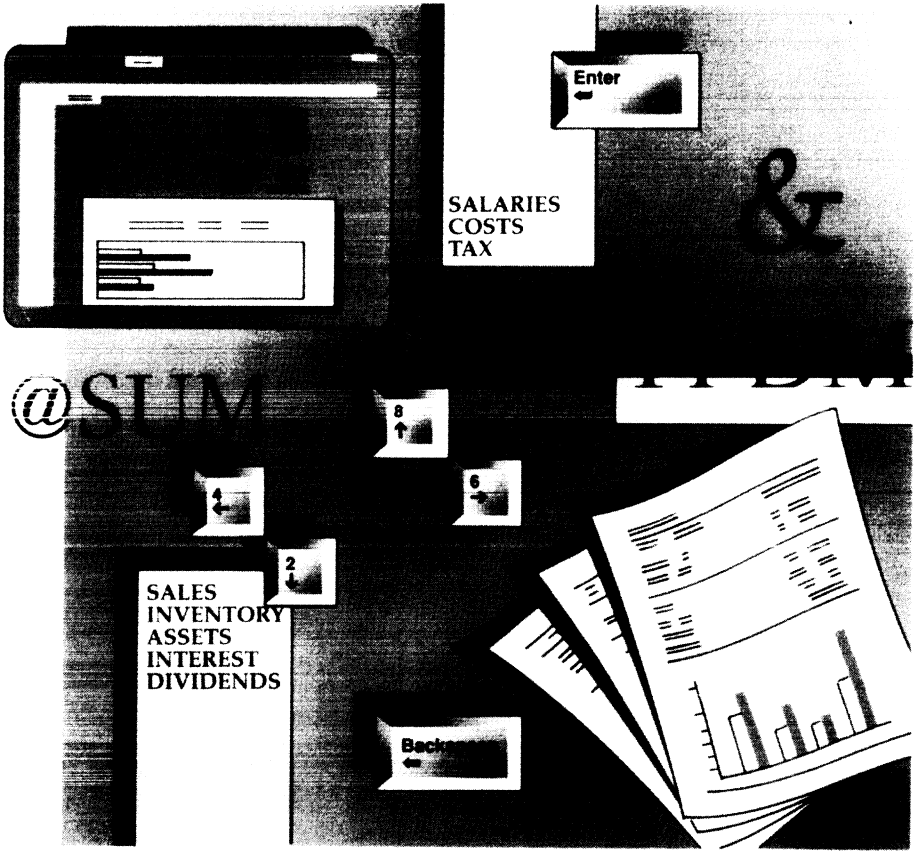
No	Returns 1-2-3 to READY mode.
Yes	Ends the 1-2-3 session.

3. If you selected Yes and you have changed data in the worksheet since the last time you saved it, 1-2-3 displays another No/Yes menu. Select one of the following options:

No	Returns 1-2-3 to READY mode so you can use /File Save to save the worksheet.
Yes	Ends the 1-2-3 session without saving changes to the worksheet. (All changes to the current worksheet will be lost.)

1-2-3 returns you to the operating system prompt if you started 1-2-3 from the operating system or to the Access system if you started 1-2-3 from the Access menu. To leave the Access System, select Exit.

Part II
Using the Worksheet



Chapter 3
Basic Worksheet Tasks

This chapter describes basic tasks you perform frequently as you work with 1-2-3. The chapter includes the following sections:

Moving Within 1-2-3

You move around in 1-2-3 with either the pointer-movement keys or the mouse. The following table describes how to move within the worksheet.

To	Press	Or do this with the mouse
Move the cell pointer left or right one column, or up or down one row	← → ↑ ↓	Click the cell or click the scroll arrow to the right of the worksheet border.
Move the cell pointer left one screen	**SHIFT-TAB** or **CTRL** - ←	
Move the cell pointer right one screen	**TAB** or **CTRL** - →	
Move the cell pointer to the intersection of a blank and a nonblank cell (a blank cell contains no data and/or label prefixes)	**END** ← **END** → **END** ↑ **END** ↓	
Move the cell pointer to lower right corner of active area (the rectangular area between cell A1 and the lowest and rightmost nonblank cell in the worksheet)	**END HOME**	

(continued)

To	Press	Or do this with the mouse
Move the cell pointer to cell A1	HOME	Click the empty cell above the first visible row and to the left of the first visible column.
Move the cell pointer up or down one screen	PG UP or PG DN	Press the up or down scroll arrow (moves the cell pointer one row at a time).
Move the view of the worksheet without moving the cell pointer	SCROLL LOCK and then a pointer-movement key	
Move the cell pointer directly to cell or named range you specify	F5 (GOTO) and enter the cell address or press F5 (GOTO) and then press F3 (NAME) and select the name of the cell or range	Click the cell. If the cell is not visible, press a scroll arrow until the cell is visible, and then click the cell.
Scroll the worksheet left, right, up, or down	Hold down ← → ↑ or ↓	Press a scroll arrow.

Moving the cell pointer changes the current cell — the cell your next action will affect. Moving the cell pointer does not specify the cell for a command, however. See the next section for information on specifying a cell for a command or formula.

Specifying a Range

When you work with 1-2-3, you often want to perform the same action on several cells at once. Some formulas and @functions also require a range of data. In these cases, you specify a range for 1-2-3. A **range** is a rectangular block of adjacent cells. It can be a single cell, several cells that are in adjacent rows and columns, a row, a column, or several adjacent rows and columns. In most cases, you can use either the keyboard or the mouse to specify ranges.

Specifying a Range Before You Select a Command

You can specify a range either before or after you select a command. Specifying a range before you select a command leaves the range specified after the command is complete. Specifying a range during a command does not. If you will use the same data for many commands, specify the range first; once the range is specified, you need not respecify it for each command. When you specify a range before selecting a command that requires a range, 1-2-3 and Wysiwyg use the specified range automatically. This means 1-2-3 skips the prompt that requests the range (or enters the preselected range when you select the Range text box in a dialog box). If a

command moves data in the range (such as /Move), the specified range becomes the range you move the data to.

CAUTION If you specify a range before you select /Range Erase, /Worksheet Delete Row, or /Worksheet Delete Column, 1-2-3 deletes the contents of the range immediately. To restore the worksheet to its original state when undo is on, press **ALT-F4 (UNDO)** immediately.

To Specify a Range

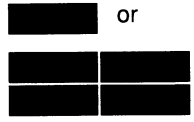
You can specify a range in several ways:

- Type the range address in a formula or in response to a prompt. A **range address** consists of the cell addresses of the upper left and lower right cells in the range, separated by one or two periods (for example, A1..B4). After you enter a range address, 1-2-3 always displays it in uppercase letters as the upper left and lower right cells (except in a formula), separated by two periods.
- Use a range name in a formula, in the Range text box in a dialog box, or in response to a prompt (for complete information about range names, see "Using Named Ranges" on page 29). **F3 (NAME)** displays a list of all range names in the worksheet. Using a range name simplifies specifying a range in dialog boxes, formulas, and @functions. Name a range if you will need the data it contains frequently, if it is large, or if you will need to specify the range often (for example, it is helpful to name the input range that contains the database table for /Data Query, or the table range for /Data Table).
- Highlight a range with the mouse or the keyboard before you select a command. You can also highlight a range when 1-2-3 or Wysiwyg is in POINT mode. 1-2-3 and Wysiwyg enter POINT mode when you press **F4**, when you hold down the left mouse button, when you must specify a range for a command, or when you are highlighting a range for a formula or @function. (To enter POINT mode in a dialog box, press **F4**.) Moving the cell pointer or pressing **ESC** in READY mode cancels the preselected range.

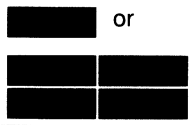
The table that follows illustrates some worksheet areas and describes how to highlight them with the keyboard or the mouse.

To highlight this area	Shape	Use these keys	Or do this with the mouse
Single cell		Press a pointer-movement key: ← → ↓ and ↑ select an adjacent cell; **PG UP**, **PG DN**, **TAB**, **SHIFT-TAB**, **HOME**, and **END** select a more distant cell. Press **F5 (GOTO)**, type the cell address, and press **ENTER**.	Click the cell. *In the Range text box in a dialog box,* press **F4** to enter POINT mode and then click the cell.

(continued)

To highlight this area	Shape	Use these keys	Or do this with the mouse
		In a formula, type the cell address or name, *or* use the pointer-movement keys. *In response to a prompt,* type the cell address or name, or enter POINT mode and use the pointer-movement keys (press **ESC** or **BACKSPACE** to free the cell pointer if necessary). *In the Range text box in a dialog box*, type the cell address or name, or enter POINT mode by pressing **F4** and use the pointer-movement keys (press **ESC** or **BACKSPACE** to free the cell pointer if necessary).	
Range	 or	*In READY mode,* press **F4** and highlight the range with the pointer-movement keys before you select a command *or* in POINT mode after selecting a command, anchor the range with . (period) if necessary and highlight the range with the pointer-movement keys (press **ESC** or **BACKSPACE** to free the cell pointer if necessary). *In a formula,* type the range address or name, *or* anchor the range with . (period) if necessary and use the pointer-movement keys. *In response to a prompt,* type the range address or name, or in POINT mode anchor the range with . (period) and use the pointer-movement keys (press **ESC** or **BACKSPACE** to free the cell pointer if necessary). *In the Range text box in a dialog box,* type the range address or name, or enter POINT mode by pressing **F4** and use the pointer-movement keys.	Drag the cell pointer to highlight the range. *In the Range text box in a dialog box,* press **F4** and drag the cell pointer to highlight the range.

(continued)

To highlight this area	Shape	Use these keys	Or do this with the mouse
Named range	 or	Press F4 and type the range name *or* press F3 (NAME) in POINT mode and select the name from the list.	

1-2-3 and Wysiwyg enter POINT mode when you press F4, press a pointer-movement key in response to a prompt, or press a pointer-movement key after typing + - (/ ^ or * within a formula or @function. The following table describes the keys you use to highlight a range in POINT mode. When a range is anchored, a pointer-movement key expands the highlight; when a range is unanchored, a pointer-movement key moves the cell pointer (and the **anchor cell**, or the cell from which you start highlighting the range).

Key	When range is unanchored	When range is anchored
. (period)	Makes the current cell the anchor cell.	Moves the anchor cell clockwise from one corner of highlighted range to next.
BACKSPACE	Returns the cell pointer to wherever it was before 1-2-3 entered POINT mode (current cell).	Removes highlighting, unanchors the cell pointer, and returns the cell pointer to wherever it was before 1-2-3 entered POINT mode.
ESC	If you are using a command, returns you to the previous menu or prompt. If you are entering a formula, clears the last cell address in the formula and returns 1-2-3 to VALUE or EDIT mode.	Removes highlighting and unanchors the cell pointer.
Pointer-movement keys	Move the cell pointer (and thus the anchor cell).	Extend the range highlight.

With some commands, such as /Data Fill, 1-2-3 "remembers" the most recently specified range. The next time you select the command, 1-2-3 automatically highlights the last range and displays its address in the control panel (unless you highlighted a range before selecting the command). Press ENTER to accept that range, or press ESC or BACKSPACE to clear the range and specify a different range.

Using Named Ranges

A **named range** is any 1-2-3 range to which you assign a range name. **Range names** are names of up to 15 characters that you use in commands and formulas instead of cell or range addresses. For example, if you assign the name SALES to A5..D9, you can move the cell pointer to A5 by pressing GOTO (F5), typing sales, and pressing

ENTER; you can add the values in A5..D9 with the formula @SUM(SALES); and you can print the data in A5..D9 by specifying SALES as the print range. Range names are generally easier to remember than the range addresses to which they correspond.

To prevent confusion when using range names in formulas and macro commands, follow these guidelines when you create range names:

- Do not include spaces, commas, semicolons, or the characters + * - / & > < { @ and # in range names because they may appear to be formulas to 1-2-3.
- Do not create names that look like cell addresses, such as Q2 or EX100.
- Do not use @function names, macro commands, or 1-2-3 key names as range names.
- Do not create range names that begin with a number, such as 20DEC, or consist entirely of numbers, such as 1989. You cannot use such range names in a formula.

When you name a range, formulas that refer by address to the range automatically change to refer to the range name. For example, if the formula @SUM(A1..A5) exists when you assign the name TOTALS to A1..A5, 1-2-3 automatically changes @SUM(A1..A5) to @SUM(TOTALS).

When you move the upper left or lower right cell of a named range, 1-2-3 adjusts the range name's definition. If you move data into the upper left or lower right cell of a named range or delete the column or row that contains the upper left or lower right cell, the range name becomes undefined. Formulas that used that range evaluate to ERR (error). When you copy formulas that contain range names, 1-2-3 treats the range names as relative references and replaces the names with addresses in the copied formulas. For more information about the effect of moving and copying on range names, see "Rearranging Data" on page 42.

When you delete a range name (or all range names), 1-2-3 replaces the range name with the range address in any formulas that use the deleted range name.

To	Do this
Name a range	Highlight the range, select /Range Name Create, type the range name following the guidelines above for creating range names, and press ENTER.
Assign names to single-cell ranges, using adjacent labels as range names	Select /Range Name Labels. Select Right (names cell to the right of the label), Down (names cell below the label), Left (names cell to the left of the label), or Up (names cell above the label). Specify the range that contains the labels. 1-2-3 uses only the labels in the range as range names; it ignores any numbers or formulas in the range. If any of the labels exceed 15 characters, 1-2-3 uses only the first 15 characters.
Rename a range	Select /Range Name Create, select the range name to change, press F2 (EDIT), edit the range name, and press ENTER.

(continued)

To	Do this
Change the range assigned to a name	Select /Range Name Create, select the range name, press ESC to clear the previous range address, and specify the new range address.
Delete a range name, leaving data in the range unchanged	Select /Range Name Delete. Specify the range name to delete.
Delete all range names in the worksheet, leaving data unchanged	Select /Range Name Reset. **CAUTION** /Range Name Reset disables named macros.
Create a table that lists all range names and their addresses	Decide on a location for the range name table. Select /Range Name Table. Specify the upper left cell of the location you decided on. **CAUTION** 1-2-3 will write over existing data in the range when it creates the table, which is two columns wide and as many rows long as there are range names, plus one. If undo is on, press ALT-F4 (UNDO) to restore the worksheet if necessary.

CAUTION If you create a range name that is identical to an existing range name, either by entering the range name or using adjacent labels, 1-2-3 reassigns the range name to the new range. If two names exist for one range, and you change the range definition for one name, 1-2-3 changes the range definition for the other name as well; for example, if BUDGET and PLAN both refer to A1..F12, changing BUDGET to refer to D1..Q24 changes PLAN as well.

TIP If you use /Range Name Table frequently, assign a range name to a worksheet area you designate as the table location. Whenever you select /Range Name Table, type the range name. This technique saves time and helps avoid the possibility of writing over data you want to keep when you create a range name table.

Use F3 (NAME) to specify a named range for a command or a formula.

Entering Data

1-2-3 recognizes two types of entries: values and labels. A **value** is any number, or a formula or @function that returns a value. **Formulas** calculate or combine numbers and/or text. **@Functions** are built-in formulas that calculate with text and numbers. A **label** is a text entry.

The first character tells 1-2-3 the entry type. Numbers and the symbols + – (. @ $ # or any currency symbol signal a value. All other characters signal a label, and 1-2-3 inserts a **label prefix** to control alignment. W Wysiwyg also uses label prefixes to control text alignment; for more information about aligning text with Wysiwyg, see "Changing the Position of Text" on page 71. The following table lists both 1-2-3 and Wysiwyg label prefixes and their effects on labels.

Prefix	Result
'	Aligns the label with the left edge of the cell (default alignment for labels).
"	Aligns the label with the right edge of the cell.
^	Centers the label in the cell.
\	Repeats the characters in the label to fill the cell.
"""	(Wysiwyg) Aligns the label with the right edge of the cell.
^^	(Wysiwyg) Centers the label in the cell.

The ¦ (split vertical bar) is also a label prefix, used primarily for embedded setup strings (see Appendix B, beginning on page 331), page breaks (see "Changing How 1-2-3 Prints" on page 84), and /Data Parse format lines (see "Parsing Imported Data" on page 257). If used as a label prefix for a label that is located in the first column of a print range, the ¦ (split vertical bar) tells 1-2-3 not to print the row. If, however, the label is located elsewhere in a row (such as between other labels), the label is left-aligned and will print. **W** In a Wysiwyg text range, the ¦ (split vertical bar) fills the row of the text range evenly. For more information about text ranges, see Chapter 6, beginning on page 69.

If a label is longer than the cell (a **long label**), 1-2-3 displays it if cells to the right are blank, or displays what fits in the cell if the cells to the right contain data. If a value is longer than the cell (a **long value**), 1-2-3 displays the value in scientific notation if the cell format is General or displays asterisks (***) in the cell if the cell has another format. 1-2-3 stores the entire entry in the cell, even if it cannot display the entire entry. Widen the cell to see the entry (see "Changing the Width of a Column" on page 51).

Formulas can contain numbers, text, cell addresses, range names, or @functions. Formulas also contain **operators** that tell 1-2-3 what to do with the data. Numeric formulas use standard mathematical operators: + (addition) – (subtraction) * (multiplication) / (division) and ^ (exponentiation). The text operator, &, joins two labels. Type + (plus) or – (minus) to start a formula that begins with a cell address. For more information about formulas, see "Working with Formulas" on page 37.

@Functions are built-in formulas. Some @functions work with numbers, others with text. Most @functions have three parts: the @ (at sign); the name of the @function in uppercase or lowercase letters; and one or more arguments enclosed in parentheses (an **argument** specifies the data the @function works on). For complete information about @functions, see the *@Functions and Macros Guide*.

1-2-3 treats dates and times in a special way to allow you to calculate differences between dates. 1-2-3 assigns an integer to each of the 73,050 days from January 1, 1900, through December 31, 2099. These integers (1 through 73050, consecutively) are called **date numbers**. For example, the integer 5 corresponds to January 5, 1900; the integer 32774 corresponds to September 23, 1989. 1-2-3 assigns a decimal number to each second from midnight through 11:59:59 P.M. These decimal numbers are called **time numbers**. For example, the decimal number .5 corresponds to 12:00:00 P.M.; the decimal number .999305 corresponds to 11:59:00 P.M. To use a date or time number,

you must enter it correctly or use an @function to calculate it. Use /Range Format to display the date or time number as a date (see "Changing How 1-2-3 Displays Numbers" on page 50).

To enter	Do this	With this result
Text	Type the text (up to 239 characters). To confirm the entry, press ENTER, press a pointer-movement key, *or* click the control panel.	The mode indicator says LABEL, and characters appear in the second line of the control panel as you type. When you confirm the entry, 1-2-3 inserts a label prefix, the text appears in the cell, and the mode indicator changes to READY.
A number	Type a number between 10^{-99} and 10^{99}, up to 240 characters long. To confirm the entry, press ENTER, press a pointer-movement key, *or* click the control panel. Do not enter spaces, commas, or other punctuation (except for a single decimal separator).	The mode indicator says VALUE, and characters appear in the second line of the control panel as you type. When you confirm the entry, the number (or asterisks) appears in the cell, and the mode indicator changes to READY.
A label, adjusting its position in the cell	Type the label prefix that corresponds to the alignment you want. Then type the text. To confirm the entry, press ENTER, press a pointer-movement key, *or* click the control panel.	The mode indicator says LABEL, and characters appear in the second line of the control panel as you type. When you confirm the entry, the text appears in the cell, and the mode indicator changes to READY.
A label that begins with a number or a number as a label	Type a label prefix and the number (and any text). To confirm the entry, press ENTER, press a pointer-movement key, *or* click the control panel.	The mode indicator says LABEL, and characters appear in the second line of the control panel as you type. When you confirm the entry, the text appears in the cell, and the mode indicator changes to READY.

(continued)

To enter	Do this	With this result
A formula	Type + or – to start the formula (if it will begin with a cell address, range name, or file reference); you can also enclose a formula in parentheses. Type the first operand or specify the cell. (An **operand** is a value in a formula — for example, a number or a cell address.) Type the operator. Type the next operand, and then type operators and operands until the formula is complete. To confirm the entry, press ENTER, press a pointer-movement key, *or* click the control panel.	The mode indicator says VALUE, and characters appear in the second line of the control panel as you type. When you confirm the entry, the result, not the formula, appears in the cell. 1-2-3 displays the formula in the first line of the control panel. Valid formulas include 27+1 +NAME–27 –A7+A3 (ACTUAL–BUDGET) +A1–B1*C1
An @function	Enter @, the function name, (, any arguments, and). To confirm the entry, press ENTER, press a pointer-movement key, *or* click the control panel.	The result of the @function appears in the cell. 1-2-3 displays the @function in the first line of the control panel.
A date	Enter @DATE(*year,month,day*) (using the *year* (2-digit), *month*, and *day* values for the day you want) to create a date number. To confirm the entry, press ENTER, press a pointer-movement key, *or* click the control panel. Then use /Range Format Date to display the date rather than the date number.	The mode indicator says VALUE, and characters appear in the second line of the control panel as you type. When you confirm the entry, the date number appears in the cell. After you use /Range Format Date, the date appears in the format you select. 1-2-3 displays the @function in the first line of the control panel.
A time	Enter @TIME(*hour,minutes,seconds*) (using the *hour*, *minutes*, and *seconds* values, in 24-hour form, for the time you want) to create a time number. To confirm the entry, press ENTER, press a pointer-movement key, *or* click the control panel. Then use /Range Format Date Time to display the time rather than the time number.	The time appears in the format you select. 1-2-3 displays the @function in the first line of the control panel.

(continued)

To enter	Do this	With this result
Copies of the same data	Enter the data once. Select /Copy. Specify the cell or range to copy at the Copy what? prompt and press ENTER. Specify the cell or range to copy to at the To where? prompt and press ENTER.	The contents of the source range appear in the destination range. If the source contains a formula or @function that contains relative cell addresses, the cell addresses in the destination change to reflect the new location.

When you press ENTER or one of the pointer-movement keys or click the control panel to confirm an entry, 1-2-3 checks the data before entering it in the worksheet to make sure you typed a valid label or value. If the entry is valid, 1-2-3 enters the data in the current cell. If the entry is not valid, 1-2-3 beeps, switches to EDIT mode, displays the data in the second line of the control panel for editing, and moves the cursor to the problem area. For information on editing data, see the next section, "Editing an Entry."

You can enter any number between 10^{-99} and 10^{99}. The number of significant digits 1-2-3 displays in a cell depends on the cell format, column width, and the magnitude of the number. If you enter a number with more digits than 1-2-3 can display, 1-2-3 rounds the number. You may want to enter large numbers in scientific notation. For example, to enter 602000, you can type 6.02E05. The format for entering a number in scientific notation is to type a positive or negative number followed by an e or E, and an exponent from -99 to 99.

If you begin a number with a $ (dollar sign), 1-2-3 will enter the number but will not display the $. You must change the format of the cell to display a currency symbol. See "Changing How 1-2-3 Displays Numbers" on page 50.

Editing an Entry

Edit an entry by deleting, inserting, or replacing characters in the entry either while you type it or after you enter it in the cell. A small change is simplest and usually quickest if you move to the cell and enter a new label or value. The new entry replaces the old one. To revise a long entry without retyping it completely, change parts of the entry in EDIT mode. Move to the cell and start EDIT mode by pressing F2 (EDIT). The mode indicator says EDIT, and the contents of the current cell appear in the control panel. You can also replace or find an entry with /Range Search.

To	Do this
Edit as you type	Press BACKSPACE to erase previous characters or press F2 (EDIT) to start EDIT mode. Type replacement characters and press ENTER *or* click the control panel.
Cancel the entry you are typing	Press ESC (in EDIT mode, press ESC twice).
Edit a short entry	Move to the cell. Type the new entry, and confirm it by pressing ENTER or a pointer-movement key *or* by clicking the control panel.
Change an entry	Move to the cell. Press F2 (EDIT) to start EDIT mode. Move the cursor to where you want to edit the entry. Press BACKSPACE to delete characters to the left of the cursor, INS to replace characters with new characters as you type, or DEL to delete characters at the cursor. Type new characters to insert them. Press ENTER *or* click the control panel when you finish editing the entry.
Erase a single entry	Move to the cell you want to erase and press DEL.
Erase several entries	Select /Range Erase. Specify the range to erase. Press ENTER *or* click the control panel.
Find an entry	Select /Range Search. Specify the range that contains the entry you want to find. Enter the characters to find at the prompt; you can use the wildcard characters ? (question mark) or * (asterisk) to search for several similar entries (for example, h?t finds hat and hot, and h* finds hat, hot, head, and so on). Select Formulas (to search in formulas only), Labels (to search in labels only), or Both (to search in both). Select Find. Select Next (to find the next occurrence) or Quit (to stop /Range Search).
Replace an entry	Select /Range Search. Specify the range that contains the entry you want to replace. Enter the characters to find at the prompt. Select Formulas (to search in formulas only), Labels (to search in labels only), or Both (to search in both). Select Replace. Enter the new characters after the prompt. Select Replace (to replace the current instance and find the next), All (to replace all occurrences of the characters), Next (to find the next occurrence, leaving the current occurrence unchanged), or Quit (to stop /Range Search).

The pointer-movement keys work differently in EDIT mode. The table below lists the keys you can use in EDIT mode.

Press	To
←	Move the cursor left one character.
→	Move the cursor right one character.
↑	Complete editing and move the cell pointer up one row.
↓	Complete editing and move the cell pointer down one row.
BACKSPACE	Erase the character to the left of the cursor.

(continued)

Press	To
ALT-F1 (COMPOSE)	Create characters that aren't available on the keyboard (see Appendix A, beginning on page 319).
CTRL - → or TAB	Move the cursor right five characters.
CTRL - ← or SHIFT-TAB	Move the cursor left five characters.
DEL	Erase the current character.
END	Move to the right of the last character in the entry.
ENTER	Complete editing.
ESC	Clear the entry from the control panel.
F2 (EDIT)	Switch to VALUE or LABEL mode.
F9 (CALC)	Convert a formula to its current value.
HOME	Move to the first character in the entry.
INS	Switch between inserting text by moving existing text to the right (INS mode), and writing over existing text (OVR mode).
PG UP	Complete editing and move the cell pointer up one screen.
PG DN	Complete editing and move the cell pointer down one screen.

TIP If undo is on and you edit an entry and then change your mind, press ALT-F4 (UNDO) immediately to restore the entry.

Working with Formulas

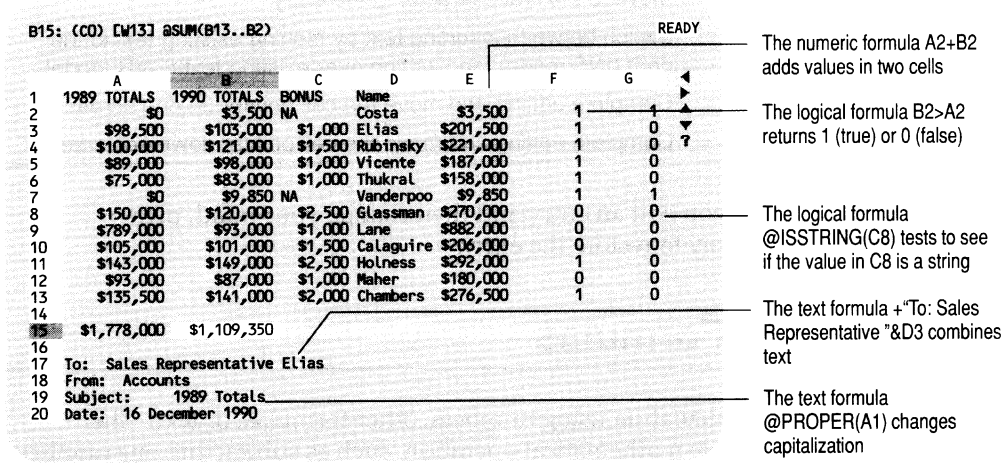
A formula performs a calculation using numbers, other formulas, or text. The calculation can be a simple mathematical operation, such as subtracting one number from another, or a more complicated operation, such as determining the net present value of a series of future cash flows.

When you enter a formula, 1-2-3 displays the value that results from the calculation in the cell. For example, if you enter the formula 25+5, 1-2-3 displays the value 30 in the cell (for information on entering a formula, see "Entering Data" on page 31). When the cell pointer is in the cell, however, 1-2-3 displays 25+5 in the first line of the control panel. To display formulas in cells instead of their results, use /Range Format Text or /Worksheet Global Format Text (for more information about changing a cell format, see "Changing How 1-2-3 Displays Numbers" on page 50).

Types of Formulas

1-2-3 lets you enter three types of formulas: numeric, text, and logical. You can also enter @functions, which are built-in formulas in 1-2-3 that perform numeric, text, or logical calculations. For a complete description of the 1-2-3 @functions, see the *@Functions and Macros Guide.*

- **Numeric formulas** calculate numeric values using one or more of the **arithmetic operators** (+ – * / and ^) and/or @functions. 1-2-3 can calculate any numeric formula whose value is between 10^{-308} and 10^{308}, but the value must be between 10^{-99} and 10^{99} for 1-2-3 to display it in the worksheet. When a formula's value is less than 10^{-99} or greater than 10^{99}, 1-2-3 displays asterisks in the cell that contains the formula.
- **Text formulas** calculate text values, using the **text operator** & (ampersand) and/or @functions. Enclose text in quotation marks within text formulas (for example, +"January "&"Sales" creates the text "January Sales").
- **Logical formulas** are statements that return either 1 (meaning the statement is true) or 0 (meaning the statement is false). Logical formulas use the **logical operators** = < > <= >= <> #AND# #OR# and #NOT# and/or @functions.



Formula Guidelines

Use the following guidelines when entering a formula:

- A formula can begin with a number or one of the numeric symbols + – @ . (or $. In addition, you can use # (number symbol) to begin a logical formula.
- When the first element in a formula is a cell address, range name, or **file reference** (a reference to a cell in another worksheet file), begin the formula with + – (or $. For example, +B7/B8, –B7*B8, $SALES/12, (SALES–EXPENSES), and +<<BUDGET.WK1>>B7 are all valid formulas.
- When a text formula starts with text, begin the formula with + or (. For example, +"Ms.•"&LAST and ("Ms.•"&LAST) are both valid formulas. (Each • represents one space.)
- A formula can contain up to 240 characters.
- A formula cannot contain spaces, except within text in text formulas.

You can use the following types of data in a formula:

- Numbers (for example, 450, -92, 7.1E12, date numbers, and time numbers)
- Text within quotation marks, sometimes called a **literal string** (for example, "Budget for" or "TOTAL")
- @Functions (for example, @SUM(A4..A8))
- Cell and range addresses (for example, B12, FF23..FH35)
- Range names (for example, JANSALES, BUDGET_90)

Order of Precedence

The arithmetic, text, and logical operators you can use in formulas follow an order of precedence. **Precedence numbers** represent the order in which 1-2-3 performs operations in a formula. The lower the precedence number, the earlier 1-2-3 performs the operation. 1-2-3 performs operations with the same precedence number sequentially from left to right.

Operator	Operation	Precedence number
^	Exponentiation	1
– or +	Identification of value as negative or positive	2
* or /	Multiplication or division	3
+ or –	Addition or subtraction	4
= or < >	Equal-to or not-equal-to tests	5
< or >	Less-than or greater-than tests	5
< =	Less-than-or-equal-to test	5
> =	Greater-than-or-equal-to test	5
#NOT#	Logical-NOT test	6
#AND# or #OR#	Logical-AND or logical-OR tests	7
&	Text concatenation (joining text together)	7

To override the order of precedence, enclose an operation in parentheses. 1-2-3 performs operations inside parentheses first. Within each set of parentheses, precedence numbers apply. You can nest one set of parentheses inside another set and create as many nesting levels as you want.

Exploring Formulas with the Auditor Add-In

Analyzing the worksheet structure, locating formulas, and finding the sources of errors in formulas is usually a time-consuming process. 1-2-3 Release 2.3 provides the Auditor add-in to make this process easier. Auditor is useful for determining where formulas are in the worksheet, and for providing information about the formulas.

Auditor identifies

- **Precedents** for the formula in the specified cell (cells that contain data the formula uses in its calculations)
- **Dependents** of the specified cell (cells that contain formulas that depend on the data in the specified cell)
- **Circular references** (a circular reference occurs when a formula refers to itself, either directly or indirectly, and worksheet recalculation order is natural; 1-2-3 displays the CIRC indicator when a circular reference exists)

Errors in formulas generally arise from a problem with the data on which the formula depends, so Auditor can be particularly useful when you need to track an error to its source. Some errors are the result of inadvertently moving or deleting data on which the formula depends; the formula usually results in ERR when data is missing. Other errors are the result of a circular reference, such as when cell A1 contains the formula +B1+C1 and cell B1 contains the formula +A1+C1. Formulas can also simply produce the wrong result, if the data they depend on is wrong; this kind of error occurs easily but is difficult to trace in complex worksheets where formulas often depend on other formulas.

The following table describes how to analyze worksheet formulas. Before you can use Auditor, it must be attached and invoked (so that the Auditor menu is in the control panel). See "Using an Add-In" on page 18.

When you invoke Auditor, the Auditor Settings dialog box and Auditor main menu appear. Use the Auditor Settings dialog box or the Options command to change the **report method**, which indicates whether Auditor highlights, lists, or moves forward or backward through identified formulas, dependents, and so on. The initial report method is Highlight. To change the report method, select the Highlight, List, or Trace option button in the Auditor Settings dialog box and select OK, *or* select Options from the Auditor main menu; select Highlight, List, or Trace; and select Quit to return to the Auditor main menu.

To	Do this after you invoke Auditor
Highlight formulas in the worksheet	Select Highlight as the report method if necessary. Select Formulas.
Identify formula cells in the order in which 1-2-3 will recalculate formulas	Select Trace as the report method if necessary. Select Recalc-List. The mode indicator changes to WAIT and Auditor displays the message 'Generating Recalc-List' and lists the cell(s). When Auditor finishes, the mode indicator changes to RECALC-LIST. Auditor displays the Trace menu, and the cell pointer moves to the formula that will be recalculated first. Select Forward to move to the next formula, Backward to move to the previous formula, or Quit to return to the Auditor main menu.

(continued)

To	Do this after you invoke Auditor
List precedents for the specified cell	Select List as the report method if necessary. Select Precedents. Specify the cell that contains the formula for which you want to find precedents. Specify the range to contain the list of precedents. The mode indicator changes to WAIT, and Auditor displays the message 'Generating Precedents' and lists the cell(s). When the list is complete, it appears in the range you specified.
List dependents of the specified cell	Select List as the report method if necessary. Select Dependents. Specify the cell that contains the formula for which you want to find dependents. Specify the range to contain the list of dependents. The mode indicator changes to WAIT, and Auditor displays the message 'Generating Dependents' and lists the cell(s). When the list is complete, it appears in the range you specified.
List the circular references that exist in the worksheet	Select List as the report method if necessary. Select Circs. Specify the range to contain the list of circular references. The mode indicator changes to CIRCS and Auditor displays the Circs window, which contains one cell address for each circular reference. (The Circs window lists the cell that is nearest to cell A1 in each circular reference; for example, if cell B22 contains the formula +B1+C1 and cell B1 contains the formula +B22+C1, the Circs window lists cell B1.) Select the cell you want to see information for. A new Circs window appears if the cell you select is involved in more than one circular reference. Select another cell as needed. The mode indicator changes to WAIT and Auditor displays the message 'Generating Circs.' When Auditor determines the path of the circular reference, it lists the cells. When the list is complete, Auditor describes the path of the circular reference (Circular path *address–>address*) and enters the formula(s) in the range you specified. Select Quit and press ESC to leave Auditor to correct formulas, or select Circs again to look at the circular reference path for another formula.

Recalculating Formulas

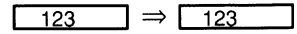
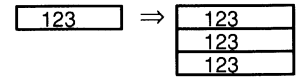
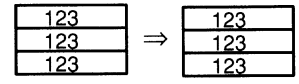
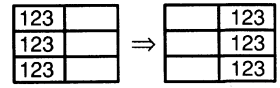
Each time you change the contents of a cell, 1-2-3 recalculates formulas that depend on the cell automatically. This is the default recalculation method. Initially, 1-2-3 recalculates formulas in **natural recalculation order**: It recalculates any precedents for a formula before it recalculates the formula.

Even with the minimal recalculation it performs by default, recalculation time can slow down some processes, such as running a macro. To speed up processing, you can choose to update formulas manually by pressing F9 (CALC) if the CALC indicator appears at the bottom of the screen (select /Worksheet Global Recalculation Manual). You can also change the recalculation order to recalculate column-by-column or row-by-row, and set the number of recalculation passes, or iterations, 1-2-3 makes (1 through 50; the default is 1).

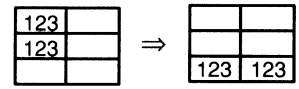
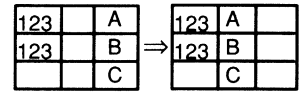
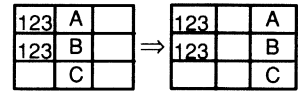
TIP If the recalculation method is set to Manual, use /Copy to recalculate a range when the worksheet contains many formulas and you don't want to wait for 1-2-3 to recalculate the entire worksheet. If you copy a range to itself (specify that range as both the source and destination), 1-2-3 will recalculate just the formulas in that range.

Rearranging Data

As you add information to a worksheet or develop new models, you often need to rearrange the worksheet by copying, moving, and transposing existing data, or by inserting or deleting columns and rows.

To	Do this	With this result
Duplicate a single cell entry in another cell	Select /Copy. Specify the cell you want to copy at the Copy what? prompt. Specify a single-cell destination for the copy at the To where? prompt.	
Duplicate data in one cell so it fills a range	Select /Copy. Specify the cell you want to copy at the Copy what? prompt. Specify the entire destination range at the To where? prompt.	
Duplicate data from one range in another range	Select /Copy. Specify the range you want to copy at the Copy what? prompt. Specify the upper left corner cell of the destination range at the To where? prompt. If source and destination ranges overlap, you may get unexpected results.	
Duplicate formulas in other cells or ranges	Select /Copy. Specify the range you want to copy at the Copy what? prompt. Specify the upper left corner cell of the destination range at the To where? prompt.	Formulas may no longer refer to original data, but to data in cell(s) that occupy the same relative position (see "Copying formulas" on page 44).
Transfer data, range names, and 1-2-3 and Wysiwyg formats and graphics to another area of the worksheet	Select /Move. Specify the range that contains the data you want to move at the Move what? prompt. Specify the destination range at the To where? prompt (you need specify only the upper left corner cell of the destination).	 Formulas that use this data may change (see "Moving data formulas depend on" on page 45).

(continued)

To	Do this	With this result
Copy a column to a row or a row to a column, and convert formulas to values	Select /Range Trans. Specify the range whose data you want to transpose at the Transpose what? prompt. Specify the first cell of the destination at the To where? prompt. **CAUTION** If the CALC indicator is on, update formulas with **F9 (CALC)** first. If any of the formulas refers to data in a file on disk, use /File Admin Link-Refresh to update those values.	 If CALC is on and you do not recalculate, values may be inaccurate.
Remove one or more columns or rows from the worksheet (closing up the space left by the deletion)	Select /Worksheet Delete. Select Column to delete one or more columns or Row to delete one or more rows. Specify the range of columns or rows you want to delete.	
Insert one or more blank columns or rows in the worksheet.	Select /Worksheet Insert. Select Column to insert one or more columns or Row to insert one or more rows. Specify a range that includes at least one cell in each of the columns or rows you are inserting.	
Copy a range and convert formulas to values	Select /Range Value. Specify the range to convert at the Convert what? prompt. Specify the first cell of the destination at the To where? prompt. **CAUTION** If the CALC indicator appears at the bottom of the screen, update formulas with **F9 (CALC)** first. If any of the formulas refers to data in a file on disk, use /File Admin Link-Refresh to update those values.	The entries in the destination range are values, not formulas. If CALC is on and you do not recalculate, values may be inaccurate.
Erase a range	Select /Range Erase. Specify the range to erase.	1-2-3 erases the entries in the range.
Erase a single cell	Move the cell pointer to the cell. Press **DEL**.	1-2-3 erases the entry in the current cell.

CAUTION The destination for moved, copied, or transposed data should be blank or contain unimportant data; 1-2-3 writes over existing data when it puts data in the range you specify. To avoid possible data loss from writing over existing data, save the worksheet first. If you make a mistake and you want to restore the worksheet to its original state, immediately retrieve the file or press **ALT-F4 (UNDO)** if undo is on.

Each cell in the destination inherits the 1-2-3 cell format, Wysiwyg formats (except lines), and protection status of the corresponding cell in the source. When you use /Move to move data from a formatted range, 1-2-3 moves the cell format with the data, but the source range reverts to the global cell format.

Rearranging Data and Formulas

Rearranging data in a worksheet can change how formulas work, or even make them invalid, depending on how the changes affect ranges that formulas depend on.

Copying formulas

When you copy formulas, 1-2-3 may adjust cell addresses in the formulas. How you refer to cells and ranges in a formula determines what happens when you copy the formula with /Copy. Before you use /Copy to copy a formula, be sure that the cell addresses in the formula will allow the results you intend. 1-2-3 has three types of cell and range addresses:

- A **relative address** in a formula is the location of the specified cell or range relative to the cell that contains the formula. If you copy a formula that contains a relative address, 1-2-3 adjusts the address to reflect the new location. The copied formula now refers to cells that are in the same position relative to the cell that contains the formula. For example, if you type +H10 in cell H12, it means "two cells up." If you then copy the contents of H12 to J15, the contents of J15 will be +J13, or, still "two cells up." This is useful for copying a formula to use with data in multiple columns or rows.
- An **absolute address** in a formula (specified by "$" before both column letter and row number in the cell address or range name) is the specific range or cell address. If you copy a formula that contains an absolute address, the address does not change. For example, if you type +$H$10 in cell H12, it means H10. If you then copy the contents of H12 to J15, the contents of J15 will still be +$H$10.
- A **mixed address** in a formula is an address that contains both relative and absolute references. If you copy a formula that contains a mixed address, 1-2-3 adjusts the relative part, but not the absolute part. For example, in the formula +$H10, column H is absolute and row 10 is relative. If you then copy the formula from cell A10 to cell J15, the contents of J15 will be +$H15.

When you enter or edit a formula, press **F4 (ABS)** when the cursor is on, or immediately to the right of, a cell address or range address. 1-2-3 cycles the address through the different types. 1-2-3 always cycles through the types in the same order, regardless of whether the original address type is relative, absolute, or mixed. The following table shows how pressing **F4 (ABS)** changes the address C5 after you type it in a formula.

When control panel displays	Press F4 (ABS) to get
+C5	$C$5 (absolute address)
+$C$5	C$5 (mixed address with absolute row reference)
+C$5	$C5 (mixed address with absolute column reference)
+$C5	C5 (relative address)

A range name in a formula can be relative or absolute. For example, +INCOME is a relative reference, while +$INCOME is absolute. A range name cannot be a mixed reference. When you copy a formula that contains range names that are relative references, 1-2-3 treats the range names as relative references and replaces the names with addresses in the copied formulas. For example, if you copy the formula @SUM(TOTALS), where TOTALS is the name for A1..A5, from A10 to C10, the formula in C10 reads @SUM(C1..C5). If a range name in a formula is an absolute reference, however, 1-2-3 copies the range name. For example, if you copy @SUM($TOTALS) from A10 to C10, the formula in C10 reads @SUM($TOTALS), and TOTALS still refers to A1..A5.

Use either of the following methods to include a cell or range reference in a formula:

- Type the cell address, range address, or range name in the formula. If the data is in another file when you are using a linking formula, precede the address or range name with a file reference (see "Creating a Link" on page 237).
- Highlight the cell or range while typing the formula (see "Specifying a Range" on page 26).

If the specified cell or range is a named range, 1-2-3 automatically substitutes the name for the address in the formula. If the specified cell or range has more than one range name, 1-2-3 displays the range name that comes first alphabetically.

Moving data formulas depend on

Moving data can affect formulas. Before you use /Move to move data, be sure that the data you move will not change formulas or range names in a way you do not intend.

If you do this	This result occurs
Move data that a formula refers to	The cell references in the formula change to reflect the new location of the data. For example, the formula @SUM(A1..A3) adds the numbers entered in the range A1..A3. If you move the data from A1..A3 to C1..C3, the formula will change to @SUM(C1..C3).
Move data into the cells that define a range in a formula	The range changes to ERR and formulas that refer to that range evaluate to ERR. For example, if you have the formula @SUM(A1..C3) and move data into A1 or C3, 1-2-3 changes the formula to @SUM(ERR) and the formula evaluates to ERR. Edit the formula to replace the original address.
Move data into the upper left or lower right cells of a named range	The range loses its definition and formulas that refer to that range evaluate to ERR. For example, suppose you name the range A1..C3 TOTALS. If you move data into A1 or C3, the range name loses its definition and @SUM(TOTALS) becomes @SUM(ERR). Edit the formula to replace the original address.

(continued)

If you do this	This result occurs
Move data out of the cells that define a range in a formula	1-2-3 changes the range definition. For example, if you refer to the range A3..D8 in the formula @SUM(A3..D8), and then move the contents of cell D8 to F6, 1-2-3 changes the formula to @SUM(A3..F6) and includes any data in the expanded range.
Move the upper left or lower right cell of a named range	1-2-3 adjusts the range name's definition and any formulas that refer to the range.

Inserting and deleting columns and rows

When you insert or delete columns or rows, it can affect formulas. Before you use /Worksheet Insert or /Worksheet Delete, be sure that you will not change formulas or range names in a way you do not intend.

If you do this	This result occurs
Insert a column or row, moving a cell used in a formula	1-2-3 adjusts the cell address in the formula. For example, suppose you enter the formula +E6*100 and then insert two columns to the left of column E. 1-2-3 changes the formula to +G6*100.
Delete a column or row, moving a cell used in a formula	1-2-3 adjusts the cell address in the formula. For example, suppose you enter the formula +E6*100 and then delete columns A and B. 1-2-3 changes the formula to +C6*100.
Delete a column or row, moving the upper left or lower right cell of a range used in a formula	1-2-3 adjusts the range address in the formula. For example, suppose you enter the formula @SUM(B8..E8) and then delete columns C and D. 1-2-3 changes the formula to @SUM(B8..C8).
Delete a column or row, moving the upper left or lower right cell of a named range	1-2-3 redefines the named range accordingly. For example, suppose you assign the range name VARIABLES to B2..M5. If you then delete row 1, 1-2-3 redefines VARIABLES as B1..M4. Or, instead, if you delete column A, 1-2-3 redefines range VARIABLES as A2..L5.
Delete the column or row that contains the upper left or lower right cell of a range used in a formula	1-2-3 replaces the address in the formula with ERR. Edit the formula to replace the original address.
Delete the column or row that contains the upper left or lower right cell of a named range	The range loses its definition and formulas that refer to that range evaluate to ERR. For example, suppose you name the range B2..M15 TOTALS. If you then delete row 2 or column B, the range name is no longer defined, and @SUM(TOTALS) becomes @SUM(ERR). Edit the formula to replace the original address.

(continued)

If you do this	This result occurs
Insert a column or row, moving the upper left or lower right cell of a range used in a formula	1-2-3 adjusts the range address in the formula. For example, if you enter the formula @SUM(A3..C5) and then insert a row at row 3, the whole range moves down a row, so 1-2-3 changes the formula to @SUM(A4..C6).
Insert a column or row, moving the upper left or lower right cell of a named range	1-2-3 redefines the named range accordingly. For example, if you assign the range name EXPENSES to B1..G10 and then insert a column at column A, 1-2-3 redefines EXPENSES as C1..H10.

CAUTION /Worksheet Delete permanently deletes columns and rows from the worksheet. To avoid possible data loss from deleting columns or rows, save the worksheet before using /Worksheet Delete. Check the entire column or row to make sure it does not contain data you want to save. If you make a mistake when deleting columns or rows and you want to restore the worksheet to its original state, retrieve the file or press ALT-F4 (UNDO) immediately if undo is on.

You cannot delete columns or rows if /Worksheet Global Protection is enabled.

Chapter 4
Changing the Appearance of Data

This chapter describes how to change the way data looks in a worksheet. The chapter includes the following sections:

Why Change How Data Looks?

Change the way data looks in a 1-2-3 worksheet to make data easier to read, such as when you want to include the worksheet models you create in reports and presentations. Changing data's appearance makes worksheets more legible and increases their visual impact.

To change how data looks, you can change how 1-2-3 displays numbers (as currency, for example, or as percentages). You can also add clarity to the worksheet by changing column widths. W With Wysiwyg, you can change typeface, type size, and type style (see "Changing Fonts" on page 53). You can emphasize a range of data by outlining it, changing row height, shading it, and even by changing colors within a range (if your monitor can display color or your printer can print in color).

When you change how data looks, you do not change the data itself. 1-2-3 still uses the same values for calculations, because each entry is stored exactly as it was when you entered it or calculated it. You change only the data's appearance — both on the screen and in printed copies of the worksheet.

Some monitors cannot display all the type styles and colors that are available with Wysiwyg, and some printers cannot print them. If you select a style your monitor cannot display, 1-2-3 displays the type style that is closest, or a shade that represents the color (if possible). If you select a type style that is not available on the current printer, 1-2-3 matches the type style as closely as possible. If the printer cannot print

in color, 1-2-3 uses a shade or pattern to represent the color (for more information about printing, see Chapter 7, beginning on page 77). You can save the file to use later with a monitor or printer that provides the type style or color.

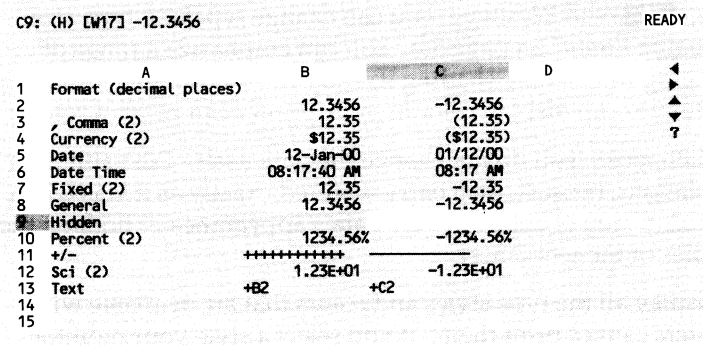
Changing How 1-2-3 Displays Numbers

To change how 1-2-3 displays data, you change the **format**. The format determines how a value appears on screen, but does not affect the value itself. 1-2-3 has 11 formats, including currency, percent, dates, times, and scientific notation (there are also 5 date formats and 4 time formats).

Depending on the number of decimal places you specify when you format a range as Comma, Currency, Fixed, Percent, or Sci, or the column width when you format a range as General, 1-2-3 may display entries in a rounded-off form. 1-2-3 continues to use the full value of those entries in calculations. To use a rounded-off value in a calculation, use @ROUND.

Use /Range Format to change the format for each cell in a range, overriding the global format set with /Worksheet Global Format. Use /Worksheet Global Format to change the default format for the entire worksheet. The initial default format is General, which displays numbers with a minus sign for negatives, no thousands separators, and no trailing zeros to the right of the decimal point; when the number of digits to the left of the decimal point exceeds the column width minus one, numbers appear in scientific notation.

Whenever the cell pointer is in a cell in the formatted range, the control panel displays the first character of the cell format name and (if applicable) the number of decimal places. For example, the notation (C0) means Currency format with zero decimal places; (P2) means Percent format with two decimal places. In the figure below, the control panel displays (H) for Hidden. The screen below shows each format for both a positive and a negative number (except for the Date and Time formats, which show different options using the same positive number).



Most formats affect the way 1-2-3 displays numeric data only. Hidden and Text formats, however, also affect the display of labels and formulas.

To Format Data

1. Select /Range Format.
2. Select the format you want from the series of menus and prompts 1-2-3 displays.
3. Enter the number of decimal places if necessary.
4. Specify the range to format.

If 1-2-3 displays a cell filled with asterisks, it usually means the column is not wide enough to display the entire number in the selected cell format. The column must be one character wider than the width of the number as formatted. To remove the asterisks and redisplay the number, widen the column (see the next section).

The /Worksheet Global Default Other International menu includes several commands that affect the display of numbers, dates, and times.

To redisplay a range of hidden data, select /Range Format Reset or format the range as any format other than Hidden.

Changing the Width of a Column

As you format a worksheet, you may need to make some columns wider or narrower. Certain formats or fonts can cause labels in columns to be truncated or values to appear as asterisks.

Use /Worksheet Column to increase the column width to allow for complete display of entries. W You can also use :Worksheet Column or the mouse to change column width.

1-2-3 measures the column width by the number of monospaced characters that fit in a column; a single column can be up to 240 characters wide. W With Wysiwyg, you can have many fonts in a worksheet. The width of characters varies when you use different fonts, so 1-2-3 uses a standard measure for the width of a character: One character width equals 1/10 inch. This means that 1-2-3 may display more characters or fewer characters than the width you specify, depending on the font and point size (for more information about fonts and type sizes, see "Changing Fonts" on page 53).

The following table describes how to change column width with the keyboard or the mouse.

To	Do this with the keyboard	Do this with the mouse if Wysiwyg is attached
Change the width of the current column (overriding the global default column width)	Select /Worksheet Column Set-Width. Type a number from 1 to 240 *or* press ← or → to decrease or increase the width and press ENTER. *or* Select :Worksheet Column Set-Width, accept the default range, and type a number from 1 to 240 *or* press ← or → to decrease or increase the width and press ENTER.	Move the mouse pointer to the vertical line to the right of the column letter. Drag the vertical line until the column is the width you want.
Change the column width of a range of adjacent columns (overriding the global default column width)	Select /Worksheet Column Column-Range Set-Width. Specify the range of columns. Type a number from 1 to 240 *or* press ← or → to decrease or increase the width, and press ENTER. *or* Select :Worksheet Column Set-Width, specify the range of columns. Type a number from 1 to 240 *or* press ← or → to decrease or increase the width, and press ENTER.	
Reset the current column to the global default column width (the default is nine characters)	Select /Worksheet Column Reset-Width *or* select :Worksheet Column Reset-Width and accept the default range.	Move the mouse pointer to the vertical line to the right of the column letter. Hold down SHIFT and click the left mouse button.
Reset a range of columns to the global default column width (the default is nine characters)	Select /Worksheet Column Column-Range. Select Reset-Width. Specify the range of columns *or* Select :Worksheet Column Reset-Width and specify the range of columns.	

After you change the width of a column, the control panel displays the column width in brackets when the cell pointer is anywhere in that column (for example, [W10]).

Aligning and Centering Labels

Aligning text can make a worksheet easier to read; for example, you might align column labels at the right of the cell so they are over the numeric data in the rest of the column. Unless you change the initial setting, 1-2-3 aligns labels at the left by default. To align text when you type it, use a label prefix (see "Entering Data" on page 31). To change the alignment of a range of text, use /Range Label. /Range Label cannot change a range of text to make each label repeat across the width of the cell; you must use the label prefix \ (backslash) in each cell.

Wysiwyg lets you align text within a range; see "Changing the Position of Text" on page 71.

To	Do this	With this result
Align labels at the left	Select /Range Label Left. Specify the range of labels whose alignment you want to change.	TEXT
Align labels at the right	Select /Range Label Right. Specify the range of labels whose alignment you want to change.	TEXT
Center labels	Select /Range Label Center. Specify the range of labels whose alignment you want to change.	TEXT
Repeat a label to fill the cell	Press F2 (EDIT). Replace the existing label prefix with \ (backslash).	TEXTTEXT

Long labels appear left-aligned no matter what label prefix they have.

Changing Fonts

1-2-3 lets you use different type styles in a worksheet. For example, you might want to reduce the data in the body of the worksheet to a smaller font (point size), increase the title to a larger font, and introduce a second typeface. The following paragraphs define common typographic terms used in spreadsheet publishing:

- A **typeface** is the overall design of the printed or displayed characters. Each typeface has a distinct appearance, and all the characters within the typeface share common design characteristics. For example, Dutch and Swiss are two typefaces. 1-2-3 Release 2.3 provides four typefaces: Swiss, Dutch, Courier, and Xsymbol.
- A **point** is a unit of measurement, approximately 1/72 of an inch, that determines the height of a character. A **font** is a typeface of a certain point size. Thus, Dutch 12 point is a font whose characters are about 1/6 of an inch high, and Dutch 24 point is a font that is twice as high, with characters about 1/3 of an inch high.

- The spacing of a font is either **fixed** (monospaced) or **proportional**. With fixed spacing, each character takes up the same amount of space regardless of the size of the actual character. For example, the letter I takes up as much space as the letter W — even though the W is wider than the I. With proportional spacing, however, characters take up different amounts of space depending on their size. For example, the letter I takes up less space than the letter W. Numbers in a font, however, always take up the same amount of space.

With the Wysiwyg commands, you can use up to eight fonts in a worksheet. The set of eight fonts that is currently available is called the **font set**. When you use 1-2-3 Release 2.3 for the first time, the font set includes Swiss typeface in 12, 14, and 24 point; Dutch typeface in 6, 8, 10, and 12 point; and Xsymbol typeface in 12 point. You can add fonts in addition to those 1-2-3 provides. For example, you might purchase Bitstream® **soft fonts** (fonts on diskettes that you transfer to your printer from your computer's disk drive), or font cartridges that you install in your printer.

As a general rule, use a 10-point or 12-point font for normal text and numbers, a 14-point to 24-point font for headings, and a 5-point to 8-point font for fine print.

1-2-3 uses screen fonts to display characters on the monitor and printer fonts to print characters with a printer. If you select a font for which no screen font exists, 1-2-3 uses the available screen font that most closely resembles the selected font. If you select a font not available on the current printer, 1-2-3 uses the printer font that most closely resembles the selected font (if possible). You can save the file to use later with a screen display or printer that does provide the selected font.

To	Do this	With this result
Change typefaces and/or type size	Select :Format Font. Select the number of the typeface and type size you want (1–8). Specify the range where you want to use the typeface and type size.	This is Dutch This is Swiss This is Courier This is Swiss 10 point Swiss 12 point Swiss 14 point
Change to the default font (the font 1-2-3 uses in the worksheet except in cells you format with another font)	Select :Format Font 1. Specify the range where you want to use the default font.	The range appears in the default typeface and type size.
Define a font	Select :Format Font Replace. Select the number to which you want to assign the new font (1–8; the default font is 1). Select the font you want to associate with the number.	Cells formatted with that numbered font change to the new font.

(continued)

To	Do this	With this result
Change the default font	Select :Format Font Replace 1. Select the font you want to be the default for the worksheet.	1-2-3 changes the font in all cells *except* in graph titles and those cells you explicitly formatted with a different font. The default row height may change.
Change the **default font set** (the group of eight fonts that is initially available when you read Wysiwyg into memory)	Select :Format Font Replace and set each of the 8 fonts to the font you want. Select :Format Font Default Update to make the current font set the default font set.	The current font set becomes the new default font set. This is the font set 1-2-3 will use each time you start Wysiwyg.
Save the current font set in a file on disk, called a **font library**	Select :Format Font Library Save. Enter the name to use for the font set.	You can retrieve the font set from the font library to use with another worksheet.
Clear all fonts (and formats and attributes) from a range	Select :Format Reset. Specify the range from which you want to clear fonts.	The range reverts to the default font. :Format Reset also removes all formats (such as colors, lines, bold, and italics).

1-2-3 does not treat bold or italics as part of a font. For information on bold and italics, see "Emphasizing Data" on page 56.

Changing Row Height

In an unformatted worksheet, all rows are the same height. As you use Wysiwyg to change fonts, however, row heights may change to accommodate different type sizes. 1-2-3 automatically adjusts the height of a row to accommodate the largest font in the row. (If you use a font smaller than the default font, row height still accommodates the height of the default font. The row height will decrease only if you format the entire row in a smaller font.)

1-2-3 measures row height in points. The default row height is 14 points. This may change if you change fonts. Typically, the row height 1-2-3 uses automatically is one or two points larger than the font height. Thus, a 10-point font might result in a row height of 11 points.

Use :Worksheet Row Set-Height to specify row height manually with the mouse or keyboard. After you change the height of a row, the control panel displays the row height in braces when the cell pointer is anywhere in that row (for example, {H11}). Use :Worksheet Row Auto to set height automatically; this is the default. Select :Worksheet Row Auto if you have changed row height and you need to make sure that the row will be high enough to display full characters. If you manually set a row to a point size smaller than the size of a font in the row, the tops of the displayed characters will be cut off.

Emphasizing Data

You can use the Wysiwyg Format commands to set apart sections of a worksheet, distinguish totals from columns of figures, and emphasize important data with lines, underlining, and drop shadows. Wysiwyg provides the following formats:

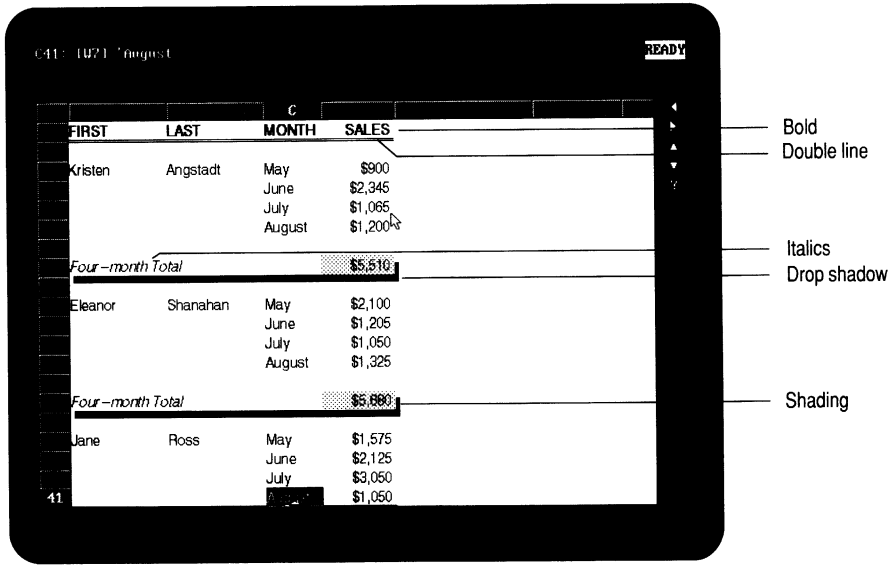
- Bold
- Italics
- Single, double, or wide underlining
- Colors for data, negative numbers, and cell background
- Drop shadow below and to the right of a range
- Light, dark, or solid shading

You can also use lines and outlines around cells and ranges; see "Adding Borders" on page 61.

To apply several formats to the same range of data, highlight the range first, then apply formats one at a time without specifying the range again. For example, in the following illustration, you would highlight A22..D22, select :Format Bold, and then select :Format Underline Double. This is especially useful when you are experimenting with different formatting effects.

After you change the format of a cell, the control panel displays the format(s) in braces when the cell is the current cell (for example, {Bold Italic Text}).

The following illustration shows some of the Wysiwyg formats in a worksheet.



The following table describes how to use formats such as bold, colors, and drop shadows to emphasize data.

To	Do this	With this result
Use bold or italics	Select :Format, and then select Bold or Italics. Select Set. Specify the range whose attributes you want to change.	**TEXT** *TEXT*
Underline type	Select :Format Underline Single, Double, or Wide. Specify the range you want to underline.	TEXT TEXT TEXT
Clear all format settings from a range	Select :Format Reset. Specify the range to clear.	Text no longer has attributes such as bold or italics. The range also reverts to the default font, color, and other format settings.
Add a drop shadow to a range	Select :Format Lines Shadow Set. Specify the range. (To create space between the last row of data and the drop shadow, include the row below the last row of data.)	1-2-3 draws a drop shadow below and to the right of the specified range.
Change the color of the background of a range	Select :Format Color Background. Select the color you want. Specify the range to change.	The background of the range changes to the color you specify.
Change the global background color	Select :Display Colors Background. Select the color.	The worksheet background changes to the new color except where you have assigned a background color to a range.
Change the color of data in a range	Select :Format Color Text. Select the color you want. Specify the range to change.	The characters in the range change to the color you specify.
Change the default color for data	Select :Display Colors Text. Select the color.	Entries in the worksheet change to the new color except those with an assigned color (such as for text or negative numbers).

(continued)

To	Do this	With this result
Change the color of negative numbers in a range	Select :Format Color Negative. Select Red or Normal (to use the normal display color for negative numbers, if any). Specify the range to change.	Negative numbers in the range change to the color you specify. Change the display color for negative numbers with :Display Colors Neg.
Switch colors in a range, so the text color becomes the background color and vice versa	Select :Format Color Reverse. Specify the range to change.	text text
Add shading to a range	Select :Format Shade. Select Light (for light shading), Dark (for dark shading), Solid (for solid black), or Clear (to remove shading). Specify the range to shade.	123.456 1234.56 123.546 Shading matches the text color set with :Display Colors Text (if any).
Name a group of formats to use together (a **named style**)	Assign the formats to a single cell. Select :Named-Style Define. Select the number to which you want to assign the named style (1–8). Specify the cell that you assigned the formats to. Enter a name for the style. Enter a description of the named style (the description will appear in the control panel when the number is highlighted in the menu).	1-2-3 stores the formats as a group. The control panel displays the name of the style and the formats in braces whenever the current cell uses the named style (for example, {Totals: Italic Text Shadow}).
Use a named style on a range	Select :Named-Style and select the named style you want to use. Specify the range.	The range changes to the formats specified in the named style.
Highlight data in the worksheet, even if you cannot display colors	Select /Range Unprot. Specify the range.	Unprotected cells appear in color or in a brighter intensity (if possible). Use :Display Colors Unprot to change the color of unprotected cells.

TIP To further emphasize a range to which you added a drop shadow, add an outline to the range with :Format Lines Outline (see "Adding Borders" on page 61).

Formatting Text When You Can't Use the Menu

You can apply formats to text with a combination of characters called a **formatting sequence** when you cannot format through the Wysiwyg menu commands, such as in headers and footers, text you add to a graphic, and specific characters within a cell. You can also use formatting sequences to format data with formats not available through Wysiwyg menu commands. For example, you can use formatting sequences to format data as subscript or superscript.

To Use a Wysiwyg Formatting Sequence

1. (Optional) To format existing text, move to the cell that contains the text, press F2 (EDIT), and move the cursor to the left of the first character to format.
2. Press CTRL-a (▲ appears).
3. Type one of the codes from the following table.

   The codes are case-sensitive, so be sure to type uppercase or lowercase letters as they appear in the table.
4. Repeat steps 2 and 3 for each code you want to use. For example, to format text as bold italics, press CTRL-a and then type b; press CTRL-a and then type i.

   There is no limit to the number of codes you can use, as long as the total number of bytes in the cell does not exceed 240. (▲ and ▼ are each two bytes.)
5. If you are entering data, type the data you want to format. If you are editing data, move the cursor to the end of the data you want to format.
6. To stop using a particular code, press CTRL-e (▲ appears) and then type the code you want to stop using. For example, if you are using bold italics and want to stop using bold but continue using italics, press CTRL-e and then type b. (If the code consists of a number and a letter or symbol, such as 2_ for double underlining, type only the letter or symbol, and not the number; for example, to stop underlining, press CTRL-e and then press_).

   To stop using all codes and mark the end of the formatting sequence, press CTRL-n (▼ appears).
7. To remove formatting sequences, move the cell pointer to the cell that contains the formatting sequence, press F2 (EDIT), and use DEL or BACKSPACE to remove the formatting-sequence characters.

Use	To format data as
b	Bold
d	Subscript
f	Flashing
i	Italics
u	Superscript
x	Data flipped on its x-axis (backwards)
y	Data flipped on its y-axis (upside down)
1_	Single underlining
2_	Double underlining
3_	Wide underlining
4_	Rectangular outline around data
5_	Strike-through characters
1c	Default color set with :Display Colors Text
2c	Red
3c	Green
4c	Dark blue
5c	Cyan
6c	Yellow
7c	Magenta
8c	Reversed colors for data and background
1F	Font 1 from the current font set
2F	Font 2 from the current font set
3F	Font 3 from the current font set
4F	Font 4 from the current font set
5F	Font 5 from the current font set
6F	Font 6 from the current font set
7F	Font 7 from the current font set
8F	Font 8 from the current font set
1o to 255o	Outline of characters (the size of the outlines varies depending on the number you use)

When the current cell contains formatting sequences, the formatting-sequence characters appear in the control panel.

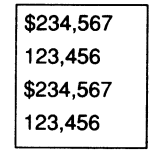
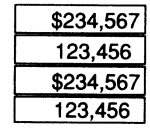
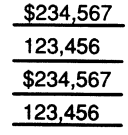
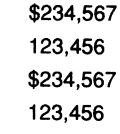
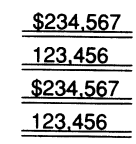
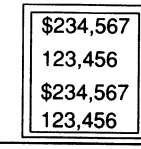
Using a formatting sequence with a cell address formats the cell address as text; for example, ▲ba1▼ produces **a1**, not the contents of cell A1. Keep this in mind in headers and footers: You must type the text directly in the header or footer to format it with a formatting sequence.

Adding Borders

With the Wysiwyg Format Lines commands you can add horizontal and vertical lines along the edges of cells in a range. You can also outline an entire range or all cells within a range. The lines can be single, double, or wide.

You can box in an entire range, form a grid by outlining each cell in a range, or add lines to the bottom, top, left, or right edges of cells in a range. For example, you can add horizontal lines across the bottom (or top) edges of the cells in a range, or vertical lines down the left (or right) edges of cells in a range.

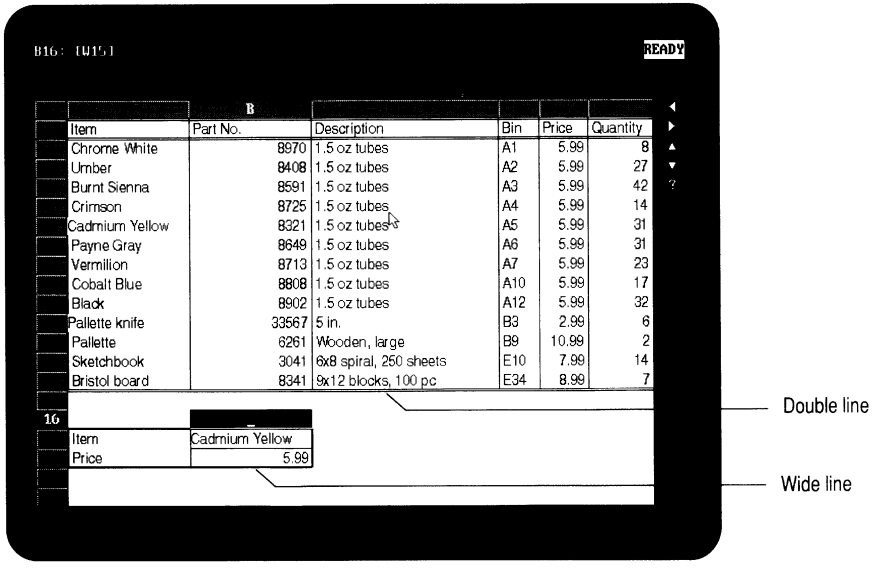
The following table describes how to add lines to a worksheet with the Wysiwyg Format Lines commands.

To	Do this	With this result
Draw a single-line outline around a range	Select :Format Lines Outline. Specify the range.	
Draw a single-line outline around each cell in a range	Select :Format Lines All. Specify the range.	
Draw a horizontal line along the bottom edge of each cell in a range	Select :Format Lines Bottom. Specify the range.	
Remove some or all lines from a range	Select :Format Lines Clear. Select Outline, Left, Right, Top, Bottom, or All. Specify a range to remove the lines from.	
Draw double horizontal or vertical lines along the edges of cells, or double-line outlines around cells	Select :Format Lines Double. Select Left, Right, Top, Bottom, or All (outlines each cell in a range). Specify a range to draw the lines in.	
Draw double-line outlines around ranges	Select :Format Lines Double Outline. Specify a range to draw the lines around.	

(continued)

To	Do this	With this result
Draw a vertical line along the left edge of each cell in a range	Select :Format Lines Left. Specify the range.	$234,567 123,456 $234,567 123,456
Draw a vertical line along the right edge of each cell in a range	Select :Format Lines Right. Specify the range.	$234,567 123,456 $234,567 123,456
Draw a horizontal line along the top edge of each cell in a range	Select :Format Lines Top. Specify the range.	$234,567 123,456 $234,567 123,456
Draw wide horizontal or vertical lines along the edges of cells or draw a wide outline around a range	Select :Format Lines Wide. Select Outline, Left, Right, Top, Bottom, Specify a range to draw the lines in.	$234,567 123,456 $234,567
Draw wide lines around cells in a range	Select :Format Lines Wide All (outlines each cell in a range). Specify a range to draw the lines around.	$234,567 123,456 $234,567 123,456

The following illustration uses lines to separate and emphasize data.



Changing the Worksheet Frame and Grid

In some worksheets, it may be easier to read data if you display the worksheet **grid** — the outline of each cell in the worksheet. You may also want to adjust the **frame**, or border of the worksheet that contains the row numbers and column letters, or even hide it.

The Wysiwyg Display Options commands let you hide or change the appearance of the 1-2-3 worksheet frame and show or hide the worksheet grid.

To Change the Appearance of the Worksheet Frame

1. Select :Display Options Frame.
2. Select 1-2-3, Enhanced, Relief, Special, or None.

Enhanced	Displays a worksheet frame in which each of the column letters and row numbers are outlined. For row numbers, the height of the rectangle matches the height of the row; for column letters, the width of the rectangle matches the width of the column. This is the default worksheet frame for Wysiwyg.
None	Suppresses the display of the worksheet frame.
1-2-3	Displays the standard 1-2-3 worksheet frame.
Relief	Displays a sculpted worksheet frame, replaces the color cyan with gray, and switches the display intensity (brightness) to high.
Special	Displays a worksheet frame in which the column letters and row numbers are replaced by rulers in 10-point characters, inches, centimeters, or points and picas.

3. If you selected Special, select Characters, Inches, Metric, or Points/Picas.

Characters	Displays the worksheet frame as horizontal and vertical rulers in 10-point characters with 6 lines per inch.
Inches	Displays the worksheet frame as horizontal and vertical rulers in inches.
Metric	Displays the worksheet frame as horizontal and vertical rulers in centimeters.
Points/Picas	Displays the worksheet frame as horizontal and vertical rulers in points and picas.

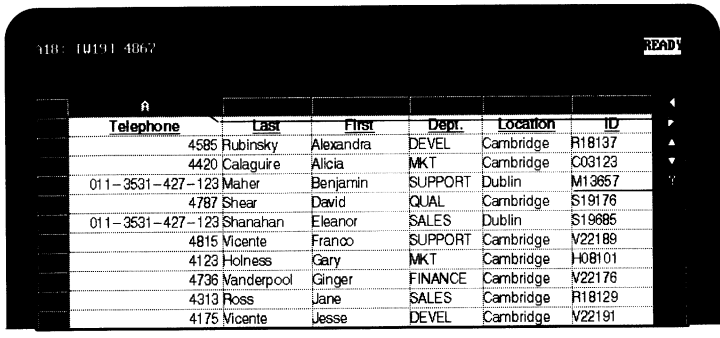
4. To update the Wysiwyg configuration file (WYSIWYG.CNF) so 1-2-3 uses the new Frame setting in future Wysiwyg sessions, select :Display Default Update.

TIP To print the standard 1-2-3 worksheet frame with the worksheet, select :Print Settings Frame Yes.

To Display the Grid

1. Select :Display Options Grid.
2. Select No (default) to suppress the display of the worksheet grid or select Yes to display the worksheet grid.
3. To update the Wysiwyg configuration file (WYSIWYG.CNF) so 1-2-3 uses the new Grid setting in future Wysiwyg sessions, select :Display Default Update.

TIP To change the color of the grid, select :Display Colors Grid and select the color you want. To print the worksheet grid with the worksheet, select :Print Settings Grid and select Yes.



Chapter 5
Protecting Data

This chapter describes how to protect data in 1-2-3 Release 2.3. It includes the following sections:

Why Protect Data?

Many worksheets contain some data you don't want others to see or change. For example, you might want to hide sensitive financial data, or prevent changes to the field names in a database.

1-2-3 offers two ways to keep data safe from accidental changes or unauthorized use:

- **Data protection** — You can globally protect a worksheet to prevent anyone from writing over data in it. To change some entries later, you unprotect a range, change the data, and then protect the range again. Global protection allows you (or another user) to read data in the worksheet, but not to change it accidentally.
- **Hiding worksheet areas** — You can hide data you don't want others to see or change. Hiding makes data in the hidden areas invisible. It's best to protect hidden areas too, or you might change hidden data accidentally.

You can also protect a worksheet from unauthorized use by assigning a password to the file; see "Limiting Access to Files" on page 228.

Preventing Changes to Data in a Worksheet

Protecting a worksheet is useful if you create a worksheet for others to use and you want to be sure that important data or formulas aren't changed (for example, if you have a worksheet that contains sales data). Turn on protection with /Worksheet Global Protection to protect a worksheet from changes to data. Users can read protected data, but they cannot change it. Anyone who uses the worksheet can remove the protection, however. Because this protection is relatively easy to remove, global protection is most useful in restricting data entry to specific areas of the worksheet. To see the /Worksheet Global Protection setting for the current worksheet, select /Worksheet Global and look at the setting in the dialog box.

You use /Worksheet Global Protection in conjunction with /Range Prot and /Range Unprot to prevent changes being made to particular cells.

When global protection is on, you can make changes only to cells that you explicitly unprotect with /Range Unprot. For example, if you are using a worksheet that contains sales data, you may have globally protected the worksheet so none of the data could be inadvertently changed or destroyed. To enter current data in the worksheet, however, you need an unprotected range in which you can enter updated information. To unprotect that range, you use /Range Unprot. To specify the unprotected (blank) cells in a fill-in-the-blank entry form, use /Range Unprot together with /Range Input (see "Creating a Form" on page 197).

After you unprotect a range, you may want to protect it again. For example, you may have unprotected a range that contained a formula so you could change the formula. To protect that range again so the formula can't be changed, use /Range Prot.

To	Do this
Turn on worksheet protection	Select /Worksheet Global Protection Enable.
Turn off worksheet protection	Select /Worksheet Global Protection Disable.
Unprotect cells to allow changes	Select /Range Unprot, specify the range to remove protection from, and press ENTER.
Protect cells again that were unprotected with /Range Unprot	Select /Range Prot, specify the range to protect, and press ENTER.

When worksheet global protection is on, 1-2-3 displays PR in the control panel when the cell pointer is in a protected cell. When the cell pointer is in an unprotected cell, 1-2-3 displays U in the control panel.

/Range Unprot uses system memory. For more information about memory management, see Appendix C, beginning on page 343.

Hiding Data in a Worksheet

There are three ways to hide data in 1-2-3: You can hide a cell or range so that it appears blank, you can change the default format to hide all entries in a worksheet, or you can hide one or more columns to make them disappear entirely from the worksheet display.

CAUTION Hidden data can be changed unless the cell(s) that contain the data are protected and global protection is on. If you enter new data in a hidden cell, the new entry replaces the old one (but is still hidden). If you move or copy hidden data, it remains hidden in the new location. When you redisplay the hidden cell, it will have the data and settings assigned while it was hidden.

If Wysiwyg is attached, you can use colors to hide data or the mouse to hide and redisplay columns. The following table describes hiding data with 1-2-3 and Wysiwyg.

To	Do this with the keyboard	Do this if Wysiwyg is attached
Hide a range of data	Select /Range Format Hidden. Specify the range to hide if it is not already highlighted.	Select :Format Color Text and select a color. Then select :Format Color Background and select the same color.
Hide the contents of the entire worksheet	Select /Worksheet Global Format Hidden.	
Hide column(s)	Select /Worksheet Column Hide. Specify the column(s) to hide.	Move the mouse pointer to the vertical line to the right of the column letter (if you are hiding several columns, move to the rightmost column). Drag the dotted line to the left until it meets the line at the left side of the column (or the leftmost column).
Display hidden columns	Select /Worksheet Column Display. The hidden columns appear with * (asterisk) after the column letter. Specify the column(s) to display.	Hold down SHIFT and click the line at the right of the column to the left of the hidden column. This resets the column to the default width. To display more than one column, click once for each column.

Data in a range hidden with /Range Format Hidden is invisible, though the data still exists and formulas that refer to the hidden data are unaffected (unless they are hidden too). The data appears in the control panel unless the cells are protected and global protection is on. The format indicator in the control panel displays (H); see "The 1-2-3 Screen" on page 4.

If you change the global format to Hidden, only cells with the global format are hidden; cells to which you have assigned a format with /Range Format keep the format you assigned.

The Hidden format is exclusive of other formats. To display the contents of a hidden cell, change the format to any other format.

If you print a range that contains hidden cells or columns, the contents of the hidden cells do not print.

Column letters of hidden columns do not appear in the worksheet border. Ordinary navigation skips over hidden columns. The only way to move the cell pointer into a hidden column is in POINT mode (see "Specifying a Range" on page 26). In POINT mode, 1-2-3 temporarily displays a hidden column with * (asterisk) next to the column letter.

Chapter 6
Adding Text in a Worksheet

This chapter describes using 1-2-3 and Wysiwyg to create text in a worksheet. The chapter includes the following sections:

W How Do I Include Text in a Worksheet?

