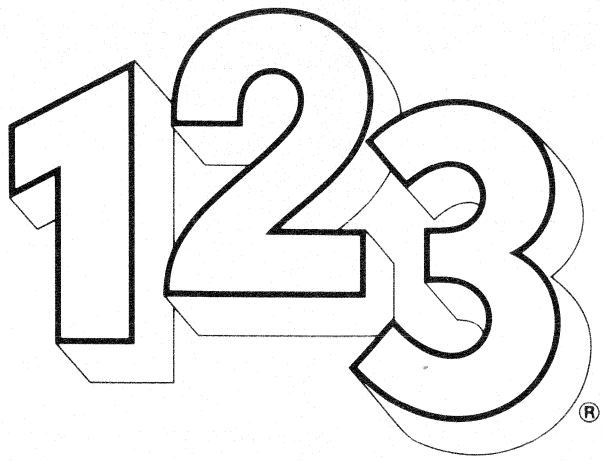

Reference Manual

Release 2

Lotus®

Second Printing

Preface

Before You Begin

Before using the *1-2-3® Reference Manual*, read *Getting Started* to learn how to use the Install program and start *1-2-3*. Then look at *A View of 1-2-3*, the disk that demonstrates *1-2-3*'s features.

Who Should Read This Book

The *Reference Manual* is designed for users who are familiar with *1-2-3* or similar software programs. The *Reference Manual* contains detailed information about all the *1-2-3* features.

Organization of the *Reference Manual*

Read Chapter 1 of the *Reference Manual* first; it contains basic information that pertains to all the other chapters. The rest of the *Reference Manual* can be read in any order. Each chapter is independent of the others; for example, you don't need to read the chapter on macros to use an @function.

Chapter 1 — Teaches basic *1-2-3* skills such as moving around the worksheet, entering numbers and labels, and using the Help facility.

Chapter 2 — Describes *1-2-3* menus and all the *1-2-3* commands.

Chapter 3 — Covers macros, including all the macro keywords and advanced macro commands.

Chapter 4 — Describes the @functions, a set of built-in formulas that perform complex and repetitive calculations.

Chapter 5 — Covers printing graphs with the PrintGraph program.

The appendices include information about the Lotus International Character Set (LICS), the Translate Utility, and a glossary.

Typographical Conventions

In the *Reference Manual*, the names of keys appear in small caps (for example, ESCAPE or RETURN). To find out which keys on your computer keyboard are equivalent to the keys named in this manual, refer to the Keyboard Guide included in the *1-2-3* documentation package. Be sure the Keyboard Guide is the correct one for your computer.

Numbers and labels that you type appear in a different type style than the rest of the text (for example JUNE SALES and 4504).

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Chapter 1 Basic Skills

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Chapter 1

Basic Skills

The Worksheet Screen

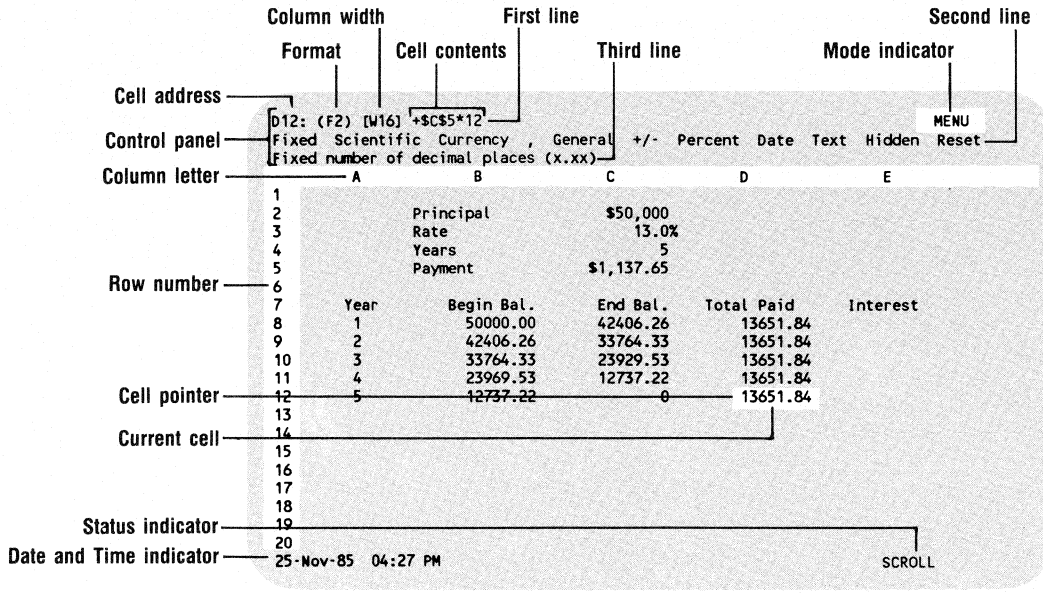

Figure 1-1

Worksheet is a grid made up of horizontal rows and vertical columns. The worksheet contains 8192 rows and 256 columns. Each intersection of a row and a column forms a cell, in which you can store data.

Row number identifies a horizontal row in the worksheet. It appears on the left border of the worksheet.

Column letter identifies a vertical column in the worksheet. It appears on the top border of the worksheet. Columns are lettered A-Z, then AA-AZ, then BA-BZ, and so on to IV.

Cell is a unit of the worksheet that can store data. Each cell has a unique address that consists of its column letter and row number. For example, B14 identifies the cell in column B, row 14.

Cell pointer is a rectangular highlight that appears on one cell in the worksheet and identifies it as the current cell. You can move the cell pointer to any cell in the worksheet.

Current cell contains the cell pointer, which indicates that your next entry or procedure affects this cell. For example, typing an entry or executing certain commands affects the current cell.

Control panel is located above the worksheet. It contains three lines of information about the current cell, the mode or current state of 1-2-3®, and commands (actions you tell 1-2-3 to perform).

First line of control panel contains information about the current cell, including the cell address, cell contents, column width, format, and protection status. It also contains the mode indicator. The cell address and contents always appear on the control panel; the other settings appear only when you establish them. The format setting determines the way in which an entry appears in the cell. The protection status tells you if you can currently change the cell contents.

Second line of control panel displays the current entry when you are creating or editing the entry. It displays the Main menu, a list of commands that appears when you press slash (/) in READY mode. It also displays a prompt, or request for information that 1-2-3 needs to complete a command you have selected.

Third line of control panel displays either a submenu or a one-line description of the command currently highlighted on the menu.

Mode indicator tells you in what state or condition 1-2-3 is currently operating. It often changes when you begin an action, such as executing a command or making an entry. See Table 1-8 in this chapter.

Status indicator describes a particular program condition or key condition. For example, the CALC indicator tells you that the worksheet formulas need to be recalculated. See Table 1-9 in this chapter.

Date and Time indicator tells you the current date and time. You can change or turn off the display of this indicator using the /Worksheet Global Default command. See Chapter 2.

Moving Around in the Worksheet

The cell pointer highlights the current cell in the worksheet. You move around in the worksheet by moving the cell pointer with the pointer-movement keys.

Pointer-Movement Keys

You can use the arrow keys (UP, DOWN, LEFT, RIGHT) to move one cell at a time in the worksheet. You can move one screen at a time, using PAGE UP, PAGE DOWN, BIG RIGHT, and BIG LEFT. You can move many screens at a time using GOTO, HOME, or using END in combination with other pointer-movement keys.

Many of the pointer-movement keys move the menu pointer among menu commands, in addition to moving the cell pointer in the worksheet. Table 1-1 describes the effect of each key in several 1-2-3 modes.

Key	READY and POINT modes	MENU and HELP modes
LEFT	Moves left one cell	Moves left one item
RIGHT	Moves right one cell	Moves right one item
UP	Moves up one cell	Moves up one item in HELP mode; beeps in MENU mode
DOWN	Moves down one cell	Moves down one item in HELP mode; beeps in MENU mode
BIG LEFT	Moves left one screen	
BIG RIGHT	Moves right one screen	
PAGE UP	Moves up one screen	
PAGE DOWN	Moves down one screen	
HOME	Moves to upper left corner	Moves to first item
END	(Must be used with another pointer-movement key)	Moves to last item

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Key	READY and POINT modes	MENU and HELP modes
END HOME	Moves to lower right corner of active area: area of worksheet where you've done work	
END UP	Moves up to filled cell at next intersection of blank and filled cell	
END DOWN	Moves down to filled cell at next intersection of blank and filled cell	
END RIGHT	Moves right to filled cell at next intersection of blank and filled cell	
END LEFT	Moves left to filled cell at next intersection of blank and filled cell	

Table 1-1

Data Entry and Editing

You can enter any kind of data in a cell by typing. You can edit an entry as you type it, or return to a completed entry and revise it.

Typing Entries

The simplest method of entering data in a cell is typing. Move the cell pointer to a cell, type the entry, and press RETURN. The entry appears in the cell after you press RETURN.

Each character that you type appears on the second line of the control panel. A cursor, or underscore character, indicates where the next character you type will appear.

To complete an entry, you can press RETURN or one of the pointer-movement keys. When you press a pointer-movement key, 1-2-3 completes the entry *and* moves the cell pointer to another cell in the direction of the pointer-movement key.

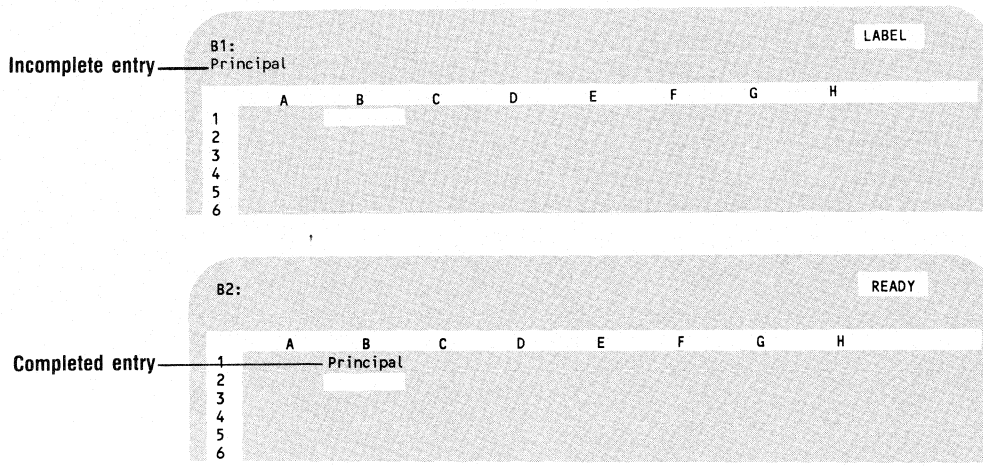

Figure 1-2

When you press RETURN or a pointer-movement key to complete an entry, several things happen:

- 1-2-3 checks for errors in the entry. If it finds an error, 1-2-3 beeps, places the cursor at the problem location, and switches to EDIT mode.
- If 1-2-3 finds no error, it stores the entry in the current cell. The previous entry, if any, disappears from the cell. There is no way to recover the old entry once you complete the new entry.
- The entry disappears from the second line of the control panel. After you press RETURN, the entry appears on the first line of the control panel. After you press a pointer-movement key, the entry disappears entirely from the control panel.
- If the Recalculation setting is Automatic, 1-2-3 recalculates every formula in the worksheet. See the /Worksheet Global Recalculation command in Chapter 2.
- 1-2-3 returns to READY mode.

Editing Entries

You can edit a cell entry as you type it, or you can edit a completed entry. To edit an entry, you must be in EDIT mode. 1-2-3 changes to EDIT mode automatically if you try to complete an entry that contains an error.

Follow these steps to edit an entry:

1. To edit a completed entry, move the cell pointer to the cell that contains the entry you want to revise. To edit an entry you are currently typing, start with step 2.
2. Press EDIT. The mode indicator in the right corner of the screen changes to EDIT.

   Use the pointer-movement keys to move the cursor around in the entry.
3. Insert or delete characters at the cursor location.
4. Press RETURN to complete the entry. The cursor can be anywhere in the entry when you press RETURN; it does not have to be at the end.

Note: There is a difference between editing and erasing an entry. To erase an entry, use the /Range Erase command described in Chapter 2.

Table 1-2 lists the keys to use for editing cell entries.

Key	When typing	When revising in EDIT mode
EDIT	Changes to EDIT mode	Switches between EDIT mode and VALUE or LABEL mode
RETURN	Completes entry	Completes entry
BACKSPACE	Erases preceding character	Erases preceding character
ESCAPE	Cancels all characters on the second line of the control panel	Cancels all characters on the second line of the control panel
DELETE		Deletes character at cursor
INSERT		Switches between inserting the text by moving existing text to the right, and replacing existing text

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Key	When typing	When revising in EDIT mode
HOME	Completes entry; moves to upper left corner cell of worksheet	Moves to first character
LEFT	Completes entry; moves left one cell	Moves left one character
RIGHT	Completes entry; moves right one cell	Moves right one character
UP	Completes entry; moves up one cell	Completes entry; moves up one cell
DOWN	Completes entry; moves down one cell	Completes entry; moves down one cell
BIG RIGHT	Completes entry; moves right one screen	Moves right five characters
BIG LEFT	Completes entry; moves left one screen	Moves left five characters
PAGE UP	Completes entry; moves up one screen	Completes entry; moves up one screen
PAGE DOWN	Completes entry; moves down one screen	Completes entry; moves down one screen
END	Completes entry; turns END indicator on if it was off, and off if it was on	Moves to last character

Table 1-2

Types of Data

A cell accepts three types of data: numbers, labels, and formulas. When you type the first character of an entry, the mode indicator changes from READY to either VALUE or LABEL, to show which type of data you are entering. When you complete an entry, the mode indicator changes back to READY.

Numbers

A number entry must conform to these rules:

- Must begin with one of the following characters:

  0 1 2 3 4 5 6 7 8 9 . + - $ (

- Can contain up to 240 characters.
- Must be between 10^-99 and 10^99, inclusive (the symbol ^ represents exponentiation). However, 1-2-3 can store a number as a result of calculations, ranging from 10^-308 to 10^308.
- Cannot include spaces or commas. You can change the cell format later to include commas. See the /Range Format command in Chapter 2.
- Can have no more than one decimal point.
- Can begin with a currency symbol ($), or other nonalphabetic currency character. See Appendix 2.
- Can end with % to indicate a percentage.
- Can be entered in scientific format, as shown in the figure below:

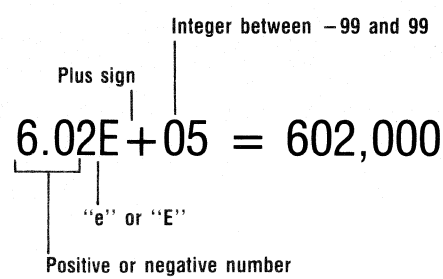


Figure 1-3

When you enter the first character of a number, the mode indicator on the top right of the screen changes from READY to VALUE. When you complete the number entry, the mode indicator changes back to READY.

Alignment of a Number

A number aligns on the right edge of a cell. You cannot change the alignment of a number entry.

Format of a Number

You can change the format, or appearance, of a number entry in a cell without changing the way 1-2-3 stores the entry. For example, you can format the entry 65.3 so that it appears as $65.30, 65.3%, or 65. See the /Range Format command in Chapter 2.

Here are some examples of number entries in different formats:

Number entry	Format
-73	General
$850.32	Currency, 2 decimal places
7254.895	Fixed, 3 decimal places
55.2%	Percent, 1 decimal place

Table 1-3

Long Numbers

A number may have too many characters to fit in a cell. If the format of the cell is General, 1-2-3 displays the number in scientific notation.

If the format of the cell that contains the number is not General, 1-2-3 displays asterisks (*****) in the cell instead of the entry. This does not affect the way 1-2-3 stores the entry. When you make the column wide enough, the entire number appears in the worksheet.

Decimal Places

1-2-3 can store a number with up to 15 decimal places. The control panel, however, displays a maximum of 9 decimal places. If you enter a number with 12 decimal places, for example, 1-2-3 calculates the entry using 12 decimal places, although you can see only 9 decimal place numbers on the control panel.

Labels

Any entry that 1-2-3 determines is not a number or a formula is a label. Often, label entries are descriptive text such as MAY SALES or Principal. A label can consist of any characters in the Lotus International Character Set (LICS). See Appendix 2 for a description of these characters.

A label must conform to these rules:

- Must begin with either a label-prefix character (see Table 1-4), or any character that does not indicate the start of a number or formula.
- Can contain up to 240 characters.
- Can contain number characters, as long as the first character is a label-prefix character.

When you enter the first character of a label, the mode indicator changes from READY to LABEL. When you complete a label entry, the mode indicator changes back to READY.

Label-Prefix Characters

Beginning an entry with a label-prefix character determines how the entry is aligned in the cell. There are three choices for labels: right-aligned, centered, or left-aligned. If you do not enter a label-prefix character, 1-2-3 automatically aligns the label entry according to the default worksheet alignment. Unless you change it, the default label alignment is left. See the /Worksheet Global Label-Prefix command in Chapter 2.

A label-prefix character does not appear in the worksheet cell; it appears on the first line of the control panel when the cell pointer is on the cell.

Table 1-4 describes label-prefix characters:

Prefix	Result
'	aligns label at left edge of cell
"	aligns label at right edge of cell
^	centers label between left and right edges of cell

Table 1-4

Here are some examples of label entries and their alignment:

Label	Alignment
'June Sales	left-aligned
"PRICE	right-aligned
^Total	centered

You can also type a backslash (\) as the first character of a label entry. Characters you type after the backslash repeat across the worksheet cell. For example, * creates a cell filled with asterisks.

Entering Numbers as Labels

To enter a label that starts with a digit or another character that 1-2-3 recognizes as a number character, use a label-prefix character. A label-prefix character identifies the entry as a label, no matter what characters the entry contains. For example, use a label-prefix character at the beginning of an entry such as 96 Lake St. If you omit the label-prefix character in such an entry, 1-2-3 beeps and changes to EDIT mode so that you can correct the entry.

Long Labels

If you enter a label entry that is too long to appear in one cell, the entry extends into the blank cells to the right. If the cells to the right are filled, 1-2-3 cuts off the entry at the right edge of the cell.

1-2-3 stores the whole entry even if it cannot display the whole entry in the worksheet cell. To make the complete entry appear in the worksheet cell, erase the cell entries to the right, or widen the column that contains the entry.

Formulas

A formula is an instruction to calculate with numbers or text. It can contain values, such as 8, operators, such as +, and cell addresses, such as A7. When you enter a cell address in a formula, 1-2-3 calculates with the value contained in that cell. A formula can also contain @functions, which are discussed later in this chapter. A formula results in a value.

A formula must conform to these rules:

- Must begin with one of the following characters:

  0 1 2 3 4 5 6 7 8 9 . + - (@ # $

- Can contain between 1 and 240 characters.
- Cannot contain spaces, except within a range name or a text string. See Chapter 4.
- Must begin with a plus sign (+) if the first part of the formula is a cell address.

When you enter the first character of a formula, the mode indicator on the top right of the screen changes from READY to VALUE. When you complete the formula, the mode indicator changes back to READY.

Viewing a Formula

When you complete a formula entry, its value, or result, appears in the worksheet cell. For example, after you enter the formula 25+75, the value 100 appears in the cell. To see the formula itself, move the cell pointer to the cell that contains the formula and look at the first line of the control panel.

You can change the format of the formula cell so that the formula rather than its value appears in the cell.

Ranges

A range is a rectangular block of cells. It can be a single cell, a row, a column, or several rows and columns. 1-2-3 prompts, or requests, you to enter a range during many commands. For example, 1-2-3 prompts you to enter a range when you use the /Move command to move a group of cells to another part of the worksheet. You can also enter a range in an @function. See Entering Formulas later in this chapter.

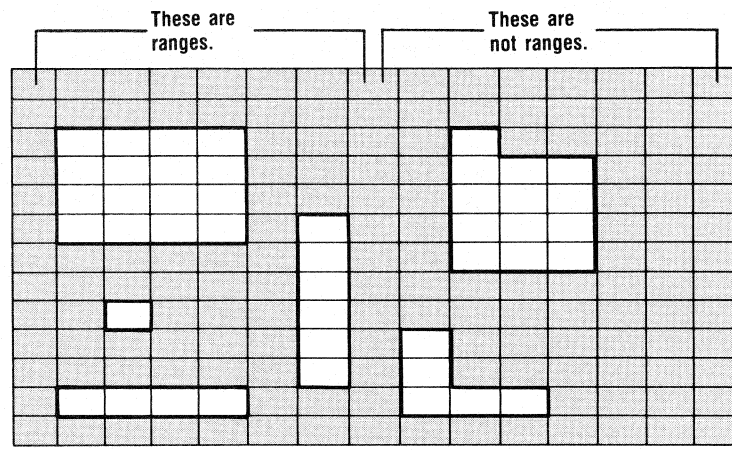


Figure 1-4

Entering Ranges

Ranges can be entered in three ways:

- Typing cell addresses
- Highlighting the range by expanding the cell pointer
- Using a range name that you create with the /Range Name Create command

Typing Cell Addresses

You enter a range address by typing the addresses of any two diagonally opposite corners of the range, separated by one or two periods. For example, G5..H29 specifies the range whose corner cells are G5 and H29. Do not use spaces in a range address.

When you are entering a range during a command, press RETURN to complete the range address. For example:

Enter range to format: A12..H19 RETURN

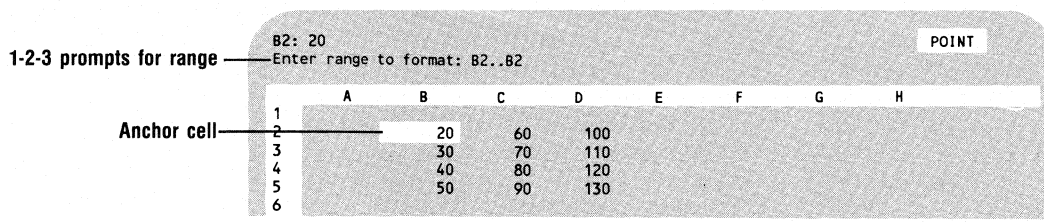
1-2-3 displays range addresses with the upper left and lower right corner cells, separated by two periods.

Highlighting a Range

To highlight a range during a command, move the cell pointer to a cell that is one corner of the intended range and press PERIOD. This cell is now the anchor cell. The cell that the pointer is currently on is the free cell, indicated by the cursor. The range address appears on the control panel: the anchor cell address and the free cell address, separated by two periods.

Use the pointer-movement keys to expand the range by moving the free cell to another cell in the worksheet. 1-2-3 highlights the entire area between the anchor cell and the free cell. To complete specifying the range address, press RETURN.

Note: Some commands, such as /Range Format, make the current cell the anchor cell automatically. If you want to make another cell the anchor cell, press ESCAPE, move the pointer to the desired cell, and press PERIOD.



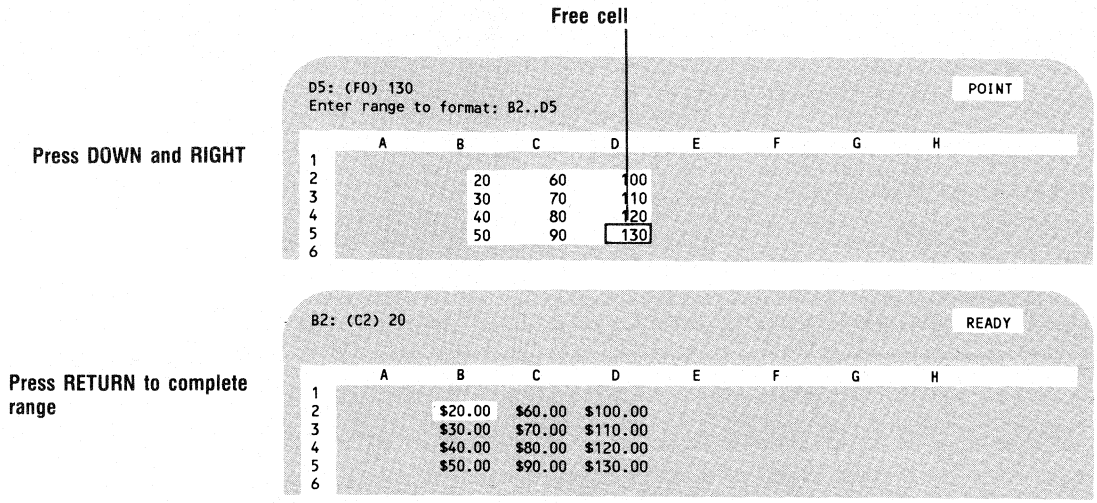


Figure 1-5

Table 1-5 shows the effect of three keys that you can use when you are highlighting a range.

Key	Unanchored range	Anchored range
PERIOD	Makes current cell the anchor cell; displays range address on control panel	Moves anchor cell and free cell to next corner cell
ESCAPE	Returns you to previous menu	Returns range highlight to anchor cell; removes anchor
BACKSPACE	Returns pointer to original location	Removes range highlight; returns pointer to current cell

Table 1-5

Naming a Range

To make a range easier to refer to, you can name it. For example, you can give the range A54..B98 the name SALES. After you name a range, you can use the range name instead of typing the range address or highlighting the range in a command or formula. A range name is often easier to remember than a range address, because the name can describe the contents of a range. For details on naming a range, see the /Range Name Create command in Chapter 2.

Defined Ranges

With most commands, 1-2-3 remembers the most recent range you indicated. This range is called a defined range. The next time you select the same command, 1-2-3 highlights the defined range and displays the upper left and lower right corner cell addresses on the control panel. You have three choices:

- Accept the current definition. Press RETURN to leave the range definition unchanged.
- Change the definition. Use the pointer-movement keys to change the highlighted range, and then press RETURN; or you can press BACKSPACE or ESCAPE and highlight a new range.
- Enter a new definition. Type a range address, type an existing range name, or press NAME and choose a range name from the menu.

Entering Formulas

1-2-3 allows you to enter three types of formulas:

- Arithmetic formulas, which calculate with numeric values using the arithmetic operators. For example, +H16/12 divides the number in cell H16 by 12. See Table 1-6.
- Text formulas, which calculate with labels using the text operator, the ampersand (&) character. For example, +B4&" Revenues" combines the label in B4 with the word Revenues.
- Logical formulas, which compare values in two or more cells using the logical operators. A logical formula is a statement that produces a value that is either 0 (meaning FALSE) or 1 (meaning TRUE). For example, +BALANCE>=500 returns the value 1 (TRUE) if the value in a cell named BALANCE is greater than or equal to 500. Otherwise, it returns the value 0 (FALSE).

Values

You can enter the following values in a formula:

- Numbers (450, -92, 7.1E12)
- Text strings enclosed in double quotation marks ("Meara O'Reilly", "TOTAL")
- Cell addresses of cells that contain numbers or labels (A12, FF23)
- Range names (JAN SALES)
- @functions (@SUM(A4..A8)). See Chapter 4.

Order of Operations

Table 1-6 shows the operators you can use in formulas and their precedence numbers. These numbers represent the order in which 1-2-3 performs operations in a formula. 1-2-3 performs an operation with a higher precedence number before an operation with a lower precedence number. Operations with the same precedence number are performed sequentially from left to right.