1-2-3 has some text-editing capabilities, such as search and replace and /Range Justify (which rearranges a column of labels to look like a paragraph), but it is not a word-processing program. W The Wysiwyg Text commands add to 1-2-3's ability to treat large blocks of text as a unit. With the Wysiwyg Text commands, you work with labels in text ranges. A **text range** is a range you specify with the Text commands. You enter text directly in a text range or align or justify data previously entered in cells. The format indicator {Text} appears in the control panel when the cell pointer is in a text range.

Within a text range, you can work with columns of labels as though you are using a word processor: You type directly in the worksheet, not in the control panel. Once you enter text in a text range, you can edit, align, and format it with the Text commands. You use the Text commands to specify a text range, create a paragraph within a text range from a series of long labels, or left-align, right-align, center, or even-align labels in a text range.

W Before you can use the Text commands, Wysiwyg must be attached and in Graphics mode (see "Using Wysiwyg" on page 19).

If you need additional word-processing capabilities with text you generate in 1-2-3, use /Print File to store the text in an ASCII text file, and then use a word-processing program to edit the text file. You can bring text from an ASCII text file into a worksheet with /File Import Text.

W Entering and Editing Text

When you are entering or editing text in a text range, a cursor appears in the worksheet within the text range, and the mode indicator changes to TEXT.

To enter and edit labels in a text range directly in the worksheet, you use the Wysiwyg Text Edit command. :Text Edit lets you enter text only in the text range you specify. It does not place text in rows not included in the specified range. When you

enter text, 1-2-3 will not write over vertical lines or graphics in a text range. When the text range is full, 1-2-3 displays the message 'Text input range full,' and you cannot enter any more characters. To enter more information, use :Text Edit again and specify a larger text range, or use :Graph Move or /Move to move graphics or other data from the text range. When you use :Text Edit, you can press F3 to see a menu of formats you can apply to the text you enter or edit.

To	Do this
Specify a text range	Select :Text Set. Specify the range that you want to make a text range.
Edit a text range	Select :Text Edit. Specify the range within which you want to edit text. Edit the text as necessary. When you finish editing, press ESC to return 1-2-3 to READY mode.
Enter text	Select :Text Edit. Specify the range in which you want to enter text. A cursor appears at the left of the first cell of the range. Type text directly in the range. When you finish typing text, press ESC to return 1-2-3 to READY mode.
Enter text in a different font in the current text range	Press F3. Select Font. Select 1, 2, 3, 4, 5, 6, 7, or 8. Type the text you want to be in the new font. To return to the default font, press F3 and select Normal.
Enter bold, italics, or underlined text in the current text range	Press F3. Select Bold, Italics, or Underline. Type the text you want to format. To return to the default style, press F3 and select Normal.
Enter text in color in the current text range	Press F3. Select Color. Select Normal, Red, Green, Dark-Blue, Cyan, Yellow, or Magenta. (Selecting Normal returns the text to the color set with :Display Colors or :Format Color.) Type the text you want to be in the new color. To return to the default color, press F3 and select Normal.
Format existing text in the current text range	Move the cursor to the first character of the text you want to format. Press F3. Select the format you want to change text to. Move the cursor to the right of the last character you want to format, press F3, and select Normal to return to the default format.
Remove formats from existing text in a text range	Move the cursor to the first character of the text you want to format. Press F3. Select Normal. 1-2-3 changes the format for the rest of the line. To change only some characters on the line, move the cursor to the right of the last character you want to return to the default format, press F3, and select the format.

NOTE F3 displays the formatting menu only when you are working in a text range.

The following table lists the editing keys you can use with :Text Edit.

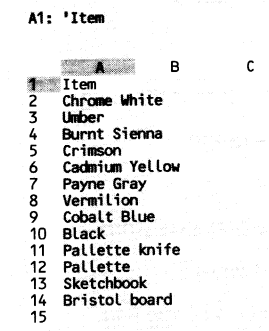
Key	Effect
← or →	Moves the cursor one character to the left or right in the range.
↑ or ↓	Moves the cursor one line up or down in the range.
BACKSPACE	Erases the character to the left of the cursor.
CTRL-←	Moves the cursor left to the beginning of the previous word.
CTRL-→	Moves the cursor right to the end of the next word.
CTRL-ENTER	Creates ¶ (end-of-paragraph symbol) and starts a new line.
DEL	Erases the character to the right of the cursor.
END	When pressed once, moves the cursor to the last character in the line. When pressed twice, moves the cursor to the last character in the paragraph.
ENTER	Starts a new line.
ESC	Ends editing and returns 1-2-3 to READY mode.
F3	Displays a menu of formats you can apply to the text (fonts, bold, italics, underlining, color, subscript, superscript, outline).
HOME	When pressed once, moves the cursor to the first character in the line. When pressed twice, moves the cursor to the first character in the paragraph.
INS	Switches between INS mode (where Wysiwyg inserts characters to the left of the cursor) and OVR mode (where Wysiwyg writes over the character above the cursor) for editing.
PG UP or PG DN	Moves the cursor up or down one screen.

You can edit text in an existing text range when 1-2-3 is in READY mode by double-clicking the text with the left mouse button.

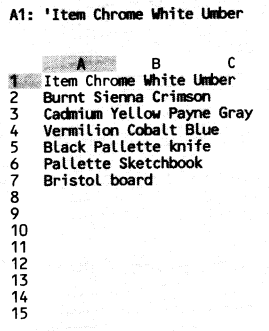
Changing the Position of Text

Once you enter labels in a worksheet, or text in a text range, you may need to reposition the text. Repositioning text may mean changing a column of labels into paragraph form without putting them in a text range, or it may mean changing how text in a text range appears. The following are the three options for changing the position of text in a worksheet or text range:

- /Range Justify lets you treat a column of labels as a paragraph and rearranges (justifies) the labels to fit within a width you specify. To use this command, global worksheet protection must be off. Use /Range Justify to make labels in a range equal lengths, fit text into a specific width for viewing or printing, create a paragraph in a worksheet, or rejustify an edited paragraph.

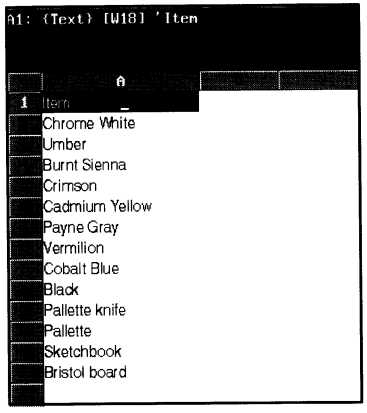


Before /Range Justify...

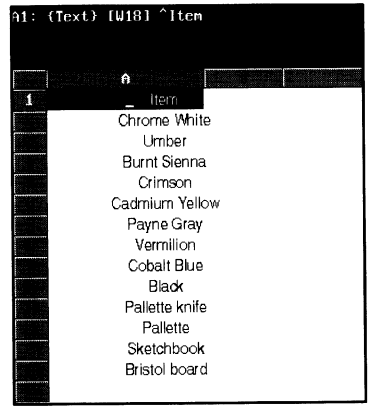


...and after

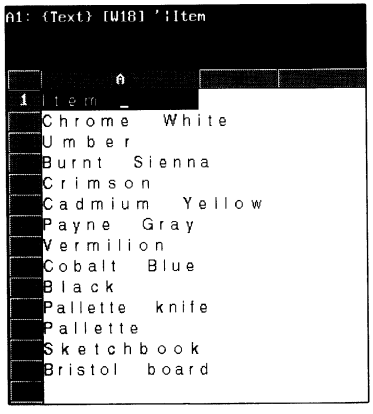
- :Text Align changes the alignment of labels within a text range by changing their label prefixes (' for left-aligned, " for right-aligned, ^ for centered, or '¦ for even-justified text that is aligned evenly with both the left and right of a text range). Wysiwyg treats a text range as a single column.



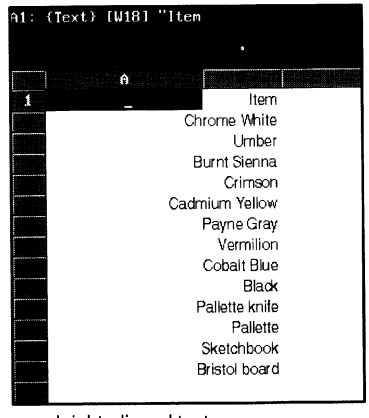
left-aligned text...



centered text...

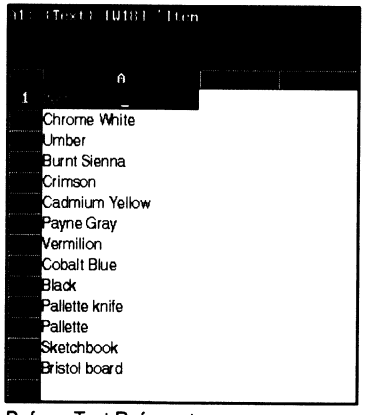


even text...

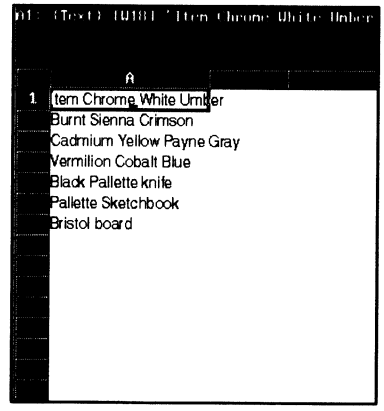


...and right-aligned text

- :Text Reformat rearranges a text range. To use this command, global worksheet protection must be off.



Before :Text Reformat...



...and after

CAUTION Using :Text Reformat on cells whose contents are used in formulas most likely will change or invalidate the results of the formulas.

:Text Clear removes the settings for a text range, so the range is no longer a text range — the {Text} format indicator no longer appears in the control panel. :Text Clear does not erase the data contained in the range or change any formatting done to the data with :Text Reformat or :Text Edit. :Text Clear removes alignment set with :Text Align, but does not affect alignment within cells.

To Justify a Column of Labels

1. (Optional) Save the worksheet with /File Save.

   Undo cannot restore the labels after they are justified. If you save the worksheet and /Range Justify does not produce the results you intend, you can restore the worksheet to its original state with /File Retrieve.

2. Move the cell pointer to the first cell in the column of labels you want to justify.

   This positions the cell pointer correctly for specifying the justify range in step 3.

3. Select /Range Justify.

4. Specify the justify range.

The width and length of the justify range control the way 1-2-3 performs the justification.

The total width of the columns in the justify range determines the maximum width of the justified labels (to a limit of 240 characters).

The total number of rows in the justify range affects the result of /Range Justify.

If you specify a single-row justify range, 1-2-3 justifies the entire column of labels to fill the width of the justify range using as many rows as necessary. If the justified labels occupy more rows than the original labels, 1-2-3 moves down any subsequent data in the column (data below the justified labels). If the justified labels occupy fewer rows than the original labels, 1-2-3 moves up any subsequent data. Use a single-row justify range only if all cells below the labels you are justifying are blank or if movement of data below the labels is acceptable.

If you specify a multiple-row justify range, 1-2-3 limits the justification to the specified range and does not move data below the justify range. If you use a multiple-row justify range, be sure the range is wide and deep enough to hold the entire series of justified labels.

/Range Justify rearranges only one column of labels at a time. (A blank cell or numeric value marks the end of a column of labels.)

CAUTION Do not use /Range Justify on a column whose contents are used in macros or text formulas; otherwise, each cell that gets moved up to the previous line will have a space inserted in front of it, thus changing the macro or text formula.

To Rearrange Labels to Fit Within a Text Range

1. Move the cell pointer to the first cell in the column of labels you want to rearrange.

   This positions the cell pointer correctly for specifying the text range in step 3.

2. Select :Text Reformat.

3. Specify the text range within which you want to rearrange labels.

   Keep the following in mind when you specify the text range:

   - The total width of the columns in the text range determines the maximum width of the rearranged labels (to a limit of 240 bytes).
   - :Text Reformat rearranges text only in the range you specify. It does not place text in rows not included in the specified range.
   - :Text Reformat rearranges text within paragraphs. It does not move text between paragraphs in the specified range. The beginning of a new paragraph is indicated by a blank row, a line that ends with ¶ (end-of-paragraph symbol, created with CTRL-ENTER), or a line that begins with a space.
   - :Text Reformat affects labels in only the first column of a text range.

When 1-2-3 rearranges the text, it aligns all the labels within the range depending on the first label's label prefix. For example, if the first label in the range is preceded by a ^ (caret), 1-2-3 centers all the labels within the range.

When you align text in a text range, 1-2-3 will not write over vertical lines or graphics in the text range.

To Align Text Within a Text Range

1. Select :Text Align.
2. Select Left, Right, Center, or Even.
3. Specify the range within which you want to align text.

   The range you specify will be the space within which 1-2-3 will align the label.

:Text Align Even has no effect on labels that end with a . (period), ! (exclamation point), ? (question mark), : (colon), or ¶ (end-of-paragraph symbol created with CTRL-ENTER).

Labels that exceed the width of the text range appear left-aligned, no matter what label prefixes they have. Use :Text Reformat to rearrange the labels so they fit within the specified text range or specify a larger text range.

When you align text in a text range, 1-2-3 will not write over vertical lines or graphics in a text range.

To Align an Existing Label in a Text Range

1. Move the cell pointer to the cell that contains the label you want to align.
2. Select :Text Align.

   1-2-3 lists the alignment options.
3. Select the type of alignment you want to use.
4. Specify the range you want to format as a text range. The range you specify will be the space within which 1-2-3 will align the label.

1-2-3 creates a text range and aligns the label within it. When the current cell is the first cell of the range, the control panel displays {Text}, any formats associated with the text range, and the contents of the text range (see the illustration of :Text Align on page 72).

Chapter 7
Printing Worksheet Data

This chapter describes printing worksheet data and enhancing the quality of printed worksheets. The chapter includes the following sections:

Should I Print with 1-2-3 or with Wysiwyg?

You print worksheet contents with either the 1-2-3 Print commands (/Print) or the Wysiwyg Print commands (:Print), depending on the type of printing you need. To print with 1-2-3 or with Wysiwyg, you need to understand the following terms:

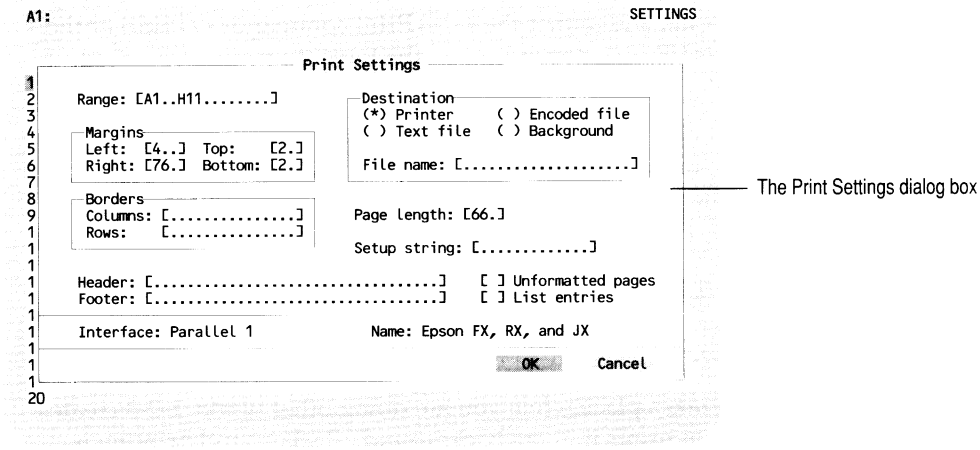
- A **print job** consists of one or more printed items. A printed item can be a file or a range of data, or one or more blank lines. The print job begins when you start sending data to a printer or a file. To begin a print job in 1-2-3, select /Print [Printer, File, Encoded, Background] Go, Line, or Page. To begin a print job in Wysiwyg, select :Print Go, File, or Background. The print job ends when the WAIT mode indicator at the top right of the screen stops flashing after the last item you send, or when you press **CTRL-BREAK**. On a network, the print job ends when you leave the 1-2-3 or Wysiwyg Print menu.
- **Background printing** takes place while you are doing other work: 1-2-3 creates an encoded file and then prints it in the background. Background printing is useful if a print job is large. Most printers accept 2KB to 8KB in a print buffer. Background printing saves time if you are printing more than this amount of data.
- **Print settings** are the options you specify for your print job. Margins, headers, and footers are a few examples of print settings.
- A **print destination** is where 1-2-3 prints your data. In 1-2-3, the print destination can be a printer, a text file, an encoded file, or background printing.
- The **default printer** is listed in the Printer Settings dialog box. If you selected more than one text printer when you ran the Install program, you can change the default printer in the Default Printer Settings dialog box, with /Worksheet Global Default Printer Name, or with :Print Config Printer.
- A **local printer** is connected to your computer; you may also have access to a shared printer on a network.

- A **text** or **print file** is an ASCII file that contains data, including text, borders, headers, footers, margins, and page breaks, but no graphs or special printer codes.
- An **encoded file** contains data (including text, borders, headers, footers, margins, and page breaks) as well as graphics and printer codes. An encoded file is useful when you want to print a file on a printer that is not connected to your computer.

Why Print with 1-2-3?

Use the 1-2-3 Print commands when you need a quick printout of a worksheet. /Print controls basic printing operations such as specifying a range to print or advancing the paper in the printer by a line or a page.

/Print can also enhance printed worksheets that don't use Wysiwyg formatting; for example, you can add headers, footers, and borders. /Print provides print options on the Print Settings dialog box or through corresponding commands in the menu above the dialog box. Press **F2 (EDIT)** *or* click the dialog box to activate it.

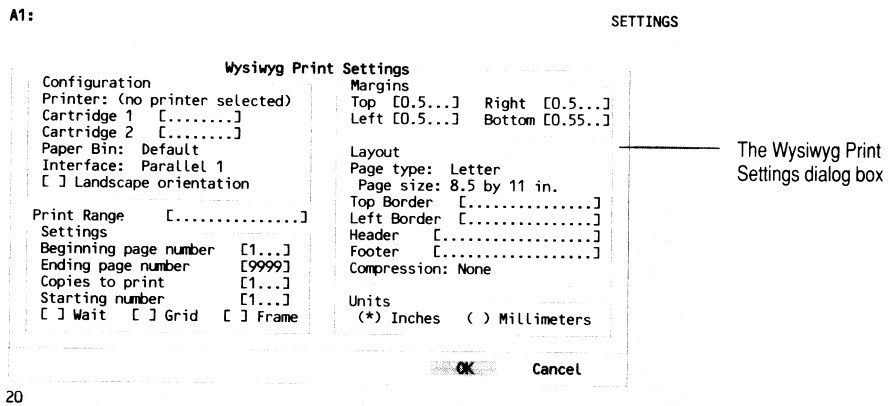


For example, the 1-2-3 Print commands let you print the contents of cells so you can easily read formulas, which is helpful when you are debugging a worksheet; print a border of column labels over the figures on each page of a printed report; or print the current date and/or page number at the bottom of each page. The 1-2-3 Print commands also let you send the printer setup strings, which are control codes that tell the printer to turn on printer settings such as compressed type (see "Using setup strings to control printing" on page 88).

Use the 1-2-3 Print commands to create a text file or an encoded file on a disk so you can import the data into another program or print the file using an operating system command.

Why Print with Wysiwyg?

In Wysiwyg, :Print lets you print on a printer or to an encoded file. :Print provides print options in the Wysiwyg Print Settings dialog box or through commands in the menu above the dialog box. Press **F2 (EDIT)** *or* click the dialog box to activate it.



Use :Print to print a worksheet you have enhanced with Wysiwyg formatting, such as fonts, type styles, and graphics. :Print offers many of the same print options as 1-2-3, as well as some additional ones; for example, you can add headers and footers or adjust page margins, and you can use compressed type without a setup string.

Use :Print to preview printed work, especially if the worksheet uses Wysiwyg formatting. Previewing lets you know what the printed copy will look like. You can preview the worksheet's printed appearance, return to the worksheet to make changes, and then preview again to check the changes, saving both time and paper.

Printing with 1-2-3

The 1-2-3 Print commands create printed copies of your work, letting you share your 1-2-3 results with others.

Selecting a Destination

Before you can use the 1-2-3 Print commands, you must select the destination for your worksheet print output. 1-2-3 offers you four choices.

Select /Print Printer to print data directly on a printer

If you are going to print your work on a printer, be sure you used the Install program to install that printer for use with 1-2-3. If you are not sure if you installed a text printer, select /Worksheet Global Default Printer and check the printer name setting in the dialog box. If no printer name is listed, you must add a printer to your driver

set. To do this, select Change Selected Equipment in the Install program. For more information, see the installation instructions in Chapters 2 and 3 of *Getting Started*. If you selected more than one text printer when you installed 1-2-3, use /Worksheet Global Default Printer Name to select the printer you want to use to print the current job. Make sure that the printer you plan to use is turned on, properly connected, and ready to print (online). Also, check that the paper in the printer is aligned at the top of a new page.

Select /Print File to print data to a text file on a disk

When you use /Print File to create a text file from a worksheet range, 1-2-3 assigns the file the default extension .PRN. You can use the text file in another program (for example, a word-processing program), or print the text file later with an operating system command or a print utility program. When you select /Print File, 1-2-3 prompts you to enter a name for the text file. When printing to a file, 1-2-3 ignores setup strings. 1-2-3 creates the text file when you select Quit to leave the Print menu.

You can use your operating system's COPY or PRINT command to print a text file on a printer. Select /Quit to end 1-2-3 and go to the operating system. At the operating system prompt, type copy *[path]filename device* and press ENTER. Include the correct extension when you type the file name. If the file is not in the current directory, enter the complete path. For example, to print the file BUDGET.PRN, which is located in a directory named \123 on drive C, on the operating system device LPT1, type copy c:\123\budget.prn lpt1 and press ENTER. For more details about your operating system's COPY or PRINT command, consult your operating system manual.

Some printers require special printing controls and cannot print text files. For example, the Apple® LaserWriter® prints files in the PostScript® format only.

To review the contents of a text file on screen, you can use your operating system's TYPE command to scroll through the print output on your screen. At the operating system prompt, type type *[path]filename* and press ENTER. Include the correct extension when you type the file name. For more details about your operating system's TYPE command, consult your operating system manual.

Select /Print Encoded to print data to an encoded file on a disk

When you use /Print Encoded to create an encoded file, 1-2-3 assigns the file the default extension .ENC. You can print the encoded file later with an operating system command or a print utility program (be sure the current printer, listed in the Print Settings dialog box, is the one you will use to print the encoded file). When you select /Print Encoded, 1-2-3 prompts you to enter a name for the encoded file. An encoded file contains all printing information, including setup strings.

You can use your operating system's COPY or PRINT command to print an encoded file. Select /Quit to end 1-2-3 and go to the operating system. At the operating system prompt, type copy *[path]filename device* and press ENTER. Include the correct extension when you type the file name. If the file is not in the current directory, enter the complete path. For example, to print the file BUDGET.ENC, located in a

directory named \123 on drive C, on the operating system device LPT1, type copy c:\123\budget.enc lpt1 and press ENTER. For more details about your operating system's COPY or PRINT command, consult your operating system manual.

Select /Print Background to print while you do other work

/Print Background prints worksheet data to an encoded file and then prints the encoded file on a printer while you continue to work with 1-2-3, or even leave 1-2-3. Before you can select /Print Background, however, you must leave 1-2-3 and run a program called BPrint. BPrint is a Terminate-and-Stay-Resident (TSR) program supplied with 1-2-3 Release 2.3. To run BPrint, you use /Quit to leave 1-2-3 (not /System), and type bprint at the operating system prompt. If you have not started BPrint when you select /Print Background, 1-2-3 displays an error message.

You can also use BPrint to print from the operating system prompt. For complete information about using BPrint and the BPrint commands from the operating system, see Appendix E, beginning on page 369.

Make sure that you start BPrint after you load your network software. If you are loading BPrint from a network, BPrint must be in your personal directory on the network. BPrint prints only to the local printer attached to your personal computer; you cannot use BPrint to print to a shared network printer.

Be sure you used the Install program to install a printer for use with 1-2-3. If you are not sure if you installed a text printer, select /Worksheet Global Default Printer and check the printer name setting in the dialog box. If no printer name is listed, you must add a printer to your driver set. To do this, select Change Selected Equipment in the Install program. For more information, see the installation instructions in Chapters 2 and 3 of *Getting Started*. If you selected more than one text printer when you installed 1-2-3, use /Worksheet Global Default Printer Name to select the printer you want to use to print the current job. Make sure that the printer you plan to use is turned on, properly connected, and ready to print (online). Also, check that the paper in the printer is aligned at the top of a new page.

After You Select a Destination

After you select a print destination, 1-2-3 displays the Print Settings dialog box, which lists all the print settings and the settings for the current print job (if any). You can use the menu or the dialog box to change settings. Press F2 (EDIT) or click the dialog box to activate it, and then change the settings in the dialog box directly, or select commands from the menu. 1-2-3 will use these settings the next time you print your work by selecting Go from the Print [Printer, File, Encoded, Background] menu.

Whether you are printing on a printer or to a file on disk, you must specify the **print range** (the cells you want 1-2-3 to print when you select Go). You can print the contents of every nonblank cell in the worksheet, or of just a few cells.

Printing Guidelines

1-2-3 keeps an internal count of lines per page as it prints. It adds 1 to this count for each line of space, data, or margin it prints. When the line count reaches the specified number of lines per page, 1-2-3 starts a new page and resets the line count to 0. This means you should use /Print [Printer, File, Encoded, Background] Line or Page to advance paper in the printer by line or page instead of using the printer's controls.

If you use your printer's line-feed control to advance the paper in the printer by one line rather than /Print [Printer, File, Encoded, Background] Line, 1-2-3 does not adjust the internal line count, so the positioning of headers, footers, and page breaks on subsequent pages is incorrect. You must use /Print [Printer, File, Encoded, Background] Line to keep the line count synchronized with the paper or /Print [Printer, File, Encoded, Background] Align to reset the line count.

If you use your printer's form-feed control to advance the paper in the printer to the top of the next page rather than /Print [Printer, File, Encoded, Background] Page, 1-2-3 does not print the specified footer, if there is one, on the last page. If you are printing on a local printer, or if you are printing to a text file, you must use /Print [Printer or File] Page to advance the paper after the last range prints.

Each time you reposition the paper in the printer at the top of a new page, select /Print [Printer, File, Encoded, Background] Align. If you do not, the new page will not be filled correctly because 1-2-3 will continue to use its existing line count instead of starting at 0, which represents the top of the page.

If the print range is wider than the paper you are printing on, 1-2-3 automatically prints the data that extends beyond the right margin on a separate page.

If the print range includes a long label, the print range must include the cell(s) the long label overlaps as well as the cell that contains the long label. For example, to print a long label entered in A1 that overlaps B1 and C1, include cells A1, B1, and C1 in the print range. If 1-2-3 cannot display a long label entirely, it prints only what appears in the worksheet.

Printers that support proportionally spaced fonts may not produce the results you intend: More characters, or fewer, may fit in the print range you specify. If you are using such a printer, you may need to experiment to achieve the results you want.

1-2-3 remembers the last print range you specified. To print the same range again, select Go from the Print [Printer, File, Encoded, Background] menu without respecifying a range. To clear the current print range, select Clear Range from the Print [Printer, File, Encoded, Background] menu.

To Print a Range

1. (Optional) To use background printing, run BPrint first.

   To run BPrint, use /Quit to leave 1-2-3 (not /System), type BPrint at the operating system prompt, and press ENTER. For complete information about using BPrint, see Appendix E, beginning on page 369.

2. Select /Print.
3. Select a destination for the printing:

Background	Print worksheet data to an encoded file, and then print the file. You can resume work with 1-2-3 immediately, or even leave 1-2-3 without interrupting the print job.
Encoded	Print worksheet data to an encoded file on a disk. An encoded file contains both the data and any printer codes you include to provide formatting instructions to your printer. You can print an encoded file with an operating system command or BPrint.
File	Print worksheet data to a text file on a disk. A text file stores the data in ASCII format. You can use a text file with other programs, or print it with an operating system command or BPrint.
Printer	Print worksheet data on a printer. 1-2-3 will control printing; you can resume working in 1-2-3 when the print job is complete.

4. (Optional) If you selected File, Encoded, or Background, specify the name of the text file or encoded file you want 1-2-3 to create.

   1-2-3 displays the names of files in the current directory with the extension .PRN (if you selected File) or .ENC (if you selected Encoded). If necessary, change the drive, directory, or extension.

   When you specify the file name, 1-2-3 uses the extension .PRN for a text file or .ENC for an encoded file unless you specify a different extension.

5. (Optional) If you selected File, Encoded, or Background, and you specify the name of a file that already exists, select Cancel to return 1-2-3 to READY mode, or Replace to write over the existing file on disk.

6. Specify the range you want to print.

   Press **F2 (EDIT)** *or* click the Print Settings dialog box to activate it and specify the range name or address in the Range text box *or* select /Print [Printer, File, Encoded, Background] Range and specify the range at the prompt.

7. (Optional) Change the current print settings.

   For a description of available print options, see "Changing How 1-2-3 Prints" on page 84. If you do not change the margins or page length, 1-2-3 uses the following default settings when it prints the range:

Setting	Default
Left margin	4 characters from left edge of the paper
Right margin	76 characters from left edge of the paper
Top margin	2 lines from the top of the paper
Bottom margin	2 lines from the bottom of the paper
Page length	66 lines

TIP For a text file, you may want to eliminate headers, footers, and page breaks and adjust margins if you will use the file in another program (such as a word-processing program). Mark Unformatted pages in the Print Settings dialog box (*or* select Options Other Unformatted from the menu) to eliminate headers, footers, and page breaks. To set the left margin to 0, select Margins (*or* Options Margins Left) and enter 0. To set the right margin, select Margins (*or* Options Margins Right) and enter a number for the right margin that is appropriate for the program in which you are going to use the text file.

8. When you finish specifying print options, select OK.
9. Select Quit if necessary to return to the Print [Printer, File, Encoded, Background] menu.
10. Select Align.

    This sets the internal line count 1-2-3 maintains to 0, which represents the top of a page. If you are printing on a printer, this tells 1-2-3 the paper in the printer is correctly positioned at the top of a page and ready for printing.
11. Select Go to print the range.
12. (Optional) To include other worksheet ranges, select Line to separate each range with a line of space. Then repeat steps 6 and 10.

    1-2-3 appends new ranges to the end of the previous range.
13. (Optional) If you are printing on a local printer or to a text file, select Page to advance the paper to the top of the next page and to include the footer (if you specified one) on the last line of the page.

    If you are printing on a shared network printer, or if you selected /Print Background or /Print Encoded, 1-2-3 advances the page automatically.
14. Select Quit to complete the print job and return 1-2-3 to READY mode.

If you are printing on a shared network printer, to a text file, or in the background, the print job does not print until you select Quit.

Changing How 1-2-3 Prints

Before you print a worksheet, you may want to override default settings and change the appearance of the printed page — for example, the page dimensions, margins, or whether each page has a header or a footer. Page enhancements affect the printed output of a worksheet: 1-2-3 does not display them in the on-screen worksheet.

In most cases, you control how 1-2-3 prints by selecting options from the Print Settings dialog box *or* selecting /Print [Printer, File, Encoded, Background] Options.

To	Do this
Print vertical headings that are repeated on the left side of each page	Select Columns from the Print Settings dialog box and specify the range you want to print as borders. (/Print [Printer, File, Encoded, Background] Options Borders Columns)
Print descriptive text above data on every page	Select Rows from the Print Settings dialog box and specify the range you want to print as borders. (/Print [Printer, File, Encoded, Background] Options Borders Rows)
Print a footer just above the bottom margin of every page, or a header just below the top margin	Select Footer (or Header) in the Print Settings dialog box. If 1-2-3 displays a footer (or a header), edit it and press ENTER when you are done. To clear existing text, press ESC or click the right mouse button. To create a new footer (or header), type the text and press ENTER, or type a \ (backslash) followed by the address or range name of the cell that contains the text and then press ENTER. (/Print [Printer, File, Encoded, Background] Options Footer or Header)
Set left, right, top, and bottom margins or clear all margins	Select Left, Right, Top, or Bottom from the Print Settings dialog box. Enter a value between 0 and 240 characters if you select Left or Right, or between 0 and 32 lines if you select Top or Bottom. (/Print [Printer, File, Encoded, Background] Options Margins Left, Right, Top, Bottom, or None)
Print formulas rather than values	Mark List entries in the Print Settings dialog box. (/Print [Printer, File, Encoded, Background] Options Other Cell-Formulas)
Insert a page break	Move the cell pointer to the first column of the print range and the row where you want a new page to begin when you print. Select /Worksheet Page.
Print without headers, footers, page breaks, and top or bottom margins	Mark Unformatted pages in the Print Settings dialog box. (/Print [Printer, File, Encoded, Background] Options Other Unformatted)
Set lines per page	Select Page length in the Print Settings dialog box. Specify the number of lines (1 to 100) for the page length. (/Print [Printer, File, Encoded, Background] Options Pg-Length)
Use printer attributes with a control code (setup string)	Select Setup string in the Print Settings dialog box and enter the setup string (up to 39 characters). (/Print [Printer, File, Encoded, Background] Options Setup)

Borders

Borders are useful when you are printing a range that is split over several pages. Use Columns when the print range contains more columns of data than will fit across one page and one or more columns contain labels or other information that will help identify data printed on subsequent pages. Use Rows when the print range contains more rows of data than will fit down one page and one or more rows contain labels or other information that will help identify data printed on subsequent pages.

1-2-3 prints borders that correspond to the rows and columns in your print range only. For example, if you specify D3..D15 as your print range and A1..A8192 as your border, 1-2-3 prints the entries in cells A3 through A15 as the border.

If the print range includes the rows and columns you specified as borders, 1-2-3 will print those rows and columns twice. Use borders only when you need them for clarity.

Headers and footers

Use the following guidelines when creating headers or footers:

- A header or footer can contain up to 240 characters (including spaces). Depending on your print margin settings, however, you may have to use fewer characters.
- Although a header or footer is limited to a single line, you can divide it into separate segments for the right, left, and center portions of each line. Use the ¦ (split vertical bar) to separate the information into sections. 1-2-3 left-aligns text you type before a ¦ (split vertical bar), centers text you type after a ¦ (split vertical bar), and right-aligns text you type after a second ¦ (split vertical bar). If you do not use any split vertical bars, 1-2-3 left-aligns the entire header or footer.
- A header or footer can include any text as well as # (number sign) and @ (at sign). Use # to include a page number on every page of print output. You can combine it with text (for example, Page #). Use @ to include the current date on every page of print output. 1-2-3 uses the date supplied by your computer's internal clock. Like #, @ can be combined with text (for example, Today's Date: @). 1-2-3 uses the date format set with /Worksheet Global Default Other Clock.
- Use \ (backslash) followed by a cell address or range name to use the contents of a cell as the header or footer. The contents of the cell will be the only text in the header or footer, but can include any of the standard conventions, such as the use of the ¦ (split vertical bar). If the ¦ (split vertical bar) is the first character in the cell, you must precede it with another ¦ (split vertical bar).

If you specify a range as the header or footer, such as A5..B5, 1-2-3 uses the contents of only the upper left cell of the range, in this case cell A5. You cannot use the ¦ (split vertical bar) to align text from a cell in a header or footer (for example, ¦ a1 produces a1 as centered text).

The following table shows some examples of headers or footers.

If you enter	This header or footer results		
ABC SALES	ABC SALES		
¦ABC SALES		ABC SALES	
ABC SALES¦¦ Page #	ABC SALES		Page 87
@¦ ABC SALES¦ Page #	1-APR-91	ABC SALES	Page 87

1-2-3 uses three lines for a header or footer. The program prints the footer on the line above the bottom margin or the header on the line below the top margin, and leaves two blank lines between printed data and the header or footer.

Margins

Change margins to change how much white space surrounds your data. Margins change how many lines and characters 1-2-3 prints on a page, but not the page size.

Printing formulas instead of data

When you mark List entries in the Print settings dialog box (/Print [Printer, File, Encoded, Background] Options Other Cell-Formulas), 1-2-3 prints the contents of each nonblank cell in the print range, one cell per line. Each line contains exactly what appears in the first line of the control panel when the cell pointer is in the cell: the cell address, the cell format, the protection status (PR or U), and the cell contents (number, formula, or label). 1-2-3 does not print borders, even if you specify them.

To print the data as it appears on your screen after you have used Cell-Formulas, remove the mark from List entries *or* select /Print [Printer, File, Encoded, Background] Options Other As-Displayed.

Page break

When 1-2-3 encounters a page break, it stops printing on the current page, resets the line counter, and begins printing at the top of the new page. 1-2-3 does not print any data that is in the same row as the page break.

Page length

Page length is measured in lines. The default page length is 66 lines, which is appropriate for printers that print 6 lines per inch on 11-inch paper. When you print with the default page length, 1-2-3 uses the 66 lines as follows:

Lines	Use
1 and 2	Default top margin
3	Header (or blank line if you did not enter text for header)
4 and 5	Blank lines
6 through 61	Worksheet data (total of 56 lines)

(continued)

Lines	Use
62 and 63	Blank lines
64	Footer (or blank line if you did not enter text for footer)
65 and 66	Default bottom margin

Laser printers often have special rules for determining the length of a page, so you may have to adjust this setting. For information on the Hewlett-Packard® LaserJet printers, see Appendix D beginning on page 355. For other laser printers, consult your printer manual.

Using setup strings to control printing

A **setup string** is a series of up to 39 characters preceded by a \ (backslash) that 1-2-3 uses to tell your printer to print a certain way. For example, you can send a setup string that causes the printer to compress or underline type. /Print [Printer, File, Encoded, Background] Options Setup lets you override the default setup string specified with /Worksheet Global Default Printer Setup. You create setup strings by translating the printer control codes for your printer into setup string format. 1-2-3 sends the setup string to your printer before printing begins. For complete information, see Appendix B, beginning on page 331.

To use a setup string longer than 39 characters, you can embed a setup string of up to 240 characters in the worksheet. For instructions, see "Embedding Setup Strings in the Worksheet" on page 335.

W Wysiwyg does not support embedded setup strings and will print the strings as if they are regular text. Therefore, if you embed setup strings in a worksheet and you decide later to print that worksheet with Wysiwyg instead of with 1-2-3, you must first remove the embedded setup strings.

CAUTION To avoid complications when printing, do not use setup strings to control print settings that you can control through 1-2-3 commands. For example, do not use setup strings to control page length and margins.

To Reset Print Settings to the Default Settings

1. Select /Print [Printer, File, Encoded, Background] Clear.
2. Select one of the following:

All	Clear the current print range; clear all borders, headers, and footers; reset all formats and options to their default settings.
Borders	Clear all borders (column and row ranges).
Format	Reset margins, page length, and setup strings to their default settings.
Range	Clear the current print range.

3. Select other Print commands or select Quit to return 1-2-3 to READY mode.

Changing Printing Defaults

The default print settings are the settings 1-2-3 uses to print unless you override them using the Print Settings dialog box or the Print commands. If you use the same settings for most of your printing, it may be useful to change the defaults so you do not have to change the print settings each time you print.

You change printing defaults with the Default Printer Settings dialog box or the Worksheet Global Default Printer commands. The table below lists the defaults you can change and the Default Printer Settings dialog box options (Worksheet Global Default Printer commands) you use to change them. To display the Default Printer Settings dialog box, select /Worksheet Global, press **F2 (EDIT)** *or* click the dialog box to activate it, select Default Settings, and select Printer from the Default Settings dialog box (*or* select /Worksheet Global Default Printer and activate the Default Printer Settings dialog box).

To	Do this in the Default Printer Settings dialog box
Select the default printer	Select Name. Then select a printer name from the list box. (/Worksheet Global Default Printer Name)
Set default margins	Select Left, Right, Top, or Bottom. Enter a value between 0 and 240 characters if you select Left or Right, or between 0 and 32 lines if you select Top or Bottom. (/Worksheet Global Default Printer Left, Right, Top, or Bot)
Set the default page length	Select Page length. Then enter a value between 1 and 100 lines. (/Worksheet Global Default Printer Pg-Length)
Specify a default setup string	Select Setup string. Then enter the setup string. (/Worksheet Global Default Printer Setup)

To use the new default settings each time you start 1-2-3, you must change the configuration file. Select /Worksheet Global, press **F2 (EDIT)** or click the dialog box to activate it, select Default Settings, and select Update from the Default Settings dialog box (*or* select /Worksheet Global Default Update).

Printing with Wysiwyg Formatting

To print a worksheet with Wysiwyg formatting, you must print using the Wysiwyg Print commands (:Print). If you print using the 1-2-3 Print commands (/Print) at this point, you will print the worksheet without Wysiwyg formatting.

Before you print a worksheet with Wysiwyg formatting, you may want to preview it. With :Print Preview, you can see how the worksheet will appear on the printed page. You may want to make layout and spacing adjustments after you preview and before you actually print the worksheet.

The Wysiwyg Print commands let you print on a printer or to an encoded file (a file that has the extension .ENC and contains printer codes that represent formatting). You can also use background printing with Wysiwyg (print the data to an encoded file and send the file to the printer so you can continue working as the data prints).

If you are going to print your work on a printer, you must install a graphics printer first. If you are not sure if you installed a graphics printer, select :Print Config Printer and check the printer name setting in the dialog box. If no printer name is listed, you must add a printer to your driver set. To do this, select Change Selected Equipment in the Install program. For more information, see the installation instructions in Chapters 2 and 3 of *Getting Started.*

If you selected more than one graphics printer when you installed 1-2-3 and you want to use a printer other than the current printer, or if no printer is currently selected, use :Print Config Printer to select the printer, and use :Print Config Interface to specify the port through which the printer is connected to the computer (either directly or through a local area network).

When you finish formatting a worksheet, it is a good idea to save your formatting changes before you print the worksheet. Use /File Save to save the worksheet file and the Wysiwyg formatting. To save the current print settings so you can use them again, use :Display Default Update.

To Preview a Worksheet

1. Select :Print.

   1-2-3 displays the Wysiwyg Print Settings dialog box.

2. Specify the range you want to preview.

   Press **F2 (EDIT)** *or* click the Wysiwyg Print Settings dialog box to activate it and then specify the range name or address in the Print Range text box. (:Range Set)

3. (Optional) Change the current print settings.

   For more information about changing print settings, see "Controlling Page Layout with Wysiwyg" on page 92.

4. Select Preview from the Wysiwyg Print menu.

   The first page of the print range appears on the preview screen. A dotted line outlines the margin settings. The print range you specified, including all graphics, appears within the outline. 1-2-3 also displays layout enhancements such as footers and page numbers specified with Wysiwyg.

   While you are previewing a worksheet, you can turn on PAN mode. In PAN mode, you can enlarge and reduce the display using the keys listed in the following table.

Press	To
F6 (WINDOW)	Turn PAN mode on and off.
+ (plus sign)	Enlarge the size of the contents of the preview screen. You can press + (plus sign) up to 5 times to continue enlarging the screen.
– (minus sign)	Reduce the size of the contents of the preview screen. Press – (minus sign) once for each time you press + (plus sign); if you press + two times, and then press – once, the display is still enlarged.
* (asterisk)	Reduce the contents of the preview screen to the original size.
← → ↑ ↓	Move within the enlarged preview screen.

5. Press PG UP or PG DN to view previous or succeeding pages, respectively.
6. Press ESC to return to the menu.
7. Select Quit to return 1-2-3 to READY mode.

   A dotted line now outlines the print range in your worksheet.

When you preview a worksheet, you see how the worksheet will be positioned on a page. You may want to make final adjustments, such as moving graphics or inserting rows, to achieve a balanced appearance. For example, the appearance of a worksheet might be improved by creating space between the title and the column headings.

To Print a Worksheet with Wysiwyg Formatting

1. Select :Print.

   1-2-3 displays the Wysiwyg Print Settings dialog box.

2. Specify the range you want to print.

   Press F2 (EDIT) *or* click the Wysiwyg Print Settings dialog box to activate it and then specify the range name or address in the Print Range text box and select OK. (:Range Set)

3. Select Go, File, or Background from the Wysiwyg Print menu.

   Select Go to print the current print range on the current printer and return 1-2-3 to READY mode.

   Select File to print the current print range to an encoded file.

   Select Background to print while you continue with other work. Before you can use :Print Background, you must run BPrint. To run BPrint, use /Quit to leave 1-2-3 (not /System), type bprint at the operating system prompt, and press ENTER.

4. (Optional) If you selected File, specify the name of the encoded file.

   1-2-3 displays the names of files in the current directory with the extension .ENC. If necessary, change the drive, directory, or file extension.

When you specify the file name, 1-2-3 uses the extension .ENC unless you specify a different extension.

5. (Optional) If you selected File and you specify the name of a file that already exists, select Cancel to return 1-2-3 to READY mode, or select Replace to write over the existing file on disk and return 1-2-3 to READY mode.

Controlling Page Layout with Wysiwyg

Page layout is the overall appearance of the printed page, including dimensions, margins, headers, and footers. Select :Print and press **F2 (EDIT)** *or* click the dialog box to control page layout with the Wysiwyg Print Settings dialog box, or use the Wysiwyg Print commands. The following table describes Wysiwyg page layout.

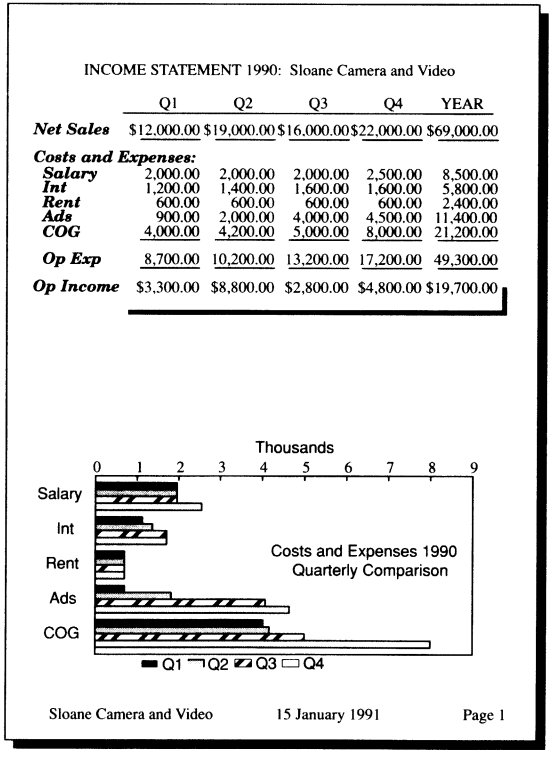
To	Do this
Adjust page margins	Select Top, Left, Right, or Bottom in the Wysiwyg Print Settings dialog box, enter a margin setting, and press **ENTER**. The initial default page margins are .50″ for the top, left, and right margins and .55″ for the bottom margin. (:Print Layout Margins)
Print a line of text at the top or bottom of every page	Select Header or Footer in the Wysiwyg Print Settings dialog box. Type a header or footer and press **ENTER**. Follow the guidelines for headers and footers on page 86. To format text within a header or footer, see "Formatting Text When You Can't Use the Menu" on page 59. (:Print Layout Titles Header *or* Footer)
Print descriptive information above data on every page of print output	Select Top Border in the Wysiwyg Print Settings dialog box and specify the range you want to print as borders. (:Print Layout Borders Top)
Print vertical headings that are repeated on the left side of each page of print output	Select Left Border in the Wysiwyg Print Settings dialog box and specify the range you want to print as borders. (:Print Layout Borders Left)
Specify the paper size	Select Page type in the Wysiwyg Print Settings dialog box. Select the paper size you want from the popup dialog box. (:Print Layout Page-Size)
Compress type to fit more data on a page	Select Compression in the Wysiwyg Print Settings dialog box. Select Automatic to have 1-2-3 determine how much to compress type or select Manual and enter the percentage by which to compress type (1–99) (entering 100 is the same as selecting None). (:Print Layout Compression)
Print landscape (across the length of the page)	Mark the Landscape orientation check box in the Wysiwyg Print Settings dialog box. (:Print Config Orientation Landscape)

(continued)

To	Do this
Expand type	Select Compression in the Wysiwyg Print Settings dialog box. Select Manual and enter the percentage by which to expand type (101–1000) (entering 100 is the same as selecting None). (:Print Layout Compression Manual)
Change measurement units for margins, page size, and so on	Select the Inches or Millimeters option in the Wysiwyg Print Settings dialog box.
Print the worksheet frame (row numbers and column labels)	Mark the Frame check box in the Wysiwyg Print Settings dialog box. (:Print Settings Frame)
Print the worksheet grid (lines around each cell)	Mark the Grid check box in the Wysiwyg Print Settings dialog box. (:Print Settings Grid)

The Units option (Inches or Millimeters) controls how measurements are displayed in the Wysiwyg Print Settings dialog box. 1-2-3 displays all measurements in the current units option. If you enter a measurement using the other type, 1-2-3 converts your entry to the current type. For example, if Inches is marked, and you enter 50mm for the Top margin, 1-2-3 converts the entry to inches and displays 1.969.

In the following illustration of a printed worksheet, you can see the effect of page layout enhancements such as margin settings and footers.



INCOME STATEMENT 1990: Sloane Camera and Video

	Q1	Q2	Q3	Q4	YEAR
Net Sales	$12,000.00	$19,000.00	$16,000.00	$22,000.00	$69,000.00
Costs and Expenses:					
Salary	2,000.00	2,000.00	2,000.00	2,500.00	8,500.00
Int	1,200.00	1,400.00	1,600.00	1,600.00	5,800.00
Rent	600.00	600.00	600.00	600.00	2,400.00
Ads	900.00	2,000.00	4,000.00	4,500.00	11,400.00
COG	4,000.00	4,200.00	5,000.00	8,000.00	21,200.00
Op Exp	8,700.00	10,200.00	13,200.00	17,200.00	49,300.00
Op Income	$3,300.00	$8,800.00	$2,800.00	$4,800.00	$19,700.00

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Preparing a Worksheet Presentation

1-2-3 Release 2.3 and Wysiwyg help you create and publish professional-quality presentations of worksheet data. Wysiwyg also lets you include graphs and graphics directly within the worksheet; for more information about including graphs and graphics, see Chapter 11, beginning on page133.

The key to effective presentation of business data is to design your spreadsheet to maximize clarity and readability. Common types of presentations include printed presentations, overhead projections, 35mm slides, and online screen shows. Quality print and overhead presentations are usually simple and inexpensive to produce: All you need is a good printer and a photocopier. For 35mm slides, you need a film recorder or the services of a slide service (check local telephone listings under "Slide Film Projection" or "Video Production Services"). For small groups, online screen shows are simple and inexpensive, requiring only a computer and monitor. For larger groups, however, you need a large monitor to ensure that everyone in the audience can read the screen easily. The paragraphs below offer guidelines for designing a worksheet for both online and printed presentations.

Design

Design the presentation before you create it. What type of presentation do you want — a printed report, for example, or a slide show, or a series of screens to be displayed on a large monitor? How many pages (or slides, or screens) do you want in the finished presentation? What are the key elements of the presentation? How many pages (or slides or screens) will present introductory or summary material, and how many will present data?

CAUTION Design the presentation with dummy data or with a copy of the worksheet using values instead of formulas. When you finish designing, make the changes to the real worksheet. As you move data, insert rows and columns, and justify text ranges, it is easy to destroy formulas or delete important data inadvertently. If you delete important data inadvertently and undo is on, press **ALT-F4 (UNDO)** immediately to restore the deleted data.

Titles

Use initial capitalization for titles rather than all uppercase (Annual Sales rather than ANNUAL SALES). Capital letters take up valuable space and are hard to read. @PROPER converts text to initial capitalization without retyping.

Use easy-to-understand titles that convey the information you want readers to learn from the page (or slide or screen). For example, "Earnings per Share Rose 13% in 1989" conveys more than "Comparison of Earnings per Share (1988–1989)."

Contents

Group related data on the same page (or slide or screen). It is easier to understand a formula or @function if the data it depends on is included with the formula and is clearly labeled. For example, if your presentation includes loan payment calculations you derive with @PMT, include the *principal*, *interest*, and *term* values near @PMT, and label them accordingly. This also makes it easier for you to proofread.

Explain anything the reader might not know. This is especially important in a written presentation or report where you may not be on hand to explain elements that are not clear. If a formula is complex, or if data is unusual, use notes and footnotes (formatted in a smaller point size with Wysiwyg) to clarify. Position notes adjacent to data, and footnotes at the bottom of the page (or slide or screen).

Use regular sentence capitalization for text and descriptions.

Spacing

Use spacing to relieve the eye, to make data more readable, and to separate or group data. Insert blank rows in long columns of numbers to make the numbers more easily readable. Use blank columns to divide groups of data. Keep the amount of data on each page (or slide or screen) as minimal as possible to allow greater impact; this is especially true in slide and online presentations. Present text and other data from left to right as a rule, as this is how people expect to find information on a page.

Avoid lines of text longer than 33 picas (5.5 inches) in printed material, as it is difficult to read a long line quickly. For 10-point type, the generally recommended line length for text that must be read closely is 21 to 24 picas (or about 3.5 inches). For 10-point text that will be skimmed, a line length closer to 30 picas (5 inches) is preferable. For slide and online presentations that use larger typefaces, appropriate line lengths will vary with point size and amount of information.

W Type

Use typefaces and type styles judiciously. In most cases, a single typeface is adequate. Two may improve the quality of your presentation, and three may be necessary in very rare cases. Do not exceed three typefaces: Doing so adds more confusion than clarity. To emphasize text, use bold, italics, or underlining. Once again, however, avoid overusing these attributes, as your data will become visually confusing if too many styles interfere with readability.

Use **display type** (type that is larger or heavier than the regular text type) for titles. The Wysiwyg Swiss typeface is a good typeface for titles. Use a type size that is at least two points larger than the text typeface, but be careful not to use a size that makes the title break into two lines or that dwarfs the text type.

For text type, use a point size that ensures your audience will be able to read the presentation comfortably. For printed material, 10-point and 12-point type are adequate for regular text, and smaller type is suitable for notes and footnotes. For slides and screens, larger type is necessary as readers will be farther from the text. Rehearse with a few people and experiment with a few type sizes until you find the

type size that is easiest for your audience to read. Be consistent from page to page (or slide to slide or screen to screen) in your use of typefaces and styles. Use the same typefaces in the same situations, and use bold and italics in the same ways throughout the presentation.

Color

Use color to emphasize certain data, to differentiate among sets of data, to group related data, and to convey information about the data (negative numbers often appear in red, for example). Be careful when you mix colors, particularly with background and foreground (text) colors. Blue and white backgrounds show off almost any foreground color, but white may be too bright for slide presentations. Avoid clashing color combinations such as purple and orange, or color combinations that tend to blend and become indistinct, such as orange on red. Consider the effect of color on the reader — traditionally, blues and greens are cool colors, and reds are hot. Don't overuse color — a few colors that work well together are far more effective than a jumble of colors. Stick with a single background color, and limit foreground colors to two or three.

Check, proofread, and verify

A typographical error in a presentation is a very noticeable error that is easily avoided — have someone with a fresh eye check the presentation for these errors. Verifying data is equally important, particularly as the changes you make when you prepare the presentation can inadvertently move data or formulas. Check all formulas and values carefully.

Chapter 8
Solving What-If Problems

This chapter describes what-if problems and how to solve them with 1-2-3 Release 2.3. The chapter includes the following sections:

What Is a What-If Problem?

A **what-if problem** is a question that requires the analysis of one or more variables to arrive at an answer. The question usually begins with the words "What if..."; for example, "What if sales go up by 5%?" The implied question is "How does a 5% increase in sales affect the outcome of the worksheet?" This particular what-if problem is easy to solve: You add 5% to the current sales figure and recalculate the worksheet. But you may want to see the effect of several possible changes to the same variable in the problem; for example, you may want to see the effects of sales increases of 2.5%, 5%, and 7.5%. Or the changes may be interdependent, as, for example, when a sales increase is possible only if you hire more sales people.

You use 1-2-3 data tables to create and evaluate a list of possible solutions for a problem based on a list of values for one or more variables in the problem. You determine the best answer for a problem based on your review of the list of answers the data table contains.

To use data tables, you must understand the following terms:

- A **data table** is an area of a worksheet that contains the input values, formula(s), and results of the calculations.
- A **variable** is the part of a formula for which input values can be substituted. For example, the formula +B2*40 contains one variable, B2.
- An **input cell** is a cell in which 1-2-3 places values when it performs calculations. Each variable in a formula has a separate input cell.
- An **input value** is a value 1-2-3 substitutes for a variable when it performs calculations. You must include the input value(s) in the data table.
- The **results area** is an area of a data table in which 1-2-3 enters the results of the calculations.

Data tables solve what-if problems by calculating a formula many times, each time substituting a different value for one or two of the variables in the formula. Each solution to the formula is one value in the data table. You use the values in data tables to evaluate a set of scenarios for a problem and determine which one gives the best solution.

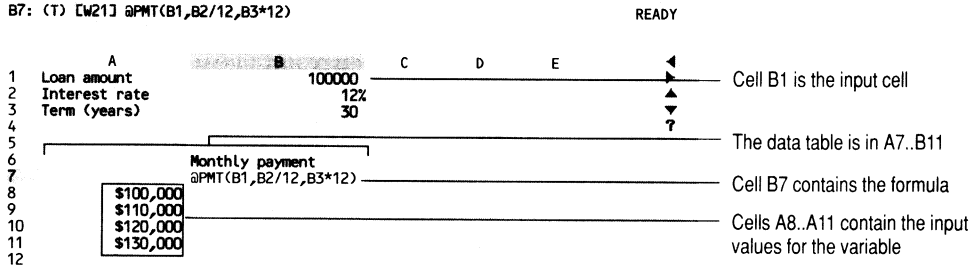
1-2-3 Release 2.3 can create two types of data tables: data table 1 and data table 2. The type of data table you create depends on the number of variables you want to use in your formula(s). Use /Data Table 1 if you have one or more formulas with one variable for which you want to substitute a range of numbers; use /Data Table 2 if you have one formula with two variables for which you want to substitute a range of numbers. Each type of data table requires a different layout, defined by the input values and formula(s) being used.

Before you can use /Data Table 1 or /Data Table 2, you must set up the data table. The data table must have a formula that contains a variable, plus the input values you want 1-2-3 to substitute for the variable. For example, in a formula that calculates the effect on a monthly payment of increasing a loan amount, the loan amount is the variable; the input values are the values you specify for the loan amount. 1-2-3 will then calculate the monthly payment for each amount. The formula can contain values, text, or cell addresses, as long as it refers to the input cell(s).

1-2-3 does not recalculate the values in a data table when it recalculates the worksheet. To recalculate the most recent data table after you change input values, repeat the Data Table command or press **F8 (TABLE)**. **F8 (TABLE)** lets you change values and then use the new values to recalculate the data table without using the menu.

Solving a Problem by Changing One Variable

A data table created with /Data Table 1 is useful in any situation where you need to assess the impact of different values for a single variable, such as when you are planning loan strategies. For example, if you aren't sure how large an amount you can afford to borrow, you will want to see a range of monthly payments for a range of loan amounts. In this case, you use two 1-2-3 features: the @function @PMT and a data table 1. @PMT calculates monthly payments for loans and investments. To find the range of payments for a range of principal amounts, you want 1-2-3 to calculate @PMT for each loan amount. The following worksheet uses /Data Table 1 to calculate @PMT (the formula) for the loan amount (the variable), using the values $100,000, $110,000, $120,000, and $130,000 (the input values). The first column of the data table contains the input values. The first row of the data table contains the formula to calculate. The upper left corner cell of the data table 1 is blank (first row, first column of the table range).



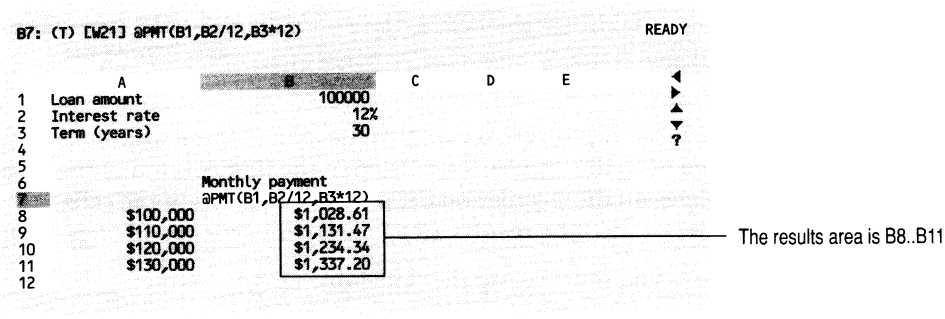
In the illustration, cell B1 is the **input cell**; it contains the loan amount argument 1-2-3 will replace in the formula with the input values listed in the first column of the data table. When 1-2-3 completes all the calculations, it places the results in the cells below the formula (B8..B11), called the **results area** (see the illustration on page 100).

Before using /Data Table 1, you must set up the data table range.

To Use /Data Table 1

1. Set up the data table with the following structure:
   - The left column contains the input values, which are the values 1-2-3 will use to replace variables in the formula(s).
   - The upper left cell is empty.
   - The formula is located in the top cell of the second column and refers to the input cell, directly or indirectly. If you are using text formulas in the data table, you may need to enter labels instead of values in the left column of the data table range. You may want to use /Range Format Text to format the formula cell(s) as text to see the formula(s) above the results.
   - Additional formulas are located in adjacent cells to the right of the first formula (see "Using /Data Table 1 with more than one formula" on page 100). (Additional formulas often refer to the input cell indirectly, as in the formula in cell C7 in the second illustration on page 100, which multiplies the results of the first formula by 12.)
   - The input cell is outside the data table range. It can be blank or can contain a value. If you enter a value in the input cell, you can see where 1-2-3 places the input values to calculate the data table, and it prevents 1-2-3 from evaluating the formula as ERR.
2. Select /Data Table 1.
3. Specify the data table range (the range that contains the input values, the formula(s), and the results area).
4. Specify the input cell.

1-2-3 calculates the formula(s) using each of the input values. In the following illustration, 1-2-3 substituted the input values in A8..A11 for B1 in the @PMT formula, and placed the results in the results area. The result of each calculation appears in the cell at the intersection of the row and column that contain the input value and formula, respectively. (For complete information about @PMT, see the *@Functions and Macros Guide.*)

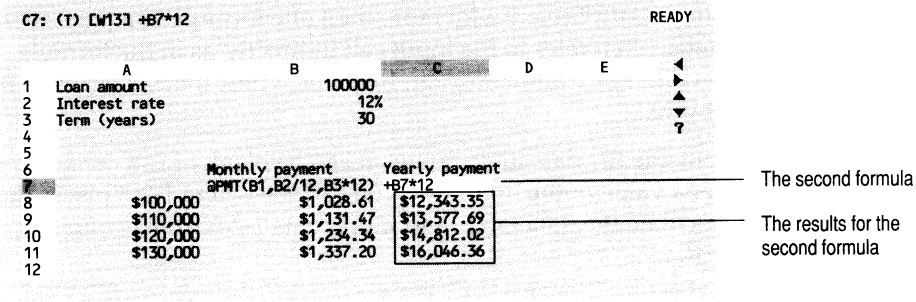


To recalculate the same data table, press **F8 (TABLE)**.

You can use an XY graph to graph information from a data table 1. The X range is the range of values in the first column, and the other ranges are selected columns in the results area of the table.

Using /Data Table 1 with more than one formula

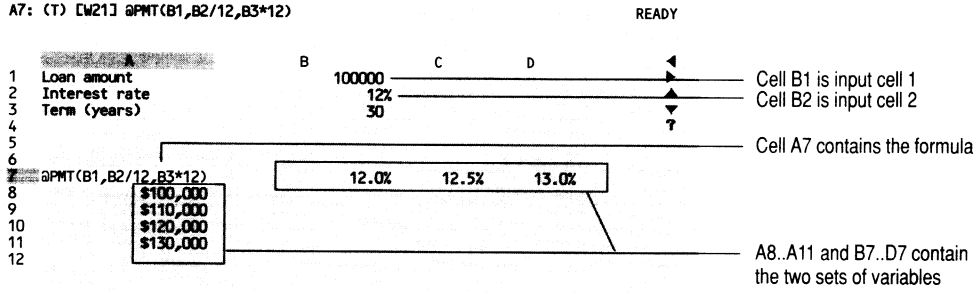
/Data Table 1 calculates one or more formulas by changing the same variable in each formula. Place additional formulas in the top row of the data table, to the right of the first formula, and include these formulas (and the cells beneath them) when you specify the data table range in step 3. The following illustration shows an additional formula (in cell C7) that multiplies the monthly payment by 12 to find the yearly payment.



Solving a Problem by Changing Two Variables

If you have a problem that involves changing values for two variables in one formula, use /Data Table 2. For example, you might want to find the range of monthly loan payments given a range of loan amounts and a range of interest rates. In this case, you have input values for two variables: loan amount and interest rate.

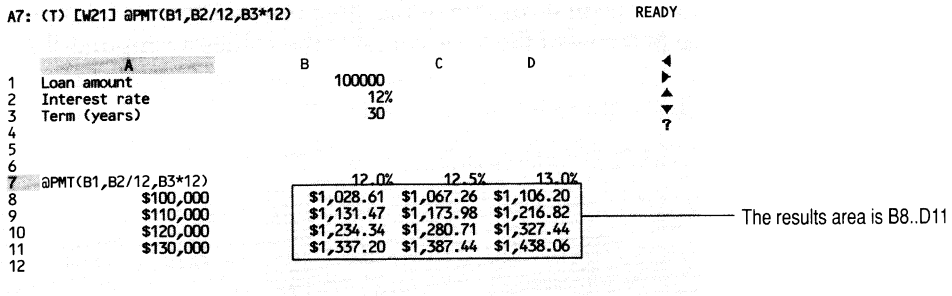
The two sets of input values define the length and width of a data table 2, as shown in the following illustration. The first column of the table contains values for input cell 1 (loan amounts). The first row of the table contains the values for input cell 2 (interest rates). The upper left corner of the data table contains the formula to calculate. /Data Table 2 finds values for one formula only.



To Use /Data Table 2

1. Enter a list of input values for input cell 1 in a single column, leaving the top cell blank.
2. Enter a list of input values for input cell 2 in the row above the input cell 1 values, starting in the column to the right.
3. Enter the formula to calculate in the cell at the upper left corner of the data table. You may want to use /Range Format Text to format the formula cell to display the formula in the data table.
4. Select /Data Table 2.
5. Specify the data table range (the range that contains the input values, the formula, and the results area).
6. Specify input cell 1.
7. Specify input cell 2.

In the example, 1-2-3 substitutes the input values in A8..A11 for B1 and the input values in B7..D7 for B2. It places the results of the calculations in each cell at the intersections of the input cell values. 1-2-3 pairs each input value in the top row of the data table range with each input value in the left column of the data table range and calculates the formula using each pair of values. For example, in the following illustration, 1-2-3 enters the result of @PMT for each loan amount and interest rate in B8..D11.



The first result, in cell B8, used $100,000 for the loan amount and 12% for the interest rate. The next result, in cell C8, used $100,000 for the loan amount and 12.5% for the interest rate.

Chapter 9
Analyzing Data

This chapter describes the 1-2-3 Release 2.3 data analysis features. The chapter includes the following sections:

What Is Data Analysis?

Data analysis involves collecting, organizing, and interpreting numeric data. A 1-2-3 worksheet not only helps you track day-to-day activities, but also helps you analyze the data of your business over the course of time. 1-2-3 offers several features that simplify data analysis:

- Statistical @functions and database statistical @functions determine the relationships among sets of data.
- Financial @functions analyze investments.
- Frequency distribution tables consolidate data.
- Regression analysis helps predict trends and future performance.
- Data matrices help find relationships between sets of numbers.

Data analysis describes, interprets, and summarizes information, giving you a basis for planning and decision making.

Using Statistical @Functions

The 1-2-3 **statistical @functions** calculate and organize data to make interpretation easier. The statistical @functions are

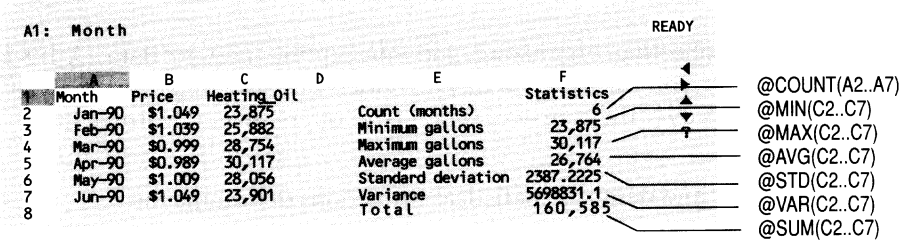
- @AVG — Finds the average value of a range.
- @COUNT — Counts all cells in a range except blank cells. (A **blank cell** is a cell that does not contain an entry or a label prefix.)

- @MAX — Finds the highest value in a range.
- @MIN — Finds the lowest value in a range.
- @SUM — Totals values in a range.
- @STD — Finds the standard deviation of a range.
- @VAR — Finds the variance of a range.

Each of these @functions takes one or more **range arguments** (a range argument is the address or name of the cells or range that contains the data to analyze). The arguments can also be a list of numbers; for example, @SUM(1,2,3,4) returns 10. For more information about using @functions, see the *@Functions and Macros Guide*.

Using statistical @functions

The worksheet in the following illustration uses statistical @functions to calculate the statistics of an oil company. The three columns, Month, Price, and Heating _Oil, provide the raw numbers; the statistical @functions work with these numbers to provide information you can use to make future business decisions. The range that contains the number of gallons of heating oil sold (C2..C7) is the argument for each statistical @function except @COUNT.



Counting values in a range

To find how many cells in a range contain entries, use @COUNT. For example, in the illustration, @COUNT(A2..A7) in cell F2 displays the total number of nonblank cells in the range A2..A7. @COUNT counts any cell that contains data or a label prefix, so a count may include cells that appear empty (for example, a cell that contains only a label prefix).

Finding extremes

To find the highest value in a range, use @MAX; to find the lowest, use @MIN. For example, in the illustration, @MAX(C2..C7) in cell F4 displays the highest number of gallons sold in the range C2..C7. @MIN(C2..C7) in cell F3 displays the lowest number of gallons sold in the range C2..C7.

Finding averages

To calculate the average, or mean, of all entries in a range, use @AVG. For example, in the illustration, @AVG(C2..C7) in cell F5 displays the average number of gallons sold.

Measuring variation

To determine how values in a range deviate, or vary, from the mean, use @STD and @VAR. @STD measures **standard deviation**, or the degree to which individual values in a sample vary from the mean (average) of all values in the sample. The lower the standard deviation, the less variation there is from the mean. @STD measures the population standard deviation. The standard deviation is the square root of the variance (@VAR).

@VAR measures **variance**, or the degree to which each value in a sample varies from the mean of all the values in the sample. @VAR measures the population variance. For example, in the illustration on page 104, @STD(C2..C7) in cell F6 calculates the standard deviation of the values in the range C2..C7. @VAR(C2..C7) in cell F7 calculates the variance of the range C2..C7.

Totaling values in a range

To find the total of values in a range, use @SUM. For example, in the illustration, @SUM(C2..C7) in cell F8 displays the total of values in the range C2..C7, or the total number of gallons sold.

Using Database Statistical @Functions

The database statistical @functions calculate results for a set of values organized as a database: The values must be listed in columns, and each column must be headed by a label (field name). The data in the columns should be related; for example, if you have names of sales people in column B, put sales figures for each person next to the name in column C.

The database statistical @functions work the same way the statistical @functions work, if you tell 1-2-3 to use all values in the columns for its calculations. With the database statistical @functions, however, you can select certain data, based on **criteria** you specify. Criteria use field names and logical formulas to describe which values to select from the range. For example, the criterion ="SMITH" under LAST_NAME tells 1-2-3 to look for SMITH in the LAST_NAME field and use the matching value for the calculation. For more information about criteria, see Chapter 15, beginning on page 177.

The database statistical @functions include

- @DAVG — Finds the average of a set of values that meet your criteria.
- @DCOUNT — Counts a set of values that meet your criteria.
- @DMAX — Finds the largest of a set of values that meet your criteria.
- @DMIN — Finds the smallest of a set of values that meet your criteria.
- @DSTD — Finds the standard deviation of a set of values that meet your criteria.
- @DSUM — Finds the total of a set of values that meet your criteria.
- @DVAR — Finds the variance of a set of values that meet your criteria.

These database statistical @functions require three arguments to define the data to analyze:

@DFUNCTION (input,field,criteria)

where *@DFUNCTION* is the name of the database statistical @function.

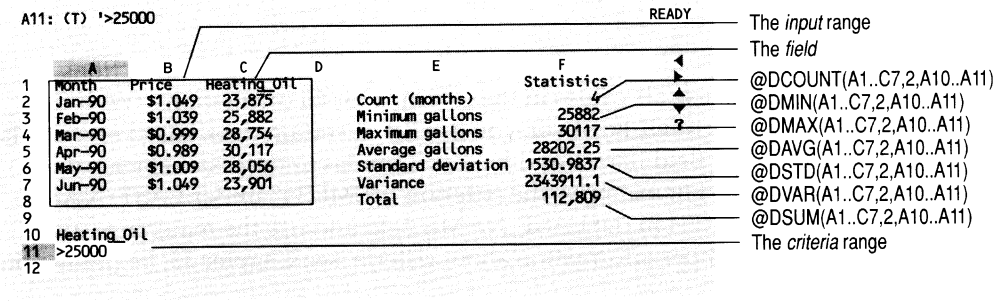
input is the address or name of a range that contains a database. *input* includes the labels, or field names, that describe the data.

field is the column, or field, in the database to analyze. *field* is an offset number that indicates the field's position in *input* or the address of a cell that contains the offset number. A **field** is a column of related data in a database, including the field name. Offset numbers begin with 0, so if *field* is a value greater than the number of columns in the database minus 1, the @function returns ERR.

criteria is a range that specifies selection requirements. A criteria range occupies cells in at least two rows. The first row contains some or all of the field names in the *input* range. The second row (and any subsequent rows) contains criteria that determine what records 1-2-3 selects. Enter criteria directly below the field name of the field to which they apply. *criteria* can be a range address or the name of a range.

The following illustration contains each of the database statistical @functions, using the following values for the arguments:

input = A1..C7
field = 2
criteria = A10..A11



The database statistical @functions find data that matches the criteria you set up and perform the calculations on the matching data, all in one step. To see which rows from the *input* range the @functions selected, use /Data Query Find with the same *criteria* and *input* ranges. For more information about the Data Query commands, see Chapter 15, beginning on page 177.

Performing Financial Analysis

To expand your business, you may need financial help such as a bank loan, or you may want to consider various investment opportunities or calculate a new venture's rate of return. The 1-2-3 financial @functions analyze possible financial investments and help you determine the financial strengths and weaknesses of your business.

The financial @functions this section discusses are

- @IRR — Calculates the internal rate of return expected from cash flows generated by an investment.
- @PMT — Calculates the monthly payments necessary to amortize a loan.
- @PV — Calculates the present value of an investment, given a series of equal payments.
- @NPV — Calculates the net present value of a series of future cash flow values.

In addition, 1-2-3 provides @functions that calculate depreciation (@DDB, @SLN, @SYD), future value and payment periods (@FV and @TERM), and single-sum compounding (@CTERM and @RATE). These financial @functions are described fully in the *@Functions and Macros Guide*.

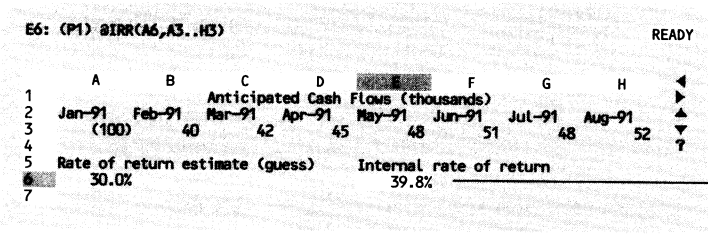
Calculating the Return on an Investment

To start a new business venture or expand an existing business, you need capital, either from a bank or from other investors. One of the financial @functions, @IRR, determines the potential rate of return you could supply to an investor. @IRR requires a specific investment amount, estimates of cash flows for the period, and your initial guess at a reasonable rate of return. The format of @IRR is as follows:

@IRR(*guess,range*)

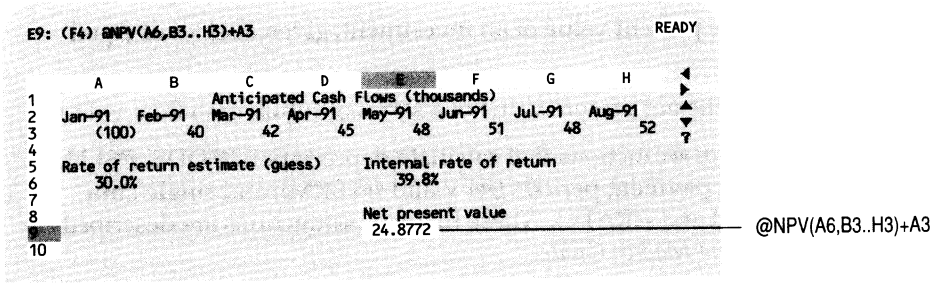
where *guess* is your best guess at the rate of return, and *range* is the range of cash flows. The first value in *range* is the initial investment, represented as a negative value.

The following illustration shows the rate of return for a business, given a monthly series of projected cash flows following an initial outside investment of $100,000, using a guess value of 30% for the return.



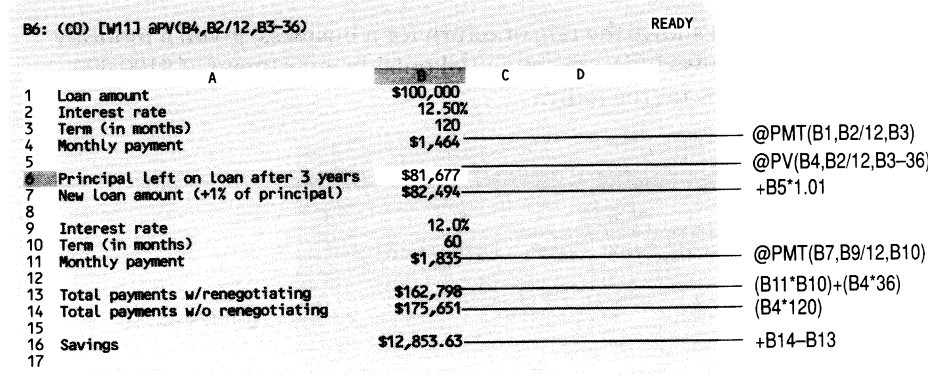
@IRR returns a value of 39.8% in this scenario. If @IRR returns a rate that is less than 0 or greater than 1, then you must try another guess value. If @IRR cannot find an answer based on your guess, it returns ERR.

To determine the guess value, find the net present value (@NPV) of the cash flows, given your guess value. If @NPV returns a negative value based on your guess and the values in *range*, the guess is too high. If @NPV returns a positive value, the guess is too low. If @NPV returns zero, the guess is accurate. For example, the following illustration shows @NPV using the guess value of 30% and the range of cash flows in B3..H3. The interest does not affect the initial cash investment (outflow) in cell A3, so you must add the initial investment to the result of the @NPV. The resulting value, 24.8772, means the guess is too low.



Comparing Financial Options

The @function @PMT(*principal, interest, term*) calculates the payments on loans or annuity investments. (An annuity is an investment in which a series of equal payments are made.) @PV calculates the present value of investments. Using these two @functions, you can examine financial alternatives, such as renegotiating an existing loan. For example, suppose you borrow $100,000 for 10 years at a rate of 12.5%. After 3 years, the bank offers to renegotiate the remainder of the loan over 5 years at a rate of 12%, but wants to add 1% to the principal. The following illustration shows the existing loan payments, using @PMT, and examines the bank's offer, using @PV.



You realize a cost savings of $12,853 by renegotiating the loan.

Creating a Frequency Distribution Table

A frequency distribution table consolidates data into a range of numeric intervals to show how frequently the range contains similar values. For example, for a list of customers and their ages, a frequency distribution table might contain the following intervals:

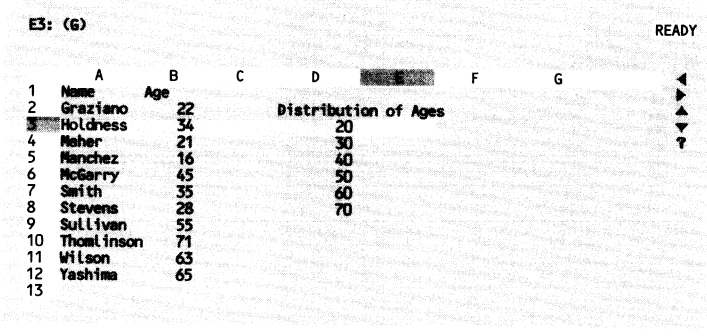
0 - 20
21 - 30
31 - 40
41 - 50
51 - 60

To determine how many customers are in each age group, use /Data Distribution, which calculates the frequency distribution of the values in a range. A frequency distribution counts how many of the values in a range (the **values range**) fall within specified numeric intervals (the **bin range**). The data in the values range need not be in any specific order.

To use /Data Distribution, you must first set up the intervals for the frequency distribution table in the bin range. Each **bin** represents the upper limit of an interval. For example, the interval or bin value 20 for a frequency distribution table based on the list above represents customers 20 years old or younger; 30 represents customers from 21 to 30 years old, and so on. The bin values must be in ascending order.

The column to the right of the bin range should be blank. When you select /Data Distribution, 1-2-3 calculates the frequencies and enters them in this column. The frequencies tell you how many values are equal to or less than the bin value to the left. 1-2-3 also counts any values that are greater than the greatest bin value and displays that number in the cell just below and to the right of the greatest bin value.

The illustration below lists customers by age. The illustration on page 110 shows the results of using /Data Distribution to create a frequency distribution table that shows the number of customers in each age group in 10-year intervals, from 20-year-olds to 70-year-olds.



To Create a Frequency Distribution Table

1. Enter the values to analyze in a range.

   1-2-3 ignores blank cells and cells that contain labels. Cells that contain ERR count at the bottom of the distribution range and cells that contain NA count at the top. If you include labels, blank cells, or formulas that result in ERR or NA in the bin range, you may get unexpected results.

2. Enter the bin intervals in a single column.

   To create a bin range, find two blank adjacent columns. In the first column, enter the intervals you want 1-2-3 to use to distribute the data. You will specify this first column as the bin range. 1-2-3 will use the blank adjacent column to the right to enter the frequency distribution when you select /Data Distribution. To create a bin range with equal intervals, use /Data Fill. You can use any values (including formulas) in the bin range, providing each value within the range is unique, and providing the values are in ascending order, with the smallest value at the top.

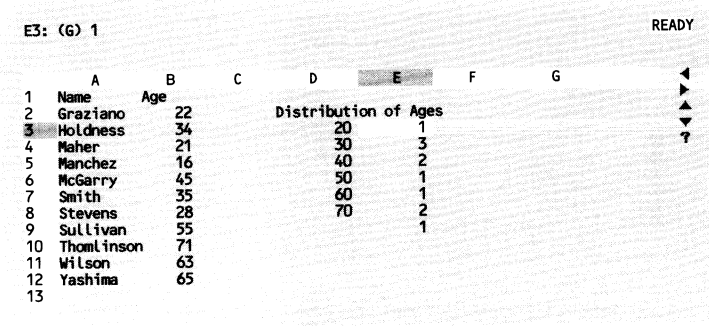
3. Select /Data Distribution.

4. Specify the values range.

5. Specify the bin range.

1-2-3 enters the frequency values in the column to the right of the bin range. If there are no values for a bin, 1-2-3 enters 0 next to the bin. The last frequency value in the column appears in the row below the last row of the bin range. The numbers in the column to the right of the bin range represent how many values in the values range are less than or equal to the adjacent value in the bin range, but greater than the preceding value. The last number in that column is the number of values in the values range that are greater than the last value in the bin range.

1-2-3 does not recalculate the frequency distribution table if values in the values range change. To recalculate the frequency distribution table, use /Data Distribution again.



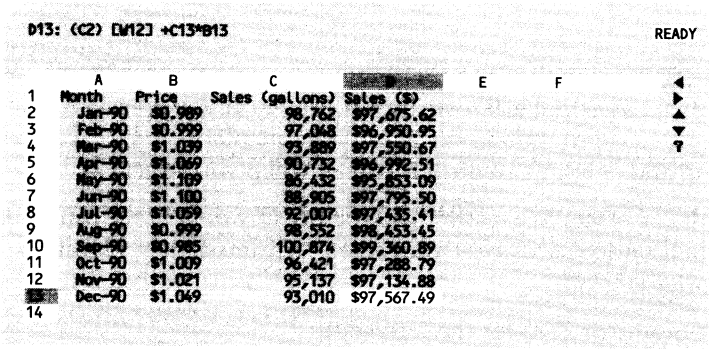
Predicting Trends with Regression Analysis

The accuracy and success of financial decisions often depend on the statistical relationships you create and use on your business data. Regression analysis helps you test the relationships you create and make forecasts for future development and growth.

Use /Data Regression to perform **linear regression analysis**, which finds the straight-line relationship between one or more independent variables and a single dependent variable. **Independent variables** are the values needed to determine a prediction. You can specify up to 16 columns of independent variables. The **dependent variable** is the variable for which you have current information, but which you want to predict in the future.

Linear regression analysis is suitable only when you believe that changes in one set of variables directly cause changes in another variable. It indicates the statistical association between independent and dependent variables and can help you estimate financial data, such as profits or costs, or the results of changes you are planning. In the example used in this section, linear regression analysis could help predict how cutting the price of heating oil will affect sales.

/Data Regression requires three ranges: the **X range** (which contains up to 16 columns of independent variables), the **Y range** (or dependent variable), and the **output range** (which contains the results of the analysis). For example, to predict sales based on the price per gallon of oil, the price of oil per month is the independent variable (X range) and the range of sales for each month is the dependent variable (Y range), as shown in the following illustration.



/Data Regression analyzes the two sets of data (in the X range and Y range) to determine if there is a statistically significant relationship between them, and displays the results in the output range. The output range must be blank.

You can also use /Data Regression when you have several sets of values and you want to see how and whether one set is dependent on the others. /Data Regression is also useful to determine the slope and the y-axis intercept of the best-fitting line for a set of data points.

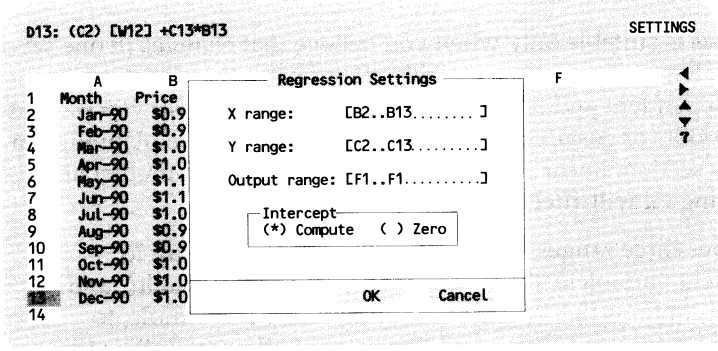
To Find the Association Between Variables

1. Enter the X range values (the values for the independent variable(s)) and the Y range values (the values for the dependent variable) in ranges. Choose a blank location for the output range.

   The X range and Y range must have the same number of rows. They cannot contain labels, blank cells, or formulas.

2. Select /Data Regression.

   The Regression Settings dialog box appears. Press **F2 (EDIT)** *or* click the dialog box to activate it. You can also use the commands to specify the X range, Y range, and Output range.



3. Specify the X range.
4. Specify the Y range.
5. Specify the output range.

   Use the address of the first cell in the range, a range name, or a range address. The results will occupy an area that is 9 rows by 4 columns. If you specify an entire range and it is too small to contain the regression calculations, 1-2-3 cannot perform the regression and displays an error message when you select Go.

   CAUTION The results of /Data Regression will replace any data in the range. If you make a mistake and undo is on, press **ALT-F4 (UNDO)** immediately to restore the worksheet to its original state.

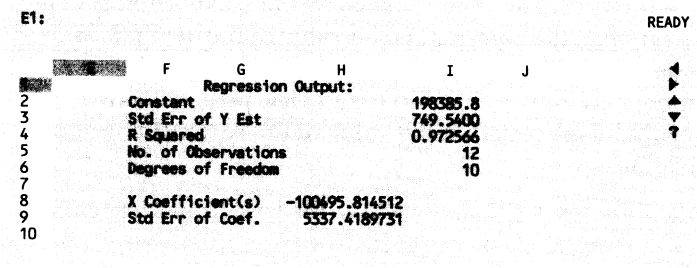
6. (Optional) Select Compute or Zero for the Intercept.

   The **intercept** is the point at which the y-axis is crossed by the predicted line.

Compute	Calculates the y-axis intercept automatically (calculates the value of the dependent variable when the independent variable is zero).
Zero	Uses zero as the y-axis intercept (uses zero for the dependent variable value when the independent variable is zero). Do not select Zero unless your data is such that when all the independent variables equal zero the dependent variable must equal zero.

7. Select OK if you are using the dialog box.
8. Select Go.

The following illustration shows the regression analysis results for the heating oil sale example in the illustration on page 111. Column H, which contains two results, is 16 characters wide to allow 1-2-3 to display the complete values.



1-2-3 analyzes the relationship between the dependent variable and the independent variable(s) and enters the following information in the output range:

Item	Description
Constant	The y-axis intercept.
Degrees of Freedom	The number of observations minus the number of independent variables minus 1. If you use a zero intercept, degrees of freedom equals the number of observations minus the number of independent variables.
No. of Observations	The number of rows of data in the X and Y ranges.
R Squared	The reliability of the regression (a value from 0 to 1, inclusive). **NOTE** If 1-2-3 displays a value less than zero, you specified a zero intercept when it was not appropriate to do so. Use /Data Regression Intercept Compute and then /Data Regression Go to recalculate the regression and adjust the R^2 value accordingly.
Std Err of Coef.	The standard error of each of the x coefficients.
Std Err of Y Est	The standard error of the estimated y values.
X Coefficient(s)	The slope for each independent variable.

These results tell you about the association of the data you used. When you examine the results, one of the first values to look at is R Squared (R^2). R^2 tells you how closely associated the independent and dependent variables are, or how much variation in the dependent variable can be explained by the combination of the independent variables. The R^2 value is usually a value between 0 and 1. If R^2 is close to 1, a high degree of association exists between the variables. (R^2 is less than zero only if you specify zero as the y-axis intercept and the independent variable values are nearly random.)

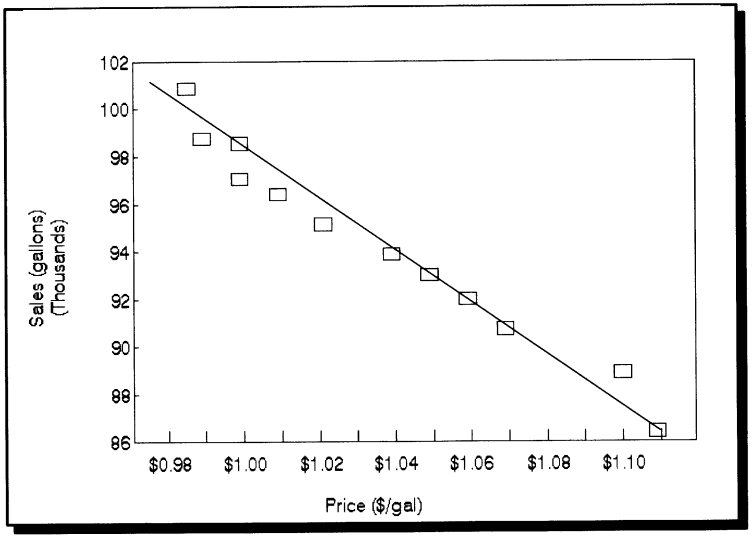
The Degrees of Freedom value is based on the No. of Observations or the number of values (rows) in the X range. 1-2-3 calculates Degrees of Freedom as

(No. of Observations – number of independent variables) – 1

Use the Degrees of Freedom to verify that 1-2-3 used all the independent variables in the regression.

The next value to consider is the Constant. The Constant is the y-axis intercept. If you have one independent variable, the Constant is the value of the dependent variable when the independent variable is zero. For example, if you used temperature as the single independent variable and barometric pressure as the dependent variable, you would be interested in the value of the barometric pressure when the temperature is 0 degrees.

In the following graph of the data, the Constant is where the best-fitting line crosses the y-axis.



You also use the Constant, along with the Standard Error of the Y Estimate and the X Coefficient(s), to estimate values of the dependent variable, given values of the independent variable. For example, to estimate the sale of gallons of oil (dependent variable) for a particular price per gallon, create a formula using the syntax

+*constant*+(x*coeff* *X)

where *constant* is the value of the Constant, *xcoeff* is the value of the X Coefficient, and X is the price per gallon. After you find an estimate using this formula, use the Standard Error of the Y Estimate to find the minimum and maximum values for the estimate. For example, if the formula yields sales of 5,000 gallons of oil and the Standard Error of the Y Estimate is 100, the sales figure is actually 5,000 plus or minus 100, or between 4,900 and 5,100 gallons.

The X Coefficient is the slope of the regression line, or the amount the dependent variable changes for every change in the independent variable. For example, if the price of oil rises by 1 penny per gallon, the X Coefficient tells you how much sales will change. Since raising the price causes sales to decrease, the X Coefficient is negative (less than 0).

If you perform regression analysis with more than one independent variable, you add one term to the formula for each independent variable. For example, if there are two independent variables, the formula is

+*constant*+(x*coeff1**X1)+(x*coeff2**X2)

Before using the formula with real values, check one more output result: the Standard Error of the Coefficient. This value tells you how well the formula describes the association between the independent and dependent variables. In general, if the Standard Error of Coefficient is less than half the value of the X Coefficient, estimates made from the formula tend to be accurate.

Making Predictions Based on Regression Results

Using the formula shown in the previous section and the /Data Regression results for the heating oil example in the illustration on page 113, you can estimate oil sales based on the price per gallon of heating oil. The equation for this example is

Sales = +I2+(H8*Price)

where I2 is the address of the constant, H8 is the address of the X Coefficient, and Price is the price per gallon.

To make a prediction based on this equation, substitute a price in the equation and solve for Sales. For example, to find out total sales when the price per gallon is $1.00, calculate

Sales = +198,385.87+(-100,496*1.00)

Sales = $97,890.05

You then use the Standard Error of the Y Estimate to calculate the range of values for this estimate. Since the Standard Error of the Y Estimate is 749.54, the range of values for estimated sales is $97,890.05 plus or minus $749.54, or between $97,140.51 and $98,639.59.

Predictions made with this equation are valid only for values of the independent variable within the range of the data. For example, if the lowest price in the data sample is $0.985 per gallon and the highest price is $1.109 per gallon, you can make valid predictions for prices from $0.985 to $1.109 only.

Analyzing Data with Matrices

Finding solutions to problems with many variables requires matrix analysis. A 1-2-3 **matrix** is a range that contains a number in each cell. Each number represents a constant in a formula or the coefficient for a variable in a formula.

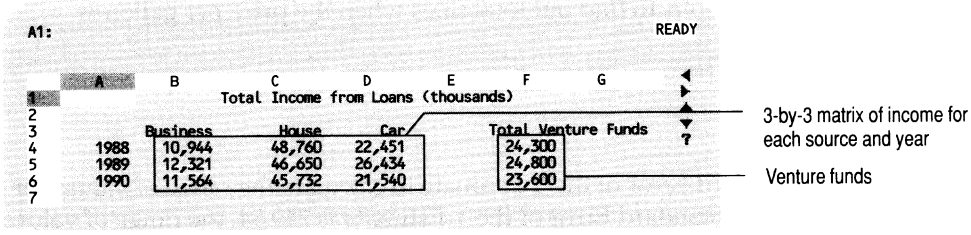
A matrix is defined by its dimensions, or the number of rows and columns it has. Always define a matrix by the number of rows first, then the number of columns. For example, a 3-by-4 matrix contains three rows and four columns of numbers.

The values in a matrix can be formula results and/or numbers.

Matrix analysis finds the relationship between two or more sets of variables in one or more formulas. You use the relationships to determine which combination of values will produce the desired result for the formula(s). For example, suppose a bank has three main sources for its loans: business accounts, car loans, and house loans. The bank also has a venture capital branch that takes money from the bank's total income to provide loans to starting businesses. Matrix analysis determines the percentage contribution each income source makes to total venture funds. The following formula represents this relationship:

x%*(Business) + y%*(House) + z%*(Car) = Total venture funds

where x%, y%, and z% are the percentage contributions each of the income sources (Business, House, and Car loans) makes to the total venture funds. The x, y, and z percentages are what you want 1-2-3 to find. To do this, first set up a matrix of values for total income received from each of the three sources, and a corresponding column for the total venture funds received, as shown in the following illustration.



To find the percentages, you use /Data Matrix Invert to invert the matrix of income values in the range B4..D6. Then you use /Data Matrix Multiply to multiply the inverted matrix by the total venture funds to find the percentage contributions. Any matrix to invert must be square (that is, it must have the same number of rows as columns). Thus, the matrix contains data for three years.

Some, but not all, square matrices have inverses. If you attempt to use /Data Matrix Invert with a matrix that has no inverse, 1-2-3 displays an error message.

/Data Matrix Multiply lets you multiply the columns of one matrix with the rows of a second matrix and create a third matrix that contains the results of the multiplication. When you multiply matrices, there must be the same number of columns in the first matrix as there are rows in the second matrix.

CAUTION /Data Matrix Invert will create an output range that is the same size as the matrix you are inverting, and /Data Matrix Multiply will create an output range that contains the number of rows in the first matrix and the number of columns in the second. To avoid possible data loss from writing over existing data, save the worksheet before using /Data Matrix. If you make a mistake and undo is on, press ALT-F4 (UNDO) immediately to restore the worksheet to its original state.

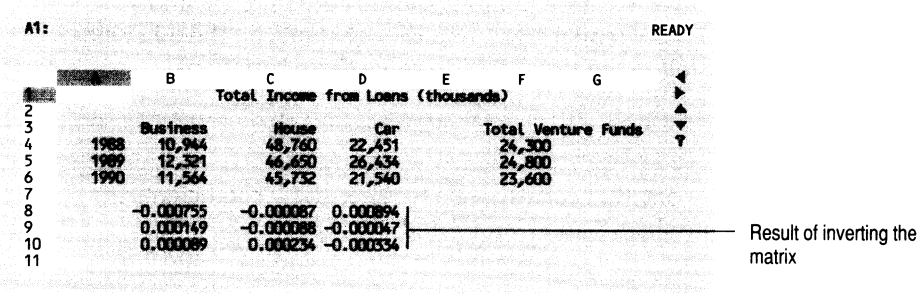
To Invert a Matrix

1. Select /Data Matrix Invert.
2. Specify the matrix range you want to invert.

   The matrix range must have the same number of columns and rows, and can contain up to 80 columns and 80 rows.
3. Specify the output range (the range in which you want 1-2-3 to enter the results of the inversion).

   You can specify either the entire range or only the upper left cell of the range.

The inverted matrix is the same size as the original matrix, as shown in the following illustration.



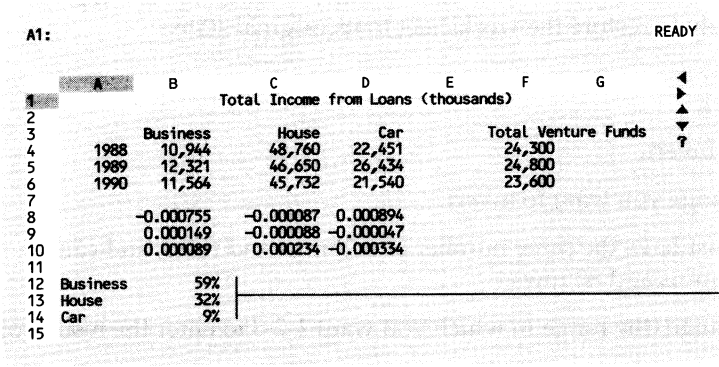
To Multiply Matrices

1. Select /Data Matrix Multiply.
2. Specify the first range you want to multiply.

   1-2-3 can multiply any matrix of values up to a maximum of 80 rows by 80 columns.
3. Specify the second range you want to multiply.
4. Specify the output range (the range in which you want 1-2-3 to enter the results of the multiplication).

   You can specify either the entire range or only the upper left cell of the range.

The result of the matrix multiplication is a matrix that contains the solutions for each variable, as shown in the illustration below. The worksheet uses the bank income example, and shows the results of using /Data Matrix Multiply to multiply the inverted matrix of income sources by the total venture funds.



Solving Simultaneous Equations with /Data Matrix: An Example

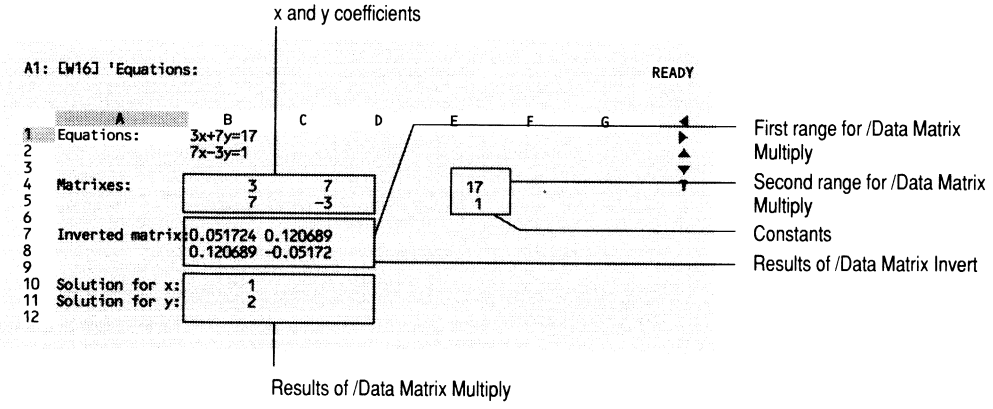
You can use both /Data Matrix Invert and /Data Matrix Multiply to solve simultaneous equations in 1-2-3. The equations should contain the x and y coefficients on one side of the = (equal sign), and the constants on the other side. For example, you use the following procedure to solve these equations:

$3x + 7y = 17$
$7x - 3y = 1$

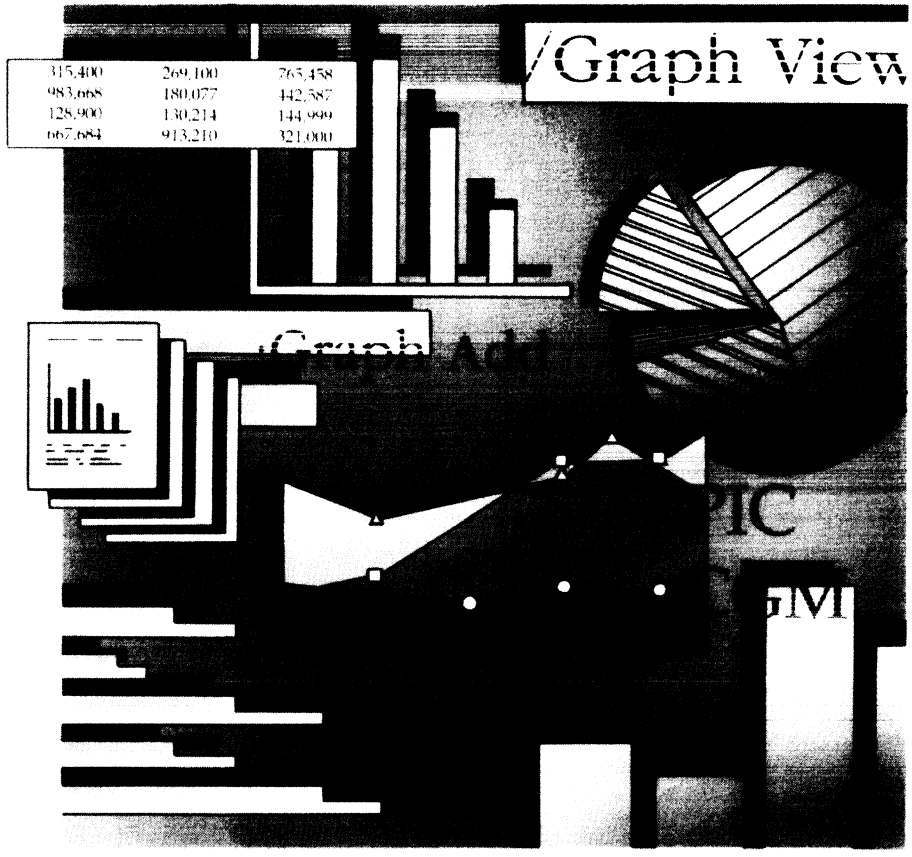
1. Create two matrices — one that corresponds to the x and y coefficients in your equations (the numbers 3 and 7 and 7 and -3, respectively, in the equations above), and one that corresponds to the constants (17 and 1 in the equations above).
2. Select /Data Matrix Invert.
3. Specify the matrix that corresponds to the x and y coefficients as the range you want to invert.
4. Specify an output range.

   1-2-3 performs a matrix inversion.
5. Select /Data Matrix Multiply.
6. Specify the inverted matrix as the first range to multiply.
7. Specify the range that contains the constants as the second range to multiply.
8. Specify an output range.

The result of the matrix multiplication is the solution to the equations. The following illustration uses the values in the example above to determine that x=1 and y=2.



Part III
Working with Graphs



Chapter 10
Creating a Graph

This chapter explains how to create graphs. The chapter includes the following sections:

What Is a Graph?

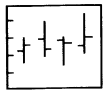
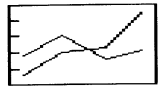
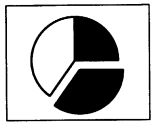
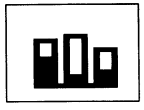
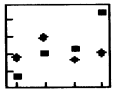
A graph illustrates the relationships among numbers. Because of their visual nature, graphs often convey messages about numbers more quickly and dramatically than the numbers themselves. The 1-2-3 Graph commands translate the numeric data in the worksheet into a visual image.

In 1-2-3, each group of worksheet values to be graphed is called a **data range**. Data ranges are columns or rows of numbers in the worksheet that you want to view for comparison or presentation. When you create a graph, you create a link between the worksheet data and the graph. This link is dynamic: If you change the worksheet data, 1-2-3 changes the graph automatically to reflect the changes to the data.

W Once you create a graph with 1-2-3, you can use Wysiwyg to add the graph to the worksheet, to edit and enhance the graph, and to turn off automatic updating and update the graph manually. For more information about including a graph in a worksheet and enhancing a graph, see Chapter 11, beginning on page 133, and Chapter 12, beginning on page 139.

1-2-3 Graph Types

1-2-3 offers seven graph types. The type of graph you use depends on the data you are graphing and how you want to present that data. The following table describes each graph type.

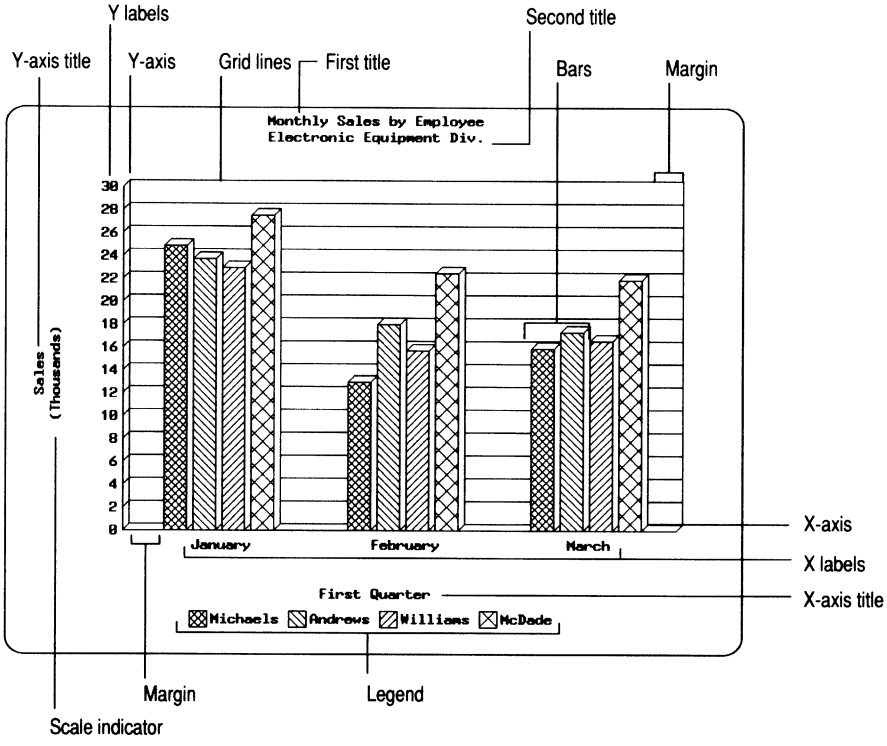
Graph	Description
	Bar graphs compare individual values or sets of values to one another. Each bar represents a single value. For a single-range bar graph, use the A data range; each bar represents a value in the range. For a multiple- range bar graph, use the A–F data ranges to indicate the ranges of values you want to represent simultaneously. Use the X data range for x-axis labels.
	HLCO graphs track fluctuations in data during a specific period of time, such as the high, low, closing, and opening of stock prices. Use the X data range for the x-axis labels, and the A, B, C, and D data ranges to represent high, low, closing, and opening values, respectively.
	Line graphs plot changes in data over time. Each line represents a data range; each point on the line represents a value in the data range. You can select up to six different sets of data to graph as lines (the A–F data ranges). You can use the X data range to indicate labels on the x-axis.
	Mixed graphs combine lines and bars in the same graph. Use the A–C data ranges to indicate the ranges of values you want to represent as bars. Use the D–F data ranges to represent the ranges of values you want to represent as lines. Use the X data range to indicate x-axis labels.
	Pie charts identify the relationship of each value in a data range to the entire data range. Use the A data range to indicate the values you want to represent as pie slices. Use the B data range to indicate the values for controlling hatch patterns or colors for slices of pie, or for exploding (separating slightly from the pie) slices of pie. Use the X data range for the labels for individual slices.
	Stacked bars graphs compare individual and total values by stacking distinct bars on top of each other in a single bar. Each color or hatch pattern represents a value. Use the A–F data ranges to indicate each set of values; one value from each range becomes a section of a bar. Use the X data range for x-axis labels.
	XY graphs show correlations between two types of numeric data The x-axis and the y-axis are numeric scales. Use the X data range for x-axis values and the the A–F data ranges for the sets of values to plot.

In addition to the graphs listed above, you can create an area graph using /Graph Options Format [Graph, A–F] Area with a line graph. For more information about area graphs, see "Customizing a Line, XY, or Mixed Graph" on page 144.

Parts of a Graph

A new 1-2-3 graph automatically displays an x-axis and a y-axis, a y-axis scale, and x-axis labels (if you specified the range for x-axis labels). You can customize your graph by adding enhancements, such as legends, titles, graph grid lines, and color. Which enhancements are available depends on the type of graph you have created.

The following illustration shows the parts of a graph and several enhancements. For more information about enhancing a graph, see Chapter 12, beginning on page 139.



- **Y-axis title** is text that describes the y-axis.
- **X-axis title** is text that describes the x-axis.
- First title and second title identify the graph. 1-2-3 places the titles at the top of the graph.
- **Legend** is a caption that identifies each data range in a graph.
- **X-axis** is a horizontal line at the bottom of a graph. (In a horizontal bar graph, the x-axis is a vertical line.) The x-axis can have X labels or a numeric scale.
- **X labels** appear below the x-axis and describe the data points directly above them. For XY graphs, the X labels describe a numeric scale.
- **Y-axis** is a vertical line along the left side of a graph. (In a horizontal bar graph, the y-axis is a horizontal line.) The y-axis includes a numeric scale.
- **Y labels** are labels that describe the data points on a y-axis.
- **Scale indicator** specifies the units, such as thousands or millions, of the y-axis.
- **Margins** are blank spaces on the left and right side of the graph.

- **Grid lines** are horizontal (or vertical) lines that cross the graph. The number of grid lines depends on the y-axis scale (or the x-axis scale for vertical grid lines).
- Bars represent the graphed data. 1-2-3 can draw the bars to look three dimensional, as in the illustration, using /Graph Type Features 3D-Effect.

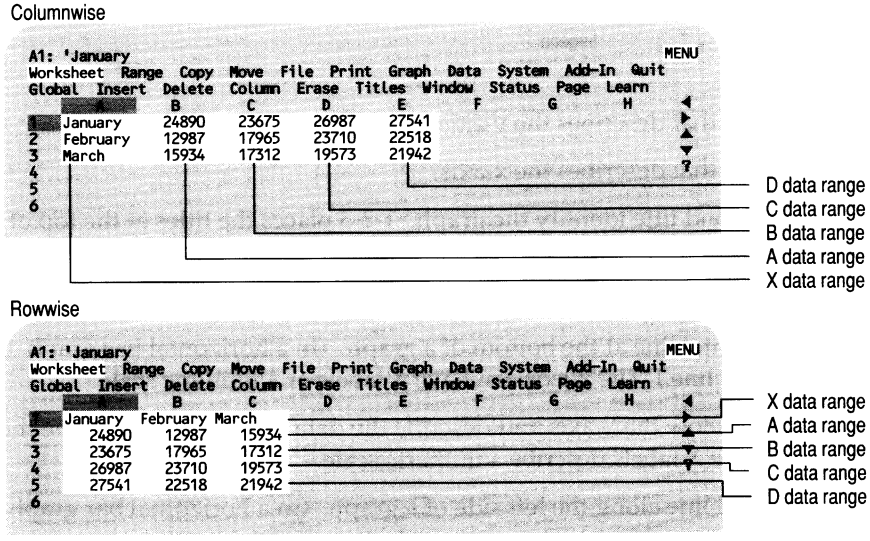
Creating a Quick Graph

If the data that you want to graph is located in consecutive columns or rows of a range that also contains x-axis labels, you can use /Graph Group to create a graph quickly. 1-2-3 uses the data in the first column or row as x-axis labels, and the data in the subsequent columns or rows as the A–F data ranges.

To Create a Quick Graph

1. Specify the range that contains the data to graph, including the x-axis labels.
2. Select /Graph Group.
3. Select Columnwise or Rowwise, depending on how the data is set up.

   The following illustration shows two data ranges: one in which the data is organized by row and one in which the data is organized by column.



   1-2-3 enters the graph settings for the data you selected in the worksheet. The graph type depends on the current Type setting (the default is line).

   NOTE If the range you specified contains more than seven columns or rows, 1-2-3 stops assigning data ranges after the seventh column or row.

4. Select Quit to return 1-2-3 to READY mode.

Creating a Basic Graph

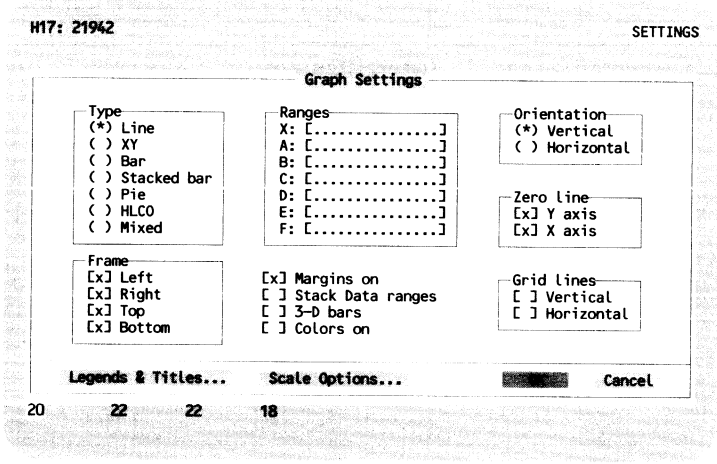
When you select /Graph, 1-2-3 displays the Graph Settings dialog box. This dialog box lets you see the basic settings for the current graph at a glance. The **current graph** is based on whatever graph settings are currently specified. You can change any of the settings directly in the Graph Settings dialog box, or select commands from the menu above the dialog box. For example, you can alter the graph type, change the alignment of data labels, and specify new x-axis and y-axis scales. As you select commands from the menu to change settings, the values in the Graph Settings dialog box change to reflect your choices. 1-2-3 uses the settings in the Graph Settings dialog box each time you display a graph with /Graph View or **F10 (GRAPH)**.

You can also display the current graph in the worksheet with Wysiwyg.

To Create a Graph

1. Select /Graph.

   The Graph Settings dialog box appears. Press **F2 (EDIT)** *or* click the dialog box to activate it. Click an option to activate the dialog box and select the option.



2. Select a type.
3. Specify the data ranges to graph.

X	The data range that contains x-axis labels, pie slice labels, x-axis data for XY graphs, or bars for a mixed graph
A	For most graphs, the first data range to graph (for a pie chart, the data range to graph; for an HLCO graph, the high values; for a mixed graph, bars)
B	For most graphs, the second data range to graph (for a pie chart, the color or hatch pattern and explosion values; for an HLCO graph, the low values; for a mixed graph, bars)

(continued)

C	For most graphs, the third data range to graph (for an HLCO graph, the closing values; for a mixed graph, bars)
D	For most graphs, the fourth data range to graph (for an HLCO graph, the opening values; for a mixed graph, lines)
E	For most graphs, the fifth data range to graph (for a mixed graph, lines)
F	For most graphs, the sixth data range to graph (for a mixed graph, lines)

4. Select OK.

   1-2-3 returns to the Graph menu. You can now view the graph.

5. Select Quit to return 1-2-3 to READY mode.

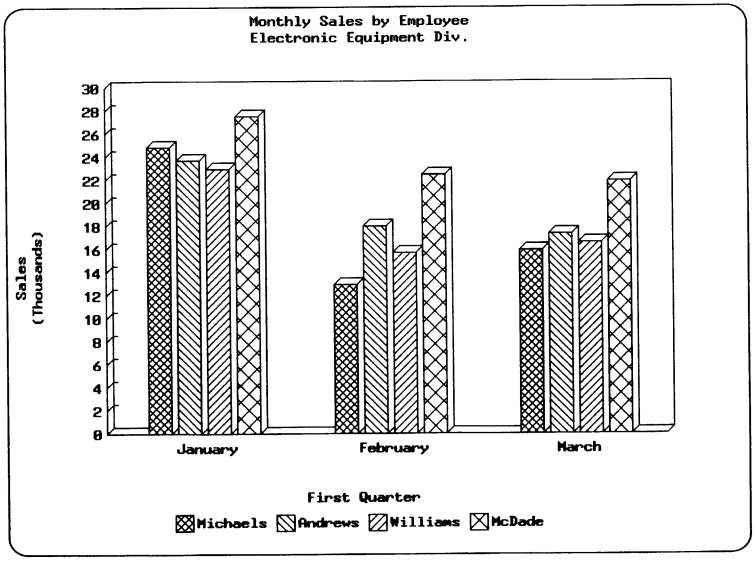
To represent the same data differently after you create the graph, change the type of graph in the Graph Settings dialog box or with /Graph Type.

Viewing a Graph

The settings you specify in the Graph Settings dialog box remain for the current session unless you change them. This lets you view a graph you created (the current graph) at any time. W You can use Wysiwyg Graph commands to view a graph stored in a graph file (.PIC) or metafile (.CGM). (**Metafiles** store graphics created with programs such as Lotus 1-2-3 Release 3.1 or Freelance® and saved with the file extension .CGM.)

To View the Current Graph

1. Select /Graph View or press **F10 (GRAPH)** from any mode (except HELP or FRMT, or after you select :Graph Edit).



NOTE If you have not specified the data ranges or you do not have a graphics monitor, 1-2-3 displays a blank screen. For information about graph settings, see "Creating a Quick Graph" on page 126 or "Creating a Basic Graph" on page 127.

2. Press any key to clear the graph from the screen.

   If you selected /Graph View, you return to the Graph menu. If you pressed **F10 (GRAPH)**, you return to the worksheet or the Graph Settings dialog box, depending on which you were using when you pressed the key.

3. Select Quit, if necessary, to return 1-2-3 to READY mode.

To View a Saved Graph File

1. Select :Graph View.
2. Select one of the following:

PIC	Display the contents of a graph file (.PIC) created with /Graph Save.
Metafile	Display the contents of a metafile (.CGM) created with a graphics program.

3. Specify the name of the file to view.

   1-2-3 uses the entire screen to display the contents of the file.

4. Press any key to return 1-2-3 to READY mode.

Using Named Graphs

The 1-2-3 worksheet can have only one graph current at a time. Each time you enter new graph settings, the existing settings are lost. To have several graphs in a worksheet, each with different settings, you can save the current settings by assigning them a name. Once you name a graph, you can view, delete, or change its settings. You can also create a table in the worksheet that lists all the named graphs in the worksheet. To view a named graph, you first make it the current graph with /Graph Name Use. The settings for the named graph replace the current settings.

Follow these guidelines when you create graph names:

- Do not include spaces, commas, semicolons, or the characters + * – / & > < { @ and # in graph names; they may appear to be formulas to 1-2-3.
- Do not use names that look like cell addresses, such as P12 or EX100.
- Do not use @functions names, macro command keywords, or 1-2-3 key names as graph names.

1-2-3 does not distinguish between uppercase and lowercase letters in graph names.

NOTE The number of named graphs you can create is limited only by available memory; each named graph uses about 700 bytes of conventional memory.

To Name a Graph

1. Enter the settings for the graph in the Graph Settings dialog box *or* use the Graph commands.
2. Select /Graph View or press **F10 (GRAPH)** to view the graph and make sure the settings you selected are correct.
3. Press any key to return to the Graph menu or the Graph Settings dialog box.

   If you selected /Graph View, 1-2-3 returns to the Graph menu. If you pressed **F10 (GRAPH)**, 1-2-3 returns to the Graph Settings dialog box.
4. Select OK to return to the Graph menu.
5. Select /Graph Name Create.
6. Type a unique name, up to 15 characters long, and press **ENTER**.

   CAUTION If you enter a graph name that is identical to an existing graph name, 1-2-3 assigns the new graph settings to the existing graph name.
7. Select Quit to return 1-2-3 to READY mode.
8. Select /File Save to save the named graph in the worksheet.

To Create a Table of Named Graphs

1. Decide on a location for the graph name table.

   You can place the table anywhere in the worksheet. The table will contain three columns: the name of the graph, the type of graph, and the first title (if any).
2. Select /Graph Name Table.
3. Specify a location for the table.

   You need to specify only the first cell of the range.

   CAUTION /Graph Name Table creates a table that occupies three columns and as many rows as there are named graphs, plus one blank row. To avoid writing over existing data, make sure the table location is blank or contains unimportant data. If you make a mistake when placing the table and undo is on, press **ALT-F4 (UNDO)** immediately to restore the worksheet to its original state.
4. Select Quit to return 1-2-3 to READY mode.

To Change the Settings of a Named Graph

1. Select /Graph Name Use.

   CAUTION When you retrieve a named graph, you lose all the current graph settings. To preserve settings for future use, assign them a name with /Graph Name Create before you use /Graph Name Use.
2. Specify the named graph to modify.

1-2-3 displays the graph and makes it the current graph.

3. Press any key to return to the Graph menu.
4. Change the graph settings.

   Use the Graph Settings dialog box or the menu.
5. Select OK.
6. Select Name Create.

   1-2-3 returns to the Graph menu.
7. Specify the named graph you specified in step 2.

   1-2-3 saves the modified settings using the existing graph name.
8. Select Quit to return 1-2-3 to READY mode.

To Delete a Named Graph

1. Select /Graph Name Delete.
2. Specify the named graph to delete.

   1-2-3 deletes the graph along with the associated settings. If the deleted named graph was the last graph you viewed, the settings in the Graph Settings dialog box are those of the deleted graph. 1-2-3 does not delete or replace the settings in the Graph Settings dialog box. To clear the current graph settings and restore the defaults, use /Graph Reset Graph.
3. Select Quit to return 1-2-3 to READY mode.

CAUTION Once you delete a named graph, you can no longer retrieve it with /Graph Name Use or with {GRAPHON} in a macro. If you delete a named graph by mistake and undo is on, select Quit to return 1-2-3 to READY mode, then press **ALT-F4 (UNDO)** immediately to restore the named graph. If you have made no other changes except deleting the graph since you last saved the worksheet, use /File Retrieve to restore the graph.

Resetting Graph Data Ranges

If you produce the same graph often (for example, a pie chart that shows your monthly budget, or a bar graph that shows weekly sales), you may want to specify different data ranges on which to base the graph, but keep the other settings for the graph. That way, you do not have to reproduce all the settings each time you create the graph. Resetting a data range clears the data range setting; it does not remove the range from the worksheet.

You can clear the data ranges in a graph several ways: You can clear all the data ranges and associated data labels at once, or you can clear an individual data range and associated data labels. You can also modify an individual data range.

To	Do this
Clear all data ranges	Select /Graph Reset Ranges.
Clear individual data ranges	Select /Graph Reset. Then select X, A, B, C, D, E, or F.
Change an individual data range	Select /Graph X, A, B, C, D, E, or F and specify the range.

Saving a Graph in a File

You can save a graph for use with the PrintGraph or to view or use with Wysiwyg. Once you save a **graph file** (a file with the file extension .PIC), it is no longer tied to the data in the worksheet. If you change the data in the worksheet, the graph does not change.

You can print a graph file with PrintGraph, or you can use Wysiwyg to add the graph file to a worksheet and then print it along with the worksheet data.

W Wysiwyg lets you include the current graph or a named graph in a worksheet, and enhance it by adding graphic objects and text. For more information on adding a graph to the worksheet, see Chapter 11, starting on page133. For more information on enhancing a graph using Wysiwyg, see "Using Objects in a Graphic" on page 148. You can use Wysiwyg Print commands to print the graph along with the data in the worksheet on which it is based.

1-2-3 cannot retrieve a graph file.

To Save a Graph in a File

1. Select /Graph Save.

   1-2-3 displays the default directory and extension.

2. To specify a graph file name, do one of the following:

   - Type or select a graph file name and press ENTER.
   - To save the graph file in another directory, press ESC, edit the directory, type a file name, and press ENTER.

3. If you select an existing graph file name, select one of the following options:

Cancel	Returns 1-2-3 to READY mode without saving the current graph.
Replace	Saves the graph in the file, replacing the graph file on disk with the current graph.

You can enter the graph file extension (.PIC) or let 1-2-3 add it for you.

CAUTION You cannot undo changes saving a graph file makes to the file on disk. Saving a graph file using an existing name permanently changes the file on disk.

Chapter 11
Including Graphics in a Worksheet

This chapter describes how to add a graphic to a worksheet and how to view and modify it. The chapter includes the following sections:

Why Include Graphics with Worksheet Data?

The Wysiwyg Graph commands let you include graphics anywhere in a worksheet. **Graphics** are current or named 1-2-3 graphs, 1-2-3 graphs saved in graph files with the file extension (.PIC), graphics saved in metafiles with the extension .CGM, or blank placeholders.

Include graphics in a worksheet to illustrate or emphasize worksheet data, and so you can edit them with the Wysiwyg Graph commands. When you include a graph in the worksheet, you can display it and print it with the data it illustrates.

After you include a graphic in the worksheet, you can use the Wysiwyg Graph commands to add extensive enhancements, such as text, colors, and geometric shapes to the graphic. For example, you can use the Wysiwyg Graph commands to

- Display the current graph or named graph in the worksheet next to the data on which it is based; when the data changes, 1-2-3 automatically updates the graph in the worksheet.
- Add explanatory text to a graph displayed in a worksheet.
- Annotate a particular point on a line graph by drawing a circle around it and adding explanatory text and an arrow.
- Display a map, saved in a metafile (.CGM), in a worksheet and add descriptive text to the map.

For information on enhancing a graphic, see Chapter 12, beginning on page 139.

Once a graphic is part of the worksheet, use the Wysiwyg Print commands to print the graphic and the worksheet (see "Printing with Wysiwyg Formatting" on page 89).

1-2-3 Release 2.3 provides many metafiles (.CGM) that contain graphics such as arrows and maps. For complete information about these files, see Appendix B in *Getting Started*.

Specifying a Graphic

Before you add a graphic to a worksheet, you must specify the entire range that the graphic will occupy. After you add a graphic to a worksheet, you can select the entire graphic by specifying any cell in the range the graphic occupies.

You can specify the range a graphic occupies before or after you select a Wysiwyg command. When you specify the range for the graphic before selecting a command that requires the range, Wysiwyg uses the preselected range automatically. Wysiwyg prompts you for the range if you do not specify it before you select a command. You specify a range for a graphic in the same way you specify any range. This chapter instructs you to select the graphic before you select a command.

Specifying a Range for a Graphic

To specify a range for a graphic you are adding to the worksheet, do one of the following:

- Move the cell pointer to the upper left cell in the range, press **F4**, highlight the range for the graphic with the pointer-movement keys, and press **ENTER**.
- Move the mouse pointer to the upper left cell in the range. Drag the cell pointer to highlight the entire range to hold the graphic.

Selecting a Graphic

To select a graphic that is already a part of the worksheet, do one of the following:

- Move the cell pointer to the range that contains the graphic, press **F4**, highlight the entire range with the pointer-movement keys, and press **ENTER**.
- Move the cell pointer to any cell in the range that contains the graphic, press **F4**, and then press **ENTER**.
- Drag the cell pointer to highlight the entire range that contains the graphic.
- Click any cell in the range that contains the graphic, holding down the mouse button until 1-2-3 enters POINT mode.

Specifying a Graphic in a Command

If you do not select a range for a graphic before you use Wysiwyg Graph commands, you can do one of the following when Wysiwyg prompts you to specify a graphic:

- Move the cell pointer to the graphic and press ENTER.
- Click any cell in the graphic and click the control panel.
- Enter the graphic name.
- Press F3 (NAME), highlight the name of the graphic, and press ENTER.

Adding Graphics to a Worksheet

You can add five types of graphics to a worksheet: the current graph, which is based on the current graph settings; a named graph from the current worksheet; a 1-2-3 graph in a graph file (.PIC) (/Graph Save saves a graph in a graph file with the file extension .PIC); a graphic metafile in a metafile (.CGM); and a blank placeholder, which you can later replace with a graphic or use to create your own graphic.

To Add a Graphic to a Worksheet

1. Specify the entire range to contain the graph.
2. Select :Graph Add.
3. Select the type of graphic to add to the worksheet: Current, Named, PIC, Metafile, or Blank.
4. If you selected Named, PIC, or Metafile, specify a named graph, a graph file (.PIC), or a metafile (.CGM).

   Wysiwyg adds the graphic to the worksheet, sizing it to fit into the specified range. Any data in the same range as the graph is hidden behind the graph. You can make the graphic transparent to show the data by using :Graph Settings Opaque No.

When the current cell is in the range that contains the graphic, the control panel displays {GRAPH *graph_indicator*} *cell_contents*. *Graph_indicator* is either the name of the graph, <CURRENT> (for the current graph), <BLANK> (for a blank placeholder), or the path to a graph file (.PIC) or metafile (.CGM). *Cell_contents* is the data in the cell behind the graphic on which the cell pointer is positioned.

If you add more than one current or blank graphic to the worksheet or add the same named graph, graph file (.PIC), or metafile (.CGM) more than once, the *graph_indicator* is followed by a number (.1, .2, and so on).

If you add the current graph to a worksheet, any subsequent changes (other than changes to the data) you make to the graph settings will change the graph in the worksheet. If you do not want the graph settings in the worksheet to change the graph, but you do want the graph to reflect changes in the data, use /Graph Name Create to name the graph and use :Graph Add Named to add the named graph to the worksheet. Only changes to the data will change the graph.

Viewing Graphics

Wysiwyg lets you view the contents of a graph file (.PIC) or metafile (.CGM) before you add it to the worksheet. You can also view a specified graphic from the worksheet. In both cases, Wysiwyg temporarily removes the worksheet from the screen and provides a full-screen view of the selected graphic.

To	Do this
View a graph file (.PIC) or metafile (.CGM)	Select :Graph View. Select PIC or Metafile to display a list of graph files (.PIC) or metafiles (.CGM). Select the graphic to view.
View a graphic in the worksheet	Specify the range that the graphic occupies. Select :Graph Zoom.

To return to the worksheet after viewing a graphic, press any key.

Changing Graphics in the Worksheet

The Wysiwyg Graph Settings commands let you move and replace graphics in a worksheet, turn the display of graphics on or off, make graphics in the worksheet opaque or transparent, and make current or named graphs change automatically when the data the graphs are based on changes.

Graphics you add to a worksheet are opaque by default, so they hide the data behind them. Make graphics transparent to make data behind them show through.

When the display of a graphic is turned off, Wysiwyg displays the graphic as a shaded rectangle in the worksheet; Wysiwyg still prints the actual graphic, however. Turning graphics display off can improve speed, because Wysiwyg does not have to redraw the graphic after recalculations or as you move in the worksheet.

When you use :Graph Settings Opaque or :Graph Settings Display, you can specify one graphic or a range that encompasses several graphics.

To	Do this	With this result
Make graphics transparent	Select the graphic(s). Select :Graph Settings Opaque No.	Data under the graphics show through the graphics.
Make graphics opaque	Select the graphic(s). Select :Graph Settings Opaque Yes.	Data under the graphics is hidden. This is the default setting.
Turn the display of graphics on	Select the graphic(s). Select :Graph Settings Display Yes.	Wysiwyg displays the graphics in the worksheet. This is the default setting.
Hide graphics	Select the graphic(s). Select :Graph Settings Display No.	Wysiwyg displays a shaded rectangle in the worksheet for each hidden graphic. If you previously made a graphic transparent (with :Graph Settings Opaque No or :Graph Edit Color Background Transparent), the graphic will be invisible.
Replace a graphic with another graphic	Select the graphic(s). Select :Graph Settings Graph. Select the type of the replacement graphic: Current, Named, PIC, Metafile, or Blank. If you selected Named, PIC, or Metafile, specify a named graph, a graph file (.PIC), or a metafile (.CGM).	Wysiwyg places the graphic in the worksheet and automatically sizes it to fit within the range of the graphic it replaces. Graph enhancements made to the original graph with Graph Edit commands remain.
Move a graphic without resizing it	Select the graphic to move. Select :Graph Move. Specify the upper left cell of the new location for the graphic and press ENTER.	Wysiwyg moves the graphic to the new location.
Resize a graphic or move it to a different range of the size you specify	Select the graphic to move or resize. Select :Graph Settings Range. Specify the new range to contain the graphic and press ENTER.	Wysiwyg resizes the graphic or moves it to a new location, sizing it to fit within the specified range.
Turn automatic recalculation of a graph on or off	Select the graph. Select :Graph Settings Sync. Select Yes to update the graph automatically or No to not update the graph.	The selected graph is or is not recalculated automatically when the data on which the graph is based changes.

When automatic recalculation of graphs is on, Wysiwyg automatically updates current and named graphs in the worksheet when the data the graphs are based on changes. When automatic recalculation of graphs is off, you must use :Graph Compute to update graphs in the worksheet.

Removing Graphics from the Worksheet

You use :Graph Remove to remove a graphic and all its enhancements from the worksheet, but not from disk or memory.

To Remove a Graphic from a Worksheet

1. Specify the graphic you want to remove from the worksheet.
2. Select :Graph Remove.

   Wysiwyg removes the graphic from the worksheet.

Chapter 12
Enhancing a Graph

This chapter describes how to enhance graphs using 1-2-3 and Wysiwyg Graph commands. The chapter includes the following sections:

How Do I Enhance a Graph?

In addition to basic graphing capabilities, 1-2-3 provides many ways to enhance graphs. For example, you can add titles, legends, and other text information. You can also change the appearance of parts of the graph, such as by displaying bars with a three-dimensional (3-D) effect or exploding specific slices of a pie chart.

To enhance a graph, select options from the Graph Settings dialog box *or* use /Graph Options and /Graph Type Features.

To enhance a named graph, make it the current graph with /Graph Name Use and then modify the graph settings. To apply the changes to the named graph, use /Graph Name Create and specify the name you specified with /Graph Name Use.

W The Wysiwyg Graph commands let you add text to the graphics you include in the worksheet, and choose the font and color for the text. You can also use these commands to add objects, such as lines, polygons, rectangles, ellipses, and freehand drawings, to a graphic. You can then move, copy, resize, or rotate them.

Annotating a Graph

1-2-3 lets you annotate a graph by creating legends, adding text for graph and axis titles, and specifying labels for the data points in a graph. You can, in addition, use Wysiwyg Graph Edit commands to add text to a graphic that is part of a worksheet. For more information about using Wysiwyg to add text to a graphic, see "Using Objects in a Graphic" on page 148.

To Add Titles, Legends, and Data Labels

1. Make the graph you want to change the current graph (if necessary).
2. Select /Graph.

   The Graph Settings dialog box appears. Press **F2 (EDIT)** *or* click the dialog box to activate it.
3. Select Legend & Titles in the Graph Settings dialog box.

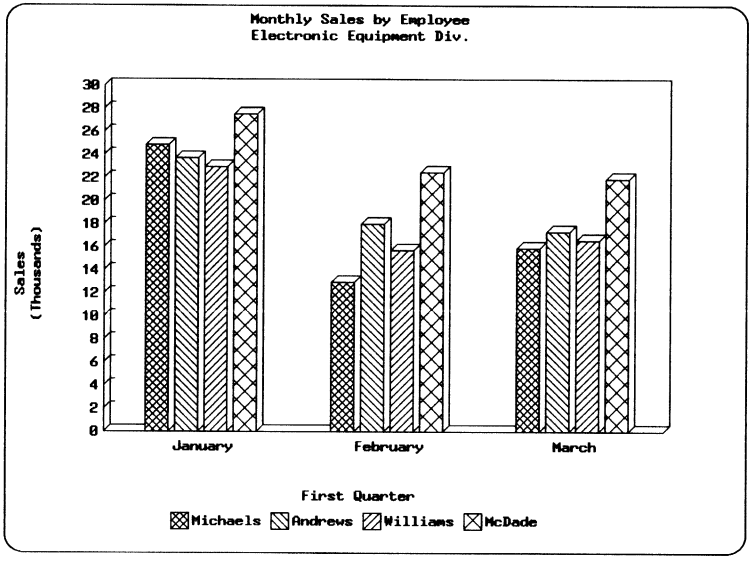
To	Do this
Add graph and axis titles	Select the type of title to use (First, Second, X axis, or Y axis). Type a \ (backslash) followed by the address or name of the cell that contains the title text, or enter the title text. (/Graph Options Titles First, Second, X-Axis, Y-Axis)
Add legends for the A–F data ranges	Select the data range to assign a legend. Type a \ (backslash) followed by the address or name of the range that contains the legend text, or enter the legend text. (/Graph Options Legends A, B, C, D, E, F, or Range)
Specify data labels	Select the data range to assign data labels. Type a \ (backslash) followed by the address or name of the range that contains the data labels. (/Graph Options Data-Labels A, B, C, D, E, F, or Group)
Specify data-label placement in relation to points on a graph	Select the data range whose labels you want to position. Select Centered, Right, Below, Left, or Above.

   Although you can select a data label placement for any graph, the placement you select only affects data labels in a line, XY, mixed, or HLCO graph. 1-2-3 always places labels for bar or stacked bar graphs above the bars if the values are positive and below if they are negative.
4. Select OK to accept the entries in the Legends & Titles dialog box.
5. Select OK to accept the entries in the Graph Settings dialog box.
6. (Optional) View the graph, and then press any key to return to the Graph menu.
7. Select Quit to return 1-2-3 to READY mode.

1-2-3 provides two commands that let you assign legends or data labels for all the data ranges at one time. To use the commands, the legend text or data labels must be arranged in adjacent cells, and the data labels range must be the same size as the data ranges in the graph. To assign legend text for all the data ranges, use /Graph Options Legends Range. To assign data labels for all the data ranges, use /Graph Options Data-Labels Group.

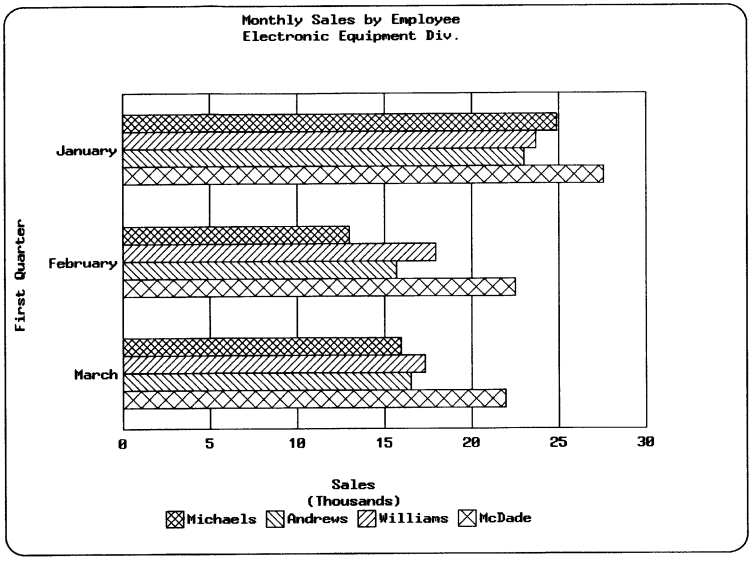
Adding a 3-D Effect to a Graph

Adding a shadow to bar, stacked bar, and mixed graphs makes the bars appear three-dimensional. To control the 3-D effect, select /Graph and mark or remove the mark from the 3-D bars check box in the Graph Settings dialog box. You can also select /Graph Type Features 3D-Effect Yes or No from the menu. The following illustration shows a 3-D bar graph.



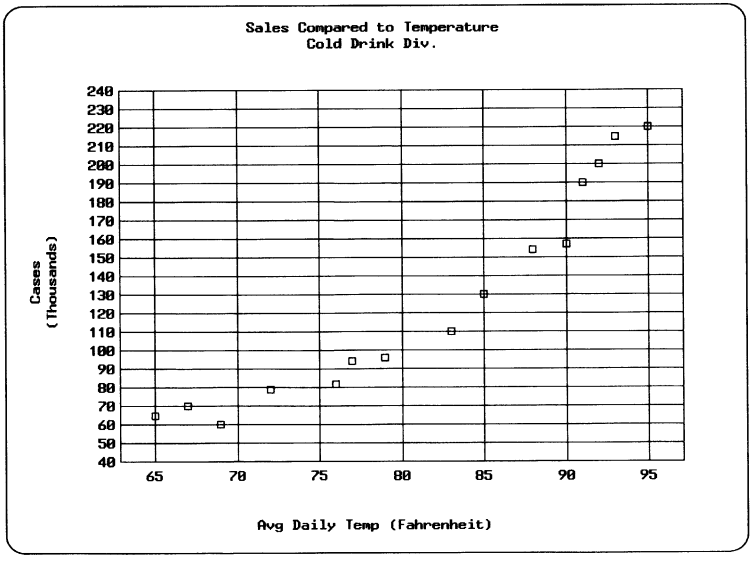
Displaying a Graph Horizontally

1-2-3 graphs are vertical by default: That is, the y-axis is displayed vertically. To rotate the graph 90 degrees (clockwise) onto its side, select /Graph Type Features Horizontal. To rotate the graph back to its original position, select /Graph Type Features Vertical. The following illustration shows a horizontal bar graph where the y-axis labels are on the right (bottom) instead of on the left (top).



Adding or Removing Grid Lines

To help show where data points fall on a graph, you can display grid lines from the x-axis, y-axis, or both. You can also remove grid lines. 1-2-3 draws the lines across the entire graph from the tick marks on the specified axis or axes. To use grid lines, select /Graph and mark or remove the mark from the Grid lines Horizontal and/or Vertical check boxes in the Graph Settings dialog box. You can also select /Graph Options Grid Horizontal, Vertical, Both, or Clear. The following illustration shows a line graph with horizontal and vertical grid lines.



Customizing a Pie Chart

A pie chart is made up of separate wedges (slices) that fit together to make a circle. You can specify a different hatch pattern or color for any or all slices, and you can also **explode** individual slices (separate them from the rest of the pie).

1-2-3 uses the following data ranges for graphing a pie chart:

- X — Contains labels for the individual slices.
- A — Contains values to graph for the pie chart.
- B — Contains values that control the color or hatch pattern of each slice and determine whether to explode specific slices.

To Customize a Pie Chart

1. Find a blank area in the worksheet for the B data range.

   The number of cells must equal the number of slices in the pie (the number of values in data range A) you want to change.

2. Enter a number in each cell in the B data range.

   The number in the first cell represents the color or hatch pattern for the pie slice that represents the first value in the A data range.

To	Do this
Specify a color or hatch pattern	Enter a number from 1 to 8. Each number represents a different hatch pattern or color. If you enter 8 or leave the cell blank, the slice will have no color or hatch pattern.
Explode a slice	Add 100 to the B data range values that correspond to the slices you want to explode. For example, to explode the slice with color or hatch pattern 6, enter 106 in the corresponding cell in the B data range.

   TIP Using Wysiwyg to add the graph to the worksheet, you can change the graph colors using :Graph Edit Color Map 1, 2, 3, 4, 5, 6, 7, 8.

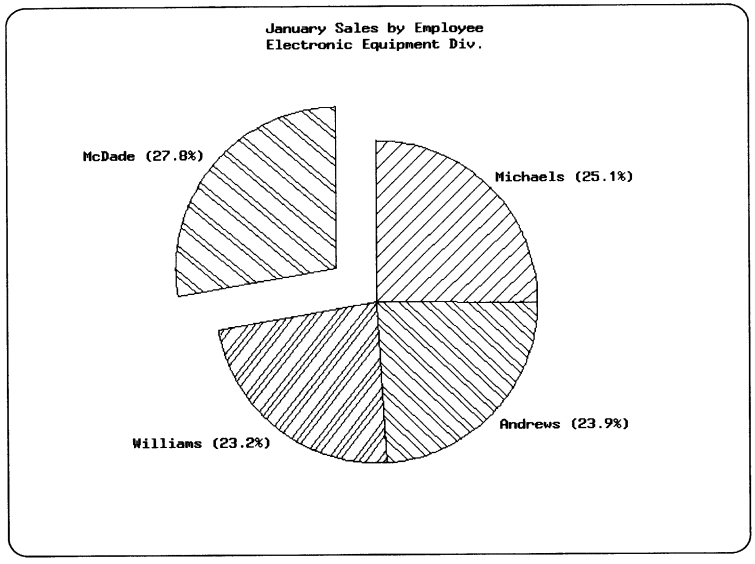
3. Make the graph you want to change the current graph (if necessary).
4. Select /Graph.

   The Graph Settings dialog box appears. Press **F2 (EDIT)** *or* click the dialog box to activate it.

5. Select B in the Ranges box and specify the range.
6. Mark Colors on to display the pie chart in color. To restore black-and-white display, remove the mark from Colors.
7. Select OK.

8. (Optional) View the graph, and then press any key to return to the Graph menu.
9. Select Quit to return 1-2-3 to READY mode.

The following illustration shows a pie graph with three hatch patterns and one slice exploded.



Customizing a Line, XY, or Mixed Graph

You customize a line, XY, or mixed graph. For example, you can connect data points with lines or mark them with symbols. You can also convert a line graph (or the D, E, and F data ranges in a mixed graph) to an area graph, in which the area between lines is shaded. 1-2-3 stacks lines automatically in an area graph. You can also stack XY graphs, but you cannot shade the area between lines.

To Customize a Line, XY, or Mixed Graph

1. Make the graph you want to change the current graph (if necessary).
2. Select /Graph.

   The Graph Settings dialog box appears. Press F2 (EDIT) *or* click the dialog box to activate it.
3. Select Legends & Titles in the Graph Settings dialog box.
4. Select Format from the Graph Legends and Titles dialog box and select the data range to format.

5. Select from the following popup dialog box options:

Lines	Connects graph data points with lines.
Symbols	Displays a symbol at each graph data point. 1-2-3 uses a different symbol for each data range.
Both	Displays both lines and symbols (the default).
Neither	Displays neither lines nor symbols, so data points are hidden. 1-2-3 will still display data labels, if any.
Area	Fills in the area below a line with color or a hatch pattern and stacks the line. An area graph cannot include negative numbers.

6. Select OK to accept the Legends & Titles dialog box.

   To use the menu, use /Graph Options Format [A, B, C, D, E, F, or Graph] Lines, Symbols, Both, Neither, or Area.

7. Select OK to accept the Graph Settings dialog box.
8. (Optional) View the graph, and then press any key to return to the Graph menu.
9. Select Quit to return 1-2-3 to READY mode.

You can use /Graph Options Format Graph to format all the data ranges the same way at the same time.

Scaling and Formatting an Axis

1-2-3 automatically scales graph axes based on the data ranges you are graphing. You can change the y-axis scale in line, bar, stacked bar, mixed, XY, and HLCO graphs, and the x-axis scale in XY graphs. You can also set the format for numbers along a scale. In addition, you can specify the placement of the y-axis scale (on the left, right, or both sides of the graph) and whether to display the scale indicator. When 1-2-3 uses an order of magnitude other than 0 for numbers along the scale, it creates a scale indicator (such as thousands or millions) to identify the order of magnitude. You can turn off the display of the scale indicator.

The **skip factor** determines which labels 1-2-3 displays along the x-axis (every other one, every third one, and so on). You can select a skip factor for the x-axis.

To Specify the Scale and Label Format Settings

1. Make the graph you want to change the current graph (if necessary).
2. Select /Graph.

   The Graph Settings dialog box appears. Press **F2 (EDIT)** *or* click the dialog box to activate it.

3. Select Scale Options in the Graph Settings dialog box.

4. Mark or select one or more of the following:

Automatic	Lets 1-2-3 scale the axes automatically. If you remove the mark from the Automatic check box, you must define the axis scale manually by setting the lower and upper limits. (/Graph Options Scale [Y-Scale, X-Scale] Automatic or Manual)
Lower limit	Sets the lower scale limit for the axis to the value you specify. Remove the mark from the Automatic check box before you set this value. (/Graph Options Scale [Y-Scale, X-Scale] Manual Lower)
Upper limit	Sets the upper scale limit for the axis to the value you specify. Remove the mark from the Automatic check box before you set this value. (/Graph Options Scale [Y-Scale, X-Scale] Manual Upper)
Format	Selects the format for the display of the numbers along a scale: Fixed, Scientific, Currency, Percent, , (Comma), General (the default), +/–, Text, Hidden, or Date/Time. (/Graph Options Scale [Y-Scale, X-Scale] Format)
Indicator on	Displays the scale indicator. Remove the mark to turn off the display of the scale indicator. (/Graph Options Scale [Y-Scale, X-Scale] Indicator Yes or No)
Labels on left	Displays the y-axis labels and tick marks on the left side of the graph frame. Mark Labels on Left and Labels on Right to display labels and tick marks on both sides of the graph. If the graph is horizontal, the labels appear above the graph. (/Graph Options Scale Y-Scale Display Left, Both, or None)
Labels on right	Displays the y-axis labels and tick marks on the right side of the graph frame. If the graph is horizontal, the labels appear below the graph. (/Graph Options Scale Y-Scale Display Right, Both, or None)
Skip factor	Displays every *n*th x-axis label. You must specify a value. (/Graph Options Scale Skip)

5. Select OK to accept the entries in the Graph Scale Settings dialog box.
6. Select OK to accept the entries in the Graph Settings dialog box.
7. (Optional) View the graph, and then press any key to return to the Graph menu.
8. Select Quit to return 1-2-3 to READY mode.

Controlling the Graph Frame

1-2-3 initially displays a graph with a four-sided frame, with margins on the left and right sides of the graph. 1-2-3 creates a zero line along the y-axis in all graphs, and a zero line along the x-axis in XY graphs.

You can control how much of the graph 1-2-3 surrounds with a frame, and whether it displays margins. You can also control the display of the zero line. You can select frame, margin, and zero line options from the Graph Settings dialog box or from the menu.

To	Do this
Remove or add the left, right, top, and/or bottom borders of a graph	Select Frame in the Graph Settings dialog box and then mark or remove the mark from Left, Right, Top, and/or Bottom. (/Graph Type Features Frame Left, Right, Top, Bottom, None, or All)
Remove or add margins	Mark or remove the mark from Margins on in the Graph Settings dialog box. (/Graph Features Frame Margins Yes or No)
Omit or display zero line(s)	Select Zero line in the Graph Settings dialog box and then mark or remove the mark from Y axis and/or X axis. (/Graph Type Features Frame Zero-Line [Y-Axis, X-Axis] Yes or No)

Displaying a Graph in Color

1-2-3 displays graphs in black and white by default, using different hatch patterns to represent different data ranges. You can display and print your graphs in color, however, by selecting /Graph Options Color *or* marking the Colors on check box in the Graph Settings dialog box. 1-2-3 represents each data range with a different color. If you use :Graph Add to add a graph to your worksheet, you can also change the background color of a graph with :Graph Edit Color. Whether you can display and print graphs in color depends on your monitor and printer.

To	Do this
Display a 1-2-3 graph in color	Make the graph you want to change the current graph, if necessary. Select /Graph. Press F2 (EDIT) and mark Colors on *or* click Colors on to activate the dialog box and mark Colors on. (/Graph Options Color)
Change the background color of a Wysiwyg graphic in the worksheet	Select the graphic. Select :Graph Edit Color Background. Select a color from the color palette. Number 17 makes the background transparent.

TIP Using Wysiwyg to add the graph to the worksheet, you can change the graph colors using :Graph Edit Color Map 1, 2, 3, 4, 5, 6, 7, 8.

Any objects or data in cells behind a Wysiwyg graphic are no longer visible after you select a background color. Wysiwyg graphics are opaque by default.

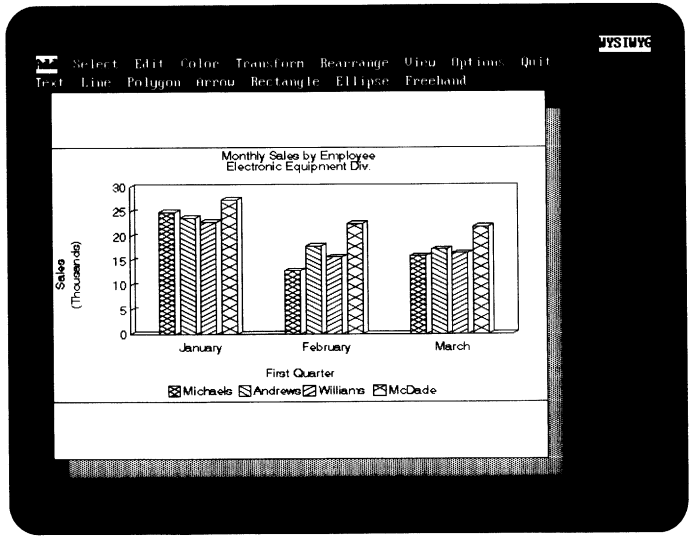
Resetting Graph Options

Use /Graph Reset Options to clear, or reset, all Graph Options settings. Some options, such as grid lines, scale settings, color, XY, line, and mixed graph format, return to the default settings. 1-2-3 clears the options for which you provided text, a cell or range address, or a range name (such as legends, titles, and data labels). /Graph Reset Options does not affect other settings, such as data range settings, the graph type setting, the graph frame settings, or 3-D effect. (For more information, see "Resetting Graph Data Ranges" on page 131). Use /Graph Reset Graph to reset all the current graph settings, including data ranges and graph type.

Using Objects in a Graphic

Wysiwyg lets you add objects to a graphic that is part of a worksheet. Objects you can create and work with include text, lines, arrows, rectangles or squares, polygons, ellipses or circles, and freehand drawings. Use objects to accentuate areas of a graph. Once you add an object to a graphic, you can manipulate it by moving, rotating, flipping or inverting it, or by changing its colors.

Before you can add an object to a graphic, you must add the graphic to the worksheet. Then you specify the graphic to modify and select :Graph Edit to display the graphic in the graphics editing window, shown in the following illustration. When the graphics editing window is on the screen, the Graph Edit menu appears above the window. Select commands from this menu to add, select, change, enhance, or move an object. The sections that follow describe commands you use after you have specified the graphic and selected :Graph Edit. For information about adding graphs and graphics to a worksheet and specifying a graphic, see Chapter 11, starting on page 133. To leave the graphics editing window, select Quit.



To use objects effectively, you need to be familiar with the following terms:

- The **underlying graphic** is the graph or contents of a graphic file (.PIC) or metafile (.CGM) that you added to the worksheet.
- An **object** is a line of text, a geometric shape, or a freehand drawing that you add to a graphic with the Graph Edit commands. The underlying graphic is one object.
- You must **select**, or identify, objects and underlying graphics in the graphics editing window to edit, move, rearrange, or transform them with the Graph Edit commands. You select objects with :Graph Edit Select or with the mouse.
- When an object is selected, small filled squares, or **selection indicators**, appear on its outer edges or its bounding box.
- A **bounding box** is a rectangle Wysiwyg creates and uses to outline each object you add to a graphic. The bounding box does not print and is visible only when you move an object, change the size or shape of an object, or drag the mouse to select multiple objects.
- A text object is enclosed inside a **text box**. Initially, you cannot see the text box because the outline of the box is hidden and the inside of the box is transparent. You can specify a color for the outline of the text box, but you cannot alter the line style or thickness. You can also change the inside color of the text box. See "Modifying Objects" on page 153.
- The **cursor**, which appears by default as a small cross, is used to create, select, and manipulate objects. You move the cursor by pressing the pointer-movement keys or by moving the mouse.

Adding an Object to a Graphic

You can add objects such as text, lines, arrows, rectangles, polygons, ellipses, and freehand drawings to a graphic with :Graph Edit Add. Before you can add an object to a graphic, you must specify the graphic to use and select :Graph Edit. Then select the commands in the following table from the menu above the graphics editing window.

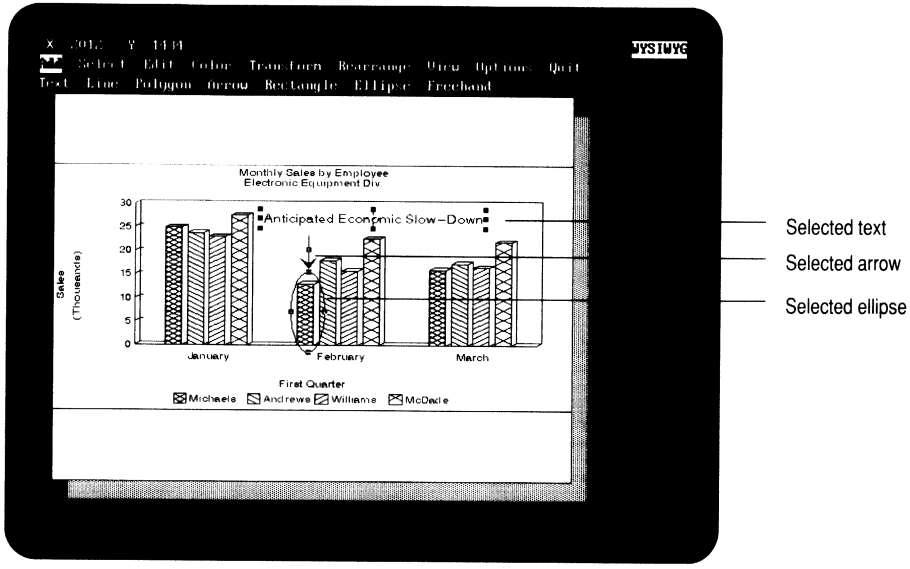
To	Do this
Add letters, numbers, special characters, or cell contents	Select Add Text. Type the characters, or a \ (backslash) followed by the address or name of the cell whose contents you want to add to the graphic, and press ENTER. Move the cursor to position the characters in the graphics editing window and then click the text location *or* press ENTER. If you enter a range name or address, Wysiwyg adds the contents of the first cell in the range. Any time the contents of the cell change, 1-2-3 adjusts the graphic if automatic updating is on.

(continued)

To	Do this
Add a straight line or connected line segments with (optionally) an arrow at the end	Select Add Line or Arrow. Move the cursor to the location where the beginning of the line will start. Click the location *or* press the space bar to anchor the first point. Move the cursor to draw a line segment. To create additional line segments, click the location *or* press the space bar to anchor the point, and then move the cursor to the next point. To complete the line, double-click the location *or* press ENTER. To align a line segment with the nearest 45-degree increment, hold down SHIFT as you draw a segment and anchor a point.
Add a rectangle or square	Select Add Rectangle. The menu indicator changes to DRAG. Move the cursor to the location where a corner of the rectangle will start. Drag the bounding box *or* press the space bar to anchor the corner and use the pointer-movement keys to stretch the bounding box to the size you want. To complete the rectangle, release the mouse button *or* press ENTER. To create a square, press and hold SHIFT as you complete the rectangle.
Add an ellipse or circle	Select Add Ellipse. The menu indicator changes to DRAG. Move the cursor to the location that will be the first corner of the bounding box for the ellipse. Drag the bounding box *or* press the space bar to anchor the corner and use the pointer-movement keys to stretch the bounding box to the size you want. To complete the ellipse, release the mouse button *or* press ENTER. To create a circle, press and hold SHIFT as you complete the ellipse.
Add a polygon	Select Add Polygon. Move the cursor to the location where you want to begin drawing the polygon. Click the location *or* press the space bar to anchor the first point. Move the cursor to draw a side of the polygon. To continue to draw sides, click the location *or* press ENTER to anchor the point, and then move the cursor to the next point. You must draw at least two sides. To end the polygon, double-click the last point *or* press ENTER. Wysiwyg automatically connects the last point with the first point. To align a side with the nearest 45-degree increment, hold down SHIFT as you anchor a point.
Add a freehand drawing	Select Add Freehand. Move the cursor to the location where the drawing will start. Press and hold the mouse button *or* press the space bar to anchor the first point. Drag the mouse *or* use the pointer-movement keys to draw. Release the mouse button *or* press ENTER to complete the drawing.

Selecting Objects

When you add an object to a graphic, that object is automatically selected. When an object is selected, selection indicators appear on its outer edge or on its bounding box.



You must select objects before you can manipulate them in any way. You can select one or more objects at a time. Before you can select an object in a graphic, you must specify the graphic to use and select :Graph Edit. Then select the commands in the following table from the menu above the graphics editing window.