Operator	Operation	Precedence Number
^	Exponentiation	7
- +	Negative, Positive	6
* /	Multiplication, Division	5
+ -	Addition, Subtraction	4
= < >	Equal, Not equal	3
< >	Less than, Greater than	3
< =	Less than or equal	3
> =	Greater than or equal	3
#NOT#	Logical NOT	2
#AND# #OR#	Logical AND, Logical OR	1
&	String combination	1

Table 1-6

Overriding Precedence Numbers

You can override precedence numbers by putting parentheses around an operation. 1-2-3 performs operations in parentheses first. Within each set of parentheses, precedence numbers apply. You can include up to 32 sets of parentheses within parentheses in a formula.

The example below shows how 1-2-3 performs the operations in a formula according to precedence number:

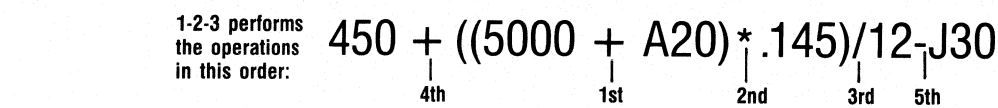


Figure 1-6

Relative, Absolute, and Mixed Cell Addresses

Cell addresses in formulas can be relative, absolute, or mixed. The difference between relative, absolute, and mixed cell addresses is important when you copy formulas.

Use a relative address to refer to the *position* of a cell in relation to the cell that contains the formula. A relative address is not a permanent reference to a particular cell. For example:

Cell address	Meaning in a formula in H11
G5	the cell one column left and six rows above this one

Use an absolute address to refer to the same cell, no matter where you copy the formula to. An absolute address is a permanent reference to a particular cell. For example:

Cell address	Meaning in a formula in H11
G5	cell G5

Use a mixed address to make a cell reference that is part relative and part absolute — either the column letter or the row number remains constant. For example:

Cell address	Meaning in a formula in H11
$G5	the cell in column G, 6 rows above this one
G$5	the cell one column left of this one, in row 5

Cell addresses are relative by default.

Indicating Absolute, Relative, and Mixed Ranges

When typing a cell or range address, specify an absolute or mixed address by typing the $ in front of the appropriate row number or column letter.

You can also indicate absolute, mixed, and relative addresses when pointing. After you point to a cell or range and *before* you type the next character, press ABS repeatedly. The range address on the control panel cycles through absolute, mixed, and relative:

Range address	Action
@sum(C50..C65	press ABS
@sum(C50..C65	press ABS
@sum(C$50..C$65	press ABS
@sum($C50..$C65	press ABS
@sum(C50..C65	

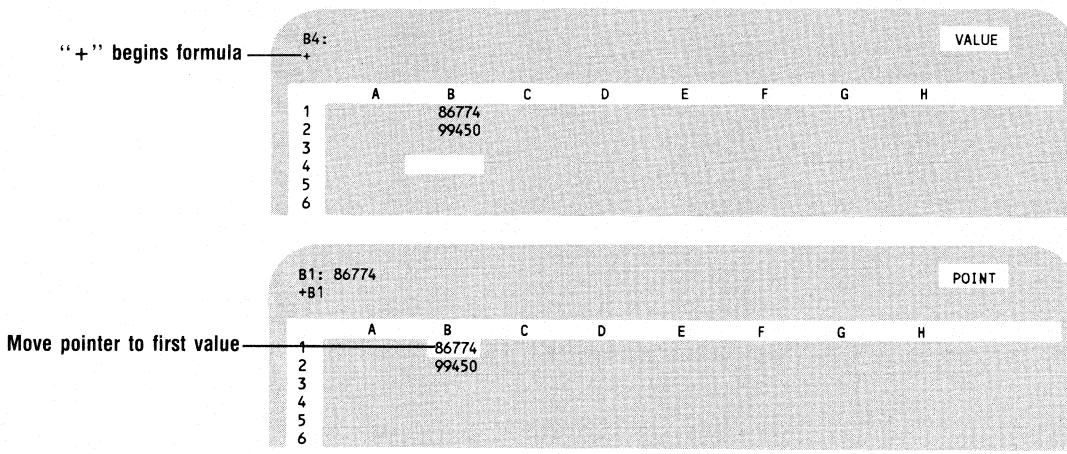
You can edit an existing cell or range address. Move the cell pointer to the cell that contains the formula and press EDIT. Move the cursor to the address you want to change, and press ABS repeatedly to cycle the address through relative, absolute, and mixed. You can also type the $ in front of the appropriate letter or number to make the address absolute or mixed. Delete all the dollar signs ($) to make the address relative.

Entering Addresses in Formulas

You can enter a cell or range address in a formula by typing it or by pointing to it. With the pointing method, you use the pointer-movement keys to move the cell pointer to the cell or range whose address you want to enter.

Pointing to a Cell

To point to a cell in a formula, first type an operator. See Table 1-6. Then move the cell pointer to the cell whose address you want to include. The cell address appears on the control panel. Type the next operator, or press RETURN to complete the formula. The pointer returns to the cell in which you are entering the formula.



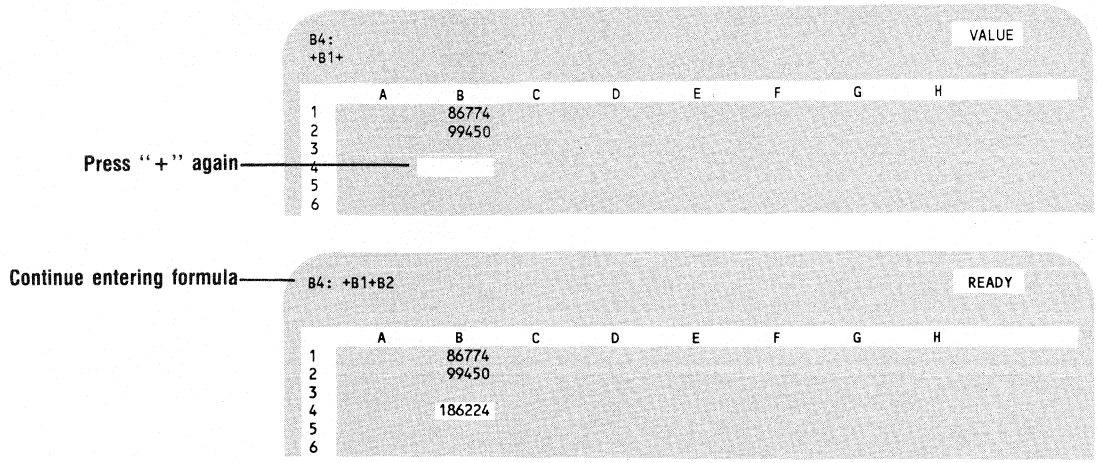


Figure 1-7

Pointing to a Range

The only kind of formula that contains a range is an @function. To point to a range in an @function, first type the @function name and a left parenthesis. Then move the cell pointer to a cell that is one corner of the intended range and press PERIOD. This cell is now the anchor cell. The cell that the cell pointer is currently on is the free cell, indicated by the cursor. The range address appears on the control panel: the anchor cell and the free cell, separated by two periods. Until you press a pointer-movement key, the anchor cell and the free cell are the same.

Use the pointer-movement keys to expand the range by moving the free cell to another cell in the worksheet. 1-2-3 highlights the entire area between the anchor cell and the free cell. Complete the range address by typing the next character in the @function.

Changing the Entry

When you point to a cell or range in a formula, two keys let you change the cell or range you have selected: ESCAPE and BACKSPACE. Table 1-7 describes the effect of these keys.

Key	Single Cell	Range
ESCAPE	Erases address; returns cell pointer to formula cell; mode indicator returns to VALUE	Erases free cell address; returns pointer to anchor cell, unanchored; mode indicator remains POINT
BACKSPACE	Returns cell pointer to formula cell; mode indicator remains POINT	Returns pointer to formula cell, unanchored; mode indicator remains POINT

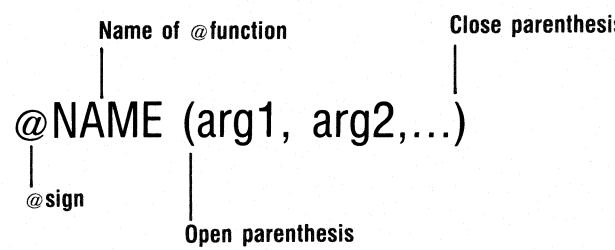
Table 1-7

@Functions

1-2-3 has a special set of built-in formulas called @functions. @functions are different from regular formulas because you supply the values, but not the operators.

Format of a Function

An @function contains specific elements: the @function name, and the values, which are enclosed in parentheses. Values in @functions are called arguments. An @function can have no arguments, one argument, or several arguments.



Many @functions allow you to perform common calculations more easily than standard formulas. For example, the @function @SUM(B4..B10) performs the same task as the formula +B4+B5+B6+B7+B8+B9+B10, but the @function is easier to enter.

Other @functions perform complex calculations efficiently. For example, the @function @PV calculates the present value of an annuity, which would otherwise require a complicated formula.

For details on all the @functions, see Chapter 4.

Indicators

An indicator is a highlighted word that appears in the upper right corner of the control panel or at the bottom of the screen. 1-2-3 has three kinds of indicators: mode, status, and date and time.

Mode Indicators

During a 1-2-3 session, a mode indicator is always visible on the upper right corner of the control panel. This indicator tells you in what state or condition 1-2-3 is currently operating.

Mode Indicator	Meaning
EDIT	An entry is being edited or needs to be edited
ERROR	An error has occurred; press ESCAPE or RETURN to clear it
FILES	A menu of files is being displayed
FIND	A /Data Query Find operation is in progress
FRMT	You are editing a format line during a /Data Parse operation
HELP	The Help facility has been invoked
LABEL	You are entering a label
MENU	A command menu is being displayed
NAMES	A menu of existing range names or graph names is being displayed
POINT	The cell pointer is pointing to a cell or range
READY	1-2-3 is ready for the next entry or command
STAT	Worksheet status information is being displayed
VALUE	You are entering a number or formula
WAIT	A command or process is being executed

Table 1-8

Status Indicators

Status indicators, which appear on the bottom right corner of the screen, indicate a particular program condition or key condition. For example, the CALC indicator tells you that the worksheet's formulas need to be recalculated, and the NUM indicator tells you that the NUM LOCK key has been pressed.

Status Indicator	Meaning
CALC	The worksheet's formulas need to be recalculated; press the CALC key
CAPS	The CAPS LOCK key is on
CIRC	The worksheet contains a formula that refers to itself (occurs only when the recalculation order is Natural)
CMD	1-2-3 is pausing during a macro
END	The END key is on
NUM	The NUM LOCK key is on
OVR	The INSERT key is on
SCROLL	The SCROLL LOCK key is on
STEP	Single-step mode has been turned on; once invoked, macros will be processed one step at a time
SST	A macro is currently being executed one step at a time

Table 1-9

Date and Time Indicator

1-2-3 displays the date and time in the lower left corner of the screen. You can change or turn off the display of this indicator using the /Worksheet Global Default command.

1-2-3 Keys

Table 1-10 contains a brief description of the standard 1-2-3 keys. To determine which keys on your computer's keyboard are equivalent to these keys, see the Keyboard Guide.

The pointer-movement keys are described in Table 1-1.

Key	Description
ABS	Cycles a cell address through relative, absolute, and mixed in POINT and EDIT modes
BACKSPACE	Erases character to left of cursor; if a range is selected, erases current range
BACKTAB	Moves cell pointer on screen to the left in READY mode; moves cursor five characters to the left in EDIT mode
BREAK	Cancels current procedure
CALC	Recalculates all worksheet formulas in READY mode; converts a formula into its current value in VALUE mode and EDIT mode
CAPS LOCK	Makes letter keys produce only upper-case letters; number and punctuation keys are not affected
COMPOSE	When used in combination with certain keys, makes international characters
CONTROL	When used in combination with certain keys, changes the function of those keys
DELETE	Erases current character in EDIT mode
EDIT	Places highlighted entry on the control panel for editing
ESCAPE	Cancels current entry or range, or returns to previous command step
GOTO	Moves cell pointer to the cell you specify
GRAPH	Displays the graph most recently specified
HELP	Invokes the Help facility
INSERT	Switches between inserting the text by moving existing text to the right, and replacing existing text.

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Key	Description
MACRO	Invokes a macro when used in combination with a macro name
NAME	Produces a menu of the current range names in POINT mode
PERIOD	When entering a range, anchors pointer if unanchored, or cycles anchor cell and free cell in range
QUERY	Repeats the last /Data Query command
RETURN	Completes an entry, a command, or part of a command
SCROLL LOCK	Switches arrow keys between moving the pointer and moving the window
SHIFT	When used in combination with another key on the typewriter section of the keyboard, produces the upper symbol on the key
SPACE	Inserts a space
STEP	Invokes single-step mode for macros: macros are processed one step at a time
TAB	In READY mode, moves pointer one screen to the right; in EDIT mode, moves cursor five characters to the right
TABLE	Repeats the last /Data Table command specified
WINDOW	Switches pointer between the two windows when there is a split screen

Table 1-10

The Help Facility

At any time while you are using 1-2-3, you can press HELP to invoke the Help facility. 1-2-3 temporarily suspends the session and displays information about the operation currently in progress. The HELP indicator appears in the upper right corner of the control panel. Each Help screen includes a menu of additional Help topics. Use the pointer-movement keys to select a topic, and press RETURN. Press BACKSPACE to view the previous Help screen. To return to the worksheet, press ESCAPE.

Chapter 2

Commands

Commands

The 1-2-3 worksheet is a grid of cells. Each cell can hold a number, a label (descriptive text), or a formula (an instruction for calculating with the contents of other cells). You use 1-2-3 commands to work with the information stored in these cells, as well as to change the appearance of the worksheet. For example, with 1-2-3 commands you can delete information or move it to another part of the worksheet. You can also insert or delete rows or columns, or change worksheet column widths.

When you type slash (/), the 1-2-3 commands appear in a horizontal list on the control panel. This list of commands is called a menu. Screen prompts sometimes appear below a highlighted command with a brief description of what the command does.

In this chapter, a functional summary describes the tasks you can do with each command. Then each section describes the commands according to the order in which they appear on the menu. The sections are Worksheet commands, Range commands, the Copy command, the Move command, File commands, Print commands, Graph commands, Data commands, the System command, and the Quit command. A menu tree showing the command and its submenus appears at the beginning of each section.

When you create a new worksheet, 1-2-3 automatically makes certain choices for you. These choices are called default settings. 1-2-3 comes with initial default settings. However, you can use 1-2-3 commands to change these settings and establish your own default settings. Worksheet Global commands change settings for the entire worksheet, while Range commands change them for parts of the worksheet.

Functional Summary

Use this summary when you know what you want to do, but do not know which command to use.

Analyzing Data

Break up lines of data into individual cell entries
/Data Parse

Calculate frequency distribution of range of numbers
/Data Distribution

Convert formulas into values
/Range Value

Enter series of numbers in a range
/Data Fill

Graph the data
/Graph

Invert matrix (range) of numbers
/Data Matrix Invert

Multiply two matrices (ranges) of numbers
/Data Matrix Multiply

Perform linear regression
/Data Regression

Sort rows of data
/Data Sort

Tabulate effect of changing values of formula(s)
/Data Table

Changing Appearance of the Worksheet

Change alignment of specific labels
/Range Label

Change appearance of specific numbers
/Range Format

Change default alignment of labels
/Worksheet Global Label-Prefix

Change default appearance of numbers
/Worksheet Global Format

Change default column width
/Worksheet Global Column-Width

Change width of specific column
/Worksheet Column Set-Width

Copy data from one part of worksheet to another
/Copy

Display formulas instead of values
/Range Format Text

Erase entire worksheet
/Worksheet Erase

Erase specific data
/Range Erase

Hide columns
/Worksheet Column Hide

Insert blank rows or columns
/Worksheet Insert

Keep row or column headings on screen
/Worksheet Titles

Move data within a worksheet
/Move

Rearrange a section of text
/Range Justify

Redisplay hidden columns
/Worksheet Column Display

Remove rows or columns
/Worksheet Delete

Split the screen into two windows
/Worksheet Window

Suppress display of values equal to zero
/Worksheet Global Zero

Use non-USA format for numeric display, currency, date, and time
/Worksheet Global Default Other International

Copying Data

Copy data from one part of worksheet to another
/Copy

Copy data, switching rows and columns
/Range Transpose

Copy formulas so that copy consists of values only
/Range Value

Incorporate data from a text (ASCII) file
/File Import

Incorporate data from another worksheet file
/File Combine

Erasing Data

Delete an entire column or row of data
/Worksheet Delete

Erase a file
/File Erase

Erase contents of specific cells
/Range Erase

Erase the entire worksheet
/Worksheet Erase

Graphing Data

Add descriptive text to graph
/Graph Options Legend; /Graph Options Titles

Cancel graph settings
/Graph Reset

Display graph on the screen
/Graph View

Display list of graph (.PIC) files
/File List Graph

Label data points
/Graph Options Data-Labels

Overlay graph with horizontal and/or vertical lines
/Graph Options Grid

Print or plot a graph
The PrintGraph program

Save graph file for printing later with PrintGraph
/Graph Save

Select the data to graph
/Graph X, A-F

Specify appearance of line and XY graph data
/Graph Options Format

Specify appearance of X and Y axis scales
/Graph Options Scale

Specify graphing settings
/Graph Options

Specify the kind of graph
/Graph Type

Use named sets of graph settings
/Graph Name

Hiding Data

Hide entire column
/Worksheet Column Hide

Hide range
/Range Format Hidden

Redisplay hidden column
/Worksheet Column Display

Suppress display of values equal to zero
/Worksheet Global Zero

Loading Data

Incorporate text (ASCII) file into worksheet
/File Import

Incorporate all or part of another worksheet file into current worksheet
/File Combine

Load worksheet file
/File Retrieve

Moving Data

Delete rows or columns
/Worksheet Delete

Insert blank rows or columns
/Worksheet Insert

Move data to another part of the worksheet
/Move

Save specified data in a separate worksheet file
/File Xtract

Printing Your Work

Advance printer paper one line
/Print Printer Line

Advance printer paper one page
/Print Printer Page

Begin printing
/Print Printer (or File) Go

Change current printing settings
/Print Printer (or File) Options

Change default printing settings for future sessions
/Worksheet Global Default Printer

Insert a page break
/Worksheet Page

Print cell formulas instead of values
/Print Printer (or File) Options Other Cell-Formulas

Print only certain columns
/Worksheet Column Hide

Print or plot a graph
The PrintGraph program

Remove current printing settings
/Print Printer (or File) Clear

Send worksheet data to a text (ASCII) file
/Print File

Set header/footer for printed page
/Print Printer (or File) Options Header/Footer

Set margins for printed page
/Print Printer (or File) Options Margins

Set paper to top-of-page
/Print Printer Align

Specify range to print
/Print Printer (or File) Range

Protecting Data

Assign password to a worksheet file
/File Save

Check protection status of worksheet
/Worksheet Status

Remove protection from specific cells
/Range Unprotect

Restrict cell pointer movement to unprotected cells
/Range Input

Turn protection on or off
/Worksheet Global Protection

Saving Your Work

Extract and save part of worksheet
/File Xtract

Save a graph so you can print it later
/Graph Save

Save entire worksheet
/File Save

Save your work in a text (ASCII) file
/Print File

Using a Database

Cancel database settings
/Data Query Reset

Control movement of cell pointer during data entry
/Range Input

Copy selected records
/Data Query Extract

Copy selected records, eliminating duplicates
/Data Query Unique

Delete selected records
/Data Query Delete

Highlight selected records
/Data Query Find

Sort records
/Data Sort

Specify ranges of database
/Data Query Input/Criterion/Output

Working with Files

Assign password to worksheet file
/File Save

Check how much disk space is available for files
/File List

Display names of files in current directory
/File List

Erase specific file
/File Erase

Extract and save part of worksheet in a file
/File Xtract

Incorporate text (ASCII) file into worksheet
/File Import

Incorporate (part of) worksheet file into current worksheet
/File Combine

Load worksheet file
/File Retrieve

Save data in a text (ASCII) file
/Print File

Save default settings in 1-2-3 configuration file
/Worksheet Global Default Update

Save graph file for printing later
/Graph Save

Save worksheet file
/File Save

Specify directory where 1-2-3 will look for files in current session
/File Directory

Specify directory where 1-2-3 will look for files in future sessions
/Worksheet Global Default Directory Update

Working with Labels

Change alignment of specific labels
/Range Label

Change column width if label too long
/Worksheet Column Set-Width

Change default alignment of labels
/Worksheet Global Label-Prefix

Copy data, switching rows and columns
/Range Transpose

Name a range using existing labels
/Range Name Labels

Rearrange a range of labels
/Range Justify

Working with Named Ranges

Delete a range name
/Range Name Delete

Delete all range names
/Range Name Reset

List all range names
/Range Name Table

Name a range
/Range Name Create

Name a range using existing labels
/Range Name Labels

Working with Numbers

Analyze distribution of values in range
/Data Distribution

Change appearance of specific numbers
/Range Format

Change column width if number displays as asterisks
/Worksheet Column Set-Width

Change default appearance of numbers
/Worksheet Global Format

Convert formulas to values
/Range Value

Copy data, switching rows and columns
/Range Transpose

Display the recalculation setting
/Worksheet Status

Enter series of numbers in a range
/Data Fill

Name a range
/Range Name Create

Specify how and when 1-2-3 recalculates formulas
/Worksheet Global Recalculation

Suppress display of values equal to zero
/Worksheet Global Zero

Tabulate effect of changing values on formula(s)
/Data Table

Use non-USA format for numeric display, currency, date and time
/Worksheet Global Default Other International

Miscellaneous

Break up lines of data into individual cell entries
/Data Parse

Display amount of memory remaining
/Worksheet Status

Display configuration settings (for printer, current directory, and so forth)
/Worksheet Global Default Status

Display worksheet settings (display format, column width, protection, and so forth)
/Worksheet Status

Leave 1-2-3
/Quit

Restrict movement of cell pointer
/Range Input

Specify configuration settings (for printer, current directory)
/Worksheet Global Default

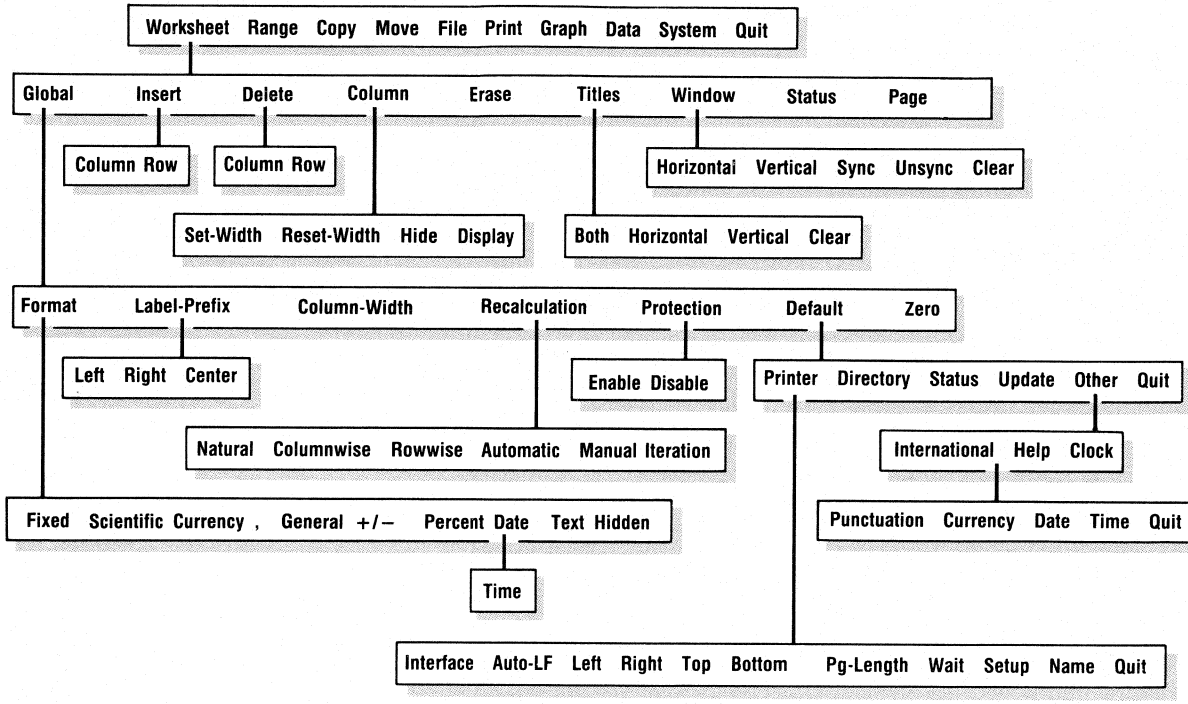
Specify display format for Date and Time Indicator
/Worksheet Global Default Other Clock

Specify how and when 1-2-3 recalculates the worksheet
/Worksheet Global Recalculation

Specify the way the Help facility is used
/Worksheet Global Default Other Help

Specify worksheet settings (display format, column width, protection and so forth)
/Worksheet Global

Temporarily go to the operating system
/System



Worksheet Commands

1-2-3 has two types of Worksheet commands — those that affect the entire worksheet and those that affect parts of the worksheet.

The commands that affect the entire worksheet are called Worksheet Global commands. These commands let you set the numeric format, the label-prefix alignment, the column width, and the protection status for the entire worksheet. (You can override these settings for specific parts of the worksheet using certain Range or other Worksheet commands.) The Worksheet Global Default commands let you specify certain settings, such as currency signs, international date and time formats, screen clock display, access to Help, the default directory, and printer types, that 1-2-3 uses when you retrieve existing worksheets or create new ones.

Worksheet commands that affect parts of the worksheet let you insert or delete rows and columns, change the widths of specified columns, prevent columns from appearing on the screen, freeze rows or columns as titles, see nonadjacent parts of the worksheet simultaneously, and tell 1-2-3 to begin a new page when printing.

/Worksheet Global Format

Fixed Scientific Currency , General +/– Percent Date Text Hidden

/WGF sets the way numeric values appear for the entire worksheet. Labels are unaffected by the command.

- Numeric values include numbers and formulas.
- All numeric values in unformatted cells appear in the current global format.
- When you have two windows on the screen (/Worksheet Window), you can set a different global format in each window because /Worksheet Global Format affects only the window that is current. Therefore, you can view the same part of the worksheet in two formats at the same time.

Procedure

1. Select /Worksheet Global Format.
2. Choose a format.

   If you choose Fixed, Scientific, Currency, , (comma), or Percent, you need to specify the number of decimal places; press RETURN to accept the default setting of 2, or type a different number (0-15) and press RETURN.

   If you choose Date, select one of the five date formats or select Time and one of the four time formats.

In date formats, a positive number (rounded off to an integer) is defined as the serial number of a date from 1 (1 January 1900) to 73050 (31 December 2099). Use the @DATE and @NOW functions to generate these serial numbers.

In time formats, fractional parts of serial numbers represent time (.000 = midnight, .5 = noon, 15/24 = 3:00 PM, and so on). Use @TIME and @NOW to generate these serial numbers.

See Table 2-6 in the Range Commands section for a description of each format.

If a value's formatted display does not fit within its column width, asterisks appear in the cell. 1-2-3 retains values with a precision of 15 decimal places, regardless of format.

Related Commands

/Range Format formats a range of cells, rather than the entire worksheet.

/Worksheet Global Default Other International Currency changes the currency sign and its alignment.

/Worksheet Global Default Other International Date and Time commands set the international date and time formats.

/Worksheet Global Default Other International Punctuation can be used to change the punctuation mark used in the , (comma) and Currency numeric displays.