To	Do this
Select one object	Click the object *or* select Select One, move the cursor to the object to select, and press ENTER.
Select all objects (except the underlying graphic)	Select Select All.
Deselect all objects (including the underlying graphic)	Click an area that does not contain any objects and that is not close to the edge of the graphics editing window *or* select Select None.
Select or deselect multiple objects	Select Select More/Less, move the cursor to each object to select or deselect, and press the space bar. To select or deselect the last object, press ENTER. To select a group of objects at once with the mouse, draw a bounding box that encloses all the objects: Move the cursor to where a corner of the bounding box will start. Drag the cursor to stretch the bounding box to enclose all the objects and release the mouse button. The bounding box disappears, and objects the bounding box completely enclosed are selected.

(continued)

To	Do this
Cycle through all the objects one at a time to select or deselect them	Select Select Cycle. Press the pointer-movement keys to cycle through each object (including the underlying graphic). Large selection indicators appear around the object. If the object is not currently selected, the selection indicators are empty. If the object is selected, the centers of the selection indicators are solid. Press the space bar to change the selection of the objects. Press ENTER when all objects are selected or deselected.
Select only the underlying graphic	Click the edge of the underlying graphic away from any other object *or* select Select Graph.

Enlarging or Reducing the Display of Objects

The View command enlarges and reduces areas of the graphics editing window. The command changes the graphics editing window on your screen only and does not affect the way the graphic appears in the worksheet or when it is printed. Before you can enlarge or shrink the graphics editing window, you must specify the graphic to use and select :Graph Edit. Then select the commands in the following table from the menu above the graphics editing window.

To	Do this
Enlarge the graphics editing window	Select View + *or* press + (plus sign). You can select View + or press + (plus sign) up to five times.
Make an area of the graphics editing window fill the entire window	Hold down CTRL and drag the bounding box to stretch it *or* select View In and move the cursor to a corner of the area to be enlarged. Press the space bar, move the cursor to stretch the bounding box to enclose the area to be enlarged, and press the space bar again or press ENTER.
Enlarge an area of the graphics editing window to its maximum size	Select View In. The menu indicator changes to DRAG. Move the cursor to the area to be enlarged. Press the space bar, move the cursor to make a small bounding box, and press the space bar again, *or* drag the bounding box to stretch it slightly.
Move the enlarged area up, down, left, or right one half screen at a time	Select View Left, Right, Up, Down, or Pan *or* press ↑, ↓, CTRL-←, or CTRL-→. If you select Pan, Wysiwyg is in PAN mode. In PAN mode, you can use the pointer-movement keys to move the display, and + (plus sign) to enlarge or – (minus sign) to reduce the display size of objects. Press ENTER to leave PAN mode.
Reduce the enlarged area of the graphics editing window	Select View – *or* press – (minus sign). You can select View – or press – (minus sign) until the graphics are displayed at their original size.
Redisplay the graphics at their original size	Select View Full *or* hold down CTRL and click the window. You can also press * (asterisk).

Rearranging Objects

:Graph Edit Rearrange copies, deletes, restores, locks, unlocks, and moves objects. You can also use this command to place objects in front of or behind other objects.

Before you can rearrange objects, you must specify the graphic to use and select :Graph Edit. Then select the commands in the following table from the menu above the graphics editing window. To rearrange objects, you must also select the objects first. See "Selecting Objects" on page 151.

To	Do this
Copy selected objects	Select Rearrange Copy or press INS. The copied objects overlap the originals.
Move selected objects within the graphics editing window	Select Rearrange Move. The cursor turns into a hand and a dotted outline encloses the objects to move. Use the pointer-movement keys to move the objects to the new location and press ENTER. If you use the mouse, you do not need to select Rearrange Move. Drag any of the selected objects to the new location, and all the selected objects move together.
Move selected objects in front of other objects	Select Rearrange Front. Objects in front may hide objects behind them.
Move selected objects behind other objects	Select Rearrange Back. To move an object behind other objects, but keep it in front of the underlying graphic, first move the object behind all the other objects and then select the underlying graphic and move it behind all the objects.
Protect selected objects from changes	Select Rearrange Lock. When you try to select objects that are locked, the selection indicators are diamonds instead of rectangles. Only Rearrange Unlock will work on locked objects.
Unprotect selected objects	Select Rearrange Unlock.
Delete selected objects	Select Rearrange Delete or press DEL. If you make a mistake and you want to restore the deleted objects, select Rearrange Restore immediately after deleting the objects or press INS.

Modifying Objects

To modify objects, you use :Graph Edit Edit, :Graph Edit Transform, :Graph Edit Color, and :Graph Edit Options:

- :Graph Edit Edit adds and removes arrowheads; edits, aligns, and changes the font for text; changes the width and style of lines; and alters the curves, corners, and angles of objects. :Graph Edit Edit works only on objects you add to a graphic with :Graph Edit Add; it does not work on the underlying graphic.
- :Graph Edit Transform resizes, rotates, and flips objects.
- :Graph Edit Color changes the color of lines and text, and the inside of objects.
- :Graph Edit Options changes the size of text in the graphic; the text added by 1-2-3, such as titles and labels; and text added by :Graph Edit Add Text.

Before you can modify an object in a graphic, you must specify the graphic to use and select :Graph Edit. Then select the commands in the following table from the menu above the graphics editing window. To modify an object, you must select the object first. See "Selecting objects" on page 151.

To	Do this
Change the style of selected lines or outlines of rectangles, polygons, ellipses, or freehand drawings	Select Edit Line-Style Solid, Dashed, Dotted, Long-Dashed, Chain-Dotted, Chain-Dashed, or Hidden. (This command does not modify the outline of a text box or the underlying graphic.)
Change the thickness of selected arrows, lines, or outlines of rectangles, polygons, ellipses, or freehand drawings	Select Edit Width Very-Narrow, Narrow, Medium, Wide, or Very-Wide. (This command does not modify the outline of a text box or the underlying graphic.)
Add arrowheads to selected arrows, lines, or freehand drawings or remove arrowheads	Select Edit Arrowheads Switch (move the arrowhead to the other end of the arrows, lines, or freehand drawings), One (add one arrowhead to the end of the lines or freehand drawings), Two (add arrowheads to both ends of the arrows, lines, or freehand drawings), or None (remove arrowheads from the arrows, lines, or freehand drawings).
Change the curves, corners, and angles of selected objects	Select Edit Smoothing None (removes any smoothing applied to the angles or corners of a line, arrow, freehand drawing, polygon or rectangle; turns an ellipse into a rectangle), Tight (replaces angles, corners, or curves with low radius curves that approximate the original outline), or Medium (replaces angles, corners, or curves with maximum radius curves; turns a rectangle into an ellipse, for example). See NOTE at the end of the table.
Specify the color of selected lines, arrows, or freehand drawings, or the outlines of selected text, rectangles, polygons, ellipses, or the underlying graphic or make them transparent	Select Color Lines Black, White, Red, Green, Dark-Blue, Cyan, Yellow, Magenta, or Hidden. (Hidden makes the lines, arrows, or freehand drawings transparent.)
Change the color of the inside of selected text boxes, rectangles, polygons, ellipses, and the area defined by lines, arrows, and freehand drawings that contain angles or curves or make them transparent	Select Color Inside, then select the color or hatch pattern from the color palette. Number 17 makes the selected objects transparent. If your monitor cannot display color, all the selections in the color palette appear as hatch patterns.

(continued)

To	Do this
Change the size of selected objects	Select Transform Size. A bounding box appears around the objects to resize. Move the cursor to resize all the objects at the same time. Press ENTER *or* click the bounding box when the objects are the desired size. To ensure that the objects or underlying graphic maintains its geometric proportions (aspect ratio), press and hold SHIFT as you complete the resizing.
Rotate selected objects freely	Select Transform Rotate. A bounding box appears around the objects to rotate. Move the cursor to rotate all the objects together. Press ENTER *or* click the bounding box when the objects are in the desired position.
Rotate objects 90° counterclockwise	Select Transform Quarter-Turn.
Flip selected objects	Select Transform X-Flip (flips objects horizontally along the x-axis), or Y-Flip (flips objects vertically along the y-axis).
Slant selected objects	Select Transform Horizontal (slants objects by width), or Vertical (slants objects by height). A bounding box appears around the objects to slant. Move the cursor to slant the objects. Press ENTER *or* click the bounding box when the objects are in the desired position.
Restore selected objects to their original form	Select Transform Clear. All transformations made to the objects are cleared. The object appears as it did when it was created. The objects may not be positioned in their original locations depending on the types of transformations applied to the objects.
Edit the content of a single text selection	Select Edit Text or press F2 (EDIT). Use the editing keys to change the text (displayed in the control panel) and press ENTER.
Change the font of selected text	Select Edit Font 1, 2, 3, 4, 5, 6, 7, or 8. Each number represents a different font. To specify a different font set, see "Changing Fonts" on page 53.
Change the alignment of selected text relative to the original center point of the text	Select Edit Centering Left, Center, or Right.
Specify the color of selected text or hide the text	Select Color Text Black, White, Red, Green, Dark-Blue, Cyan, Yellow, Magenta, or Hidden.
Increase or reduce the size of all text objects and text in the underlying graphic	Select Options Font-Magnification and enter a number below 100 (percent) to reduce the font size, or greater than 100 (percent) to increase the font size.

NOTE A freehand drawing is a series of short line segments. Smoothing a freehand drawing may result in a very subtle or unnoticable change. In this case, use :Graph Edit Add Line to create a series of line segments. The longer the line segments, the more dramatic the smoothing.

Chapter 13
Printing a Graph

This chapter explains how to print a graph and provides solutions to problems you may encounter while printing graphs. The chapter includes the following sections:

How Do I Print a Graph?

It is usually easiest to print a graph by adding it to the worksheet and printing it with Wysiwyg. Once you add a graph to the worksheet, you can edit it and add text and graphic objects to it, and then use the Wysiwyg Print commands to preview, adjust, and print the graph. For information about adding a graph to the worksheet, see Chapter 11, beginning on page 133. For information about adding text and other objects to a graph, see Chapter 12, beginning on page 139. For information about printing with Wysiwyg, see "Printing with Wysiwyg Formatting" on page 89.

You can also use the 1-2-3 Print Graph utility to print graphs. Before you can print a graph with the 1-2-3 PrintGraph utility, you must use /Graph Save to save the graph. /Graph Save saves the graph in a graph file (.PIC) so you can print the graph using PrintGraph, or add the graph to a worksheet and use Wysiwyg Print commands.

Before you print graphs, you need to understand the following terms:

- A **graph file** is a file 1-2-3 creates when you use /Graph Save. The graph file contains an image of the graph. A graph file has the file extension .PIC.
- The **interface**, or port, refers to the way your printer is connected to the computer. Your interface may be parallel or serial, and your computer may have more than one interface of either type.
- The **baud rate** is the speed at which PrintGraph sends data to a printer with a serial interface.
- A **font**, or typeface, is the overall design of printed characters. Each font has a distinct appearance, and all the characters within a font share common design characteristics.
- The **density** of printing, or resolution, refers to the detail in your printed graph. The higher the density, the finer the detail.
- A **driver set** is a file that contains settings saved from the 1-2-3 Install program. This allows you to use different hardware setups when using PrintGraph.

Printing a Graph with Worksheet Data

To print a graph with worksheet data, you must add the graph to the worksheet that contains the data. You use the Wysiwyg Graph commands to do this. (See "Adding Graphics to a Worksheet" on page 135.) Once you add the graph to the worksheet, you can use Wysiwyg to add enhancements to the graph. Before you print the worksheet with the graph, use :Print Preview to see what the printed version will look like. You can then perform further enhancements until you are satisfied with the results. Use Wysiwyg Print commands to print the worksheet and graphs you added. For more information, see "Printing with Wysiwyg Formatting" on page 89.

Printing a Graph with PrintGraph

The PrintGraph program is a 1-2-3 utility program that lets you print graphs from graph files you create in 1-2-3 with /Graph Save. Graph files are the only files PrintGraph can print.

To use PrintGraph, you must have a printer or plotter that is capable of printing graphs. PrintGraph does not work with all printers. If you are not sure whether your printer can print graphs, check your Hardware Chart or your printer manual. To use your printer with PrintGraph, you must select a graphics printer in the Install program. To select a graphics printer, see Change Selected Equipment in the Install program. For more information, see Chapters 2 and 3 of *Getting Started*.

Starting PrintGraph

You can start PrintGraph from the operating system, or with the Access system:

- Starting PrintGraph directly from the operating system prompt makes more of your computer's memory available for work, and saves the step of going through the Access system. When you start PrintGraph from the operating system, you return to the operating system when you end the PrintGraph session.
- The Access system lets you start PrintGraph by choosing the program name from a menu. Access makes it easy to switch back and forth among 1-2-3, PrintGraph, and the other 1-2-3 utility programs. When you start PrintGraph from the Access system, you return to the Access system when you end the PrintGraph session.

To Start PrintGraph

1. Make sure your computer is on and the operating system prompt is displayed.
2. At the operating system prompt, type cd \123r23 and press ENTER.

   If the 1-2-3 program is not located in \123R23, enter the correct directory name, including the drive, after cd.

3. Do one of the following:

From the operating system	Type pgraph, optionally followed by a space and the name of the driver set to use, and press ENTER.
From the Access system	To display the Access system menu, type lotus, optionally followed by a space and the name of a driver set, and press ENTER. Select PrintGraph from the Access menu.

If a driver set is not located in the current directory, you must specify the full path of the driver set, including a drive letter if necessary (such as B:). If you do not specify a driver set, the default driver set is used.

The PrintGraph main menu and settings sheet appear on the screen. PrintGraph displays the description of the highlighted command above the menu.

To Print a Graph

1. Save the graph to print in a graph file (.PIC) using /Graph Save in 1-2-3.

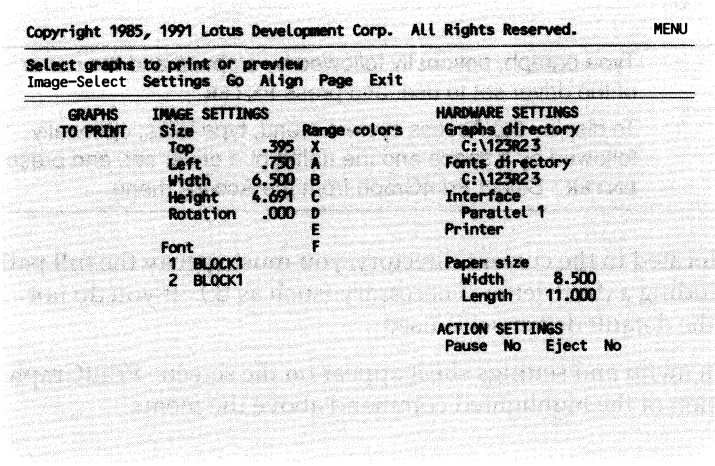
   /Graph Save saves the graph for later printing, not for viewing. If you are creating more than one graph and you want to save a graph so you can view it at another time, you must also name the graph using /Graph Name Create in 1-2-3 and then save the worksheet with /File Save.

   If you have only one graph in a worksheet, its settings are automatically saved when you save the worksheet.

   You cannot change a graph file (.PIC) in PrintGraph or in 1-2-3. To modify a graph, you must return to 1-2-3, retrieve the worksheet that contains the graph, change the graph settings, and save it again in a graph file (using /Graph Save). If you do not save a graph's settings as described above, you must recreate the graph from scratch before you can create a new graph file. W You can add a graph from a graph file to a worksheet with Wysiwyg.

2. Start PrintGraph using one of the methods described in the previous section.

   The PrintGraph settings sheet appears on the screen.



3. Select Settings from the PrintGraph main menu and make any necessary changes to the current settings.

   You may need to change the following settings so PrintGraph can work with your hardware:

   - Settings Hardware Graphs-Directory — Specifies the drive and directory where the graph file(s) you want to print are located.
   - Settings Hardware Fonts-Directory — Specifies the drive and directory where the PrintGraph font files (files with a .FNT extension) are located. The font files are usually in your Release 2.3 directory (\123r23).
   - Settings Hardware Printer — Specifies the printer to use to print the graphs.
   - Settings Hardware Interface — Specifies the port that connects the printer you want to use to your computer. If you are printing on a shared network printer, you must choose one of the options numbered 5 through 8, which refer to the logical devices LPT1, LPT2, LPT3, and LPT4. The device you use depends on the logical device name associated with the printer you want to use on the network, and is determined by the network software.
   - Settings Save — Saves these settings for future PrintGraph sessions.

4. Select Image-Select and follow the instructions on the screen to indicate the graphs you want to print.
5. Make sure the printer is properly connected to your computer, turned on, and online (ready to print). Also make sure that the paper is at the top of a new sheet.
6. Select Align to tell PrintGraph that you have positioned the paper at the top of a page.
7. Select Go to begin printing.

   To stop printing, press **CTRL-BREAK**; do not turn off the printer.

8. When printing is complete, select Page to advance the paper to the top of the next page.

   To print the next graph on the same page, skip this step and select the next graph to print (step 4).

9. When you are done using PrintGraph, select Exit to end the PrintGraph session.

   When you leave PrintGraph, you return to the operating system or the Access system, depending on how you started PrintGraph.

Solving PrintGraph Problems

This section offers solutions to some of the most common problems people have when using PrintGraph. If you have a problem using PrintGraph, try the following:

- Press F1 (HELP) for Help about a PrintGraph command or error message.
- Look for the solution in this section.
- Consult your computer dealer or technical resource person.
- If you are using 1-2-3 on a network, see your network administrator. If necessary, he or she can call Customer Support with your problem and information about your network.

Starting and Running PrintGraph

Problem: When I try to run PrintGraph, I get a message that says that there is no driver for the graphics printer I selected.

Solution: The printer setting you saved in PrintGraph does not match any of the graphics printers you selected in the Install program. Press ESC to clear the error message and select Settings Hardware Printer. If the correct printer is in the list that appears, select it. Then select Settings Save to save the information for future PrintGraph sessions. If the correct printer is not in the list, end PrintGraph and run the Install program to select a driver for the graphics printer you want to use.

Problem: When I try to start PrintGraph from the Access system, I get the message 'Cannot find COMMAND.COM.'

Solution: This problem is often caused by Terminate-and-Stay-Resident (TSR) programs you may be running, such as BPrint or local area network software. Unload any such programs and try running PrintGraph again. Unloading TSRs may involve turning the computer off and restarting it.

Printing

Problem: Sometimes my printed graphs look different from the way they looked on the screen.

Solution: This occurs because your printer's capabilities are different from those of your monitor. For instance, your printer may use a different font from the one on the screen, or your printer may size characters differently.

Problem: When I try to print a graph, I get a message that says no graphics printer is active.

Solution: You did not select a graphics printer in the Install program, or you did not indicate the graphics printer you want to use with the PrintGraph Settings Hardware Printer command. To install a graphics printer, leave PrintGraph and use Change Selected Equipment in the Install program; for more information, see Chapters 2 and 3 of *Getting Started*. To select a graphics printer to use, select Settings Hardware Printer from the PrintGraph menu and select the printer.

Problem: Is there a way I can print four graphs on a single page?

Solution: Select Settings Image Size Manual and specify the following settings: Left, .750; Top, .395; Width, 3.25; Height, 4.691; Rotation, 0. Then use Image-Select to choose two graphs to print. Select Go to print them. The two graphs print on the left side of the page.

After the first two graphs finish printing, roll the paper back to the top of the page and select two more graphs for printing. Then select Settings Image Size Manual and set the left margin to 4.0. Select Go, and the two graphs will print on the right side of the page.

PrintGraph has default top and bottom margins of .5 inch that it adds to what you specify for the top margin. Even if you set the top margin to 0 (zero), the top margin will be .5 inch.

W You can use Wysiwyg Graph commands to add the graphs to the worksheet and arrange them so they are side-by-side, and then use Wysiwyg Print commands to print them. See Chapter 11, starting on page 133.

Problem: I tried to print, but I got the message 'No graph files found in this disk/directory.'

Solution: PrintGraph needs to know where to look for the graph files (.PIC) that you are trying to print. Select Settings Hardware Graphs-Directory and type the full path of the directory that contains the graph files, for example, C:\GRAPHS. Then save the setting with Settings Save so you do not have to specify it again unless you move the graph files to another directory.

Problem: I tried to print, but got a message about a font not being found.

Solution: PrintGraph needs to know where to look for the font files (.FNT) it uses to print graphs. These fonts should be in your Release 2.3 program directory. Select Settings Hardware Fonts-Directory and type the full path of the directory that contains the font files, for example, C:\123R23. Then save the setting with Settings Save so you do not have to specify it again unless you move the fonts files to another directory.

Problem: When I tried to print, the WAIT indicator came on for a while but nothing printed.

Solution: Your printer port is not specified correctly. Select Settings Hardware Interface to select the correct interface for your printer and computer system.

Problem: Some of the information in my graphs is getting cut off when I try to print full and half-size graphs on my plotter.

Solution: For PrintGraph to work correctly with the default margin settings for full and half-size graphs, it must have an actual plotting area of 8 x 11 inches. Some plotters, however, do not have this size plotting area so the defaults are not appropriate. If you are trying to plot two half-sized graphs on the same sheet, reduce the top margin setting (Settings Image Size Manual Top) to half the default setting or to zero. Sometimes you may need to experiment a little to adjust the margin correctly. Once you set the top margin, save the setting with Settings Save.

Using Hewlett-Packard LaserJet Printers

Problem: I am using an HP LaserJet printer and have had trouble printing a graph in landscape orientation.

Solution: If you try to print a graph with the LaserJet set to landscape orientation (sideways printing), you will either get a blank page or a printout of indecipherable characters. The printer will be set for landscape orientation if the previous document was printed that way or, on the Series II, if you used the control panel to specify a font in landscape orientation. You need to reset the printer to portrait orientation. To do so, press the Hold to Reset key on the LaserJet Plus, press the Enter/Reset Menu key on the Series II, or turn the printer off and then back on. If you were using a soft font, be aware that turning off the printer removes the font from memory. If you want to change the orientation of the graph you can do so by changing its rotation with Settings Image Size Manual Rotation.

Problem: I cannot print a full page graph on my HP LaserJet printer.

Solution: If you have more than 512KB of internal printer memory, you may have some soft fonts loaded from another application. Reset the printer to clear out the soft fonts. If you only have 512KB of internal printer memory, you cannot print a full-page high-density (300 dots per inch (dpi)) graph on a LaserJet printer. You must

either purchase additional printer memory or decrease the size or resolution of the graph. To select a LaserJet printer, a LaserJet Plus printer, and a LaserJet II printer, see Change Selected Equipment in the Install program. For more information, see Chapters 2 and 3 of *Getting Started*. The LaserJet driver allows you to print graphs at 75 dpi, while the LaserJet plus driver allows you to print graphs at either low density (100 dpi) or high density (300 dpi). If you specify both in the Install program, you can then choose from three graphic densities when you use PrintGraph. Select Settings Hardware Printer and the three options will appear for you to choose from.

Problem: I am having trouble printing two half-size graphs on the same page with my HP LaserJet printer.

Solution: LaserJet printers cannot print in the bottom half inch of the page, so define the following settings with Settings Image Size Half for your half-size graphs: Top equal to .395, Left equal to 1.102, Height equal to 4.191, and Width equal to 5.805.

Viewing Graphs

Problem: I saved a graph in 1-2-3 and printed it with PrintGraph, but then was unable to view the graph again when I returned to 1-2-3.

Solution: When you save a graph in 1-2-3 with/Graph Save, you save it in a graph file (.PIC) that only PrintGraph or Wysiwyg can use. You cannot view or modify this file in 1-2-3. You can view a graph in PrintGraph by using Image-Select to highlight a graph and pressing **F10 (GRAPH)**. You cannot, however, make any changes to the graph in PrintGraph. To view the graph with Wysiwyg, select :Graph View PIC and specify the name of the graph file.

If you create a graph in 1-2-3 that you want to use in future 1-2-3 sessions, you must name the graph with /Graph Name Create. This command creates a named graph by assigning a name to whatever graph settings exist when you use the command. After naming a graph, you must also use /File Save to save named graphs with the worksheet. If you do not complete these steps, the settings for the graph are lost when you end the 1-2-3 session.

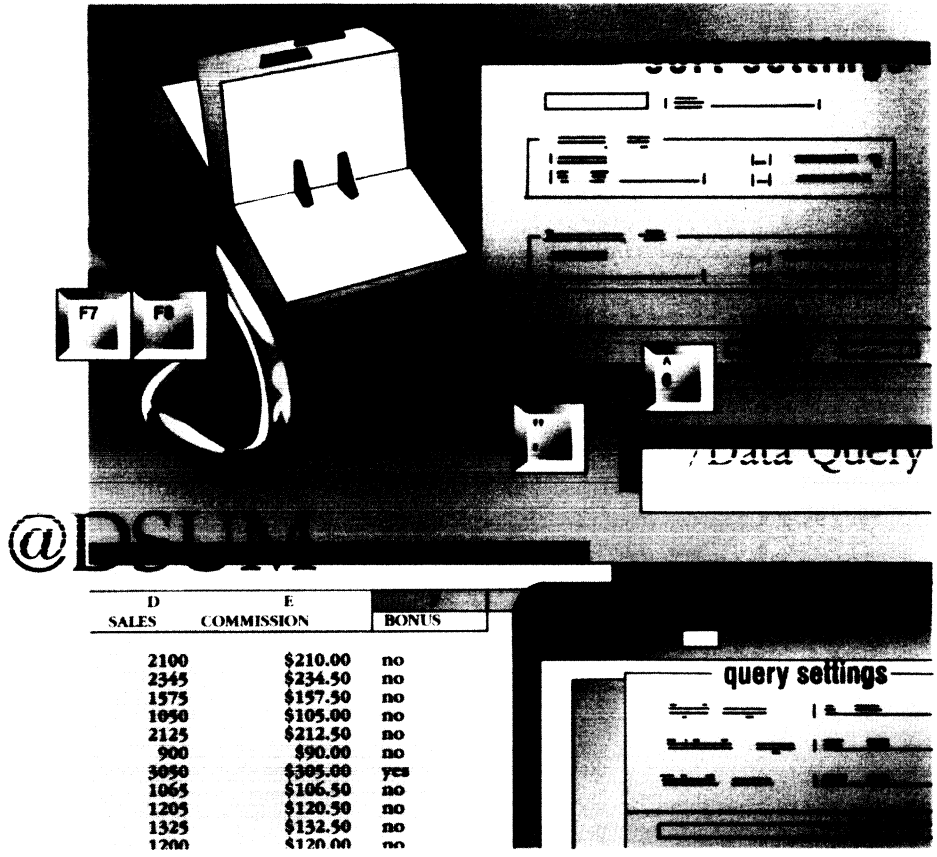
When you are ready to work with a particular graph in 1-2-3, you can use /Graph Name Use to select the named graph you want to work with. You will be able to view the graph, change its settings, and so on.

Changing Hardware Settings

Problem: When I try to select a printer with Settings Hardware Printer, I get a message that says there is no graphics printer in the driver set.

Solution: You did not select a graphics printer in the Install program. To select a graphics printer, see Change Selected Equipment in the Install program. For more information, see Chapters 2 and 3 of *Getting Started*.

Part IV
Working with Databases



D SALES	E COMMISSION	BONUS
2100	$210.00	no
2345	$234.50	no
1575	$157.50	no
1050	$105.00	no
2125	$212.50	no
900	$90.00	no
3050	$305.00	yes
1065	$106.50	no
1205	$120.50	no
1325	$132.50	no
1200	$120.00	no

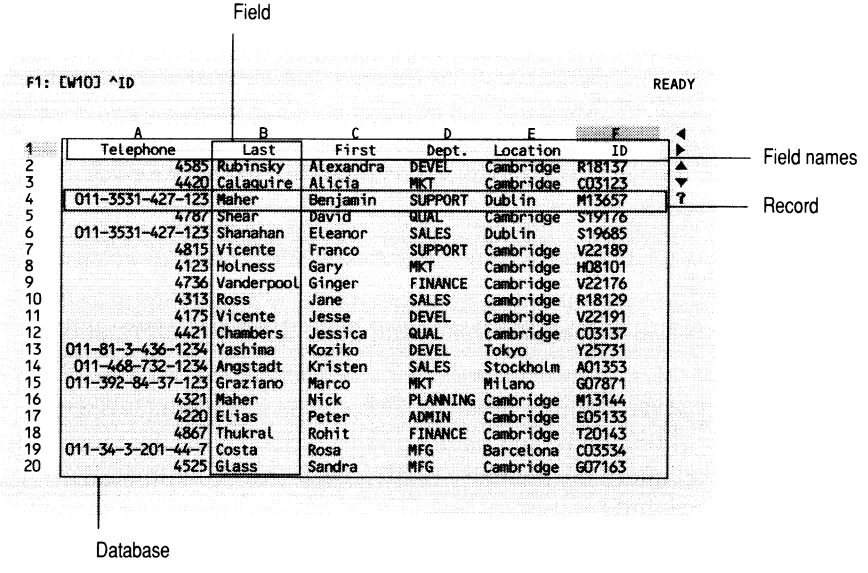
Chapter 14
Creating a Database

This chapter describes creating a database with 1-2-3. It includes the following sections:

What Is a 1-2-3 Database?

A 1-2-3 **database** is a range of related data organized in rows and columns in a worksheet. A worksheet may contain many different databases. 1-2-3 lets you work with the information in the database in many ways. For example, you can search for information that meets particular conditions, or reorganize information.

The database in the illustration below contains information about a company's employees: their telephone numbers, names, departments, locations, and ID numbers.



	A	B	C	D	E	F
1	Telephone	Last	First	Dept.	Location	ID
2	4585	Rubinsky	Alexandra	DEVEL	Cambridge	R18137
3	4420	Calaquire	Alicia	MKT	Cambridge	C03123
4	011-3531-427-123	Maher	Benjamin	SUPPORT	Dublin	M13657
5	4787	Shear	David	QUAL	Cambridge	S19176
6	011-3531-427-123	Shanahan	Eleanor	SALES	Dublin	S19685
7	4815	Vicente	Franco	SUPPORT	Cambridge	V22189
8	4123	Holness	Gary	MKT	Cambridge	H08101
9	4736	Vanderpool	Ginger	FINANCE	Cambridge	V22176
10	4313	Ross	Jane	SALES	Cambridge	R18129
11	4175	Vicente	Jesse	DEVEL	Cambridge	V22191
12	4421	Chambers	Jessica	QUAL	Cambridge	C03137
13	011-81-3-436-1234	Yashima	Koziko	DEVEL	Tokyo	Y25731
14	011-468-732-1234	Angstadt	Kristen	SALES	Stockholm	A01353
15	011-392-84-37-123	Graziano	Marco	MKT	Milano	G07871
16	4321	Maher	Nick	PLANNING	Cambridge	M13144
17	4220	Elias	Peter	ADMIN	Cambridge	E05133
18	4867	Thukral	Rohit	FINANCE	Cambridge	T20143
19	011-34-3-201-44-7	Costa	Rosa	MFG	Barcelona	C03534
20	4525	Glass	Sandra	MFG	Cambridge	G07163

A database can contain any kind of related information you want to store and use together. For example, business databases commonly include personnel information, company financial information, inventory, and customer and sales records. Any collection of data that you organize in rows and columns can be a database.

Parts of a Database

Fields and records are the basic structure for information in a database. To use a 1-2-3 database for more than simple data storage, however, you need to define certain ranges.

Fields and Records

In a 1-2-3 database, each column is a field and each row is a record.

A **field** is a column that contains one category of information that each record in the database has in common; for example, the database illustrated on page 167 has fields for telephone number, last name, first name, department, location, and ID. Each of these categories is a field, stored in a column in the 1-2-3 worksheet. The top cell of each column contains a **field name** that identifies the contents of the field; for example, the database illustrated on page 167 has the field names Telephone, Last, First, Dept., Location, and ID.

Field names are the basis for all databases. They determine how data is organized and how you will use it. Follow these rules when you create field names:

- Each field name must be a label, not a number or formula. To enter a field name that begins with a number or other nonalphabetic character, precede the name with a label prefix (' " or ^).
- Each field name must be unique.

A **record** is a single row that contains space for information for each field in a database. For example, in the database illustrated on page 167, each employee's information makes up a record.

Database Ranges

To use the 1-2-3 commands and @functions that manipulate database information, you need four ranges:

- The **input range** specifies the location of the database. The input range contains the entire database, including both field names and records. This is the range that 1-2-3 searches when you query the database (with a Data Query command) or when you use a database statistical @function.
- The **data range** is used only for the Data Sort command. The data range includes all the database records, but not the field names.

- The **criteria range** tells 1-2-3 which records to search for in the input range. The first row of the criteria range contains copies of the field names from the input range you are searching. The remaining rows contain the criteria you want 1-2-3 to use to select records during a Data Query command or when you use a database statistical @function.
- The **output range** is where 1-2-3 will put copies of the records that match the criteria in the criteria range when you use /Data Query Extract or /Data Query Unique. (An output range is not required for other Data Query commands or for database statistical @functions.) Like the criteria range, the first row of the output range must contain copies of the field names from the input range you want 1-2-3 to search. 1-2-3 uses the remaining rows of the output range to copy the selected records.

Setting Up a Database

Before you create a 1-2-3 database, consider how you will organize the data. For example:

- Are there types of data that are easily grouped together, such as Address, City, State, and Postal code? If so, include each one as a field.
- Is each record unique? For example, each person in the employee database illustrated on page 167 has a unique ID number, in case two people have the same information in one or more fields, for example, the same first name and last name.
- Do you want to see all the data in a database each time you use it, or only some fields? If you often need only certain fields, consider splitting the data into two databases; this saves both system memory and time entering and scanning data. Another way to organize data is to place frequently used fields at the beginning of the database, which reduces the need to scroll when moving from one field to the next.
- Does the structure of the database make it easy to locate and use data? For example, if first and last names are in a single Name field, it may be difficult to sort by last name or use first names in salutations in letters, or if an Address field includes the complete address, you may not be able to select only those records with a particular postal code.

When you create a database, remember these rules:

- The first row of the database must contain the field names. Subsequent rows must contain the records. Do not insert any blank rows or divider lines between the field names (the first row) and the records; you can, however, use Wysiwyg formatting to set off the field names.
- The entries in a field must be either all labels or all values. Do not enter values in some records and labels in other records for the same field.
- Field names must be unique within a database.

- A database can contain up to 256 fields and 8,191 records, though memory constraints may limit your database's size.

To Create a Database

1. Choose an area of the worksheet that is large enough to accommodate the entire database, including the associated ranges you will need for commands and @functions.

   If the database will be large, a new worksheet is best (see "Starting a New Worksheet" on page 16).

   The input range and the data range overlap, but the other ranges can be anywhere in a worksheet. It is generally easier to use the ranges, however, if they are in the same area of the worksheet, for example, if they all begin in the same column.

2. Enter field names in adjacent cells in the top row of the database.

3. Create records by entering data (text, numbers, @functions, or formulas) for each field in the rows immediately below the row of field names.

   Do not use any separator, such as a dashed line or blank row, between the row that contains the field names and the second row (the first record in the database).

   W You can use Wysiwyg formats such as bold or underscore to make the field names stand out from the records, and you can underscore rows in the database (for example, every fifth or tenth row) to make it easier to read across. For more information, see "Emphasizing Data" on page 56.

   You can also use /Worksheet Titles to make the field names appear at the top of the screen no matter where you are in the database (for more information, see "Keeping Headings in View" on page 249).

4. (Optional) Name the database ranges with /Range Name Create:

   Input range — The range that will contain both field names and records. Using INPUT as the range name for the input range makes it easy to remember the name of the input range when you need to specify it. Naming the input range makes it easier to specify the range for commands and database statistical @functions.

   Data range — The range that will contain records (*not* field names). Using DATA as the range name for the data range makes it easy to remember the name of the data range when you need to specify it. Naming the data range makes it easier to specify the range for the Data Sort command.

   For information on naming a range, see "Using Named Ranges" on page 29.

To Create a Criteria Range

1. Copy field names from the top row of the database to the top row of the criteria range.

   Choose an area of the worksheet that does not overlap the input range, for example, several columns to the right of the input range or several rows below it. If you enter the criteria range just below the input range and then want to add records to the database, use /Worksheet Insert Row to create more space below the input range. Do not put the criteria range below the output range.

   Use /Copy to copy field names exactly as they appear in the input range to ensure a correct first row of the criteria range. Although you need to copy only the names of the fields you want 1-2-3 to search, copying all the field names makes it easier to change criteria (using any fields) whenever you want. You can include up to 32 field names in the criteria range.

2. Enter criteria in the row(s) below the field names. For information about entering criteria, see "Writing Criteria" on page 172.

   In the second row (and subsequent rows) of the criteria range, enter your criteria. Enter each criterion below the appropriate field name. You can enter labels or values exactly as they appear in the input range if you want 1-2-3 to search for records that match the criteria exactly. You can also enter formulas as criteria. For more information, see "Writing Criteria" on page 172.

3. (Optional) Name the criteria range (field names and row(s) below them) with /Range Name Create.

   Using CRITERIA as the range name for the criteria range makes it easy to remember the name of the criteria range when you need to specify it. Naming the criteria range makes it easier to specify the range for commands and database statistical @functions. If the number of rows or fields in the criteria range changes, however, you may need to redefine the range name.

To Create an Output Range

1. Copy some or all of the field names from the top row of the input range to the top row of the output range.

   Choose an area in the worksheet that does not overlap your input or criteria range, for example, below or to the right of both ranges.

   Use /Copy to copy the first row of the input range to the first row of the output range to ensure an accurate copy of the field names. The output range can include some or all the field names from the input range; when you use a Data Query command, 1-2-3 will enter data only in the fields you include. Include each of the fields that you want 1-2-3 to use to copy records that match criteria. Each field name must be identical to the corresponding field name in the input and criteria ranges, but the fields in the output range can be in any order.

2. (Optional) Name the output range with /Range Name Create.

   Using OUTPUT as the range name for the output range makes it easy to remember the name of the output range when you need to specify it. Naming the output range makes it easier to specify the range for commands.

   If you specify a **single-row output range** that consists of just the row that contains the field names, 1-2-3 will erase all data in the columns below the field names to the bottom row of the worksheet every time you use /Data Query Extract or /Data Query Unique. Then 1-2-3 will use as many rows as it needs to copy data below the field names.

   CAUTION If these rows contain data, 1-2-3 erases it. If undo is on, press **ALT-F4 (UNDO)** immediately to undo the effects of the query and restore the deleted information.

   If you specify a **multiple-row output range** that consists of the field names in the first row and a number of blank rows below it, 1-2-3 will use only this range when you use /Data Query Extract or /Data Query Unique to copy data below the field names, even if more records match the criteria than will fit in the range. If the range is not large enough to accommodate all the records that match the criteria, 1-2-3 displays the message, 'Too many records for Output range' and fills only the specified range.

Writing Criteria

After you set up a criteria range (see "To Create a Criteria Range" on page 171), you must enter criteria to tell 1-2-3 which records to search for. **Criteria** are cell entries that 1-2-3 interprets as tests for the records in a database. The criteria determine whether a Data Query command or a database statistical @function includes a particular record. (For more information about using /Data Query, see "Working with Selected Records" on page 180); for information on using database statistical @functions with a database, see Chapter 16, beginning on page 185.)

You can write criteria that match label or value entries in the database, and you can use more than one criteria. In the following table, Last and First are field names; Shanahan is a label entry in the Last field.

To	Do this	Example
Match a particular label	Enter the label exactly as it appears in the input range.	Last First Shanahan
Match labels in which most characters are the same, but one (or more) is different	Substitute the wildcard ? (question mark) for any single character.	h?t matches hat, hot, and hut, but does not match huts; h??d matches head and hood, but not heel.

(continued)

To	Do this	Example
Match labels that begin with the same character(s), but end differently	Substitute * (asterisk) for all characters to the end of a label.	cat* matches cat, catsup, and category, but not cart.
Match all labels *except* the one you specify	Precede the label with a ~ (tilde).	~Shanahan matches all records with an entry in that field other than Shanahan.
Match labels that meet a specific condition	Enter a label prefix (' " or ^), one of the logical operators (= < <= > >= and <>), and the label.	'<>shanahan matches labels that are not shanahan '>shanahan matches labels that follow shanahan alphabetically
Match labels that meet several conditions	Combine the label-matching symbols. If a label criterion contains a wildcard (? (question mark) or * (asterisk)), you can use the logical operators = and <> only.	~S* matches all records with an entry in that field that do not begin with S.
Match a label that looks like a value	Enter = (equal sign), the label prefix, and the label.	='021* matches all labels that begin with 021 (such as ZIP codes 02104 or 02155
Match a value	Enter the value as the criterion. The format does not need to match the format of the value in the database.	$23 matches 23, 23.000, and 2.30E+01.
Match values that meet a condition	Enter a label prefix (' " or ^), one of the logical operators (= < <= > >= and <>), and the value.	'>1500 matches all entries greater than 1500 '<>1500 matches all entries that do not equal 1500.
Match only those records that meet all the criteria at once	Enter criteria for different fields in a single row of the criteria range.	Last First Shanahan E* Matches all records with both Shanahan in the Last field *and* any label beginning with E in the First field. 1-2-3 treats criteria in the same row as if they were linked by the logical operator #AND#.

(continued)

To	Do this	Example
Match records that meet any of the criteria	Enter criteria for different fields in separate rows of the criteria range.	Last First Shanahan Maher Matches all records with either Shanahan *or* Maher in the Last field. 1-2-3 treats criteria in separate rows as if they were linked by the logical operator #OR#.
Create criteria that match more than one condition in the same field	Use the logical operators #AND#, #OR#, or #NOT# in formulas.	+D2>150#AND#+D2<250 searches for entries greater than 150 but less than 250. +D2=150#OR#+D2=250 searches for entries that are *either* 150 *or* 250. D2 is the cell below the field name in the field in column D.

1-2-3 never matches a label criterion with blank cells in the input range.

If you selected the ASCII collating sequence when you used the Install program, 1-2-3 distinguishes between uppercase and lowercase letters when searching for labels. For example, ABC matches ABC, but not abc. If you selected any other type of collating sequence or did not make a selection — that is, if you are using the initial setting for the collating sequence (Numbers first) — 1-2-3 does not distinguish between uppercase and lowercase letters when searching for labels. You can change the collating sequence by selecting Change Selected Equipment in the Install program. For more information, see Chapters 2 and 3 of *Getting Started*.

When you write a comparison criterion in a field in the criteria range, 1-2-3 assumes the comparison criterion refers to the corresponding field in the input range unless you specify another field. For example, the criterion >250 in the Quantity field of the criteria range tells 1-2-3 to find records that have a value greater than 250 in the Quantity field in the database.

To match capitalization of labels, use @EXACT with the criterion. For example, 'shanahan matches Shanahan, shanahan, sHaNaHaN, and SHANAHAN. @EXACT("Shanahan",A2) matches only Shanahan (A2 is the cell below the field name in the field in column A). Use @EXACT to find records with entries that contain * (asterisk), ? (question mark), or symbols 1-2-3 will interpret as operators in criteria.

Use relative cell addresses in formulas that refer to database fields in the input range. Use absolute cell addresses to refer to values outside the input range. For example, use the criterion +B2<>C2 to search for records whose entry in the field in column B is not equal to its entry in the field in column C. Use +B2<>$J$2 to search for records whose entry in the field in column B is not equal to the value in cell J2, which is outside the database. For further information on logical operators and formulas, see "Working with Formulas" on page 37.

When you use a database statistical @function in a formula in a criteria range, make sure the database @function does not refer to that criteria range. Such a database statistical @function results in a circular reference, causing 1-2-3 to display an error message when you perform the query.

Adding a Record or Field

As you use a database, you often need to add new information to it. Records are the most common addition to a database; for example, each time a new employee joins a company, information about that employee must be added to an employee database such as the one illustrated on page 167.

The kind of information a database contains may change as well, so you may need to add a field to a database; for example, it might be useful to expand an employee database such as the one illustrated on page 167 to include employees' addresses.

To	Do this
Add a record at the end of the database	Enter data for each field in the rows immediately below the last record in the database. Use /Range Name Create to expand the range name to include the new record.
Add a record (or group of records) within a database, expanding the range name definitions	Select /Worksheet Insert Row. Specify a range that includes at least one cell in each row you are inserting (for example, to create 5 new records, insert 5 rows by specifying a range that includes a cell in each of 5 adjacent rows). Enter the new data in the blank row(s).
Add a field at the end of the database	Enter a field name in the top row of the database in the column immediately to the right of the last field. Enter data in the field for each record in the database. Expand the range name to include the new field.
Add a field (or group of fields) within a database, expanding the range name definitions	Select /Worksheet Insert Column. Specify a range that includes at least one cell in each column you are inserting (for example, to create 5 new fields, insert 5 columns by specifying a range that includes a cell in each of 5 adjacent columns). Enter data in the field(s) for each record in the database.

When you add records or fields (rows or columns) with /Worksheet Insert, 1-2-3 automatically expands the database range names to include the new records only if the new rows or columns are within the database. If you add records or fields at the end of the database (below the last row or to the right of the last column, for example), 1-2-3 does not expand the range name definition. To add records or fields at the end of a database, use the macro commands {APPENDBELOW} and {APPENDRIGHT}. {APPENDBELOW} is described in "Creating a Form" on page 197. For complete information on {APPENDBELOW} and {APPENDRIGHT}, see the *@Functions and Macros Guide*.

Chapter 15
Managing Database Information

This chapter describes organizing and retrieving database information. It includes the following sections:

Why Manage Database Information?

A 1-2-3 database typically contains records entered in no particular order — employee information entered as new employees join the company, for example, or inventory information that changes as new products replace old ones. When you need to use the database information, this random order can be a hindrance. 1-2-3 provides database tools that help make this information easier to manage.

Sorting makes database records easier to scan by putting them in numerical or alphabetical order. For example, you might want to arrange the records in an employee database in alphabetical order by last name, in alphabetical order by department and then by last name, or in date order by date of hire.

Criteria let you work with only some of the records in a database — those that match the criteria you specify. For complete information about creating criteria, see "To Create a Database" on page 170 and "Writing Criteria" on page 172.

Sorting a Database

Sorting arranges the records in a database in the order you specify. You use /Data Sort to sort the records in a 1-2-3 database, or to reorganize data in any range.

1-2-3 sorts data in ascending or descending order according to the **collating sequence** you specified when you used the Install program. The default collating sequence is Numbers first. Ascending sort order arranges data by listing numbers first unless you change the collating sequence. Descending sort order is the reverse. The following table shows the available collating sequences.

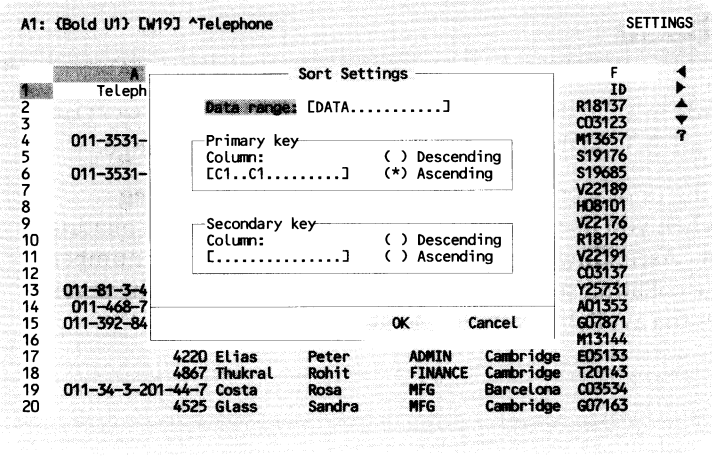
Collating sequence	Sort order
Numbers first	1. Blank cells 2. Labels beginning with numbers in numerical order 3. Labels beginning with letters in alphabetical order 4. Labels beginning with other characters 5. Values 1-2-3 ignores capitalization.
Numbers last	1. Blank cells 2. Labels beginning with letters in alphabetical order 3. Labels beginning with numbers in numerical order 4. Labels beginning with other characters 5. Values 1-2-3 ignores capitalization.
ASCII	1. Blank cells 2. All labels, using their ASCII values 3. Values Uppercase letters precede lowercase letters.

With the Numbers first sequence, 1-2-3 does not distinguish between uppercase and lowercase letters. To change the collating sequence, select Change Selected Equipment in the Install program. For more information, see Chapters 2 and 3 of *Getting Started*.

To Sort Database Records

1. Select /Data Sort.

   1-2-3 displays the Sort Settings dialog box. Press **F2 (EDIT)** *or* click the dialog box to activate it.



2. Specify the range to sort.

   The data range must contain all the records or rows you want to sort. If you are sorting a database, do not include the field names (the first row of the database). Use the range name DATA if you named the data range when you set up the database (see "To Create a Database" on page 170).

3. Specify the primary sort key and specify the primary sort order — Ascending (A–Z, and smallest number to largest) or Descending (Z–A, and largest number to smallest).

   Enter the cell address of any cell in the field you want 1-2-3 to use to determine the new order for your records.

   For more information about the sort order, see the introduction to this section, beginning on page 177.

4. Specify the secondary sort key and the secondary sort order (A for ascending or D for descending).

   Specify a secondary sort key if some records have the same entries in the primary sort key field and you want these records arranged in a specific order. After sorting the data according to the primary field, 1-2-3 will sort the data according to the secondary field. For example, if you select the field LAST_NAME as the primary sort key and the field FIRST_NAME as the secondary sort key, 1-2-3 sorts any records with the same LAST_NAME by FIRST_NAME.

   Enter the cell address of any cell in the field you want 1-2-3 to use to break ties in the primary sort key field.

5. Select OK.

   1-2-3 returns to the Data Sort menu.

6. Select Go to sort the database records.

CAUTION Be careful when you sort ranges that contain formulas. If a cell that contains a formula moves when you select /Data Sort Go, 1-2-3 adjusts relative cell addresses in the formulas to reflect the new position of the cell. This can cause problems if the formula refers to information outside the database. If you make a mistake while sorting a database and undo is on, press **ALT-F4 (UNDO)** immediately to restore the database to its original condition.

TIP Use /Data Fill to enter a field of record numbers in a database before you use /Data Sort, and include the record numbers in the data range. You can then use the field that contains these numbers as the primary sort key if you want to re-sort the records back to their original order.

Working with Selected Records

The Data Query commands let you locate and edit selected records in a database.

Before you can use /Data Query, you must set up the input range (the range that contains the records to search), the criteria range (the range that contains the conditions to match), and the output range (the range where 1-2-3 will place copies of records that meet the criteria). These are the ranges 1-2-3 will use when you use the Data Query commands to find, copy, or delete records; for more information about these ranges, see "To Create a Database" on page 170.

In addition to the Data Query commands, you can also use **F7 (QUERY)** to repeat the last query operation you performed. This is especially helpful if you are using a command such as /Data Query Extract, because you can change values in the database or the criteria range and then repeat the command without using the menu.

Deleting selected records

/Data Query Delete lets you delete the records in the input range that match the criteria you specified in the criteria range and shrink the input range to remove the blank rows. As a precaution against data loss, 1-2-3 prompts you for confirmation before it deletes the records.

Use /Data Query Delete to delete unwanted or obsolete records from database(s). Before you use this command, you may want to use /Data Query Find to check that the criteria select the correct records to delete before 1-2-3 deletes the records. /Data Query Delete does not highlight the records it deletes.

If you make a mistake and undo is on, press **ALT-F4 (UNDO)** immediately to restore the deleted records. If undo is not on, save the worksheet before you use /Data Query Delete. Then use /File Retrieve to restore the worksheet if the results of /Data Query Delete are incorrect.

Copying selected records

Extracting records from a database copies selected records from the input range to the output range. 1-2-3 selects the records to extract based on criteria you enter in the criteria range. To extract records, use /Data Query Extract.

Finding matching records

If you set up complex criteria to select records in a database, check the criteria with /Data Query Find to make sure 1-2-3 selects the correct records. /Data Query Find finds records in a 1-2-3 database that meet the criteria and highlights them so you can see where they occur in the database. Use /Data Query Find to locate records you want to edit.

Copying records without duplicates

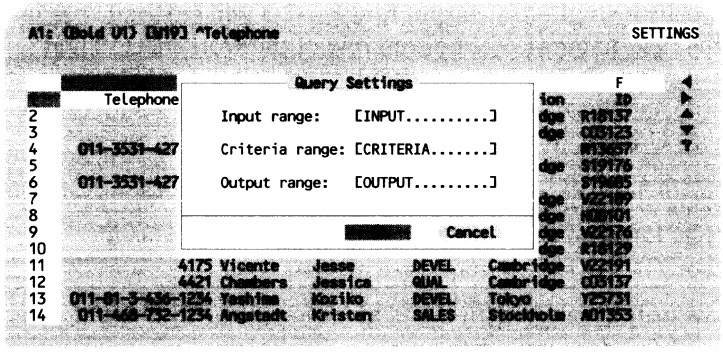
Adding records to databases often introduces duplicates, particularly if several people add to or use the database. To eliminate duplicates, use /Data Query Unique. /Data Query Unique lets you perform the same operation as /Data Query Extract except you can eliminate any duplicate records in the output range. When you use /Data Query Unique, 1-2-3 searches the input range, uses the criteria range to match the records, and automatically eliminates any duplicates when it copies the records to the output range.

/Data Query Unique uses the fields in the output range to match duplicates. For example, even though two records in the input range are not exactly alike, if the output range contains only fields that have the same entries in those two records, 1-2-3 does not copy the second record.

To Query a 1-2-3 Database

1. Select /Data Query.

   The Query Settings dialog box appears. Press **F2 (EDIT)** *or* click the dialog box to activate it.



   The dialog box lists the location of the input, criteria, and output ranges. You must specify an input range and a criteria range for all Data Query commands; an output range is necessary only for /Data Query Extract or /Data Query Unique.

2. Specify the input range.

   Specify the range name or range address. Use the range name INPUT if you named the input range with this name when you set up the database (see "To Create a Database" on page 170). Be sure to include the field names in the first row.

3. Specify the criteria range.

   Specify the range name or range address. Use the range name CRITERIA if you named the criteria range with this name when you set up the database (see "To Create a Database" on page 170). The criteria range must include a top row that contains the field names of the fields you want to query, and one or more rows below that contain the criteria.

4. (Optional) Specify the output range as either a single-row or multiple-row range.

   The output range is required for /Data Query Extract and /Data Query Unique. Specify the range name or range address. Use the range name OUTPUT if you named the output range with this name when you set up the database (see "To Create a Database" on page 170). Be sure to include the field names in the first row.

   Specify a single-row output range that contains just the field names if you have a lot of empty space below the field names and are not concerned about any existing entries being written over. 1-2-3 will use as many rows below the field names as it needs.

   CAUTION If you specify a single-row output range, 1-2-3 will erase all data in the columns below the field names to the bottom row of the worksheet. Then 1-2-3 creates an output range that contains as many rows as needed to contain the data. To avoid possible data loss, save the worksheet before using /Data Query Extract or /Data Query Unique. If you make a mistake and undo is on, press **ALT-F4 (UNDO)** immediately to restore the worksheet to its original state. If undo is not on, save the worksheet before you use /Data Query Extract or /Data Query Unique. Then use /File Retrieve to restore the worksheet if the results of /Data Query Extract or /Data Query Unique are incorrect.

   Specify a multiple-row output range with the field names as the first row if you want to be certain that 1-2-3 does not write over existing entries. 1-2-3 will write only to the multiple-row range you specify. If the range is not large enough to accommodate all the records that match your selection criteria, 1-2-3 will display the error message 'Too many records for the Output range.' Press **ESC** to return 1-2-3 to READY mode and then specify an output range with more rows, or specify just the row that contains the field names as the output range.

5. Select OK.

   1-2-3 returns to the Data Query menu.

6. Select a query operation.

Select	To	With this result
Delete	Delete records in the input range that match criteria in the criteria range; you must confirm the deletion by selecting Delete *or* select Cancel to cancel the command	1-2-3 deletes the records that meet the criteria and shrinks the input range to remove the blank rows. The range name definition does not change.
Extract	Copy records that match criteria to the output range	1-2-3 finds the records that meet the criteria and copies them to the output range. 1-2-3 copies formats (including Wysiwyg formatting) as well as entries. The records are in the same order they were in the input range. 1-2-3 copies only the fields included in the output range.
Find	Highlight records that match criteria	1-2-3 highlights the first record in the input range that matches the criteria. You can edit the record(s) /Data Query Find selected. If there are no matching records, 1-2-3 returns to the Data Query menu.
Unique	Copy records that match criteria to the output range; if two (or more) records are the same, eliminates duplicates in the output range	1-2-3 copies the records in the input range that match criteria to the output range, eliminating any duplicate records in the output range. 1-2-3 copies formats (including Wysiwyg formatting) as well as entries. The records in the output range are in the same order they were in in the input range.

7. If you selected /Data Query Find, use the following keys to move among the matching records in the input range.

Key	Description
←	Moves the cursor left one field within a highlighted record.
→	Moves the cursor right one field within a highlighted record.
↑	Moves the cell pointer up to other records in the input range that match the criteria. If there are no more matching records in that direction, 1-2-3 beeps.
↓	Moves the cell pointer down to other records in the input range that match the criteria. If there are no more matching records in that direction, 1-2-3 beeps.
END	Moves the cell pointer to the last record in the input range.

(continued)

Key	Description
ESC or ENTER	Ends /Data Query Find and returns you to the Data Query menu.
F2 (EDIT)	Lets you edit the field displayed in the current record. Press → and ← to move from field to field. Press ENTER to save the changes and continue using /Data Query Find; press ESC to cancel the changes and continue using /Data Query Find.
F7 (QUERY)	Ends /Data Query Find, leaves the cell pointer in the current cell, and returns 1-2-3 to READY mode.
HOME	Moves the cell pointer to the first record in the input range.

8. Select Quit to return 1-2-3 to READY mode.

   The cell pointer returns to the cell that was the current cell when you selected /Data Query Find.

Chapter 16
Calculating with Database Records

This chapter describes using database information in calculations. It includes the following sections:

What Calculations Are Available in a Database?

The entries in a 1-2-3 database are the same as any other worksheet entries. You can include any database entry in any formula or @function. In addition, you can use special 1-2-3 features to calculate with information in a database. The database statistical @functions use criteria to select the records used in the statistical calculation, and data tables allow you to cross-tabulate database information. You can also use lookup @functions to retrieve database information.

Calculating Database Statistics

The database statistical @functions find data that matches the criteria you set up and perform the calculations on the matching data, all in one step. To see which rows from the *input* range the @functions selected, use /Data Query Find with the same *criteria* and *input* ranges. For more information about the Data Query commands, see "Working with Selected Records" on page 180. For detailed information on the database statistical @functions, see the *@Functions and Macros Guide.*

Use database statistical @functions to calculate with records that match the criteria you set, and display the result in a single cell. The advantage of using database statistical @functions is that you do not need to extract records to perform calculations. A database statistical @function searches through the database, finds records that match the criteria, and calculates the result using the matching records. The database statistical @functions work the same way the statistical @functions work, if you tell 1-2-3 to use all values in the columns for its calculations. For more information about statistical @functions, see "Using Statistical @Functions" on page 103. For more information about criteria, see "Writing Criteria" on page 172.

The database statistical @functions include

- @DCOUNT — Counts a set of values that meet your criteria.
- @DMAX — Finds the greatest value in a set of values that meet your criteria.
- @DMIN — Finds the smallest value in a set of values that meet your criteria.
- @DAVG — Finds the average of a set of values that meet your criteria.
- @DSUM — Finds the sum of a set of values that meet your criteria.
- @DSTD — Finds the standard deviation of a set of values that meet your criteria.
- @DVAR — Finds the variance of a set of values that meet your criteria.

All database statistical @functions begin with a D and have the following syntax:

@DFUNCTION(input,field,criteria)

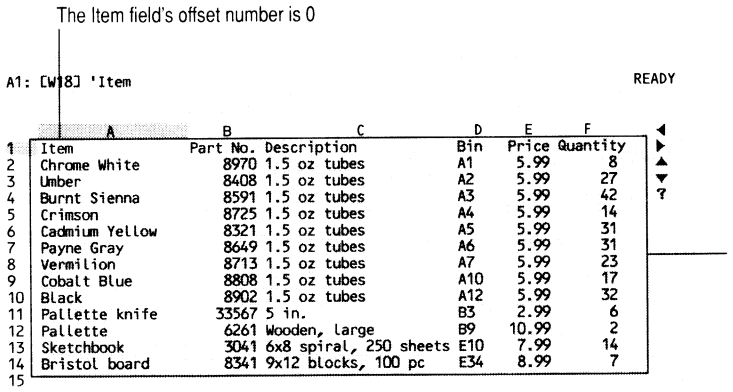
where *@DFUNCTION* is the name of the database statistical @function.

input is the address or name of a range that contains a database. Use the range name INPUT if you used this name for the input range when you set up the database (see "To Create a Database" on page 170). You do not need to use /Data Query to identify an *input* range before you use an *input* argument with a database @function. *input* includes the field names.

field is the column, or field, in the database. *field* is an offset number that indicates the field's position in *input* or the address of a cell that contains the offset number. A field is a column of related data in a database, including the field name. An **offset number** corresponds to the position the row or column occupies in *input*. The leftmost field's offset number is 0, the second field's offset number is 1, and so on. If the offset number is positive, 1-2-3 moves across the specified number of fields; if it is 0, 1-2-3 stays in the first field. If the value of *field* exceeds the number of columns in the database minus 1, the @function returns ERR.

criteria is a range that specifies selection requirements. A criteria range occupies cells in at least two rows. The first row contains some or all of the field names in the *input* range. The second row (and any subsequent rows) contains criteria that determine what records 1-2-3 selects. Enter criteria directly below the field name of the field to which they apply. *criteria* can be a range address or the name of a range. Use the range name CRITERIA if you used this name for the criteria range when you set up the database (see "To Create a Database" on page 170).

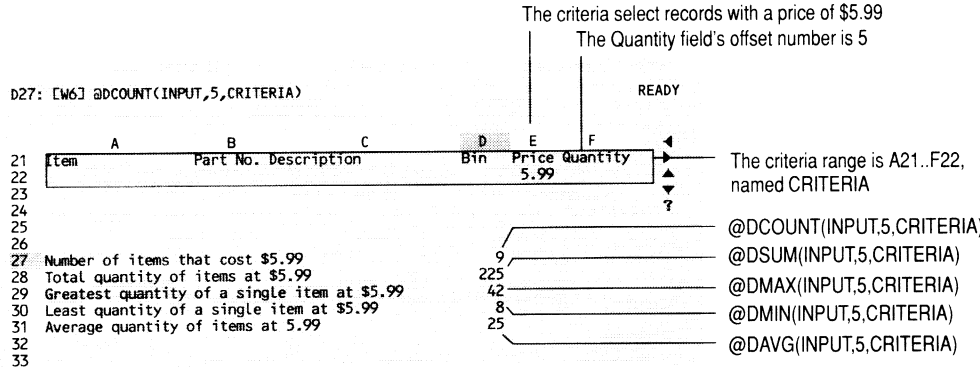
The following illustration shows an inventory database.



	A	B	C	D	E	F
1	Item	Part No.	Description	Bin	Price	Quantity
2	Chrome White	8970	1.5 oz tubes	A1	5.99	8
3	Umber	8408	1.5 oz tubes	A2	5.99	27
4	Burnt Sienna	8591	1.5 oz tubes	A3	5.99	42
5	Crimson	8725	1.5 oz tubes	A4	5.99	14
6	Cadmium Yellow	8321	1.5 oz tubes	A5	5.99	31
7	Payne Gray	8649	1.5 oz tubes	A6	5.99	31
8	Vermilion	8713	1.5 oz tubes	A7	5.99	23
9	Cobalt Blue	8808	1.5 oz tubes	A10	5.99	17
10	Black	8902	1.5 oz tubes	A12	5.99	32
11	Pallette knife	33567	5 in.	B3	2.99	6
12	Pallette	6261	Wooden, large	B9	10.99	2
13	Sketchbook	3041	6x8 spiral, 250 sheets	E10	7.99	14
14	Bristol board	8341	9x12 blocks, 100 pc	E34	8.99	7
15						

The following illustration uses five database statistical @functions with the inventory database illustrated above.

- @DCOUNT calculates the number of items that cost $5.99.
- @DSUM calculates the total quantity of items that cost $5.99.
- @DMAX finds the greatest quantity of items that cost $5.99.
- @DMIN finds the least quantity of items that cost $5.99.
- @DAVG calculates the average quantity of items that cost $5.99.



	A	B	C	D	E	F
21	Item	Part No.	Description	Bin	Price	Quantity
22					5.99	

Retrieving Particular Information

Database information is organized as a table — information is presented in columns and rows, and the information in each column or row is related. Because of this table structure, you can use a database in any situation where 1-2-3 uses information in a table. @VLOOKUP and @HLOOKUP are two 1-2-3 @functions that retrieve data from a **lookup table** — a table that stores information for easy retrieval. @VLOOKUP(*x,range,column-offset*) is generally more useful with database records

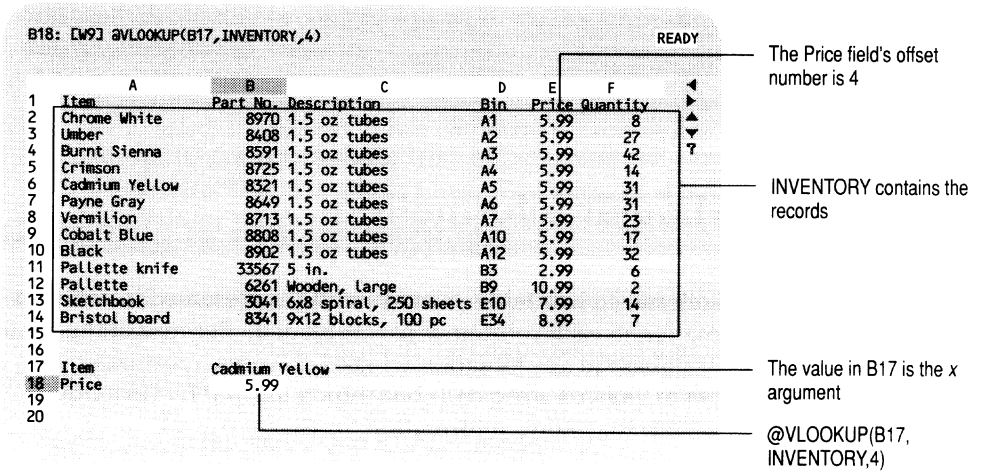
because it returns the contents of a cell in a specified column of a database; this column can be used as a vertical lookup table. @HLOOKUP(*x,range,row-offset*) returns the contents of a cell in a specified row of a horizontal lookup table.

Use @VLOOKUP or @HLOOKUP when you need to find information or items in a database individually, or to automate data selection for formulas or macros, such as in an application that supplies a price from a price list database.

@VLOOKUP and @HLOOKUP each require three arguments:

- *x* is a value or text, or the address or name of a cell that contains a value or text. If *x* is a value that is less than the first value in *range*, @VLOOKUP or @HLOOKUP returns ERR. @VLOOKUP and @HLOOKUP use *x* to determine what record or field the cell is in. If *x* is text, it must be an exact match of the text in *range*.
- *range* is the range address or range name of the range that contains the database, not including the row of field names. This is the same as the data range; use the range name DATA if you named the data range when you set up the database (see "To Create a Database" on page 170). If *x* is a value, the values in the first column or row of *range* must be sorted in ascending order.
- *column-offset* (@VLOOKUP) or *row-offset* (@HLOOKUP) is a value, or the address or name of a cell that contains a value. *column-offset* (@VLOOKUP) can be an integer from 0 through 255. *row-offset* (@HLOOKUP) can be an integer from 0 through 8,191. This argument represents an offset number, which corresponds to the position the row or column occupies in *range*. The leftmost column or top row has an offset number of 0, the second column or row has an offset number of 1, and so on. If the offset number is positive, 1-2-3 moves across the specified number of columns or rows; if it is 0, 1-2-3 stays in the first column or row.

The following illustration shows @VLOOKUP with the inventory database illustrated on page 187. Below the database, in rows 17 and 18, are an item from the database and its price. The price in cell B18 is retrieved by @VLOOKUP based on the item specified in cell B17, the *x* argument.

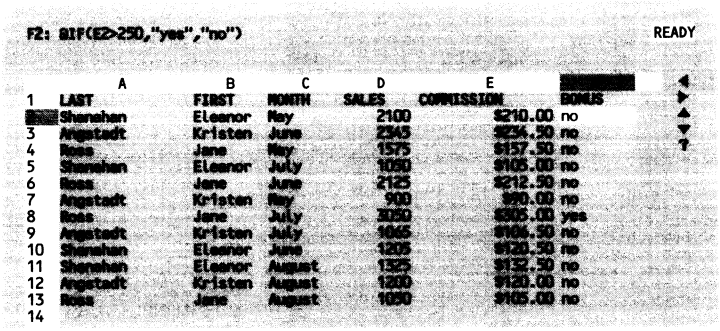


	A	B	C	D	E	F
1	Item	Part No.	Description	Bin	Price	Quantity
2	Chrome White	8970	1.5 oz tubes	A1	5.99	8
3	Umber	8408	1.5 oz tubes	A2	5.99	27
4	Burnt Sienna	8591	1.5 oz tubes	A3	5.99	42
5	Crimson	8725	1.5 oz tubes	A4	5.99	14
6	Cadmium Yellow	8321	1.5 oz tubes	A5	5.99	31
7	Payne Gray	8649	1.5 oz tubes	A6	5.99	31
8	Vermilion	8713	1.5 oz tubes	A7	5.99	23
9	Cobalt Blue	8808	1.5 oz tubes	A10	5.99	17
10	Black	8902	1.5 oz tubes	A12	5.99	32
11	Pallette knife	33567	5 in.	B3	2.99	6
12	Pallette	6261	Wooden, large	B9	10.99	2
13	Sketchbook	3041	6x8 spiral, 250 sheets	E10	7.99	14
14	Bristol board	8341	9x12 blocks, 100 pc	E34	8.99	7
15						
16						
17	Item	Cadmium Yellow				
18	Price	5.99				
19						
20						

@VLOOKUP compares the value for *x*, found in cell B17, to each cell in the first column of the inventory database. When 1-2-3 locates a cell in the first column that contains *x* (Cadmium Yellow in the illustration above), it moves across that row the number of columns specified by *column-offset* (4 in the illustration above) and returns the contents of that cell (Price in the illustration above).

Cross-Tabulating Database Information

Cross-tabulating information lets you reorganize database information and use a formula with values in the database. For example, the following database shows information broken down by last name, first name, month, sales, commission, and bonus.



You can cross-tabulate the information in the database to show the total sales for each person for each month. You use a data table to cross-tabulate database information. You can also use database statistical @functions in the formulas in the data table. This lets you perform calculations using data from selected records in the database.

Before you use /Data Table with a database, be familiar with the following:

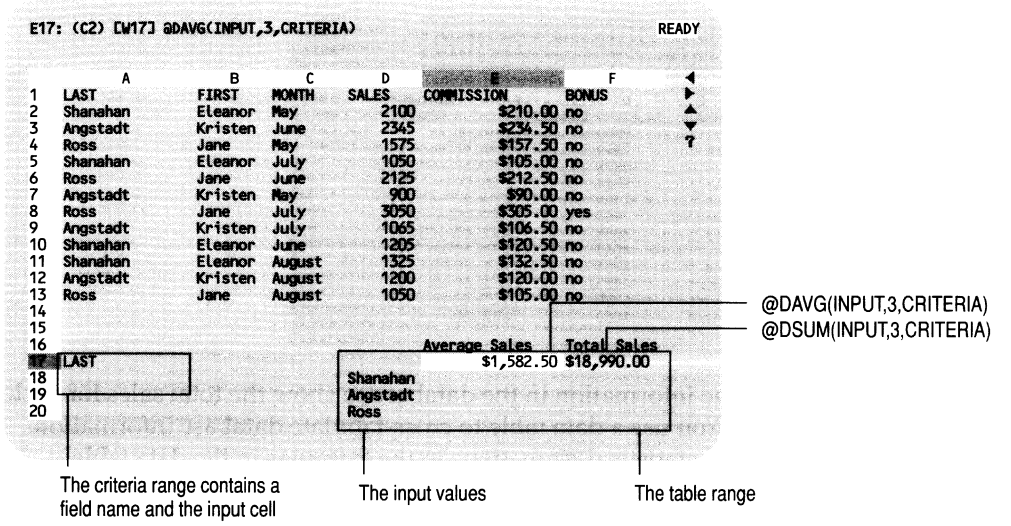
- The structure of databases. For information on setting up a database, see "To Create a Database" on page 170.
- Database statistical @functions. For detailed information on the database statistical @functions, see the *@Functions and Macros Guide.*
- The structure of a data table: you must set up the data table range, choose an input cell, and write a formula (or formulas). The steps below describe these briefly; for more information, see Chapter 8, beginning on page 97.

To Cross-Tabulate with /Data Table 1

1. Decide on a location for the data table range and input cell.

   The input cell must be in the criteria range, immediately below the field name for the variable you want to analyze. If you already created a criteria range for the database, you can use it to specify the input cell, or you can create a separate criteria range specifically for the data table.

   In the following illustration, the data table includes two formulas. The table range is D17..F20; the input values (salespeople) are in D18..D20; the formulas (average sales and total sales) are in E17..F17; and the results area is E18..F20. The input cell is A18, immediately below the field name (LAST) for the variable (salespeople) that will be analyzed.



	A	B	C	D	E	F
1	LAST	FIRST	MONTH	SALES	COMMISSION	BONUS
2	Shanahan	Eleanor	May	2100	$210.00	no
3	Angstadt	Kristen	June	2345	$234.50	no
4	Ross	Jane	May	1575	$157.50	no
5	Shanahan	Eleanor	July	1050	$105.00	no
6	Ross	Jane	June	2125	$212.50	no
7	Angstadt	Kristen	May	900	$90.00	no
8	Ross	Jane	July	3050	$305.00	yes
9	Angstadt	Kristen	July	1065	$106.50	no
10	Shanahan	Eleanor	June	1205	$120.50	no
11	Shanahan	Eleanor	August	1325	$132.50	no
12	Angstadt	Kristen	August	1200	$120.00	no
13	Ross	Jane	August	1050	$105.00	no
14						
15						
16					Average Sales	Total Sales
17	LAST				$1,582.50	$18,990.00
18					Shanahan	
19					Angstadt	
20					Ross	

2. Enter the formula(s); each formula must include a reference to the input cell.

   In the illustration above, the formulas — database @functions that calculate the average (@DAVG) and total sales (@DSUM) for each salesperson — are in E17..F17. In both formulas, INPUT is the name of the input range, which contains the field names and all the records in the database, and CRITERIA is the name of the criteria range, which contains a copy of the field name LAST and a blank cell (the input cell). (The 3 in the formula is the offset number for the SALES field.)

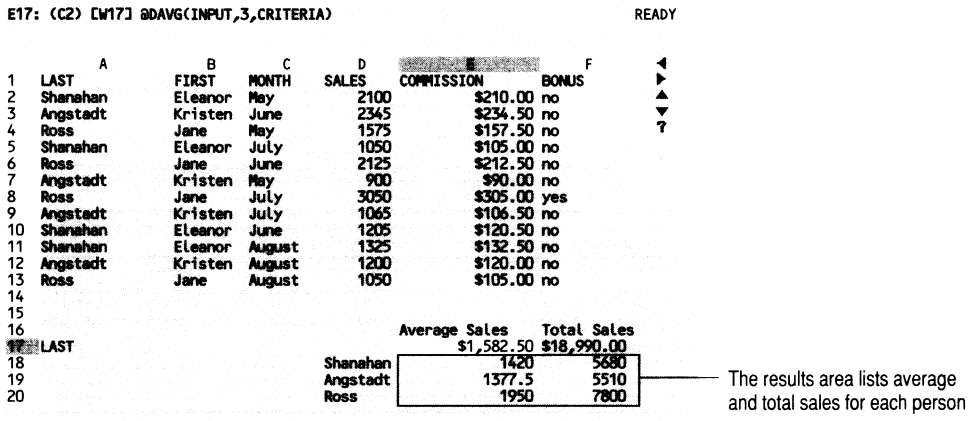
3. Enter the input values exactly as they appear in the database.

   In the illustration above, the input values (names of selected salespeople) are in D18..D20. To calculate the average and total sales for specific months, enter the months instead of names for the input values, and change the criteria range so that the field name is MONTH, not LAST.

4. Position the cell pointer in the blank cell in the upper left corner of the data table (D17 in the illustration above).

5. Select /Data Table 1.
6. Specify the data table range (D17..F20 in the illustration above).
7. Specify the input cell (A18 in the illustration above).

   1-2-3 calculates the formula(s), using each input value. The result of each calculation appears in the cell at the intersection of the row and column that contains the input value and formula, respectively. In the following illustration, the results area is E18..F20.

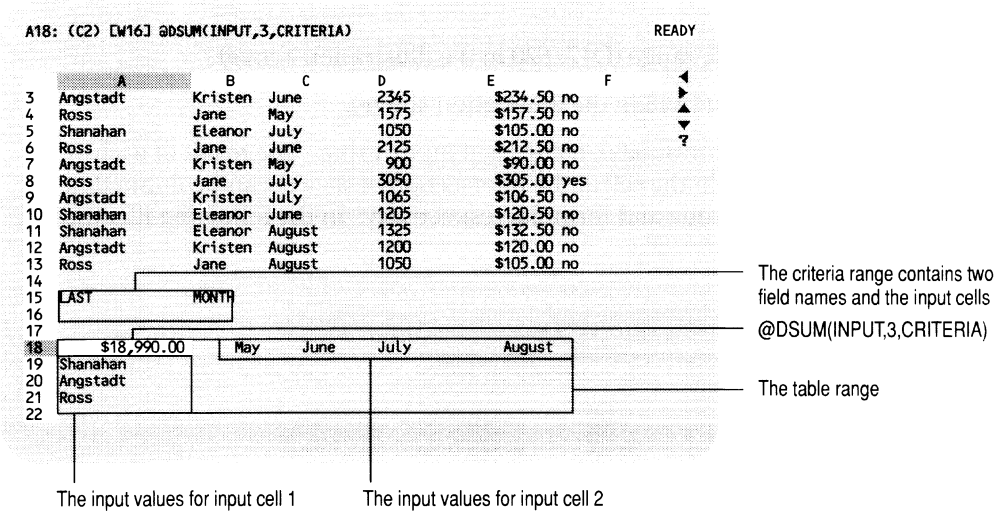


To Cross-Tabulate with /Data Table 2

1. Decide on a location for the data table range, input cell 1, and input cell 2.

   Each input cell must be in the criteria range, immediately below the field name for the variable you want to analyze. If you already created a criteria range for the database, you can use it to specify the input cell, or you can create a separate criteria range specifically for the data table.

   In the following illustration, the table range is A18..E21; the first set of input values (salespeople) is in A19..A21; the second set (months) is in B18..E18; the formula is in A18, and the results area is B19..E21. The two input cells are A16 and B16, immediately below the field names (LAST and MONTH, respectively) for the variable (salespeople) that will be analyzed. Because the input values for the salespeople are in the first column of the table range, cell A16 (which represents the salespeople in the @DSUM formula) must be input cell 1. Because the input values for the months are in the first row of the table range, cell B16 (which represents the months in the @DSUM formula) must be input cell 2.



2. Enter the formula, making sure it refers to both input cells.

   In the illustration above, the formula is in A18. INPUT is the name of the input range, which contains the field names and all the records in the database, and CRITERIA is the name of the criteria range, which contains a copy of the field names LAST and MONTH and a blank cell for each input cell. (The 3 in the formula is the offset number for the SALES field.) A1..F13 is the input range, which contains the field names and all the records in the database, and A15..B16 is the criteria range, which contains copies of the field names NAME and MONTH and two blank cells (the two input cells). (The 3 is the offset number for the SALES field.)

3. Enter the input values for input cell 1 exactly as they appear in the database.

   In the illustration above, the input values for the salespeople are in A19..A21.

4. Enter the input values for input cell 2 exactly as they appear in the database.

   In the illustration above, the input values for the months are in B18..E18.

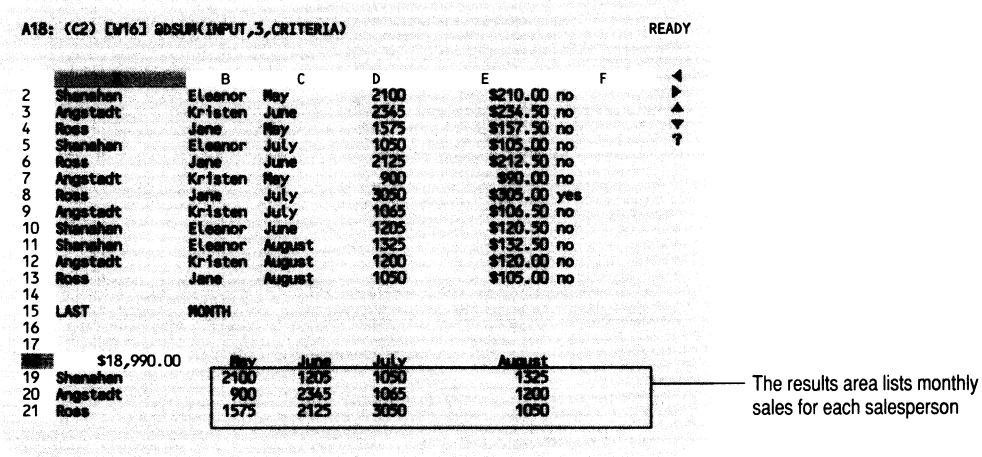
5. Select /Data Table 2.

6. Specify the table range (A18..E21 in the illustration above).

7. Specify input cell 1 (A16 in the illustration above).

8. Specify input cell 2 (B16 in the illustration above).

   1-2-3 pairs each input value in the top row of the data table range with each input value in the first column of the data table range and calculates the formula using each pair of values. The result of each calculation appears in the cell at the intersection of the row and column containing the two input values. In the following illustration, B19..E21 is the results area.



		B	C	D	E	F
2	Shanahan	Eleanor	May	2100	$210.00	no
3	Angstadt	Kristen	June	2345	$234.50	no
4	Ross	Jane	May	1575	$157.50	no
5	Shanahan	Eleanor	July	1050	$105.00	no
6	Ross	Jane	June	2125	$212.50	no
7	Angstadt	Kristen	May	900	$90.00	no
8	Ross	Jane	July	3050	$305.00	yes
9	Angstadt	Kristen	July	1065	$106.50	no
10	Shanahan	Eleanor	June	1205	$120.50	no
11	Shanahan	Eleanor	August	1325	$132.50	no
12	Angstadt	Kristen	August	1200	$120.00	no
13	Ross	Jane	August	1050	$105.00	no
14						
15	LAST	MONTH				
16						
17						
18	$18,990.00	May	June	July	August	
19	Shanahan	2100	1205	1050	1325	
20	Angstadt	900	2345	1065	1200	
21	Ross	1575	2125	3050	1050	

TIP You can use an XY graph to graph information from a data table 2. Use the values in either the first column or the top row as the X data range; use other columns in the results area of the table as the A–F data ranges. Do not include the formula in the top left cell of the table range in any of the graph ranges.

Chapter 17
Setting Up a Database for Others

This chapter describes techniques for setting up a database that other people will use to enter and retrieve data. It includes the following sections:

How Do I Set Up a Database Others Will Use?

A 1-2-3 database may contain data that only one person will use, such as a personal address and telephone number database. Frequently, however, a database contains information that many people need access to. In many situations, too, data may be entered by some people, and used by others.

When many people use a database, the risk of damaging or losing the data it contains increases. To protect a shared database, you can use several 1-2-3 features when you set up the database. Protecting areas of the worksheet keeps data in those areas safe from accidental changes. Hiding data prevents casual access to data. Finally, forms simplify data entry and retrieval.

Protecting Database Information

Protecting a database ensures important data isn't changed inadvertently. You protect database information as you protect any worksheet entries: Turn on protection with /Worksheet Global Protection. You use /Worksheet Global Protection in conjunction with /Range Prot and /Range Unprot to prevent changes being made to particular cells. When global protection is on, you can make changes only to cells that you explicitly unprotect with /Range Unprot. To specify the unprotected (blank) cells in a fill-in-the-blank entry form, you use /Range Unprot together with /Range Input or the {FORM} macro command (see "Creating a Form" on page 197). For more information about protecting worksheet data, see "Preventing Changes to Data in a Worksheet" on page 65.

To	Do this
Turn on worksheet protection	Select /Worksheet Global. Press F2 (EDIT) *or* click the dialog box to activate it. Mark Protection on. (/Worksheet Global Protection Enable)
Turn off worksheet protection	Select /Worksheet Global. Press F2 (EDIT) *or* click the dialog box to activate it. Remove the mark from Protection on. (/Worksheet Global Protection Disable)
Unprotect cells to allow changes	Select /Range Unprot and specify the range to remove protection from (in a data entry form, this is the entry area).
Reprotect cells that were unprotected with /Range Unprot	Select /Range Prot and specify the range to protect.

When worksheet global protection is on, 1-2-3 displays PR in the control panel when the cell pointer is on a protected cell. If you try to enter data, 1-2-3 beeps and displays an error message. When the cell pointer is on an unprotected cell, 1-2-3 displays a U in the control panel.

Hiding Database Information

You hide database information just as you hide any worksheet data: by hiding a cell or range so that it appears blank; by changing the default format to hide all entries in a worksheet; or by hiding one or more columns. In a database, hiding a column suppresses the display of fields that contain sensitive information, such as salary information, or projected earnings figures. The following table describes how to hide columns and display hidden columns; for more information about hiding data, see "Hiding Data in a Worksheet" on page 66. If Wysiwyg is attached, you can use the mouse to hide columns.

CAUTION Hidden data can be changed unless the cell(s) that contain the data are protected and global protection is on.

To	Do this with the keyboard	Or this with the mouse (Wysiwyg)
Hide column(s)	Select /Worksheet Column Hide. Specify the column(s) to hide.	Move the mouse pointer to the vertical line to the right of the column letter. Drag the dotted line to the left until it meets the line at the left side of the column.
Display hidden columns	Select /Worksheet Column Display. The hidden columns appear with an asterisk after the column letter. Specify the column(s) to display.	Hold down SHIFT and click the line at the right of the column to the left of the hidden column.

If you print a range that contains hidden cells or columns, the contents of the hidden cells do not print (unless the List entries check box is marked in the Print Settings dialog box).

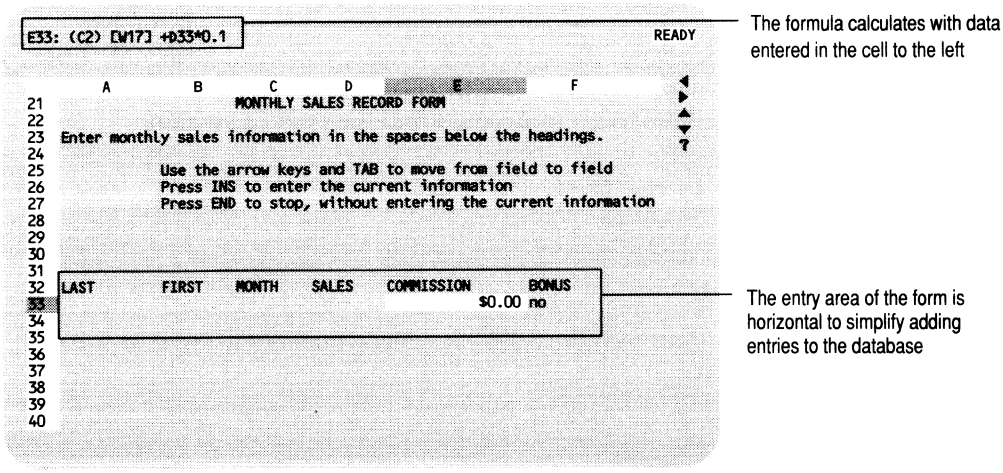
Column letters of hidden columns do not appear in the worksheet border. Ordinary navigation skips over hidden columns. The only way to move the cell pointer into a hidden column is in POINT mode (see "Specifying a Range" on page 26). In POINT mode, 1-2-3 temporarily displays a hidden column with * (asterisk) next to the column letter.

Creating a Form

A form simplifies the process of adding records to a database, particularly if the database contains many fields or if people who are unfamiliar with the database need to add information. A 1-2-3 form is similar to the many paper forms you use daily: It contains text that requests information, and blanks where you fill in the information. In a 1-2-3 form, these are cells that contain text and blank cells. The text prompts the user for the information to enter in the blanks and provides instructions for filling in the blanks. The blank cells are where you enter data when you use the form.

A form is usually separate from the database, so you must move the data from the form to the database. Using a horizontal form with the field names above the cells where you will enter data makes it easier to transfer the data to the database from the form. If you use a vertical form, you must either transpose the data with /Range Transpose to move it into the database, or move the data cell by cell.

Using a form also lets you enter some data automatically; for example, in the following illustration, a formula in the cell below COMMISSION calculates the commission automatically by multiplying the value entered in SALES by 10%.



Forms for data entry are frequently created and used within a macro. A **macro** is a set of instructions that automate a 1-2-3 task, providing all the commands, keystrokes, and other information 1-2-3 needs to carry out the procedure; for more information about macros, see the *@Functions and Macros Guide*.

1-2-3 Release 2.3 provides two ways to create a data entry form:

- /Range Input lets you limit cell pointer movement and data entry to unprotected cells in a range so you can enter or edit data in those cells but not in others. This command works with /Range Unprot. /Range Input is used for data entry in a fill-in-the-blanks entry form, with the unprotected cells acting as the blanks in the form.
- {FORM} is similar to /Range Input, but it gives you more control over user entries than /Range Input allows. {FORM} is a **macro command** (an instruction that tells 1-2-3 to perform a particular action). {FORM} uses **arguments** to control where and what data is entered with the form. Three {FORM} arguments (*call-table*, *exclude-list*, and *include-list*) let you redefine keys and limit the data users can enter (for example, you can restrict entries to numbers by excluding all keys but number keys).

When you create a database entry form for others to use, you generally want to automate data entry and restrict access to the database itself. Using {FORM} in a macro gives you the most control over what users enter. To move the information into the database automatically, you use {FORM} (or /Range Input) and another macro command, {APPENDBELOW}, within a macro. {APPENDBELOW} copies data, format, and protection settings, and expands the range name definition of the input range (if any) to include the new records. {APPENDBELOW} converts formulas to their values, and the records remain unprotected after it copies them. You may want to use /Range Protect to protect the new entries in the database.

In some databases, information is added infrequently; for example, in an inventory database, new products may be added only a few times a year. Quantities of existing products change frequently, however, and you may want to design a form that simplifies updating the database. To create such a form, you use a form and /Data Query together. You can also use {FORM} with /Data Query for data retrieval; for example, in an inventory database, a form could find the price of an item.

To Use a Simple Data Entry Form

1. Set up the form.
2. Select /Range Unprot.
3. Specify the cell(s) to unprotect (the cell(s) in which you want to enter or edit data during /Range Input).
4. Select /Range Input.
5. Specify the data input range.

The **data input range** is any range that includes the cells you unprotected in steps 2 and 3. If you set up an entry form (step 1), be sure to include the entire entry form — not just the blank cells — in the data input range.

1-2-3 moves the data input range to the upper left corner of the screen, with the cell pointer in the first unprotected cell in the range.

6. Enter or edit data in the unprotected cells.

   Use the pointer-movement keys to move within the data entry area. If you use ENTER or ESC, /Range Input ends. You can move the cell pointer only to the unprotected cells in the data input range.

   If a protected range is part of a data input range specified during /Range Input, you cannot move the cell pointer to the protected cells.

7. To end /Range Input, press either ENTER or ESC when 1-2-3 is in READY mode.

   1-2-3 returns the cell pointer to the cell it was in before you selected /Range Input and restores unrestricted cell pointer movement.

8. Move the data to the database with /Move.

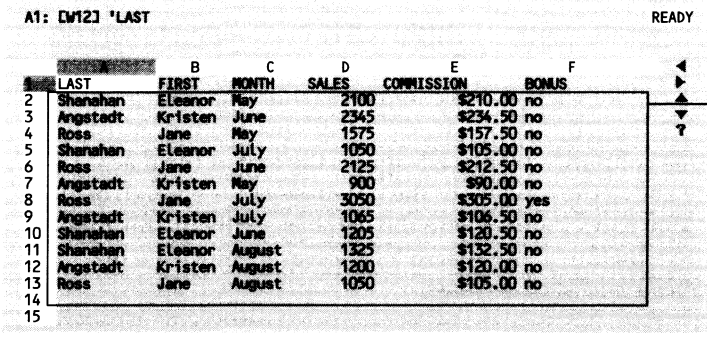
TIP When 1-2-3 encounters /Range Input in a macro, 1-2-3 suspends the macro until you press ENTER or ESC to end /Range Input. At that point, 1-2-3 continues the macro. Subsequent instructions in the macro might move the data to the database with /Move, for example, or append data in the form to the database with {APPENDBELOW}, as in the following section.

To Automate Data Entry

1. Set up the form.

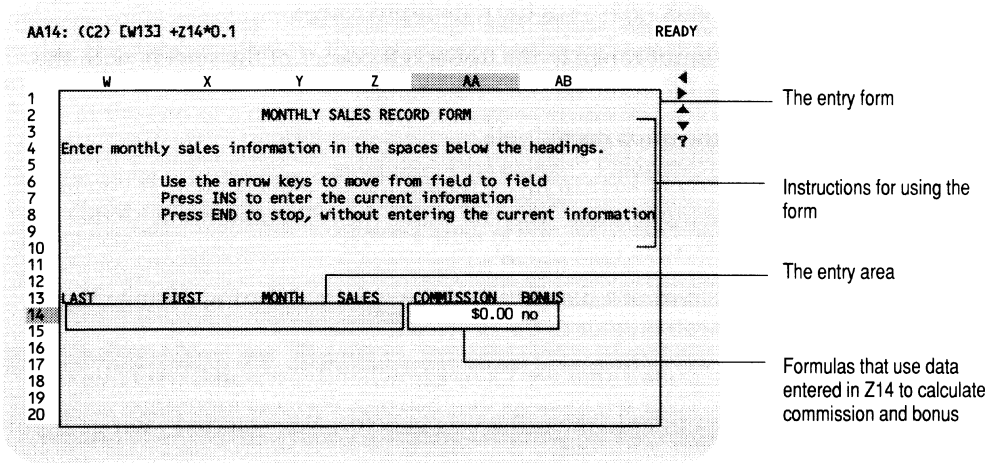
   To enter data in a database, use a horizontal form with the field names above the cells where you will enter data. If you use a vertical form, you must either transpose the data with /Range Transpose before you move it into the database, or move the data cell by cell.

   The database in the following illustration shows monthly sales figures for employees. New figures must be added frequently.



The sales database, in the range named SALESDB

The form in the following illustration will facilitate data entry in the sales database.



2. (Optional) Name the ranges you need to use with the form.

   Range names simplify referring to areas of the worksheet in the macro. In a form, you generally need a range name for the entire area that contains the form (W1..AB20, named ENTRY_FORM, in the illustration above), a name for the area where you will enter data when you use the form (W14..Z14, named ENTRY_AREA, in the illustration above), and a name for the database. If you use calculated fields in the form, as the illustrated form does, you must also name a range that includes both the entry blanks and the calculated information (W14..AB14, named RECORD, in the illustration above).

3. Select /Range Unprot to unprotect the cell(s) in which you want to enter data.

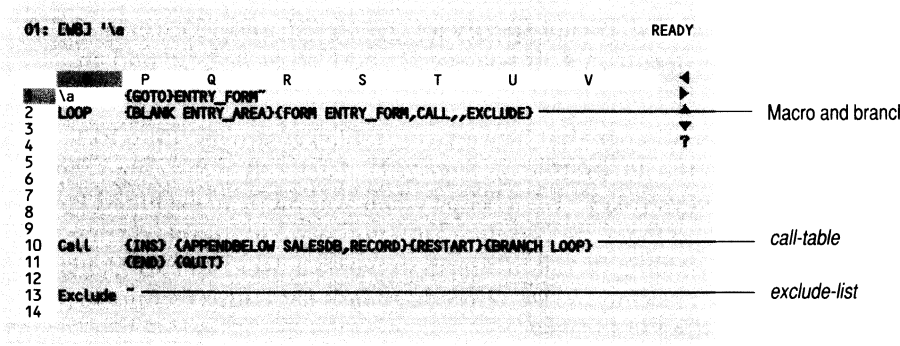
   This is the range where you will enter data. It is the range of blank cells in the form below (or to the right of) the field names (W14..Z14, named ENTRY_AREA, in the illustration above). If some of the cells contain formulas that calculate with data entered in the form, do not unprotect them (AA14..AB14 are not unprotected in the illustration above). If you are creating a form that others will use often, you may want to include this step as part of the macro.

4. Choose a location for the macro.

   Use cells in two columns for the macro: a single cell in one column to contain the macro name, and one or more cells in the other column to contain the macro. For clarity, plan to use a cell for each macro command (short macros can fit in a single cell, but this makes them difficult to read). Macro instructions must be in adjacent cells in the same column; a blank cell signals the end of the macro. The macro location must be above the top row of the database or far enough below the database to ensure that rows inserted into the database will not affect the macro. For complete information about macro location and entering a macro, see Chapter 3 of the *@Functions and Macros Guide*.

5. Enter the macro name in the left column of the location you chose, and then enter the macro as a label in the cell(s) in the column to the right of the name.

   For example, the macro in the following illustration is named \a (the second name in the column, LOOP, is used when the form macro repeats). This macro uses the form in the illustration on page 200.



This macro uses the following commands:

- {GOTO} moves the screen display so that the entire entry form is visible. {GOTO} is equivalent to pressing **F5 (GOTO)**. ENTRY_FORM in the illustration above is the name of the range that contains the form. The ~ (tilde) is equivalent to pressing **ENTER**.
- {BLANK *location*} erases the contents of the cell or range specified by *location*. ENTRY_AREA in the illustration above is the name of the range of unprotected cells that will be erased.
- {FORM *input-location*,[*call-table*],[*include-list*],[*exclude-list*]} lets you enter data in the unprotected cells within the form.

  input-location is the range that includes the entire form (W1..AB20, named ENTRY_FORM, in the illustration on page 200), within which is the range of unprotected cells you set up in step 3. *input-location* cannot include hidden columns.

  call-table is an optional two-column range that redefines keys (O10..P11, named CALL, in the illustration above). Use a *call-table* when you want to change how 1-2-3 responds to a particular keystroke; for example, the call table in the illustration above redefines **INS** so that pressing it inserts the information in the RECORD range in the database, and redefines **END** so that pressing it ends data entry without adding the information to the database.

  To set up a *call-table*, enter one or more macro names of keyboard keys in each cell in the first column (for more information about macro names of keyboard keys, see the *@Functions and Macros Guide*). In each adjacent cell in the second column, enter a set of macro instructions that 1-2-3 performs when you press the key(s) listed in the first column.

include-list is an optional range that lists allowable keystrokes (the illustration on page 201 does not include an *include-list*). You can specify any character key and any key name. The keys listed in the *include-list* are the only keys 1-2-3 will accept during data entry. Use an *include-list* when there are very few keys you want to allow during data entry; for example, if you want to restrict entries to numbers, list only numbers in the *include-list* range.

If you specify an *include-list*, do not specify an *exclude-list*, and vice-versa. 1-2-3 uses only one of these arguments. If you specify both an *include-list* and an *exclude-list*, 1-2-3 uses the *include-list*.

exclude-list is an optional range that lists unacceptable keystrokes (O13..P13, named EXCLUDE, in the illustration on page 201). Each cell in the range can contain one or more keystrokes. 1-2-3 beeps when you press an excluded key. Use an *exclude-list* when there are very few keys you want to disable during data entry; for example, disabling **ENTER** in a form prevents a user from accidentally ending data entry by pressing **ENTER**. Precede *exclude-list* with a comma to indicate that you omitted *include-list*.

call-table, *include-list*, and *exclude-list* are case-sensitive; for example, if *include-list* contains an uppercase B, but not a lowercase b, 1-2-3 lets you enter only uppercase B during the {FORM} command and ignores lowercase b.

- {APPENDBELOW *target-location*, *source-location*} copies the contents of *source-location* to the row(s) immediately below *target-location*.

  target-location is the range that includes the database (named SALESDB in the illustration on page 199).

  source-location is the range that includes the information to enter in the database. This is often only the range of unprotected cells (named ENTRY_AREA in the illustration on page 200), but can also include other cells, as in the macro in the illustration on page 201, where the range named RECORD includes the formulas in cells AA14..AB14 from the illustration on page 200.

- {RESTART} tells 1-2-3 to clear the **subroutine stack**, or levels of nesting of macro commands, after it finishes performing the current **subroutine**, or set of macro commands (in this case, the subroutine is the instructions 1-2-3 carries out when you press **INS**). This prevents too many levels of nesting from occurring. For more information about subroutines and nesting, see the *@Functions and Macros Guide*.

- {BRANCH *location*} transfers control from the current instruction to the instruction specified by *location*. *location* contains other macro commands or instructions; in the macro illustrated on page 201, the macro branches to LOOP, the second line of the macro, from the call-table when you press **INS**.

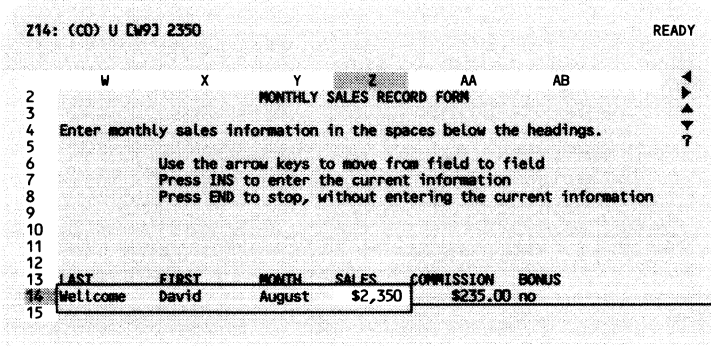
- {QUIT} ends the macro. The macro illustrated on page 201 uses {QUIT} to end the macro if you press **END**. Enter the keyword {QUIT} or leave a blank cell after the last line of the macro to end the macro.

6. Name the macro and any cell(s) to which the macro branches.

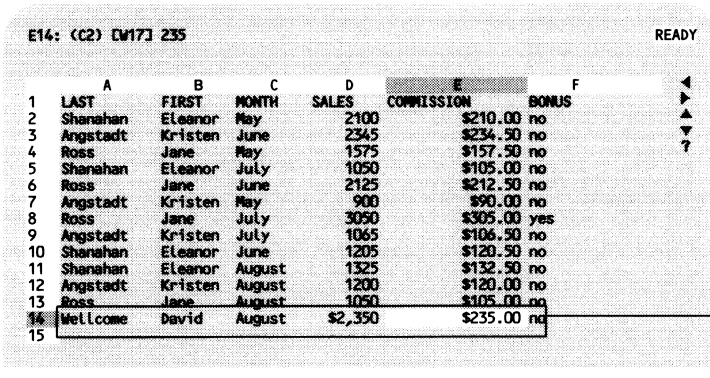
   Use /Range Name Create to assign a range name to the top cell of the macro and the first cell of any branch macro. For example, in the macro illustrated on page 201, there are two range names: \a names the first cell of the macro, cell P1, and LOOP names the first cell of the branch, cell P2.

7. To run the macro, press **ALT** and the macro name.

   For example, to run the macro illustrated on page 201, press **ALT**-a.



After you enter information in the unprotected cells in the form, the {APPENDBELOW} macro command copies the data to the database. In the macro illustrated on page 201, pressing **INS** moves the data, including calculated information, to the row below SALESDB, and expands the range to include the new row.



Chapter 18
Printing Database Information

This chapter describes ways of printing database information. It includes the following sections:

What's Different About Printing from a Database?

A database is like any information in a 1-2-3 worksheet. When you want to print the entire database, or any portion of it, you print the data using the 1-2-3 Print commands (or, if you have used Wysiwyg formatting, using the Wysiwyg Print commands). Chapter 7, beginning on page 77, provides instructions for printing worksheet data.

Often, however, you do not want to print the entire database, or you want to reorder information or enhance its appearance. For example, you may want to create a database report that presents information in a particular way, or that includes information from certain fields or records, and not others. Form letters and mailing labels are other common ways of formatting database information for printing.

Creating a Report of Selected Data

What a report includes and the kind of layout and formatting you want to use depend on the type of information the database contains and the purpose of the report. For example, you might use a database of monthly financial statistics to create a report of year-end financial summaries for investors in your company. Such a report would probably be a few pages long, and might take advantage of Wysiwyg formatting to enhance its appearance. The same database might furnish the information for a report to division heads on performance by division. This report might be longer, and would present the information differently. Format and appearance might be less important in such a report as well.

Database reports generally differ from worksheet print jobs in two ways:

- A database report usually includes selected records and/or fields, rather than the entire database. You select what information the report will include with criteria in a criteria range, an output range, and the Data Query commands (for more information, see Chapter 14, beginning on page 167, and Chapter 15, beginning on page 177).

- A database report often calculates or combines information from different records or fields. For example, a year-end financial summary such as the one mentioned above might use database statistical @functions, formulas, and other @functions to calculate with database information (for more information about calculating with database information, see Chapter 17, beginning on page 195).

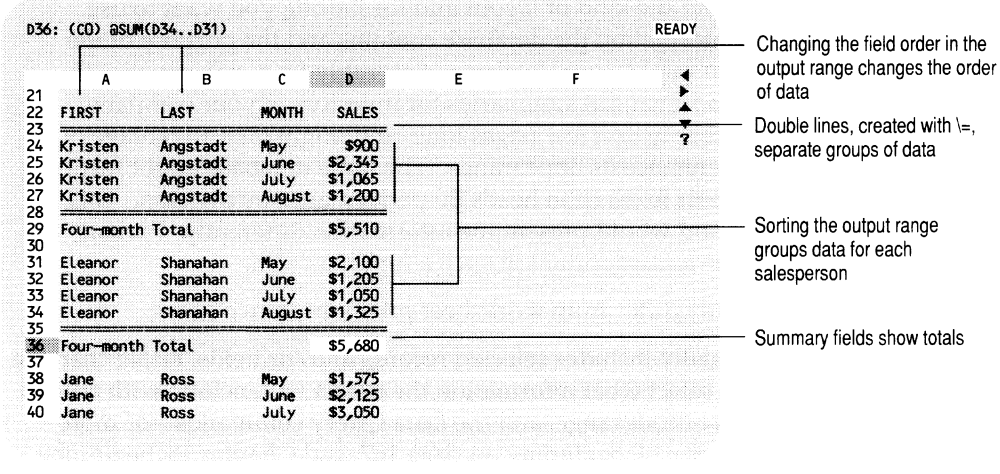
The output range is the basis for database reports that work with selected data (for more information about the output range, see "Parts of a Database" on page 168 and "Setting Up a Database" on page 169). Generally, it is the output range you will manipulate, format, and print. You will often need to adjust the output range, or even use several output ranges, to extract the data you want in the way you want. Once you have finished arranging the report, use the 1-2-3 or Wysiwyg Print commands to print the **report range** (the range that contains the finished report). For more information about printing, see Chapter 7, beginning on page 77.

The paragraphs that follow offer guidelines for creating database reports. The example uses data from the database illustrated below.

A1: [W12] 'LAST READY

	A	B	C	D	E	F
1	LAST	FIRST	MONTH	SALES	COMMISSION	BONUS
2	Shanahan	Eleanor	May	2100	$210.00	no
3	Angstadt	Kristen	June	2345	$234.50	no
4	Ross	Jane	May	1575	$157.50	no
5	Shanahan	Eleanor	July	1050	$105.00	no
6	Ross	Jane	June	2125	$212.50	no
7	Angstadt	Kristen	May	900	$90.00	no
8	Ross	Jane	July	3050	$305.00	yes
9	Angstadt	Kristen	July	1065	$106.50	no
10	Shanahan	Eleanor	June	1205	$120.50	no
11	Shanahan	Eleanor	August	1325	$132.50	no
12	Angstadt	Kristen	August	1200	$120.00	no
13	Ross	Jane	August	1050	$105.00	no
14						

The report range in the following illustration shows some ways to organize and enhance a report.



Design

Design the report before you create it. What type of report do you want? How many pages will the report have? How many pages will present introductory or summary material, and how many will present data? If you will create different reports from the same database, design and save each report in a separate copy of the worksheet, and then use /File Xtract to copy the database records into the report file each time you need to create a particular report.

Selecting records and fields to include in a report

To include only certain records in a report, set up criteria that select only the records you want. For example, to include sales for a particular salesperson, use the name of the salesperson as the criterion.

To include only certain fields in a report, enter only those field names in the output range. To arrange fields in a report in a different order from that of the database, put the field names in the output range in the order you want. For example, to put the FIRST field first, the LAST field second, and exclude commission and bonus information from a report of information about each salesperson in the database in the illustration on page 206, enter FIRST first and LAST second, and do not enter the COMMISSION or BONUS field names in the output range.

Spacing and emphasis

Use spacing to relieve the eye, to make data more readable, and to separate or group data. Insert blank rows in long columns of numbers to make the numbers more easily readable. Use blank columns to divide groups of data.

To generate a report that is broken into groups of related records separated by rows of space, use /Data Query Extract (or /Data Query Unique) with criteria that select all the records the final report will contain. Then use /Data Sort to organize the data in whatever way the report requires. Finally, insert one or more blank rows between groups with /Worksheet Insert Row. To use lines instead of space, enter \– or \= in each cell in the row, as in the illustration on page 206.

W Using Wysiwyg formats can also make a report easier to read. For example, using bold type or underlining for totals, underlining every fifth row of data, and using bold or italics for column headings all help enhance readability. (For an illustration of a report with Wysiwyg formatting, see the illustration of a printed report on page 209.)

Wysiwyg also lets you include graphics in a report. For example, in a report of sales data, you might want to include a line graph showing sales increase over the last five years, or a pie chart to illustrate market share. For more information about including graphics, see Chapter 11, beginning on page 133.

Summary fields

Summary fields summarize the data in a group of records. For example, in the report range illustrated on page 206, @SUM in cells D29 and D36 total the figures in the four cells above the line.

Type

W Use typefaces and type styles judiciously. In most cases, a single typeface is adequate. Two may improve the quality of your report; for example, for field names or titles, you may want to use display type (type that is larger or heavier than the regular text type). For text type, use a point size that ensures your audience will be able to read the report comfortably; 10- and 12-point type are adequate for regular text, and smaller type is suitable for notes and footnotes.

Titles or field names (borders)

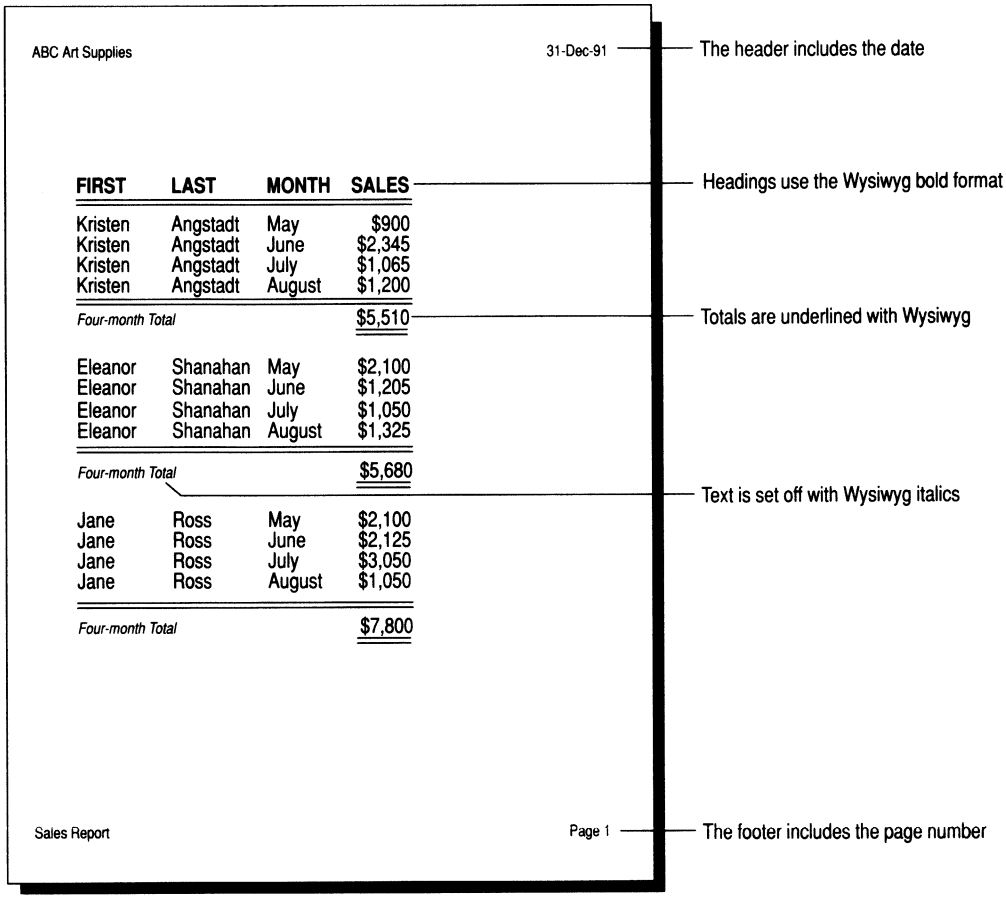
Database reports are one of the places where print borders are most useful. Borders are headings or titles that appear at the top or at the left of each page of a printed report. In a database, row borders are most often used to print field names at the top of each page. You can create borders with either the 1-2-3 Print command or the Wysiwyg Print command. Wysiwyg lets you format the text in the borders.

Use initial capitalization for titles rather than all uppercase (Annual Sales rather than ANNUAL SALES). Capital letters take up valuable space and are hard to read. @PROPER converts text to initial capitalization without retyping. To emphasize titles, use bold, underlining, or display type. The Wysiwyg Swiss typeface is a good typeface for titles. Use a type size that is at least 2 points larger than the text typeface. To change typeface or type style in a border, you must use Wysiwyg.

Headers and footers

Use headers and footers in database reports to date the report, to include the title of the report on each page, or to include notes that apply to the entire database.

W You can create headers and footers with either the 1-2-3 Print commands or the Wysiwyg Print commands, but you must use Wysiwyg to format the text they contain (for more information, see "Formatting Text When You Can't Use the Menu" on page 59).



Creating Mailing Labels

Mailing labels and form letters are two of the most common ways of using database information. Using a macro simplifies the task of creating labels or the name and address information in a form letter. This section describes how to create a macro that prints mailing labels from a database. The sample macros file, SAMPMACS.WK1, contains a similar macro you can experiment with. For more information about sample macros, see Chapter 5 of the *@Functions and Macros Guide*.

To Create Mailing Labels

1. Enter the names and addresses in a database.

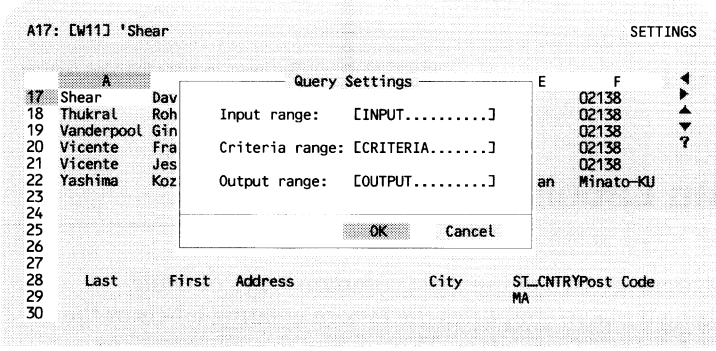
   For example, the database illustrated below contains employees' names and addresses.

A1: [W11] ^Last READY

	A	B	C	D	E	F
1	Last	First	Address	City	ST_CNTRY	Post Code
2	Angstadt	Kristen	Box 123, Farogatan 123	Stockholm	Sweden	S-164 28
3	Boveroux	Victor	123 Rue Cerise	Paris	France	02138
4	Calaguire	Alicia	123 Apple Tree Road	Cambridge	MA	02138
5	Chambers	Jessica	123 Yewberry Drive	Cambridge	MA	02138
6	Costa	Rosa	Avenida las Palmas 1	Barcelona	Spain	2C 08028
7	Elias	Peter	12 Boxwood Drive	Cambridge	MA	02138
8	Glass	Sandra	4321 Chestnut	Cambridge	MA	02138
9	Graziano	Marco	Via del'Arancia 123	Milano	Italy	20141
10	Holness	Gary	123 Sycamore Dr	Cambridge	MA	02138
11	Lane	Tessa	321 Cottonwood Blvd.	Cambridge	MA	02138
12	Maher	Benjamin	123 Lotus Drive	Dublin	Ireland	
13	Maher	Nick	321 Pine Street	Cambridge	MA	02138
14	Ross	Jane	123 Spruce Road	Cambridge	MA	02138
15	Rubinsky	Alexandra	1234 Cherry Tree Ln	Cambridge	MA	02138
16	Shanahan	Eleanor	312 Limetree Road	Dublin	Ireland	
17	Shear	David	321 Pear Tree Lane	Cambridge	MA	02138
18	Thukral	Rohit	1234 Cypress	Cambridge	MA	02138
19	Vanderpool	Ginger	321 Orange Tree St	Cambridge	MA	02138
20	Vicente	Franco	231 Oak Drive	Cambridge	MA	02138

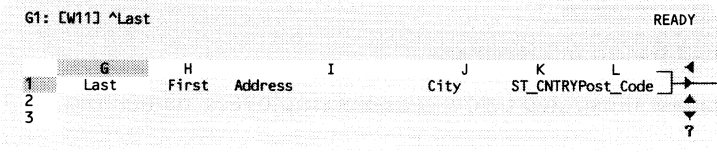
2. (Optional) Copy records that meet criteria to the output range with /Data Query Extract.

   You can also add this step to the macro. To create mailing labels from every record in the database, do not use criteria or an output range. For more information about criteria and the output range, see Chapter 14, beginning on page 167. The criteria in the following illustration select records of employees who live in Massachusetts.



3. Copy the field names from the database to another area of the worksheet.

   For example, in the following illustration, the field names in A1..F1 have been copied to G1..L1.



4. Use /Range Name Labels Down to assign each field name as the range name for the cell below it (in the illustration above, the field names in G1..L1 are assigned to cells G2..L2).

5. Choose a column for the print range.

6. Use /Worksheet Column Set-Width to set the width of the print range column.

   Set the column width to 40 (or any setting that is at least one character wider than the longest mailing label). In this example, column M is the print range column.

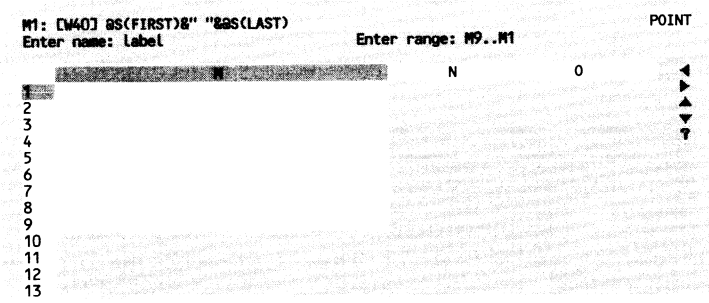
7. Create the formulas that will produce the mailing label.

   Enter the following formulas in three consecutive cells in the print range column, using the range names you created from the field names in your database in step 4. (Each • (bullet) represents a space. The @S function prevents blank cells in a database record from causing formulas to display and print ERR.)

   @S(FIRST)&"•"&@S(LAST)
   @S(ADDRESS)
   @S(CITY)&"•"&@S(ST_
   /CNTRY)&"••"&@S(POSTAL_CODE)

8. Name the print range with /Range Name Create.

   The print range contains the formulas and as many rows as necessary for the printer to skip from one mailing label to the next. In the following illustration, the range M1..M9, named LABEL, includes six extra rows.



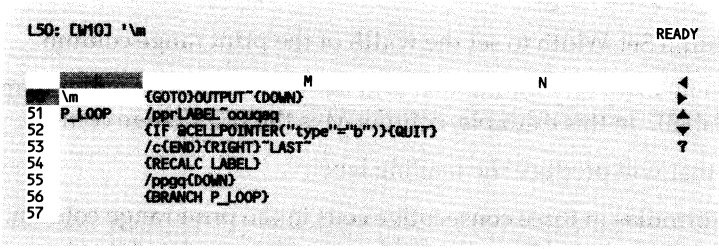
9. Choose a location for the macro.

   Macro instructions must be in adjacent cells in the same column; a blank cell signals the end of the macro. The macro location must be above the top row of the database or far enough below the database to ensure that rows inserted into the database will not affect the macro. For complete information about macro location and entering a macro, see Chapter 3 of the *@Functions and Macros Guide*.

10. Enter the macro name in the left column of the location you chose.

11. Enter the macro as a series of labels in the cell(s) to the right of the name.

    Use the macro in the illustration below, but substitute the range names you used in your database if they are different.



    The macro above contains the following instructions:

- {GOTO}*location* moves the cell pointer to the first cell in the database (or the output range if you extracted records in step 2); *location* is the name of the range that contains the database (or the output range, named OUTPUT in the example). {DOWN} moves the cell pointer down one row to the leftmost cell in the first record.
- /ppr*name*~ selects /Print Printer Range and enters *name* (LABEL in the example) as the print range.
- oouqaq selects Options Other Unformatted for no top-and-bottom margins or page breaks, leaves the /Print Printer Options menu, selects Align to align the paper in the printer, and leaves the /Print menu.
- {IF @CELLPOINTER("type")<>"b"} checks to see whether the current cell is blank (a blank cell signals the end of the database records or records in the output range).
- If the cell is blank, the macro ends with {QUIT}. If the cell contains information, the macro continues to the next line.
- /c{END}{RIGHT}~LAST~ copies the current record from the database or output range to the cells you named in step 4. These are the cells the formulas use to create the mailing labels. In the example, these cells are named LAST, FIRST, ADDRESS, ST_CNTRY, and POSTAL_CODE. If you used a different field name for the leftmost cell, use that name instead of LAST.
- {RECALC LABEL} recalculates the mailing-label text formulas using the new information.
- /ppgq{DOWN}{BRANCH P_LOOP} selects /Print Printer Go Quit to print the current mailing label and then leave the /Print menu, moves the cell pointer down one row, and branches back to cell P_LOOP (cell L51 in the example) to create the next mailing label.

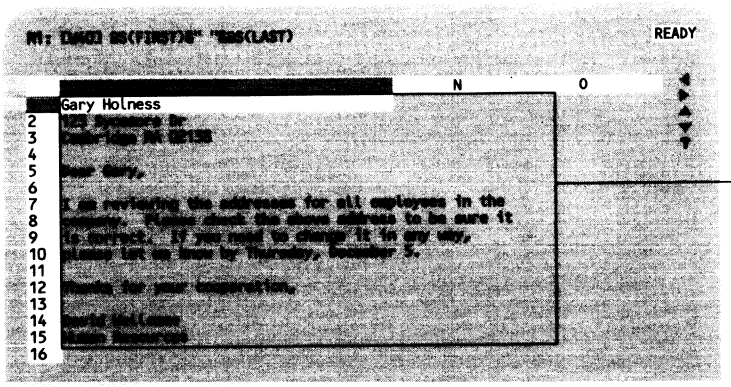
12. Name the macro and any cell(s) to which the macro branches.

    Use /Range Name Create to assign a range name to the top cell of the macro and the top cell of any branch macro. For example, in the macro illustrated on page 212, the macro name is \m; there is one branch, named P_LOOP.

13. To run the macro, press ALT and the macro name.

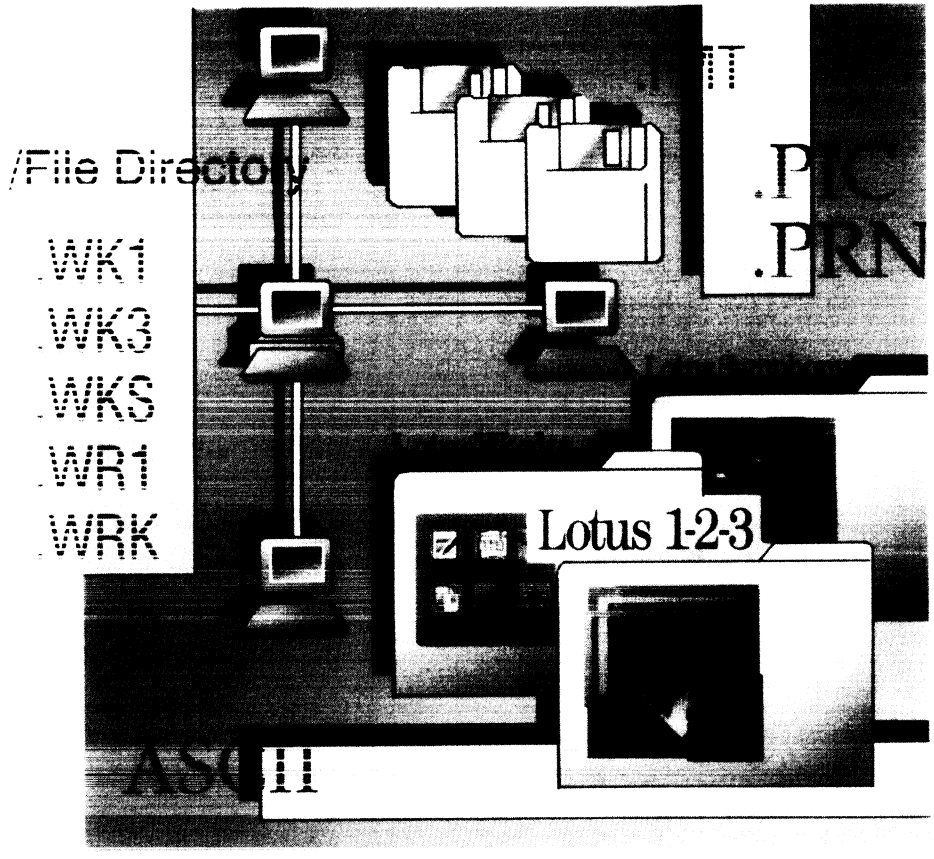
    For example, to run the macro illustrated on page 212, press ALT-m.

TIP To create form letters, create the formulas described in step 7. Use these formulas to generate the name and address sections of the form letter, as in the following illustration. Then create another formula that uses only the first name to generate the salutation. Specify the entire form letter as the print range.



If you have used Wysiwyg formatting in the form letter, use the Wysiwyg Print command to print the letter. For more information, see "Printing with Wysiwyg Formatting" on page 89.

Part V
Working with Files



Chapter 19
Managing Files

This chapter describes the files you use with 1-2-3 and how to manage them. It includes the following sections:

What Is a File?

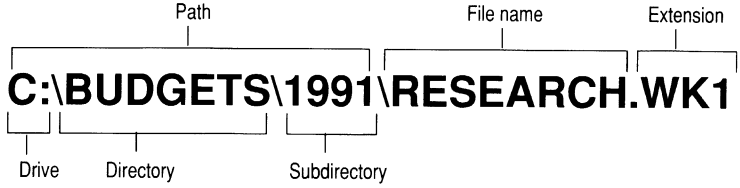
A **file** is a named collection of data stored on a disk. As you work with 1-2-3, you manage files in several ways:

- **Save** a worksheet by copying it from memory to a file on disk to keep a permanent record of the work you do during a 1-2-3 session. Unless you save a worksheet in a file, your work is preserved only as long as the worksheet remains in memory (you do not use /Worksheet Erase or /Quit Yes to end the 1-2-3 session). You can save an entire worksheet (with /File Save), or only part of it (with /File Xtract).
- Look through the files on your disks with the Viewer add-in.
- **Retrieve** the file by copying the file from disk into memory. When you do, 1-2-3 displays the file exactly as it was when you last saved it. You retrieve files with /File Retrieve or with the Viewer add-in.
- Restrict access to a file with a password.
- Erase disk files.
- Combine all or parts of a file with another file.

- Change the default directory 1-2-3 uses to save worksheets and other files, and determine what files a disk contains.
- Use files that are shared on a network.

Some of the changes you make when you manage files change information on disks. These changes cannot be undone, even if undo is on. For example, when you save a file with /File Save, 1-2-3 cannot restore the file's previous contents once it replaces them with the new information. All the commands you use to manage files prompt you that data may be lost; select responses to these prompts with care to avoid inadvertently replacing or changing data you want to keep.

Before you work with files, you need to be familiar with the following terms:



- The **path** supplies two pieces of information: the drive name (if different from the current drive) and the directory (and subdirectory) where the file is located.
- The **drive** tells 1-2-3 where the disk that stores the file is located. A drive name always consists of a letter followed by a colon, for example, B: or C:. If the file is located on a disk in the current drive, you do not need to specify a drive name. For example, if drive C is the current drive, you can specify the file using the path \BUDGETS\1991\RESEARCH.WK1.
- A **directory** is a subdivision of a disk, used for organizing the files on the disk. For example, the directory in the previous example contains budget files. When you specify a file, use the directory name to tell 1-2-3 in which directory on the specified drive the file is located. If the file you are specifying is in a **subdirectory** (a directory included in another directory), the path will include more than one directory name. For example, in the previous example, the budget files are subdivided into subdirectories by year. You must use a \ (backslash) to separate each directory name from the next. In addition, you must use a backslash to separate the last directory name from the file name. Refer to your operating system documentation for information about creating and maintaining directories.

  If the file is in the **current directory** (the directory specified with /File Directory or /Worksheet Global Default Directory), you need not specify a directory name.

- Every file in a directory has a unique **file name**, which you assign when you first create the file. Use descriptive file names so you can remember them easily. For example, the file name in the previous example contains the budget for the Research department. Each operating system has its own guidelines for naming files, which are described in detail in your operating system documentation, but the following general guidelines apply to file names: Use any combination of eight letters, numbers, _ (underscores), and - (hyphens) in file names, but do not use spaces. If you enter more than eight characters, 1-2-3 ignores the extra characters. Do not use the name AUX, CON, COM1, COM2, LPT1, NUL, or PRN. Uppercase and lowercase letters are treated as the same letter.

  You should not use extended Lotus International Character Set (LICS) characters in a file name. These characters cannot be displayed by the operating system; they can only be displayed using 1-2-3. Extended LICS characters include accented characters, such as ä. For complete information about LICS, see Appendix A, beginning on page 319.

- A file name **extension** is a suffix to a file name. It consists of a . (period) followed by one to three characters. Extensions group files into categories. For example, the extension in the previous example shows that the file contains a 1-2-3 worksheet. If you do not specify an extension, 1-2-3 automatically adds an extension that is appropriate to the type of file you are naming. Uppercase and lowercase letters are treated as the same letter.

Types of Files

1-2-3 Release 2.3 creates the following types of files. For definitions of other file types, see *Quick Reference*.

File Type	Description
.WK1	A worksheet file created with /File Save or /File Extract, which stores the data you have entered in 1-2-3.
.BAK	A backup worksheet file created with /File Save Backup or /File Xtract Backup, which stores the previously saved version of a worksheet file.
.ENC	An encoded file created with /Print Encoded or /Print Background, which stores printer codes, text, and other information for printing a formatted worksheet (see Chapter 7, beginning on page 77).
.PRN	A text or print file created with /Print File, which stores worksheet data in ASCII format (see "Using Data from a Text File" on page 256).
.PIC	A graph file created with /Graph Save, which stores a 1-2-3 graph in a picture format for use with PrintGraph and other programs.
.CNF	A configuration file created with /Worksheet Global Default Update, which stores default settings (such as printer and directory settings) that affect every 1-2-3 session.

(continued)

File Type	Description
.FMT	A format file automatically created by Wysiwyg when you use /File Save or /File Extract, which stores formatting information for a worksheet with the same file name.
.FMB	A backup format file automatically created by Wysiwyg when you use /File Save Backup, which stores the previously saved version of Wysiwyg formatting information for a worksheet with the same file name.
.AFS	A font library file created with :Format Font Library Save, which stores a Wysiwyg font set so you can use those fonts with any worksheet.
.ALS	A page layout library file created with :Print Layout Library Save, which stores Wysiwyg layout settings so you can use them with any worksheet.
.ALL	A format file created with :Special Export, which stores Wysiwyg formatting in a way that allows you to use the file with the Allways™ add-in.

Responding to File Name Prompts

When you select a command that requires a file name, such as /File Retrieve, 1-2-3 displays a list of files and subdirectories in the current directory. 1-2-3 displays only files of the appropriate type (for example, files with the extensions .WK1 and .WKS if you select /File Retrieve, or files with the extension .PIC if you select /Graph Save). A \ (backslash) follows the name of a subdirectory. (/Add-In Attach and /Worksheet Global Default Other Add-In Set display a menu of files with the extension .ADN in the directory from which you started 1-2-3.)

You can specify a file by selecting a file name from the menu, by typing the file name, or by specifying a path if the file is in another directory or on another drive. The following table describes how to specify a file name.

To	Do this
Select a file from the current directory	Press ←, →, ↑, ↓, **HOME**, **END**, **PG UP**, **PG DN**, **TAB**, **SHIFT-TAB**, or the space bar to highlight the file name and then press **ENTER**, *or* click a scroll arrow to move the highlight through the file names and click the name.
Select a file in a sub-directory of the current directory	Select the name of the subdirectory from the list of file names, and then select the file. Subdirectory names are followed by a \ (backslash).
Specify a new file name	Type the name and press **ENTER**. 1-2-3 will use the current directory and will add an extension automatically if you do not specify one.
Display file names in a full-screen list	Press **F3 (NAME)** *or* click List in the first line of the control panel.
Display all files in the current directory	Type *.* and press **ENTER**.

(continued)

To	Do this
Display all files in the directory above the current directory	Press BACKSPACE *or* click .. (directory icon) in the first line of the control panel.
Display files from a different drive and/or directory	Press ESC *or* click the right mouse button to clear the file names (and directory if needed), edit the drive and/or directory, and then press ENTER. You can also click a drive letter in the control panel to specify a different drive.

Using wild card characters in file names and extensions

When 1-2-3 prompts you for a file name, you can include files with similar names or extensions by including the wild card characters * (asterisk) and ? (question mark).

* (asterisk) represents any number of consecutive characters in a file name or extension. For example, to have 1-2-3 list all files with the extension .WKS, you would type *.wks at the file name prompt and press ENTER. To have 1-2-3 list all files that begin with B and have the extension .wk1, you would type b*.wk1 at the file name prompt and press ENTER.

? (question mark) represents any single character in a file name or extension. For example, to list all worksheet files with names that begin with LOT, have any single character in the next position, end with DEPT, and have the default 1-2-3 Release 2.3 extension .WK1, you would type lot?dept.WK1 at the file name prompt and press ENTER. Possible files are LOT1DEPT.WK1, LOTXDEPT.WK1, and LOT8DEPT.WK1.

Determining What Files Are on a Disk

If you use directories and subdirectories to organize different types of files or information, you may want to change the default directory 1-2-3 uses. Also, as your collection of files grow, you may need to determine what files a disk contains. Once you determine what files are on a disk (or in a directory), you can create a copy of the list in the worksheet instead of a temporary display of file names. Use /File List to list the files in the current directory, /File Directory to change the current directory, and /File Admin Table to list file information in the worksheet.

To	Do this	With this result
List file names	Select /File List. Select Worksheet to list .WK? files, Print to list .PRN, Graph to list .PIC, Other to list all file extensions such as .FMT or .CGM, or Linked to list all the files on disk that are linked to the current worksheet.	If you selected Linked, 1-2-3 displays the names of all files on disk that are linked to the current worksheet. When you highlight a file name, 1-2-3 displays the full path in the control panel. Characters that you typed when you linked the file are displayed in color or a brighter intensity; 1-2-3 completes the path if necessary with characters displayed in normal color or intensity.

(continued)

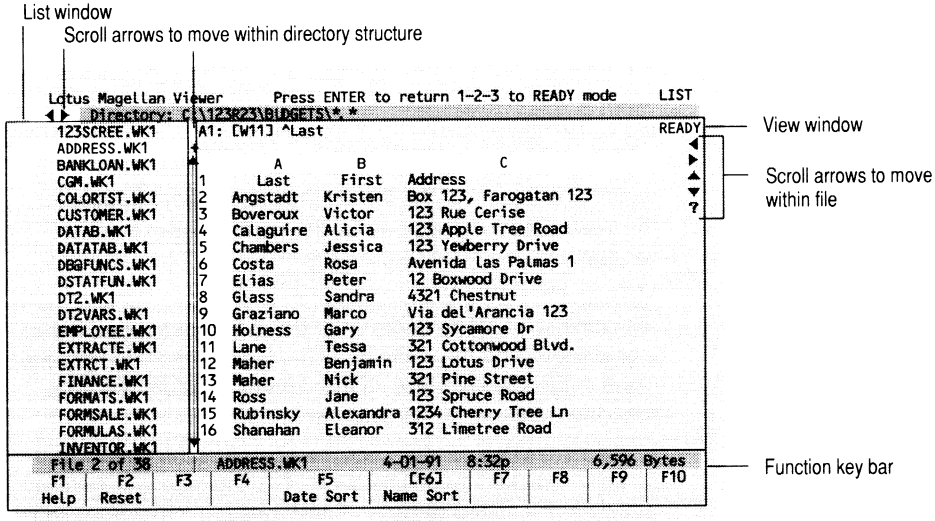
To	Do this	With this result
Change the current directory	Select /File Directory, edit the path, and press ENTER.	/File Directory changes the directory for the current 1-2-3 session. This is the path 1-2-3 uses if you do not specify a path with a file name. 1-2-3 uses the specified directory until you use /File Directory again, use /Worksheet Global Default Directory to change the current directory for future sessions, or end the 1-2-3 session. **CAUTION** If the current worksheet contains linking formulas that do not include paths as part of their file references, and you use /File Directory to change the default directory, 1-2-3 cannot locate the source files to which the formulas refer. The linking formulas will evaluate to ERR.
Create a table of file information in the worksheet	Select /File Admin Table. Select Worksheet to list .WK? files, Print to list .PRN, Graph to list .PIC, Other to list all file extensions such as .FMT or .CGM, or Linked to list all the files on disk that are linked to the current worksheet. Specify the range for the file information. **CAUTION** 1-2-3 replaces existing data when it creates the table. If you make a mistake and undo is on, press ALT-F4 (UNDO) immediately to restore the worksheet to its original state.	/File Admin Table creates a table in four columns and as many rows as the number of files you are listing plus one blank row. The first column lists the file names, the second and third columns list the date and time each file was last saved (as date and time numbers), and the fourth column lists the size of the file in bytes. Subdirectories of the specified directory are indicated by <DIR> in the fourth column. If you selected Linked, only the path information you entered is displayed for the file name. Linked files that 1-2-3 cannot find list 0 for size, date, and time.

TIP Format the date range (the second column) of a table of file information created with /File Admin Table with one of the /Range Format Date date formats, and then format the time range (the third column) with one of the /Range Format Date Time time formats. This will display the values in these columns as dates and times.

Viewing the Contents of Files

When you need more information about files than /File Admin Table and /File List can provide, you can use the Viewer file management add-in. You can find files and view the contents of each file on a disk with Viewer. This is useful when simply listing the files does not provide enough information — when you need to determine the contents of files on an old disk, for example, or when you need to find a file in a group of files with similar names. Viewer lets you browse through the contents of all 1-2-3 files and the text of any other type of file. In addition, Viewer displays DOS directory information, such as the time the file was last saved and the file size.

Viewer displays file names and file contents in a split-screen display, as shown in the following illustration. The **List window** on the left displays the list of subdirectories and file names in your current directory (subdirectories always appear at the top of the list). As you scroll through the list, the contents appear in the **View window** on the right.



Viewer recognizes and displays several different file types, including 1-2-3, Symphony®, LotusWorks, and ASCII word-processing and database files. Viewer does not display Wysiwyg formatting in the worksheet. Viewer tries to display the contents of any file you choose to view, even files that are not meant to be read, such as executable programs. Such files may display only characters and symbols that do not make sense.

Before you can use Viewer, you must first attach it. Then you can invoke it using /File View or /Add-In Invoke. For complete information about attaching and invoking an add-in, see "Using an Add-In" on page 18.

To	Do This
Attach Viewer	Select /Add-In Attach. Select VIEWER.ADN from the list of add-in programs. Select the key you will use to invoke the Viewer or No-Key.
View files on a disk	Select /File View. The Viewer menu appears. Select Browse.
Change the current Viewer directory to match the current 1-2-3 directory	Press **F2 (RESET)**. This step is only necessary if you changed the current 1-2-3 directory during the session.
Display the contents of a file or subdirectory	Press **PG UP**, **PG DN**, **END**, **HOME**, ↑, or ↓ to highlight the file or directory name in the List window *or* click the file or directory name. The contents of the highlighted file or subdirectory appear in the View window.
Scroll through the file displayed in the View window	Press → *or* click the View window to move the highlight to the View window. Use the pointer-movement keys *or* drag the highlight to an edge of the View window and press the left mouse button to scroll through the contents of the file. (If the file is a worksheet file, the scroll arrows appear at the right of the View window.)
Move the highlight to the List window	Move to the leftmost column in the file and press ← *or* click the List window.
View a subdirectory	Move the highlight to the List window. Highlight the subdirectory name. The files in the subdirectory appear in the View window. Press → to display the files in the List window.
View the directory above the current directory	Move the highlight to the List window. Press ← *or* click the left scroll arrow. The contents of the directory appear in the List window, and the contents of the highlighted directory are listed in the View window. If the current directory was the root, the available drives are listed.
Sort files by the date the files were last modified	Press **F5 (DATE SORT)** *or* click the F5 box at the bottom of the screen. Brackets appear around F5 to indicate that the files are currently sorted by date. Files appear in date order, most recent first. Subdirectories still appear at the top of the list sorted alphabetically.
Sort files in alphabetical order	Press **F6 (NAME SORT)** *or* click the F6 box at the bottom of the screen. Brackets appear around F6 to indicate that the files are currently sorted in alphabetical order. Files appear in alphabetical order, numbers first. Subdirectories still appear at the top of the list sorted alphabetically.
Return to the Viewer main menu	Press **ESC**.
Leave Viewer and return to the worksheet	Press **ENTER**.

Viewer will display 'No files' for a directory where you do not have read access to the files. Password-protected files cannot be viewed.

Saving a File

1-2-3 does not automatically save your work. Because of this, you must save your work to make a permanent copy on disk before you erase the worksheet, end the 1-2-3 session, or turn off the computer. Also, you should save your files frequently so you do not lose work in the case of a power failure or a problem with your computer.

/File Save lets you save worksheet data and settings in a worksheet file on disk. Use /File Save to create new files on disk and to update existing files. You can change the file name or extension when you save it. 1-2-3 assigns the extension .WK1 to worksheet files unless you enter a different extension. If you change the extension, 1-2-3 will not display the file in most file name lists unless you specify the new file extension; the exception is the file list created with /File List Other.

W Using /File Save will automatically create an .FMT file with the same file name to store Wysiwyg formatting information for the worksheet.

You can save the entire current worksheet and settings in a file using /File Save, or you can save part of the current worksheet and settings in a file using /File Xtract.

When you use /File Xtract, 1-2-3 enters the extracted range beginning in cell A1. If you extracted formulas, 1-2-3 adjusts the cell references in formulas to reflect their new location in the extracted file.

You cannot undo changes /File Save and /File Xtract make to a file on disk.

W /File Xtract does not save Wysiwyg formatting for the new file. Use :Special Export to save the Wysiwyg formatting to an .FMT file with the same file name used with /File Xtract. If named or current graphs were added to the worksheet using :Graph Add, their position in the worksheet and any enhancements made with the Graph Edit commands will be exported, but not the graphs themselves.

To Save a File

The following table describes saving the contents of a worksheet in a file on a disk.

To	Do this
Name the current worksheet	Select /File Save. Type a file name and press ENTER *or* click the control panel.
Save the current unnamed worksheet in a file on a different drive and/or directory	Select /File Save. Press ESC *or* click the right mouse button. Edit the drive and/or directory *or* click .. (directory icon) to specify the directory above the current directory to see other directory names; click a drive letter to use a different drive, type a file name, and then press ENTER *or* click the control panel.
Use the same file name to save the current named worksheet	Select /File Save. Press ENTER *or* click the control panel. Select Replace to write over the worksheet file on disk with a copy of the current worksheet. (Cancel returns 1-2-3 to READY mode without saving the worksheet. Select Cancel if you are not sure you want to replace the contents of the file.)
Save a file and keep a backup copy of the last version without renaming the file	Select /File Save. Press ENTER *or* click the control panel. Select Backup. 1-2-3 copies the worksheet file on disk to a backup file with the same file name but with the extension .BAK, and saves the current worksheet with the existing file name and the extension .WK1. If Wysiwyg is attached, it copies the .FMT file on disk to a backup file with the extension .FMB, and saves the current Wysiwyg formatting information with the existing file name and the extension .FMT.
Edit a file name to save the current named worksheet	Select /File Save. Press the space bar and then press BACKSPACE to delete the space. Move the cursor to the character(s) you want to change (using the pointer-movement keys). Press DEL to delete the character over the cursor, and type new characters to insert them; or press INS to replace characters with new characters you type. Press ENTER.
Choose the file name to save to from a full-screen list of file names in the current directory	Select /File Save. Press F3 (NAME) *or* click List in the first line of the control panel.
Save a file on a diskette	Place a diskette in the drive. Select /File Save. Clear the default file, directory, and drive by pressing ESC twice *or* clicking the right mouse button twice. Specify the drive that contains the diskette *or* click the drive letter in the control panel. Type a file name, and press ENTER *or* click the control panel.

(continued)

To	Do this
Save the current worksheet with a different name in the same directory	Select /File Save. Type a new file name, and press ENTER *or* click the control panel.
Save the current worksheet in a different drive and/or directory	Select /File Save. Press the space bar and then press BACKSPACE to delete the space. Edit the drive and/or directory as needed; use TAB, →, and ← to move the cursor. Press ENTER *or* click the control panel.
Try to get the file reservation if the RO (read-only) indicator is on	Select /File Admin Reservation Get.
Save the file without a reservation	Select /File Save. Press ESC *or* click the right mouse button, edit the drive and/or directory, type a new file name as needed, and then press ENTER *or* click the control panel to save the file with a different file name.
Save the worksheet in a text file	Select /Print File. Type the name of the file and press ENTER *or* click the control panel.
Save the current print range in an encoded file	Select /Print Encoded. Type the name of the file and press ENTER *or* click the control panel.
Save the current print range in an encoded file including all graphics, data, and Wysiwyg formatting	Select :Print File. Type the name of the file and press ENTER *or* click the control panel.
Save part of the current worksheet	Select /File Xtract. Select Formulas to save data and formulas *or* select Values to save data and current values of formulas. Specify a file name. Specify the range that contains the data to extract. If you specified an existing file name, select Replace to write over the worksheet file on disk with a copy of the current worksheet. (Cancel returns 1-2-3 to READY mode without saving the worksheet; select Cancel if you are not sure you want to replace the contents of the file. Backup copies the worksheet file on disk to a backup file with the same file name but with the extension .BAK, and saves the extracted data with the existing file name and the extension .WK1.)

When you save a file with Wysiwyg attached, Wysiwyg creates a file that contains the formatting information. The file has the same file name as the worksheet file, but uses the extension .FMT. When you retrieve the file, Wysiwyg uses the information the .FMT file contains as long as Wysiwyg is attached. /File Xtract does not create an .FMT file for the new file. You can use the Wysiwyg Special Export command to save the Wysiwyg formatting information for the current worksheet to a new file.

When you use /File Xtract Formulas, extract all the data the formulas refer to. If all the data is not in the extracted file, the formula will not produce the expected results.

You must also extract an entire named range. If you extract only part of a named range, the range name appears in the extracted file, but it no longer refers to the correct range of data.

If the CALC indicator is on, press **F9 (CALC)** to update formulas before you select /File Xtract Values. If you don't update formulas, the extracted values will be incorrect.

Limiting Access to Files

You can limit access to a worksheet file by saving or extracting it with a password. When you save a file with a password, no one can retrieve the file without knowing and specifying the password. To create a password, use /File Save or /File Xtract. To change or delete a password, use /File Save.

W Files that contain Wysiwyg formatting (.FMT) are not password-protected when you password-protect the associated 1-2-3 worksheet file (.WK1). Users could unintentionally change the .FMT file using :Special Export.

Passwords can be up to 15 characters long, and they can contain spaces. Passwords are case-sensitive, so be careful to use uppercase and lowercase letters in a way that will be easy to remember.

CAUTION Remember your password. When you save a file with a password, you can retrieve the file again only if you enter the correct password. Also, data in password protected files can not be linked to any worksheets or displayed by Viewer. Before you assign a password to an existing file, make sure it is not currently linked to any other file. For more information on linking files, see Chapter 20, beginning on page 237.

To specify, change, or delete a password for a file, you must first read the file into memory. Select /File Retrieve if the worksheet is not already in memory. For more information, see "Retrieving a File" on page 230.

You then can use the procedures for saving a file described in "Saving a File" on page 225 with one exception. Before you press **ENTER** to accept the file name, perform one of the steps in the following table. Then, perform the rest of the steps for saving a file.

To	Do This
Save a new file with a password	Select /File Save. Type the file name, including a path if necessary. After the file name, type a space followed by p. Press ENTER. Type a password and press ENTER. Type the same password again after the 'Verify password' prompt and press ENTER. Each time you save the file, [PASSWORD PROTECTED] will appear after the file name.
Create a password for the current file	Select /File Save. Press the space bar and type p. Press ENTER. Type a password and press ENTER. Type the same password again after the 'Verify password' prompt and press ENTER. Select Replace to write over the worksheet file on disk with a copy of the current worksheet. (Cancel returns 1-2-3 to READY mode without saving the worksheet; select Cancel if you are not sure you want to replace the contents of the file. Backup copies the worksheet file on disk to a backup file without a password with the same file name but with the extension .BAK, and saves the current worksheet data with the existing file name and the extension .WK1.) Each time you save the file, [PASSWORD PROTECTED] will appear after the file name.
Save part of the current worksheet with a password	Select /File Xtract Formulas *or* Values. Type the file name, including a path if necessary. After the file name, type a space followed by p. Press ENTER. Type a password and press ENTER. Type the same password again after the 'Verify password' prompt and press ENTER. Specify the range that contains the data to extract. Each time you save the file, [PASSWORD PROTECTED] will appear after the file name.
Change the password for a file	Select /File Save. Specify the file name. Press ESC or BACKSPACE once to remove the [PASSWORD PROTECTED] indicator. Type a space followed by p and press ENTER. Type the new password and press ENTER. Type the same new password again after the 'Verify password' prompt and press ENTER.
Delete the password for a file	Select /File Save. Specify the file name. Press ESC or BACKSPACE once to remove the [PASSWORD PROTECTED] indicator. Press ENTER to save the file without a password.
Retrieve a password-protected file	Select /File Retrieve. If the current worksheet contains unsaved changes, select No to cancel and save the changes, or Yes to retrieve file anyway (the new file will replace the current worksheet and changes will be lost). Specify the name of the file to retrieve. Type the password exactly as it was entered and press ENTER.

CAUTION If you select Backup to save an existing file and add or change the password, the backup copy of the file will not have the same password protection as the worksheet file. The backup is a copy of the file *before* you add, change, or delete a password. To assign the same password or protection to the backup copy of the file, use /File Save Backup again before you make any changes to the worksheet.

Retrieving a File

To use a worksheet file from a disk, you retrieve it with /File Retrieve or with /File View Retrieve. You can also retrieve a file automatically each time you start 1-2-3.

Use /File Retrieve when you know which file you want to retrieve. Use /File View Retrieve when you want to view the contents of the files on the disk to help you decide which file to retrieve. See "Viewing the Contents of Files" on page 223.

After you retrieve a file, the retrieved worksheet replaces the worksheet that was current when you selected /File Retrieve or /File View Retrieve. 1-2-3 uses the window settings in the retrieved file. These may be different from the recalculation and worksheet window settings you were using. If 1-2-3 does not have enough memory to read the file, it cannot retrieve the file. For information on memory management and regaining memory for 1-2-3, see Appendix C, beginning on page 343.

If you are sharing files on a network, 1-2-3 automatically gets the reservation for a file when you retrieve the file. The reservation for the previous worksheet file is automatically released. For more information on file reservations, see "Using Files on a Network" on page 234.

CAUTION When you retrieve a file, 1-2-3 replaces the current worksheet without saving it. A prompt warns you that you will lose changes if you continue. If you want to save the current worksheet, use /File Save before you select /File Retrieve or /File View Retrieve. If you make a mistake and undo is on, press **ALT-F4 (UNDO)** immediately to restore the worksheet that was in memory.

If you make a mistake in the worksheet and want to start again with the version of the file on disk, do not save the file. Retrieve the file again, and 1-2-3 will replace the worksheet with a copy of the file on disk.

W 1-2-3 automatically uses the formats stored in the .FMT file associated with the worksheet, if any. When you save a file that includes Wysiwyg formats, 1-2-3 creates a file that contains the Wysiwyg information using the same file name as the worksheet file, but with the extension .FMT. When you retrieve the file, 1-2-3 uses the information the .FMT file contains as long as Wysiwyg is attached. When you retrieve a worksheet that has formats stored in an .ALL file instead of an .FMT file, 1-2-3 uses the information in the .ALL file as long as Wysiwyg is attached. If both an .FMT file and an .ALL file exist for the worksheet, 1-2-3 uses the .FMT file.

To Retrieve a File

1. Select /File Retrieve.

   If the current worksheet contains unsaved changes, 1-2-3 prompts you to save the worksheet first.

No	Returns 1-2-3 to READY mode so you can use /File Save to save the current worksheet.
Yes	Retrieves the file anyway (the new file will replace the current worksheet and changes will be lost).

   If you select Yes, or if the current worksheet does not contain unsaved changes, 1-2-3 displays files with .WKS, .WK1, and .WK3 extensions in the current directory. (You cannot retrieve files saved in the .WK3 worksheet file format.)

2. (Optional) Display files in a different drive and/or directory, with a different extension, or display a full-screen file list.

   For more information, see "Responding to File Name Prompts" on page 220.

3. Specify the name of the file to retrieve.

4. To retrieve a file from a network when someone else has the file reservation or it is in a read-only directory, select one of the following options:

Yes	Retrieves the file without the reservation; changes cannot be saved with the same file name.
No	Cancels the command without retrieving the file.

   CAUTION If you do not have the reservation for the file, 1-2-3 displays the RO indicator at the bottom of the screen. You cannot save the file with the same file name without the reservation. Use /File Admin Reservation Get to try to get the reservation if it is available, or save the file with a different file name or in a different directory. For further information, see "Using Files on a Network" on page 234.

5. If the file on disk is password-protected, type the password and press ENTER.

   You must type the same combination of uppercase and lowercase letters that you used when you created the password.

Retrieving a File When You Start 1-2-3

To retrieve a file when you start 1-2-3, type 123 -w followed by the name of the file on the operating system command line. For example, to retrieve a file named JANUARY.WK1 in the default directory, you would type 123 -wjanuary; you can also specify a different drive and/or directory, such as -wc:\sales\january.

Retrieving a File Automatically When You Start 1-2-3

When you start 1-2-3, a blank worksheet appears. Instead of displaying a blank worksheet, however, 1-2-3 can retrieve a particular worksheet automatically every time you start the program. Use /File Save to save the worksheet you want to retrieve automatically in a file named AUTO123.WK1 in the default directory (the directory specified with /Worksheet Global Default Directory).

To Retrieve a File After Viewing Its Contents

1. Attach Viewer.

   For information on attaching Viewer, see "Using an Add-In" on page 18.

2. Select /File View and then select Retrieve from the Viewer menu.

3. If the current worksheet contains unsaved changes, select No to cancel and save the changes, or Yes to retrieve file anyway (the new file will replace the current worksheet and changes will be lost).

4. Scroll through the files in the List window, and scroll through the contents of the current file in the View window.

5. Retrieve the file by highlighting the file name and pressing **ENTER** *or* by double-clicking the file name.

Erasing a File

You can use 1-2-3 to erase worksheet files you no longer need. /File Erase erases a file from disk. Password-protected files can be erased without knowing the password. Before you erase a file, make sure that it is not linked to other worksheets. For more information on linking files, see Chapter 20, beginning on page 237.

CAUTION Once you erase a file on disk, you cannot retrieve the data in that file or use **ALT-F4 (UNDO)** to recover the file. Before you use /File Erase, make certain that you no longer need the data in the file you are erasing.

/File Erase is different from /Worksheet Erase:

- /File Erase erases a file on disk. It does not affect the contents of the current worksheet (unless it is linked to the file being erased).
- /Worksheet Erase removes the current worksheet from memory, leaving a blank worksheet, but does not erase the corresponding file on disk.

Any shared worksheet file can be erased using /File Erase even if you do not have the reservation as long as no one else has the reservation.

Erasing a file will not erase the associated .FMT file (if one exists) unless Wysiwyg is attached when you use /File Erase.

To	Do This
Erase a worksheet file	Select /File Erase Worksheet (*.WK?). Specify the name of the file to erase. Select Yes to erase the file *or* select Cancel to return 1-2-3 to READY mode, leaving the file intact.
Erase a print file	Select /File Erase Print (*.PRN). Specify the name of the file to erase. Select Yes to erase the file *or* select Cancel to return 1-2-3 to READY mode, leaving the file intact.
Erase a graph file	Select /File Erase Graph (*.PIC). Specify the name of the file to erase. Select Yes to erase the file *or* select Cancel to return 1-2-3 to READY mode, leaving the file intact.
Erase any type of file	Select /File Erase Other (*.*). Specify the name of the file to erase. Select Yes to erase the file *or* select Cancel to return 1-2-3 to READY mode, leaving the file intact.

What Is a Network?

A **network** is two or more computers that are connected together by cables and that are running network software. At least one of the computers must be a network **file server** (determined by the network software at installation). The file server is where you store the **shared files**: (files that you want to share with users on other computers connected to the network). Each computer on the network runs the network software to be able to use the shared files stored on the file server. The network software allows you to use the drives on the file server just as you use the drives on your computer.

If you have questions about network procedures or run into problems while using 1-2-3 shared files, see your **network administrator**, the person responsible for setting up the file server and for maintaining the network for your company or work group. If your network administrator cannot solve the problem, he or she will call Lotus Customer Support. Channel your questions through the network administrator, who has information about the network that Lotus Customer Support will need.

To work with shared 1-2-3 files, your computer must be connected to the network and you must know the path of the shared files on the file server. The command you use to connect your computer to the network is specific to your network software. Ask your network administrator for the command that connects your computer to the network.

The path to files on the server depends on your network software, but should include the drive for the directory that contains the shared files and, perhaps, other subdirectories. Ask your network administrator how to get to the files you need.

To read a shared file into memory, specify its complete path when you use /File Retrieve. Include only the logical drive, directory, and file name. (You do not need to specify the complete path if the default 1-2-3 directory is on the file server.)

To save a shared file, specify its complete path when you use /File Save. (You do not need to specify the complete path if the default 1-2-3 directory is on the file server.)

NOTE Do not use the path of the shared file as it appears on the server. Specify the logical drive, directory, and file name when you want to retrieve a shared file from the server.

Files on a network may not be available to all users. In addition, even if you have **privileges** for a file (you can read the file and **write**, or save, to the file name), you may not be able to save the file if someone else is using it at the same time. 1-2-3 provides controls, called **reservations**, to help you make sure users who share files on a network do not write over each other's work. The following sections describe access to shared files.

Limiting Read Access

Operating system software, network software, and 1-2-3 all provide ways to limit access to shared files. If some files contain sensitive or privileged information, you may want to limit access to them to prevent certain users from reading them.

The following techniques prevent users from reading shared files:

- To secure files so that some users cannot read them, you can save the file with a password. For information on saving files with passwords, see "Limiting Access to Files" on page 228.
- Your network administrator may be able to use network software to restrict access to a file. For example, the administrator might restrict access to a directory on the server by assigning it a password. Only users who know the password would be able to use files in that directory.

Limiting Write Access

If files require input from only a few users but contain information that all users need to read, you may want to limit access to them so that all users can read them, but only certain users can save changes to them. There are several ways to prevent users from saving changes to shared files:

- Your network administrator can use network software to limit write access to shared data files by giving the directories they are in read-only status.
- Your administrator can set up network directories in which you can read and save existing files, but cannot create or delete them.

- You can give a file read-only status through operating system commands such as ATTRIB. See your operating system manual for details on ATTRIB and other commands.

A **read-only** file cannot be changed or deleted. Whenever you have read-only access to a shared 1-2-3 data file, the read-only indicator (RO) appears at the bottom of the screen as long as the file is in memory. This is true whether the file is read-only because of operating system commands such as ATTRIB, because it is in a read-only directory, or because you do not have the file reservation.

Limiting Concurrent Access

1-2-3 supports sharing data files on a network under DOS version 3.10 or higher by providing concurrency controls through /File Admin Reservation. Users who share the privilege of saving changes to a file need to safeguard against inadvertently writing over each other's changes. **Concurrency controls** do not prevent users from changing a file or part of a file as access controls do, but rather ensure that users who share files do not change the same file simultaneously.

1-2-3 provides concurrency controls through **file reservations**. Reservations ensure that no more than one user at a time can save changes to a file, although a number of users can retrieve a shared file to read it. Each shared file, stored on a server, has a reservation. The reservation is a kind of lock; it prevents different people from creating different versions of the same file by making changes to a file and saving it with the same name at the same time.

1-2-3 reservations adhere to the following guidelines:

- Each file has one reservation, and only one person can have a file's reservation at any one time. When you retrieve a shared file you will automatically get its reservation unless someone else has already retrieved the file with its reservation.
- If the reservation is not available, 1-2-3 asks if you want to read the file into memory without a reservation. If you do, 1-2-3 reads the file into memory without the reservation. You can look at the file, but you won't be able to save changes to it. 1-2-3 displays the RO indicator to remind you that you will not be able to save changes to the file with the original file name until you get the file's reservation.
- Only the person who has the file's reservation can save changes to the file using the same file name. When you use /File Save to save changes to a file under an existing name, 1-2-3 automatically gets the file's reservation if you do not have the file in memory and if the reservation is available. Therefore, you can only use /File Save to save changes to a file for which no one has a reservation.