/Worksheet Global Protection and /Range Protect protects hidden data.

/Worksheet Status displays the current global format.

/Worksheet Window creates two windows on the screen.

/Worksheet Global Label-Prefix

Left Right Center

/WGL sets the alignment of labels for the entire worksheet. Labels can be left-aligned, right-aligned, or centered.

- The default label alignment is Left.
- All labels subsequently entered into the worksheet without a label-prefix character are aligned according to the alignment set with this command.
- This command does not affect existing label and value entries.

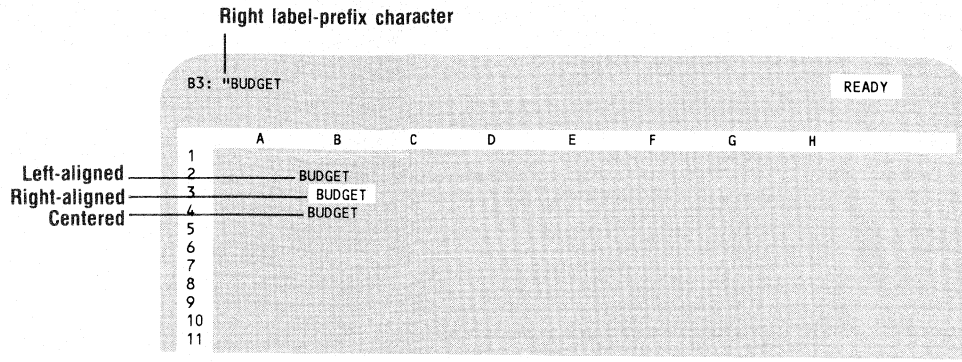


Figure 2-1

Procedure

1. Select /Worksheet Global Label-Prefix.
2. Select Left, Right, or Center.

Labels are always preceded by a label-prefix character that represents the alignment. The label-prefix is displayed to the left of the label entry on the control panel, but does not appear in the worksheet or in printed copy.

Label-prefix character	Alignment
' (apostrophe)	left
" (quotation mark)	right
^ (caret)	centered

Table 2-1

To enter a label that begins with a number or another character that 1-2-3 interprets as beginning a value (such as +), precede the entry with a label-prefix character. For example, to enter the label, 100 Main Street, type '100 Main Street and press RETURN.

Similarly, to create a label beginning with the slash (/) character, precede it with a label-prefix character.

To realign individual label entries, change the label-prefix character using EDIT mode.

A label that is longer than its cell's column width is always left-aligned regardless of its label-prefix character. When column width is increased so that the entire label fits within the cell, the label-prefix character determines the alignment.

To enter a label that repeats itself to fill the cell's width, precede the label with the backslash (\) character.

Related Commands

/Range Label alters the alignment of existing labels in a specified range of cells in the worksheet.

/Worksheet Status displays the current global label prefix.

/Worksheet Global Column-Width

/WGC sets the width for all worksheet columns except for columns whose width has been individually set with /Worksheet Column Set-Width.

- Column width can be from 1 to 240 characters. Initially, the default is 9.
- To see the current default column width before adjusting it, use /Worksheet Status.
- If you split the worksheet into two windows, each window can have its own global column width. Each global column width must be set separately since the command affects only the window that is current. Only the current window's settings are saved in a split window.

Procedure

1. Select /Worksheet Global Column-Width.
2. Use RIGHT or LEFT to increase and decrease the width (the screen displays the effect of each change), or enter a number.
3. Press RETURN.

Related Commands

/Worksheet Column Set-Width overrides /Worksheet Global Column-Width for individual columns.

/Worksheet Global Column-Width or /Worksheet Column Set-Width expands columns that are too narrow to fully display values, which appear as asterisks.

/Worksheet Status displays the current global column width.

Natural Columnwise Rowwise Automatic Manual Iteration

/WGR controls when, in what order, and how many times formulas in the worksheet are recalculated.

Procedure

Select /Worksheet Global Recalculation.

- To change *when* 1-2-3 recalculates the worksheet, choose Automatic or Manual.
- To change *in what order* 1-2-3 recalculates formulas, choose Natural, Columnwise, or Rowwise.
- If you choose Columnwise or Rowwise, execute the command again and choose Iteration to specify the number of recalculation cycles. See the following table.

Menu Item	Description
Natural	Before recalculating a particular formula, 1-2-3 recalculates any other values on which it depends. For example, if the formula in B7 depends on the value in cell C28, 1-2-3 recalculates the formula in C28 before it calculates B7. This is the initial default order of recalculation.
Columnwise	1-2-3 begins recalculating at the top of column A and proceeds to the bottom of the column. It then recalculates columns B, C, and so on.
Rowwise	1-2-3 begins recalculating at the beginning of row 1 and proceeds to the end of the row. It then recalculates rows 2, 3, and so on.
Automatic	1-2-3 recalculates the worksheet each time you change the contents of a cell. Automatic is the default setting.

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Menu Item	Description
Manual	1-2-3 recalculates the worksheet only when you press the CALC key. When recalculation is manual, the CALC indicator appears in the lower right corner of the screen whenever any cell entries have changed since the last recalculation.
Iteration	Sets the number of times (1 through 50) 1-2-3 recalculates the worksheet when the recalculation method is set to Columnwise or Rowwise, or when recalculation is set to Natural and there is a circular reference. The default is 1. This setting has no effect if recalculation is set to Natural and there are no circular references.

Table 2-2

Use Automatic recalculation to immediately view the effect of each change to a value in the worksheet.

Use Manual recalculation when 1-2-3 takes a long time to calculate a large or complex worksheet. Press CALC when you want to update the worksheet.

The initial default setting for recalculation order, Natural, is sufficient for most worksheet calculations. Use the columnwise or rowwise order only when you have constructed a worksheet in which you need to explicitly control the recalculation order.

Related Commands

/Worksheet Status displays the current recalculation settings.

/Worksheet Global Protection

Enable Disable

/WGP works in conjunction with /Range Protect and /Range Unprotect to prevent changes being made to particular cells.

With the protection facility turned on using /Worksheet Global Protection Enable, you can make changes only to cells that you have unprotected with /Range Unprotect.

Procedure

1. Select /Worksheet Global Protection.
2. Choose Enable or Disable.

Choosing Enable turns on the protection facility, preventing you from changing cell entries, except in cells that had been unprotected with /Range Unprotect. A U appears on the control panel when the cell pointer is on an unprotected cell; a PR appears on the control panel for protected cells when protection is enabled.

While protection is enabled, you cannot delete columns or rows that include protected cells. Protected cells whose contents are hidden using /Range Format Hidden cannot be changed to make them visible. You can, however, erase the entire worksheet with the /Worksheet Erase command when protection is enabled.

Choosing Disable turns off the protection facility and allows you to change any cell entry, even if it has been protected with /Range Protect.

Related Commands

/Range Unprotect allows you to change particular cells when /Worksheet Global Protection is enabled.

/Range Protect allows you to protect cells that you had unprotected with /Range Unprotect.

/Range Justify cannot be used while cell protection is enabled. You may get protected cell errors when this command rearranges the cell entries.

/Worksheet Status displays the current protection setting.

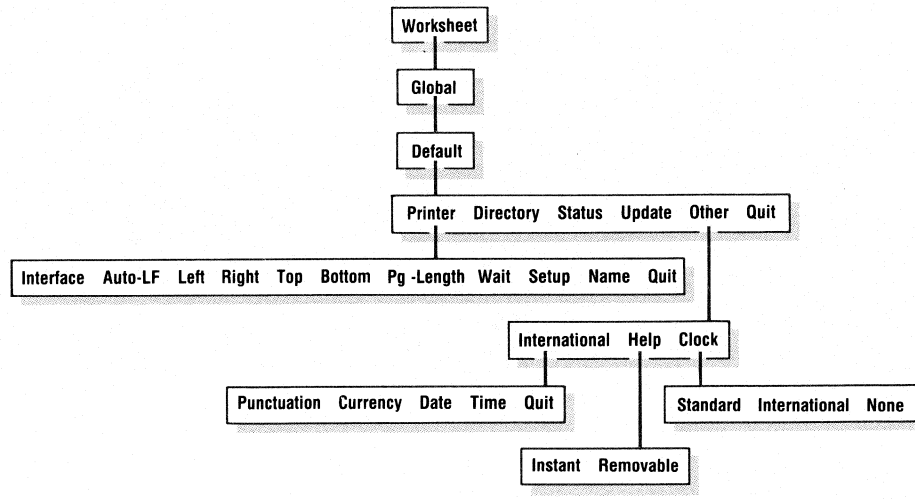

Figure 2-2

The Worksheet Global Default Commands

The Worksheet Global Default commands allow you to specify certain settings for 1-2-3 to load when starting the program. With these commands, you can establish your own default settings for:

- Type of printer and its connection, as well as the printed page format
- Directory that 1-2-3 automatically uses when searching for files
- International display formats, including currency symbol, and date and time
- Method of using the Help facility
- Type of clock display on the screen

1-2-3 comes with these settings preset; these *initial* settings are described in this section. You can change these settings and establish your own defaults for future sessions by using the /Worksheet Global Default Update command.

/Worksheet Global Default Printer

Interface Auto-LF Left Right Top Bottom Pg-Length Wait Setup Name Quit

/WGDP specifies the default printer and interface settings.

Procedure

1. Select /Worksheet Global Default Printer.
2. Choose the setting you want to change. See the following table.

The initial default settings supplied by 1-2-3 are indicated in the table.

Menu Item	Description	Choices
Interface	Specifies the connection between 1-2-3 and your printer. Computers send data to a printer by one of two possible means, parallel or serial, so you must configure 1-2-3 to work with the specific type of printer interface you have. If you select a serial interface, you must also supply a baud rate (speed of transmission) and set your printer to: 8 bits, no parity, and 1 stop bit (except 2 stop bits at 110 baud). Choices 5 through 8 refer to devices accessed through DOS on a local area network.	(1)Parallel 1 (initial) (2)Serial 1 (3)Parallel 2 (4)Serial 2 (5)DOS Device LPT1 (6)DOS Device LPT2 (7)DOS Device LPT3 (8)DOS Device LPT4
Auto-LF	Specifies whether your printer automatically issues a linefeed after a carriage return. To test this for your printer, print something. If the printing is double spaced, set Auto-LF to Yes; if the paper does not advance, set Auto-LF to No.	Yes No (initial)
Left	Sets left margin (number of spaces) on printed page.	0-240 (initially, 4)
Right	Sets right margin (number of spaces) on printed page.	0-240 (initially, 76)
Top	Sets top margin (number of lines) on printed page.	0-32 (initially, 2)

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Menu Item	Description	Choices
Bottom	Sets bottom margin (number of lines) on printed page.	0-32 (initially, 2)
Pg-Length	Sets length (number of lines) of printed page.	10-100 (initially, 66)
Wait	Allows you to insert a pause at the end of each printed page to change paper in single sheet feed printers.	Yes No (initial)
Setup	Specifies a string of control characters to be sent to your printer before printing begins (some printers need to be "initialized"). The default setting is blank, for no setup string. See the printer control codes in your printer manual for a description on how to enter setup strings.	Blank
Name	Specifies which printer to use. If you selected more than one text printer when you installed 1-2-3, a list of the printers selected appears when you choose this menu item.	The default is the first printer you selected when installing 1-2-3

Table 2-3

Related Commands

/Worksheet Global Default Update saves changes you make to these settings so they will become the default settings in future sessions.

/Print Printer Options overrides the default settings for margins, setup string, and page length in any 1-2-3 sessions.

/Worksheet Global Default Directory

/WGDD specifies the directory that 1-2-3 will automatically search (when you retrieve a file) and write to (when you save a file) if you do not specify a directory at the time.

Procedure

1. Select /Worksheet Global Default Directory.
2. Specify the directory.

   If necessary, press ESCAPE to clear the current directory before entering the new directory.
3. Press RETURN.

1-2-3 initially uses the root directory in drive A.

If you execute the command and clear the existing setting without providing a new directory, 1-2-3 uses the directory that was current when you started the program.

You can always override the default directory by typing in a directory when specifying a file with the File commands.

Related Commands

/Worksheet Global Default Update allows you to save a new directory setting to make it the default directory in future sessions.

In any 1-2-3 session, you can override the default directory setting specified here by using /File Directory.

/Worksheet Global Default Status

/WGDS displays the current settings established by the other Worksheet Global Default commands.

Procedure

1. Select /Worksheet Global Default Status.
   The worksheet disappears and the current settings are displayed in the worksheet.
2. Press any key to clear the settings and return to the worksheet.

The settings are only displayed; they cannot be changed here. Use the other Worksheet Global Default commands to change the settings.

Related Commands

/Worksheet Status displays global settings pertaining to the current worksheet, including available memory, method of recalculation, display formats, and protection status.

/File Directory allows you to check the current directory.

/Worksheet Global Default Update

/WGDU saves the current settings established by the other Worksheet Global Default commands in a configuration file (123.CNF).

- If you have changed default settings and want to use the new settings in future sessions, you *must* select Update to save them.
- If you have made changes to the default settings but do not want to preserve them, *do not* select Update. Instead, select /Worksheet Global Default Quit to leave the menu.
- After starting 1-2-3 from a removable disk, make sure that the disk containing the 1-2-3 program is in the drive before you execute the Update command and that the disk's write-protect tab is removed. When 1-2-3 cannot find the configuration file in the drive from which it was started, it creates a new file on the disk currently in that drive.

Procedure

Select /Worksheet Global Default Update. There is no confirmation step.

The default settings are saved in a configuration file (123.CNF). The next time you start 1-2-3, the new default settings will be read from the configuration file.

/Worksheet Global Default Other International

Punctuation	Currency	Date	Time	Quit

/WGDOI sets non-USA display formats for numeric punctuation, currency, date, and time.

Procedure

1. Select /Worksheet Global Default Other International.
2. Select the setting you want to change. See table below.
3. Choose Quit to return to the previous menu.

The initial settings supplied by 1-2-3 are indicated in the table.

Menu Item	Description	Choices
Punctuation	Specifies which characters 1-2-3 uses as the point and thousands separators for numbers, and as the argument separator in @functions and macro keywords. The eight settings (A through H) provide fixed combinations of period, comma, and space separators and are listed in the order of point separator, argument separator, and thousands separator.	(A) (.,,) (initial) (B) (,..) (C) (.;,) (D) (,;.) (E) (.,) (F) (,.) (G) (.;) (H) (.;)
Currency	Specifies the alphanumeric sequence to use as the currency sign. It also specifies whether the currency sign precedes or follows the value. You can use any LICS character. See Appendix 2.	Alphanumeric sequence (initially, $) preceding value
Date	Specifies the international date formats (D4 and D5). The D4 format displays month, day, and year; D5 displays only month and day. 1-2-3 uses the D4 setting when it displays the date at the bottom of the screen if Clock is set to International. This setting affects how you enter the argument for @DATEVALUE. If you use this @function with either of the international formats, you must use the form specified here.	(A) MM/DD/YY (initial) (B) DD/MM/YY (C) DD.MM.YY (D) YY-MM-DD

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Menu Item	Description	Choices
Time	Specifies the international time formats (D8 and D9). The D8 format includes hours, minutes, and seconds; D9 includes only hours and minutes. All the international time formats are 24-hour instead of 12-hour formats. 1-2-3 uses the D9 setting when it displays the time at the bottom of the screen if Clock is set to International. This setting affects how you enter the argument for @TIMEVALUE. If you use this @function with either of the international formats, you must use the form specified here.	(A) HH:MM:SS (initial) (B) HH.MM.SS (C) HH,MM,SS (D) HHhMMmSSs

Table 2-4

Related Commands

/Worksheet Global Default Update allows you to save changes you make to these settings so they will become the default settings in future sessions.

/Range Format Currency assigns the Currency format to a range of values.

/Range Format Date assigns an International Date or Time format to a range of values.

/Worksheet Global Format specifies an International format as the default display format.

/Worksheet Global Default Other Help

Instant	Removable

/WGDOH specifies the way 1-2-3 accesses the Help facility.

Procedure

1. Select /Worksheet Global Default Other Help.
2. Select Instant or Removable.

   If you choose Instant, 1-2-3 opens the Help file when you press HELP, and the file remains open throughout the session. When you press HELP again, 1-2-3 reads the file instantly. Do not, however, remove the disk containing the Help facility. Use Instant if the Help facility is on a fixed (hard) disk.

   If you choose Removable, 1-2-3 closes the Help file when you leave the Help facility. You can safely remove the disk containing the Help facility. Use Removable if the Help file is on a removable disk. This is the initial setting.

Related Command

/Worksheet Global Default Update allows you to save a change you make to this setting so it will become the default setting in future sessions.

/Worksheet Global Default Other Clock

Standard International None

/WGDOC specifies the format in which the date and time are displayed in the lower left corner of the screen.

Procedure

1. Select /Worksheet Global Default Other Clock.
2. Choose a setting.

   If you select Standard, 1-2-3 displays the date in standard long format (DD-MMM-YY) and the time in standard short format (HH:MM AM/PM). This is the initial setting.

   If you select International, 1-2-3 displays the date in the long international format (D4) and the time in the short international format (D9).

   If you select None, the date and time are not displayed on the screen.

Related Commands

/Worksheet Global Default Update saves a change you make to this setting so it will become the default setting in future sessions.

/Worksheet Global Default Other International sets the D4 and D9 formats.

/Worksheet Global Zero

Yes No

/WGZ specifies whether values of zero are displayed on the screen.

Procedure

1. Select /Worksheet Global Zero.
2. Choose Yes or No.

Choosing Yes suppresses the display of zero values, whether they were entered as numbers or are the results of formulas. Though hidden, the values are still stored in the worksheet.

Choosing No displays zero values. The default is No.

CAUTION If you suppress the display of zeros, 1-2-3 could write over cells.

To prevent writing over hidden data, enable Worksheet Global Protection or Range Protection.

Related Commands

/Range Format Hidden suppresses the display of all cells in a range.

/Worksheet Column Hide hides an entire column.

/Worksheet Status displays the current setting.

/Worksheet Insert

Column Row

/WI adds blank rows or columns into the worksheet.

Procedure

1. Position the cell pointer in the row where you want the new blank row(s) to appear, or in the column where you want the new blank column(s) to appear.
2. Select /Worksheet Insert.
3. Select Column or Row.
4. Specify the range or highlight the number of rows or columns you want to insert.
5. Press RETURN.

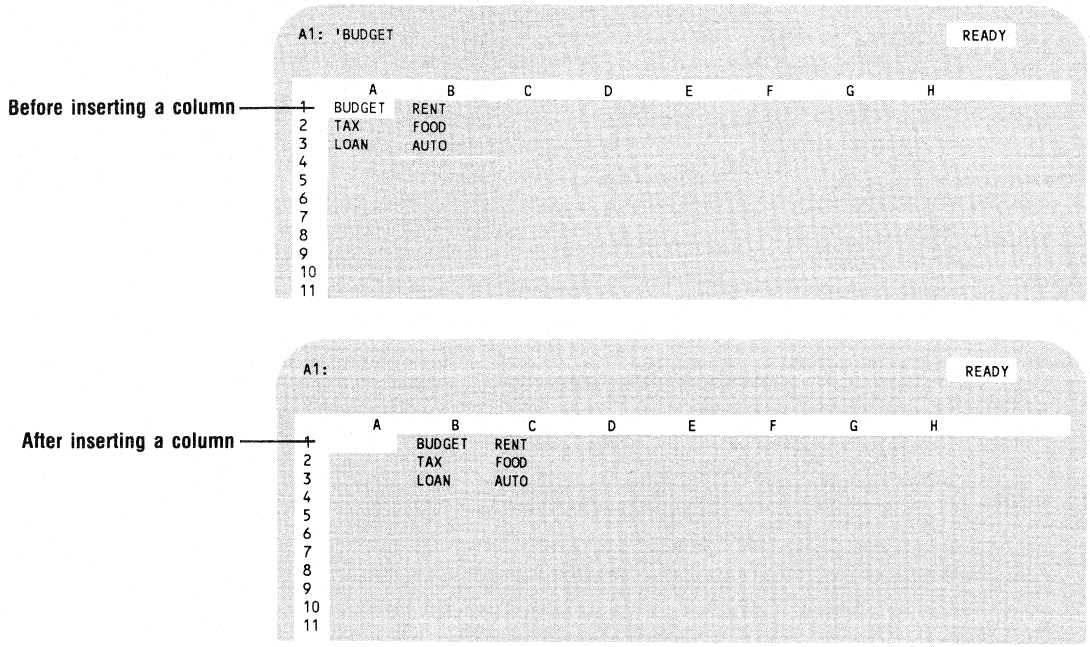


Figure 2-3

When you insert rows or columns, existing rows or columns move down or over to make room for the new rows or columns, and 1-2-3 adjusts any formulas so they continue to refer to the same data. If you insert rows or columns into a named range or a range that appears in a formula, the size of the range increases. Inserted rows or columns assume the global formats and column-width of the worksheet.

If you formatted a column to the bottom of the worksheet, 1-2-3 displays the Worksheet full error message when you try to insert a column. Use /Range Format Reset to reset the format for all the blank cells in the column; then save and retrieve the worksheet.

/Worksheet Delete

Column	Row

/WD removes entire rows or columns from the worksheet.

Procedure

1. Position the cell pointer in the row or column you want to delete.
2. Select /Worksheet Delete.
3. Choose Column or Row.
4. Expand the highlight or specify a range if you want to delete more than one row or column.
5. Press RETURN.

All columns to the right of a deleted column shift to the left, and all rows below a deleted row shift up.

Deletions inside ranges make the range smaller. Deleting a corner of a range invalidates the range.

Formulas that refer to a deleted cell, or to a range with a deleted corner, now have the value ERR. 1-2-3 adjusts all other formulas and named ranges so they continue to refer to the same data.

Deleting columns or rows from the worksheet recovers some memory for your use. You can recover more memory by saving the worksheet and then retrieving it.

Related Commands

/Range Erase removes only the data you highlight or specify, without deleting rows or columns.

/Worksheet Column

Set-Width	Reset-Width	Hide	Display

/WC changes the width of a column, hides a column, or redisplays a hidden column.

Procedure

1. Position the cell pointer in the column you want to change.
2. Select /Worksheet Column.

3. Choose an option from the menu.

   Set-Width: Changes the column width. The current column width appears on the control panel, after the prompt. Use LEFT or RIGHT to increase or decrease the width, or type a number from 1 to 240. Then press RETURN.

   Reset-Width: Restores the global column width (initially 9 spaces) for the column that contains the cell pointer.

   Hide: Hides one or more columns without permanently erasing the data. Use RIGHT or LEFT to highlight the column(s) you want to hide, and press RETURN. You can specify a range if you want to hide more than one adjacent column.

   Display: Redisplays hidden columns. All the hidden columns appear with asterisks beside the column letter. Move the cell pointer to the column you want to redisplay and press RETURN. You can specify a range if you want to redisplay more than one adjacent column.

If you have two windows on the screen, each can have its own column width. Setting the column width only affects the current window, so each window's column width must be set separately.

Use /Worksheet Column Set-Width if a cell displays asterisks because it is too narrow for the values it contains.

Once you change the width of an individual column, the new width appears in brackets on the control panel when the cell pointer is in that column.

Related Commands

/Worksheet Global Column Width sets the default column width for the entire worksheet.

/Worksheet Status shows you the current global column width.

/Worksheet Erase

No Yes

/WE removes the current worksheet from the screen and gives you a blank worksheet. If you want to keep the current worksheet, save it in a file before using /Worksheet Erase.

Procedure

1. Select /Worksheet Erase.
2. Choose No or Yes.

   If you choose No, 1-2-3 returns the worksheet without erasing it. If you choose Yes, 1-2-3 erases the worksheet.

Related Commands

/Range Erase removes a single cell or range of cells.

/Worksheet Delete removes columns or rows from the worksheet.

/File Retrieve erases the current worksheet before retrieving a different one from a disk. If you want to keep the current worksheet, save it in a file before you retrieve a new worksheet.

/Worksheet Titles

Both	Horizontal	Vertical	Clear

/WT freezes rows or columns along the top or left edge of the screen so you can see them as you move around the worksheet. Use /Worksheet Titles to keep row and column headings on the screen when you scroll through long rows or columns of data.

Procedure

1. Position the cell pointer one row below the rows you want to freeze, one column to the right of the columns you want to freeze, or below and to the right of the rows and columns you want to freeze.
2. Select /Worksheet Titles.
3. Select an item.

   Both: Freezes the rows above and columns to the left of the cell pointer.

   Horizontal: Freezes the rows above the cell pointer.

   Vertical: Freezes the columns on the screen to the left of the cell pointer.

   Clear: Unfreezes all existing titles.

If you have two windows on the screen, you can set different titles for each one.

You cannot use the pointer-movement keys to move the cell pointer into the area you indicated as a title, but you can do so with GOTO. 1-2-3 displays a second copy of the title rows or columns and you can make any changes you want. To clear the second copy from the screen, press PAGE DOWN and then PAGE UP for rows or TAB and then BACKTAB for columns.

/Worksheet Window

Horizontal	Vertical	Sync	Unsync	Clear

/WW divides the screen into two horizontal or vertical windows. You can use each window to see a different part of the worksheet.

Procedure

1. Move the cell pointer to the row you want to use as the top edge, or to the column you want to use as the left edge, if you are creating a window.
2. Select /Worksheet Window.
3. Choose an item from the menu.

   Horizontal: Creates two windows with the screen split horizontally.

   Vertical: Creates two windows with the screen split vertically.

   Sync: For horizontal windows, if one window scrolls horizontally, the other also scrolls, keeping the same columns on the screen in both windows. For vertical windows, if one window scrolls vertically, the other also scrolls, keeping the same rows on the screen in both windows.

   Unsync: Windows scroll independently in both directions.

   Clear: Removes a second window from the screen.

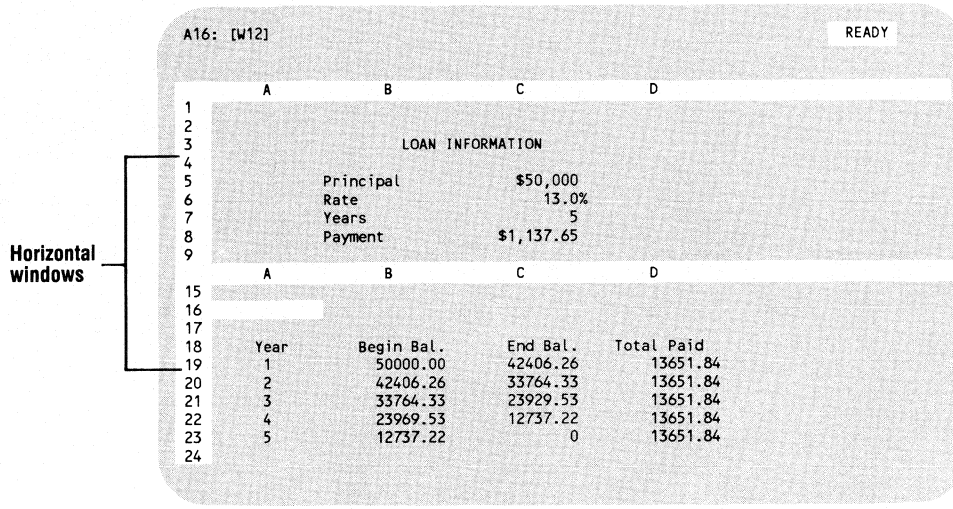


Figure 2-4

When you create a second window, it displays the same part of the worksheet as the first window. Use WINDOW to move the pointer to the second window, and then use the pointer-movement keys to get to the area of the worksheet you want to see.

The default for scrolling is Sync. Use /Worksheet Window Unsync if you want each window to display different rows and different columns.

When you select Clear, the single remaining window uses the titles, column widths, global formats and global label prefixes of the window that was on top or on the left.

/Worksheet Status

/WS displays information about memory use, global settings, and hardware options.

Procedure

1. Select /Worksheet Status.
2. Press any key to return to your worksheet when you finish looking at the information on the screen.

The worksheet status information appears on the screen, temporarily replacing the current worksheet.

Status Display	Sample Settings
Available Memory:	
Conventional	308940 of 315744 Bytes (97%)
Expanded	(None)
Coprocessor:	8087
Recalculation:	
Method	Automatic
Order	Natural
Iterations	1
Circular Reference:	B4
Cell Display:	
Format	(G)
Label Prefix	'
Column Width	9
Zero Suppression	Off
Global Protection:	Off

Table 2-5

You can reduce the amount of memory you use by erasing any data you don't need and resetting the format of any formatted blank cells. To regain memory after you make changes, you must save your worksheet and then retrieve it.

There is no simple relationship between the amount of main memory (RAM) that a worksheet occupies and the size of the worksheet file (.WK1) created with the /File Save command.

Circular Reference displays the address of a cell where the formula refers to the cell itself. If you eliminate the circular reference in the cell, select /Worksheet Status again to see whether there is another cell with a circular reference. The status screen can display only one circular reference at a time.

/Worksheet Page

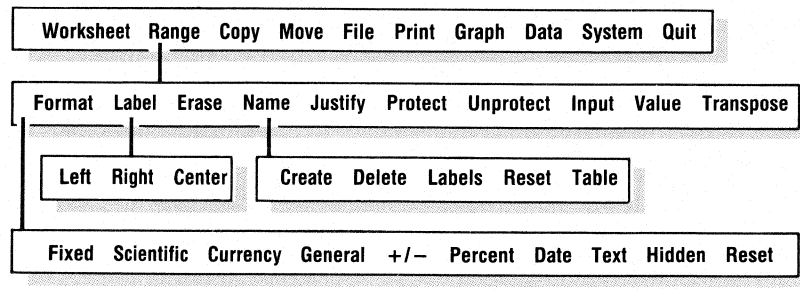
/WP inserts a page break into a worksheet. When you print the worksheet, a new page begins at the page break.

Procedure

1. Move the cell pointer to the row below where you want the page to end.
2. Select /Worksheet Page.

A double colon (::) appears in column A of the row you indicated as the place for the page break, and the rest of the worksheet moves down. Do not make any other entries in the row with the double colon; 1-2-3 doesn't print anything that appears in that row.

To remove a page break, use /Range Erase, or write over the page break with another entry.



Range Commands

The Range commands manipulate ranges of cells. A range is any rectangular block of cells. It can be a single cell, a single row, a single column, or parts of several rows and columns.

With the Range commands, you can change the numeric format of a range to control how numbers appear, align the labels in a range, erase the contents of a range, transpose a range by switching from a vertical layout (columns) to a horizontal one (rows), and vice versa.

You can also convert the formulas in a range to their values, protect or unprotect a range to prevent or allow changes to entries, rearrange "paragraphs" of long labels, restrict the movement of the cell pointer to a specific range, name a range, and change or delete a range name.

/Range Format

Fixed Scientific Currency , General +/- Percent Date Text Hidden Reset

/RF sets the numeric format for a range of cells, overriding the default numeric format. The numeric format determines the appearance of numbers, but does not affect the display of labels.

- The numeric format changes the *appearance*, not the actual value of numbers. You may, for example, choose to display a number without its decimal places, but 1-2-3 still stores the number with its decimal places for calculations.
- A numeric format you choose with /Range Format overrides the default numeric format in which numbers automatically appear. (The default numeric format is initially General, but you can change the default with /Worksheet Global Format.)
- Changing the format has no effect on the way you enter numbers.
- A numeric format affects the appearance of numbers and formula values, but has no effect on labels unless you choose the Hidden format. You can hide any kind of cell entry with the Hidden format.
- You can change the format of a range of cells either before or after entering numbers in the range.
- To use date and time formats, you must first generate serial numbers that represent dates and times. You produce serial numbers with @functions (@DATE, @DATEVALUE, @TIME, @TIMEVALUE, and @NOW). Chapter 4 describes @functions.
- Global default settings determine certain date and time formats. You can set these defaults with the /Worksheet Global Default Other International command.
- Global default settings determine the currency sign and its position, and the separator used to separate thousands. You can set these defaults with the /Worksheet Global Default Other International command.

Procedure

1. Select /Range Format.
2. Choose a format. Table 2-6 describes the choices.

   To assign a Time, select Date, then Time, from the menu.
3. If you choose Fixed, Scientific, Currency, , (comma), or Percent, indicate the number of decimal places you want. To accept the default setting 2, press RETURN; otherwise, enter any number between 0 and 15 and press RETURN.
4. If you choose Date, select a Date format.
5. If you choose Time from the Date menu, select a Time format.
6. Specify the range you want to format and press RETURN.

Menu Item	Description	Examples
Fixed	Constant number of decimal places (0–15). Leading zero integers always appear.	12 –125.00 0.567
Scientific	Scientific notation with a specified number (0–15) of decimal places in the multiplier. Exponent of 10 from –99 to +99.	–4.3E+ 1.2E+01 1.245E+22 6.24E–24
Currency	Currency sign before/after each entry. Separator between thousands. Negative values in parentheses. Leading zero integers always appear. Decimal places (0–15).	$12.43 ($4.25) $8,999 $0.67 £150
, (comma)	Separators between thousands. Negative values in parentheses. Leading zero integers always appear. Decimal places (0–15).	8,999.00 (15,000) 0.55
General	Trailing zeros suppressed (after decimal point). Leading zero integers always appear. This is the default numeric format. Very large and very small numbers appear in scientific (exponent) format.	12.427 0.45 –4.25 1.3E+12 2E–07
+/–	Horizontal bar graph. Each symbol equals one integer. Symbols: + for positive values, – for negative values, . for zero and values between –1 and +1. Limited by column width.	+ + + – – –
Percent	Percentage, with specified number of decimal places (0–15). Displays the value times 100, followed by a percent sign.	1242.7% –4.25%

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Menu Item	Description	Examples
Date	**1** DD-MMM-YY	06-Jan-54
	2 DD-MMM	06-Jan
	3 MMM-YY	Jan-54
	4 MM/DD/YY (Long International)	01/06/54
	5 MM/DD (Short International)	01/06
Time	**1** HH:MM:SS AM/PM	12:03:14 PM
	2 HH:MM AM/PM	04:23 AM
	3 HH:MM:SS 24 hour (Long International)	14:05:10
	4 HH:MM 24 hour (Short International)	20:15
Text	Formulas (not their values) appear as entered; any numbers in the range appear in General format.	12.427 +C22/4
Hidden	The contents of the specified range do not appear on the screen although they still exist.	
Reset	Restores default numeric format for specified range. Redisplays all or part of Hidden range of cells.	

Table 2-6

In date formats, a positive number (rounded off to an integer) is defined as the serial number of a date from 1 (1 January 1900) to 73049 (31 December 2099). Use the @DATE and @NOW functions to generate these serial numbers.

In time formats, fractional parts of serial numbers represent time (.000 = midnight, .5 = noon, 15/24 = 3:00 PM, and so on). Use @TIME and @NOW to generate these serial numbers.

1-2-3 formats the specified range. Any number currently in the range, or any number you subsequently enter, appears in the format you selected.

When the cell pointer is on a cell that you have formatted, the first letter of the format name and the number of decimal places you chose appear in parentheses before the cell contents on the control panel. For example, (C0) means Currency format with 0 decimal places.

If you hide the contents of a range by selecting the Hidden format, you may want to protect the range using /Worksheet Global Protection to prevent the possibility of writing over the contents accidentally. This command protects the entire worksheet. If you still need to enter data in the worksheet, unprotect specific cells with /Range Unprotect.

When you choose certain formats, 1-2-3 may display asterisks (*) instead of the number you entered. Asterisks indicate that the column is too narrow for the number. Widen the column to display the number by using /Worksheet Column.

A cell retains the numeric format that you assign it with /Range Format, even if you subsequently erase its contents with /Range Erase.

If you move the contents of a range that you have formatted, the moved data retains its numeric format. The area from which you moved the range, however, reverts to the default numeric format.

If you copy formatted cells, the copies take on the numeric format of the original cells.

Related Commands

/Worksheet Global Format defines the default numeric format for the entire worksheet. Any number that you enter appears in this format. You can, however, overide this format with /Range Format.

/Range Label

Left	Right	Center

/RL aligns *existing* labels in a range of cells. 1-2-3 can position labels at the left or right edge, or in the center of cells in a range.

- You cannot "preformat" a range before entering labels in it; /Range Label affects *only* existing labels.
- /Range Label has no effect on numbers, which are always right-aligned.
- /Range Label changes the alignment of a label by changing its label-prefix character. These special characters determine the position of a label in its cell. A label prefix (' for left-aligned, " for right-aligned, or ^ for centered) is visible only on the control panel when the cell pointer is on the label. When entering labels, you can either enter the label prefix with the label, or have 1-2-3 enter the default label prefix (initially ' for left-aligned) automatically.
- If you are changing the alignment of just one label, you may find it quicker to edit the label by pressing EDIT and changing the label prefix at the beginning of the label.

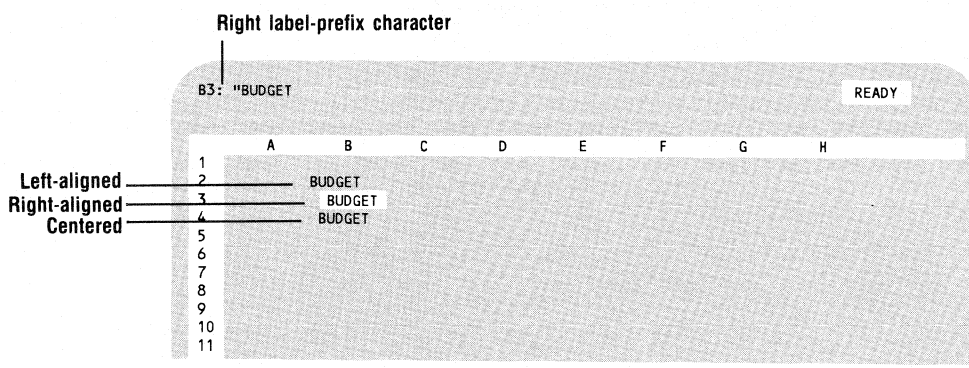


Figure 2-5

Procedure

1. Select /Range Label.
2. Select Left, Right, or Center.
3. Specify the range of labels you want to realign and press RETURN.

1-2-3 displays all the labels in the specified range according to the alignment you selected. Any labels you subsequently enter in this range, however, are unaffected by the alignment you chose. If you enter them without a label prefix, 1-2-3 automatically assigns them the default label prefix (initially ' for left).

Any long labels or formulas resulting in string values always appear left-aligned, no matter what alignment you choose.

Related Commands

/Worksheet Global Label-Prefix defines the default label prefix for the worksheet. 1-2-3 assigns this label prefix automatically to any label that you enter without a label prefix.

/Range Erase

/RE removes the contents of cells in a range.

- Before erasing any data, be sure you do not need it. If necessary, first save the worksheet with /File Save.
- You cannot erase the contents of protected cells. Either disable global protection using /Worksheet Global Protection Disable, or unprotect the cells you want to erase with /Range Unprotect.

Procedure

1. Select /Range Erase.
2. Specify the range whose contents you wish to erase and press RETURN.

1-2-3 erases the data from the specified range, leaving the cells blank. /Range Erase does not affect the numeric format and protection status of the cells in the range, however.

Related Commands

/Worksheet Erase deletes the entire worksheet.

/Worksheet Delete removes entire columns or rows of data from the worksheet, closing up the space left by the deletion.

/Range Name Create

/RNC names a range or redefines which cells an existing range name refers to.

- Range names are useful when you frequently refer to the same range of data (or even to a single cell). Instead of constantly highlighting the range on the screen or typing its address, you can just type the name you assigned the range. If, for example, range B6..H6 contains sales results, you can name the range SALES and type SALES whenever 1-2-3 requests a range. You no longer have to highlight the range on the screen or remember its address to type it in.
- If you are unsure of the name you assigned when 1-2-3 requests a range, you can press NAME to see a list of range names you have assigned, and select the one you want.
- To prevent confusion when using range names in formulas, avoid including spaces and arithmetic operators (+ or *) in a range name. Also avoid names like P12 that look like cell addresses. 1-2-3 does not distinguish between uppercase and lowercase letters.

Procedure

1. Select /Range Name Create.
2. To name a range, type a name up to 14 characters long and press RETURN.
3. To change the cells an existing range name refers to, or to view the current location of a named range, select a name from the menu of range names 1-2-3 displays and press RETURN.
4. If you are just viewing the range, press RETURN to get back to READY mode; otherwise, specify the range you are naming (or whose definition you are changing) and press RETURN.

1-2-3 saves range names as part of the worksheet when you save the worksheet with /File Save.

If you move data, or insert or delete columns or rows so that either the upper left or lower right corner of a named range is affected, 1-2-3 modifies the named range.

When writing a macro, name the macro by assigning a range name to the first cell in the range containing the macro.

Related Commands

/Range Name Labels names an adjacent cell.

/Range Name Delete removes a specific range name.

/Range Name Reset deletes all range names from the worksheet.

/Range Name Table lists all the range names in the worksheet.

/Range Name Delete

/RND removes a range name but leaves the contents of the range unchanged.

CAUTION Be sure that you no longer need a range name before you delete it.

Procedure

1. Select /Range Name Delete.
2. Choose the range name you want to delete from the menu 1-2-3 displays or type the name.
3. Press RETURN.

1-2-3 deletes the name from the range. You can no longer use this name in formulas or in commands requiring a range specification. If a formula used this name, however, it continues to refer to the same cells, but does so by cell address rather than name.

Related Commands

/Range Name Reset deletes all the range names from a worksheet.

/Range Name Table lists all the range names in the worksheet.

/Range Name Labels

Right	Down	Left	Up

/RNL names single-cell ranges, using labels located in adjacent cells for the range names.

- When you have labels that can serve as range names next to the cells you want to name, /Range Name Labels is very useful. For example, if cell A1 contains the label RATE, and cell B1 contains the rate 12%, you can use /Range Name Labels Right to assign RATE as the range name for the contents of B1. Similarly, if D3..F3 contained labels you could use as range names for the contents of each cell in D4..F4, use /Range Name Label to name all three ranges at once.
- You can use /Range Name Labels to assign names to the fields of the first record of a database. See the Data Commands section.

- 1-2-3 does not assign numbers as range names.
- 1-2-3 uses only the first 14 characters of a label for the range name.

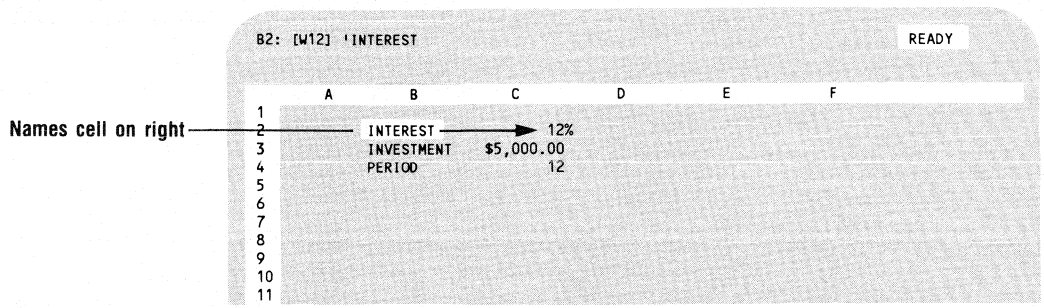


Figure 2-6

Procedure

1. Position the cell pointer on one of the corner cells in a range of labels you want to use.
2. Select /Range Name Labels.
3. Choose Right, Down, Left, or Up depending on the direction of the cells you are naming in relation to the labels. For example, if the labels are in D3..F3 and the cells you are naming are in D4..F4, select Down.
4. Specify the range of labels you are using to name adjacent cells and press RETURN.

1-2-3 names each cell in the direction you indicated with the corresponding cell in the range you specified in step 4.

If you subsequently erase or edit the label you used as the range name, the range name does not change.

If a label you used to name a range duplicates an existing range name, 1-2-3 erases the previous range address and uses the new cell address. 1-2-3 does not warn you of this change. Formulas that referred to the named range as it was previously defined, however, continue to refer to the same range, but by range address, not by name.

Related Commands

/Range Name Create names ranges with any name you choose. The name does not have to be an existing label.

/Range Name Delete removes a specific range name.

/Range Name Reset deletes all range names from the worksheet.

/Range Name Table lists all the range names in the worksheet.

/Range Name Reset

/RNR deletes all the range names in a worksheet, but leaves the contents of the worksheet as they were. Formulas that used range names continue to refer to the same ranges, but use range addresses rather than range names.

CAUTION /Range Name Reset deletes *all* range names from the worksheet, so be sure you want to delete all of them before using this command. To delete individual range names, use /Range Name Delete.

Procedure

Select /Range Name Reset.

The worksheet no longer has any named ranges.

Related Commands

/Range Name Delete removes specific range names.

/Range Name Table lists all the range names in the worksheet.

/Range Name Table

/RNT alphabetically lists all the range names and their corresponding addresses in a two-column table in the worksheet. The ability to check the locations of named ranges prevents you from assigning range names to overlapping ranges.

CAUTION Be sure you specify the range for the table in an empty part of the worksheet; otherwise, the table writes over any data in the range.

Procedure

1. Select /Range Name Table.
2. Specify a range for the table of range names and press RETURN. You need specify only the upper left corner cell of the range.

1-2-3 lists all the range names in the specified range. The names appear alphabetically in the first column, and their corresponding addresses appear in the second column.

If you name additional ranges or change the definition of existing ones, you must create another table with /Range Name Table to see the current status of range names.

Related Commands

/Range Name Create names ranges with any name you choose.

/Range Name Labels names cells with adjacent labels.

/Range Name Delete removes a specific range name.

/Range Name Reset deletes all range names from the worksheet.

/Range Justify

/RJ treats a continuous column of text as a paragraph, rearranging the words so that none of the lines is longer than a specified width.

- You can use /Range Justify if you want the words in a series of long labels to appear on the screen at the same time, or to be printed within specific margins. For /Range Justify to work, the long labels must all start in the same column and appear in consecutive rows. The first non-label cell in the column signifies the end of the "paragraph."
- If you have added or deleted words in a paragraph and want to rejustify it, /Range Justify is also useful.
- After the justification, the width of the specified range becomes the new width for the labels in the first column. The maximum width is 240 characters. The width depends on the number of columns you specify as part of the range and the current width of those columns.
- You cannot use /Range Justify to justify text in more than one range at a time.
- 1-2-3 is useful for some text processing, but it is not a word processor. You can store text in a text file using /Print File, and then use it with a word processing program, or you can load certain word processing files into the worksheet using /File Import Text.

CAUTION Do not use /Range Justify if any cells in the range are protected, or you may get an error. Select /Worksheet Global Protection Disable to turn off protection before using /Range Justify.

Procedure

1. Position the cell pointer at the top of the column you want to justify.
2. Select /Range Justify.
3. Specify a single-row or multiple-row range of the width you want by pressing the arrow keys and press RETURN.

   If you specify a single-row range, 1-2-3 automatically makes room for the rearranged labels.

   When you specify a single-row range, 1-2-3 justifies the labels ir consecutive rows of the first column of the range down to the first non-label cell in the column. 1-2-3 moves the words that make up the labels to different rows, if necessary, so that no

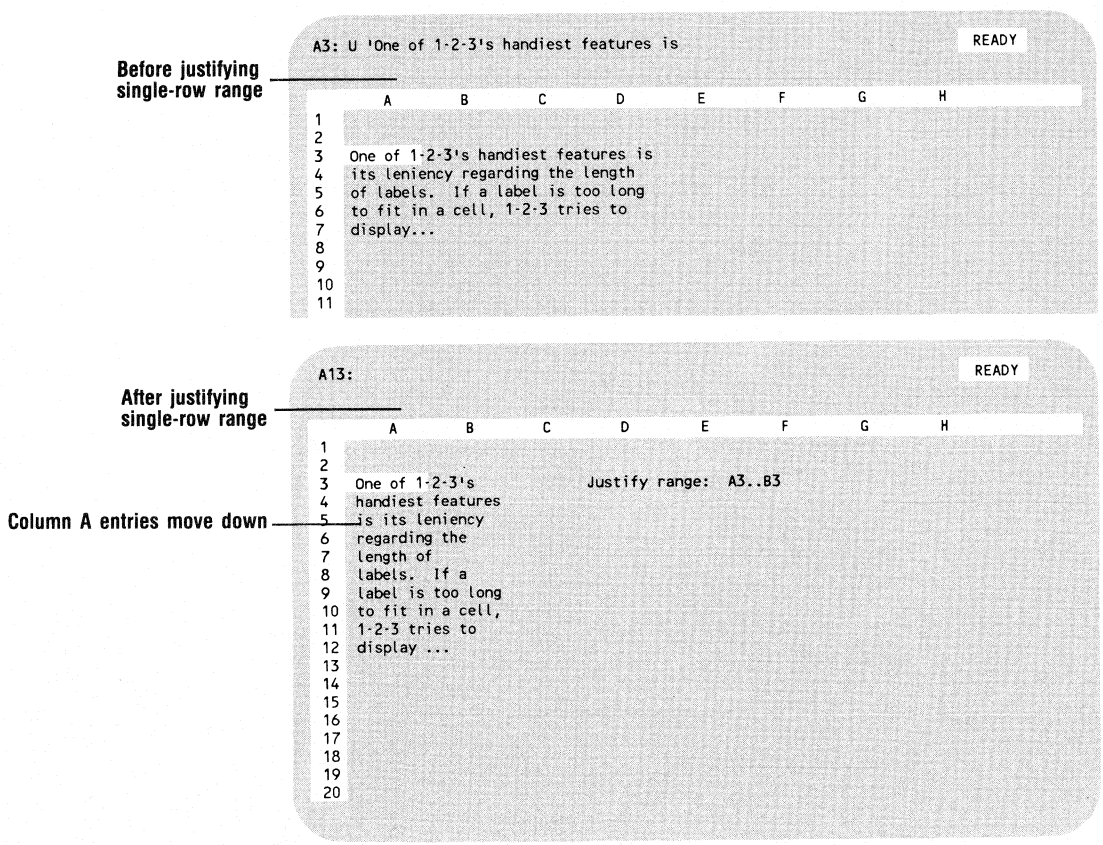


Figure 2-7

label exceeds the specified width and left-aligns all the labels, giving them the label prefix ('). If a narrower paragraph requires more rows than it originally occupied, 1-2-3 shifts the contents of the remainder of the column down below the end of the range. Conversely, in the case of a wider paragraph, 1-2-3 moves cells up in the column below the paragraph.

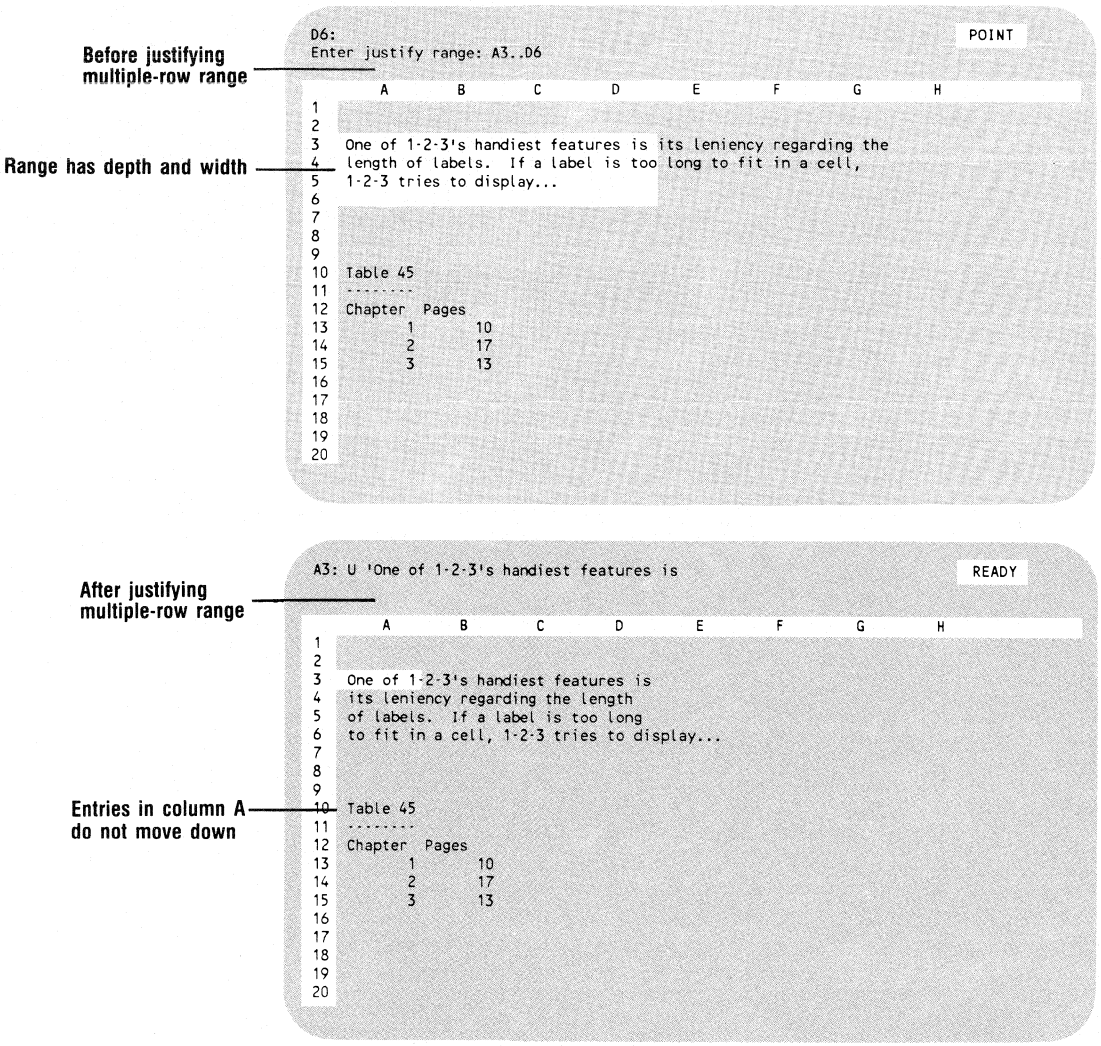


Figure 2-8

If you specify a multiple-row range, 1-2-3 restricts the justification to the exact area you have specified. If you do not specify an area large enough for the labels you are trying to justify, you get an error message.

When you specify a multiple-row range, 1-2-3 considers the end of the paragraph to be either a blank cell or one containing a number, or the bottom of the range you specified. 1-2-3 rearranges words in the labels *only* within the specified range; it does not move any data outside the range.

/Range Protect

/RP prevents changes and deletions to a range of cells when global protection for the worksheet is enabled.