If undo is on and you press **ALT-F4 (UNDO)** after using /File Retrieve or /Worksheet Erase, and the file you replaced was reserved (the file that was current when you pressed **ALT-F4 (UNDO)**, the reservation is released. If the previous file was reserved (the file restored with **ALT-F4 (UNDO)**), 1-2-3 attempts to regain the reservation.

Pressing ALT-F4 (UNDO) does not undo the effects of /File Admin Reservation Get or Release.

Pressing ALT-F4 (UNDO) does not undo the effects of a file saved to disk with /File Save; it only restores the original reserved status to the last file you worked on.

Getting and Releasing Reservations

Use /File Admin Reservation to get or release the current file's reservation. /File Admin Reservation works only for shared files. You use /File Admin Reservation when you want to get the reservation for the current file or to release the reservation so someone else can get it.

You can get the reservation for the current file only if the reservation is available and no one has changed the file since you read it into memory.

Operating system and network commands take precedence over the 1-2-3 reservation status. For example, you will not be able to get the reservation of a file that has been given read-only status through the operating system ATTRIB command, even if no other user has the reservation.

To	Do This
Get the reservaton for the current shared file	Select /File Admin Reservation Get. If the file reservation is available and no one has changed the file since you read it into memory, the RO indicator at the bottom of the screen disappears.
Release the reservation for the current shared file	Select /File Admin Reservation Release. This gives up the reservation so someone else can get it, and displays the RO indicator at the bottom of the screen. **CAUTION** If you made changes to the file and want to save them, select /File Save before you release the reservation.

If you cannot get a reservation because the current file has changed on disk since you read it into memory, 1-2-3 tells you this is the reason the reservation is unavailable. Use /File Retrieve to read the newest version of the file into memory. If you still do not get the reservation with the file, use /File Admin Reservation Get to try to get the reservation.

Wysiwyg .FMT format files do not have file reservations, even when the associated worksheet file has a reservation.

Chapter 20
Linking and Consolidating Worksheets

This chapter explains the procedures for linking and consolidating worksheets. The chapter includes the following sections:

Why Use Links or Consolidate Worksheets?

Many times, instead of creating one huge worksheet, you may want to divide your data among several worksheets. For example, if you need a financial statement for each branch of your company, as well as for the company as a whole, enter the data into separate worksheets and save them as separate files. You can then use the 1-2-3 linking feature to total the numbers in corresponding cells of the separate worksheets. The data is not just copied into the **current worksheet** (the worksheet file currently in memory), it is linked. This means that when the data in the worksheet you are linking to changes, the data in the current worksheet will be updated to reflect those changes.

File linking saves you the effort of manually updating every worksheet affected by a change in another worksheet. One of the most useful applications of file linking is the consolidation of data from a number of worksheets in a summary worksheet.

There may be times when instead of linking several worksheets together, you only want the current values copied to the current worksheet, added to numbers in the current worksheet, or subtracted from numbers in the current worksheet. 1-2-3 lets you bring in the data from an entire worksheet or from a specified range.

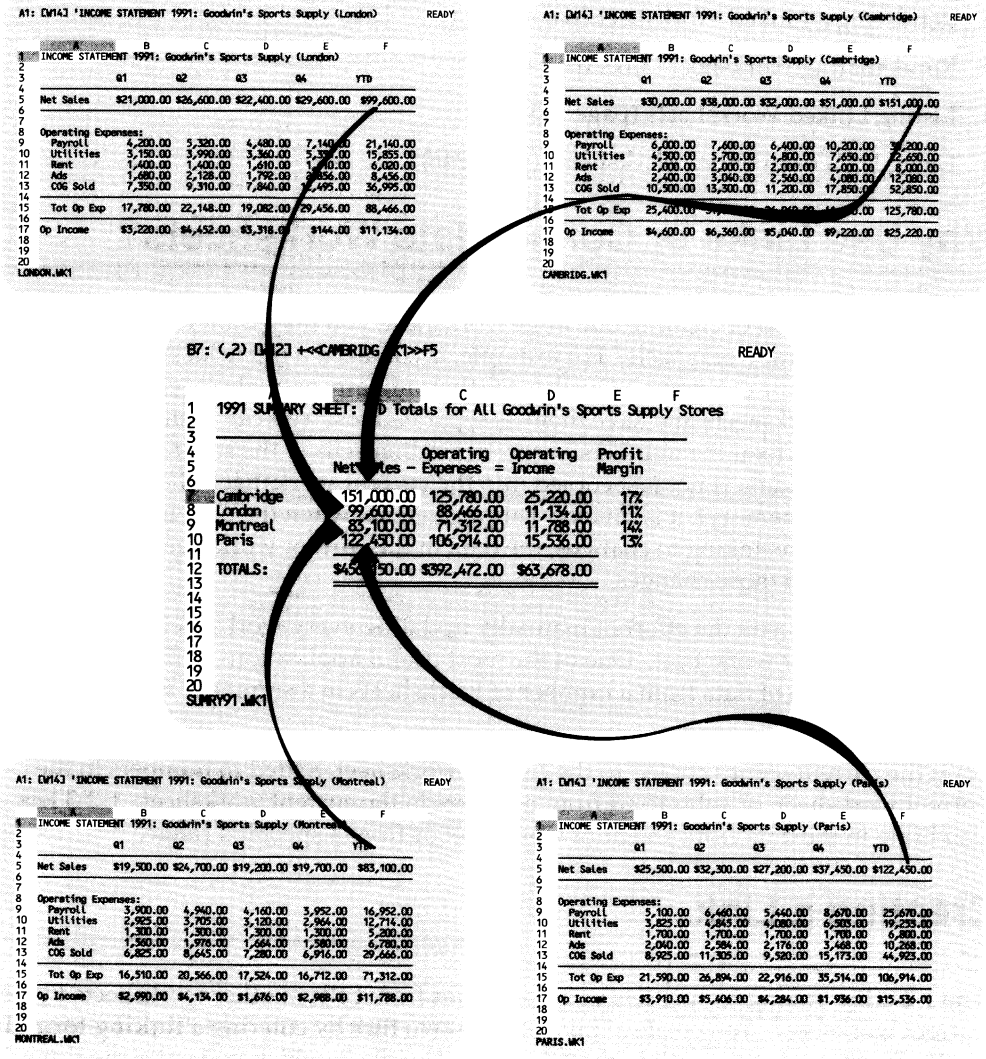
Creating a Link

The 1-2-3 file linking feature lets you use values from cells in other worksheets in the current worksheet. You create a link between two files by entering a **linking formula** in one file that refers to a cell in the other file. The file in which you enter the formula is called the **target file** because it receives the data. The file that the formula refers to is called the **source file** because it supplies the data.

Once the two files are linked, 1-2-3 copies the value of the cell in the source file (the **source cell**) to the cell in the target file (the **target cell**) that contains the linking formula. If the value of a source cell is changed, the value of the target cell is automatically updated whenever you retrieve the target file or select /File Admin Link-Refresh while you are working in the target file. (In general, you only need to use /File Admin Link-Refresh if you are sharing data files on a network.) Recalculating the worksheet does not update linking formulas.

NOTE When you use /File Directory, 1-2-3 will update any linking formula in which the source file reference does not include a path.

The following figure illustrates linked worksheets.



You can create a linking formula two ways: You can enter each linking formula in the current worksheet, or you can use the Viewer add-in to automatically create the linking formulas for you.

When you create the linking formula yourself, you must know where the source file is on the disk, and the cell address or range name of the source cell. If you want to link data in a range of source cells to target cells in the current worksheet, you have to enter or copy the linking formula in each target cell. If you use a range name for the address of the source cell, the target cell is always linked to the same data even if the source cell is moved.

If you use Viewer, you can view the contents of worksheet files to select the file you want to link to the current worksheet. Once you select a source file, you specify one or more source cells. Viewer then automatically enters a linking formula or formulas starting at the specified target cell. The linking formula will contain the address of the source cell.

The Linking Formula

A linking formula has the following format:

+<<*file reference*>>*cell reference*

The file reference is the name of the source file if it is in the current directory or the path and name of the file if it is located elsewhere. The cell reference is the address or range name of the source cell in that file. If you use a range name that refers to more than one cell, 1-2-3 uses the first cell in the range. The file and cell references can be entered in uppercase or lowercase letters. 1-2-3 will always display the references in all uppercase letters, however.

Before You Create a Link

You should be aware of the following when you link files:

- You cannot create a link to a password-protected source file.
- 1-2-3 expects the source file you reference in a linking formula to have a specific internal file format and order. The linking formulas you enter in a Release 2.3 worksheet can refer to source cells in 1-2-3 Release 2.0, 2.01, or 2.2 worksheet files (.WK1 files), 1-2-3 Release 1A worksheet files (.WKS files), Symphony Release 1.1, 1.2, 2.0, or 2.2 worksheet files (.WRK and .WR1 files), or 1-2-3 Release 3.0 or 3.1 worksheet files saved in .WK1 file format. You must include the appropriate file reference and cell reference in the linking formula. For example, the formula +<<INCOME89.WKS>>B16 refers to cell B16 in a 1-2-3 Release 1A file.

  Files created by programs other than the ones listed above may not have the correct format. If you are trying to reference a file created with another program and the file will not link correctly, retrieve the file in 1-2-3 (/File Retrieve) and then use /File Save to save the file in the proper file format, with a different name.

- The target cell can contain only the linking formula. You cannot include a linking formula in another formula. For example, +<<USSALES>>C15*<<UKSALES>>D30 and @ROUND(<<UKSALES>>A12,2) are not valid formulas.
- If the source cell contains a formula, 1-2-3 copies only the value of the formula to the target cell rather than the formula itself.

  If you use a cell address in a linking formula, and you subsequently move the source cell to a different location in the source file, 1-2-3 does not adjust the linking formula in the target cell. For example, if you enter the formula +<<BALANCE.WK1>>C15 and then move the data in C15 to J6, when you retrieve the target file, 1-2-3 will display the value of C15 and not J6.
- If you did not include a path as part of the file reference and the source file is no longer in the default directory (for example, if you use /File Directory or /Worksheet Global Default Directory to change the default directory), 1-2-3 will not be able to find the source file and displays ERR in the target cell.
- If you erase or rename the source file referenced in a linking formula, 1-2-3 displays ERR in the target cell the next time you retrieve the target file or use /File Admin Link-Refresh.
- If the data you are linking to depends on linked cells, you can get incorrect results. For example, if worksheet A depends on worksheet B, and worksheet B depends on worksheet C, the changes you make in worksheet C are not reflected when you retrieve worksheet A. After you save the changes in worksheet C, you must retrieve and save worksheet B before you retrieve worksheet A.
- If you are linking to shared files on a network, use /File Admin Link-Refresh periodically to update the linking formulas. This is important since other network users may be making changes to the source files referenced by the linking formulas. Always select /File Admin Link-Refresh before saving the worksheet so the linked data reflects the current values in the source files.
- If you delete or reset a range name referenced in a linking formula, 1-2-3 displays ERR in the target cell the next time you retrieve the target file or use /File Admin Link-Refresh.
- If you enter a linking formula in a target cell and later enter the identical linking formula in another cell, 1-2-3 displays the value of the first linking formula rather than retrieving the current value of the source cell. For example, if you enter the formula +<<UKSALES>>QTR3 in cell A5 and later enter +<<UKSALES>>QTR3 in cell J50, 1-2-3 displays the value of A5 in J50. This is important to note in case you assume the linked data in the source file has not changed because the target cell values are the same. Select /File Admin Link-Refresh to update both formulas with the current value of the source cell.

- A linking formula uses 32 bytes of memory. If the source cell referenced in a linking formula contains a numeric value, no additional memory is used. If, however, the source cell contains a label or string formula, 1-2-3 uses 32 bytes of memory for the link, the number of bytes (characters) in the label or string, plus 1 byte. Each unique range name included in a linking formula uses an additional 16 bytes of memory, plus the number of bytes (characters) in the range name, plus 1 byte. For more information about how 1-2-3 uses memory, see Appendix C, starting on page 343.

  If 1-2-3 runs out of memory while updating linking formulas, the program displays a 'Memory Full' error message. 1-2-3 updates as many linking formulas as it can before it runs out of memory. Any linking formulas that still need to be updated evaluate to ERR. To resolve this condition, you must free up some memory. For information on the techniques you can use to do this, see "What to Do When You're Running Out of Memory" on page 350.

To Create a Linking Formula

1. Move the cell pointer to the target cell.
2. Type a + (plus) to begin the formula.
3. Enter a file reference enclosed in << >> (double angle brackets).

   A file reference must always include the name of the source file. In some cases, however, it may also be necessary for you to supply other information:

   - If the source file does not have the default file extension .WK1, you must include the appropriate file extension. For example, if the source file is a 1-2-3 Release 1A worksheet named UKSALES.WKS, you would enter the file reference +<<UKSALES.WKS>>.
   - If the source file is not in the default directory (the directory specified with /File Directory), you must include a directory name to tell 1-2-3 where to look for the file. For example, if the current directory is C:\123 and the file you want to link to, UKSALES.WK1, is stored in a directory named C:\123DATA, you could enter the file reference +<<\123DATA\UKSALES>> or +<<C:\123DATA\UKSALES>>.
   - If the source file is not on the disk in the default drive (the drive specified with /File Directory), you must include a drive name to tell 1-2-3 where to look for the file. For example, if the current drive is C: and the file you want to link to, UKSALES.WK1, is in the root directory on a disk in drive B:, you could enter the file reference +<<B:\UKSALES>> or +<<B:UKSALES>>.
4. Enter a cell reference, either the address of the source cell or its range name.
   - If you enter a range address, 1-2-3 uses only the cell in the upper left corner of the range as the source cell. For example, if you enter the formula +<<C:\123DATA\UKSALES>>A5..J16, 1-2-3 changes the formula to +<<C:\123DATA\UKSALES>>A5 when you press **ENTER**.

- If you enter a range name that represents a multiple-cell range in the source file, 1-2-3 uses only the cell in the upper left corner of the range as the source cell although it always displays the range name in the formula. For example, if you enter the formula +<<USSALES>>QTR1 and QTR1 defines the range A24..F24 in the source file, 1-2-3 uses only A24 as the source cell.

5. Press **ENTER** or a pointer-movement key *or* click the control panel to complete the formula.

   When you complete the linking formula, 1-2-3 checks to make sure the source file you referenced exists. If any of the following conditions exist, 1-2-3 displays an error message and will not enter the formula in the worksheet:

   - The source file does not exist.
   - The specified directory does not exist so 1-2-3 cannot find the source file.
   - The specified drive is not ready (for example, you have not closed the door on a diskette drive).
   - The specified range name does not exist in the source file.
   - The source file is a password-protected worksheet.
   - You are sharing files on a network and the source file is being retrieved or saved by another user.
   - The data in the file cannot be read by 1-2-3.

   If 1-2-3 is able to locate the source file and cell, it copies the value of that cell into the target cell.

6. To make a link permanent, use /File Save to save the worksheet.

To Create Linking Formulas Using Viewer

1. Move the cell pointer to the target cell in the current worksheet.

   If you are linking a range of source cells, make sure the cell pointer is in the upper left corner of the target cells that will contain the linking formulas.

2. Attach Viewer using /Add-In Attach.

   If there is not enough memory to attach Viewer, free memory by detaching other add-ins (/Add-In Detach), or turning off the undo feature (/Worksheet Global Default Other Undo Disable). If there is still not enough memory to attach Viewer, see "What to Do When You're Running Out of Memory" on page 350. For more information about attaching and invoking add-ins, see "Using an Add-In" on page 18.

3. Select /File View and then select Link from the Viewer menu.

   For information on how to use Viewer, see "Viewing the Contents of Files" on page 223.

4. Highlight the file you want to link to the current worksheet, and press → to move the cursor into the worksheet.

5. Specify the source cell or range to link.

   To select a single source cell, move the cell pointer to that cell and press ENTER. To select a range of cells, move the cell pointer to the first cell in the range, press . (period) to anchor the range, press the pointer-movement keys to highlight the range, and press ENTER. Selecting a range of source cells will create linking formulas for the same number of target cells in the current worksheet, starting at the cell pointer location.

6. If the target cell or cells contain data, select Yes to replace the target cell contents with the linking formula. Select No to return to the Viewer screen.

   CAUTION If you select Yes, Viewer writes over existing target cell data. If you selected Yes inadvertently and undo is on, press ALT-F4 (UNDO) immediately to restore the worksheet data.

Copying and Moving Linking Formulas

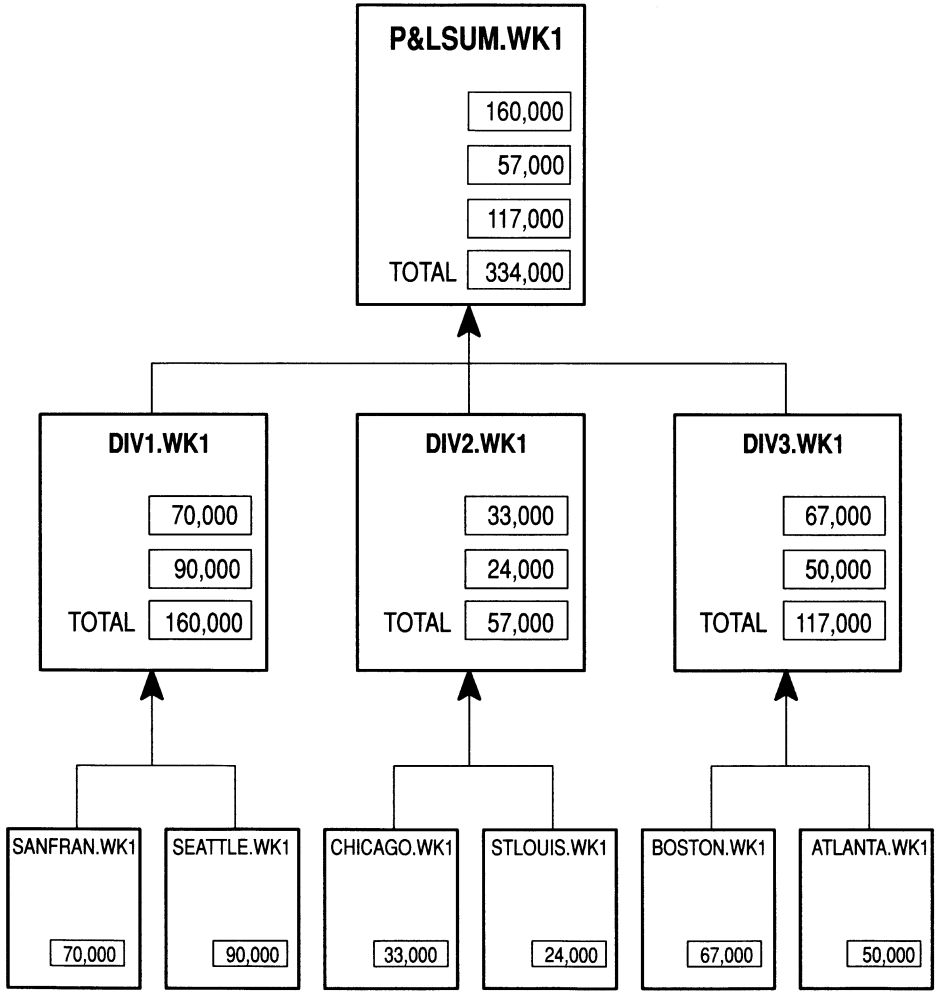
You can use absolute, relative, and mixed cell addresses in a linking formula. The kind of reference you use in the linking formula affects the results of copying the formula, but not moving the formula. If you copy the linking formula to another location in the target file, 1-2-3 will adjust relative cell references in the copied formulas. For example, if the source file is in the current directory and named UKSALES.WK1 and the source cell is A1 (which also has the range name TOTAL_SALES), the following table shows how the source cell references are affected when you copy the linking formula.

Target cell formula in D4	Copied to G10
+<<UKSALES>>A1	+<<UKSALES>>D7
+<<UKSALES>>$A1	+<<UKSALES>>$A7
+<<UKSALES>>A$1	+<<UKSALES>>D$1
+<<UKSALES>>$A$1	+<<UKSALES>>$A$1
+<<UKSALES>>TOTAL_SALES	+<<UKSALES>>D7
+<<UKSALES>>$TOTAL_SALES	+<<UKSALES>>$TOTAL_SALES

For more information on cell references, see "Working with Formulas" on page 37.

Retrieving a Linked Worksheet

You can use the linking feature to create links to cells that depend on other linked cells. For example, suppose your company has three divisions and that each division has three operating subsidiaries. Right now each subsidiary maintains its own profit-and-loss statement. In addition to these profit-and-loss statements, however, you want each division to maintain a profit-and-loss statement (subconsolidations) and you want a consolidated company profit-and-loss statement. The following figure shows how you would link the files to develop the consolidation.



If the data you are linking to depends on other linked cells, you can get incorrect results unless you update the files in an "upward" order. That is, if you think of the linked files being organized in a hierarchical structure like the one shown in the figure above, you must always start updating at the level where you are making changes and work to the top level. For example, if you want to change data in the

Chicago profit-and-loss statement, you must do the following to make sure the values in the consolidated company profit-and-loss statement are correct:

- Use /File Retrieve to retrieve CHICAGO.WK1.
- Make the necessary changes and then save the file under the same name using /File Save Replace.
- Use /File Retrieve to retrieve DIV2.WK1.

  1-2-3 automatically updates the data that is linked to CHICAGO.WK1.
- Use /File Save Replace to save DIV2.WK1 under the same name.

  This updates the subconsolidation worksheet for Division 2.
- Use /File Retrieve to retrieve P&LSUM.WK1.

  1-2-3 automatically updates the data that is linked to DIV2.WK1.
- Use /File Save Replace to save P&LSUM.WK1 under the same name.

  This updates the consolidated company profit-and-loss statement.

NOTE When you read a worksheet into memory, the number of unique linking formulas there are in the worksheet may affect the time it takes to retrieve the worksheet. 1-2-3 must update each unique link before the file can be retrieved.

Recalculating Worksheet Links

You use /File Admin Link-Refresh to recalculate formulas in the current worksheet that refer to worksheet files on disk. If you are linking to shared files on a network, you should periodically use /File Admin Link-Refresh to update the linking formulas. This is important since other network users may be making changes to the source files referenced by the linking formulas. It is also recommended that you always select /File Admin Link-Refresh before saving the worksheet. Recalculating the worksheet does not update linking formulas.

Listing Linked Worksheets

To list the files that are linked to the current worksheet, you can use /File List Linked or /File Admin Table Linked. /File List Linked clears the screen and displays the names of all the files that are linked to the current worksheet. Highlight a file name to display more information about the file, such as its size, and the date and time it was last modified. The characters that you entered for the file name in the linking formula are displayed in color or a brighter intensity. 1-2-3 completes the path if necessary with characters displayed in normal color or intensity.

To create a table of all files on disk that are linked to the current spreadsheet, use /File Admin Table Linked. You can locate the table in any unprotected area of the worksheet.

CAUTION Make sure that the worksheet location is blank or contains unimportant data; 1-2-3 writes over existing data when it creates the table. The table will occupy four columns and as many rows as the number of files that are linked plus one blank row. If undo is on, press **ALT-F4 (UNDO)** immediately to restore the worksheet data.

The table lists the file names in the first column, the date and time each file was last saved (as date and time numbers) in the second and third columns, and the size of the file on disk in bytes in the fourth column. 1-2-3 also lists any subdirectories within the specified directory, which are indicated by <DIR> in the fourth column. The file name includes the path, if you entered one in the linking formula. Linked files that 1-2-3 cannot find on disk list 0 for size, date, and time.

TIP Format the date range (the second column) of a table of file information created with /File Admin Table with one of the /Range Format Date date formats, and then format the time range (the third column) with one of the /Range Format Date Time time formats. This will display the values in these columns as dates and times.

Using Data from Other Worksheets

Use /File Combine to perform the following tasks:

Command	Task
Add	Adds only the numeric data contained in a file on disk to numbers or blank cells in the current worksheet.
Copy	Copies all data (labels and values) contained in a file on disk to the current worksheet writing over the cell contents.
Subtract	Subtracts only the numeric data contained in a file on disk from numbers or blank cells in the current worksheet.

/File Combine Add or Subtract works only with numeric data in .WK1 and .WKS worksheet files. 1-2-3 adds or subtracts numbers and the results of numeric formulas in a worksheet file on disk to numbers and blank cells in the current worksheet. The incoming data has no effect on labels or formulas in the current worksheet.

You can use /File Combine Copy, Add, and Subtract to summarize and consolidate numeric data in several different worksheet files. For example, you can use /File Combine Add to create year-to-date totals by consolidating sales data from several monthly worksheet files into the current worksheet. You can use /File Combine Copy to combine data from several smaller files into one file. For example, you can combine database records from several files into one database.

CAUTION /File Combine Copy, Add, and Subtract change data in the current worksheet beginning at the cell pointer location. To avoid possible data loss from combining files incorrectly, save the worksheet before using /File Combine. If you make a mistake when combining data and undo is on, press **UNDO (ALT-F4)** immediately to restore the worksheet to its original state.

Before You Combine Files

You should be aware of the following before you try to combine data:

- You can incorporate data from any 1-2-3 Release 1A, Release 2, Release 2.01, or Release 2.2 worksheet file; or from a 1-2-3 Release 3 or 3.1 worksheet file that has been saved in the .WK1 worksheet file format — you cannot combine Release 3 files that have been saved in the .WK3 worksheet file format.
- To simplify /File Combine, create named ranges in the files that contain data you want to combine. You can then specify the range names when you select /File Combine [Copy, Add, Subtract] Named/Specified-Range and do not have to remember the cell addresses of the data.
- When you use /File Combine, 1-2-3 changes cell formats in the current worksheet to reflect those of the incoming data. It does not, however, change column widths or other worksheet settings in the current worksheet, and does not add to or change any of the current worksheet's range names.
- 1-2-3 incorporates data from another worksheet file into the current worksheet beginning at the cell pointer location. Therefore, before you use /File Combine, verify that the worksheet is large enough to hold all incoming data and that the cell pointer is positioned correctly for the desired results.
- Do not use /File Combine Add or Subtract with date or time numbers because the results will not be meaningful.
- If you subtract a positive number from a blank cell, the result is a negative number.

To Combine Data in a Worksheet

1. Move the cell pointer to wherever you want 1-2-3 to start combining data from the file on disk.
2. Select /File Combine.
3. Select Copy, Add, or Subtract.
4. Select one of the following options:

Entire-File	Combines all data from a file on disk in the current worksheet.
Named/Specified-Range	Combines the data in a specified range from a file on disk in the current worksheet.

5. If you selected Named/Specified-Range, specify the range you want to use and press ENTER.

   1-2-3 displays files with .WKS, .WK1, and .WK3 extensions in the current directory. (You cannot combine files saved in the .WK3 worksheet file format.)

6. Specify the file on disk whose data you want to use.

7. If the file on disk is password-protected, type the password and press ENTER.

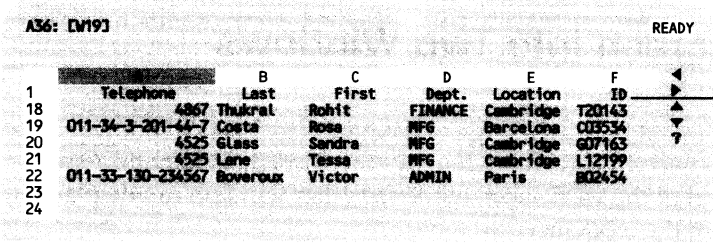
   You must type the same combination of uppercase and lowercase letters that you used when you created the password.

Chapter 21
Viewing Large Worksheets

This chapter describes special techniques for using large worksheets. It includes the following sections:

Keeping Headings in View

A worksheet often contains titles or headings that identify the data the worksheet contains. **Titles** are rows or columns that are always visible, even when you scroll to other areas of the worksheet. You freeze rows or columns as titles with /Worksheet Titles. Titles can be horizontal (one or more rows), vertical (one or more columns), or both.



To	Do this	With this result
Create horizontal titles	Position the cell pointer one row below the row(s) to freeze. Select /Worksheet Titles Horizontal.	1-2-3 freezes rows above the cell pointer.
Create vertical titles	Position the cell pointer in the column to the right of the column(s) to freeze. Select /Worksheet Titles Vertical.	1-2-3 freezes columns to the left of the cell pointer.

(continued)

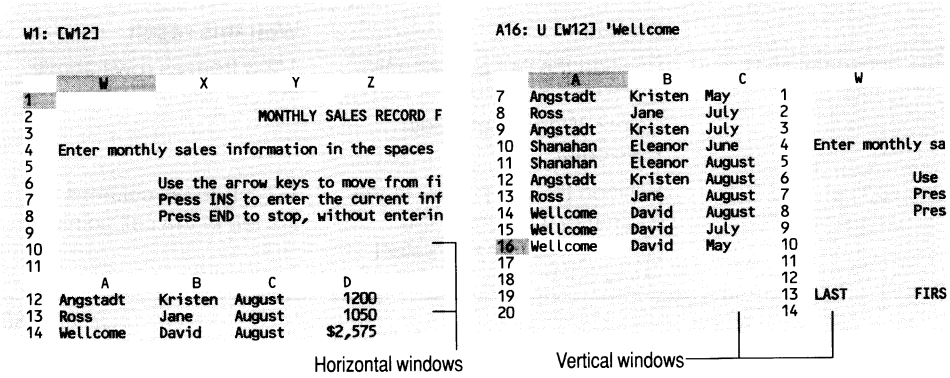
To	Do this	With this result
Create both horizontal and vertical titles	Position the cell pointer one row below and one column to the right of the row(s) and column(s) to freeze. Select /Worksheet Titles Both.	1-2-3 freezes rows above the cell pointer and columns to the left of the cell pointer.
Clear all titles	Select /Worksheet Titles Clear.	1-2-3 unfreezes all title rows and columns.

To move the cell pointer to a title row or column, press **F5 (GOTO)** and specify the address or range name of the cell you want to go to. 1-2-3 displays a second set of the rows or columns immediately below or to the right of the first set and moves the cell pointer to the specified cell in the second set. To clear the second set of rows or columns, press **PG DN** and then **PG UP** (for rows) or **CTRL-→** and then **CTRL-←** (for columns).

1-2-3 automatically clears worksheet titles in any situation in which the cell pointer would not be visible because of the current /Worksheet Titles setting. For example, if you retrieve a file in which rows 1 through 25 are set as worksheet titles but your screen displays only 20 rows, 1-2-3 clears the titles when you retrieve the file; otherwise, the cell pointer would not be visible.

Splitting the Screen into Two Windows

Another way to view different parts of a large worksheet is to create windows. This splits the worksheet into two windows and displays the worksheet in both. One window displays one part of the worksheet, while the other window can display the same or a different part of the worksheet.



You split the worksheet into vertical or horizontal windows with /Worksheet Window. If Wysiwyg is attached, you can also use the mouse to create windows.

Use **F6 (WINDOW)** *or* click the window to move the cell pointer from one window to the other.

When the worksheet is split into windows, you can scroll in each window independently or in parallel. The synchronized scrolling of the windows matches the type of window you select: if you select vertical windows, synchronized scrolling is vertical; if you select horizontal windows, synchronized scrolling is horizontal.

To	Do this	With this result
Split the screen horizontally	Move the cell pointer to the row to use as the top edge of the second window. Select /Worksheet Window Horizontal.	1-2-3 creates two windows with the screen split horizontally immediately above the row the cell pointer is in.
Split the screen vertically	Move the cell pointer to the column to use as the left edge of the second window. Select /Worksheet Window Vertical.	Creates two windows with the screen split vertically immediately to the left of the column the cell pointer is in.
Split the screen horizontally with the mouse if Wysiwyg is attached	Move the mouse pointer to the frame origin (the empty block above the row numbers and to the left of the column letters). Drag the frame origin down until the window is the size you want.	1-2-3 creates two windows with the screen split horizontally where you stopped dragging the frame origin.
Split the screen vertically with the mouse if Wysiwyg is attached	Move the mouse pointer to the frame origin (empty block above the row numbers and to the left of the column letters). Drag the frame origin to the right until the window is the size you want.	1-2-3 creates two windows with the screen split vertically where you stopped dragging the frame origin.
Synchronize window scrolling	Select /Worksheet Window Sync (this is the default).	For horizontal windows, the same columns are visible in both windows. For vertical windows, the same rows are visible in both windows.
Unsynchronize window scrolling	Select /Worksheet Window Unsync.	Windows scroll independently in all directions.

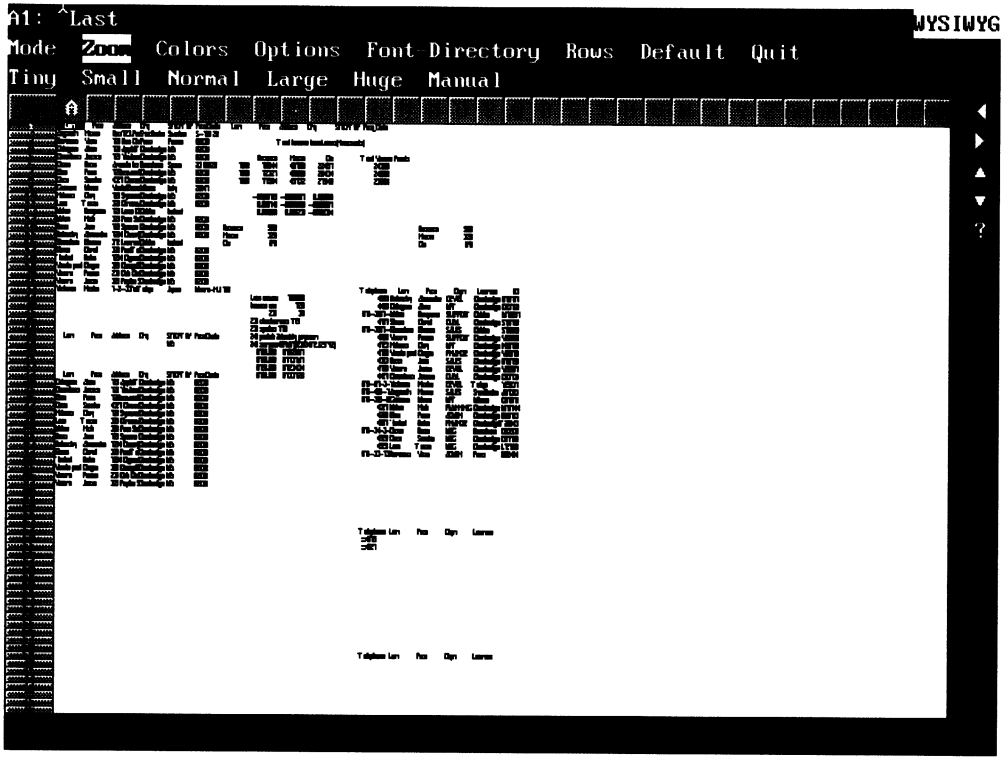
(continued)

To	Do this	With this result
Restore a single window (the top or left window)	Select /Worksheet Window Clear.	A single window occupies the whole screen and uses the contents, titles, global and individual column width settings, and hidden/displayed columns of the top or left window.
Restore a single window (the lower or right window) with the mouse if Wysiwyg is attached	Move the mouse pointer to the frame origin (the empty block above the row numbers and to the left of the column letters in either window). If a vertical window is set, drag the frame origin from the right window as far left as possible. If a horizontal window is set, drag the frame origin from the lower window up as far as possible.	A single window occupies the whole screen and uses the contents, titles, global and individual column width settings, and hidden/displayed columns of the window whose frame origin you dragged (the right vertical window, or the lower horizontal window).

Commands that change the worksheet display affect both windows, except for /Worksheet Column, /Worksheet Global Column-Width, and /Worksheet Titles, which affect only the current window.

Seeing More of the Worksheet

When you work with a large worksheet, it is often helpful to see as much of the worksheet on the screen as possible to determine where ranges of data are located and which areas of the worksheet are empty. As you edit a large worksheet, you may leave unintended gaps in a range or accidentally miss a few stray cells when deleting a range. Shrinking each cell in the worksheet lets you see as much of the worksheet as possible. You shrink and enlarge worksheet cells with the Wysiwyg Display Zoom commands. You can also use :Display Rows to display a specified number of rows; this shrinks and enlarges worksheet rows without affecting the width of columns.



To Shrink the Worksheet

1. Select :Display Zoom.
2. Select one of the following:

Tiny	Reduce cells to 63 percent of their normal size.
Small	Reduce cells to 87 percent of their normal size.
Normal	Display cells at their normal size.
Large	Enlarge cells to 125 percent of their normal size.
Huge	Enlarge cells to 150 percent of their normal size.
Manual	Reduce cells down to 25 percent of their normal size, or enlarge cells up to 400 percent of their normal size.

3. If you select Manual, enter a size for the display of cells.

In the previous illustration, 1-2-3 displays the worksheet at a manual setting of 25% of its normal size, allowing you to see what cells contain entries.

Chapter 22
Working with Other Programs and Files

This chapter describes how to use data from 1-2-3 with other programs, how to use data from other programs with 1-2-3, and how to use worksheets created with other spreadsheet programs with 1-2-3. The chapter includes the following sections:

How Do I Use Data with 1-2-3 and Other Programs?

1-2-3 Release 2.3 uses files stored in the .WK1 worksheet file format (a **file format** is the structure a program uses to store data in disk files). Sometimes, however, you may want to use data stored in other file formats, such as text from a word-processing program or data from other spreadsheet programs such as Symphony. You may also want to use data from a 1-2-3 worksheet with another program. 1-2-3 lets you exchange data between programs easily:

- You can use /File Import to copy data into the current worksheet from a **text file**, a disk file in ASCII file format that you created with 1-2-3 or another program, such as a word processor. The **ASCII file format** uses standard codes to represent all characters and symbols. Most personal computer software programs can use data in ASCII format. (ASCII stands for **A**merican **S**tandard **C**ode for **I**nformation **I**nterchange.) After you bring the data into 1-2-3 with /File Import, you can use /Data Parse to convert the data from the text file into separate columns.
- You can create a text file in ASCII file format with /Print File. You can use the text file in another program (for example, a word-processing program), or print the text file later with an operating system command or BPrint.
- You can convert 1-2-3 and Symphony worksheet data to other file formats using the Translate utility. This means you can use your 1-2-3 Release 2.3 data with other spreadsheet and database management programs, as well as with other releases of 1-2-3. Translate also lets you convert database and spreadsheet data from other programs to 1-2-3 and Symphony file formats.

Using Data from a Text File

Use /File Import to copy data from a text file into the current worksheet, beginning at the cell pointer location. You can import data from two types of text files:

- A **delimited text file** contains characters (delimiters) that separate data. Some programs have commands or translate utilities that create delimited text files. For 1-2-3 to import this type of text file correctly, labels must be enclosed in quotation marks, and all labels and numbers must be separated by commas, spaces, colons, or semicolons. Numbers must not be formatted with commas for thousands separators because the commas will act as delimiters. To import data from a delimited text file into the current worksheet, you use /File Import Numbers. 1-2-3 imports both labels and numbers, entering them in separate cells.
- A **nondelimited text file** does not separate data. For 1-2-3 to import this type of text file correctly, each line in the file must end with a carriage return or a line feed, and each line must not exceed 240 characters. To import only numbers from a nondelimited text file, use /File Import Numbers. 1-2-3 enters each number in a separate cell. To import both labels and numbers, use /File Import Text. 1-2-3 treats each line of data in the text file as a long label, entering it in a separate cell.

W When you import data into cells that contain Wysiwyg formatting, the formatting is not lost. The Wysiwyg formatting is applied to the imported data.

CAUTION To avoid possible data loss from incorrectly importing files, save the current worksheet before using /File Import. If you make a mistake when importing data and undo is on, press **ALT-F4 (UNDO)** immediately to restore the worksheet to its original state.

To Add Data from a Text File to the Worksheet

1. Move the cell pointer to an area of the worksheet that is large enough to include all the imported data.
2. Select /File Import.
3. Select one of the following options:

Numbers	Imports only numbers from a nondelimited text file; imports numbers and labels from a delimited text file. 1-2-3 places each entry in a separate cell in the current worksheet beginning at the current cell.
Text	Imports labels and numbers from a nondelimited text file; do not use with a delimited text file. 1-2-3 imports each line of data as a long label, entering it in a single cell in the current worksheet beginning at the current cell. 1-2-3 enters each successive line from the text file in the same column, one cell below the other.

1-2-3 displays files with a .PRN extension in the current directory. Change the drive, directory, and/or extension if necessary.

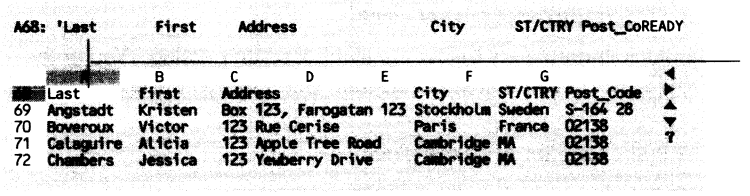
4. Specify the name of the text file you want to import.

Some word-processing programs produce files that contain special non-ASCII characters. 1-2-3 cannot import these characters properly with /File Import.

You can view or print data imported with /File Import Text, but you cannot use the numbers in calculations unless you use /Data Parse to place the labels and numbers in separate cells in the worksheet.

Parsing Imported Data

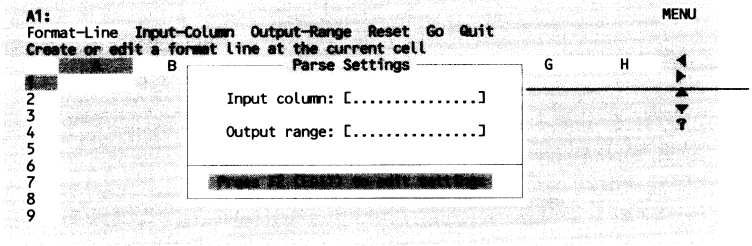
Parsing data converts any long labels into separate columns of data. 1-2-3 treats data you import with /File Import Text as long labels. The labels are contained in one column, even though the data may look like it extends across several columns. You can view or print imported data when it appears as long labels, but you cannot calculate with the numbers each label contains, nor can you easily move any part of the label. To be able to work with the imported data, you must separate the data within the long labels into individual cell entries with /Data Parse.



The entire row of text is a single label in cell A68, not a row of separate labels

/Data Parse works best with similarly structured data that can be separated into columns and rows easily, such as data from a database program or names and addresses from a word processing program.

When you select /Data Parse, 1-2-3 displays the Parse Settings dialog box. You can specify the input column range and the output range in the dialog box *or* use the menu. The labels contained in the input column range are parsed using a format line. Use /Data Parse Format-Line Create to create a format line.



The dialog box to specify he ranges 1-2-3 will use to parse the data

Format Lines

A **format line** determines how 1-2-3 parses the label below the format line into individual entries, separating the label wherever there are one or more spaces. For example, 1-2-3 parses the three-word label Average Monthly Sales into three pieces, because the spaces after Average and Monthly indicate the start of a new entry.

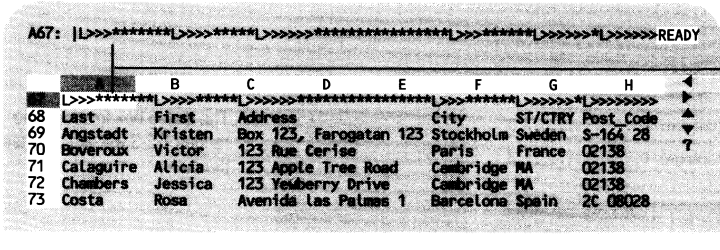
The pieces into which 1-2-3 breaks up the label are called **data blocks**. In the illustration on page 257, cell A68 contains six data blocks because the label contains spaces in five places.

The format line is a label, preceded by the ¦ (split vertical bar) label prefix. (Some screens may display a split vertical bar; others display an unbroken vertical bar.) The characters in the format line indicate the data type and the width of each data block in the long label below it. The **data type** is the type of data — label, value, date, or time — within a data block.

Format lines can contain the following symbols:

Symbol	Description
D	Represents the first character of a date block.
L	Represents the first character of a label block.
S	Skips the data block immediately below the symbol when parsing. You enter the skip symbol (S) when you edit a format line. Use this symbol when your labels include a data block you do not want 1-2-3 to parse.
T	Represents the first character of a time block.
V	Represents the first character of a value block.
>	Represents characters in a data block. For example, 1-2-3 displays a value block that is four characters wide as V>>>.
*	Represents blank space that can become part of a data block if that block in any label requires extra characters.

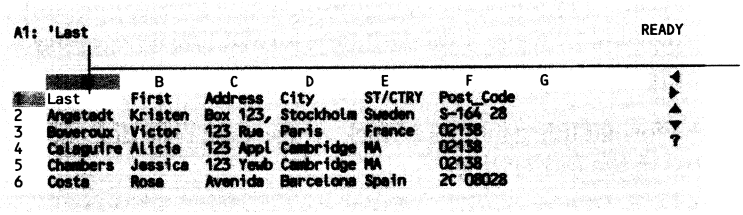
1-2-3 creates the format line shown in the following illustration for the unparsed label in cell A68:



The format line tells 1-2-3 how to break up the data in the column of long labels

If you select /Data Parse Go with the format line shown in the illustration above, 1-2-3 enters Last as a label in first column, First as a label in the second column, Address as a label in the third column, City as a label in the fourth column, ST/CTRY as a label in the fifth column, and Post_Code as a label in the sixth column. The format line contains a sufficient number of undefined spaces (*) to accommodate the

additional width of the labels in the cells below, as shown in the following illustration. To display all the characters of the parsed data, use /Worksheet Column Set-Width to increase the width of the columns where necessary.



	A	B	C	D	E	F	G
1	Last	First	Address	City	ST/CTRY	Post_Code	
2	Angstadt	Kristen	Box 123,	Stockholm	Sweden	S-164 28	
3	Boveroux	Victor	123 Rue	Paris	France	02138	
4	Calaguire	Alicia	123 Appl	Cambridge	MA	02138	
5	Chambers	Jessica	123 Yeub	Cambridge	MA	02138	
6	Costa	Rose	Avenida	Barcelona	Spain	2C 08028	

CAUTION You must include as many character symbols (> or *) as the longest label in any one block, or you may lose data.

To Parse Data

1. Position the cell pointer in the cell that contains the first long label to parse.
2. Select /Data Parse Format-Line Create.

   1-2-3 analyzes the label in the current cell, inserts a row, creates a format line in the current cell, and moves the range of data down one row. The characters in the format line reflect the data type and width of each of the data blocks in the cell below it. 1-2-3 uses the format line to guess how it should parse the label. 1-2-3 treats each group of characters separated by one or more blank spaces as a single data block and identifies each of these data blocks as one of the following data types: value, date, time, or label.

   NOTE If a data block contains an ambiguous entry — that is, data to which 1-2-3 could assign more than one data type — 1-2-3 determines the data type using the following order of precedence: value, date, time, and label. For example, if a data block contains the characters 4/10, 1-2-3 identifies the data type as a value instead of a date, because value comes before date in the order of precedence.

   W When you select /Data Parse, data is temporarily displayed in text mode. This allows the characters to line up, which makes creating and editing the format line easier. When you quit /Data Parse, 1-2-3 returns to graphics mode.
3. If you need to edit the format line, select Format-Line. Then follow the procedure in "To Edit a Format Line" on page 261.

   You need to edit the format line if

   - Any data block (including adjacent * characters) is not wide enough to accommodate any of the data that 1-2-3 will parse in the labels below it.
   - Any of the block widths or data type characters is incorrect. In the example in the note above, you would change the data type character from V (value) to D (date) if you wanted 1-2-3 to interpret 4/10 as a date.

- Any single block contains a space, because the format line treats the block as two shorter blocks.

4. If you need to create additional format lines, select Quit to return 1-2-3 to READY mode, position the cell pointer in the next cell requiring a new format line, and select /Data Parse Format-Line Create. Edit each new format line if necessary.

   You need to create additional format lines if

   - Any label below the format line contains a block whose data type does not match that indicated in the format line.
   - Any label below the format line contains a block whose width should be different from that indicated in the format line.
   - In addition to values, your imported data contains titles, column headings, other descriptive labels, or a row of characters separating different parts of the worksheet.

5. Specify the single-column range (input column) that contains the format lines and labels to parse in the Parse Settings dialog box.

   The first cell in the input column range must contain a format line. 1-2-3 ignores any cells that do not contain labels.

6. Specify in the Parse Settings dialog box the address or range name of the first cell in a blank range large enough to hold your rows and columns of parsed data (output range).

   CAUTION /Data Parse will create an output range that contains as many columns and rows as needed to contain the parsed data. To avoid possible data loss from writing over existing data, save the worksheet before using /Data Parse. If you make a mistake when parsing data and undo is on, press **ALT-F4 (UNDO)** immediately to restore the worksheet to its original state.

7. Select Go.

   1-2-3 produces a parsed copy of the imported data in the output range by entering each data block as a value, date, time, or label in a cell. When you move the cell pointer through the output range, the cell contents displayed in the control panel show that each cell in the output range contains data.

If the input column contains one or more blank cells, 1-2-3 ignores these cells when it parses the information in the output range.

TIP If you want to parse a very large database and do not have enough memory, try specifying the upper left cell of the range that contains the imported data as the output range. This will write over the original data and save memory. As a precaution, use /File Save before you do this. You can then use /File Retrieve to restore the worksheet prior to parsing the data.

To Edit a Format Line

1. Position the cell pointer in the cell that contains the format line you want to edit.
2. Select /Data Parse Format-Line Edit.

   1-2-3 highlights the format line, places the cursor under the first character in the line, and enters OVR (overstrike) mode. To edit the format line in INS (insert) mode, press INS once and the OVR indicator will disappear from the bottom of your screen.
3. Edit the format line.

   You edit the format line as you edit any cell entry. For complete information about editing, see "Editing an Entry" on page 35. Several keys (described in the following table) have special functions when you use them to edit a format line.

Key	Description
↑	Scrolls the unparsed labels below the format line up one row at a time so you can compare each label with the format line.
↓	Scrolls the unparsed labels below the format line down one row at a time so you can compare each label with the format line.
CTRL-BREAK	Cancels edits to the format line and returns 1-2-3 to READY mode.
ESC	Erases the format line; if pressed repeatedly, returns the format line to its previous state.
HOME	Returns the cursor to its initial position in the format line and, if you scrolled the unparsed labels below the format line, displays the unparsed labels that were visible before you began scrolling.
PG DN	Scrolls the unparsed labels below the format line down by the number of rows on the screen so you can compare each label with the format line.
PG UP	Scrolls the unparsed labels below the format line up by the number of rows on the screen so you can compare each label with the format line.

4. Press ENTER when you finish editing the format line to return to the Data Parse menu.

Saving Data in a Text File

A standard text file contains data, including text, borders, headers, footers, margins, and page breaks, but no graphs or special printer codes. You use /Print File to create a text file from a worksheet range. You can use the text file in another program (for example, a word-processing program), or print the text file later with an operating system command or BPrint. 1-2-3 assigns the file the default extension .PRN.

To review the contents of a text file, you can use Viewer or your operating system's TYPE command to scroll through the print output on your screen. At the operating system prompt, type type [*path*]*filename* and press ENTER. Remember to specify an extension for the file if one exists.

After you select /Print File, 1-2-3 prompts you for the name of the text file to create. Then 1-2-3 displays the Print Settings dialog box, which lists all the print settings and the settings for the current print job (if any). To change print settings, press F2 (EDIT) *or* click the dialog box to activate it, and then change the settings in the dialog box directly, or select commands from the menu. You must specify the **print range**, or the cells you want 1-2-3 to include in the text file when you select Go.

To Create a Text File

1. Select /Print File.
2. Specify the name of the text file.

   1-2-3 displays the names of files in the current directory with the extension .PRN. If necessary, change the drive, directory, or extension.

   When you specify the file name, 1-2-3 uses the extension .PRN for a text file unless you specify a different extension.
3. If you specify the name of a file that already exists, select Cancel to return to READY mode, or Replace to write over the existing file on disk.
4. Specify the range to print.

   Press F2 (EDIT) *or* click the Print Settings dialog box to activate it and specify the range address (/Print File Range).

   If the range contains long labels that exceed the cell width, make sure that you include the cells the labels cover in the range to print or the labels will be truncated.
5. (Optional) Change the current print settings.

   For a description of available print options, see "Changing How 1-2-3 Prints" on page 84.

   TIP In a text file, you may want to eliminate headers, footers, and page breaks and adjust margins if you will use the text file in another program (such as a word-processing program). Mark Unformatted pages from the Print Settings dialog box (Options Other Unformatted) to eliminate headers, footers, and page breaks. To set the left margin to 0, select Margins (Options Margins Left) and enter 0. To set the right margin, select Margins (Options Margins Right) and enter a number for the right margin that is appropriate for the program in which you are going to use the text file.
6. When you finish specifying print options, select OK to return to the menu.

7. Select Align.

   This sets the internal line count 1-2-3 maintains to 0, which represents the top of a page.

8. Select Go.

9. (Optional) To include other worksheet ranges, select Line to separate each range with a line of space. Then repeat steps 4 and 8.

   1-2-3 appends new ranges to the end of the previous range in the text file.

10. Select Quit to complete the print job and return to READY mode.

1-2-3 ignores setup strings when creating a text file.

W The text file that you create using /Print File will not contain any Wysiwyg formatting.

Translating Worksheets

The Translate utility lets you convert 1-2-3 and Symphony worksheet data to other file formats. This allows you to use your 1-2-3 Release 2.3 data with other spreadsheet and database management programs, as well as with previous releases of 1-2-3. Translate also lets you convert database and spreadsheet data from other programs to 1-2-3 and Symphony file formats.

When you translate files, you need to understand the following terms:

- The **source file** is the file you want to translate. It is in the file format of the **source product**, which is the program used to create the file.
- The **target file** is the new file you create with Translate. It contains source file data that has been translated into the file format of the **target product**, which is the program you will now use to work with the file.

For example, to translate a 1-2-3 Release 2.3 file named EMPLOYS.WK1 to a dBase III® file named EMPLOYS.DBF, 1-2-3 Release 2.3 would be the source product, EMPLOYS.WK1 would be the source file, dBase III would be the target product, and EMPLOYS.DBF would be the target file. The following sections describe all the possible file translations you can perform with the Translate utility.

For more detailed information on sharing files among different Lotus programs, see Chapter 2 in *Quick Start for 1-2-3 Upgraders*.

1-2-3 Release 1A

You can translate 1-2-3 Release 1A files (.WKS files) to the following file formats:

Target product	Target file extension
dBase II	.DBF
dBase III	.DBF
Products that can read files in Data Interchange Format (DIF)	.DIF

1-2-3 Release 2, 2.01, 2.2, and 2.3

You can translate 1-2-3 Release 2, 2.01, 2.2, and 2.3 files (.WK1 files) to the following file formats:

Target product	Target file extension
1-2-3 Release 1A	.WKS
dBase II	.DBF
dBase III	.DBF
Products that can read files in Data Interchange Format (DIF)	.DIF
Enable 2.0	.SSF
Multiplan	.SLK
SuperCalc4	.CAL
Symphony 1.0 or 1.01	.WRK

NOTE Symphony 1.1, 1.2, 2.0, and 2.2, and 1-2-3 Release 3 and 3.1, can read 1-2-3 Release 2, 2.01, 2.2, and 2.3 files (.WK1 files) without translation. For more information, see "When not to use the Translate utility" on page 265.

dBase II and III, DIF, Multiplan and VisiCalc

You can translate dBase II® and dBase III files (.DBF files), DIF® files, Multiplan® files (.SLK files), and VisiCalc® files (.VC files) to the following file formats:

Target product	Target file extension
1-2-3 Release 1A	.WKS
1-2-3 Release 2, 2.01, 2.2, or 2.3	.WK1
Symphony 1.0 or 1.01	.WRK
Symphony 1.1, 1.2, 2.0, or 2.2	.WR1

Enable and SuperCalc4

You can translate Enable® 2.0 files (.SSF files) and SuperCalc®4 files (.CAL files) to 1-2-3 Release 2, 2.01, 2.2, or 2.3 (.WK1 files).

Symphony 1.0 and 1.01

You can translate Symphony 1.0 and 1.01 files (.WRK files) to the following file formats:

Target product	Target file extension
1-2-3 Release 1A	.WKS
dBase II	.DBF
dBase III	.DBF
Products that can read files in Data Interchange Format (DIF)	.DIF

Symphony 1.1, 1.2, 2.0, and 2.2

You can translate Symphony 1.1, 1.2, 2.0, and 2.2 files (.WR1 files) to the following file formats:

Target product	Target file extension
1-2-3 Release 1A	.WKS
dBase II	.DBF
dBase III	.DBF
Products that can read files in Data Interchange Format (DIF)	.DIF
Symphony 1.0 or 1.01	.WRK

When not to use the Translate utility

In some cases, translation is not necessary. You can use Viewer or /File Retrieve to use worksheet data from another Lotus product. For example, to use a Symphony Release 1.2 file called INCOME.WR1, start 1-2-3 Release 2.3 and select /File Retrieve. Press ESC to erase the default file extension .WK1, and then type *.wr1. When you press ENTER, 1-2-3 will list all Symphony 1.1, 1.2, 2.0, and 2.2 worksheet files in the specified directory. Highlight INCOME.WR1 and press ENTER to retrieve the file.

When you use /File Save to save the file, it will be saved with the original file name and the extension of the product you used to retrieve the file. For example, if you save INCOME.WR1 after retrieving it with 1-2-3 Release 2.3, 1-2-3 will name the file INCOME.WK1 unless you give it a different name. Consequently, you will have two files on disk with the same name but different extensions.

CAUTION When you use one Lotus product to retrieve a file created in a different Lotus product or release, the file loses whatever unique features the source program offered. In the previous example, any Symphony features, such as multiple windows or database forms, will no longer be in the file.

The following table indicates the correct procedure for each possible translation between the different releases of 1-2-3 and Symphony.

Source product	Target product	Procedure
1-2-3 Rel. 1A	1-2-3 Rel. 2, 2.01, 2.2, 2.3, 3, or 3.1	Retrieve .WKS file using target product
	Symphony Rel. 1.0 or 1.01	Retrieve .WKS file using target product
	Symphony Rel. 1.1, 1.2, 2.0, or 2.2	Retrieve .WKS file using target product
1-2-3 Rel. 2, 2.01, 2.2, or 2.3	1-2-3 Rel. 1A	Use 1-2-3 Release 2.3 Translate utility
	1-2-3 Rel. 3 or 3.1	Retrieve .WK1 file using target product
	Symphony Rel. 1.0 or 1.01	Use 1-2-3 Release 2.3 Translate utility
	Symphony Rel. 1.1, 1.2, 2.0, or 2.2	Retrieve .WK1 file using target product
1-2-3 Rel. 3 or 3.1	1-2-3 Rel. 1A	Use 1-2-3 Release 3 or 3.1 Translate utility
	1-2-3 Rel. 2, 2.01, 2.2, or 2.3	See **NOTE** at the end of this table.
	Symphony Rel. 1.0 or 1.01	Use 1-2-3 Release 3 or 3.1 Translate utility
	Symphony Rel. 1.1, 1.2, 2.0, or 2.2	See **NOTE** at the end of this table.
Symphony Rel. 1.0 or 1.01	1-2-3 Rel. 1A	Use 1-2-3 Release 2.3 Translate utility
	1-2-3 Rel. 2, 2.01, 2.2, 2.3, 3, or 3.1	Retrieve .WRK file using target product
	Symphony 1.1 or 1.2	Retrieve .WRK file using target product

(continued)

Source product	Target product	Procedure
Symphony Rel. 1.1, 1.2, 2.0, or 2.2	1-2-3 Rel. 1A	Use 1-2-3 Release 2.3 Translate utility
	1-2-3 Rel. 2, 2.01, 2.2, 2.3, 3, or 3.1	Retrieve .WR1 file using target product
	Symphony Rel. 1.0 or 1.01	Use 1-2-3 Release 2.3 Translate utility

NOTE If a 1-2-3 Release 3 or 3.1 file does not include features unique to Release 3, such as multiple worksheets or new @functions, you can save it in Release 2 format by naming the file with the .WK1 extension when you use /File Save in Release 3 or 3.1. The file can then be retrieved with 1-2-3 Release 2, 2.01, 2.2, or 2.3, or with Symphony Release 1.1, 1.2, 2.0, or 2.2. Translation is not necessary. If, however, a 1-2-3 Release 3 or 3.1 file does include features or @functions unique to Release 3, you must use the 1-2-3 Release 3 or 3.1 Translate utility to translate it before you can use it with 1-2-3 Release 2.3, previous releases of 1-2-3, or Symphony.

Translation restrictions

A few of the restrictions for translating files are listed below:

- You cannot translate password-protected files.
- Translate accepts as source files only those 1-2-3 or Symphony files created with /File Save. To translate files created with /File Xtract, read them into memory with /File Retrieve and save them again with /File Save Replace.
- Sometimes a source product contains a feature or @function that has no equivalent in the target product. The Help screens that appear after you select the source and target products describe limitations for that particular type of translation, as well as restrictions on file size and structure, and what results during translation when there are discrepancies between a source file and target product.

To Use the Translate Utility

1. Start the Translate utility.

   Make the directory that contains 1-2-3 current (this is usually the directory named 123R23 that the Install program created). Then do one of the following:

From the operating system	Type trans, optionally followed by a space and the name of a driver set to use, and press ENTER.
From the Access system	To display the Access system menu, type lotus, optionally followed by a space and the name of the driver set to use, and press ENTER. Select Translate when the Access menu appears.

A driver set is a file that contains settings saved from the 1-2-3 Install program. Multiple driver sets let you use different hardware setups with Translate. If the driver set you want to use is not located in the current directory, you must specify the full path of the driver set, including a drive if necessary (such as B:). If you do not specify a driver set, Translate uses the default driver set.

Starting Translate directly from your computer's operating system prompt gives you more of your computer's memory for work, and saves the step of going through the Access system. When you start Translate from the operating system, you return to the operating system when you leave Translate.

A menu of source products appears on the left side of the screen.

2. Select a source product.

   Highlight the product and press ENTER. The mouse does not work in the Translate utility. A list of available target products for the source product you selected appears on the right side of the screen.

3. Select a target product.

   The Translate utility displays Help screens that provide information about the translation you selected, including any restrictions.

4. Press ESC to leave the Help screens and specify the source file.

   The Translate utility displays a list of files in the current directory that were created with the source product you specified in step 2. To list source files in a different drive or directory, press ESC and then use the pointer-movement keys to edit the path. When you are done, press ENTER. The Translate utility displays a list of source files in the directory you specified.

   If a source file's extension is different from the default extension of the source product, you will still be able to translate it.

5. Select the source file you want to translate.

   The Translate utility displays a prompt followed by the default target file name. The Translate utility creates a default target file name by adding the target product extension to the source file name.

6. Press ENTER to accept the default name the Translate utility suggests or edit the path and/or file name or type a new directory and/or file name and press ENTER.

7. The Translate utility displays additional prompts specific to certain source and target products and to certain situations:

   - If a file with a target file name already exists, the Translate utility asks if you want to write over the existing file. Select Yes to write over the file or No to specify a different target file name.
   - If you are translating to DIF, specify the orientation as row or column.

- If you are translating to dBase II or dBase III, specify whether to translate a named range or an entire file. If you specify range, enter the range name at the prompt and press ENTER.

8. When the Translate utility asks if you want to proceed with the translation, select Yes to translate the file or Quit to return to the Translate utility menu without translating the file.

   The Translate utility displays a progress message that indicates the percentage of data that has been translated. When the translation is complete, the message 'Translation successful' appears.

   NOTE If the Translate utility is unable to translate, it displays an error message with information about the problem. This usually happens when the file you are attempting to translate is not in the correct format, or the file has functions that do not translate to the target product directly. For each type of translation, the Translate utility expects the file to be structured in a particular way. For information about the correct format, press F1 (HELP).

9. Press ENTER to translate another file from the same source product, or press ESC to specify a different source product or press ESC twice to display the message 'Do you want to leave Translate?,' and select Yes.

If you started Translate from the operating system, the operating system prompt appears. If you started Translate from Access, the Access menu appears.

W The Translate utility does not support Wysiwyg .FMT format files or Allways .ALL format files. Use the Wysiwyg Special commands to import and export these types of files. See "Special Commands" on page 306.

Chapter 23
Setting Defaults

This chapter describes viewing and changing the default settings for a worksheet. The chapter includes the following sections:

What Are Defaults?

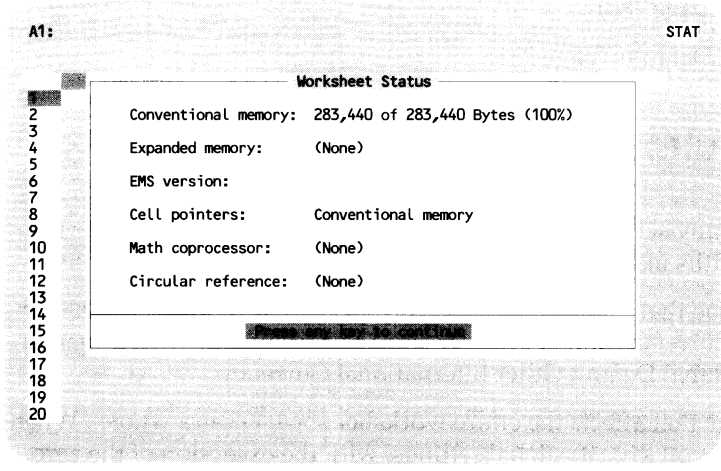
A 1-2-3 worksheet has many settings, or **defaults,** when you start working in it. For example, the column widths may be set to 9. There are different kinds of defaults:

- An **initial setting** is one that 1-2-3 uses unless you specify a different setting. For example, the default currency sign is $ (dollar sign) as a prefix unless you change it with /Worksheet Global Default Other International Currency.
- A **global setting** is one that affects the entire worksheet or 1-2-3 as a whole. When you save a worksheet, you save its global settings, with the exception of the zero display setting. You can override many global settings on the local level.
- A **configuration setting** is one that 1-2-3 uses each time you begin a session, such as auto-execute macros, Help access method, printer instructions, and many others. Configuration settings are stored in a file named 123.CNF, and appear in the Default Settings dialog box.
- W **Default display settings** are settings 1-2-3 uses each time you attach Wysiwyg. The default display settings are stored in a file named WYSIWYG.CNF.
- W **Page layout settings** control how Wysiwyg prints. Page layout settings are stored in a file named LAYOUT.CNF. These are the default settings 1-2-3 uses when you print with Wysiwyg (:Print).
- W The **default font set** is the group of eight fonts that are initially available when you attach Wysiwyg.

Seeing the Current Defaults

You can see some current worksheet settings by selecting /Worksheet Status or /Worksheet Global Default Status.

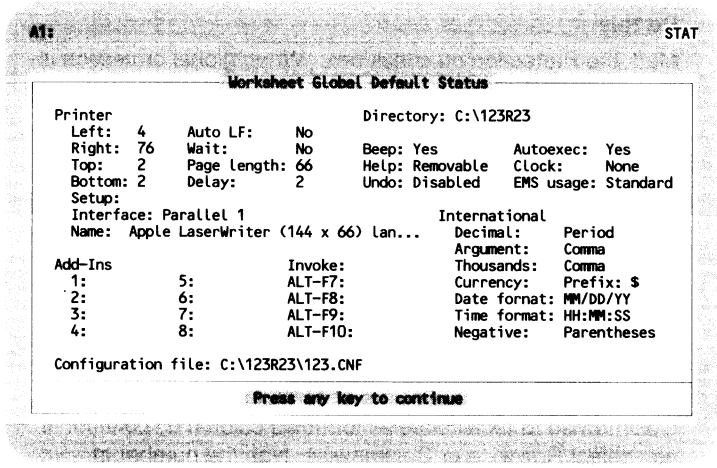
/Worksheet Status displays information about available memory, the type of memory in which cell pointers are stored, whether 1-2-3 recognizes a math coprocessor in your system, and circular references. Use /Worksheet Status to check available memory before using /File Combine or when the MEM indicator is flashing. If your system has a math coprocessor, 1-2-3 uses it to process values; otherwise, 1-2-3 uses the Software Coprocessor Floating Point driver.



The status screen displays only one circular reference at a time. For information about circular references, see "Exploring Formulas with the Auditor Add-In" on page 39. For information about cell pointers and Expanded Memory System (EMS), see Appendix C, beginning on page 343.

TIP 1-2-3 reserves approximately half of your computer's available conventional memory if undo is enabled. Use /Worksheet Global Default Other Undo Disable to increase your available memory. If you have enough expanded memory, 1-2-3 will use expanded memory for undo. For further ways to increase available memory, see Appendix C, beginning on page 343.

/Worksheet Global Default Status displays the current default settings, such as the default printer settings. For information about the settings that appear in the Worksheet Global Default Status screen, see the following section, "Setting Defaults."



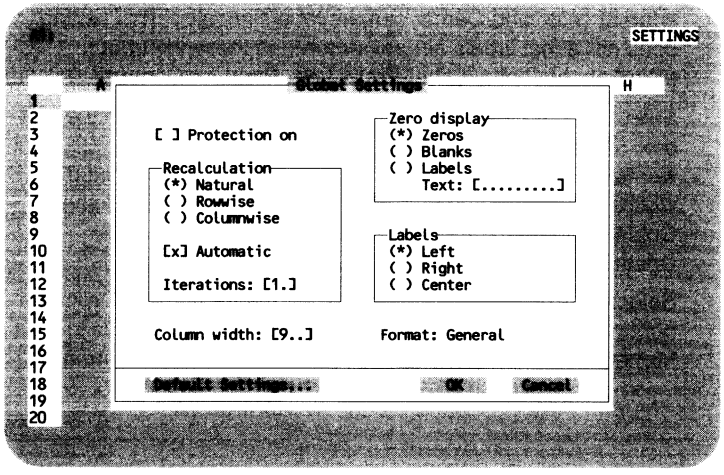
Setting Defaults

The Worksheet Global commands let you change default settings for the current 1-2-3 session and configuration settings that 1-2-3 uses every time you start a 1-2-3 session.

This section describes three Worksheet Global commands that set defaults: /Worksheet Global, /Worksheet Global Default, and /Worksheet Global Default Other International. For each of these commands, you can select options in a dialog box or select corresponding commands in the menu above the dialog box.

Global Defaults

To specify global worksheet settings, select /Worksheet Global. Press **F2 (EDIT)** *or* click the dialog box to activate it.



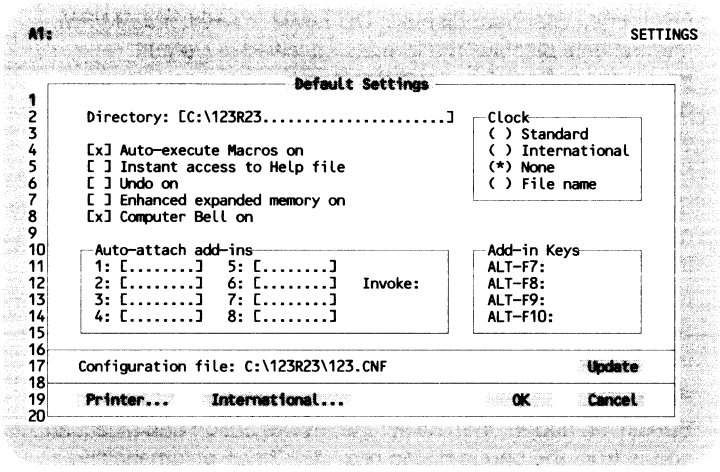
To	Do this
Turn global protection on	Mark the Protection on check box. When global protection is on, you cannot enter or edit data in the worksheet except in cells you explicitly unprotect with /Range Unprot. (/Worksheet Global Protection Enable or Disable)
Set the display for cells whose value is zero	Select one of these options: Zeros, Blanks, or Labels. Zeros displays zeros, Blanks displays a blank cell, and Labels displays a label. If you select Labels, type the label you want to display in the text box. (/Worksheet Global Zero No, Yes, or Label)
Set the order in which 1-2-3 recalculates formulas	Select one of these options: Natural, Rowwise, or Columnwise. Select Natural to recalculate each formula only after recalculating other formulas on which that formula depends. Select Rowwise to recalculate all formulas row by row. Select Columnwise to recalculate all formulas column by column. If you select Rowwise or Columnwise, type the number of recalculation passes you want 1-2-3 to make in Iterations. (/Worksheet Global Recalculation Natural, Columnwise, Rowwise, or Iteration)
Set the number of recalculation passes	Select Iterations. Type a number from 1 to 50 in the text box. This sets the number of recalculation passes 1-2-3 makes for a complete recalculation. 1-2-3 uses this setting only when recalculation order is Columnwise or Rowwise, or when the recalculation order is Natural and a circular reference exists. (/Worksheet Global Recalculation Iteration)
Set recalculation to occur automatically or manually	Mark or remove the mark from the Automatic check box. When recalculation is automatic, 1-2-3 automatically recalculates formulas each time you change the contents of a cell. When recalculation is manual (not automatic), 1-2-3 recalculates formulas only when you press F9 (CALC). (/Worksheet Global Recalculation Automatic or Manual)
Set the alignment for future label entries	Select one of these options: Left, Right, or Center. Left aligns labels at the left edge of cells, Right aligns labels at the right edge of cells, and Center centers labels in cells. This setting does not affect labels already entered in the worksheet. (/Worksheet Global Label-Prefix Left, Right, or Center)
Set the global column width	Select Column width. Enter a number from 1 to 240 in the text box. This sets the column width for all columns in the worksheet. The global column width does not affect column widths set with /Worksheet Column Set-Width or /Worksheet Column Column-Range Set-Width. (/Worksheet Global Column-Width)
Set the global number format	Select Format and then select the format for numbers from the popup dialog box. This setting does not affect numbers in cells formatted with /Range Format. (/Worksheet Global Format)

Configuration Defaults

The Worksheet Global Default commands let you set global defaults that affect the current 1-2-3 session. You can also save these global settings as configuration settings, which means 1-2-3 uses them in future 1-2-3 sessions.

For information on global printer settings you can save as configuration settings, see "Printer defaults" on page 276. For information on international settings you can save as configuration settings, see "International defaults" on page 279.

To specify global worksheet settings that you can save as configuration settings, select /Worksheet Global Default. Press **F2 (EDIT)** *or* click the dialog box to activate it.



To	Do this
Set the default directory	Select Directory. Type the default path (drive and directory names) in the text box. 1-2-3 automatically uses this directory when you retrieve, save, list, combine, and extract files. (/Worksheet Global Default Directory)
Set autoexecute macros to run automatically	Mark the Auto-execute Macros on check box. This tells 1-2-3 to run auto-execute macros when it retrieves a file that contains one. All auto-execute macros are named \0 (zero). (/Worksheet Global Default Autoexec)
Set Help to remain open during the current session	Mark the Instant access to Help file check box. This keeps the Help file open during the current session after the first time you open it. If you remove the mark from this check box, the Help file closes each time you return to the worksheet. (/Worksheet Global Default Other Help Instant or Removable)
Turn Undo on	Mark the Undo on check box. When Undo is on, you can press **ALT-F4 (UNDO)** to cancel any changes made to the worksheet since 1-2-3 was last in READY mode. For more information on Undo, see "Undoing an Action" on page 12. (/Worksheet Global Default Other Undo Enable or Disable)

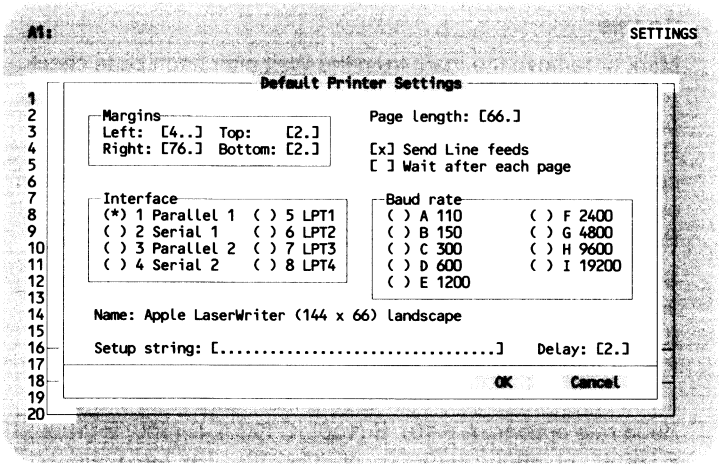
(continued)

To	Do this
Use available expanded memory	Mark the Enhanced expanded memory on check box. This keeps both data and cell pointers in expanded memory, which is useful for larger worksheets. Remove the mark from the check box to keep only data in expanded memory and maximize processing speed. (/Worksheet Global Default Other Expanded-Memory Standard or Enhanced)
Make 1-2-3 beep when errors occur	Mark the Computer bell on check box. This sounds the computer bell when an error occurs and during {BEEP} commands in a macro. (/Worksheet Global Default Other Beep)
Set the display for the date-and-time indicator	Select one of these options: Standard, International, None, or File name. Standard displays DD-MMM-YY HH:MM AM/PM, International displays the formats specified in Default International Settings, None displays nothing, and File name displays the current worksheet's file name or the last Clock setting in an unnamed file. (/Worksheet Global Default Other Clock Standard, International, None, Clock, or Filename)
Set 1-2-3 to automatically attach an add-in when you start 1-2-3	Select one of the Auto-attach add-ins text boxes. Then type the name of the add-in or press **F3 (NAME)** and select an add-in from the popup dialog box. You can specify up to eight add-ins. (/Worksheet Global Default Other Add-in Set)
Assign a key that invokes an add-in	Select one of the Add-in keys text boxes. Then select an add-in from the popup dialog box. To invoke the add-in, press the assigned key(s). (/Worksheet Global Default Other Add-In Set)
Set 1-2-3 to automatically invoke an add-in when you start 1-2-3	Specify an add-in, then select the Invoke option and select an add-in from the popup dialog box. 1-2-3 can automatically invoke only one add-in. (/Worksheet Global Default Other Add-In Set <Key> Yes)
Update the 1-2-3 configuration file	Select Update. This saves the changes to all default settings (global defaults, printer defaults, and international defaults) in the 1-2-3 configuration file (123.CNF) for use in future sessions. (/Worksheet Global Default Update)

Printer defaults

/Worksheet Global Default Printer sets defaults for your printer that 1-2-3 uses at the start of each 1-2-3 session. After you specify the printer settings you want, you can save them as configuration settings by selecting /Worksheet Global Default Update.

To specify default printer settings, select /Worksheet Global Default Printer. Press **F2 (EDIT)** *or* click the dialog box to activate it.



To	Do this
Set the left margin for printed pages	Select the Left text box and enter a number from 0 to 240. This sets the left margin in number of characters from the left edge of the paper. The number should be smaller than the right margin setting. The initial left margin setting is 4. (/Worksheet Global Default Printer Left)
Set the right margin for printed pages	Select the Right text box and enter a number from 0 to 240. This sets the right margin in number of characters from the right edge of the paper. The number should be greater than the left margin setting. The initial right margin setting is 76. (/Worksheet Global Default Printer Right)
Set the top margin for printed pages	Select the Top text box and enter a number from 0 to 32. This sets the top margin in number of standard lines. The initial top margin setting is 2. (/Worksheet Global Default Printer Top)
Set the bottom margin for printed pages	Select the Bottom text box and enter a number from 0 to 32. This sets the bottom margin in number of characters from the bottom edge of the paper. The initial bottom margin setting is 2. (/Worksheet Global Default Printer Bot)
Set the length of each printed page	Select Page length and enter a number from 1 to 100 in the text box. This sets the printed page length in number of standard lines. Generally, the Page length settings should equal the number of standard lines per inch for your printer times the length of your paper in inches. The initial page length setting is 66. (/Worksheet Global Default Printer Pg-Length)
Control whether 1-2-3 inserts line feeds at the end of each line of printed output	Mark or remove the mark from the Send Line feeds check box. (/Worksheet Global Default Printer AutoLF Yes or No) **NOTE** To determine the correct line feed setting, print a range of two or more rows. If the paper does not advance, mark the check box. If the printing is double-spaced, remove the mark from the check box.