- Protecting cells is particularly useful when you create a worksheet for others to use but you want to prevent them from changing or deleting data.
- /Range Protect has no effect unless you have enabled global protection using /Worksheet Global Protection Enable, or unless the protected cells are part of the range you are working with while using the /Range Input command.
- You do not need to use /Range Protect unless you previously allowed changes to cells with /Range Unprotect. If you enable global protection, you cannot change the contents of *any* cell in the worksheet unless you use /Range Unprotect.

Procedure

Note: Only use /Range Protect to protect cells you unprotected after enabling global protection with /Worksheet Global Protection Enable.

1. Select /Worksheet Global Protection Enable to turn on the protection facility, if you have not already done so.
2. To change or add data, unprotect specific cells with /Range Unprotect.
3. Select /Range Protect.
4. Specify the range that you wish to protect again and press RETURN.

The range you specified is now protected. If you enabled global protection, a PR appears on the control panel to indicate protected cells.

Related Commands

/Worksheet Global Protection enables and disables protection.

/Range Unprotect allows changes to cells even if global protection is enabled.

/Range Unprotect

/RU allows changes to a range of cells when global protection for the worksheet is enabled.

Procedure

1. Select /Range Unprotect.
2. Specify a range to which you want to allow changes and press RETURN.

The range you specified is now unprotected, so you can make changes to its contents. 1-2-3 indicates unprotected cells with a U on the control panel.

If you are using the /Range Input command, you can move the cell pointer only to the unprotected cells in the specified range.

Related Commands

/Range Protect prevents changes to cells when global protection is enabled.

/Range Input

/RI limits the movement of the cell pointer to unprotected cells within a specified range.

/Range Input helps you set up fill-in-the-blanks entry forms to facilitate data entry. With the cell pointer limited to unprotected cells, protected cells can contain information you do not want modified. The /Range Input command is most useful in conjunction with macros.

Procedure

1. Enter labels or values into the worksheet to identify the information you will be entering.
2. Select /Range Unprotect to remove protection from the cells in which you want to enter data using the /Range Input command.
3. Select /Range Input.
4. Specify the range you want to serve as the entry form area and press RETURN.

   The entire entry range moves to the upper left corner of the screen. You can only move the cell pointer to the unprotected cells in the range.

5. Move the cell pointer to unprotected cells and enter or edit data in these cells.

   You can use the following keys with /Range Input: RETURN, ESCAPE, HELP, EDIT, BACKSPACE, HOME, END, RIGHT, LEFT, UP, and DOWN.

6. End the /Range Input command by pressing ESCAPE or RETURN *without* first typing or editing an entry.

When you try to move the cell pointer to a protected cell while using /Range Input, 1-2-3 beeps and displays an error message.

If you use /Range Input as part of a macro, 1-2-3 suspends all macro activity to process data input. When you end the /Range Input command, 1-2-3 returns control to the macro.

After you finish using /Range Input, the cell pointer returns to its initial positions.

Related Commands

/Range Unprotect allows pointer movement to specified cells during the /Range Input command.

/Range Value

/RV converts formulas in a range to their values.

- /Range Value is useful if you want to copy only the displayed values of formulas, *not* the formulas themselves, to another part of the worksheet. If a cell contains the formula +A5*B6, which results in the value 34, /Range Value would copy 34, not +A5*B6. To copy formulas, you must use /Copy.
- To convert the formulas in a range to their values, specify the same range as the FROM and the TO range during the /Range Value command. Note, however, that by doing this you lose the formulas.

CAUTION If you copy values to a range whose cells already have entries, 1-2-3 replaces their contents with the copied values. Formulas that depended on the previous contents of the range will now use the transferred values.

Procedure

1. Select /Range Value.
2. Specify the FROM range, the cells whose entries you want to convert to values, and press RETURN.
3. Specify the TO range, the cells in which you want to place the copied values, and press RETURN.

You need to specify only the upper left corner cell of the range.

1-2-3 copies cell values to the TO range. The copied entries include the numeric format of the FROM range cells.

/Range Value does not affect the data in the FROM range. 1-2-3 recalculates the worksheet or turns on the CALC indicator, depending on the recalculation setting.

Related Commands

/Copy copies cell entries, including formulas, to another location in the worksheet.

/Range Transpose

/RT reorders ranges from columns to rows or from rows to columns.

- /Range Transpose copies and rearranges data in the worksheet by changing a horizontal arrangement to a vertical one, or vice versa. For example, if you had a vertical two-column table, with labels in the first column and corresponding numeric data in the second column, you could rearrange it horizontally so the labels were in a row above the row of numeric data.
- Transposing a range leaves the original range as it was; the operation results in a rearranged copy of the original range.

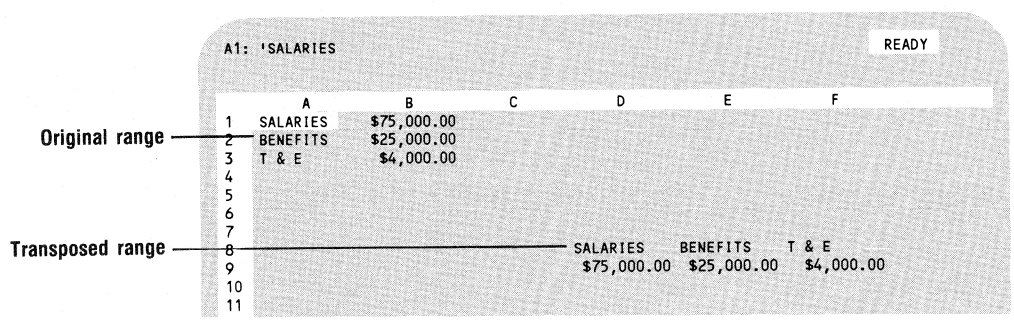


Figure 2-9

CAUTION Do not use this command if your range contains formulas with relative cell addresses. 1-2-3 does not adjust relative cell addresses to refer to the same cells. Use the /Move command instead.

CAUTION If you transpose a range to a location whose cells already contain data, 1-2-3 replaces their contents with the transposed range. Formulas that depended on the previous contents of the TO range will now refer to the transposed cell entries.

Procedure

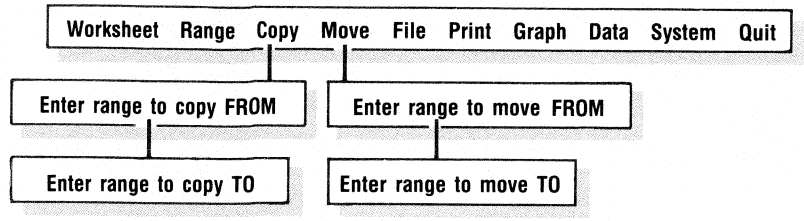
1. Select /Range Transpose.
2. Specify the FROM range, the cells you want to transpose (rearrange), and press RETURN.
3. Specify the TO range, the cells in which you want to place the transposed FROM range, and press RETURN. You need to specify only the upper left corner cell of the range.

1-2-3 creates a copy of the entire FROM range. The copy is a transposed version of the original and runs perpendicular to the original direction of the range. 1-2-3 copies columns into rows and rows into columns. It also copies the numeric formats of the original cells.

/Range Transpose does not work if the FROM and TO ranges share the same upper left corner cell.

Related Commands

/Move lets you rearrange data that includes formulas.



Copy Command

/Copy /C creates copies of existing cell entries.

- When you copy labels and numbers, 1-2-3 makes exact duplicates of the original entries in another location.

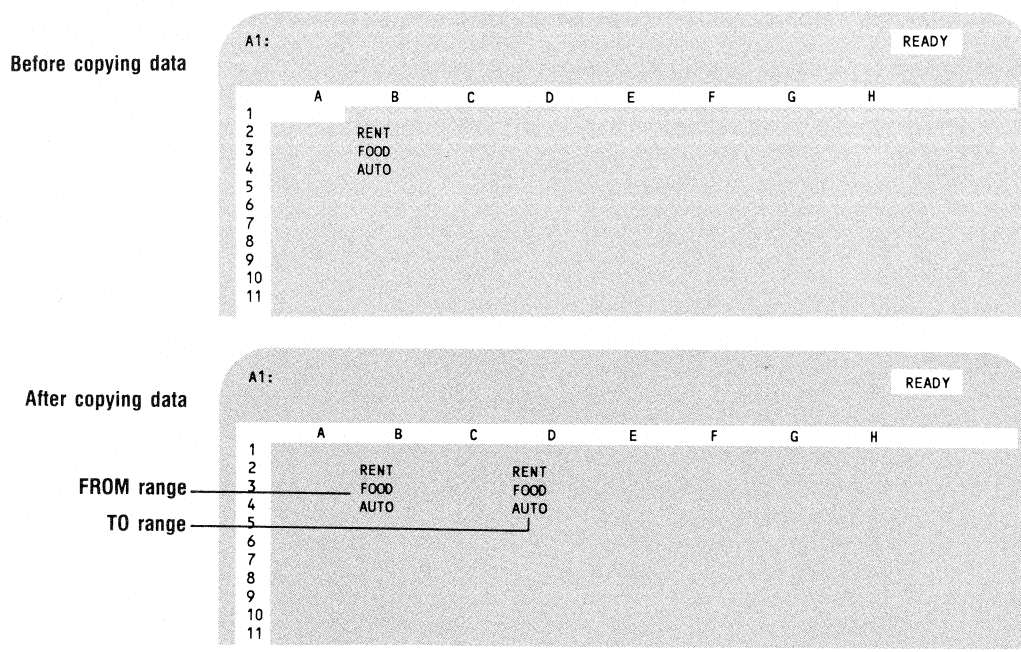


Figure 2-10

- When you copy formulas, 1-2-3 may or may not adjust cell addresses in the formulas, depending on the kind of cell addresses. 1-2-3 recognizes three types of cell addresses: relative cell addresses, absolute cell addresses, and mixed cell addresses. Before you start copying formulas, be sure you understand the differences among these three.

Relative Cell Addresses

When you enter a cell address such as A6 or B45 in a formula, 1-2-3 does not record the address of the cell. Instead, it records the position of the cell in relation to the cell containing the formula. For example, looking at Figure 2-11, if the formula in cell B8 is +B4+B5+B6, 1-2-3 interprets this as "add the contents of the cell four rows up to the contents of the cell three rows up to the contents of the cell two rows up."

A cell address that has a positional meaning is a relative cell address and is easy to copy. For example, in Figure 2-11, if you copy the formula from B8 to E8, the formula in E8 becomes +E4+E5+E6. The relative positions of the cells are maintained.

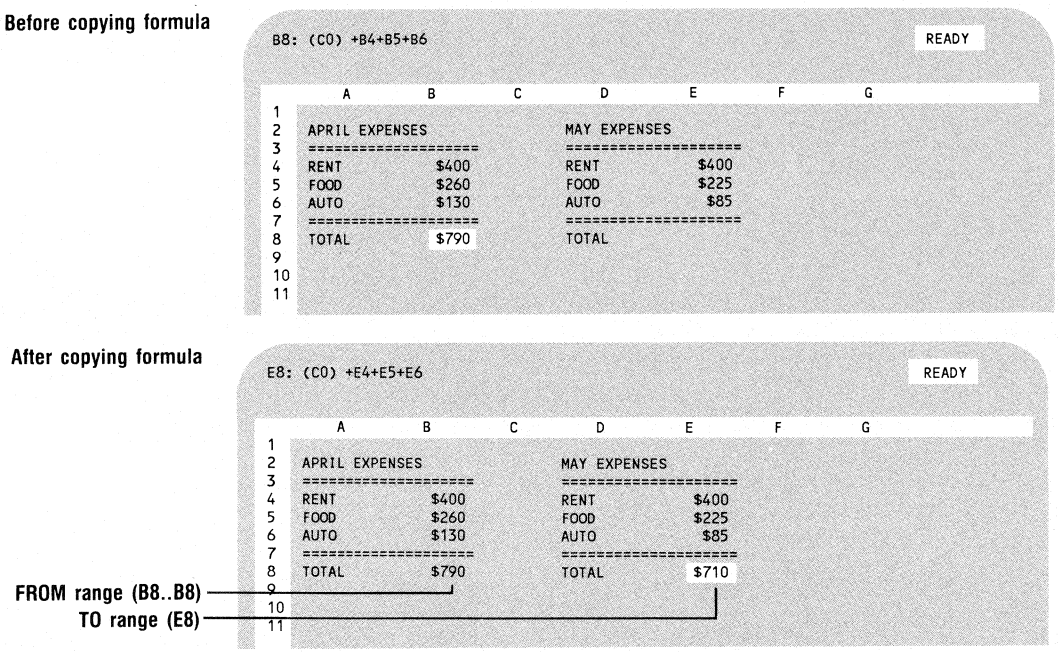


Figure 2-11

Absolute Cell Addresses

In some formulas, you may not want 1-2-3 to regard a cell address as relative. For example, in Figure 2-12, one cell may contain an interest rate that you want to use in a series of calculations. If you wrote the formula +D26*F23 in cell F26 and then copied the formula to F27, the copied formula would be +D27*F24, and F24 does not contain the interest rate you need.

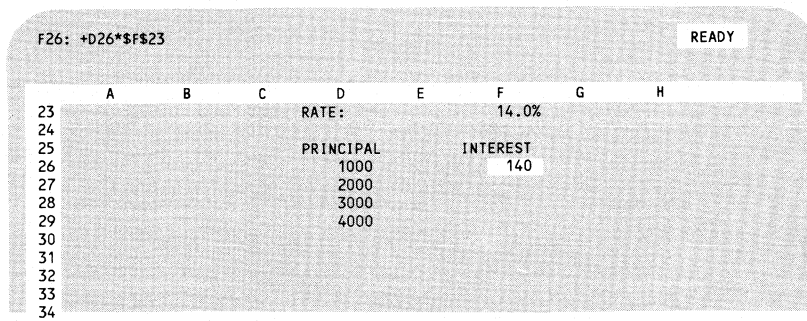


Figure 2-12

To maintain the reference to a specific cell when copying formulas, you must use an absolute cell address. An absolute cell address includes a dollar sign before both the column letter and row number (F23). Figure 2-12 indicates a permanent reference to the value of column F and row 23 of the worksheet. To make a range name absolute, precede it with a dollar sign ($RATE).

Mixed Cell Addresses

At times, when you copy a formula, you may want the row in a cell address to stay the same (absolute) while the column changes (relative), or vice versa. This is a mixed cell address. In a mixed cell address, either the column or row is preceded by a dollar sign but not both. For example, to tell 1-2-3 to use the successive values in column A, you need to indicate that the column should remain the same while the rows change for each new calculation ($A6). Likewise, to calculate using successive values in row 3, you need the row to stay the same while the columns change (B$3).

CAUTION If you copy data to an area of the worksheet that already contains data, 1-2-3 replaces this data with the copied data. Unless you want to replace the existing data, choose an empty area of the worksheet for the copy of the data.

Procedure

1. Select /Copy.
2. Specify the FROM range, the cells whose entries you want to copy, and press RETURN.

CAUTION Avoid specifying overlapping FROM and TO ranges; the results may be unexpected.

3. Specify the TO range, the cells in which you want the copies to appear, and press RETURN.

   You need to specify only the upper left corner cell of the TO range.

1-2-3 copies the data you specified to the area of the worksheet you specified and adjusts any relative addresses in formulas.

Related Commands

/Range Value copies the values of formulas, not the formulas themselves.

Move Command

/Move /M transfers a range of cell entries from one part of the worksheet to another.

- /Move lets you rearrange data in the worksheet while maintaining all the functional relationships among the cells containing the data. 1-2-3 automatically adjusts all formulas in the worksheet to account for moved data. As a result, /Move is a powerful tool for redesigning the worksheet.
- If you move a cell containing a formula, the formula stays the same. If you move the contents of a cell that a formula refers to, 1-2-3 changes the formula to reflect the new cell location.

CAUTION If you move data to an area of the worksheet that already contains data, 1-2-3 replaces this data with the moved data. Unless you want to replace the data, choose an empty area of the worksheet for your data to be moved to.

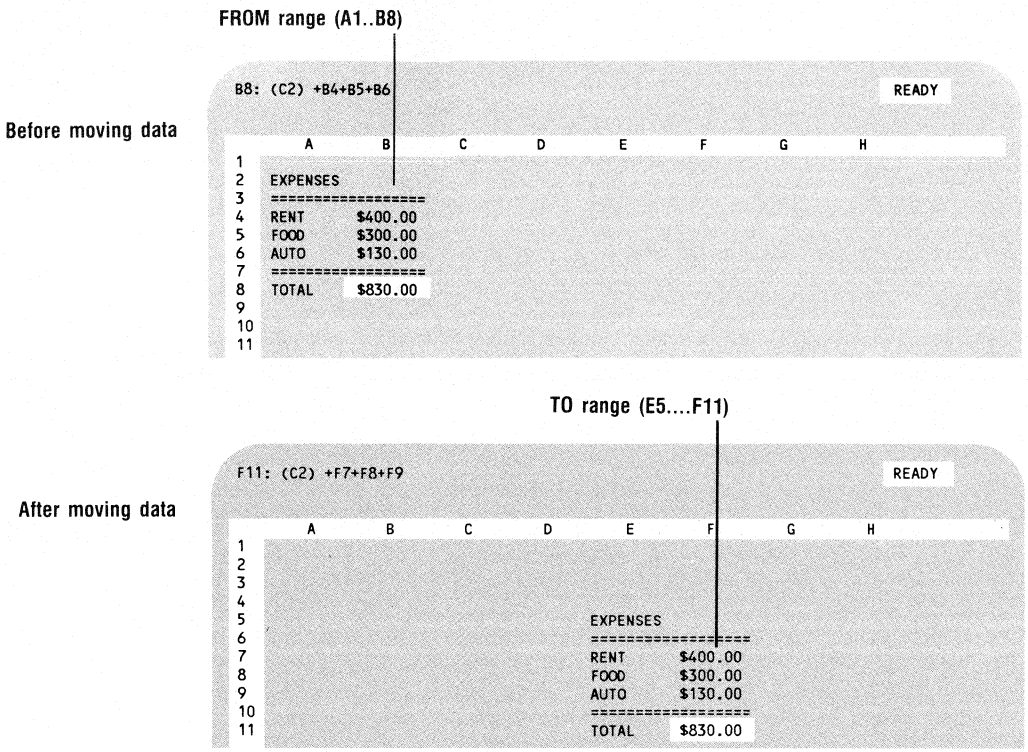


Figure 2-13

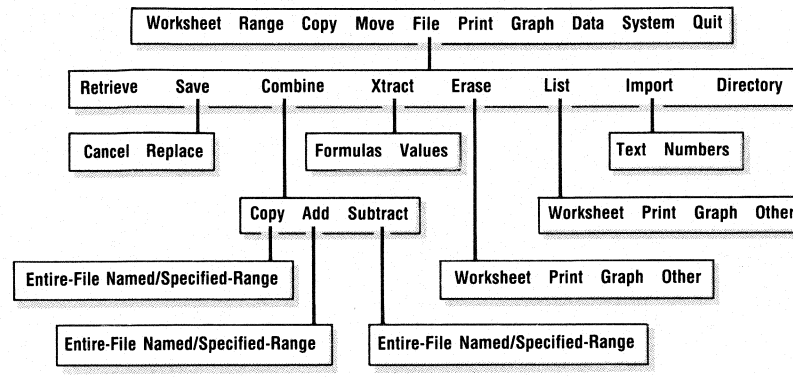
Procedure

1. Select /Move.
2. Specify the FROM range, the range that contains the cell entries you want to move, and press RETURN.
3. Specify the TO range, the cells to which you want to move the cell entries to, and press RETURN.

   You need to specify only the upper left corner cell of the TO range.

1-2-3 moves the entries from the FROM range to the cells in the TO range and automatically adjusts all formulas in the worksheet to reflect the move. 1-2-3 adjusts formulas if you moved either the formulas or the cell entries the formulas depend on.

If you move a cell that is the upper left or lower right corner of a named range, 1-2-3 adjusts the definition of the named range. Moving any other cell in a named range effectively moves it out of the range but does not alter the range name definition.



File Commands

The File commands save 1-2-3 worksheets in files that are stored on a disk. By saving your work in a file, you can retrieve your data after you leave 1-2-3 or turn off your computer.

With the File commands, you can save worksheets in files, retrieve existing 1-2-3 files, incorporate part of one worksheet into another, save part of a worksheet in a separate worksheet file, erase files from a disk, and import a print file into the current worksheet.

File Names

When you save a file, 1-2-3 prompts you to type a file name. A file name can be up to eight characters long, and can include uppercase and lowercase letters, numbers, and the underscore character (_). 1-2-3 does not accept space characters in a file name. Check your DOS manual to see if you can use any other special characters.

If you type	1-2-3
STOCKS	accepts it
CHAP_3_4	accepts it
1985_Rev	accepts it
STOCKS 3	does not accept it because it does not accept spaces in a file name
CHECKBOOK	cuts the name off at the eighth letter

Table 2-7

File Types and File Extensions

You can create three types of files in 1-2-3: worksheet files, print files, and graph files. 1-2-3 distinguishes these file types by adding a three-character extension to each file name you enter. 1-2-3 adds the extension .WK1 to any worksheet file you save, the extension .PRN to any print file you save, and the extension .PIC to any graph file you save.

If you save a worksheet as CLAS_AVG, 1-2-3 adds the extension .WK1. When you retrieve that file with the /File Retrieve command, 1-2-3 displays all the .WK1 files that you have saved, including the CLAS_AVG.WK1 file.

You can enter your own file extension when you save a file, as long as it has three characters or less. Previous releases of 1-2-3 save worksheet files with a .WKS extension, and 1-2-3 displays any of those files along with the .WK1 files when you retrieve a worksheet file. You can save the CLAS_AVG file as CLAS_AVG.WKS, or CLAS_AVG.LST. 1-2-3 automatically displays CLAS_AVG.WKS when you retrieve a file, but to retrieve CLAS_AVG.LST, you must type the file name and its extension after the prompt.

File Name Menus

1-2-3 keeps a list of all the files you have saved in 1-2-3 and all the directories you have created in DOS. When you retrieve a file, 1-2-3 displays a menu showing the names of the files you have saved in the same file type. It also displays the directories you created when the directory on the screen was current. Directories appear with a backslash (\) after the directory name.

You can select a file or directory from the menu. You can also select a file with a different extension by typing in the file name and extension, or you can select a file from another directory by typing in the pathname. Directories can contain many files. When you save a file, 1-2-3 stores it in the directory that you see on your screen, called the current directory.

In this figure, the root directory, indicated by the backslash (\), is the current directory. You can select one of the worksheet files or the OLDACCTS directory.

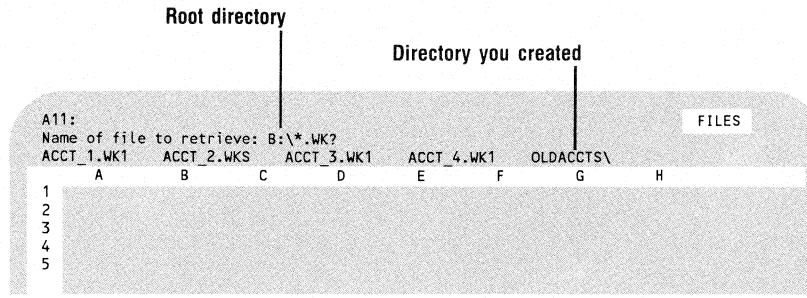


Figure 2-14

Drives and Directories

When you use the 1-2-3 File commands, you see certain characters after the prompt, such as B:\, that direct 1-2-3 to the right directory to locate a file. When you save a file, you see the prompt, Enter save file name: B:*.wk1. Each part of the name is a specification for 1-2-3.

The Drive Specifier

The B:\ tells 1-2-3 which drive to search. A drive specifier always consists of a single letter, followed by a colon. 1-2-3 automatically searches the same disk drive when it saves and retrieves files. This drive is set in the configuration file. If you want 1-2-3 to retrieve a file from a different drive, begin the file name with the drive specifier you want 1-2-3 to go to. If you want to save a file named ACCT_1 on drive C and drive C is not the drive 1-2-3 automatically searches, you must press ESCAPE twice and then type C:\ACCT_1 after the prompt. When you want to retrieve it again, you also type C:\ACCT_1.

The Directory Specifier

The backslash (\) tells 1-2-3 which directory to search. A directory is a subdivision of a disk in which you group related files. Every 1-2-3 file exists in a directory. If you never create your own directory, the files exist in the main DOS directory, called the root directory. The backslash (\) just after the disk drive specifier designates the root directory.

You can create a directory in DOS by typing md and the name you want your directory to have. You can create subdirectories within directories. In 1-2-3, you set one directory as the current directory. The current directory is the one 1-2-3 searches for files. The file names listed in the menu when you retrieve a file are all in the current directory.

The File Name Specifier

The asterisk (*) in the file name is a wild card character for any number of sequential characters. *.WK1 tells 1-2-3 to list the name of every file with a .WK1 extension in the current directory. *.PIC tells 1-2-3 to list the name of every file with a .PIC extension.

The question mark (?) is also a wild card character, but only represents one character. *.W? tells 1-2-3 to list the name of every file with a two-character extension beginning with .W.

Directory Organization and Pathnames

You organize directories and subdirectories in a tree structure, beginning with the root directory. This figure illustrates a sample organization for the directories you might use to store files in 1-2-3.

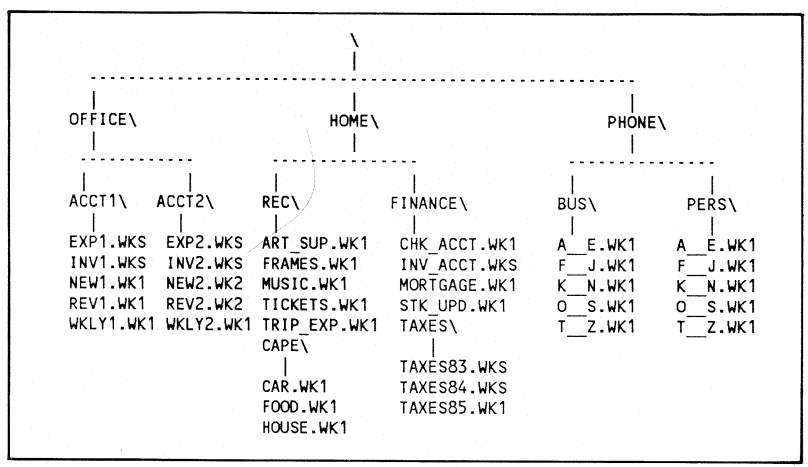


Figure 2-15

When you want to save a file or retrieve a file, 1-2-3 always gives you the entire list of directories that mark the path to this file. This list, beginning with the root directory, is called a pathname. A complete pathname begins at the root directory. A partial pathname begins at the current directory and works its way down in levels.

When you retrieve a file in the BUS (Business) directory, your file menu lists the entire path to that directory, and looks like Figure 2-16.

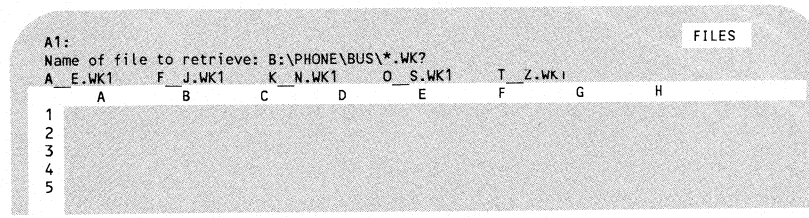


Figure 2-16

When you save a file in the REC (Recreation) directory, your file menu looks like this:

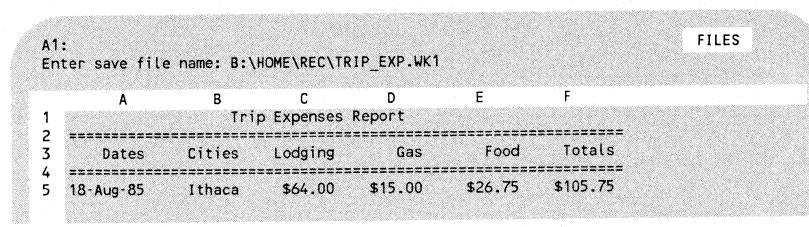


Figure 2-17

File Protection

You can save any 1-2-3 file and protect it by typing a password during the /File Save command. When you save a file with a password, you can retrieve it again only if you enter the correct password.

Automatic File Retrieval

When you start a 1-2-3 session, a blank worksheet appears on the screen. If you want to work on the same worksheet each time you start a session, name it AUTO123 and 1-2-3 automatically retrieves that worksheet every time you start a session.

Make sure that AUTO123 is saved in the current directory so that 1-2-3 can retrieve it at the start of each new session.

/File Retrieve

/FR loads a worksheet file from a disk into the computer's memory, and displays it on the screen. 1-2-3 retrieves a file only from the current directory.

- Because 1-2-3 erases the current worksheet when you use the /File Retrieve command, save the changes in the current worksheet before you retrieve the new file.
- If you retrieve a protected worksheet file, 1-2-3 prompts you to enter the file's password.

- When you use /File Retrieve, and the file names appear on the menu, you can press NAME to see a list of current files and directories, when they were last used, and how large they are. Press NAME again to return to the File menu.
- To retrieve a file in another directory, enter the correct directory pathnames before the file name. For example, if the current directory is PROJECT1 and you want to retrieve the EXPENSES.WK1 file from the directory named PROJECT2\, you type \PROJECT2\EXPENSES. You must always begin your pathnames with the root directory.

Procedure

1. Select /File Retrieve.
2. Choose a file from the menu with the menu pointer, or type the name of a file not on the menu, and its extension, after the prompt.
3. Press RETURN.

   A copy of the file you choose appears on the screen.

Related Commands

/File Combine copies, adds, or subtracts a section of a worksheet file to the current worksheet.

/File Import transfers a file from another program to 1-2-3 and converts it to 1-2-3 format.

/Worksheet Global Default Status displays the current directory at start up.

/File Save

Cancel Replace

/FS saves the current worksheet and the settings associated with it in a worksheet file.

- You should save files often, keeping an updated file on the disk, of the changes in your worksheet.
- Save a copy of the worksheet in a file on a disk that is not the default disk by typing the disk drive specifier and a colon before the file name. To save the file NEW_ACCT in drive C, type C:\NEW_ACCT.

- Save the worksheet on the default disk in a directory other than the current directory by typing the correct directory pathname before the file name. To save the file NEW_ACCT in the ACCTS directory, you type \ACCTS\NEW_ACCT. You must always begin your pathnames with the root directory.
- Save the worksheet that you want to appear every time you start 1-2-3 in a file named AUTO123, and make sure that AUTO123 is in the current directory.
- If you try to save a file on a disk with inadequate available memory space, an error message appears. When this happens, press ESC, insert another data disk, and try again.
- Save a worksheet that contains more information than one disk can hold by extracting portions of it with the /File Xtract command, and saving those portions on separate disks. To retrieve them from separate disks, use /File Combine.

Procedure

1. Select /File Save.
2. Enter the file name at the prompt by pressing RETURN, or type a new file name and press RETURN.
3. Choose Replace or Cancel from the menu.

   If you choose Replace, you write over the existing file of the same name with the data from the current worksheet.

   If you choose Cancel, you return to the current worksheet in READY mode. Nothing is saved.

Saving a File with a Password

You can use the /File Save command to create a password for a file, change the password, or delete the password.

CAUTION When you save a file with a password, you can retrieve it only if you enter the correct password. If you forget the password, there is no way to retrieve the file.

Procedure

To create a new password:

1. Select /File Save.
2. Type the file name.
3. Press SPACE.
4. Type P.
5. Press RETURN.

6. Enter the password at the prompt.

   You do not see your password on the screen. Instead, you see a small box after the prompt for each letter you type. Your password can be up to 15 characters long, and you can use any LICS characters.

7. Press RETURN.
8. Type the password again after the Verify prompt and press RETURN.

To change or delete a password:

- Use the same password by pressing RETURN.
- Change the password by pressing either ESCAPE or BACKSPACE, and repeat the steps for saving a new password starting at step 3.
- Delete the password, but save the file, by pressing either RETURN or BACKSPACE and then press RETURN.

Related Commands

/File Xtract saves a copy of a portion of the current worksheet in a separate worksheet file.

/Worksheet Global Default Status displays the current directory.

/Worksheet Status displays the available memory.

/File Combine

Copy Add Subtract

/FC incorporates all or part of a worksheet file into the current worksheet at the location of the cell pointer. 1-2-3 uses the cell pointer as the upper left corner cell for the incoming data. All other entries fall into corresponding cells to the right and below the cell pointer.

- 1-2-3 combines only cell entries. No worksheet or print settings are incorporated into the current worksheet.
- Avoid any loss of data from combining a file incorrectly by saving the current worksheet before using /File Combine.
- You have three options when combining the data from the incoming file: add to the cells in the current worksheet, subtract from the cells in the current worksheet, or copy over the cells in the current worksheet.

Procedure

1. Position the cell pointer in the upper left corner of the area into which you want to incorporate data from the worksheet file.
2. Select Copy, Add, or Subtract from the menu.
3. Choose Entire-File or Named-Range from the menu.

   If you choose Entire-File, select a name from the menu, or enter a new file name. Include a disk drive specifier or a directory pathname if you want 1-2-3 to read files from another disk or directory.

   If you choose Named-Range, type the name of the range to extract from the worksheet. 1-2-3 does not display a menu of these names.

Menu Item	Action
Copy	Replaces the entries in the current worksheet with incoming values.
Add	Adds incoming values to the values in the current worksheet. If an incoming value overlays a cell containing a numeric value, 1-2-3 adds the two values. Incoming values replace blank cells. If an incoming value overlays a label or formula cell, 1-2-3 discards the incoming value and retains the label in the current worksheet.
Subtract	Subtracts incoming numeric values from numeric values in the current worksheet file. A positive number subtracted from a blank cell produces a negative result.

Table 2-8

Related Commands

/Range Name Create names a specific worksheet range.

/File Xtract

Formulas Values

/FX extracts and saves a portion of the current worksheet in a separate worksheet file. /FX does not change any data in the current worksheet.

The global settings in the current worksheet, such as named ranges, graphs, and formats, are saved in the new file with the extracted range.

- Use /File Xtract to split a large worksheet into smaller parts or to use one part of a worksheet in another worksheet.
- When you select a range to extract, make sure it does not contain formulas that reference cells outside of the extracted range or range names that refer to ranges outside of the extracted range.

Procedure

1. Select /File Xtract.
2. Choose Formulas or Values from the menu.
3. Select a file name from the menu or type a new file name.

   The file you select is the file that will hold the data you extract from the current worksheet.
4. Enter the range you want to extract from the current worksheet.
5. If you selected a name from the menu, choose Replace or Cancel.

   Replace: Writes over the existing file with the data from the current worksheet.

   Cancel: Returns you to the current worksheet in READY mode. Nothing is saved.

Menu Item	Action
Formulas	1-2-3 saves formulas in the current worksheet in the extract file.
Values	1-2-3 saves numbers and labels. It also saves values resulting from formulas but does not save the formulas that produced those values.

Table 2-9

Related Commands

/File Combine incorporates part of a worksheet file into the current worksheet.

/File Erase

Worksheet Print Graph Other

/FE removes files of a particular file type from the disk.

- /File Erase brings up a menu of one file when you type in an explicit file name.
- /File Erase removes all files that match a description when you type in wild card characters as part of a file name. To find files REF1.WK1, REF2.WKS, REF3.WK1, REF4.WKS, and REF5.WRK, you can type REF?.W?? as the file name.
- A question mark (?) matches any single character in the same position in the file name. H?T matches HIT, HOT, and HUT, but not HUM.
- An asterisk (*) matches all remaining characters up to the end of the file name. C* matches C, CAT, CAR, and CONF, but not ACCTS.
- To erase files that are not in the current directory, change the current directory or precede the file name with the correct directory pathnames; for example, type \DIR3\ACCTS.
- To erase files that are not in the current disk drive, precede the file name with the correct disk drive letter and a colon; for example, type C:\ACCTS.

Procedure

1. Select /File Erase.
2. Choose Worksheet, Print, Graph, or Other.

   Worksheet displays all .WK1 and .WKS files. Print displays all .PRN files. Graph displays all .PIC files. Other displays all files in the current directory.
3. Select a file name from the menu.
4. Press RETURN.
5. Select No or Yes from the menu.

Related Commands

/Range Erase removes a range from the current worksheet but leaves the disk file unchanged.

/Worksheet Erase removes the current worksheet from the screen and gives you a new one, but leaves the disk file unchanged.

/File List

Worksheet Print Graph Other

/FL displays the names of all files of a particular type stored in the current directory.

- /File List temporarily replaces the current worksheet with a list of file names and information about the highlighted file.
- If there are no files of the specified file type on the disk, 1-2-3 puts you in EDIT mode so that you can enter a new file extension.
- Use /File List after you erase a file to see if it is erased from the list of current files.

Procedure

1. Select /File List.
2. Choose Worksheet, Print, Graph, or Other.

   Worksheet displays all .WK1 and .WKS files. Print displays all .PRN files. Graph displays all .PIC files. Other displays all files in the current directory.
3. Press RETURN.

/File Import

Text Numbers

/FI copies a print file from the current directory into the current worksheet at the location of the cell pointer. You can import text or numbers. /File Import imports standard ASCII files.

- Use this command to import data from programs that produce standard ASCII files. You may need to rename the incoming file because all print files must have the .PRN file extension.
- ASCII files can be only 240 characters wide and 8192 characters long.

CAUTION: Many word processors produce files that contain special characters. If you try to import these files with the /File Import command, you may get unpredictable results. Most word processors, however, produce standard ASCII files which should be compatible with 1-2-3.

New data replaces any existing cell contents for both text and numbers. Blank lines in the incoming file skip a row in the current worksheet; the contents of those worksheet rows are not affected.

Procedure

1. Position the cell pointer in a worksheet cell.

   This cell becomes the top left corner cell of the range into which you import the file.
2. Select /File Import.
3. Choose Text or Numbers from the menu.
4. Type the name of the print file that you want to import.
5. Press RETURN.

Menu Item	Action
Text	Each row in the worksheet file now has a separate left-aligned label containing the text in that line, resulting in a column of long labels.
Numbers	1-2-3 searches the print file for numbers and any series of characters enclosed in quotes. All other file contents are ignored. 1-2-3 creates a number cell for each number. 1-2-3 creates a left-aligned label for each quoted label. Successive numbers and labels from the same line of the print file appear in successive columns of the same row of the current worksheet. Data from the next input line appears in the next row of the worksheet, continuing until the print file has been completely read.

Table 2-10

Related Commands

/Data Parse breaks up a row of data entered as a long label into individual cell entries.

/Print File sends worksheet data to a standard ASCII file.

/File Directory

/FD replaces the current directory with a new one, making that the current directory for this 1-2-3 session. If you type a file name without a disk drive specifier, 1-2-3 automatically assigns the current disk drive and directory to the file.

Procedure

1. Select /File Directory.

   The current directory appears on the screen.

2. Press RETURN to retain the setting, or type the correct directory pathname to change the current directory.

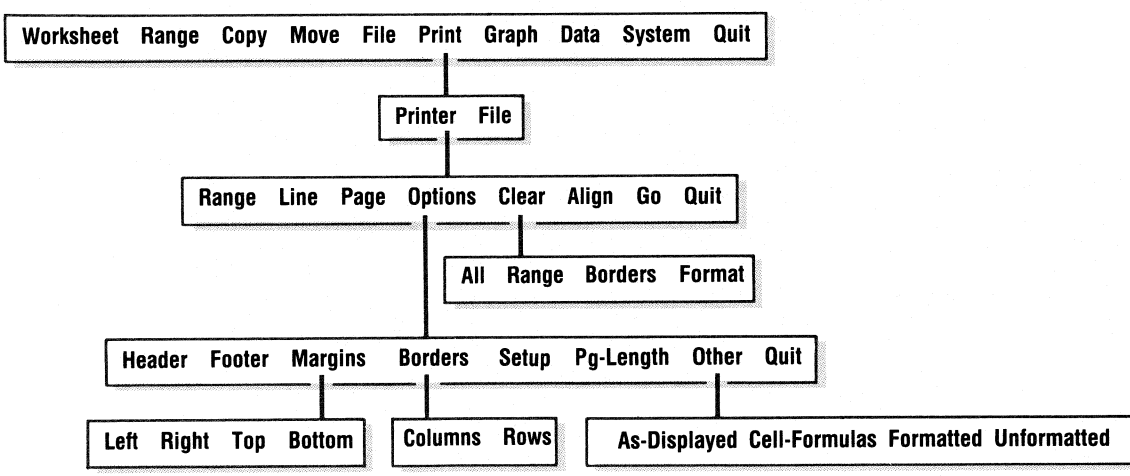
   You can start a pathname at the current directory if the directory you want is on a lower level.

Related Commands

/File Retrieve loads a file from the current disk directory.

/Worksheet Global Default Directory sets the default disk directory where 1-2-3 stores and receives data.

/Worksheet Global Default Update saves default settings in a configuration file and permanently updates the current directory.



Print Commands

The Print commands let you create printed copies of a worksheet. You can print a worksheet on a printer, or print it to a file saved on a disk. Printing to a file lets you print the file from DOS, or use the file in another program, such as a word processing program.

With the Print commands, you can also specify a range to print, advance the printer by a line or a page, tell the printer you are at the top of a page, and set printing options such as margins, page length, headers, and footers.

The basic steps for printing to a printer or file appear immediately below. The rest of the section describes the printing options. Before you try to print a worksheet on a printer, be sure to use the Install program to indicate the printer you are using. See Chapter 1 of *Getting Started*. It is a good idea to save your file using /File Save just before you print it.

Procedure

1. Select /Print Printer or /Print File.

   If you are printing to a file, type a file name, or choose one from a list of existing file names.

   If you choose an existing name, select Replace to replace the file with the current worksheet, or select Cancel and start the /Print command again.

2. Select Range.
3. Specify the range you want to print.
4. Select Options and make any changes.
5. Select Align from the Print menu, turn your printer on, and adjust the paper so that it is at the top of a page.
6. Select Go to print the range.
7. Select Quit to leave the menu.

If you are printing to a file, you will not see anything happen until you select Quit.

If you don't make any changes in the individual or global page format, 1-2-3 uses the following settings when you print a worksheet:

Left Margin	4 spaces from the left edge of the paper
Right Margin	76 spaces from the 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

You can change any of these settings for all your 1-2-3 sessions with /Worksheet Global Default Printer, or change them for a single worksheet with /Print Printer Options.

The default printer port is Parallel 1. If you are using a serial printer or a printer on a DOS network, select /Worksheet Global Default Printer Interface and choose the appropriate port. Then press Quit and select Update to store this change for future 1-2-3 sessions.

When you print to a file, 1-2-3 automatically appends the extension .PRN to the file name so you can easily identify print files on your disk. (Worksheet files use the extension .WK1.) You can bring a .PRN file back into 1-2-3 with /File Import, but you lose the column and row structure. A .PRN file is an ASCII file.

/Print Printer *or* File Range

/PPR and /PFR let you specify the worksheet range you want to print or store in a file.

When you specify the range, be sure that the highlight covers all the information you want to print. For instance, if column H has no filled cells, but you have long labels in column G that extend into column H, you must highlight column H as well as column G, or the end of the labels will not be printed.

Procedure

1. Select either /Print Printer Range or /Print File Range.
2. Press PERIOD to anchor the range.

3. Use the pointer-movement keys to highlight the range you want to print.
4. Press RETURN.

To indicate the print range, you can highlight it, type the corner addresses of the range, or use a range name created with /Range Name Create.

1-2-3 remembers the last range you printed, so if you want to print the same range again, you do not need to use /Print Printer (or File) Range.

If you do select Range from the Print menu, 1-2-3 highlights the last range you selected, and you can accept it by pressing RETURN.

If you plan to use a border (a range from the worksheet that appears at the top or on the left side of each printed page), do not include the cells for the border in the print range or you will have two copies of the information.

Related Commands

/Print Printer Go or /Print File Go starts the print procedure.

/Print Printer *or* File Line

/PPL advances the printer to the beginning of the next line on the page. If the printer reaches the bottom of a page, the paper advances to the top of the next page. /PFL inserts a blank line in a text file.

Procedure

Select /Print Printer Line or /Print File Line.

/Print Printer *or* File Page

/PPP advances the current page to the bottom and prints the footer, if there is one. Using /Print Printer Page at the end of a document puts the footer on the last page and advances to the top of the next page. /Print File Page inserts a footer and blank spaces in a print file.

Procedure

Select /Print Printer Page or /Print File Page.

Related Commands

/Worksheet Page puts a page break in the worksheet, so 1-2-3 starts a new page as indicated, no matter how much space is left on the current page.

/Print Printer *or* File Options

Header	Footer	Margins	Borders	Setup	Pg-Length	Other	Quit

/PPO and /PFO change the margins, borders, and page length of your printed documents, add headers and footers, and indicate font size and style.

Procedure

1. Select /Print Printer Options or Print File Options.
2. Select a menu item.

   Header: Prints one line of text just below the top margin of every page. You can type up to 240 characters (limited by your paper width and margins). Use a number sign (#) to generate sequential page numbers starting with 1. Use an at sign (@) to produce the current date.

   Footer: Prints one line of text just above the bottom margin of every page. You can type up to 240 characters (limited by your paper width and margins). Use a number sign (#) to generate sequential page numbers starting with 1. Use an at sign (@) to produce the current date.

   Margins: Sets margins for the printed page. Select Left, Right, Top, or Bottom. 1-2-3 displays the current margin setting. To change the setting, type a number up to 240 (for left or right margins) or 32 (for top or bottom margins) and press RETURN.

   Borders: Prints specified rows or columns on every page, above or to the left of the range you are printing. Choose Rows or Columns. If you have already specified that kind of border, 1-2-3 highlights it. To use this range, press RETURN; otherwise, highlight or type a new range. Don't include the area you specify for the borders in your print range or you will get two copies of the same information.

   Setup: Specifies font size and style for the printer. Type a setup string up to 39 characters, and press RETURN. If 1-2-3 displays an existing setup string, press ESCAPE first. Setup strings come from printer control codes, which you can find in your printer manual. You generally use a three-digit or four-digit code, prefaced with a backslash (\).

   Pg-Length: Indicates the number of printed lines that fit from top to bottom on a page. Press RETURN to use the current page length, or type a number between 10 and 100 and press RETURN.

Other: This command is described in the /Print Printer Options Other section.

Quit: Select Quit to return to the Print menu.

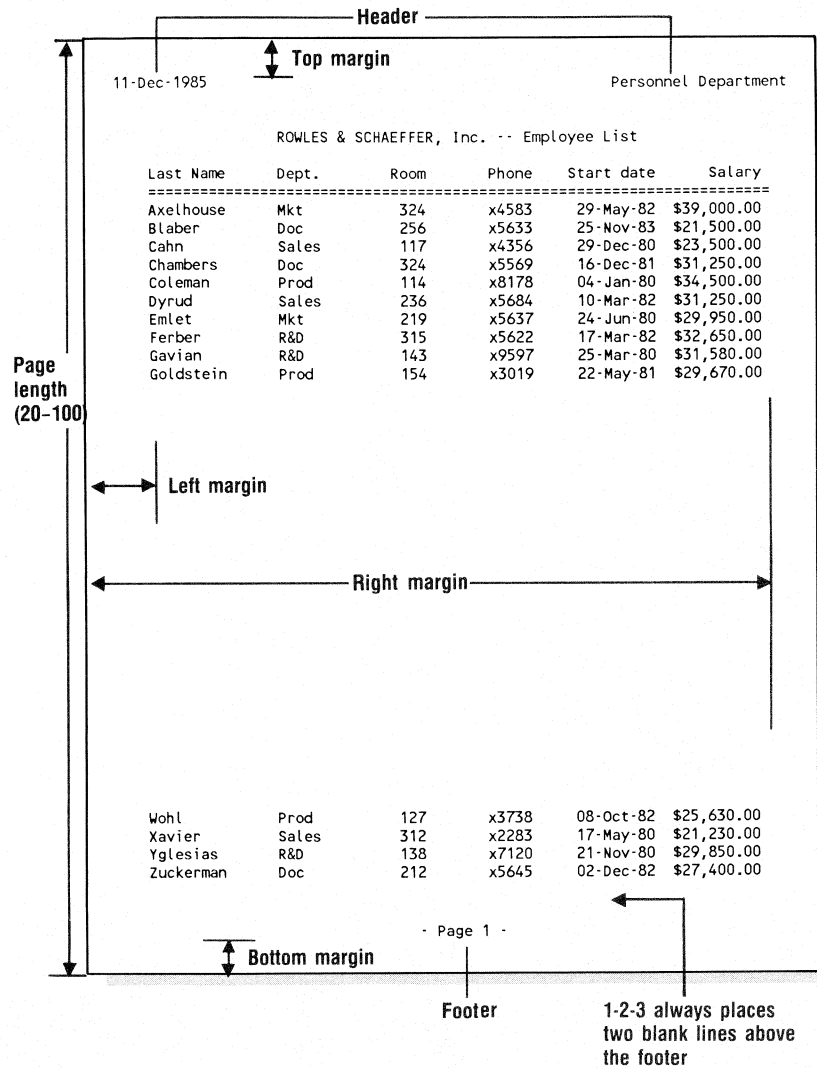


Figure 2-18

1-2-3 always leaves two blank lines between the text and the headers or footers. Headers and footers can have up to three parts: a left-aligned segment, a centered segment, and a right-aligned segment. Use the split vertical bar character (¦) to separate segments. The examples below illustrate page 15 of a document printed on February 23, 1986:

Enter	Results
ABC Company	ABC Company
¦ABC Company	ABC Company
ABC Company¦¦ Page #	ABC Company Page 15
@¦ABC Company¦ Page #	2/23/86 ABC Company Page 15

Table 2-11

If anything in your print range extends beyond the right margin you set with /Print Printer Options Margins, 1-2-3 prints it at the end of the document. If your right margin is wider than the paper in your printer, 1-2-3 prints the end of the line on the next line. You can eliminate these problems by indicating compressed type in your setup string. In some cases, you need to increase the right margin after you select compressed type to fit more on the page. An alternative is to reduce the margin setting so that the extra material is printed at the end of the document; then match the two parts together for a wide printout.

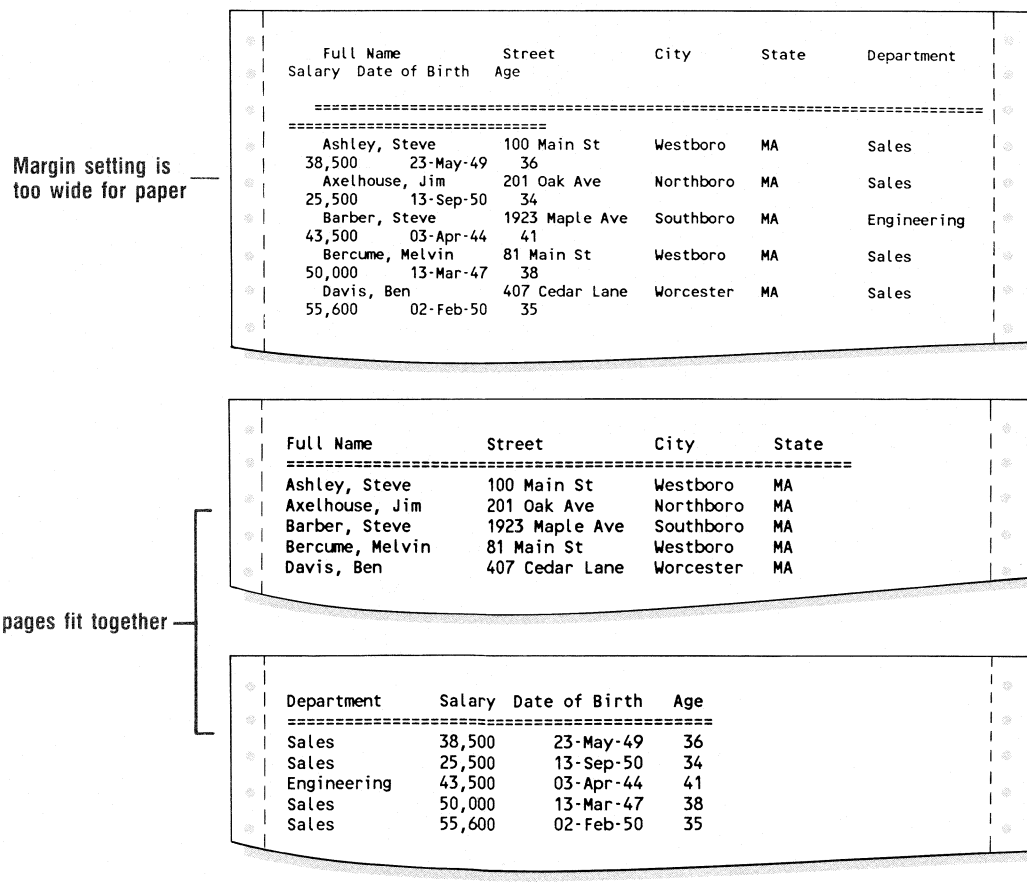


Figure 2-19

The initial default page length is 66, which is appropriate for type that uses 6 lines per inch on 11-inch paper. With a page length of 66, you can print 56 lines from the worksheet as follows:

Lines 1-2	default top margin
Line 3	header (or blank)
Lines 4-5	blank
Lines 6-61	for worksheet
Lines 62-63	blank
Line 64	footer (or blank)
Lines 65-66	default bottom margin

You can use Borders to print nonadjacent columns or rows next to each other. You can also use Worksheet Column Hide for columns. Do not duplicate headings by including them in both the borders and the range. If you select Borders to see the current setting, use ESCAPE, not RETURN, when you finish. Using RETURN will set a border column or row where the cell pointer is.

To indicate a setup string, use your printer's control codes in the form \nnn. Refer to your printer's manual. If you change from one setup string to another, you usually have to turn your printer off and on for the change to take effect. The four examples below work for many printers:

Setup string	Result	Note
\015	turns on compressed print	maximum margin of 132
\018	turns off compressed print	maximum margin of 80
\0270	sets line spacing to 8 lines/inch	set Pg-Length to 88
\0272	sets line spacing to 6 lines/inch	set Pg-Length to 66

Table 2-12

You can enter certain setup strings in worksheet cells to switch from one print style to another within a single worksheet. Precede the setup string with two split vertical bars (¦¦); for instance, on some printers you can use ¦¦\015 to print a section of the worksheet in compressed print. Use ¦¦\018 at the point where you want to return to standard print.

Related Commands

/Print Printer (or File) Clear Borders eliminates the border settings.

/Print Printer (or File) Clear Format restores margins, page length, and setup string to the default settings.