(continued)

To	Do this
Specify whether 1-2-3 pauses after it prints each page	Mark or remove the mark from the Wait after each page check box. Mark the check box if you are printing on single sheets of paper, so you can insert a new sheet after each page is printed. Remove the mark from the check box if you are printing on continuous-form paper or if you are using a print spooler, which controls single sheet paper feeding. (/Worksheet Global Default Printer Wait Yes or No)
Identify the printer port through which your printer and computer are connected	Select one of these Interface options: 1 (Parallel 1), 2 (Serial 1), 3 (Parallel 2), 4 (Serial 2), 5 (LPT1), 6 (LPT2), 7 (LPT3), or 8 (LPT4). The initial setting is 1. (/Worksheet Global Default Printer Interface) If you select Interface option 2 or 4, then select one of these Baud rate options: A (110), B (150), C (300), D (600) E (1200), F (2400), G (4800), H (9600), or I (19200). The baud rate is the speed at which 1-2-3 sends data to the printer. The baud rate setting must match your printer's baud rate. In addition, make sure your printer is set to accept 8 data bits, 1 stop bit (except 2 stop bits at 110 baud), no parity, and handshaking (XON/XOFF) enabled. For instructions on changing these settings, see your printer manual.
Specify the printer to use if you specified more than one printer when you used the Install program	Select the Name text box, then select the name of a printer from the popup dialog box. When you change the Name setting, you may also have to change the Interface setting, because the specified printer may be connected to your computer through a different printer port. (/Worksheet Global Default Printer Name)
Specify the setup string to send to your printer before printing begins	Select Setup string and enter a setup string in the text box. The setup string is a \ (backslash) followed by a series of characters. 1-2-3 sends the setup string to your printer to tell it to print a certain way, such as compressed type or underlined text. (/Worksheet Global Default Printer Setup) You create setup strings by translating the printer control codes for your printer into the appropriate format. For more information on entering printer control codes as setup strings, see Appendix B, beginning on page 331. **CAUTION** To avoid printing problems, do not use setup strings to control print settings that you can control through 1-2-3 commands. For example, do not use setup strings to control page length or margins.
Specify the number of minutes it takes for 1-2-3 to display an error message once a printing error occurs	Select Delay and enter a number from 0 to 30 in the text box. The initial setting is 2. It may be useful to select a higher number, for example, if your printer can't print as fast as 1-2-3 sends data to it. If you select 0, 1-2-3 displays no error message and keeps trying to print. (/Worksheet Global Default Printer Delay)

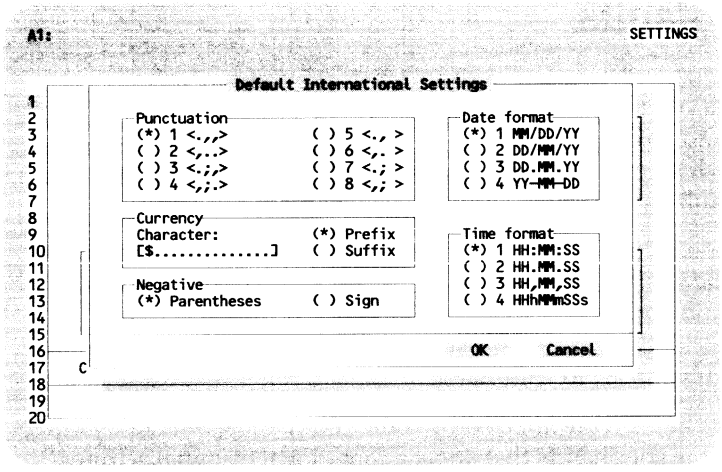
TIP Use the following guidelines to determine the correct Interface setting for your printer.

- Select option 1, 2, 3, or 4 if your printer is connected to your computer with a printer cable. The correct choice depends on which computer port the printer cable is attached to, and whether the printer uses parallel or serial transmission (check your printer manual). For example, if the printer is attached to the second serial port, select Interface option 4 (Serial 2).
- Select option 5, 6, 7, or 8 if your printer is on a local area network. You can also try options 5 through 8 if your printer is connected to your computer with a cable, but doesn't print when you select setting 1, 2, 3, or 4.

International defaults

/Worksheet Global Default Other International lets you set a variety of display formats that contain international settings. After you specify the international settings you want, you can save them as configuration settings by choosing /Worksheet Global Default Update.

To specify default international worksheet settings, select /Worksheet Global Default Other International. Press **F2 (EDIT)** *or* click the dialog box to activate it.



To	Do this
Set the characters 1-2-3 uses for decimal separators, argument separators, and thousands separators	Select the Punctuation option that contains the characters you want. The characters appear in order of decimal separator, argument separator, and thousands separator. (/Worksheet Global Default Other International Punctuation A–H) **NOTE** If you select 2 or 6, you must always use two periods as the argument separator in range addresses. You can always use a semicolon as an argument separator.
Set the currency symbol	Select the Character text box, type up to 15 currency symbols, then select Prefix or Suffix. Prefix displays the currency symbol before the number. Suffix displays the currency symbol after the number. (/Worksheet Global Default Other International Currency)

(continued)

To	Do this
Set the display of negative numbers in cells formatted as Comma or Currency	Select one of these options: Parentheses or Sign. Parentheses displays the number in parentheses. Sign displays – (minus) in front of the number. You can use Wysiwyg commands to set a color for negative numbers. (/Worksheet Global Default Other International Negative Parentheses or Sign)
Set the date format	Select the Date format option that contains the date format you want. This option sets the international Date format 1-2-3 uses for cells formatted as D4 (Long Intn'l) or D5 (Short Intn'l) and the international date display for the date-and-time indicator. (/Worksheet Global Default Other International Date A–D)
Set the time format	Select the Time format option that contains the characters you want. This option sets the international Time format 1-2-3 uses for cells formatted as D8 (Long Intn'l) or D9 (Short Intn'l) and the international time display for the date-and-time indicator. (/Worksheet Global Default Other International Time A–D)

Saving New Defaults

You can save the settings you selected with /Worksheet Global Default, /Worksheet Global Default Printer, and /Worksheet Global Default Other International as configuration settings, which means they apply to future 1-2-3 sessions. Select /Worksheet Global Default Update, which saves the changes in the configuration (123.CNF) file.

You may want to vary the settings you use with different worksheets. For example, you can set the recalculation method to Manual and save the worksheet. The next time you retrieve it, recalculation will still be set to Manual, even if you started the 1-2-3 session with recalculation set to Automatic.

Initial and global settings in 1-2-3 are affected by some commands, but not by others. The following table lists the commands that affect either global or initial settings.

Command	Settings affected	Settings not affected
/File Save	Global settings, except zero suppression, are saved with the worksheet. When the worksheet is retrieved, those settings become current.	Initial settings are not saved with the worksheet.
/Worksheet Erase	Global settings are erased along with the worksheet.	Initial settings remain in effect.
/Worksheet Global Default Update	Initial settings are saved in the 1-2-3 configuration file. They are in effect for every 1-2-3 session until you change them.	Global settings are not saved.

Saving Wysiwyg Defaults

Each time you attach Wysiwyg, 1-2-3 uses default settings stored in the Wysiwyg configuration file WYSIWYG.CNF. Depending on whether you have changed other defaults, 1-2-3 may also use default settings stored in two other Wysiwyg configuration files: LAYOUT.CNF and FONTSET.CNF.

Default Display and Printer Settings

1-2-3 stores both default display settings and default printer settings in the file WYSIWYG.CNF. These settings include the following:

- The display mode (Graphics, Text, B&W, or Color). The initial setting is Graphics. (:Display Mode)
- The zoom factor, or how many cells 1-2-3 displays in the worksheet area. The initial setting is Normal. (:Display Zoom)
- Display colors for background, text, unprotected cells, the cell pointer, the grid and frame (when displayed), negative values, lines, and drop shadows. (:Display Colors)
- Frame, grid, page break, cell pointer, intensity, and graphics adapter display options. (:Display Options)
- The directory that contains Wysiwyg fonts. The initial directory is the directory named 123R23\WYSIWYG that the Install program created unless you created a different directory. (:Display Font-Directory)
- The number of worksheet rows 1-2-3 displays when Wysiwyg is attached. The initial setting is 20. (:Display Rows)
- Printer settings, including the printer, interface, and cartridge to use. Initially, no printer, interface, or cartridge is selected. (:Print Config Printer, :Print Config Interface, and :Print Config 1st-Cart or :Print Config 2nd-Cart)
- The measurement units 1-2-3 uses in the Wysiwyg Print Settings dialog box. The initial Units setting is Inches. (:Print)

To change these default settings, select the appropriate commands for the settings you want to change and select or enter the new defaults. This changes the defaults for the current session. To use the new default settings in future sessions when Wysiwyg is attached, select :Display Default Update.

Default Page Layout Settings

Page layout controls the overall appearance of the printed page. You use the Wysiwyg Print Settings dialog box *or* :Print Layout to control page layout when you print with Wysiwyg. If you use a particular page layout for most of your print jobs, you may want to save those page layout settings as the default settings 1-2-3 will use each time you print with Wysiwyg. For complete information about printing with

Wysiwyg, see "Printing with Wysiwyg Formatting" on page 89. Page layout settings include the following:

- Page size. The initial setting is 8.5 by 11 inches. (:Print Layout Page-Size)
- Margins. The initial settings are Top, 0.5 inch; Left, 0.5 inch; Right, 0.5 inch; and Bottom, 0.55 inch. (:Print Layout Margins)
- Headers and footers. Initially, there are no headers or footers. (:Print Layout Titles)
- Headings, or descriptive information that appears at the top or left of every page. Initially, there are no headings. (:Print Layout Borders)
- Type compression. Initially, type is not compressed or expanded. (:Print Layout Compression)

To change default page layout settings, select :Print Layout and change the settings in the Wysiwyg Print Settings dialog box. This changes the defaults for the current session. To use the new default settings in future sessions when Wysiwyg is attached, select :Print Layout Default Update. 1-2-3 stores the default page layout settings in a layout configuration file named LAYOUT.CNF. LAYOUT.CNF does not exist until you use :Format Font Default Update. Once you have created LAYOUT.CNF, 1-2-3 uses the fonts in the font configuration file each time you attach Wysiwyg.

TIP You can also create a library of named page layouts with :Print Layout Library.

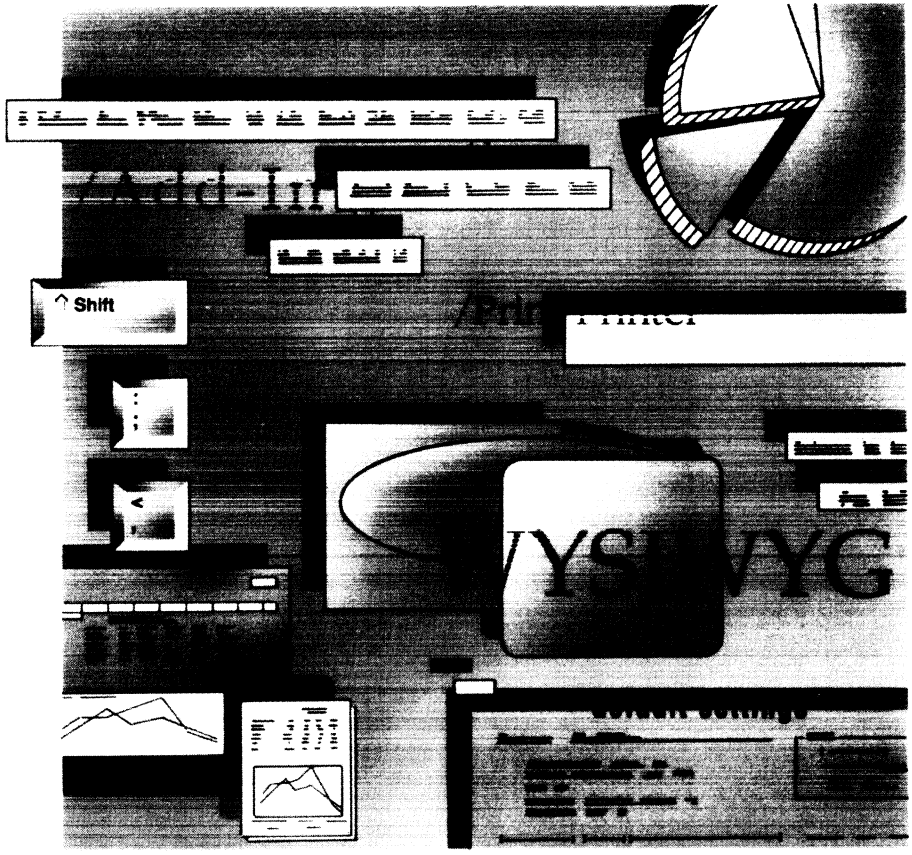
The Default Font Set

The default font set is the group of eight fonts that is initially available when you attach Wysiwyg. The initial default font set includes Bitstream Swiss 12, 14, and 24 point; Bitstream Dutch 6, 8, 10, and 12 point; and Xsymbol 12 point. One other font is available (Bitstream Courier), and other point sizes may be available, depending on the font option you selected in the Install program (see Chapter 2 of *Getting Started*). In addition, if you have purchased other fonts, these are available. For more information about fonts, see "Changing Fonts" on page 53.

To change the default font set, select :Format Font Replace and set each of the eight fonts to the font you want. Select :Format Font Default Update to make the current font set the default font set. The default font set is stored in a font configuration file named FONTSET.CNF. FONTSET.CNF does not exist until you use :Format Font Default Update. Once you have created FONTSET.CNF, 1-2-3 uses the fonts in the font configuration file each time you attach Wysiwyg.

TIP You can also create a library of named font sets with :Format Font Library.

Part VI
Command Summaries



Chapter 24
1-2-3 Commands

You use the 1-2-3 commands to store, manipulate, and print data. This chapter presents a summary of each command in the 1-2-3 main menu. The commands are arranged alphabetically in tables. To make the main menu appear in the control panel, press / (slash) or < (less-than symbol), or move the mouse pointer to the control panel. For more information on any command, highlight the command with the menu pointer and press **F1 (HELP)** or click the ? (Help icon) in the icon panel.

The Add-In Commands

The Add-In commands let you use 1-2-3 add-in programs to extend the features of 1-2-3. To use the Add-In commands, select /Add-In from the main menu or press **ALT-F10 (APP4)** if you have not assigned an add-in program to that key.

Command	Task
/Add-In Attach	Loads an add-in program into memory.
/Add-In Clear	Removes all attached add-in programs from memory.
/Add-In Detach	Removes an attached add-in program from memory.
/Add-In Invoke	Activates an attached add-in program.
/Add-In Quit	Returns 1-2-3 to READY mode.

The Copy Command

The Copy command lets you copy data from one location to another, leaving the data in the location you copied from unchanged. You can copy a single cell entry to other cells or ranges, copy ranges to ranges, or copy formulas to other cells or ranges. When you copy a formula, the formula in the destination depends on the type of cell address used in the original formula; for more information about cell addresses in formulas and /Copy, see "Rearranging Data and Formulas" on page 44. For example, if you copy a formula from H12 to J15, and H12 contains the relative reference +H10 ("two cells up"), the contents of cell J15 will contain the relative reference +J13, or, still, "two cells up" from its current location. (The relative reference remains intact.)

/Copy copies all Wysiwyg formats set with the Format, Named-Style, and Text commands (except for line formats, 3D-effect formats, and named-style definitions).

CAUTION 1-2-3 writes over existing data when it copies data to the range you specify. To avoid possible data loss, save the worksheet before you use this command. (If you accidentally write over existing data and undo is on, press ALT-F4 (UNDO) immediately to restore the worksheet to its previous state.)

Command	Task
/Copy	Copies a cell or range of data and its cell formats to another cell or range in the worksheet; duplicates data in one cell so it fills a range; makes one copy or multiple copies of a cell or range of data; applies a formula that refers to a single column or row to multiple columns or rows.

The Data Commands

The Data commands let you create, analyze, and manipulate data in ranges and in 1-2-3 databases. For example, you can use /Data Distribution to count the number of values in a range that fall within a specific numeric interval.

CAUTION *To avoid possible data loss, save the worksheet before you use this command. If you make a mistake and undo is on, press ALT-F4 (UNDO) immediately to restore the worksheet to its previous state. (This caution applies to all commands marked with an * (asterisk).)

Command	Task
/Data Distribution	Calculates the frequency with which values in a range fall within specified numeric intervals.
/Data Fill*	Enters a sequence of values, column by column, from left to right, in a specified range. (The values you enter can be numbers, percentages, or formulas.)
/Data Matrix	Inverts or multiplies matrices to solve problems that involve simultaneous equations.
Invert*	Creates the inverse of a matrix; the inverted matrix contains the same number of rows and columns as the original.
Multiply*	Multiplies the columns of one matrix by the rows of a second matrix to create a third matrix that is the result of the multiplication.
/Data Parse*	Separates a single column of long labels into multiple columns and assigns data types to each column.
Format-Line	Creates or edits a format line to define how 1-2-3 will separate a long label into individual cell entries, one per column. **NOTE** When Wysiwyg is in graphics mode, selecting /Data Parse Format-Line Edit puts Wysiwyg in text mode. Selecting Quit from the /Data Parse menu returns Wysiwyg to graphics mode.
Go	Parses the labels in the input column and places them in the output range.

(continued)

Command	Task
Input-Column	Specifies the entire single-column range that contains the format line and data you want to parse. The first cell in the input column must contain a format line.
Output-Range	Specifies the range in which you want 1-2-3 to place the parsed data. If you specify one cell, 1-2-3 uses that cell as the upper left cell in the output range.
Reset	Clears the range address settings for the input column and the output range.
/Data Query	Locates and edits selected records in a 1-2-3 database based on criteria you specify. When you select /Data Query, the Query Settings dialog box appears. Before you can use /Data Query to locate or work with records in a 1-2-3 database, you must create the input, criteria, and (for /Data Query Extract and /Data Query Unique) output ranges. (The Query Settings dialog box appears when you select this command.)
Criteria	Specifies the criteria range, which contains the selection criteria for records in the 1-2-3 database.
Delete	Deletes the records in the input range that match the criteria you specified in the criteria range and shrinks the input range to remove the blank rows.
Extract*	Copies to the output range the records in the input range that match the criteria you specified in the criteria range. **NOTE** When you use /Data Query Extract, all Wysiwyg formats set with the Format, Named-Style, and :Text commands (except for line formats and 3D-effect formats), are copied to the output range.
Find	Highlights and lets you edit the records in the input range that match the criteria you specified in the criteria range.
Input	Specifies the range that contains the records you want to search. The first row of the input range must include the field names.
Output	Specifies the range where you want to place the results of /Data Query Extract or /Data Query Unique. The first row of the output range must include the field names.
Reset	Clears the range address settings for the input, criteria, and output ranges you specified.
Unique*	Copies to the output range the records in the input range that match the criteria you specified in the criteria range. (Unlike /Data Query Extract, /Data Query Unique eliminates any duplicate records in the output range.)
/Data Regression*	Produces statistics that describe the association between one data range and another; calculates the slope of the line that best illustrates the data; or predicts future trends based on current data. (The Regression Settings dialog box appears when you select this command.)
Go	Calculates a data regression for the selected X range, Y range, and output range.

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Command	Task
Intercept	Determines whether 1-2-3 calculates the y-axis intercept automatically (default) or uses zero as the intercept. The y-axis intercept appears in the results as the constant.
Output-Range	Specifies the range in which 1-2-3 places the results of the regression analysis.
Reset	Clears the range addresses for the X range, Y range, and output range; resets Intercept to Compute.
X-Range	Specifies the independent variables.
Y-Range	Specifies the dependent variable.
/Data Sort	Rearranges the data in a range in the order you specify. The range can be records in a 1-2-3 database or rows in the worksheet. (The Sort Settings dialog box appears when you select this command.)
Data-Range	Specifies the range you want to sort, either records in a database or rows in a worksheet.
Go	Sorts the data in the data range according to the primary key and secondary key settings, and returns 1-2-3 to READY mode. You must specify a data range and a primary sort key; the secondary sort key is optional. **NOTE** When you use this command, all Wysiwyg formats set with :Format, :Named-Style, and :Text (except line formats and 3D-effect formats), move with the data as 1-2-3 sorts it.
Primary-Key	Determines the primary field for sorting records or rows. (The data can be in either ascending or descending order.) You must specify a primary key and sort order before you can perform a sort.
Reset	Clears range address settings and sort keys.
Secondary-Key	Determines the order for records or rows that have the same primary sort key entries. (The data can be in ascending or descending order.)
/Data Table	Records the effect of changing the values of one or more variables in one or more formulas; performs "what-if" analyses; cross-tabulates the information in a 1-2-3 database.
1	Creates a table that calculates the results of one or more formulas, each of which uses one variable; analyzes or cross-tabulates the data in a 1-2-3 database.
2	Creates a table that calculates the results of one formula that uses two variables.
Reset	Clears all the table range and input cell settings you specified in the worksheet. Use /Data Table Reset before you save a file if you do not want to save table range and input cell settings with the file.

The File Commands

The File commands let you retrieve files, organize and maintain the information you store in files, and consolidate data from different files. For example, to create a year-to-date report, you can use /File Combine Add to add data from separate monthly worksheet files into one file.

CAUTION *To avoid possible data loss, save the worksheet before you use this command. If you make a mistake and undo is on, press **ALT-F4 (UNDO)** immediately to restore the worksheet to its previous state. (This caution applies to all commands marked with an * (asterisk).)

Command	Task
/File Admin	Creates a table of information about files, updates file links in the current worksheet, and controls access to a worksheet file reservation.
Link-Refresh	Recalculates formulas in the current worksheet that include references to files on disk by retrieving the current contents of the linked cells. **NOTE** You cannot include a linking formula in another formula. For example, +<<USSALES>>C15*<<UKSALES>>D30 and @ROUND(<<UKSALES>>A12,2) are not valid formulas.
Reservation*	Gives one person permission (reservation) to make and save changes to a shared data file on a network. The reservation prevents other users from saving to the same file name.
Table*	Creates a table of information about the files and directories on disk.
/File Combine	Incorporates data from a worksheet file on disk into the current worksheet. **NOTE** /File Combine does not incorporate Wysiwyg formatting (from an .FMT file) into the current worksheet.
Add*	Consolidates numeric data from several files by adding incoming numeric data to numbers or blank cells in the current worksheet.
Copy*	Copies all incoming data (labels and values) from a worksheet file on disk to the current worksheet.
Subtract*	Subtracts incoming numeric data from numbers or blank cells in the current worksheet.
/File Directory	Changes the default directory for the current 1-2-3 session. The directory for the current session is the path (drive and directory names) 1-2-3 uses if you do not specify a path and file name when you save, retrieve, or list files.
/File Erase	Deletes a worksheet file, text file, graph file, or any other file on disk; erases the current file in memory. 1-2-3 also erases the corresponding Wysiwyg format file (.FMT) or Allways format file (.ALL), if one exists. **CAUTION** Before you use /File Erase, make certain that you no longer need the data in the file you are erasing. Once you erase a file on disk, you cannot retrieve the data in that file or use **ALT-F4 (UNDO)** to recover the file.

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Command	Task
/File Import*	Copies data (text and/or numbers) from an ASCII file on disk (created with 1-2-3 or another program) into the current worksheet.
/File List	Displays a list of information about worksheet, text, graph, linked, or all files currently on disk.
/File Retrieve*	Reads a worksheet file into memory. The retrieved file replaces the current worksheet. (If you do not have the reservation for the file, 1-2-3 displays the RO indicator at the bottom of the screen.) **NOTE** 1-2-3 also reads the formatting information into memory from the Wysiwyg format file (.FMT) or Allways format file (.ALL) by the same name, if one exists.
/File Save	Saves the current worksheet to a worksheet file on disk; creates new files on disk and replaces existing files. (Use /File Save Backup to keep a copy of the last version of a file on disk.) **NOTE** 1-2-3 also saves the formatting information in a Wysiwyg format file with the same name as the .WK1 file, but with the file extension .FMT.
/File View	Retrieves, links, and lets you scan through the contents of all 1-2-3 files and the text of any other type of file; also displays DOS directory information. **NOTE** To select the View command from the /File menu, you must first attach the Viewer add-in. (For information on how to attach an add-in, see "Using an Add-In" on page 18. For further information on using the Viewer, see Chapter 29, beginning on page 315).
/File Xtract	Copies a range of data including labels, numbers, and formulas (Formulas), or copies a range of data including labels, numbers, and the values of formulas (Values) from the current worksheet and saves it in a worksheet file on disk. All settings associated with the worksheet are also saved. 1-2-3 does not create a Wysiwyg format file (.FMT) for the new worksheet file.

The Graph Commands

The Graph commands convert numeric data from the worksheet into visual representations in a graph. 1-2-3 Release 2.3 offers seven graph types (bar, HLCO (high-low-close-open), line, mixed, pie, stacked bar, and XY), that let you compare data visually and immediately. For example, you can use a line graph to plot data over time. Each line in the graph represents a range of data from the worksheet; each symbol on the line represents a value in the worksheet range. The Graph commands also let you name graph settings and add ranges to an existing graph.

The Graph Settings dialog box appears when you select Graph from the main menu. This dialog box shows the current settings for all graph settings. The Graph Legends & Titles dialog box appears when you select Legend or Titles from the /Graph Options menu.

CAUTION *To avoid possible data loss, save the worksheet before you use this command. If you make a mistake and undo is on, press ALT-F4 (UNDO) immediately to restore the worksheet to its previous state. (This caution applies to all commands marked with an * (asterisk).)

Command	Task
/Graph A–F	Specifies the ranges (A–F) that contain the numeric data you want to graph.
/Graph Group	Specifies multiple graph data ranges (X and A–F) at once, when the ranges are located in consecutive columns or rows.
/Graph Name	Creates, modifies, and deletes named graphs in the current worksheet and creates tables of the named graphs.
Create*	Creates or modifies a named graph by storing the current graph settings with the name you specify. If you enter a name that is identical to an existing graph name, 1-2-3 reassigns the graph name to the new graph settings.
Delete	Deletes a named graph. **CAUTION** Once you delete a named graph, you can no longer view or use it with /Graph Name Use or, in a macro, with {GRAPHON}. If you did not mean to select Delete and undo is on, select Quit to return to the worksheet, then press (ALT-F4) UNDO immediately to restore the named graph.
Reset *	Deletes all named graphs in the worksheet.
Table*	Creates a three-column table in the worksheet that alphabetically lists all named graphs, graph types, and titles.
Use	Makes a named graph the current graph so you can view and use it. **CAUTION** When you use a named graph, you lose all of the previous graph settings. To preserve those settings for future use, assign them a name with /Graph Name Create before you use /Graph Name Use.
/Graph Options	Adds enhancements such as titles, legends, colors, and grid lines to a graph and determines the scaling method for the axes of the graph.
B&W	Sets graph display to black and white (monochrome) if you previously selected /Graph Options Color. 1-2-3 displays bars and pie slices (if you specified a data range B for the pie chart) in contrasting hatch patterns.
Color	Sets the graph display to color. If your monitor can display colors, 1-2-3 displays bars, pie slices, graph lines, and symbols in contrasting colors.
Data-Labels	Uses the contents of a range as labels for the points or bars in a graph. The labels come from the ranges you specify as the data label ranges A–F.
Format	In XY and line graphs, sets whether 1-2-3 connects the data points with lines, uses symbols to mark the points, uses symbols and lines, or uses neither symbols nor lines.
Grid	Adds or removes grid lines in a graph. All graph types except pie charts can include grid lines.

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Command	Task
Legend	Creates legends for data ranges A–F. The legends identify the data range represented by each symbol, color, or hatch pattern in the graph.
Scale	Determines the axis scaling method and sets the format of the numbers that appear along each axis; sets which entries in data range X appear along the x-axis in line, bar, stacked bar, mixed, and HLCO graphs; sets the display of y-axis labels and tick marks on the left, right, both sides, or no sides of the graph frame; formats the x-axis for XY graphs and y-axis labels in graphs. (The Graph Scale Settings dialog box appears when you select this command.)
Titles	Adds graph titles and axis titles to a graph.
/Graph Reset	Resets some or all of the current graph settings to the default graph settings.
/Graph Save	Saves the current graph in a graph file (.PIC) for use with PrintGraph, Wysiwyg, or other programs.
/Graph Type	Specifies the kind of graph to create (bar, HLCO, line, mixed, pie, stacked bar, or XY) and adds features (stacked data ranges, frames, margins, 3-D effects, and choice of horizontal or vertical graph orientation).
Bar	Graphs one or more data ranges (X, A–F) as bars. Each data range is distinguished by either a hatch pattern or color.
Features	Rotates the graph so the x-axis is horizontal or vertical or the y-axis is vertical or horizontal; places values in data ranges on top of each other in bar, line, mixed, and XY graphs; adds or removes a frame around part or all of the graph, adds or removes margins, or adds or removes the zero line; creates 3-D effects in bar, stacked bar, and mixed graphs.
HLCO	Creates an HLCO (high-low-close-open) graph. An HLCO graph shows each set of four values as a vertical line with tick marks in the graph. The line extends from the high value to the low value. (A tick mark on the right side of the line shows the closing value; a tick mark on the left side of the line shows the opening value.)
Line	Graphs one or more data ranges (X, A–F). 1-2-3 displays line graphs in one of four ways set with /Graph Options Format: Lines, Symbols, Both, or Neither.
Mixed	Creates a graph in which one or more data ranges are represented as bars and one or more are represented as lines.
Pie	Graphs the A data range as slices of a pie. 1-2-3 labels each slice of the pie with the percentage it represents of the whole pie. These numbers are rounded off, so they may not exactly total 100%. Entries in the X data range appear as labels next to each slice. Values in the B data range specify exploded slices, as well as the type of hatch patterns or colors.
Stack-Bar	Graphs one or more data ranges (X, A–F) as stacked bars. (The ranges are distinguished by either hatch patterns or colors.)

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Command	Task
XY	Graphs the X data range and one or more other data ranges (A–F). You must specify the X data range and at least one other data range. The X data range determines the numeric scale of the x-axis. 1-2-3 pairs the other data ranges with values for the X data range and plots them as coordinates along the x- and y- axes. (They are displayed in one of four ways set with /Graph Options Format: Lines, Symbols, Both, or Neither.)
/Graph View	Temporarily removes the current worksheet from the screen to display the current graph.
/Graph X	Specifies the range that contains the x-axis labels, the x-axis values for an XY graph, or the pie slice labels.

The Move Command

The Move command lets you transfer a range of data, formulas, range names, and cell formats to another range in the worksheet. Use /Move to reorganize data. For other methods of transferring data in the worksheet, see /Copy, /Range Trans, /Range Value, /Worksheet Delete, and /Worksheet Insert.

CAUTION The range to which you move data can be any unprotected area of the worksheet. To avoid possible data loss from writing over existing data, save the worksheet before you use /Move. If you make a mistake and undo is on, press ALT-F4 (UNDO) immediately to restore the worksheet to its previous state.

Command	Task
/Move	Removes data from one location and enters it in another location in the same worksheet. **NOTE** 1-2-3 also moves all Wysiwyg formats set with the :Format, :Named-Style, and :Text commands, and moves graphics added to the worksheet with :Graph Add if the entire graphic is in the range you move.

The Print Commands

The Print commands create printed copies of your work. You can send print output to a printer, to a text file, or to an encoded file for immediate or subsequent background printing. In addition, the Print commands let you control basic printing operations such as specifying a range to print and advancing the paper in the printer by a line or by a page. To enhance printed worksheets, you can add headers, footers, and borders.


You can also use the Wysiwyg spreadsheet publishing add-in to print copies of your work. (For more information, see Chapter 25, beginning on page 301.)

When you select /Print Printer, /Print File, /Print Encoded, or /Print Background, the Print Settings dialog box appears, from which you can select print settings. Press **F1 (HELP)** if you need help on how to navigate through the box by keyboard or mouse. Press **F2 (EDIT)** to edit settings.

Command	Task
/Print [Printer, Background, Encoded, or File] Align	Tells 1-2-3 that the paper in the printer is correctly positioned at the top of a page and ready for printing; resets the page number to 1.
/Print Background	Sends a copy of the selected range to an encoded file and then prints the encoded file on a printer while you continue your 1-2-3 session. When the file finishes printing, 1-2-3 deletes the encoded file. **NOTE** Before you can use /Print Background, you must load the print utility program called BPrint *or,* if you are working in 1-2-3, select /Quit to leave 1-2-3 (not /System), then type bprint and press **ENTER** at the operating system prompt. If you have not started BPrint when you select /Print Background, 1-2-3 displays an error message. (For further information, see Appendix E, beginning on page 369.)
/Print [Printer, Background, Encoded, or File] Clear	Resets some or all of the current print settings and returns them to the default settings.
/Print Encoded	Sends print output you specify to an encoded file (.ENC) on disk so you can print later. The encoded file contains printer codes and setup strings, in addition to text.
/Print File	Selects a text (ASCII) file on disk as the print destination and then lets you select other options for printing.
/Print [Printer, Background, Encoded, or File] Go	Starts the print job. Sends your worksheet data to a printer or to a file on disk.
/Print [Printer, Backgound, Encoded, or File] Line	Advances the paper in the printer one line.
/Print [Printer, Background, Encoded, or File] Options	Establishes printing settings, including the header, footer, margins, borders, setup string, page length, and range format.
Borders	Prints descriptive information from specified columns and rows in your worksheet to the left and top edges of every page of print output.
Footer	Prints a line of text just above the bottom margin of every page.
Header	Prints a line of text just below the top margin of every page.
Margins	Sets left, right, top, and bottom margins for the print output or clears all margins and returns them to the default settings.

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Command	Task
Other	Determines whether 1-2-3 prints the data in the worksheet or the formulas underlying the data, and whether 1-2-3 prints headers and footers and inserts page breaks.
Pg-Length	Overrides the default number of lines to be printed on a page (66 lines per page) set with /Worksheet Global Default Printer Pg-Length, and lets you set the number of lines. The number of lines you set becomes the new default.
Setup	Specifies additional printer attributes available on your printer. **CAUTION** To avoid complications when you print, do not use setup strings to control print settings that you can control through 1-2-3 commands. For example, do not use setup strings to control page length and margins.
/Print [Printer, Background, Encoded, or File] Page	Advances the paper in the printer to the top of the next page or inserts blank lines in a text file on disk.
/Print Printer	Prints a range on a printer. Use /Print Printer to print directly from 1-2-3. You can resume your work in 1-2-3 once the printing is done.
/Print [Printer, Background, Encoded, or File] Quit	Ends the current print job and returns 1-2-3 to READY mode; tells 1-2-3 to send the print job to a network printer (you cannot send a print job until you select Quit).
/Print [Printer, Background, Encoded, or File] Range	Specifies the range to print either to a printer or to a file. Whether you print to a printer or to a file on disk, you must specify the range you want 1-2-3 to print.

The Quit Command

The Quit command lets you end the current 1-2-3 session and return to the operating system or to the Access system menu, depending on how you started 1-2-3.

CAUTION Before you use the Quit command, select /File Save if you want to save your work. If you do not save changes you made to the current worksheet before selecting /Quit, 1-2-3 will prompt you to do so before ending the session.

Command	Task
/Quit	Ends the current 1-2-3 work session. To return 1-2-3 to READY mode, select No; to end the 1-2-3 session and return to the operating system or the Access system menu, select Yes.

The Range Commands

The Range commands help you work with data quickly and efficiently by letting you work with a group of cells rather than a single cell at a time. For example, you could use /Range Format to display a group of numbers as Currency format, another group as Percent format, and another as Hidden. A **range** is any rectangular block of cells (including a single cell), such as part of a row or column, a whole row or column, parts of several rows and columns, or an entire worksheet.

CAUTION *To avoid possible data loss, save the worksheet before you use this command. If you make a mistake and undo is on, press ALT-F4 (UNDO) immediately to restore the worksheet to its previous state. (This caution applies to all commands marked with an * (asterisk).)

Command	Task
/Range Erase	Erases data in a range without changing the format or protection status.
/Range Format	Changes how 1-2-3 displays data in a range.
/Range Input	Restricts cell-pointer movement and data entry to unprotected cells in a range used along with /Range Unprot.
/Range Justify	Rearranges a column of labels as a paragraph to fit within a specified width. **CAUTION** Do not use /Range Justify on a column whose contents are used in macros or text formulas; if you do, the macros may not work.
/Range Label	Left-aligns, right-aligns, or centers labels in a range.
/Range Name	Creates, modifies, deletes, or generates tables of range names.
Create	Creates or modifies a range name. If you enter a range name that is identical to an existing range name, 1-2-3 reassigns the range name to the new range.
Delete	Deletes a range name. The data in the range remains unchanged.
Labels	Creates range names for single cell ranges, using labels in adjacent cells as the range names.
Reset	Deletes all range names in the current worksheet. The data in the ranges remains unchanged. **CAUTION** All named macro labels are deleted with /Range Name Reset.
Table*	Creates a two-column table in the worksheet that lists range names and their corresponding addresses alphabetically.
/Range Prot	Reprotects cells in a range (that have been unprotected with /Range Unprot) when global worksheet protection is on.
/Range Search	Finds or replaces a specified string in a range.
/Range Trans*	Copies a range of data to a new location and transposes it from rows to columns, replacing any copied formulas with their current values.

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Command	Task
/Range Unprot	Unprotects and allows changes to cells in a range when global worksheet protection is on; allows changes to cells in a range that will be used with /Range Input.
/Range Value*	Copies a range of data, replacing any copied formulas with their current values.

The System Command

The System command lets you suspend the current 1-2-3 session temporarily and return to the operating system without clearing the worksheet from memory. Select /System when you want to use the operating system commands without ending the current 1-2-3 session. When you finish using the operating system commands, type exit and press ENTER to return to 1-2-3.

CAUTION Do not load or unload TSRs (terminate-and-stay-resident programs, such as Norton Utilities) or use the operating system PRINT or BPRINT command. If you do, you will lose your changes and be unable to resume the 1-2-3 session.

Command	Task
/System	Suspends the current 1-2-3 session and returns you to the DOS prompt while the worksheet remains in memory. At the DOS prompt, you can create a new directory, run another program, or perform other operating system tasks.

The Worksheet Commands

The Worksheet commands let you control the display and organization of your work. For example, to widen columns to make a worksheet more legible, or to display numbers instead of asterisks in cells, you use /Worksheet Global Column-Width, /Worksheet Column Set-Width, or /Worksheet Column Column-Range Set-Width. The Worksheet commands also let you control **global settings**, which are 1-2-3 settings that affect the entire worksheet and 1-2-3 as a whole.

Command	Task
/Worksheet Column	Sets the width of one or more columns, resets columns to the global column width, and hides or redisplays columns.
Column-Range	Changes the column width of a range of columns, overriding the global default column width, or resets a range of columns to the global default column width (9 characters).

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Command	Task
Display	Redisplays one or more hidden columns.
Hide	Hides one or more columns without erasing the data in the columns.
Reset-Width	Resets the current column width to the global default column width (9 characters).
Set-Width	Changes the width of the current column (overrides the global default column width).
/Worksheet Delete	Permanently removes one or more columns or rows from the worksheet. **CAUTION** To avoid possible data loss from deleting columns or rows, save the worksheet before using /Worksheet Delete. Check the entire column or row to make sure it does not contain data you want to save. If you make a mistake when deleting columns or rows and undo is on, press ALT-F4 (UNDO) immediately to restore the worksheet to its previous state. You cannot delete columns or rows if /Worksheet Global Protection is enabled.
/Worksheet Erase	Removes the current worksheet from memory and replaces it with a blank worksheet. When you remove a worksheet file from memory with this command, the following Wysiwyg formatting changes occur: The default font set becomes the current font set, and all named styles, print settings, and layout settings return to their default settings. **CAUTION** /Worksheet Erase removes the current worksheet from memory. It does not affect the worksheet file stored on disk. To avoid data loss, use /File Save to save the worksheet before using /Worksheet Erase. If you make a mistake when erasing a worksheet and undo is on, press ALT-F4 (UNDO) immediately to restore the worksheet to its previous state.
/Worksheet Global	Sets the global cell format, label alignment, column width, protection status, recalculation method, and zero-display setting for the worksheet. Also sets 1-2-3 default setttings, which are used every time you begin a 1-2-3 session. (The Global Settings dialog box appears when you select this command.)
Column-Width	Sets the global column width, without affecting the columns whose widths you set individually.
Default	Changes the default settings for the current 1-2-3 session, such as printer instructions, the current directory, undo, international and clock display formats, auto-execute macros, and auto-attach add-ins; changes the default file directory. If you select /Worksheet Global Default Update during the current 1-2-3 session, the current default settings become the settings for all subsequent 1-2-3 sessions. (The Default Settings dialog box appears when you select this command, and the Default Printer Settings dialog box appears when you select /Worksheet Global Default Printer.)
Protection	Turns global protection on or off for the worksheet. /Worksheet Global Protection works in conjunction with /Range Prot and /Range Unprot to prevent changes from being made to specified cells.

(continued)

Command	Task
Recalculation	Sets when and in what order 1-2-3 recalculates formulas, and how many recalculation passes 1-2-3 performs each time it recalculates the formulas. (This setting is saved with the file.)
Zero	Specifies whether 1-2-3 displays a zero, a label, or nothing in cells that contain either the number zero or a formula that evaluates to zero. (This setting is saved with the file.)
/Worksheet Insert	Inserts one or more blank columns or rows in the worksheet. 1-2-3 formats the new column or rows with the Wysiwyg formats common to columns or rows directly on either side of them. **CAUTION** Inserting rows may insert blank cells in macros that invalidate the macros.
/Worksheet Learn	Specifies a range in which to record keystrokes to run as a macro.
Cancel	Cancels the current learn range.
Erase	Clears the contents of all cells in the current learn range without canceling the learn range.
Range	Specifies the range where 1-2-3 will record keystrokes as labels.
/Worksheet Page	Inserts a row and creates a page break (: :) in a worksheet, which causes 1-2-3 to begin a new page when printing the worksheet.
/Worksheet Status	Displays, in a dialog box, information about memory, hardware, and circular references.
/Worksheet Titles	Freezes one or more columns and/or rows along the top and left edges of a worksheet so they remain in view as you scroll through the worksheet.
/Worksheet Window	Splits the screen into two horizontal or vertical windows, turns synchronized scrolling on or off, and restores single-window display.

Chapter 25
Wysiwyg Commands

Wysiwyg is the 1-2-3 Release 2.3 spreadsheet publishing add-in. You use Wysiwyg commands to add and edit worksheet graphics, format data, print presentation-quality documents, and customize the way 1-2-3 displays worksheets on-screen. This chapter presents a summary of each command in the Wysiwyg main menu. The commands are arranged alphabetically in tables. When Wysiwyg is attached (in memory), and 1-2-3 is in READY mode, you display the Wysiwyg menu by pressing : (colon) or moving the mouse pointer in the control panel. (You may need to click the right mouse button anywhere in the control panel to switch between the 1-2-3 menu and the Wysiwyg menu.)

Wysiwyg is invoked (activated) when the status indicator in the upper right corner of the screen says "WYSIWYG." For more information on any command, highlight the command with the menu pointer and press F1 (HELP) or click the ? (Help icon) in the icon panel. For a complete list of Wysiwyg character symbols, see Appendix F, beginning on page 373.

The Display Commands

When Wysiwyg is attached, the Display commands control how 1-2-3 displays the worksheet on the screen. Except for :Display Colors and :Display Mode (if you have a color printer), the Display commands do not affect worksheets or graphics you print.

Command	Task
:Display Colors	Specifies the on-screen colors for the worksheet background and data, cell pointer, grid, worksheet frame, lines, 3-D effect, negative numbers, and data in unprotected ranges when in graphics display mode; modifies the hue (color palette) of the eight colors 1-2-3 uses with Wysiwyg when in graphics mode (you must select :Display Mode Color, not :Display Mode B&W). If your printer is capable of printing in color, and you select :Display Mode Color (rather than :Display Mode B&W), the colors you select with :Display Colors Neg, :Display Colors Lines, and :Display Colors Shadow will print.
:Display Default	Creates a new set of default display settings, based on the current settings (Update), or replaces the current display settings with the default display settings (Restore). The default settings are stored in the Wysiwyg configuration file (WYSIWYG.CNF) that 1-2-3 uses automatically when you attach the Wysiwyg add-in.

(continued)

Command	Task
:Display Font-Directory	Specifies the directory in which 1-2-3 looks for display and printer fonts. If you specify a directory that contains no font files and no directory in your DOS path contains fonts, 1-2-3 replaces all display and printer fonts with the system font, Courier, which 1-2-3 uses when Wysiwyg is not attached.
:Display Mode	Switches the screen display between graphics mode and text mode; displays the worksheet in black and white or in color when in graphics mode.
:Display Options	Determines whether 1-2-3 displays page breaks and grid lines; determines how 1-2-3 displays the worksheet frame and cell pointer; specifies screen-display brightness and the video adapter to use.
:Display Rows	Specifies the number of worksheet rows to display on-screen while 1-2-3 is in graphics mode. (You can select from 16 to 60 worksheet rows.) **NOTE** The number of rows 1-2-3 displays may differ from the number of rows you specify, depending on several factors: your graphics display card, the default font size, the zoom setting, and any other formatting that affects row heights.
:Display Zoom	Enlarges the size of displayed cells and their contents up to 400% (decreasing the number of rows and columns displayed on the screen), or reduces the size of displayed cells and their contents down to 16% (increasing the number of rows and columns displayed on the screen).

The Format Commands

The Format commands give you control over the appearance of your worksheets on-screen and when printed. You can control the format of a single cell or range, or multiple cells and ranges at the same time. /File Save stores the formats in the format file (.FMT) associated with the current worksheet.

For information on codes you can use to format text that you cannot format with the Wysiwyg commands (such as formatting text for superscript or subscript, upside down, or outline characters), see "Formatting Text When You Can't Use the Menu" on page 59.

Command	Task
:Format Bold	Adds or removes the boldface attribute from data in a range.
:Format Color	Specifies colors for the background, text, and negative numbers in a range for color monitors and color printers; reverses text colors and background colors. (You can use up to seven colors.) **NOTE** Monochrome monitors display different shades in lieu of colors.

(continued)

Command	Task
:Format Font	Specifies fonts for ranges and the default font for the current worksheet, replaces fonts in the current font set, updates and restores the default font set, and saves font libraries in files on disk. (You can use up to eight fonts in a file.) **NOTE** When you select :Format Font, the Wysiwyg Font Selection dialog box appears, from which you select a font; when you select :Format Font Replace, the Wysiwyg Font Replacement dialog box appears, from which you replace a font in the current font set.*
:Format Italics	Adds or removes the italics attribute from data in a range.
:Format Lines	Adds or removes single, double, or wide horizontal and vertical lines, outlines, and 3-D effects in ranges. (1-2-3 displays lines in the global text color until you change the color globally with :Display Color Lines.)
:Format Reset	Resets all formats for the current range to the default formats.
:Format Shade	Adds or removes light, dark, or solid shading from a range. (Solid shading prints in black, even if you have a color printer.)
:Format Underline	Adds or removes single, double, or wide underlines from a range. (Underlines appear only under the data in a cell; they do not appear in blank cells.)

*For information on how to make selections in dialog boxes, see "1-2-3 Dialog Boxes" on page 9.

The Graph Commands

The Graph commands let you add, edit, and save graphics in a format file associated with a worksheet. Wysiwyg defines **graphics** as current or named 1-2-3 graphs, or graphs saved in graph files (.PIC), metafile files (.CGM), or blank placeholders in a worksheet. The Graph commands also let you view graphics in a graphics editing window where you can edit and enhance them.

Command	Task
:Graph Add	Adds a graphic to a specified range in the worksheet. (Wysiwyg automatically sizes the graphic to fit in the specified range.)
:Graph Compute	Recalculates and redraws the graphics in the worksheet based on the current worksheet data.
:Graph Edit	Adds and modifies text, objects, and other enhancements, such as arrows, polygons, rectangles, color, text alignment, and freehand drawings. (You must be in graphics mode to use the Graph Edit commands.)
:Graph Goto	Moves the cell pointer to a graphic in the worksheet.

(continued)

Command	Task
:Graph Move	Moves a graphic to another range in the worksheet. (The row and column dimensions of the original range remain unchanged.)
:Graph Remove	Clears a graphic range from the worksheet. (1-2-3 data and graphs remain unchanged when the Wysiwyg graphic is removed.)
:Graph Settings	Replaces a graphic in the worksheet with another graphic (preserving any graphic enhancement), resizes or moves a graphic in the worksheet, turns the display of graphics on or off, makes the graphics transparent or opaque, and determines whether 1-2-3 updates current and named graphs in the worksheet automatically when data they are based on changes.
:Graph View	Lets you view a full-screen display of a graph file (.PIC) or metafile file (.CGM) graphic without adding it to the worksheet. (You must be in graphics mode.)
:Graph Zoom	Displays a full-screen view of the selected graphic range in the worksheet. (You must be in graphics mode.) To return from full-screen view of the graphic, press any key.

The Named-Style Commands

The Named-Style commands define a **named style**, which is a collection of Wysiwyg formats taken from a single cell, and apply the named style to a cell or range of cells in the current file. Each file can contain up to eight named styles.

Command	Task
:Named-Style Define	Creates a named style based on formats in the specified cell. (You can enter a name of up to 6 characters for a named style you define, and you can enter a description of the named style that is up to 37 characters.)
:Named-Style 1 – 8	Assigns one of eight named styles to a range. (If you redefine a named style, any range you formatted with that style is automatically reformatted.)

The Print Commands

The Print commands create printed copies of your work that include all formatting done with the Wysiwyg commands. You can print data and graphics on a printer or to an encoded file, or you can print from an encoded file in the background.

NOTE When you select :Print, the Wysiwyg Print Settings dialog box appears, from which you select print settings. For information on how to make selections in dialog boxes, see "1-2-3 Dialog Boxes" on page 9.

Command	Task
:Print Background	Sends a copy of the selected range to an encoded file and then prints the encoded file on a printer while you continue your 1-2-3 session. When the file finishes printing, 1-2-3 deletes the encoded file. **NOTE** Before you can use :Print Background, you must load the print utility program called BPrint *or* if you are working in 1-2-3, select /Quit to leave 1-2-3 (not /System), then type bprint and press ENTER at the operating system prompt. If you have not started BPrint when you select :Print Background, 1-2-3 displays an error message. (For further information, see Appendix E, beginning on page 369.)
:Print Config	Specifies the printer, printer interface, font cartridges, orientation of paper, and paper-feed method.
:Print File	Prints your data to an encoded file with the file extension .ENC, unless you specify another extension. The files can be printed only on the same type of printer as the printer specified in :Print Config Printer when the file was created. The file can include 1-2-3 data, graphics, and printer codes for all Wysiwyg options. (You cannot read an encoded file back into 1-2-3.)
:Print Go	Sends your data to the specified printer and starts printing.
:Print Info	Removes or redisplays the Wysiwyg Print Settings dialog box.
:Print Layout	Specifies the page size, margins, headers and footers, border columns and rows, and print compression; updates and restores the default page layout; saves and retrieves page layouts in library files on disk with the file extension .ALS, unless you specify another extension.
:Print Preview	Displays, page by page, on-screen, how printed pages will look. (To magnify objects on the page, press the + (plus) key; to reduce objects on the page, press the – (minus) key. (For further information on keys you can use with :Print Preview, see Chapter 7, page 77.)
:Print Range	Sets or clears the print range, which is the range of data that Wysiwyg prints.
:Print Settings	Specifies which pages to print, page numbering, number of copies to print, whether to print the worksheet frame, whether to print grid lines, and whether to pause for manual paper feed before each page.

The Quit Command

The :Quit command lets you end the current Wysiwyg session and return 1-2-3 to READY mode, while Wysiwyg remains atttached. To invoke Wysiwyg from 1-2-3 READY mode, press : (colon) or move the mouse pointer to the control panel and click the right mouse button to switch menus if necessary.

The Special Commands

The Special commands copy and move Wysiwyg formats from one range to another, import formats and graphics from another format file, and export formats and graphics from the current worksheet to format files on disk.

Command	Task
:Special Copy	Copies the Wysiwyg formats of a range to another range. (Data, graphs, and graph enhancements remain unchanged.)
:Special Export	Saves the format of the current file in a Wysiwyg (.FMT) or Allways (.ALL) format file on disk.
:Special Import	Reads a Wysiwyg (.FMT) or Allways (.ALL) format file into memory and applies its formats to the current file. Lets you import all format settings, named styles only, fonts only, or graphs only.
:Special Move	Moves the Wysiwyg formats of a range to another range. (Data, graphs, and graphic enhancements remain unchanged.)

NOTE If you use Special commands to copy or move formats to a range that already contains Wysiwyg formats, Wysiwyg replaces the existing formats with the copied or moved formats.

The Text Commands

The Text commands let you enter and edit text in worksheet ranges as though the words were in paragraphs in a word processor. To enter text, or align or justify data previously entered in cells, you specify a text range. The attribute indicator {Text} appears in the control panel when the cell pointer is in a text range.

NOTE When you enter, align, or justify text, Wysiwyg will not write over vertical lines or graphics in a text range.

Command	Task
:Text Align	Left-aligns, right-aligns, centers, or even-aligns labels in a text range.
:Text Clear	Removes the alignment settings for a text range and the {Text} formatting description. (Data does not get deleted.)
:Text Edit	Lets you enter and edit labels in a text range directly in the worksheet instead of in the control panel.
:Text Reformat	Formats a column of long labels so the labels fit within a text range and look like a paragraph. (To use this command, you must first select :Display Mode Graphics.)
:Text Set	Specifies a text range to use with :Text Align, :Text Edit, or :Text Reformat.

The Worksheet Commands

The Worksheet commands set column widths and row heights and insert and delete vertical and horizontal (column and row) page breaks.

Command	Task
:Worksheet Column	Lets you set the width of one or more columns or resets one or more columns to the global column width. (A column can be from 1 to 240 characters wide.) **NOTE** This command cannot be used to hide columns. If you want to hide a column, select /Worksheet Column Hide from the 1-2-3 main menu.
:Worksheet Page	Lets you insert and delete vertical and horizontal (column and row) page breaks in worksheets. (:Display Options Page-Breaks Yes must be set to see them.)
:Worksheet Row	Lets you set the height of one or more rows, or automatically sets the height of one or more rows based on the size of the largest font in a given row. (A row can be from 1 to 255 points high.)

Chapter 26
Auditor Commands

The Auditor is an add-in program that helps you analyze and display information about worksheet formulas. With Auditor commands, you can find all cells that provide data for a specified formula (Precedents), identify all formulas that use a specified cell (Dependents), locate all formulas in the entire worksheet or in a specified range (Formulas), and identify worksheet formulas in order of recalculation (Recalc-List). In addition, Auditor finds cells involved in circular references and errors in formulas (Circs). For example, Auditor identifies the errors caused by a circular reference when cell A1 contains the formula +B1+C1 and cell B1 contains the formula +A1+C1. Auditor identifies cell A1 as the circular reference.

You can set up Auditor to identify formula relationships by highlighting cells (Highlight), by listing cell contents in the worksheet (List), or by moving the cell pointer forward or backward to display the next or previous formula (Trace).

For more information about any command, highlight the command with the menu pointer and press F1 (HELP) or click the ? (Help) icon in the icon panel.

Command	Task
Circs	Lists the address of and identifies all cell contents involved in circular references. (A circular reference can occur only when the recalculation order is Natural and a formula directly or indirectly refers to itself.) **NOTE** The upper left cell involved in a circular reference is considered the source cell, and appears in the Auditor Circ window. In 1-2-3, the /Worksheet Status dialog box displays any cell involved in a circular reference.
Dependents	Identifies all formula cells in the specified audit range that refer to a particular cell. (Formulas that refer to cells and ranges are dependent on those cells or ranges.) Use Dependents to see if a particular cell is referred to by a formula.
Formulas	Identifies all formula cells in the audit range, including file-linking formula cells. (Auditor searches column-by-column.)
Options	Lets you select the report method by which Auditor identifies precedents, dependents, formulas, recalculation lists, and circular references. Lets you return the report method and audit range to their default settings.
Audit-Range	Lets you specify the range to examine to find Precedent, Dependent, or Formula cells.

(continued)

Command	Task
Highlight	Sets the report method to display particular cells in bright intensity or in a different color (if you have a color monitor), so you can examine relationships among highlighted cells. (Highlight is the default report method; Auditor highlights cells it identifies using the unprotected cell color.) **NOTE** If you change the contents of a highlighted cell, the highlight remains. Any adjustment you make to the worksheet resets (removes) all highlights. Adjustments include moving cells, inserting or deleting rows or columns, and redefining range names.
List	Sets the report method to list cells Auditor identifies in a worksheet range you specify; also reports the contents of the identified cells. After you select the List report method and specify Precedents, Dependents, Circs, Recalc-List, or Formulas from the main menu, Auditor prompts you to specify a blank list range. If you specify a one-row list range, Auditor automatically expands it to the bottom of the worksheet. An error message appears if you specify a list range that contains data. Auditor will not write over existing data. (If data exists in the list range, press ESC to return to the Auditor main menu. You can either start over and select a blank list range or select Quit from the Auditor main menu and return 1-2-3 to READY mode. When 1-2-3 is in READY mode, you can examine the specified output range and select /Range Erase to clear it. You can then invoke Auditor and continue your list operation.)
Reset	Lets you remove the highlight from cells Auditor highlighted or lets you reset Auditor settings to the defaults (Audit-Range to A1..IV8192 and the report method to Highlight). Auditor then returns to the previous menu.
Trace	Sets the report method that lets you move the cell pointer to locate cells Auditor identified. You can move forward or backward through these cells, or, if you want to modify a particular cell, leave Trace and remain at the last traced cell. **NOTE** 1-2-3 displays hidden columns in Trace mode. If you select Quit from the Trace menu when the cell pointer is in a hidden column, the cell pointer returns to the cell that was current prior to the trace.
Precedents	Identifies all cells in the audit range that provide data for a specified formula cell. The formula requires data from these cells to calculate a formula result. (Only a formula can have precedents.)
Recalc-List	Identifies all worksheet formula cells, except file-linking formula cells, in order of the method of recalculation for the current worksheet (Natural, Columnwise, or Rowwise).

Chapter 27
Macro Library Manager Commands

The Macro Library Manager (MACROMGR.ADN) commands let you create and manage macro libraries that you can use with any 1-2-3 worksheet. To create a macro library, you enter macros in a worksheet range. You then select Save from the Macro Library Manager menu to name the library, specify the range that contains the macros, and save them in a library file (.MLB). (When you save macros in a library, they disappear from the worksheet range.) You start a macro stored in a macro library just as you start a macro saved in any worksheet. The Macro Library Manager menu appears when you invoke the add-in.

For more information, see "Using the Macro Library Manager Add-In" in Chapter 6 of the *@Functions and Macros Guide* or highlight a specific command with the menu pointer and press **F1 (HELP)** or click the ? (Help icon) in the icon panel.

Command	Task
Edit	Copies the contents of a macro library in memory to a range in the worksheet so you can make changes to the library or use its contents in the worksheet. (You must first select Load to read a macro library into memory.)
Load	Copies the contents from a library file (.MLB) on disk to a library file in memory so you can use the library. (Libraries are stored separately from the worksheets. Macro Library Manager displays a menu of all library files in the current directory. From this menu, you select a macro library to read into memory.)
Name-List	Lists, in the current worksheet, the range names stored in a macro library. (The list consists of a column of labels.)
Remove	Erases a macro library from memory while Macro Library Manager maintains a copy of the library file on disk. (To use the library again, select Load.)
Save	Lets you name the macro library to be saved, moves the contents of the range and its range names to the macro library in memory as well as to the library file (.MLB) on disk. (The contents of the range are removed from the worksheet and the range names now refer to library locations rather than to the worksheet.)

CAUTION If you use the contents of a macro library in a worksheet, make sure the worksheet location is blank or contains unimportant data; otherwise, Macro Library Manager writes over existing data. If you accidentally write over existing data and undo is on, press **ALT-F4 (UNDO)** immediately to restore the worksheet to its previous state.

Chapter 28
PrintGraph Commands

PrintGraph is a 1-2-3 Release 2.3 utility program that lets you print graphs from files that you create with /Graph Save in 1-2-3. /Graph Save stores an image of the current graph in a graph file with the file extension .PIC. Graph files are the only type of files PrintGraph can print. During the PrintGraph session, the PrintGraph settings sheet remains on the screen. You select commands from the PrintGraph menu just as you do in 1-2-3.

The PrintGraph commands let you select graphs to print and enhance their appearance. For example, to change the appearance of a graph, you can specify the layout, proportions, angle of rotation, typeface styles, and colors of the printed graph. The PrintGraph commands also let you configure PrintGraph to work with your hardware setup.

You cannot start PrintGraph from the 1-2-3 main menu. You must start PrintGraph from the operating system or by selecting the program name (PrintGraph) from the Access system menu. (The Access system menu lets you switch between 1-2-3 and PrintGraph and the other 1-2-3 utility programs.)

To start PrintGraph from the Access system menu, make the directory that contains the 1-2-3 program files the current directory, type lotus, and then press **ENTER**. When the Access system menu appears at the top of the screen, select PrintGraph by typing p, or by pressing ← or → to highlight PrintGraph and then pressing **ENTER**. For more information on any PrintGraph command, highlight the command with the menu pointer and press **F1 (HELP)**.

NOTE You can also create and print presentation-quality graphs with Wysiwyg, the 1-2-3 Release 2.3 spreadsheet publishing add-in. For more information, see Chapter 25, beginning on page 301.

Command	Task
Align	Resets the line counter to the top of the page after you adjust the paper and tells PrintGraph that the paper in the printer is correctly positioned. If you adjust paper position manually during the session, use Align before you select Go to tell PrintGraph the paper is at the top of the page.
Exit	Ends the PrintGraph session and returns you to either the operating system or the Access system menu, depending on how you started PrintGraph. (To use the current settings in future sessions, select Settings Save before you select Exit.)
Go	Starts printing the selected graph(s). (To stop printing a graph, press **CTRL-BREAK**; do not turn off the printer. The printer may not stop printing immediately if the printer's buffer still contains information, however.)

(continued)

Command	Task
Image-Select	Lets you select one or more graph files (with the extension .PIC) to print or preview. (When you select Go, the selected graphs print in the order in which you select them.)
Page	Advances the paper in the printer to the top of the next page.
Settings	Controls all PrintGraph settings, including the size and proportion of the graph, the fonts and colors (if any) used in the graph, whether PrintGraph should save or reset the current settings, and the hardware you use.
Action	Controls what PrintGraph does between printing graphs (pauses, advances the page, or returns you to the Settings menu).
Hardware	Specifies printer and printer interface, paper size, and location of graph and font files. (Unless you change printers or print density, you usually change these settings only the first time you use the program.)
Image	Controls graph size, fonts, colors, angle of rotation, width and height, and top and left margins.
Reset	Replaces the current PrintGraph settings with the settings stored in the PrintGraph configuration file (PGRAPH.CNF).
Save	Stores the current PrintGraph settings (image, hardware, fonts, colors, paper size, and action settings) in the PrintGraph configuration file (PGRAPH.CNF).

NOTE To use PrintGraph, you must have a printer or plotter that can print graphs. If you are not sure whether your printer can print graphs, check your printer manual. In addition, you can use your printer with PrintGraph only if you selected a graphics printer in the Install program. To select a graphics printer driver, see Change Selected Equipment in the Install program. For more information, see Chapters 2 and 3 of *Getting Started*.

Chapter 29
Viewer Commands

Viewer is a 1-2-3 file management utility add-in that extends your ability to find and view the contents of files on your hard disk. With the Viewer commands, you can scan through the contents of any 1-2-3 file or the text of any other type of file without retrieving it. Viewer also simplifies entering linking formulas and displays directory information, such as the time a file was last saved. (For further information on linking formulas, see "Creating a Link" beginning on page 237.) For further information on any Viewer command, highlight the command with the menu pointer and press **F1 (HELP)** or click the ? (Help icon) in the icon panel.

When Viewer is attached, you can use the following methods to invoke (activate) the Viewer menu:

- Select View from the 1-2-3 /File menu. (1-2-3 displays View on the /File menu if you attached the Viewer add-in.)
- Press the key **(ALT-F7, ALT-F8, ALT-F9,** or **ALT-F10)** to which you assigned the Viewer add-in *or* select /Add-In Invoke and then select VIEWER.ADN from the list of add-in names.

When invoked, Viewer provides a split-screen display of your data. The **List window** on the left displays the list of subdirectories and file names in your current directory. As you scroll through the list, the contents of the file that is highlighted in the List window appear in the **View window** on the right. To see more of a file you select from the List window, press → to move the highlight to the View window, or click the left mouse button anywhere in the View window. To scroll through the file, when the highlight is in the View window, you can press any pointer-movement key or click any arrow icon at the right side of the screen.

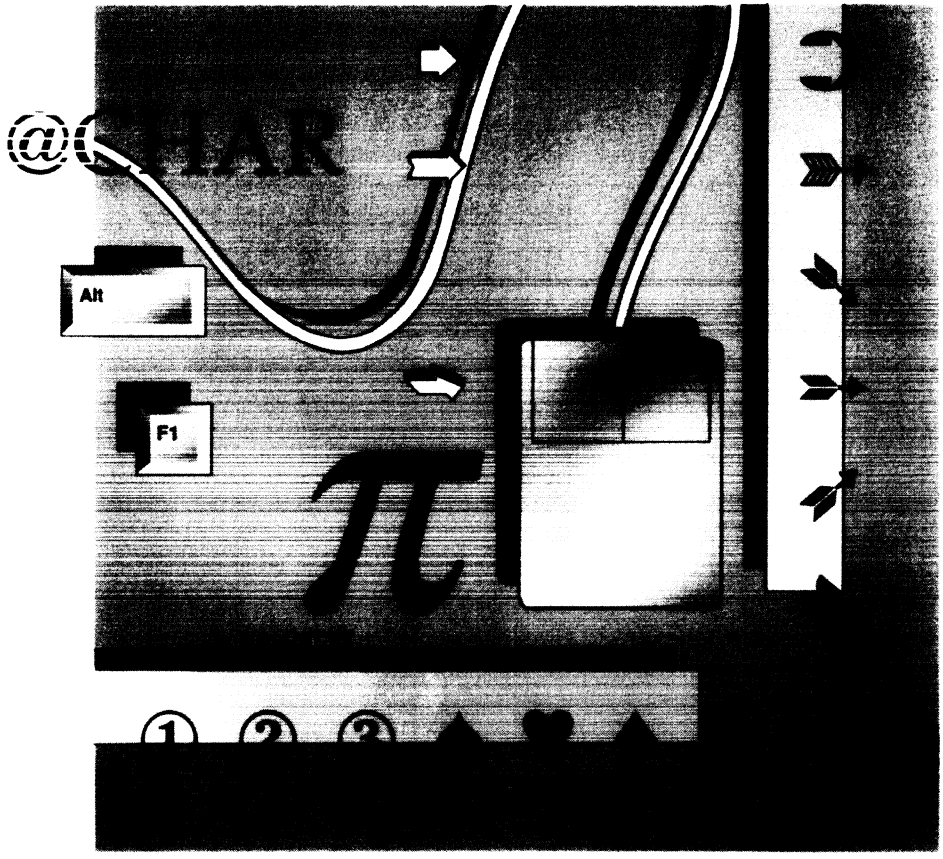
With /File View Retrieve, you can retrieve the file currently displayed in the View window by pressing **ENTER** or clicking the right mouse button.

When the highlight is in the List window, you can move through the directory structure (levels) by pressing ← or → or by clicking the left or right arrows that appear at the top left of the List window.

Command	Task
Browse	Displays, in the List window, all the files in the current directory; lets you scroll through the list of files and view their contents in the View window. (Press ESC to quit browsing and return to the Viewer main menu; press ENTER to quit browsing and return 1-2-3 to READY mode.)
Link	Displays, in the List window, all the .WK1, .WK3, .WKS, .WR1, and .WRK worksheet files in the current directory and prompts you to link (except for .WK3 files) the current cell or range to a cell or range you select from another worksheet. To link a cell or range in the current worksheet to a cell or range in a source worksheet, place the cell pointer in the target cell or upper left corner of the target range, then invoke Viewer to locate the source worksheet. Select the source worksheet from the List window, and then move the cell pointer into the View window and select the source cell or range. To select a source cell, use ← → ↑ ↓ to move the cell pointer to the source cell and press ENTER, or, with the mouse, click the source cell to write the linking formula to the target cell. To specify a source range, move the cell pointer to one edge of the range, press . (period) to anchor the cell pointer, use ← → ↑ ↓ to highlight the range and press ENTER. With the mouse, drag from one corner of the range to the opposite corner, and click it to confirm the range. **CAUTION** Viewer writes over existing data. If the target range contains data, a message asks you to confirm that you want to write over nonblank cells in the target worksheet. Select Yes to write over nonblank cells; select No to return to the List or View window.
Retrieve	Displays, in the List window, a list of all .WK1, .WK3, .WKS, .WR1, and .WRK worksheet files in the current directory; prompts you to scroll through the list of files while viewing their contents, then highlight the file you want from the list and retrieve it (except for .WK3 files). (Pressing ENTER from the View window also retrieves the selected file.) **NOTE** If the current worksheet file has been changed, but not saved, 1-2-3 asks if you want to write over it.

NOTE To make the current directory in 1-2-3 the current Viewer directory, press F2 (RESET) or click the F2 box in the function key bar. To see file names saved in order by most recent date saved first, press F5 (DATE SORT) or click the F5 box in the function key bar. To see file names in alphabetical order, press F6 (NAME SORT) or click the F6 box in the function key bar.

Part VII
Appendixes



Appendix A
Lotus International Character Set (LICS)

1-2-3 uses the Lotus International Character Set to display, store, and print characters. You can use LICS codes to enter characters in the worksheet that are not on your keyboard.

There are 256 LICS codes (decimal codes 0 through 255) that are divided into three groups:

- Codes 0 through 31 represent control characters and not LICS characters. Although these control characters are used internally by 1-2-3, general use of these characters in the worksheet is not supported.
- Codes 32 through 127 represent the ASCII characters 32 through 127. They are shown in the table of standard ASCII characters that begins on page 323.
- Codes 128 through 255 represent various international characters and special symbols, such as £ (British pound), ¥ (Japanese yen), and π (pi). These are listed in the table of international characters and special symbols that begins on page 326.

NOTE Some personal computers that run under DOS 3.0 and higher versions allow you to display and print letters, numbers, and symbols from various character sets using a process called code page switching. In the United States, 1-2-3 supports only code page 437 (English), which is the default code page. If you have set your computer to run a different code page, change it back to code page 437 before using 1-2-3 or any of its utility programs. If you do not do this, many of the accented LICS characters will be displayed incorrectly. If you need instructions for switching the code page, refer to your operating system documentation.

Displaying and Printing LICS Characters

You should be aware before you try entering LICS characters that some monitors cannot display all LICS characters, and some printers cannot print all LICS characters. In these cases, 1-2-3 uses a **fallback presentation** for that character. The intention of the fallback presentation is to represent the LICS character as closely as possible using characters that are available on your monitor or printer.

For example, if you use the © symbol and your monitor cannot display this particular LICS character, 1-2-3 might display (c) or c as the fallback presentation (depending on the capabilities of your monitor).

Entering LICS Characters

There are four ways to include a LICS character in a worksheet entry. The method you use depends on the specific LICS character you want to enter.

- You can enter any LICS character using the @CHAR function and the LICS code for the character, as described in "Using @CHAR" below.
- You can enter many LICS characters using compose sequences, as described in "Using Compose Sequences" on page 321. The tables in this appendix list the compose sequences for the characters that have them.
- You can enter the LICS characters that represent standard ASCII characters (codes 32 through 127) by pressing the appropriate character key on your keyboard.
- You can hold down the ALT key as you enter the LICS code number on the numeric keypad.

  NOTE Some keyboards do not have all of the following characters: # @ \ ¦ { } [ ] ' _ ^. If this is true for your keyboard, you must enter each of these characters using either @CHAR or the compose sequence listed for the character in the table of standard ASCII characters that begins on page 323. For instructions, see "Using Compose Sequences" on page 321.

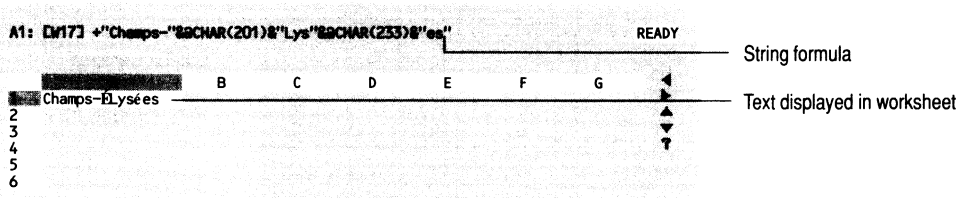
Using @CHAR

@CHAR(x) returns the character that the LICS code x produces (for more information on the @CHAR function, see "@CHAR" in Chapter 2 of the *@Functions and Macros Guide*). You can enter any LICS character in the worksheet using the @CHAR function and the LICS code for the character. For example, to enter © (copyright sign) in a cell, look up the LICS code for © in the table of international characters and special symbols. You will find that the code is 169. Type @CHAR(169) and press ENTER.

If you want to combine a LICS character with other text, and you wish to use @CHAR, you must use the @CHAR function in a string formula. For example, suppose you want to enter the text Champs-Élysées, which contains both an uppercase and lowercase e with an acute accent. You would look up the LICS code for each of these characters (É and é) in the table of international characters and special symbols, and then use these LICS codes (201 and 233) in a formula, as shown in the following example:

1. Move the cell pointer to the cell where you want to enter the text.
2. Type +"Champs-"&@CHAR(201)&"lys"&@CHAR(233)&"es" and press ENTER to enter the formula in the worksheet.

   1-2-3 displays Champs-Élysées in the worksheet if your monitor can display the characters É and é. Otherwise, 1-2-3 displays fallback presentations that represent an uppercase and a lowercase e with an acute accent. (See "Displaying and Printing LICS Characters" on page 319.)



Using Compose Sequences

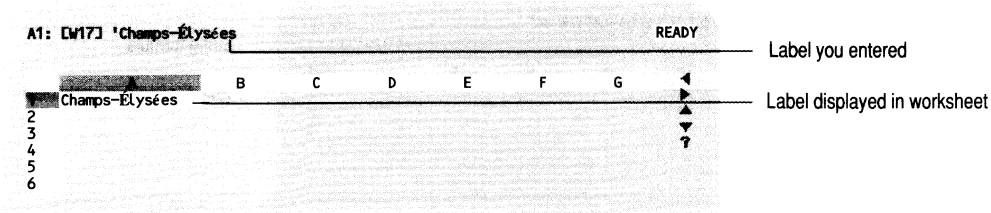
A **compose sequence** is a series of keystrokes you use in combination with ALT-F1 (COMPOSE) to enter a LICS character. The tables in this appendix list the LICS characters that have compose sequences. You enter one of these characters by pressing ALT-F1 (COMPOSE) and then typing the sequence of keystrokes listed for that LICS character. For example, to enter the character £ (British pound) in a cell, look up the compose sequence for £ in the table of international characters and special symbols. You will find the compose sequence is L = . Press ALT-F1 (COMPOSE), type L = , and press ENTER to complete the entry.

You can use the same technique to combine a LICS character with other text in a label. For example, suppose you want to enter the label Champs-Élysées, which contains both an uppercase and lowercase e with an acute accent. You would look up the compose sequence for each of these characters (É and é) in the table of international characters and special symbols, and then use these compose sequences (E' and e') when entering the label:

1. Move the cell pointer to the cell where you want to enter the label.
2. Type Champs-
3. Press ALT-F1 (COMPOSE) and type E' (uppercase E and an apostrophe).

   1-2-3 displays É if your monitor can display this character. Otherwise, 1-2-3 displays a fallback presentation that represents an uppercase E with an acute accent as closely as possible. (For more information, see "Displaying and Printing LICS Characters" on page 319.)
4. Type lys
5. Press ALT-F1 (COMPOSE) and type e' (lowercase e and an apostrophe).

   1-2-3 displays é if your monitor can display this character. Otherwise, 1-2-3 displays a fallback presentation that represents a lowercase e with an acute accent as closely as possible.
6. Type es and press ENTER to enter the label in the worksheet.

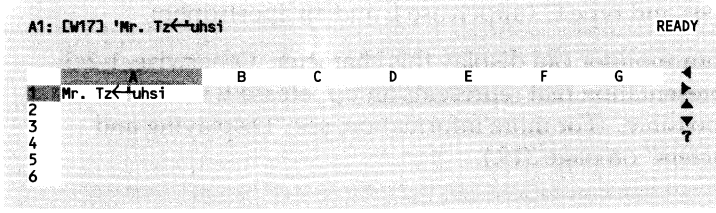


NOTE You can use more than one compose sequence to create some characters. In these cases, the tables list all possible compose sequences.

Printing Characters That Are Not in LICS

If your printer has full backspacing capability (see your printer manual or consult your computer dealer or technical resource person if you are not sure), you can use the **merge character**, **ALT-F1 (COMPOSE)** mg, to print characters that are not in LICS. Essentially, a merge character tells 1-2-3 to overstrike one character on another. After printing the first character you specify, 1-2-3 prints a backspace (or the equivalent), and then prints the next character you specify. For example, to create a ź (z with an acute accent), you would type z, press **ALT-F1 (COMPOSE)** and type mg' — mg is the merge character and ' (apostrophe) is the character you want 1-2-3 to overstrike on the z.

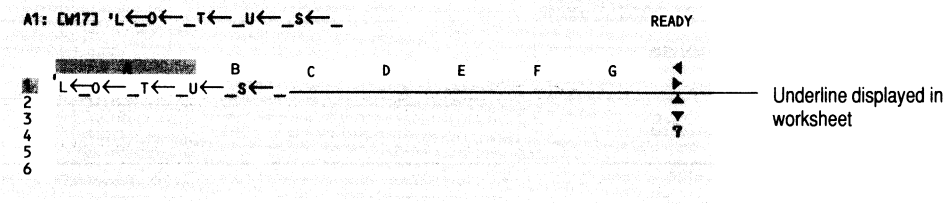
The following illustration shows a label containing the merge character. 1-2-3 displays the merge character as ← (left arrow). The ← indicates that the ' (apostrophe) will be printed on top of the z when you print the worksheet.



You can also use the merge character to underline a character. For example, suppose you want to enter the word LOTUS in a cell and underline each letter. You would do the following:

1. Move the cell pointer to the cell where you want to enter the label.
2. Type L, press **ALT-F1 (COMPOSE)**, and type mg_
3. Type O, press **ALT-F1 (COMPOSE)**, and type mg_
4. Type T, press **ALT-F1 (COMPOSE)**, and type mg_

5. Type U, press ALT-F1 (COMPOSE), and type mg_
6. Type S, press ALT-F1 (COMPOSE), and type mg_
7. Press ENTER to complete the label.



The label will be printed as L̲ O̲ T̲ U̲ S̲ when you print the worksheet.

NOTE Although you can overstrike any printable character with any other printable character, the result may not always look the way you expected.

LICS Tables

Standard ASCII Characters

The following table defines LICS codes 32 through 127, which represent standard ASCII characters.

You can enter any of these LICS characters by pressing the appropriate character key on your keyboard. If, however, you do not have a key on your keyboard for a particular character, you must enter the character by using the @CHAR function and the LICS code listed for the character, or by using the compose sequence listed for the character. See "Entering LICS Characters," on page 320.

NOTE You can use more than one compose sequence to create some characters. In these cases, the table lists all possible compose sequences.

LICS code	Character	Description	Compose sequence
32	Space	Space	
33	!	Exclamation point	
34	"	Double quotes	
35	#	Pound or number sign	+ +
36	$	Dollar sign	
37	%	Percent	
38	&	Ampersand	

(continued)

LICS code	Character	Description	Compose sequence
39	'	Close single quote	
40	(	Open parenthesis	
41	)	Close parenthesis	
42	*	Asterisk	
43	+	Plus	
44	,	Comma	
45	–	Minus	
46	.	Period	
47	/	Slash	
48	0	Zero	
49	1	One	
50	2	Two	
51	3	Three	
52	4	Four	
53	5	Five	
54	6	Six	
55	7	Seven	
56	8	Eight	
57	9	Nine	
58	:	Colon	
59	;	Semicolon	
60	<	Less-than symbol	
61	=	Equal sign	
62	>	Greater-than symbol	
63	?	Question mark	
64	@	At sign	aa or AA
65	A	A, uppercase	
66	B	B, uppercase	
67	C	C, uppercase	
68	D	D, uppercase	
69	E	E, uppercase	
70	F	F, uppercase	
71	G	G, uppercase	
72	H	H, uppercase	
73	I	I, uppercase	
74	J	J, uppercase	

(continued)

LICS code	Character	Description	Compose sequence
75	K	K, uppercase	
76	L	L, uppercase	
77	M	M, uppercase	
78	N	N, uppercase	
79	O	O, uppercase	
80	P	P, uppercase	
81	Q	Q, uppercase	
82	R	R, uppercase	
83	S	S, uppercase	
84	T	T, uppercase	
85	U	U, uppercase	
86	V	V, uppercase	
87	W	W, uppercase	
88	X	X, uppercase	
89	Y	Y, uppercase	
90	Z	Z, uppercase	
91	[	Open bracket	((
92	\	Backslash	//
93	]	Close bracket	))
94	^	Caret	vv
95	_	Underscore	
96	`	Open single quote	
97	a	a, lowercase	
98	b	b, lowercase	
99	c	c, lowercase	
100	d	d, lowercase	
101	e	e, lowercase	
102	f	f, lowercase	
103	g	g, lowercase	
104	h	h, lowercase	
105	i	i, lowercase	
106	j	j, lowercase	
107	k	k, lowercase	
108	l	l, lowercase	
109	m	m, lowercase	
110	n	n, lowercase	

(continued)

LICS code	Character	Description	Compose sequence
111	o	o, lowercase	
112	p	p, lowercase	
113	q	q, lowercase	
114	r	r, lowercase	
115	s	s, lowercase	
116	t	t, lowercase	
117	u	u, lowercase	
118	v	v, lowercase	
119	w	w, lowercase	
120	x	x, lowercase	
121	y	y, lowercase	
122	z	z, lowercase	
123	{	Open brace	(-
124	¦	Split vertical bar	^/
125	}	Close brace	)-
126	~	Tilde	--
127		Delete	

International Characters and Special Symbols

The following table defines LICS codes 128 through 255, which represent international characters and special symbols.