/Print Printer (or File) Clear All eliminates borders, headers and footers, clears the format, eliminates the print range, and restores any settings under Other to their default settings.

/Print Printer (or File) Options Other Unformatted temporarily suppresses headers, footers, and page breaks; use this command if you're printing to a file.

/Worksheet Page lets you indicate the places in your worksheet where you want the printer to start a new page.

/Worksheet Global Zero Yes suppresses the display and printing of all cells equal to zero.

/Print Printer *or* File Options Other

As-Displayed	Cell-Formulas	Formatted	Unformatted

/PPOO and /PFOO change the printing format and the information the document includes.

Procedure

1. Select /Print Printer Options Other or /Print File Options Other.
2. Select an item from the menu.

   As-Displayed: 1-2-3 prints the range as it appears on the screen. Use this option to restore standard output after you have chosen Cell-Formulas.

   Cell-Formulas: 1-2-3 prints the contents of each filled cell in the print range, one cell per line. Each line contains exactly what appears on the first line of the control panel when the cell pointer is on the cell: the cell address, format, the protection status (P or U), and the value or formula in the cell.

   Formatted: Restores any page breaks, headers, and footers, after you have chosen Unformatted.

   Unformatted: 1-2-3 prints ranges without page breaks, headers, or footers. This is useful if you are printing a range to a file, or if you are trying to print a very full page.

As Displayed

```
          Yearly Expenses
==============================

Rent       $5,040.00
Heat         $850.00
Lights       $350.00
Water        $125.00
--------------------
Total      $6,365.00
```

Cell Formulas

```
B1: [W11] 'Yearly Expenses
A2: \=
B2: [W11] \=
C2: \=
A4: 'Rent
B4: (C2) [W11] 420*12
A5: 'Heat
B5: (C2) [W11] 850
A6: 'Lights
B6: (C2) [W11] 350
A7: 'Water
B7: (C2) [W11] 125
A8: \-
B8: [W11] \-
A9: 'Total
B9: (C2) [W11] @SUM(B7..B4)
```

Figure 2-20

Related Commands

/Print Clear All returns printing to As-Displayed and restores other settings to their defaults.

/Print Printer *or* File Clear

All	Range	Borders	Format

/PPC and /PFC clear the print range, headers, footers, and borders, and reset other options. You may want to put these commands in macros to clear any pre-existing print settings.

Procedure

1. Select /Print Printer Clear or /Print File Clear.
2. Select an option from the menu.

   All: Cancels the current print range, clears all borders, headers, and footers, and resets all formats and options to their default settings.

   Range: Cancels the current print range.

   Borders: Clears all borders.

   Format: Resets margins, page length, and setup string to default settings.

/Print Printer Align

/PPA tells the printer that you have positioned the paper at the top of a new page. You do not see any change on your screen.

Procedure

1. Position the printer paper at the top of a page.
2. Select /Print Printer Align.

   Select Align each time you print a worksheet. If you do not use this command, you may get gaps in the middle of your printed page.

Related Commands

/Print Printer Line advances the printer paper a single line.

/Print Printer Page advances the paper to the bottom of the current page and prints the footer, if there is one.

/Print Printer *or* File Go

/PPG and /PFG start the process of printing the range you indicated with /Print Printer Range or /Print File Range.

Procedure

1. Make sure that you have specified a range using /Print Printer Range or /Print File Range.
2. Select /Print Printer Align if you are using a printer.
3. Select Go.
4. Select Quit.

Be sure to select Quit after you print to a file, or the process will be unfinished.

If your printer is off or disconnected when you select Go, 1-2-3 beeps and displays a printer error message on the bottom of the screen. Press ESC, check your printer, and try again.

With some systems, you can interrupt printing and return to the Print menu by pressing BREAK, and then ESCAPE. The printer may not stop immediately because it still has characters in its memory. To clear the printer's memory, turn it off. When you turn it back on, reposition the paper and select /Print Printer Align; then select Go.

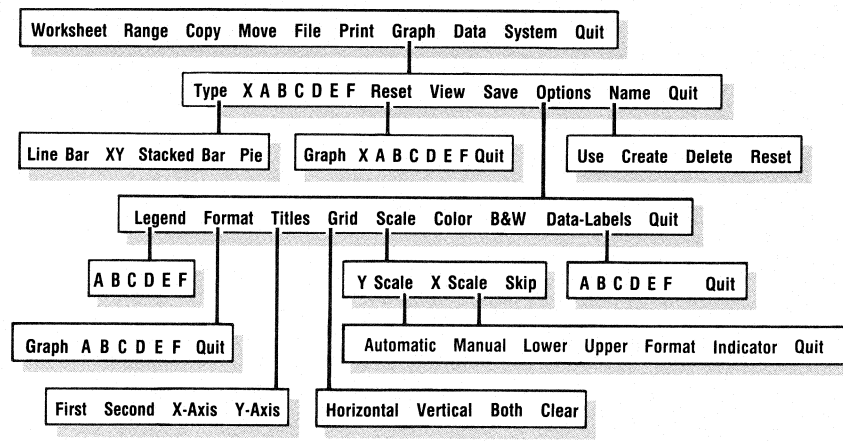
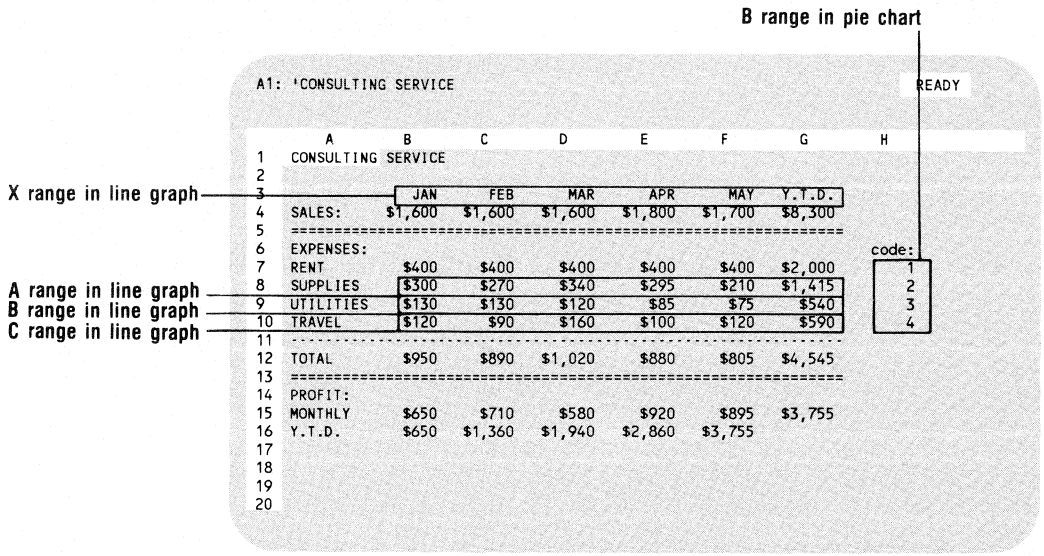


Figure 2-21

Graph Commands

You can represent numeric data you enter into a worksheet as a graph. The 1-2-3 Graph commands can create five different types of graphs: line, bar, XY, stacked bar, and pie charts.

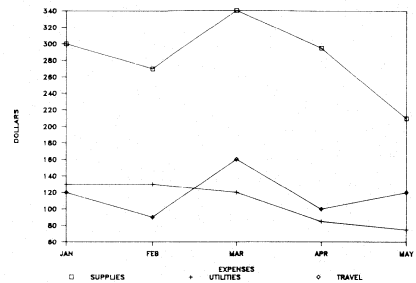
Line graphs show changes in data over time, bar graphs emphasize differences between data items, XY graphs show relationships between two sets of data, and pie charts compare parts to the whole. The following graphs were created from the worksheet in Figure 2-22.



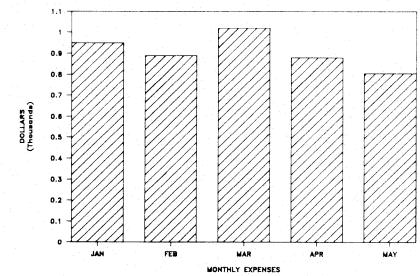
	A	B	C	D	E	F	G	H
1	CONSULTING SERVICE							
2								
3		JAN	FEB	MAR	APR	MAY	Y.T.D.	
4	SALES:	$1,600	$1,600	$1,600	$1,800	$1,700	$8,300	
5	==========	==========	==========	==========	==========	==========	==========	
6	EXPENSES:							
7	RENT	$400	$400	$400	$400	$400	$2,000	1
8	SUPPLIES	$300	$270	$340	$295	$210	$1,415	2
9	UTILITIES	$130	$130	$120	$85	$75	$540	3
10	TRAVEL	$120	$90	$160	$100	$120	$590	4
11	----------	----------	----------	----------	----------	----------	----------	
12	TOTAL	$950	$890	$1,020	$880	$805	$4,545	
13	==========	==========	==========	==========	==========	==========	==========	
14	PROFIT:							
15	MONTHLY	$650	$710	$580	$920	$895	$3,755	
16	Y.T.D.	$650	$1,360	$1,940	$2,860	$3,755		
17								
18								
19								
20								

Figure 2-22

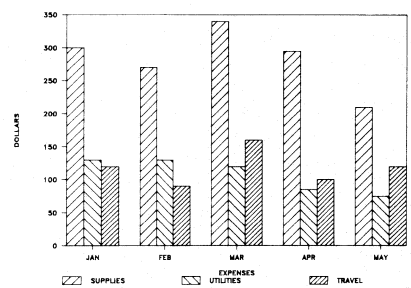
LINE GRAPH



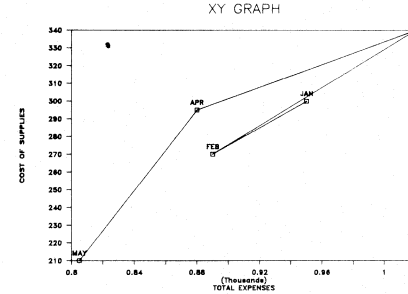
SINGLE RANGE BAR GRAPH



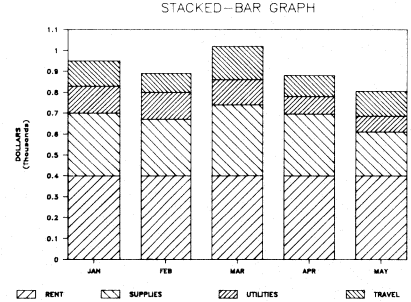
MULTIPLE RANGE BAR GRAPH



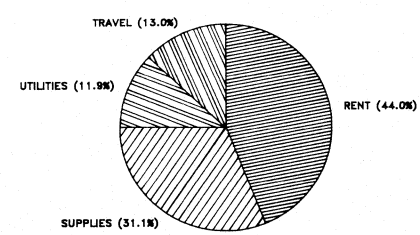
XY GRAPH



STACKED-BAR GRAPH



PIE CHART



/Graph Type

Line	Bar	XY	Stacked-Bar	Pie

Creating a Graph

You can create graphs from worksheet data and view them on your computer's screen if your system has graphics capability. Even if you cannot view the graphs on your computer's screen, you can create a file to print graphs on a printer or plotter using the 1-2-3 PrintGraph program. See Chapter 5.

Graph Data Ranges

When you create a graph, you specify the data ranges you want 1-2-3 to represent in the graph. The different types of graphs display each data range in varying manners.

When displaying a graph, 1-2-3 matches up corresponding values or labels from each range based on their relative positions in the range. Therefore, when you specify data ranges, each range must be a column or row that is the same size as all your other specified data ranges.

To specify graph data ranges, you select the Graph menu item X and A through F. Use the following guidelines to determine the appropriate data range specification for your graph.

Line Graph

A line graph represents each value with a point at an appropriate distance above the horizontal axis. You may create up to six lines on a single graph. 1-2-3 uses different symbols to identify the points on each line.

Use the A range to indicate the set of values you want to represent with your first line, or with one single line.

Use the B–F ranges to indicate the sets of values you want to represent with each additional line.

Use the X range to indicate labels for the points along the X (horizontal) axis.

1-2-3 automatically indicates a numerical scale along the Y (vertical) axis.

Bar Graph

A bar graph represents each value in a range with a bar of varying height. You may create a single-range bar graph, which compares values in one set of data to each other, or a multiple-range bar graph, which displays comparable values from up to six sets of data at each point along the X axis. In a multiple-range bar graph, 1-2-3 uses a variety of shadings or colors to identify the bars for each data range.

For a single-range bar graph, use the A range to indicate the range of values you want each bar to represent.

For a multiple-range bar graph, use the A–F ranges to indicate the ranges of values you want to represent simultaneously.

Use the X range to indicate labels for the points along the X (horizontal) axis.

1-2-3 automatically indicates a numerical scale along the Y (vertical) axis.

XY Graph

In an XY graph, 1-2-3 pairs each value from the X range with the corresponding value from each of the A–F ranges to plot points on the graph. You may create up to six lines on a single XY graph. 1-2-3 uses different symbols to identify the points on each line.

Use the X range to indicate the set of values you want to plot on the X (horizontal) axis.

Use the A range to indicate the set of values you want to plot on the Y (vertical) axis in your first line, or in one single line.

Use the B–F ranges to indicate the sets of values you want to plot on the Y (vertical) axis in each additional line.

1-2-3 automatically indicates numerical scales along both the X (horizontal) and Y (vertical) axes.

Stacked Bar Graph

In a stacked bar graph, 1-2-3 displays the corresponding value from each data range stacked above the preceding value in each bar. You can create stacked bar graphs that show up to six corresponding values at each point along the X (horizontal) axis. 1-2-3 uses different shadings or colors to represent each data range.

Use the A–F ranges to indicate each set of values you want to represent. The A range is the lowest portion of each bar; the B through F ranges are stacked successively above.

Use the X range to indicate labels along the X (horizontal) axis.

1-2-3 automatically indicates a numerical scale along the Y (vertical) axis.

Pie Chart

A pie chart compares parts to the whole, so each value in the range is a wedge of the pie.

Use the A range to indicate the set of values that 1-2-3 will represent as wedges of the pie.

You can indicate shadings or colors for each of the pie wedges. In addition, you can explode one or more wedges of the pie to emphasize a particular value or values. 1-2-3 displays the exploded sections slightly apart from the rest of the pie chart.

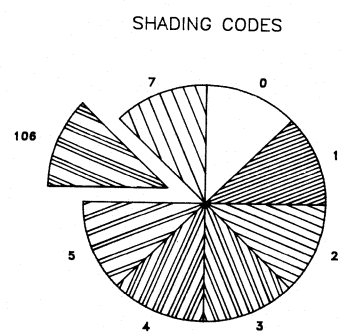
Use the B range to indicate the range where you enter shading or color and exploding codes for the pie wedges.

The B range can be any blank range of your worksheet that is the same size as the A range. Enter a number between 1 and 7 to indicate the desired shading or color for each corresponding pie wedge. The codes 0 or 8 indicate an unshaded wedge.

Indicate the section you want to explode by adding 100 to its corresponding shading or color code. For example, the code 106 in the seventh cell of the B range will explode a wedge representing the seventh cell of the A range, and display it with type 6 shading or color.

Use the X range to indicate labels for each pie wedge.

1-2-3 automatically indicates the precentage value of each wedge of the pie.



Use this procedure to create any 1-2-3 graph from a pre-existing worksheet.

Procedure

1. Select /Graph.
2. Select Type.
3. Select a graph type: Line, Bar, XY, Stacked-Bar, or Pie.
4. Select each of the appropriate data ranges (X and A through F) and specify the range for each.
5. Select View to see the graph.

   You can select View any time you are in the top level Graph menu to see the current graph.

6. Press RETURN to return to the worksheet and the Graph menu.
7. Select Reset, Save, Options, or Name to use any of these features, which are described later in this chapter.
8. Select Quit when you have completed your graph and want to return to READY mode.

You can view your current graph from READY mode by pressing GRAPH.

Your most recently specified graph type and data ranges remain with the worksheet. The next time you create a graph, these specifications will appear if you saved the worksheet.

You can change the type of graph you create without altering the data ranges to see which type of graph displays your data most effectively. Select and specify the graph type and then view the graph.

If you want to continue to use the same graph type, but want to alter data ranges, skip steps 2 and 3.

Accept any previous data range specifications by pressing RETURN when 1-2-3 displays them at the prompt, or change them by entering new data ranges.

Related Commands

/Graph Reset cancels all or some of your previous range specifications if you want fewer data ranges in your current graph.

/Graph Name saves the settings for each graph if you want to create more than one graph from a particular worksheet.

/Graph Options adds legends or titles, or alters the appearance of the graph.

/Graph Save creates a graph file if you want to print a graph using PrintGraph.

/Graph Reset

```
Graph  X  A  B  C  D  E  F  Quit
```

/GR cancels graph or range settings.

Use /GR to start over again on the current graph.

1. Select /Graph Reset.
2. Specify what you want to cancel.

   Select Graph to cancel the settings for the current graph. This command will not affect a named graph.

Select X, A, B, C, D, E, or F to suppress the display of a particular range. Resetting a range also resets the corresponding data label range. Resetting the X range removes the label entries, except on XY graphs.

3. Select Quit to return to the previous menu.

/Graph Save

/GS stores the current graph in a graph file (filename extension .PIC).

- Use /Graph Save to generate a graph file that you print later with PrintGraph.
- Use /Graph Name Create and /File Save, not /Graph Save, if you want to save graph settings with a worksheet so that you can create additional graphs from the same worksheet.

Procedure

1. Select /Graph Save.
2. Enter a file name for the saved graph. Type a name or select a name from the menu of existing graph files displayed on the third line of your control panel. 1-2-3 does not distinguish between uppercase and lowercase letters, so you can use either.
3. Press RETURN.

/Graph Save saves the graph only for printing purposes. You cannot bring that saved graph back to the screen to modify it.

Use the /File Save command to save the graph settings and file before you end your work sessions.

If you save a graph under an existing graph file name, 1-2-3 writes over the contents in that file.

When you save a graph for printing, 1-2-3 stores the graph's image in the current directory unless you specify a different directory as part of the file name.

If you want to use a graph again, or modify it later, you must create a name for it using the /Graph Name Create command.

/Graph Options Legend

```
A  B  C  D  E  F
```

/GOL adds a legend below the graph to identify what each symbol, color, or crosshatching represents in the graph.

Procedure

1. Select /Graph Options Legends.
2. Choose a data range, A, B, C, D, E, or F.

   1-2-3 displays the most recent legend for that range, if any.

3. Press RETURN to reselect it, or press ESC to cancel it, specify a new legend, and press RETURN.
4. Select Quit to return to the previous menu.

When you display the graph, the selected legends appear at the bottom of the screen.

To use the cell contents as a legend, type a backslash (\), followed by the cell address, or range name. If you enter a range name, 1-2-3 uses the contents in the upper left cell as the legend.

If you use a cell address in a legend, 1-2-3 does not adjust the address, if the referenced cells are relocated with the /Move, /Worksheet Insert, or /Worksheet Delete commands.

Related Commands

/Graph Reset resets a data range, retaining any associated settings, such as legends or symbols.

/Graph Options Format

```
Graph  A  B  C  D  E  F  Quit
```

/GOF controls data display for line and XY graphs.

Use /Graph Options Format to change the appearance of line and XY graphs.

Procedure

1. Select /Graph Option Format.
2. Select Graph to change the format of the entire graph.

   Select A through F to format each data range individually.

   Choose Lines to connect each range data point with a straight line.

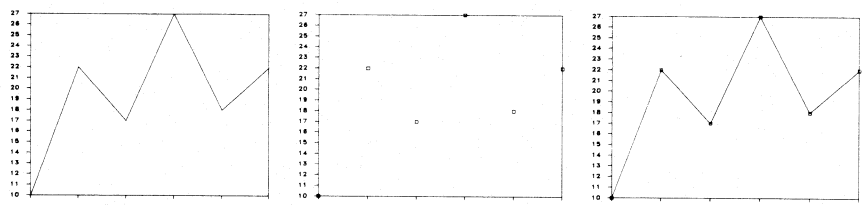
Choose Symbols to display each range data point with the same symbol. There is a different symbol for each range.

Choose Both to set lines and symbols.

Choose Neither if you do not want symbols or lines to appear in the screen display. If you select /Graph Options Format Neither, you must specify data labels (see below), in order to make the data points or lines visible.

3. Select Quit to return to the previous menu.

1-2-3 adjusts the new format for the current graph. If you choose Symbols or Both, the symbols in Figure 2-23 display on your screen.



Lines Symbols Both

Figure 2-23

If you reset a data range, 1-2-3 saves the associated format settings and reuses them whenever you specify a new range.

/Graph Options Data-Labels

A B C D E F Quit

/GOD labels the data points in a data range, A through F, with the contents from a specified range of cells.

Use /Graph Options Data-Labels to include detailed data value information in your graph.

Procedure

1. Select /Graph Options Data-Labels.
2. Choose a data range to label from A through F.

   1-2-3 displays the most recent range, if any; press RETURN to use it again, or specify a new range of cells to use for the data label range.
3. Press RETURN.
4. Choose Quit to return to the previous menu.

   Line and XY graphs: Aligns data labels Center, Left, Above, Right, or Below in relation to their data points.

   Bar and stacked bar graphs: Centers data labels above positive bars and below negative bars.

   Pie charts: Does not display data labels.

1-2-3 displays the specified range contents as data point labels the next time you view the graph. If a data label cell contains a number or formula, 1-2-3 displays the cell value as a label in the graph. If you reset a data range, 1-2-3 also resets the corresponding data label range.

/Graph Options Titles

First	Second	X-Axis	Y-Axis

/GOT assigns a title to each axis or to an entire graph.

Use this command in addition to the /Graph Options Legend, and /Graph Options Data-Labels commands to expand the description of your graph data.

Procedure

1. Select /Graph Options Titles.
2. Choose First, Second, X-Axis, or Y-Axis to add a title line to the graph.
3. Enter a title of up to 39 characters in length.

   1-2-3 displays the most recent title, if any; press RETURN to reuse it.
4. Press ESC to cancel it, and enter a new title.

5. Press RETURN.
6. Choose Quit to return to the previous menu.

First and Second: Lines in graph titles appear centered at the top of the graph. First and second title lines are independent of the names you use with /Graph Name and /Graph Save.

X axis: Titles appear below the horizontal axis.

Y axis: Titles appear on the side to the left of the vertical axis.

To use the contents of a cell in the worksheet as a title, type a backslash (\), followed by the cell address or range name. If you use a range name, 1-2-3 uses the contents from the upper left cell in the range as the title.

For printed graphs made with the PrintGraph program, the first title line is printed larger than the second. The second title line can be in a different font style. In some cases, the screen displays more characters than the printer can print, depending on the font you select and total number of characters in the title.

/Graph Options Grid

Horizontal Vertical Both Clear

/GOG adds or removes grid lines on your graph display.

You cannot use grid lines with pie charts.

Procedure

1. Select /Graph Options Grid.
2. Choose Horizontal, Vertical, Both, or Clear.

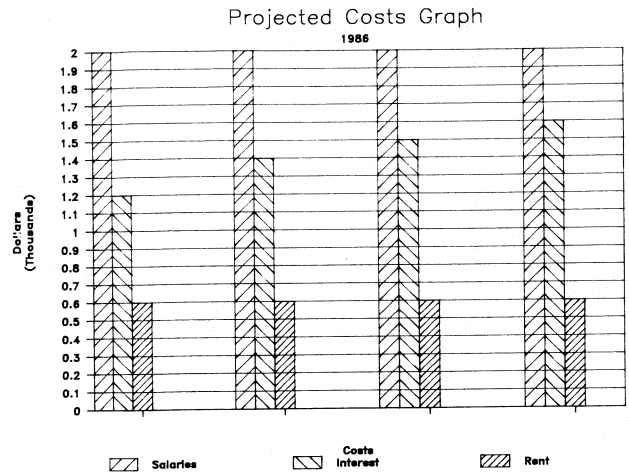


Figure 2-24

Horizontal: Horizontal grid lines appear across the graph when you select /Graph View.

Vertical: Vertical grid lines appear across the graph when you select /Graph View.

Both: Horizontal and vertical grid lines appear across the graph when you select /Graph View.

Clear: Erases all of the grid lines.

/Graph Options Scale

Y Scale	X Scale	Skip

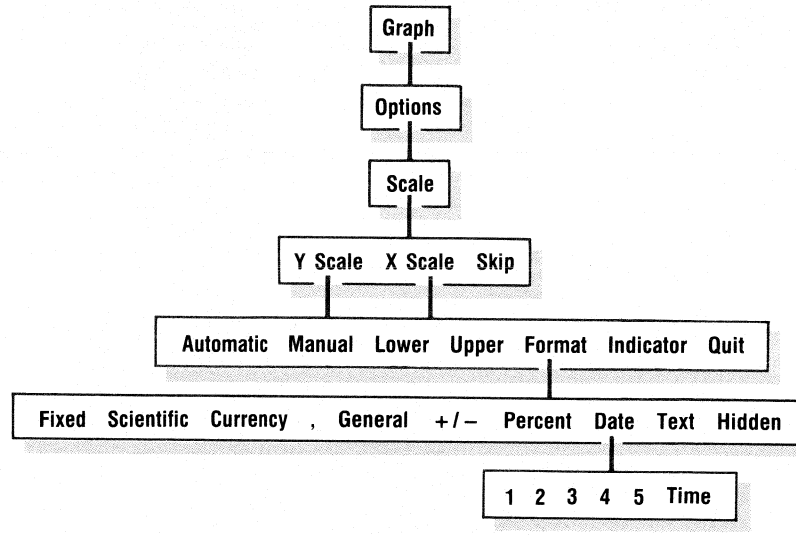


Figure 2-25

/GOS sets the numeric scales for the X axis and Y axis, and specifies the skip factor for X axis labels. It also controls the format of numbers used in the graph scale.

Use /GOS to adjust the scale display on your graph.

Procedure

1. Select /Graph Options Scale.
2. Select the Scale option you want to change.

   Y Scale: Alters the scale of the Y axis.

   X Scale: Alters the scale of the X axis.

   Skip: Changes how 1-2-3 displays labels on the X axis. Specify the skip factor. For a skip factor of n, 1-2-3 plots every nth entry from the X range on the horizontal axis in bar, stacked bar, and line graphs. For example, if n = 10, then the 1st, 11th, and 21st X range entries appear on the X axis, and so on.

3. Select one of these options after choosing Y Scale or X Scale.

   Automatic: When you select View, 1-2-3 displays all the data points, using scale limits that let the graph fill the screen. 1-2-3 uses round numbers for the scale limits. This option overrides the other scale options and is the default setting.

Manual: When you select View, 1-2-3 displays the data points that fall within the limits you specify. You must specify upper and lower limits. Depending on the limits you choose, some data points may not be displayed. Also, when a data range includes values that vary widely (for instance, 10, 20, 30, 100000, and 2000000), bars representing the larger values may not be displayed.

If you set a scale to a limit that is smaller than the spread of data values, 1-2-3 expands the graph of the specified area to fill the screen.

Lower: Determines the lower scale limit 1-2-3 uses when displaying a graph. 1-2-3 adjusts the limit you set to a round number. This limit is used only after you select /Graph Options Manual. The default value is 0.

1-2-3 ignores a positive lower limit for bar and stacked bar graphs.

Upper: Determines the upper scale limit 1-2-3 uses when displaying a graph. 1-2-3 adjusts the limit you set to a round number. This limit is used only after you select /Graph Options Manual. Maximum values may be rounded off slightly. The default value is 0.