You can enter any of these characters by using the @CHAR function and the LICS code for the character, or by using the compose sequence listed for the character. For more information, see "Entering LICS Characters," on page 320.

NOTE Some compose sequences are order sensitive, which means you must enter the sequence of keystrokes in the order shown in the table. These cases are marked with an * (asterisk). Do not type the asterisk as a part of the compose sequence; it only identifies the order-sensitive compose sequences.

In addition, you can use more than one compose sequence to create some characters. In these cases, the tables list all possible compose sequences.

LICS code	Character	Description	Compose sequence
128	`	Grave, uppercase	* ` space bar
129	'	Acute, uppercase	* ' space bar
130	^	Circumflex, uppercase	* ^ space bar

(continued)

LICS code	Character	Description		Compose sequence
131	¨	Umlaut, uppercase	*	" space bar
132	~	Tilde, uppercase	*	~ space bar
133	▪	Unknown character (display only)		
134	▪	Unknown character (display only)		
135	▪	Unknown character (display only)		
136	▪	Unknown character (display only)		
137	▪	Unknown character (display only)		
138	▪	Unknown character (display only)		
139	▪	Unknown character (display only)		
140	▪	Unknown character (display only)		
141	▪	Unknown character (display only)		
142	▪	Unknown character (display only)		
143	▪	Unknown character (display only)		
144	`	Grave, lowercase	*	space bar `
145	´	Acute, lowercase	*	space bar ´
146	^	Circumflex, lowercase	*	space bar ^
147	¨	Umlaut, lowercase	*	space bar "
148	~	Tilde, lowercase	*	space bar ~
149	ı	i without dot, lowercase		i space bar
150	–	Ordinal indicator		_ space bar
151	▲	Begin attribute (display only)		ba
152	▼	End attribute (display only)		ea
153	▪	Unknown character (display only)		
154	•	Hard space (display only)		space bar space bar
155	←	Merge character (display only)		mg
156	▪	Unknown character (display only)		
157	▪	Unknown character (display only)		
158	▪	Unknown character (display only)		
159	▪	Unknown character (display only)		
160	*ƒ*	Guilder sign		ff
161	¡	Exclamation mark, inverted		! !
162	¢	Cent sign		c¦ C¦ c/ or C/
163	£	British pound sterling symbol		L = I = L- or I-
164	“	Open double quotes, low		" ^

(continued)

LICS code	Character	Description		Compose sequence
165	¥	Yen sign		Y = y = Y- or y-
166	Pt	Peseta sign	*	PT pt or Pt
167	§	Section sign		SO so or s Ø
168	¤	General currency sign		XO xo or x Ø
169	©	Copyright sign		CO co or c Ø
170	ª	Feminine ordinal indicator		a_ or A_
171	<<	Much-less-than sign		< <
172	Δ	Delta		dd or DD
173	π	Pi	*	PI pi or Pi
174	≥	Greater-than-or-equals sign	*	> =
175	÷	Division sign		: -
176	°	Degree sign		^ Ø
177	±	Plus-or-minus sign		+ -
178	²	2, superscript		^ 2
179	³	3, superscript		^ 3
180	„	Close double quotes, low		" v
181	µ	Micron symbol or mu	*	/ u
182	¶	Paragraph sign		!P or !p
183	•	Middle dot		^.
184	™	Trademark sign	*	TM Tm or tm
185	¹	1, superscript		^ 1
186	º	Masculine ordinal indicator		o_ or O_
187	>>	Much-greater-than sign		> >
188	1/4	One-quarter fraction	*	14
189	1/2	One-half fraction	*	12
190	≤	Less-than-or-equals sign	*	= <
191	¿	Question mark, inverted		? ?
192	À	A grave, uppercase		A `
193	Á	A acute, uppercase		A '
194	Â	A circumflex, uppercase		A ^
195	Ã	A tilde, uppercase		A ~
196	Ä	A umlaut, uppercase		A "
197	Å	A ring, uppercase		A *
198	Æ	AE diphthong, uppercase	*	AE
199	Ç	C cedilla, uppercase		C ,

(continued)

LICS code	Character	Description		Compose sequence
200	È	E grave, uppercase		E `
201	É	E acute, uppercase		E '
202	Ê	E circumflex, uppercase		E ^
203	Ë	E umlaut, uppercase		E "
204	Ì	I grave, uppercase		I `
205	Í	I acute, uppercase		I '
206	Î	I circumflex, uppercase		I ^
207	Ï	I umlaut, uppercase		I "
208	Ð	Icelandic eth, uppercase		D -
209	Ñ	N tilde, uppercase		N ~
210	Ò	O grave, uppercase		O `
211	Ó	O acute, uppercase		O '
212	Ô	O circumflex, uppercase		O ^
213	Õ	O tilde, uppercase		O ~
214	Ö	O umlaut, uppercase		O "
215	OE	OE diphthong, uppercase	*	OE
216	Ø	O slash, uppercase		O /
217	Ù	U grave, uppercase		U `
218	Ú	U acute, uppercase		U '
219	Û	U circumflex, uppercase		U ^
220	Ü	U umlaut, uppercase		U "
221	Ÿ	Y umlaut, uppercase		Y "
222	Þ	Icelandic thorn, uppercase		P -
223	ß	Beta or German sharp, lowercase		ss
224	à	a grave, lowercase		a `
225	á	a acute, lowercase		a '
226	â	a circumflex, lowercase		a ^
227	ã	a tilde, lowercase		a ~
228	ä	a umlaut, lowercase		a "
229	å	a ring, lowercase		a *
230	æ	ae diphthong, lowercase		ae
231	ç	c cedilla, lowercase		c ,
232	è	e grave, lowercase		e `
233	é	e acute, lowercase		e '
234	ê	e circumflex, lowercase		e ^
235	ë	e umlaut, lowercase		e "

(continued)

LICS code	Character	Description	Compose sequence
236	ì	i grave, lowercase	i `
237	í	i acute, lowercase	i '
238	î	i circumflex, lowercase	i ^
239	ï	i umlaut, lowercase	i "
240	ð	Icelandic eth, lowercase	d -
241	ñ	n tilde, lowercase	n ~
242	ò	o grave, lowercase	o `
243	ó	o acute, lowercase	o '
244	ô	o circumflex, lowercase	o ^
245	õ	o tilde, lowercase	o ~
246	ö	o umlaut, lowercase	o"
247	oe	oe diphthong, lowercase	oe
248	ø	o slash, lowercase	o /
249	ù	u grave, lowercase	u `
250	ú	u acute, lowercase	u '
251	û	u circumflex, lowercase	u ^
252	ü	u umlaut, lowercase	u"
253	ÿ	y umlaut, lowercase	y"
254	⊐	Icelandic thorn, lowercase	p -
255	▪	Unknown character (display only)	

Appendix B
Printing with Setup Strings

Printers often require special characters, called printer control codes, to accomplish specialized printing tasks. A **printer control code** is a sequence of nonprinting characters that tells your printer to use certain settings or to switch to a print mode, such as printing in italics, double spacing lines, or compressing print. Each printer recognizes only its own set of printer control codes.

To use a printer control code with the 1-2-3 Print command, you must translate the control code for the print mode or setting you want to use into a setup string. A **setup string** is a series of characters preceded by a \ (backslash) that 1-2-3 sends to your printer to tell it to print a certain way. Most setup strings consist of a \ (backslash) followed by three digits; but some contain more than three digits, while others include uppercase and lowercase letters, as well as symbols such as @ (at sign), & (ampersand), and ! (exclamation point).

Creating a Setup String

To create a setup string, you must complete the following tasks:

- Locate in your printer manual the printer control code for the print mode or setting you want to use.
- Translate the printer control code into a 1-2-3 setup string using the table of setup strings at the end of this appendix.
- Enter the appropriate 1-2-3 setup string by using /Print Printer Options Setup or /Worksheet Global Default Printer Setup, or by embedding the setup string directly in the worksheet.

Locating the Appropriate Printer Control Code

To create a setup string, you must first locate in your printer manual the printer control code for the print mode or setting you want to use. Generally, printer manuals list printer control codes in an appendix. If you have trouble finding this list, however, try looking in the index under attribute codes, CHR$ or character-string functions, initialization strings, mode commands, print commands, print enhancements, or printer codes. If you still can't find the list, try looking under the topic that is relevant to the task you want the printer to perform. For example, if you want to condense print, look in the index under condensing print or condensed mode.

Translating a Printer Control Code into a Setup String

Once you locate the appropriate printer control code in your printer manual, you must translate it into a 1-2-3 setup string. Use the table of setup strings at the end of this appendix. To do this, look up each character that comprises the printer control code in the second column of the table. If the character has a decimal code (listed in the first column of the table) between 0 and 31, you must use the 1-2-3 setup string shown in the third column of the table. If, however, the character has a decimal code between 32 and 127, you can use either the 1-2-3 setup string in the third column of the table or the character itself.

Using characters whenever possible is a good practice because you can shorten the setup string and also save time when entering it. In general, you do not need to convert any ASCII character that appears on your keyboard.

NOTE Some printer manuals list printer control codes in decimal format. In these cases, you do not need to translate the printer control code. Be sure, however, that each decimal code is three digits long and is preceded by a \ (backslash). For example, if the manual lists 98 as the decimal code for a particular print mode, use \Ø98 as the setup string. Use the same procedure if your printer manual lists decimal codes in the format CHR$(*n*), which means you use the number *n* in your setup string. For example, if your manual lists the code CHR$(4), use \ØØ4 as the setup string.

As you experiment with creating setup strings, you will find you can use many combinations to accomplish the same task. Some examples of these combinations are shown below.

Example

The printer control code for printing in italics on an Epson® FX printer is

ESC 4

If you look in the second column of the table of 1-2-3 setup strings, you will find that the setup string for ESC is \Ø27 and the setup string for the character 4 is \Ø52. Therefore, you can use the setup string \Ø27\Ø52 to print in italics on this printer. Since the character 4 has a decimal code greater than 31 (listed in the first column of the table), however, you do not have to translate it into a setup string. You can save keystrokes by using the setup string \Ø274.

Example

The printer control code for printing in elite type (12 characters per inch) on the Epson FX printer is

ESC M

If you look in the second column of the table of 1-2-3 setup strings, you will find that the setup string for ESC is \Ø27 and the setup string for the character M is \Ø77. Therefore, you can use the setup string \Ø27\Ø77 to print in elite type on this printer.

Since the character M has a decimal code greater than 31 (listed in the first column of the table), however, you do not have to translate it into a setup string. You can save keystrokes by using the setup string \Ø27M.

Example

The printer control code for selecting magenta on a color process ribbon on an IDS Prism® is

ESC , Q , 2 , $

If you look in the second column of the table of 1-2-3 setup strings, you will find that each character following ESC (, Q , 2 , $) has a decimal code greater than 31 (listed in the first column of the table). This means you can enter the codes using the setup string listed in the third column of the table or by using the characters themselves. The following are all valid setup strings, but notice that the last one is much shorter than the rest:

\Ø27\Ø44\Ø81\Ø44\Ø5Ø\Ø44\Ø36

\Ø27,\Ø81,\Ø5Ø,\Ø36

\Ø27,Q,2,$

Entering the Setup String

There are three ways to enter a setup string for 1-2-3 to send to your printer:

- You can enter a default setup string by using /Worksheet Global Default Printer Setup to specify the setup string, and then selecting /Worksheet Global Default Update to save the setup string as a default setting. Entering a default setup string is useful if you use a particular setup string every time you print a worksheet.
- You can enter the setup string you want to use for the current print job or override the default setup string (if you specified one) with /Print Printer Options Setup. The setup string remains in effect until you specify another setup string, cancel the setup string, or end the 1-2-3 session. If you save the worksheet, however, 1-2-3 saves the current print settings (including the setup string) along with the worksheet, making the setup string available the next time you retrieve and print that worksheet.
- You can enter setup strings directly into the worksheet. This is useful when you want to use different setup strings to print different parts of the print range. See "Embedding Setup Strings in the Worksheet" on page 335.

A setup string that you enter with /Worksheet Global Default Printer Setup or /Print Printer Options Setup affects the entire print range that you have specified with /Print Printer Range. When you select Go from the /Print Printer menu, 1-2-3 sends the printer control code associated with the specified setup string to your printer. The program then sends the print range you specified.

A setup string that you embed in the worksheet affects the contents of only the rows below the row containing the setup string. By entering different setup strings in a worksheet, you can turn various print attributes on and off and control the way specific parts of the print range are printed.

You should also be aware that when you use /Worksheet Global Default Printer Setup or /Print Printer Options Setup to enter a setup string, the setup string can be only 39 characters long. If you embed a setup string in the worksheet, it can be up to 240 characters long.

Combining different printer control codes in a setup string

You can include more than one printer control code in the same setup string by joining setup strings. When you put the setup strings together, be sure to precede each one with a \ (backslash).

For example, to print in emphasized mode with double spacing on an Epson FX printer, you must create a setup string that combines the printer control code for emphasized type with the printer control code for double spacing.

The printer control code for printing in emphasized type on this printer is

ESC E

If you look in the second column of the table of 1-2-3 setup strings, you will find that the setup string for ESC is \Ø27 and the setup string for the character E is \Ø69. Since the character E has a decimal code greater than 31 (listed in the first column of the table), you do not have to translate it into a setup string. Therefore, the setup string for printing emphasized type on this printer can be either \Ø27\Ø69 or \Ø27E.

The printer control code for double spacing text on an Epson FX printer is

ESC A CTRL X

If you look in the second column of the table of 1-2-3 setup strings, you will find that the setup string for ESC is \Ø27, the setup string for the character A A is \Ø65, and the setup string for the character CTRL X is \Ø24. Since the character A has a decimal code greater than 31 (listed in the first column of the table), you do not have to translate it into a setup string. Therefore, the setup string for printing double spacing on this printer can be either \Ø27\Ø65\Ø24 or \Ø27A\Ø24.

You then add the setup string for double spacing to the end of the setup string for emphasized type to create the setup string \Ø27\Ø69\Ø27\Ø65\Ø24. Or, to save keystrokes, you can combine the abbreviated forms of the setup strings to create the setup string \Ø27E\Ø27A\Ø24.

NOTE You cannot combine all print modes and settings. If the combination you are trying does not work, check your printer manual to make sure it is possible to combine those particular printer control codes.

Embedding Setup Strings in the Worksheet

It is possible to use setup strings by embedding the strings directly in the worksheet. By doing this, you can instruct the printer to switch from one print mode to another within the same print range. This allows you to print different parts of the print range using different setup strings.

1-2-3 prints entire worksheet rows that follow an embedded setup string using the print mode or settings you have specified. This means you cannot embed setup strings to print individual cells or columns of a worksheet in a special way. You may find it helpful to keep the printed output in mind when designing a worksheet. If you know that you want a special printed effect in part of the worksheet, lay out that section in a row format rather than a column format.

NOTE W Wysiwyg does not support embedded setup strings and will print the strings as if they are regular text. Therefore, if you embed setup strings in the worksheet and you later want to print that worksheet with Wysiwyg instead of with 1-2-3, you must first remove the embedded setup strings.

A print range can contain any number of sections that will be printed in special print modes specified by embedded setup strings. However, each section must be set off by rows containing setup strings that turn the print modes on and off.

1. Use /Worksheet Insert Row to insert a blank row above the row in which you want a particular print mode to start.
2. Move the cell pointer to the cell in the inserted row that is located in the leftmost column of the range you want to print.

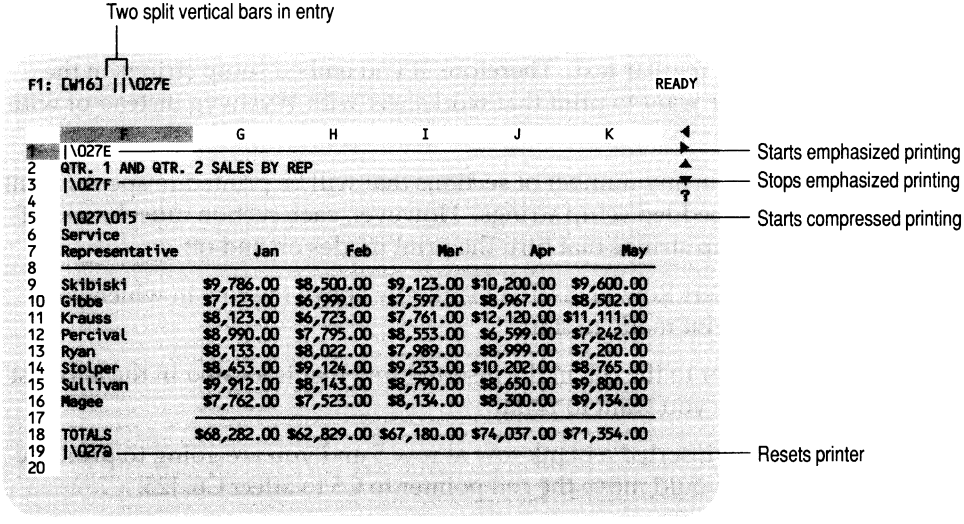
   For example, if you inserted a blank row at row 5 and you are going to print the range C2..J25, you would move the cell pointer to C5 to affect C6..J25.
3. Type ¦¦ (two split vertical bars) followed by the setup string you want to use, and then press ENTER.

   1-2-3 will not print any row that begins with ¦¦ (two split vertical bars). The first ¦ indicates that you are entering a label that you want to display but don't want to print; and the second ¦ indicates that the information that follows is a setup string. Only the second ¦ is displayed in the worksheet, but you can see both if you look in the control panel.
4. Use /Worksheet Insert Row to insert a blank row below the last row of the range you want to be printed using the setup string you entered in step 3.
5. Move the cell pointer to the cell in the inserted row that is located in the leftmost column of the range you want to print.
6. Type ¦¦ (two split vertical bars) followed by the setup string that cancels the setup string you entered in step 3, and then press ENTER.

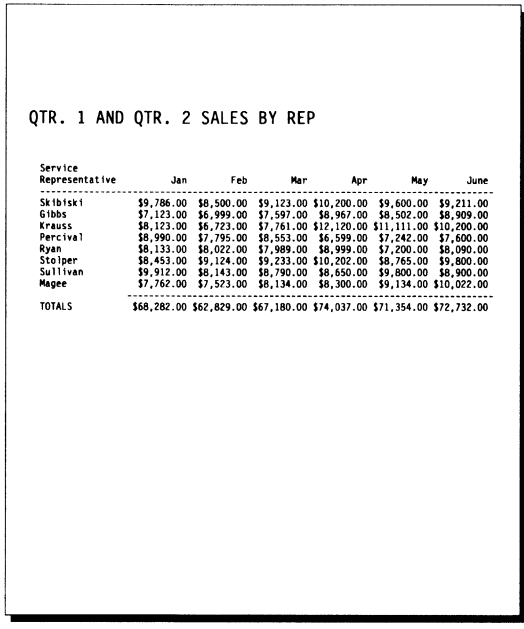
NOTE Once you use a particular setup string, all your printouts will appear in the specified print mode until you specify another setup string that resets the printer or until you turn off your printer. If your printer manual doesn't list a control code that turns off a particular print mode, look for a master reset code, which will return the printer to the default print mode. 1-2-3 Release 2.3 will automatically reset the printer when you exit from the program.

7. When you specify the print range with /Print Printer Range, be sure to include the rows containing the embedded setup strings.

The first illustration below shows a worksheet that contains embedded setup strings for an Epson FX-80™ printer. The second illustration shows the resulting printed report.



	F	G	H	I	J	K
1	|\027E					
2	QTR. 1 AND QTR. 2 SALES BY REP					
3	|\027F					
4						
5	|\027\015					
6	Service					
7	Representative	Jan	Feb	Mar	Apr	May
8						
9	Skibiski	$9,786.00	$8,500.00	$9,123.00	$10,200.00	$9,600.00
10	Gibbs	$7,123.00	$6,999.00	$7,597.00	$8,967.00	$8,502.00
11	Krauss	$8,123.00	$6,723.00	$7,761.00	$12,120.00	$11,111.00
12	Percival	$8,990.00	$7,795.00	$8,553.00	$6,599.00	$7,242.00
13	Ryan	$8,133.00	$8,022.00	$7,989.00	$8,999.00	$7,200.00
14	Stolper	$8,453.00	$9,124.00	$9,233.00	$10,202.00	$8,765.00
15	Sullivan	$9,912.00	$8,143.00	$8,790.00	$8,650.00	$9,800.00
16	Magee	$7,762.00	$7,523.00	$8,134.00	$8,300.00	$9,134.00
17						
18	TOTALS	$68,282.00	$62,829.00	$67,180.00	$74,037.00	$71,354.00
19	|\027@					
20						



QTR. 1 AND QTR. 2 SALES BY REP

Service Representative	Jan	Feb	Mar	Apr	May	June
Skibiski	$9,786.00	$8,500.00	$9,123.00	$10,200.00	$9,600.00	$9,211.00
Gibbs	$7,123.00	$6,999.00	$7,597.00	$8,967.00	$8,502.00	$8,909.00
Krauss	$8,123.00	$6,723.00	$7,761.00	$12,120.00	$11,111.00	$10,200.00
Percival	$8,990.00	$7,795.00	$8,553.00	$6,599.00	$7,242.00	$7,600.00
Ryan	$8,133.00	$8,022.00	$7,989.00	$8,999.00	$7,200.00	$8,090.00
Stolper	$8,453.00	$9,124.00	$9,233.00	$10,202.00	$8,765.00	$9,800.00
Sullivan	$9,912.00	$8,143.00	$8,790.00	$8,650.00	$9,800.00	$8,900.00
Magee	$7,762.00	$7,523.00	$8,134.00	$8,300.00	$9,134.00	$10,022.00
TOTALS	$68,282.00	$62,829.00	$67,180.00	$74,037.00	$71,354.00	$72,732.00

Resulting printout on Epson FX-80 printer

Canceling a Setup String

To cancel a setup string specified with /Worksheet Global Default Printer Setup or /Print Printer Options Setup, do the following:

1. Select either /Worksheet Global Default Printer Setup or /Print Printer Options Setup, depending on which of these commands you originally used to enter the setup string.

   The current specified setup string appears in the control panel.

2. Press ESC to clear the setup string.

3. Press ENTER.

4. If you selected /Worksheet Global Default Printer Setup in step 1 and you do not want to use the setup string in future 1-2-3 sessions, select /Worksheet Global Default Update.

   That setup string will no longer be sent to your printer when you use /Print Printer Go.

NOTE To cancel a setup string specified with /Print Printer Options Setup, you can also select /Print Printer Clear Format. This command, however, also returns the print margins and page length to the default settings.

When you cancel a setup string, your printer may still continue to print in the special print mode. This happens because the printer has stored the setup string in its memory. There are two ways to return your printer to normal printing:

- Turn the printer off for a few seconds and then turn it on again.

- Enter a setup string for your printer's master reset code, which will return the printer to the default print mode the next time you print.

Tips for Using Setup Strings

- If you use more than one printer, remember that a setup string you create for one printer may not produce the same effect on another printer.
- Each printer recognizes only its own set of printer control codes. In addition, some printers provide more printer control codes than other printers. For example, some printers do not support letter-quality printing, italic printing, and double spacing. Refer to your printer manual to find out what print modes your printer supports.
- Some printers require you to combine two or more setup strings to create a special effect. For example, the Epson LQ1500 can produce compressed print only when in draft mode. Therefore, to use compressed print with this particular printer, you must combine the setup string for compressed printing with the setup string for draft mode. See "Combining different printer control codes in a setup string"on page 334.
- 1-2-3 cannot automatically adjust page or line length when you use setup strings for printing. When you use a setup string that affects pitch and/or line spacing (for example, printing with compressed italics), you must adjust margins and/or page length yourself. For example, since your printer squeezes extra characters on each line when you use a setup string for compressed print, widen the right margin to 132 characters if you are printing in portrait mode on 8 1/2 by 11-inch paper.
- For large worksheets, you might want a page length longer than 66 lines. For example, if you use a setup string to set line spacing to 8 lines per inch and you are printing in portrait mode on 8 1/2 by 11-inch paper, change the page length setting to 88 lines (see /Print Printer Options Pg-Length in Chapter 24, beginning on page 285). If you don't want to use these settings for other print jobs, be sure to reset margins and/or page length when you are done printing the current print job.
- If you use a setup string to print with double spacing, you must select /Print Printer Options Pg-Length and change the setting to half of its current value.
- In general, do not use setup strings to control print settings that you can control through the 1-2-3 Print commands. For example, do not use setup strings to control page length and margins.
- If you use an HP LaserJet printer, the font cartridge you choose determines which print modes are available. For more information on creating setup strings for LaserJet printers, see Appendix D, beginning on page 355.

Table of 1-2-3 Setup Strings

The following table shows 128 standard decimal codes in their 1-2-3 setup string format. It also shows the character equivalent for each code.

NOTE ESC, a printer control code many printers use frequently, is \Ø27 in 1-2-3.

Decimal code	Character	1-2-3 setup string
0	CTRL @	\000
1	CTRL A	\001
2	CTRL B	\002
3	CTRL C	\003
4	CTRL D	\003
5	CTRL E	\005
6	CTRL F	\006
7	CTRL G	\007 (bell)
8	CTRL H	\008
9	CTRL I	\009 (tab)
10	CTRL J	\010 (line feed)
11	CTRL K	\011
12	CTRL L	\012 (form feed)
13	CTRL M	\013 (carriage return)
14	CTRL N	\014
15	CTRL O	\015
16	CTRL P	\016
17	CTRL Q	\017
18	CTRL R	\018
19	CTRL S	\019
20	CTRL T	\020
21	CTRL U	\021
22	CTRL V	\022
23	CTRL W	\023
24	CTRL X	\024
25	CTRL Y	\025
26	CTRL Z	\026
27	ESC	\027
28	FS	\028
29	GS	\029
30	RS	\030

(continued)

Decimal code	Character		1-2-3 setup string
31	US		\031
32	Space bar		\032
33	!	(exclamation point)	\033
34	"	(double quotes)	\034
35	#	(pound or number symbol)	\035
36	$	(dollar sign)	\036
37	%	(percent sign)	\037
38	&	(ampersand)	\038
39	'	(close single quote)	\039
40	(	(open parenthesis)	\040
41	)	(close parenthesis)	\041
42	*	(asterisk)	\042
43	+	(plus)	\043
44	,	(comma)	\044
45	–	(minus)	\045
46	.	(period)	\046
47	/	(slash)	\047
48	0		\048
49	1		\049
50	2		\050
51	3		\051
52	4		\052
53	5		\053
54	6		\054
55	7		\055
56	8		\056
57	9		\057
58	:	(colon)	\058
59	;	(semicolon)	\059
60	<	(less-than symbol)	\060
61	=	(equal sign)	\061
62	>	(greater-than symbol)	\062
63	?	(question mark)	\063
64	@	(at sign)	\064
65	A		\065
66	B		\066
67	C		\067

(continued)

Decimal code	Character		1-2-3 setup string
68	D		\068
69	E		\069
70	F		\070
71	G		\071
72	H		\072
73	I		\073
74	J		\074
75	K		\075
76	L		\076
77	M		\077
78	N		\078
79	O		\079
80	P		\080
81	Q		\081
82	R		\082
83	S		\083
84	T		\084
85	U		\085
86	V		\086
87	W		\087
88	X		\088
89	Y		\089
90	Z		\090
91	[	(open bracket)	\091
92	\	(backslash)	\092
93	]	(close bracket)	\093
94	^	(caret)	\094
95	_	(underscore)	\095
96	'	(open single quote)	\096
97	a		\097
98	b		\098
99	c		\099
100	d		\100
101	e		\101
102	f		\102
103	g		\103
104	h		\104

(continued)

Decimal code	Character		1-2-3 setup string
105	i		\105
106	j		\106
107	k		\107
108	l		\108
109	m		\109
110	n		\110
111	o		\111
112	p		\112
113	q		\113
114	r		\114
115	s		\115
116	t		\116
117	u		\117
118	v		\118
119	w		\119
120	x		\120
121	y		\121
122	z		\122
123	{	(open brace)	\123
124	¦	(split vertical bar)	\124
125	}	(close brace)	\125
126	~	(tilde)	\126
127	DEL		\127

Appendix C
Managing Your Computer's Memory

Many factors affect the amount of memory 1-2-3 uses. Among them are the undo feature, Wysiwyg, the size of your operating system and other programs you have in memory, the size of the drivers you select in the Install program, the type of data you enter in your worksheet, and the organization of your worksheet. This appendix explains how you can use memory efficiently with 1-2-3 and covers the following topics:

What Is Memory?

Memory is your computer's temporary storage area; it is where a worksheet resides while you work with 1-2-3. Each time you enter or change data in the worksheet, you use more available memory. 1-2-3 displays the MEM indicator on the status line at the bottom of the screen when the amount of memory available is low. If you continue to add data to the worksheet, you will eventually run out of memory, in which case 1-2-3 displays the 'Memory full' error message.

Both memory and disk storage are measured in bytes, with one kilobyte (1KB) equal to 1,024 bytes. A computer with 640KB of memory has 640 kilobytes, or 655,360 bytes, of temporary storage. One megabyte (1MB) is 1,024 kilobytes, or 1,048,576 bytes.

Random access memory (RAM) disks, or virtual disks, are usually in your computer's memory and are temporary storage areas. Data in RAM is lost when you end 1-2-3 or turn off your computer. To store this data for future use, save your worksheet on a **physical disk** such as a hard disk or a diskette.

Disk storage is permanent storage; it is not the same as memory. For example, you might have a large-capacity hard disk (for example, a 100MB hard disk) but only 640KB of memory in your computer. The large amount of disk storage you have does not mean you necessarily have enough memory for programs you want to run and worksheets you want to create. The amount of worksheet data you can store on disk does not translate directly to the amount of data you can store in memory.

Types of Memory

There are three types of memory used in personal computers: conventional, extended, and expanded. 1-2-3 Release 2.3 uses conventional and expanded memory, but not extended memory.

Type of memory	Description
Conventional	All computers have up to 1MB of conventional memory. The first 640KB is used by the operating system and by applications such as 1-2-3. The rest is reserved for adapters you install in your computer.
Extended	80286/80386-based computers can have additional memory in addition to the 1MB of conventional memory, called extended memory. This memory is not directly available to applications such as 1-2-3. 1-2-3 can, however, use extended memory that has been converted to expanded memory.
Expanded	All computers can have up to 32MB of expanded memory in addition to the 1MB of conventional memory. To make expanded memory available to applications, you install a special program called an expanded memory manager, and in some cases, an expanded memory board. Expanded memory managers adhere to the Lotus/Intel®/Microsoft (LIM) Expanded Memory Specification (EMS), version 3.2 or 4.0. Some expanded memory managers convert extended memory, or even disk storage, into expanded memory.

How 1-2-3 Uses Memory

If your computer has conventional memory only, 1-2-3 stores all your work in conventional memory. If your computer has expanded memory, 1-2-3 stores some information in expanded memory and some in conventional memory, as shown in the following table.

Each cell 1-2-3 stores has a corresponding component, called a **cell pointer**. 1-2-3 uses cell pointers to locate data stored in memory (either expanded or conventional). 1-2-3 stores all cell pointers in expanded memory when you select /Worksheet Global Default Other Expanded-Memory Enhanced and you have a LIM version 4.0 expanded memory manager. Otherwise, 1-2-3 stores all cell pointers in conventional memory.

Stored in conventional memory	Stored in expanded memory
The 1-2-3 program itself	Labels
Named ranges and graphs	Formulas
Results of text formulas	Real (or decimal) numbers (any decimal number from –32,767.0 through +32,767.0)

(continued)

Stored in conventional memory	Stored in expanded memory
Wysiwyg fonts (larger than 16KB)	Undo buffer
Driver sets	Cell pointers
Add-in programs	Wysiwyg fonts (smaller than 16KB)
Memory-resident software such as BPrint	
Network software	

Keep the following issues in mind when working with expanded memory:

- If you have expanded memory and you turn on the undo feature, 1-2-3 places the entire undo buffer in expanded memory, if possible. If the entire undo buffer cannot fit in expanded memory — either because you have too small an amount of expanded memory or because much of expanded memory is being used by other memory-resident programs — 1-2-3 places as much of the undo buffer as can fit in expanded memory and then places the rest of the undo buffer in conventional memory. If no expanded memory is available, 1-2-3 places the entire undo buffer in conventional memory.
- Because it stores so much necessary data, conventional memory can fill up more quickly than expanded memory. Consequently, it is possible to receive the 'Memory full' error message when you use conventional memory to store cell pointers and expanded memory to store cell contents. Once conventional memory is full, you are effectively out of memory no matter how much unused expanded memory you have.
- 1-2-3 stores labels, formulas, and decimal numbers in expanded memory until expanded memory is full. 1-2-3 then stores any additional labels, formulas, and decimal values in conventional memory.
- 1-2-3 stores integers (whole numbers from –32,767 to +32,767) directly in the cell pointer so they do not require additional memory.
- Expanded memory is divided into blocks of 16KB called **pages**.

How To Check the Type of Expanded Memory Your Computer Uses

Select /Worksheet Status to display the LIM version number of the expanded memory manager software installed in your personal computer. The version number is either LIM 3.2 or LIM 4.0. You cannot change this number from within 1-2-3.

Specifying How 1-2-3 Uses Expanded Memory

You select /Worksheet Global Default Other Expanded-Memory to specify how 1-2-3 is to use expanded memory. You can also change this setting using the Default Settings dialog box.

Select	To
/Worksheet Global Default Other Expanded-Memory Standard	Store cell contents in expanded memory and cell pointers in conventional memory (default setting).
/Worksheet Global Default Other Expanded-Memory Enhanced	Store both cell contents and cell pointers in expanded memory. (1-2-3 uses this setting only if you have LIM 4.0.)

The default setting, Standard, provides maximum performance and compatibility with previous releases and add-ins. The Enhanced setting lets you build larger worksheets because you can have more active cells, but has an impact on performance and compatibility — very large worksheets you create in Release 2.3 cannot be used in previous releases of 1-2-3, and some add-ins that assume 1-2-3 uses conventional memory for cell pointers may not work.

CAUTION If you have a COMPAQ® computer that uses CEMM 4.02 or an earlier version of the COMPAQ expanded memory management software, contact COMPAQ Customer Support for an updated version of CEMM before you try using /Worksheet Global Default Expanded-Memory Enhanced. You can contact COMPAQ Customer Support at 1-800-345-1518 (U.S. only).

1-2-3 Release 2.3 uses up to 4MB of expanded memory for worksheet data, as do previous releases of 1-2-3. With LIM 4.0 expanded memory, 1-2-3 can also use an additional 8MB for cell pointers. This means that with LIM 4.0 you can fill every cell in the worksheet, provided your data does not use more than 4MB of expanded memory, and that the maximum worksheet size is 12MB.

How 1-2-3 Allocates Memory

1-2-3 Release 2.3 allocates memory in blocks of four cells arranged in a column. Cells A1, A2, A3, and A4 are one block, for example. Each cell uses 4 bytes to store the cell pointer, plus additional bytes for the contents of the cell. If you format a cell, enter data in a cell, or unprotect data in one of the cells in a block, 1-2-3 reserves memory for all four cells (using a total of 16 bytes). This four-cell block is then **active**. If you format a cell that is already active or if you enter certain types of data in a formatted cell, 1-2-3 does not use additional memory.

To save memory, minimize the number of active blocks. If, for example, you need to enter 100 values to set up a 1-2-3 database, enter the values down a column instead of in a row. Also, try to minimize the distance between the first and the last entry (avoid a lot of blank cells) to save memory.

Memory 1-2-3 Uses for Different Types of Data

Once an empty cell is active, entering data into that cell uses memory only for data — no additional memory is required for the cell. The following table provides examples of the amount of memory worksheet entries require beyond the amount used by the cell pointer.

Worksheet entry	Typical amount of memory 1-2-3 uses
Integers (–32767 to +32767)	No additional memory beyond that required by the cell pointer.
Integers (less than –32767 or greater than +32767)	8 bytes.
All other numbers	8 bytes.
Blank formatted cells	No additional memory beyond that required by the cell pointer.
Labels	6 bytes minimum, but varies depending on the number of bytes (characters) in the label. 1-2-3 includes the label prefix, plus 1 byte. If stored in conventional memory, 1-2-3 rounds up the total number of bytes required to an even number. If stored in expanded memory, 1-2-3 rounds up the number of bytes to the next multiple of eight.
Range names	34 bytes, regardless of the length of the name.
Graph names	468 bytes, regardless of the graph options you selected.
Formulas	22 bytes minimum, but varies depending on the complexity of the formula. If stored in expanded memory, 1-2-3 rounds up the number of bytes to the next multiple of eight.
Linked formulas	The first link to a file uses 25 bytes plus the length of the file name, rounded up to an even number. Subsequent links to the same file use 32 bytes each.

The amount of memory 1-2-3 uses to store an entry differs depending on whether the entry is stored in conventional or expanded memory, as the following table shows.

Example	Conventional memory	Expanded memory
You enter a label into an active cell. The label, including the label prefix, uses 7 bytes, plus 1 additional byte.	8 bytes	8 bytes
You enter a label into an active cell. The label, including the label prefix, uses 8 bytes plus 1 additional byte.	10 bytes	16 bytes

(continued)

Example	Conventional memory	Expanded memory
You enter a label into an active cell. The label, including the label prefix, uses 16 bytes plus 1 additional byte.	18 bytes	24 bytes
You enter a number into a new cell, which activates a block of four vertical cells and uses 16 bytes. You then format these four cells as Currency.	No additional memory	No additional memory
You enter a decimal number into a cell that is part of an active block.	8 bytes	8 bytes
You use /Range Unprot to unprotect a cell that is part of an active block.	No additional memory	No additional memory

Memory 1-2-3 Uses for Wysiwyg

Keep the following in mind when you use Wysiwyg:

- You can save memory by limiting the number of fonts you use in your worksheet.
- Wysiwyg uses more memory for fonts that have a large point size than for fonts that have a small point size.
- Each time you select a different font or a different point size for a font, Wysiwyg uses 1KB of conventional memory plus a minimum of 2KB to load the font. The largest point size for a font can use up to 14KB.

The following table provides examples of how 1-2-3 uses memory when Wysiwyg is attached.

Example	Typical amount of memory Wysiwyg uses
You format a cell that contains an entry using font 2	1KB of conventional memory, plus the amount of memory required to load the font (2–14KB)
You format another cell that contains an entry using font 2	No additional memory
You assign an attribute to a cell that contains an entry (bold, italics, underline, color, lines, or shading)	3KB for the first attribute; no additional memory for subsequent attributes

Memory 1-2-3 Uses for Undo

When you turn on the undo feature, 1-2-3 allocates enough memory to back up the largest possible worksheet you can create. 1-2-3 stores this backup copy of your worksheet in an area of memory called the **undo buffer**.

Keep the following issues in mind when you use the undo feature:

- If no expanded memory is available, 1-2-3 reserves more than half of your computer's available conventional memory for the undo buffer. This significantly reduces the amount of memory available for worksheet data and may prevent you from attaching Wysiwyg.
- If expanded memory is available, 1-2-3 reserves for the undo buffer an amount of expanded memory equal to the amount of conventional memory available, plus the amount of expanded memory 1-2-3 uses for worksheet data and cell pointers, plus 16KB to back up data internal to the 1-2-3 program.
- If you turn off the undo feature and then retrieve a worksheet or attach an add-in, you cannot turn on undo again if any part of the undo buffer is in conventional memory. 1-2-3 cannot reserve memory for the undo buffer once you retrieve a worksheet or attach an add-in. To turn on undo in this situation, save the worksheet, clear the worksheet from memory with /Worksheet Erase (or detach the add-in), turn on undo (using /Worksheet Global Default Other Undo Enable or the Default Settings dialog box), and retrieve the worksheet or attach the add-in again.
- When the undo buffer is in expanded memory, the amount of memory used is always a multiple of 16KB.
- If you use undo frequently, you can change your default settings to turn on undo automatically when you start 1-2-3. For more information, see "Configuration Defaults" on page 275.

Structuring Your Files for Minimum Memory Use

You can do several things to structure your files to minimize memory use.

- Keep data in columns as close together as possible. For example, making an entry in cell A1 and an entry in cell A8192 uses 32KB because 1-2-3 activates all cells in the column, while making the same entries in cells A1 and A2 uses only 16 bytes. If you discover that the active area of your worksheet is larger than necessary, delete blank columns and rows in the active area, or move data up. You need to save and retrieve the file again to free up memory used for cell pointers. Moving or erasing data does not free up memory for cell pointers on its own.
- If your current file contains a large area of data, and formulas refer to only a few of the cells that contain the data, you can often save memory by extracting the data to a new file and creating formulas to link to the data in the new file. However, if the formulas link to many cells in the new file, you may not save memory by using this procedure. In fact, with many linking formulas 1-2-3 may use more memory than if the data were in memory.
- Limit the number of fonts you use in your worksheet.
- Eliminate unused named graphs.

- Eliminate unused columns and/or rows. Press **END HOME** to move the cell pointer to the end of the active area. If this cell location is outside the area that contains the data, delete the unused columns and rows. Then save and retrieve the file again.

Checking How Much Memory Is Available

You use /Worksheet Status to check how much memory is available for a worksheet. The status screen 1-2-3 displays shows you how much conventional and expanded memory is available. For example, the amount of conventional memory available may appear as follows: '232,288 of 240,512 Bytes (97%)'. The first number is the amount of memory available for worksheet growth; the second is the amount you had after you started 1-2-3. 1-2-3 shows the percent of memory you have available.

If you check these settings when you have a blank worksheet on the screen, the amount of conventional and expanded memory displayed is the total amount available for a worksheet. The numbers you see represent the amount of memory available after you start your operating system, your network software (if any), any memory-resident programs (such as BPrint), 1-2-3, and any add-ins and after 1-2-3 allocates a portion of memory for the undo buffer (if undo is turned on).

As you enter data in the worksheet and check the available memory, you will see the amount of memory decrease. If you want to know the size of a worksheet in memory after you retrieve it, first use /Worksheet Status to check the available memory. Then, save the file with /File Save, erase the file with /Worksheet Erase, and check the available memory again. The difference between the two numbers is the approximate size of your worksheet in memory.

NOTE If you want to use /Worksheet Status to check the amount of memory the undo buffer uses with expanded memory, you must have an empty worksheet and there must be no add-ins attached. The memory used for the undo buffer is the difference between the amount of available memory and the amount of total memory.

What to Do When You're Running Out of Memory

A flashing MEM indicator on the status line at the bottom of your screen is usually the first indication of a potential memory problem.

If cell pointers are stored in conventional memory, the MEM indicator appears when the amount of memory for new cells is 4KB or less. This does not necessarily mean that the amount of available memory displayed by /Worksheet Status will be 4KB or less. The amount displayed is available for both new cells and data; the MEM indicator reflects only the amount for new cells.

If cell pointers are stored in expanded memory, the MEM indicator appears when the amount of memory available is 4KB or less, or the conventional memory used by 1-2-3 or by add-in programs has become fragmented. When this occurs, you will need to save and retrieve your file. See "Eliminate Blocks of Unusable Memory" below.

If you continue to activate cells in the worksheet, you will eventually run out of memory, in which case 1-2-3 displays a 'Memory full' error message. You can still save your file and no data will be lost.

The following sections explain how you can modify your large worksheets to save memory.

Erase Unnecessary Data

The easiest way to free up memory is to use /Range Erase to erase any data you no longer need in the worksheet. This makes memory used for cell contents available for other uses. To make memory used for cell pointers available, save the file with /File Save and then retrieve the file with /File Retrieve.

You can also free memory used for cell contents by using /Range Name Delete or /Graph Name Delete to delete any range names or named graphs that are no longer useful.

Eliminate Blocks of Unusable Memory

When you free memory by erasing unnecessary data or moving data around, the freed memory often becomes "fragmented," which makes it less usable. To eliminate fragmentation and produce a contiguous (unbroken) area of free memory, always save and retrieve your file after any memory saving operation.

The contiguous memory produced by saving and retrieving a worksheet improves performance (especially if you have expanded memory) and allows you to use the greatest number of cells. It also lets you use add-ins that you might otherwise be unable to use. (Add-ins need contiguous memory to be loaded.) Suppose you have a 50KB add-in and 200KB of available memory. If the memory is fragmented so that 50KB of contiguous memory is unavailable, you will not be able to load the add-in.

Review Cell Formatting

Although assigning formats to cells with /Range Format enhances the appearance and legibility of your worksheet data, it also makes a cell active — so any blank, formatted cells in the range use memory.

In general, format only cells that contain, or will contain, numeric data. Assign the format required by the majority of the cells as the global format with /Worksheet Global Format. Assign other individual cell formats with /Range Format only as necessary. For example, avoid formatting entire rows or columns.

If you formatted many cells, you can regain some memory by setting the format of any blank cells to the default with /Range Format Reset. Then use /File Save to save the file and /File Retrieve to retrieve the file again.

You can regain some memory by erasing the unprotected setting from blank cells you unprotected with /Range Unprot. Then use /File Save to save the file and /File Retrieve to retrieve the file again.

Convert Formulas

Formulas use more memory than labels or numbers. If you used formulas to generate values that do not change as you use the worksheet, consider converting the formulas to their values with /Range Value. Note that by doing this you lose the formulas, but not the resulting values.

Turn Off Undo

If the undo feature is on when you start to run out of memory, consider turning off (disabling) the feature with /Worksheet Global Default Other Undo Disable. Turning off the undo feature is particularly important if you do not have expanded memory and you are running Wysiwyg (or any large add-in).

If you routinely work with large worksheets and want to use the undo feature, you should consider installing some expanded memory. For more information, see your technical resource person.

Turn Off the Display of Graphics

If you are using Wysiwyg, you can regain some memory by turning off the display of graphics with :Display Options Adapter 9. Your worksheet will look just as it does in 1-2-3 and you can continue to select all Wysiwyg commands (except :Display Mode Graphics). You can select :Display Options Adapter Auto to turn on the display of graphics again (as long as there is enough memory available for 1-2-3 to load the graphics display driver).

Detach Add-In Programs

Add-ins use conventional memory. You can free memory (either to attach another add-in or to create more room for worksheet data) by detaching the add-in(s) with /Add-In Detach. Attaching an add-in, however, does not detach any add-in @functions that are a part of that add-in. You must use /Quit to leave 1-2-3 and then start 1-2-3 without attaching the add-ins.

If you are using Macro Library Manager, remove from memory any libraries you no longer need to use. When saving a range in a library, make sure the range includes as few blank cells as possible. Macro Library Manager allocates one cell in conventional memory for each cell in the range you save — even if the cell is blank. (For more information about Macro Library Manager, see Chapter 6 of the *@Functions and Macros Guide*.)

Unload Memory-Resident Programs

Memory-resident programs reduce the amount of memory available for worksheet data. When working on a large worksheet, consider unloading such programs from memory before you start 1-2-3.

Sometimes you may not be aware that other programs are running. If you are using DOS, the DOS file AUTOEXEC.BAT may start other programs when you start your computer. Examine this file. If it starts other programs, you may want to edit it to prevent other programs from starting automatically. If you are not sure how to examine and edit the file, refer to your DOS manual or your technical resource person.

To free some conventional memory, you can load some memory-resident programs into expanded memory or extended memory. For more information, see the documentation for your memory-resident program or expanded memory driver.

Avoid Running Two Copies of 1-2-3

You may get the 'Memory full' error message if you accidentally load 1-2-3 into memory twice. This can happen if you use /System to perform an operating system task and type 123 to return to 1-2-3. You then have two copies of 1-2-3 in memory. To avoid this problem, after you use /System, type exit at the operating system prompt to return to 1-2-3.

Avoid Using the Access System

You can save approximately 2.5KB of memory if you start 1-2-3 from the operating system instead of from the Access system.

If you started 1-2-3 by typing lotus, you used the Access system. Select /Quit to end 1-2-3 and then select Exit from the Access system menu. When you return to the operating system prompt, type 123 to restart the program.

Create a Smaller Driver Set

Although you can include up to four text printer drivers in a 1-2-3 driver set, each text driver uses approximately 500 bytes of memory. You can save memory by using small driver sets for your text printers (for example, a driver for a single printer) and loading the driver sets only when you will use the printer. For example, include the driver for the dot-matrix printer in the default driver set (123.SET), and include the driver for the laser printer in a driver set named LASER.SET. To use the dot-matrix printer, start 1-2-3 as you normally do. To use the laser printer, start 1-2-3 by typing 123 laser at the operating system prompt.

You can also save memory by not installing a graphics display driver if you are not planning to use graphics, or if you plan to use Wysiwyg to display graphics.

Hardware Solutions

If you try all the techniques discussed in the preceding sections and you still do not have enough memory for your worksheet, you should consider upgrading your computer's conventional memory to 640KB (if you do not already have 640KB) or installing expanded memory. For information about upgrading your personal computer, see your technical resource person.

To determine how much conventional memory your computer has, use your operating system's CHKDSK command. Type chkdsk at the operating system prompt. (To use this command, you must be in your operating system's directory or you must have a path to this directory.)

The second to last line of the CHKDSK listing indicates how many bytes of conventional memory the operating system is using.

If CHKDSK displays	Your computer has
655360 bytes total memory	640KB of conventional memory. You cannot add any more conventional memory. However, you may be able to add expanded memory.
A number less than 655360	Less than 640KB of conventional memory. You can upgrade to 640KB, and you may be able to add expanded memory. (To determine the number of kilobytes of memory, divide the number displayed by 1,024. For example, if the line reads '524288 bytes total memory,' divide 524,288 by 1,024. The result is 512, which means your computer has 512KB of conventional memory.)

Appendix D
Using 1-2-3 with HP LaserJet Printers

1-2-3 and Hewlett-Packard LaserJet printers let you produce high-quality printouts of your worksheets. The LaserJet printer family includes the following printers: LaserJet, LaserJet Plus, LaserJet 500 Plus, LaserJet Series II, LaserJet IID, LaserJet IIP, LaserJet 2000, LaserJet III, LaserJet IIID, LaserJet IIIP, and LaserJet IIISi.

The general procedure for printing on a LaserJet printer is no different than printing on any other kind of printer in 1-2-3: You specify a range to print with /Print Printer Range and then print it with /Print Printer Go. If, however, you want to take full advantage of the many choices a LaserJet printer offers for controlling the appearance of a printed worksheet (typeface, orientation, and so on), you will need to know how to specify certain print settings, in particular, margins, page length, and setup strings. A **setup string** is a command that 1-2-3 sends to the LaserJet printer to control such aspects of printing as the print size or typeface. These commands, also known as **escape sequences**, are part of the Hewlett-Packard **PCL Printer Language**.

NOTE If you have used Wysiwyg to format your worksheets, follow the steps in "Printing with Wysiwyg Formatting" on page 89 to print on your LaserJet printer. Wysiwyg takes care of sending commands to the printer for you.

Before You Print

In order to print on HP LaserJet printers, you must be familiar with the following terms.

- **Orientation** defines the way printed information appears on a page. In portrait orientation, information prints down the length of a page; in landscape, it prints across the length of a page, or sideways.
- The **typeface** is the overall design of the printed characters. The LaserJet typefaces include Courier, Tms Rmn, Helv, and Line Printer typefaces.
- A **point** is a unit of measurement that determines the height of a character. A point is approximately 1/72 of an inch.
- A **font** is a complete collection of letters and symbols that are the same point size and typeface, for example, Helv 12 point. A font is also defined by its **style** and **stroke weight**.
- A **symbol set** is the available characters in a font. Different sets serve different purposes and contain a variety of characters, such as Greek symbols or mathematical characters.

- The **spacing** for a font is either fixed (monospaced) or proportional. With fixed spacing, each character uses the same amount of space. For example, the letter I takes as much space as the letter W. With proportional spacing, some characters take up more space than others. For example, the letter W takes up more space than the letter I. (To print numbers, always select a font with fixed spacing, or your data could get misaligned when printed.)
- The **pitch** is the number of characters that fit in an inch of horizontal space. A font with fixed spacing prints a uniform number of characters per inch, typically 10, 12, or 16.66.
- The **style** of a font can be either upright (normal) or italic.
- The **stroke weight** is the thickness of the print. The choices are light, medium, or bold.
- The **PCL Printer Language** is the Hewlett-Packard language for controlling what the LaserJet printers produce.
- An **escape sequence** is a PCL command that specifies a particular printer setting. For example, an escape sequence might control the selection of a paper tray (rather than manually feeding paper into the printer) or might specify the typeface you want to use. An escape sequence begins with the ASCII decimal code for ESC (\027), followed by the characters that specify a particular setting. For example, \027&l1O selects landscape orientation.

  NOTE In escape sequences throughout the text and in tables, a lowercase letter l looks like l. Be careful not to confuse it with the number 1. In addition, a zero appears with a / (slash) through it (Ø) to distinguish it from an uppercase letter O.

- A **setup string** consists of one or more commands to the printer. For LaserJet printers, these commands are usually PCL escape sequences, but they could also be ASCII decimal control codes such as \012 for form feed. You can specify a setup string with /Print Printer Options Setup. You can also enter certain setup strings in the worksheet (perhaps to switch to a different stroke weight) by preceding them with ¦¦ (two split vertical bars), for example, ¦¦ \027(s3B. (You see only one of the split vertical bars on the screen, however.) For more information on entering setup strings directly into a worksheet, see "Embedding Setup Strings in the Worksheet" on page 335.

  NOTE Wysiwyg does not support embedded setup strings and will print the strings as if they are regular text. Therefore, if you embed setup strings in a worksheet and you decide later to print that worksheet with Wysiwyg instead of with 1-2-3, you must first remove the embedded setup strings.

- A **print job** consists of one or more printed items, such as a file, a range of data, or one or more blank lines. The print job begins when you start sending data to a printer with /Print Printer Go, /Print Printer Line, or /Print Printer Page. The print job ends when you select Quit or press ESC or CTRL-BREAK to leave the /Print menu.

Basic Printing

This section reviews the basic procedure for printing on a LaserJet printer if you are not sending any special commands to it.

1. Specify a print range with /Print Printer Range.
2. Select Align.
3. Select Go.
4. Select Page.

TIPS

- If you don't select /Print Printer Page and you are printing a small range, nothing will print. If you are printing several pages, the last one will not print. This is because the LaserJet printer is a **page printer**, meaning that it stores the contents of each page in a buffer (temporary storage place) and will not print anything until it is sure it has composed an entire page. The LaserJet printer knows the page is complete when you select /Print Printer Page, or when it encounters a page break that you entered with /Worksheet Page. Without one of these, the information stays in the buffer and is printed out at the start of the next print job. (You can tell there is information in the buffer if the Form Feed light is on.)

  NOTE Three other actions will signal the end of a page to the LaserJet printer: sending the reset command (\027E) (see "PCL Printer Language" on page 358), sending a form feed ASCII code (\012), or taking the printer off line and pressing the Form Feed key on the printer. Lotus, however, does not recommend you use these in most cases because they bypass 1-2-3 and can cause pagination problems or incorrect printing of headers and footers.

- Pagination problems can occur if you use the LaserJet printer control panel or a setup string to change line spacing. Be sure to select the proper page length for the line spacing you are using, either by selecting /Print Printer Options Pg-Length or by entering a new page length in the Print Settings dialog box. For some commonly used settings, refer to Tables D-4 and D-5.

- If the entire worksheet is printed on a single line, make sure that Send line feeds in the Default Printer Settings dialog box is not marked. (LaserJet printers do not automatically advance the line in response to a carriage return; they must receive both a carriage return and a line feed.) Be sure to save the AutoLF setting for future sessions by selecting /Worksheet Global Default Update or selecting Update in the Default Settings dialog box.

- To print several non-adjoining ranges on a single page, specify the first range with /Print Printer Range, select Align and then Go. To print the other ranges, specify each range and then select Go. Do not select Align before selecting Go after you've printed the first range.

- The factory default settings for a LaserJet printer include portrait orientation; Roman-8 symbol set; and 10-pitch, 12-point, upright style, medium weight Courier typeface. (For more information about default fonts, see "Specifying a Font with PCL Commands" on page 363.)
- Not all LICS characters print as you expect them to on LaserJet printers. For a list of characters that aren't supported, see "Solving HP LaserJet Printer Problems" on page 365.

PCL Printer Language

Hewlett-Packard PCL Printer Language lets you control your output. With the PCL language, you can control your print job and what happens on each printed page, as well as specify fonts. The PCL language consists of commands, or escape sequences, that you combine to form a setup string. (If you are unfamiliar with some of these terms, see "Before You Print" on page 355.)

Shortening Setup Strings

Setup strings often require a number of keystrokes. To save time when entering a setup string, you can shorten it by combining certain repetitive elements in it. Also, when you enter a setup string with /Print Printer Options Setup, the string cannot exceed 39 characters, in which case you will have to shorten it if it exceeds 39 characters. If you want or need to shorten a setup string, follow these guidelines:

- The first two characters after the \Ø27 must be the same in all the sequences you want to combine.
- All alphabetic characters within each combined command must be lowercase, except the final letter, which must always be uppercase.

The following setup string defines landscape orientation; the USASCII symbol set; fixed spacing; and 16.66 pitch, 7-point, upright, medium weight Prestige typeface:

```
\Ø27&l1O\Ø27(ØU\Ø27(sØP\Ø27(s16.66H\Ø27(s7V\Ø27(sØS\Ø27(sØB\Ø27(s8T
```

Using the above guidelines, you could shorten the string as follows:

```
\Ø27&l1O\Ø27(ØU\Ø27(sØp16.66h7vØsØb8T
```

If your setup string does not produce the effect you want, check for any lowercase letter l that should be a number 1 and any letter O that should be a Ø (zero), and vice versa. LaserJet printers ignore any sequences they cannot interpret.

PCL Command Order

When you use PCL commands, you must send escape sequences in a particular order for them to work correctly. As a 1-2-3 user, you will be working with three major groups of commands which must appear in the following order in setup strings:

1. Job control commands
2. Page control commands
3. Font selection commands

For each group, the escape sequences must appear in the order shown in Tables D-1 through D-3.

Job control commands

Job control commands affect a print job and are usually grouped together and sent at the beginning of a job. You should not send them again until after the job has printed.

Table D-1 PCL job control commands

Description	Command	Replace # with
Printer reset	\027E	
Number of copies	\027&l#X	Number of copies
Simplex/ duplex print (IID, IIID, 2000)	\027&l#S	0 for simplex, 1 for duplex with long-edge binding (along the 11-inch side), 2 for duplex with short-edge binding (along the $8^1/_2$-inch side)

NOTE Check your printer manual to find additional choices for replacing the # symbol in an escape sequence.

Page control commands

Page control commands let you select the paper source, page size, page and text lengths, orientation, margins, and line spacing.

Table D-2 PCL page control commands

Description	Command	Replace # with
Paper source (IID, IIID, 500 Plus, 2000, IIISi)	\027&l#H	1 for tray, 2 for manual, 4 for lower
Page size (All except LJ, LJ Plus, 500 Plus)	\027&l#A	2 for letter size, 3 for legal, 8 for commercial envelope

(continued)

Description	Command	Replace # with
Page length	\027&l#P	Number of lines per page at a given number of lines per inch (66 for letter, 84 for legal, at 6 lines per inch)
Orientation	\027&l#O	0 for portrait, 1 for landscape
Top margin	\027&l#E	Number of lines (default is 3; you should not have less than two at 6 lines per inch)
Text length	\027&l#F	Number of lines of text printed on a page (must be less than or equal to the page length minus the top margin – $^1/_2$-inch will skip the perforation)
Line spacing	\027&l#D	Lines per inch (1, 2, 3, 4, 6, 8, 12, 16, 24, 48)

Font selection commands

The font commands control the following characteristics of a font. For more information, see "Specifying a Font with PCL Commands" on page 363.

Table D-3 PCL font selection commands

Description	Command	Replace # with
Orientation	\027&l#O	0 for portrait, 1 for landscape
Symbol set	\027(#	Symbol set ID code, for example, 0U for USASCII symbol set, 8U for HP Roman-8 symbol set
Spacing	\027(s#P	0 for fixed, 1 for proportional
Pitch	\027(s#H	Number of characters per inch
Point size	\027(s#V	Height of characters in points
Style	\027(s#S	0 for upright, 1 for italic
Stroke weight	\027(s#B	-3 for light, 0 for medium, 3 for bold
Typeface	\027(s#T	Typeface code from printer manual or font cartridge. Common typefaces include:

Typeface	Code
Courier	3
Helv	4
Letter Gothic	6
Line Printer	0
Prestige	8
Tms Rmn	5

Printing a Worksheet with PCL Commands

This section explains what you need to specify to print the maximum amount of information on one printed page, given such factors as orientation (portrait or landscape), paper size (letter or legal), lines printed per inch (6 or 8), and pitch (for example, 10, 12, or 16.66 characters per inch). Table D-4 gives settings for portrait

printing and Table D-5 for landscape printing. The tables also indicate which pitches and orientations are available via the internal fonts on the LaserJet printers.

If the pitch and orientation are not available internally on your printer, you'll need to use a font cartridge or soft font that offers the pitch in the orientation you want. (On the LaserJet IID, IIP, IIID, IIIP, IIISi, and 2000 printers, all available fonts can be printed in both orientations.) Also, depending on which fonts are currently available on your LaserJet printer (internal, soft, or cartridge), you may have to add an extra command to the setup strings given in Tables D-4 and D-5 to obtain the exact typeface, style, and so on, that you want. (For more information, see "Specifying a Font with PCL Commands" on page 363.)

If you want to feed paper manually, you'll need to add the \Ø27&l2H sequence to the setup string shown in the tables below. For the correct placement of this escape sequence in your setup string, refer to Table D-2.

To obtain the results listed in Tables D-4 and D-5, in 1-2-3 you must set the left, top, and bottom margins to Ø (zero) and the right margin to the setting shown in the tables. You must also enter the correct setup string. For page lengths greater than 100, select /Print Printer Options Other Unformatted. Proceed as follows:

1. Select /Print Printer Options Margins None.

   This command automatically sets the left, top, and bottom margins to Ø so you need to change only the right margin setting.

   To make it easier for you to continue changing settings, 1-2-3 keeps the Print Printer Options menu on the screen.

2. Select Margins Right and enter the number shown in Table D-4 or D-5 for the effect you want.

   For example, if you want portrait orientation with letter size paper, six lines per inch, and compressed (16.66) pitch, your right margin setting should be 132.

3. Select Pg-Length and enter the page length shown in Table D-4 or D-5 for the effect you want.

   For example, if you want portrait orientation with legal size paper, eight lines per inch, and 12-pitch print, the page length setting should be 100.

   NOTE To avoid a variety of problems, do not adjust the page length setting except as specified in Tables D-4 and D-5.

4. Select Setup and enter the setup string shown in Table D-4 or D-5 for the effect you desire.

   For example, if you want landscape printing, eight lines per inch, and 10-pitch print, you would enter \Ø278&l1O\Ø27l8D.

   NOTE Setup strings have a maximum length of 39 characters, and several of the setup strings in Tables D-4 and D-5 are abbreviated. For the rules, see "Shortening Setup Strings" on page 358.

5. For page lengths greater than 100, select Other Unformatted.

Table D-4 Settings for portrait printing

Paper size/ lines per inch	Pitch	Available via internal font? LJ Plus	LJ II	Page length	Right margin	Setup string
Letter size/6	10	Yes	Yes	60	80	\027&l6D
	12	No	No	60	96	\027(s0p12H
	16.66	Yes	Yes	60	132	\027(s16.66H
Letter size/8	10	Yes	Yes	80	80	\027&l8D
	12	No	No	80	96	\027&l8D\027(s12H
	16.66	Yes	Yes	80	132	\027&l8D \027(s16.66H
Legal size/6	10	Yes	Yes	78	80	\027&l84P
	12	No	No	78	96	\027&l84P\027(s0p12H
	16.66	Yes	Yes	78	132	\027&l84P\027(s16.66H
Legal size/8	10	Yes	Yes	100	80	\027&l84p8D
	12	No	No	100	96	\027&l84p8D\027(s0p12H
	16.66	Yes	Yes	100	132	\027&l84p8D \027(s16.66H

Table D-5 Settings for landscape printing

Paper size/ lines per inch	Pitch	Available via internal font? LJ Plus	LJ II	Page Length	Right margin	Setup string
Letter size/6	10	Yes	Yes	45	106	\027&l1O
	12	No	No	45	127	\027&l1O \027(s0p12H
	16.66	No	Yes	45	176	\027&l1O\027(s16.66H
Letter size/8	10	Yes	Yes	60	106	\027&l1o8D
	12	No	No	60	127	\027&l1o8D \027(s0p12H
	16.66	No	Yes	60	176	\027&l1o8D \027(s16.66H
Legal size/6	10	Yes	Yes	45	136	\027&l84p1O
	12	No	No	45	163	\027&l84p1O \027(s0p12H
	16.66	No	Yes	45	226	\027&l84p1O \027(s16.66H
Legal size/8	10	Yes	Yes	60	136	\027&l84p1o8D
	12	No	No	60	163	\027&l84p1o8D \027(s0p12H
	16.66	No	Yes	60	226	\027&l84p1o8D \027(s16.66H

TIPS

- If you want to include a header or footer and/or change margin settings, first make sure your print settings allow page breaks, headers, and footers (select /Print Printer Options Other Formatted). If you want to print six lines per inch, the maximum number of lines you can fit on a page is 60 because LaserJet printers reserve 1/2 inch at the top and bottom for a margin. If you specify a header and footer, deduct another six lines (three for the header and three for the footer), which gives you 54 lines for printing from the print range you specified. If you then specify a top and bottom margin of five, you need to deduct another 10 lines to arrive at a total of 44 lines that will be printed on your page.
- To get the most lines on a formatted page, set the top and bottom margins to zero.

Specifying a Font with PCL Commands

The font that you select to use on your LaserJet printer determines the appearance of the data in your printed worksheet. As shown in Table D-3, a different command manages each characteristic of a font (for example, point size, pitch, stroke weight). (If you are unfamiliar with some of these terms, see "Before You Print" on page 355.) You will need to combine these commands in your setup string to describe the font you want to use.

When you construct a setup string, be sure to specify the font commands in the order shown in Table D-3.

If, for example, you want to select a font from HP Font Cartridge G and want a font with landscape orientation, a USASCII symbol set, fixed spacing, compressed (16.66) pitch, 7 points, upright style, medium weight, and Prestige typeface, you would specify the commands as listed (in the correct order) in Table D-6.

Table D-6 Escape sequence order for font commands

Characteristic	Your choice	Escape sequence
Orientation	Landscape	\027&l1O
Symbol set	USASCII	\027(0U
Spacing	Fixed	\027(s0P
Pitch	Compressed (16.66)	\027(s16.66H
Point size	7	\027(s7V
Style	Upright	\027(s0S
Stroke weight	Medium	\027(s0B
Typeface	Prestige	\027(s8T

As with all escape sequences, you simply string the pieces together to form a setup string, keeping them in the proper sequence with no spaces between characters:

```
\027&l1O\027(0U\027(s0P\027(s16.66H\027(s7V\027(s0S\027(s0B\027(s8T
```

This is a lengthy setup string and, in fact, exceeds the 39-character limit for strings you enter with /Print Printer Options Setup. See "Shortening Setup Strings" on page 358.

You do not need to specify every characteristic of a font in each setup string. For example, if you have three 12-pitch fonts available and want to select the only one that prints 12-pitch italic type in landscape orientation, your setup string must contain enough information for the LaserJet printer to select that font. You will want to use the escape sequences for landscape, 12-pitch, and italic style, and enter them in the correct sequence in the setup string.

If you do not get the font you want, make sure you have sent enough information about the font to the LaserJet printer and double-check the order of the sequences. Also, if you fail to specify a sequence for a characteristic of the font, the printer may assume you want to use what was last specified. For example, if the last document was printed in a 10-pitch font and you don't specify a different pitch in your setup string, the printer may assume you still want a 10-pitch font. In addition, make sure that the font you are trying to use is available in the orientation you want. For example, the Q cartridge has a Letter Gothic medium 12-pitch font available in portrait but not landscape orientation.

If you want to add other escape sequences to your font specification setup string (perhaps to print multiple copies), make sure you add them in the correct places, as shown in Tables D-1 through D-3.

The default font on LaserJet printers changes, depending on the combination of fonts currently available. The LaserJet printers do, however, follow this priority scheme for default fonts:

1. The font you specify with a setup string, which will be in effect until you reset the printer with the reset sequence, `\027E`, or until you turn off the printer. (On all models except the original LaserJet classic printer, you can also use the Reset key on the control panel.)
2. The default font contained in an installed font cartridge (which is noted with an * (asterisk) on the font cartridge).
3. On a LaserJet Series II, IID, 2000, or newer model LaserJet printers, the font you specify by using the control panel's print menu.
4. The internal factory-set default font: portrait orientation, Roman-8 symbol set, 10-pitch, 12-point, upright style, medium weight, and Courier typeface.

Solving HP LaserJet Printer Problems

This section provides answers to commonly asked questions about using 1-2-3 with LaserJet printers.

Problem: The first page of my worksheet prints correctly, but subsequent pages "creep down."

Solution: The number of lines of text (as defined by the page length setting) must not exceed the printer's text length (as defined by the printer's control panel FORM item). Use /Print Printer Options Pg-Length to specify the correct page length, as provided in Tables D-4 and D-5. If your worksheet has no headers, footers, or borders, you can select /Print Printer Options Other Unformatted.

Problem: How can I quickly print several copies of a worksheet?

Solution: Select /Print Printer Options Setup and enter the setup string \027&l#X where # is the number of copies you want to print. For example, to print five copies, enter \027&l5X.

Problem: How can I print a very large worksheet?

Solution: On a LaserJet Plus printer, use a font cartridge that supports compressed print in landscape orientation. For example, HP Font Cartridge G offers a compressed Prestige font in landscape orientation. This font, used with legal size paper and a setup string to print 8 lines per inch, fits 60 rows of 226 characters each onto one page.

With 1-2-3, first set the left, top, and bottom margins to Ø, and the right margin to 226. Select /Print Printer Options Setup and enter the following setup string:

\027(ØU\027&l84p1o2h8D\027(s16.66H

This setup string assumes that you'll manually feed the sheet of paper into the printer. The setup string also works with LaserJet Series II, IID, and 2000 printers, which have an internal font that prints in condensed landscape mode.

NOTE If you are not feeding paper manually, omit the 2h command from the setup string.

Unless you want headers, footers, or borders, select /Print Printer Options Other Unformatted after entering the setup string and then print the worksheet.

Problem: My pages eject themselves in the middle of a print job.

Solution: This problem occurs if you use embedded setup strings in a worksheet to turn on and off print attributes such as boldface, underlining, and so on, and begin each setup string with the master reset sequence \027E. This sequence not only clears all previous settings but also ejects the page from the printer. Avoid using this

sequence, to prevent page ejections. Refer to your printer manual for the escape sequences to turn off certain attributes so you can avoid using the master reset sequence.

Problem: How can I use a macro to print out a series of ranges, one to a page?

Solution: If your worksheet contains three named ranges: RANGE1, RANGE2, and RANGE3, for example, you can use the following macro to print them out, one to a page:

```
/pprRANGE1~agp
{WAIT @NOW+@TIME(0,0,2)}
rRANGE2~agp
{WAIT @NOW+@TIME(0,0,2)}
rRANGE2~agpq
```

This macro contains two essential {WAIT} commands to give the printer a two-second pause between printing ranges. If you omit the {WAIT} command, the print buffer could overflow and cause the LaserJet printer to display error code 22. If you use this macro and still receive this error code, increase the wait time.

Problem: When trying to print on a LaserJet Series II printer with compressed print in landscape orientation, I get double spacing on the printout.

Solution: Double spacing occurs if the printer FORM setting on the LaserJet Series II printer's menu is set to 45 and the font source and font number depict a portrait font. To print in compressed print in landscape mode, first make sure the FORM setting on the printer is set to 60 and the font source and font number specify a portrait font. Then set the page length with 1-2-3 to 45, enter the setup string \Ø27&l1O\Ø27(s16.66H, and make sure /Worksheet Global Default Printer AutoLF is set to No.

Problem: When I print, I select Align before Go and then select Page, but the form feed light on the LaserJet printer stays on.

Solution: Make sure that the form length is set correctly on the printer. Typically, it should be 60.

Problem: Is there an easy way to calculate the correct page length for 1-2-3 when printing in different modes on the LaserJet printers?

Solution: To calculate the correct page length in 1-2-3, multiply the length of the paper by the number of lines printed per inch. Remember that the LaserJet printers provide a top and bottom default margin of 1/2 inch, thus reducing the measured length of the paper by one inch.

Table D-7 lists page length settings based on 8 1/2 by 11-inch paper, and 1-2-3 top and bottom margins of Ø (zero). This leaves 10 inches for portrait orientation and 7 1/2 inches for landscape.

Table D-7 Sample 1-2-3 page length settings

Orientation	Lines per inch	Page length
Portrait	6	60
Portrait	8	80
Landscape	6	45
Landscape	8	60

Problem: I sometimes have trouble printing characters in the Lotus International Character Set (LICS) on my LaserJet printer.

Solution: The LaserJet printers' Roman-8 character set supports many, but not all, of the characters in the LICS table. Table D-8 shows those LICS characters *not* supported by LaserJet printers. When you try to produce one of these characters, you will get a fallback presentation. The intention of the fallback presentation is to represent the LICS character as closely as possible.

Table D-8 LICS characters not supported on HP LaserJet printers

LICS code	Description
149	i without dot, lowercase
164	Open double quotes, low
166	Peseta sign
169	Copyright sign
172	Delta
173	Pi
174	Greater-than-or-equals sign
175	Division sign
178	2, superscript
179	3, superscript
180	Close double quotes, low
181	Micron symbol or mu
182	Paragraph sign
183	Middle dot
184	Trademark sign
185	1, superscript
190	Less-than-or-equals sign
215	OE diphthong, uppercase
247	oe diphthong, lowercase

Appendix E
Using the BPrint Utility

This appendix describes how to use the BPrint utility. BPrint is a Terminate-and-Stay-Resident (TSR) program that is supplied with 1-2-3 Release 2.3 to provide background printing.

What Is Background Printing?

When you send a file to the printer, 1-2-3 begins printing, but lets you continue to work in the worksheet or create additional print jobs without waiting for your file to finish printing. This is called **background printing**.

1-2-3 creates an encoded file and then prints it in the background in the following situations:

- You select /Print Background from the 1-2-3 menu, specify a file and print settings, select Go, and then select Quit.
- You select :Print Background from the Wysiwyg menu, specify a file name and print settings, and then select Go.
- You type bprint followed by the name of the file to print at your operating system prompt. (You can issue these commands by using /System to temporarily suspend 1-2-3, or by using /Quit to leave 1-2-3.)

When you use background printing, you can resume work with 1-2-3 immediately, or even leave 1-2-3 without interrupting your print job.

NOTE Background printing saves time if you are printing jobs that are large (more than 8KB).

Starting BPrint

You start BPrint from the operating system prompt before you start 1-2-3. If you have already started 1-2-3, use /Quit to end 1-2-3 and then start BPrint. To start BPrint and attach to the default port (parallel port 1), type bprint at the operating system prompt. (To attach BPrint to another port, see "BPrint Command Arguments" beginning on page 370.)

When you are ready to start BPrint, follow these guidelines:

- Make sure that BPrint is the last TSR that you load before starting 1-2-3.

- Make sure that you start BPrint after you load your network software. If you are loading BPrint from a network, your personal directory must be the current directory when you type BPrint. BPrint prints only to the local printer attached to your personal computer; you cannot use BPrint to print to a shared network printer.
- If you have already loaded PRINT.COM, you will not be able to start BPrint.
- Once you start BPrint, you cannot detach it from one port and attach it to another port.
- BPRINT.EXE cannot be in a read-only directory.
- If you are using BPrint to print to a serial printer, you must first use the DOS MODE command to initialize the serial port. For example, to initialize serial port 1 at 9600 baud, you type mode com1:96,n,8,1,p and press ENTER. The port and baud rate (com1:96) will vary; the other numbers will not. You must know the correct baud rate for your printer.
- To run BPrint with Microsoft® Windows™, use a program information file (.PIF) to run a batch file that starts BPrint. The same file must also start 1-2-3. You can start BPrint either before or after you start Windows. For information about creating program files, see your Microsoft Windows documentation.

If there is a problem with your printer (for example, your printer is not online or a printer cable is disconnected), BPrint does not start; it displays an error message. You must correct the problem and start BPrint again. After you start BPrint, however, it does not report any printer problems.

Issuing BPrint Commands

Printing files with BPrint from the DOS command line provides options that are not available when you print from 1-2-3. For example, if you select /System and type bprint, you can check the status of the **print queue** — a list showing the name of the file that is currently printing, the names of all other files that are waiting to be printed, and the port to which BPrint is currently attached. You can check the status of the print queue, pause or resume printing, or cancel a specific print job. If you use /Quit to leave 1-2-3, BPrint continues to print the files in your print queue.

BPrint Command Arguments

Before you issue a BPrint command, you must type bprint at the operating system prompt. If the current directory is not 1-2-3 and 1-2-3 is not in your path, you must precede bprint with appropriate directory information (for example, c:\123r23\bprint).

You can enter one or more arguments following bprint, using the format shown below. However, only one file operation is performed by each BPrint command. You can enter arguments in any order. Separate arguments with spaces.

[*path*]BPrint [*argument1 argument2 argumentn*]

Argument	What it does
filename	Sends *filename* to the printer. *filename* is a file with the extension .ENC or a text file. (After printing a text file, you will need to manually position the paper in your printer to the top of the page.)
–p=*number*	Directs printing to a parallel port. *number* is the value 1 or 2. The default printer port is parallel port 1.
–s=*number*	Directs printing to a serial port. *number* is the value 1 or 2.
–pa	Pauses background printing.
–r	Continues printing 1-2-3 print jobs that were temporarily suspended with –pa.
–c *filename*	Cancels the print job you specify and removes it from the print queue. *filename* must include a path and cannot be the file that is currently printing.
–t	Stops the current 1-2-3 print job and cancels any other 1-2-3 print jobs that are waiting to be printed. (If your printer has a print buffer or you are using a print spooler, your printer may continue to print until no data remains in the buffer or spooler.)

Keep the following information in mind when you use BPrint commands:

- If you omit the –p or –s argument, BPrint attaches to parallel port 1.
- If you have more than ten files in your print queue, BPrint creates a temporary file named BPRINT.Q to monitor the print queue.
- The file that is currently printing is read-only.

Examples

The following command starts BPrint, directs printing to serial port 2, and then sends the file SALES.ENC to the printer.

bprint –s=2 sales.enc

The following command cancels print job EXPENSES.ENC that is waiting to print.

bprint –c c:\april\expenses.enc

The following macro illustrates that you can issue BPrint commands after you've started 1-2-3. The macro sends several files to the printer.

{SYSTEM "bprint report.enc"}
{SYSTEM "bprint c:\newhires\employee.enc"}
{SYSTEM "bprint taxes.enc"}

Appendix F
Wysiwyg Symbol Character Table

Wysiwyg lets you display and print many symbols that are not on your keyboard. The following table lists the code numbers and the characters they produce.

To produce a symbol, use :Format Font to format the cell in which you want the symbol to appear, and specify the Xsymbol typeface. Then find the code number that corresponds to the symbol in the following table, and enter the code number as an argument for @CHAR in the cell. For example, to produce a ♥ (heart), you would find the corresponding code number, 42, and enter @CHAR(42) in a cell formatted in Xsymbol typeface.

If you enter @CHAR and a code number in a cell formatted in an alphanumeric typeface, such as Swiss or Courier, the result is an ASCII character.

NOTE While most alphanumeric characters require only one byte, some symbols require more than one byte.

Code number	Xsymbol typeface	Alphanumeric typeface	Code number	Xsymbol typeface	Alphanumeric typeface
32			49	⑥	1
33	¶	!	50	⑦	2
34	❣	"	51	⑧	3
35	❣	#	52	⑨	4
36	❤	$	53	⑩	5
37	❥	%	54	❶	6
38	❦	&	55	❷	7
39	❧	'	56	❸	8
40	♣	(	57	❹	9
41	♦	)	58	❺	:
42	♥	*	59	❻	;
43	♠	+	60	❼	<
44	①	,	61	❽	=
45	②	–	62	❾	>
46	③	.	63	❿	?
47	④	/	64	①	@
48	⑤	0	65	②	A

(continued)

Code number	Xsymbol typeface	Alphanumeric typeface	Code number	Xsymbol typeface	Alphanumeric typeface
66	③	B	98		b
67	④	C	99		c
68	⑤	D	100		d
69	⑥	E	101		e
70	⑦	F	102		f
71	⑧	G	103		g
72	⑨	H	104		h
73	⑩	I	105		i
74	❶	J	106		j
75	❷	K	107		k
76	❸	L	108		l
77	❹	M	109		m
78	❺	N	110		n
79	❻	O	111		o
80	❼	P	112		p
81	❽	Q	113		q
82	❾	R	114		r
83	❿	S	115		s
84	→	T	116		t
85	→	U	117		u
86	↔	V	118		v
87	↕	W	119		w
88	↘	X	120		x
89	→	Y	121		y
90	↗	Z	122		z
91	→	[	123		{
92	→	\	124		|
93	→	]	125		}
94	→	^	126		~
95		_	127		
96		'			
97		a			

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