1-2-3 ignores a positive upper limit for bar and stacked bar graphs.

Format: lets you change the format of numbers in the graph scale. Select a format from the options in Table 2-6 in the Range Commands section.

Indicator: Determines whether 1-2-3 displays scale indicators on a graph when you select View. Choose Yes to use indicators or No not to use them. The default setting is Yes.

/Graph Options Color

/GOC displays data range bars, graph lines and symbols in contrasting colors, if your monitor can display color graphs.

Procedure

1. Select /Graph Options Color.
2. Select Quit to return to the Graph Options menu.

You can save a graph with color settings, even if your monitor cannot display colors.

When you save a graph, 1-2-3 assigns a different color to each data range, so that PrintGraph can draw each data range with a different color, even if the graph was made with the /Graph Options B&W command. Bar and stacked bar graphs print out as solid bars.

/Graph Options B&W

/GOB displays data range bars in contrasting monochrome crosshatchings. Specify a B range to display crosshatchings in the wedges in a pie chart.

Use /Graph Options B&W only if you have previously selected /Graph Options Color and want to return to a monochrome display.

Procedure

1. Select /Graph Options B&W.
2. Select Quit to return to the Graph Options menu.

/Graph Name Create

/GNC saves the current graph settings under a graph name. You can change the cell contents in a graph data range after naming it, because the data range specifies only the location, or cell address, of a cell, not the cell contents.

Use /Graph Name Create to save more than one graph with a worksheet or shift quickly from one graph to another during a 1-2-3 session.

Procedure

1. Select /Graph Name Create.
2. Specify a graph name up to 14 characters long.

   If you use an existing graph file name, 1-2-3 replaces the previous specifications with the current graph settings. There is no Cancel or Replace step.

3. Press RETURN.

You must also use the /File Save command to attach the named settings to the current worksheet. If you make any changes to the graph, select /Graph Name Create and then save the worksheet file.

Related Commands

/File Save saves all named graph specifications as well as those of the current graph.

/File Retrieve retrieves named graph specifications with the worksheet.

/Graph Save saves graph settings for printing with PrintGraph.

/Graph Name Use

/GNU makes a named set of graph settings current and draws the graph.

You can use /Graph Name Use only if you have created a graph and named it.

Procedure

1. Select /Graph Name Use.
2. Enter a graph name at the prompt.

   Choose a graph name from a menu 1-2-3 displays, or type in a different existing graph name. You can use uppercase and lowercase letters.
3. Press RETURN.

/Graph Name Delete

/GND erases one set of named graph specifications.

Use /Graph Name Delete to eliminate unwanted graphs or to free graph file names for reuse.

CAUTION When you select /Graph Name Delete, 1-2-3 immediately erases the graph settings for the selected graph, and automatically returns you to the Graph Options menu. There is no confirmation step.

Procedure

1. Select /Graph Name Delete.
2. Specify a graph to delete.
3. Press RETURN.

Related Commands

/Graph Name Reset deletes all named graphs.

/Graph Name Reset

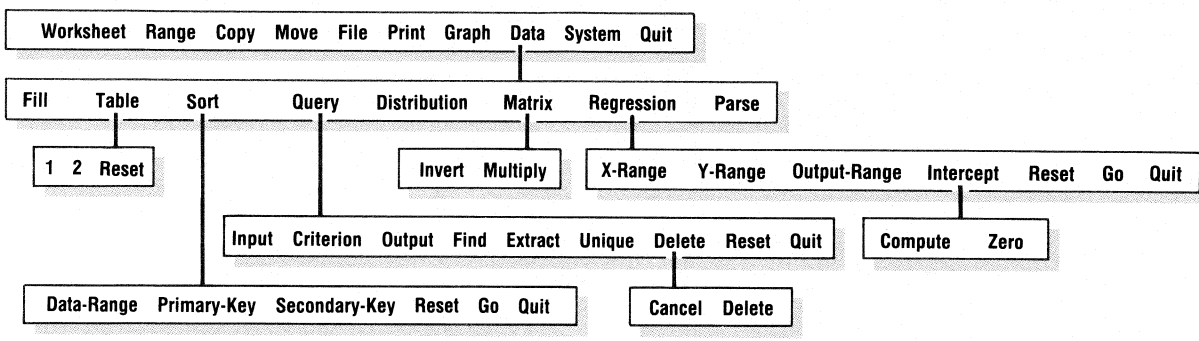
/GNR erases all named graphs.

CAUTION When you select /Graph Name Reset, 1-2-3 erases all named graphs and automatically returns you to the Graph Options menu. There is no confirmation step.

Procedure

Select /Graph Name Reset.

The last graph created will remain with no name attached.



Data Commands

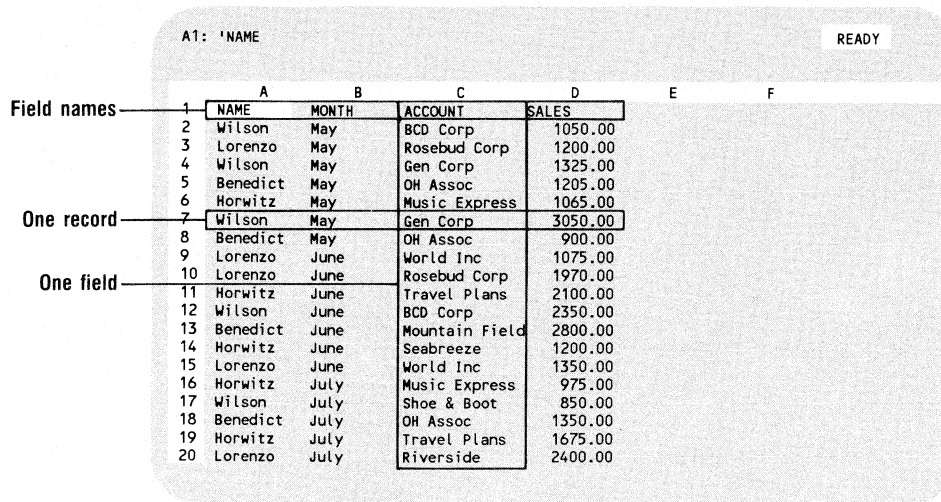
1-2-3 Data commands let you enter and analyze data in a worksheet. For example, you can enter numbers in a specified sequence, and create a table that records the way the result of a formula changes when the values it depends on change.

Several of the 1-2-3 Data commands are used with a 1-2-3 worksheet that is organized as a database.

Database

A 1-2-3 database is a worksheet range consisting of data organized in a specific way.

- All entries in a single row constitute one record, a collection of information about one particular item in the database.
- Each record in a database consists of the same categories, called fields. Each column in the database comprises one field.
- Each cell in the first row of a database contains a label, called a field name, that identifies the category of information in the column below. All subsequent rows contain records.



	A	B	C	D	E	F
1	NAME	MONTH	ACCOUNT	SALES		
2	Wilson	May	BCD Corp	1050.00		
3	Lorenzo	May	Rosebud Corp	1200.00		
4	Wilson	May	Gen Corp	1325.00		
5	Benedict	May	OH Assoc	1205.00		
6	Horwitz	May	Music Express	1065.00		
7	Wilson	May	Gen Corp	3050.00		
8	Benedict	May	OH Assoc	900.00		
9	Lorenzo	June	World Inc	1075.00		
10	Lorenzo	June	Rosebud Corp	1970.00		
11	Horwitz	June	Travel Plans	2100.00		
12	Wilson	June	BCD Corp	2350.00		
13	Benedict	June	Mountain Field	2800.00		
14	Horwitz	June	Seabreeze	1200.00		
15	Lorenzo	June	World Inc	1350.00		
16	Horwitz	July	Music Express	975.00		
17	Wilson	July	Shoe & Boot	850.00		
18	Benedict	July	OH Assoc	1350.00		
19	Horwitz	July	Travel Plans	1675.00		
20	Lorenzo	July	Riverside	2400.00		

Figure 2-26

Any collection of data that you organize in records and fields can be a 1-2-3 database. When you create a database, remember these rules:

- Do not leave any blank rows or divider lines below the field names or between records.
- Fields contain either labels or numeric data. Do not mix labels and values within a single field.
- A database may contain up to 256 fields.

Data commands used with a database let you sort database records in alphabetical or numeric order, and find and list records that match criteria you specify.

/Data Fill

/DF enters an ascending or descending sequence of numbers into a specified range of cells.

Use /Data Fill with any 1-2-3 worksheet or with a database.

- The Start value is the beginning number in your sequence.
- The Step value is the increment between each of the numbers in the sequence. It can be a positive or a negative number.
- The Stop value is the final value in the sequence. You may specify a Stop value to end the sequence before 1-2-3 fills the range. If you do not specify a Stop value, 1-2-3 uses the default Stop value.
- You can use the default values for Start (0), Step (1), and Stop (8191) by pressing RETURN at the appropriate prompt, or you can enter your own values.

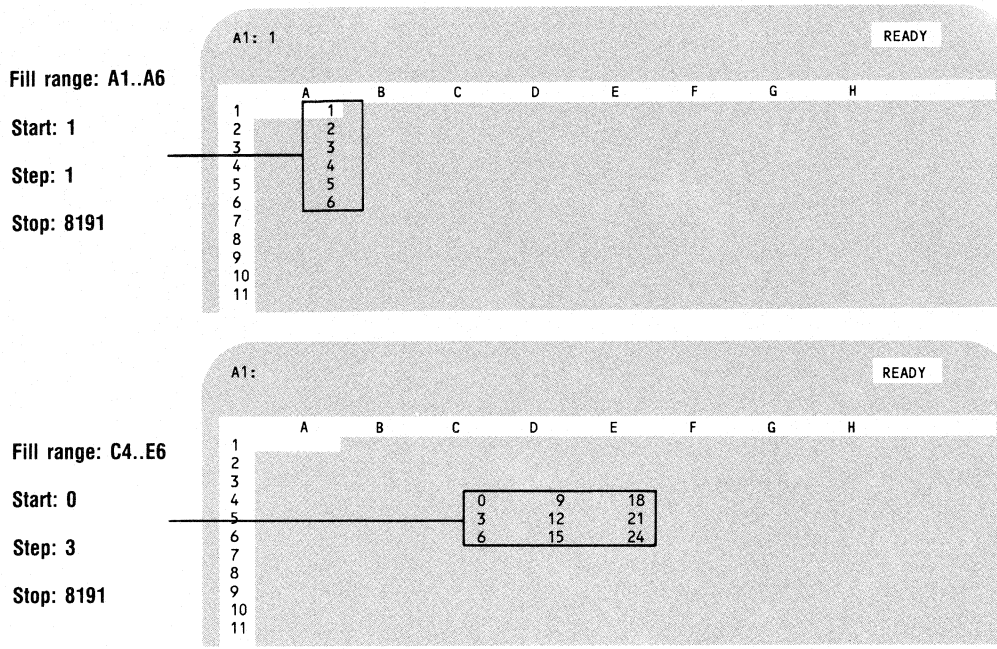


Figure 2-27

Procedure

1. Position the cell pointer in the upper left corner cell of the range you want to fill.
2. Select /Data Fill.
3. Enter the range you want to fill with numbers when 1-2-3 prompts you for the fill range.
4. Enter the number you want as the beginning value of your sequence when 1-2-3 prompts you for a Start value.
5. Enter the value you want as the increment between each of the numbers in the sequence when 1-2-3 prompts you for a Step value.
6. Enter the value you want as the final number of the sequence when 1-2-3 prompts you for a Stop value.

/Data Fill places the start value in the upper left cell of the fill range. 1-2-3 continues to place a number in each cell of the range, adding the step value to each previous value, until the range is filled or the stop value is reached. Cells are filled downward through the left column and then downward through each subsequent column, from left to right. The values filling the range are numbers, not formulas.

The fill range you most recently specified appears the next time you use this command in the same worksheet.

/Data Fill can assist in restoring the original order of records in a sort range. Before you execute the /Data Sort command, use /Data Fill to number your records in a column adjacent to the database. Be sure that this column is part of the sort range. To return to the original order, execute the /Data Sort command, specifying this column as the primary-key.

You may use a formula or @function as a start value in a /Data Fill command. For example, use @NOW as the start value to fill a column with sequential dates beginning with today's date. Be sure to enter a large enough stop value, since @NOW generates values larger than 30,000.

Data Tables

Data tables let you try out different values in formulas. You can perform sensitivity analysis, see the effects of what-if tests, prepare graphs, and quickly analyze data from a database.

Data Table commands let you calculate formulas quickly. They record the effects of changing one or two values in one or more formulas.

/Data Table 1

/DT1 produces a table that shows the different values a formula generates each time you change one value in that formula. When you create a data table 1, 1-2-3 places a single set of values into one or more formulas.

- Use /Data Table 1 independent of other worksheet data or with any pre-existing 1-2-3 worksheet.
- Use /Data Table 1 with a pre-existing database to generate values using database statistical @functions.
- Before selecting /Data Table 1, you must set up the data table in a table range, which can be in any unused part of the worksheet.

Setting up a Data Table 1

Use the following guidelines to set up a Data Table 1.

Choose a blank area of the worksheet for your table range.

Choose any cell outside the table range to use as input cell 1. You will use the cell address of this cell to represent the changing value in each of the formulas the data table will calculate.

Leave the upper left cell of the table range blank.

Enter formulas into the first row of the data table, the row of cells immediately to the right of the blank cell. You can enter one or more formulas that contain values, strings, or cell addresses. You must use the cell address of input cell 1 as the variable in each of the formulas.

Enter the values for the input cell address into the column of the table range directly below the blank cell.

See the section on Database Data Table 1 for special setup procedures for using /Data Table 1 with database statistical @functions.

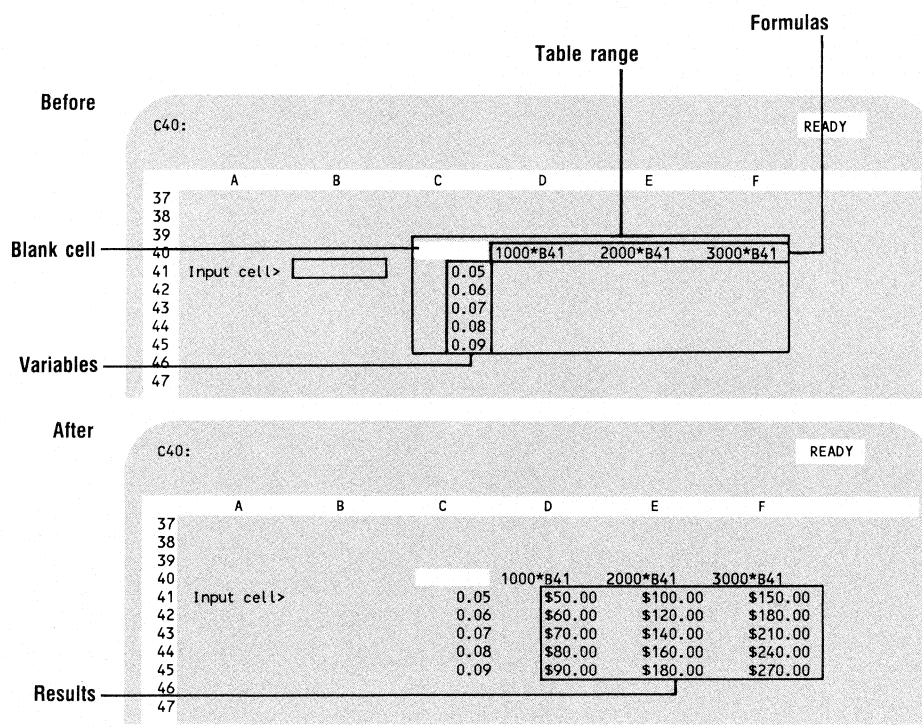


Figure 2-28

Example: The data table in Figure 2-28 is independent of any other data in the worksheet. It shows how commissions vary when different percentage rates are used in the formulas determining the commission. The first row contains formulas that determine the commission for sales of $1000, $2000, and $3000. Each formula uses B41, the cell address of input cell 1, to represent possible percentage rates. The first column lists a variety of percentage rates that 1-2-3 uses as the value for the input cell, B41, in each of these formulas. (The cells containing the formulas have been formatted with /Range Format Text so that you can see the actual formulas, and the results area has been formatted for currency.)

After the /Data Table 1 command executes, the possible commissions appear in the results area of the data table.

Procedure

1. Position the cell pointer in the blank cell in the upper left corner of the table range.
2. Select /Data Table 1.
3. Enter the table range at the prompt.

   The table range contains the blank cell, all the formulas in the first row, and all the values in the column below the blank cell.
4. Enter the cell address of input cell 1 at the prompt.

1-2-3 places each value from the first column into the input cell, one at a time, and uses that value to calculate the formulas in the first row. The result of each calculation appears in the data table in the cell below the appropriate formula and to the right of the appropriate value. The calculation does not affect the input cell.

Input cell 1 can be a cell in a worksheet range that already contains data if your formulas use this cell address as the variable. Executing /Data Table 1 will not affect the current contents of this cell.

1-2-3 does not automatically recalculate the results area of a data table if you change any of the formulas or value entries in the table. You can recalculate your most recent data table from READY mode by pressing TABLE. 1-2-3 uses the most recently specified table range and input cell.

Reset: Cancels the current table range and input cell specifications.

If you are using string formulas, you may enter labels instead of values in the first column of a data table 1.

Database Data Table 1

If you are using /Data Table 1 in conjunction with a database, you can use the database statistical @functions as formulas in the top row of the data table. These functions let you perform calculations using data from only those records that meet your criteria. See Chapter 4 for detailed information on these @functions.

To create a criterion range for the @function, enter the name of the database field you are testing in a blank area of the worksheet, and leave a blank cell directly below it. This blank cell serves as the input cell.

Enter values or labels from the field you are using in your criterion in the first column of the table range, leaving the upper left cell blank. You must enter these values or labels exactly as they appear in the database.

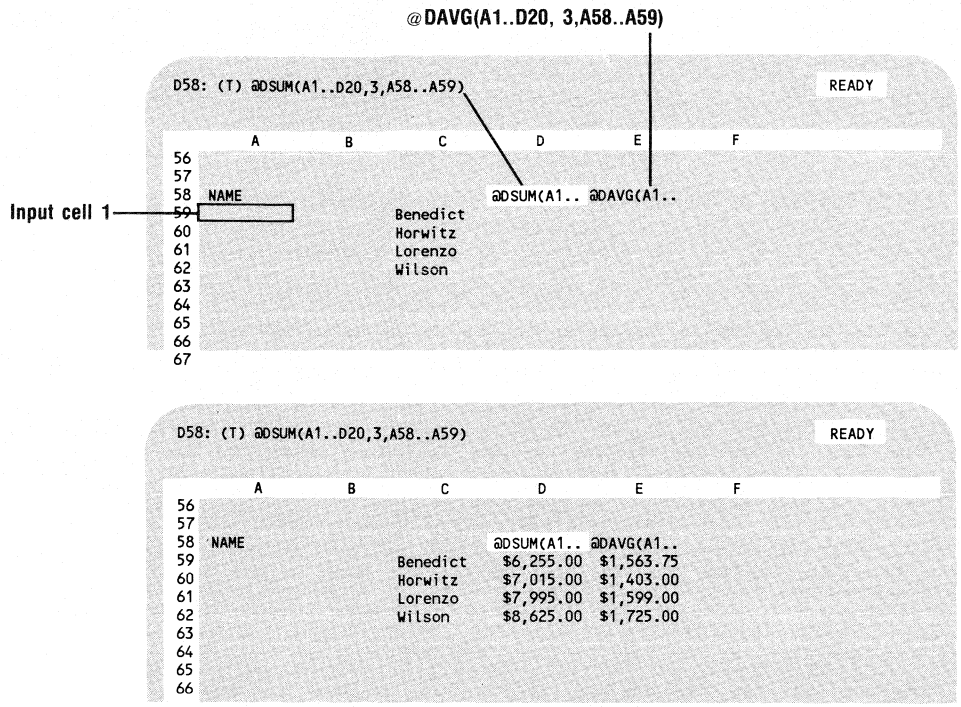


Figure 2-29

Figure 2-29 illustrates this application of /Data Table 1. The database used in this example is shown in Figure 2-26 in the introduction to Data commands. It contains sales records for various sales personnel. There are four fields: NAME, MONTH, ACCOUNT, and SALES.

You can use /Data Table 1 to find the total and average sales for each employee in the database.

The formulas for total and average sales are the database statistical @functions, @DSUM (*input*, *offset*, *criterion*) and @DAVG (*input*, *offset*, *criterion*). For this database, the *input* range, A1..D20, includes the field names and all records. The *offset* for the formula is 3, since SALES is three columns to the right of the left column in the database. The *criterion* range, A58..A59, contains a copy of the field name, NAME, and a blank cell below it, which is the input cell 1.

Enter the formulas in cells D58 and D59 in the top row of the table range to the right of the blank cell. The employee names from the database field, NAME, are entered in the first column of the table range below the blank cell. The table range is C58..E62, and input cell 1 is A59.

After /Data Table 1 executes, the total and average sales for each salesperson appear in the data table. To make the illustration easier to read, the cells with formulas have a Text format and the results area has a Currency format.

Related Commands

/Range Unprotect unprotects the data table range and the input cell if cell protection is enabled.

/Graph Type XY graphs 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.

/Data Table 2

/DT2 produces a table showing the different values a formula generates each time you change one or two values in that formula. When you create a data table 2, 1-2-3 places two sets of values into a single formula.

- Use /Data Table 2 independent of other worksheet data or with any pre-existing 1-2-3 worksheet.
- Use /Data Table 2 with a pre-existing database to generate values using database statistical @functions.
- Before selecting /Data Table 2, you must set up the data table in a table range, which can be in any unused part of the worksheet.

Setting up a Data Table 2

Use the following guidelines to set up a Data Table 2.

Choose a blank area of the worksheet for your table range.

Choose any two cells outside the table range to use as input cell 1 and input cell 2. You will use the cell addresses of these cells to represent the two changing values in the formula that the data table will calculate.

Enter the formula in the upper left cell of the table range. The formula can contain values, strings, or cell addresses. You must use the cell addresses of input cell 1 and input cell 2 as the two variables in the formula.

Enter the first set of values into the column of the table range directly below the cell where you entered the formula. These are the values that 1-2-3 will use one at a time in place of the cell address of input cell 1 in the formula.

Enter the second set of values into the top row of the table range to the right of the cell containing the formula. These are the values that 1-2-3 uses, one at a time, in place of the cell address of input cell 2 in the formula.

See the section on Database Data Table 2 for special setup procedures for using /Data Table 2 with database statistical @functions.

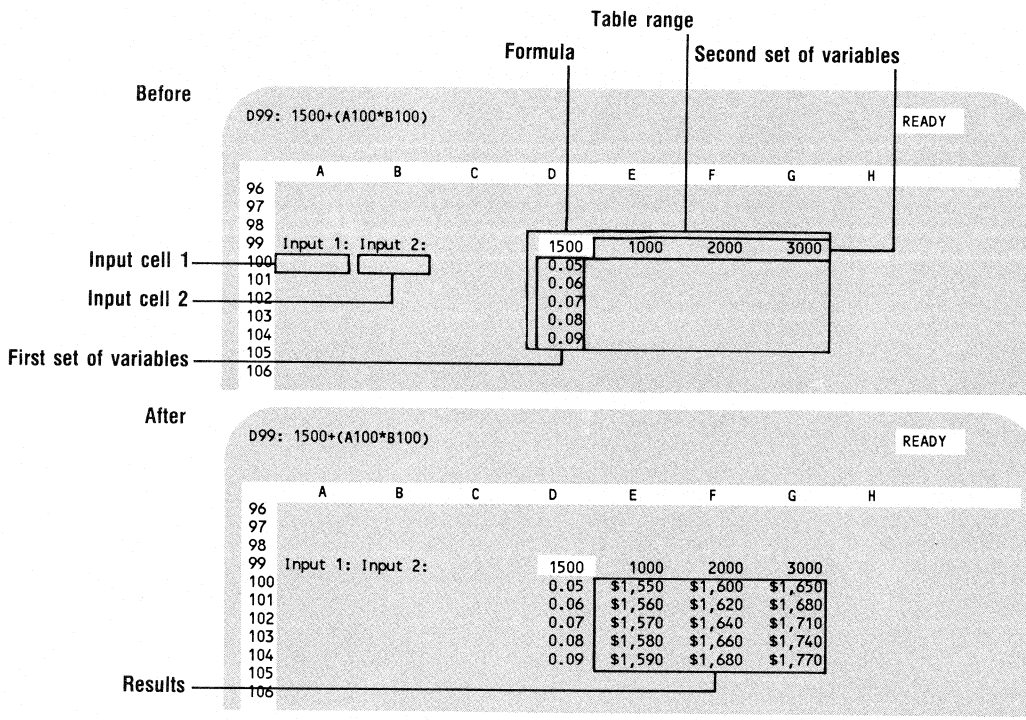


Figure 2-30

Example: The data table in Figure 2-30 is independent of any other data in the worksheet. It uses one formula with two variables to show how a monthly salary varies when both the sales levels and the percentage rates change. The upper left cell of the table contains the formula, 1500+(A100*B100), that adds the commission to a monthly base pay of $1500. The formula uses A100, the cell address of input cell 1, to represent possible percentage rates, and B100, the cell address of input cell 2, to represent possible sales levels. The first column lists a variety of percentages that 1-2-3 uses as the value for input cell 1, and the top row lists a variety of sales levels that 1-2-3 uses as the value for input cell 2.

After the /Data Table 2 executes, the possible monthly salaries appear in the results area of the data table. The results area has a currency format.

Procedure

1. Position the cell pointer in the cell containing the formula, the upper left cell of the data table range.
2. Select /Data Table 2.
3. Enter the table range at the prompt.

   The table range contains the cell with the formula, all the values in the column below that cell, and all the values in the top row to the right of that cell.
4. Enter the cell address of input cell 1 at the prompt.
5. Enter the cell address of input cell 2 at the prompt.

1-2-3 places each value, one at a time, from the first column into input cell 1 and each value, one at a time, from the top row into input cell 2. It uses each combination of values to calculate the formula in the upper left cell. The result of each calculation appears in the data table, in the cell below the appropriate row value and to the right of the appropriate column value. The input cells themselves are unaffected.

The input cells can be cells in a worksheet range that already contain data if your formula uses these cell addresses as variables. /Data Table 2 does not affect the current contents of these cells.

1-2-3 does not automatically recalculate the results area of a data table if you change the formula or value entries in the table. You can recalculate your most recent data table from READY mode by pressing TABLE. 1-2-3 uses the most recently specified table range and input cells.

If you are using a string formula, you may enter labels instead of values in the first column and top row of a data table 2.

Database Data Table 2

If you are using /Data Table 2 in conjunction with a database, you can use any database statistical @function as your formula. These functions let you perform calculations using data from only those records that meet your criteria. See Chapter 4 for detailed information on @functions.

To create a criterion range for the @function, enter the names of the two database fields you are testing in adjacent cells in a blank area of the worksheet, and leave a blank cell directly beneath each. These blank cells serve as input cell 1 and input cell 2.

Enter the formula in the upper left cell of the table range.

Enter values or labels from the field you are using in your first criterion, the field associated with input cell 1, into the first column of the table range, below the cell containing the formula. Enter values or labels from the field you are using in your second criterion, the field associated with input cell 2, into the top row of the table range, to the right of the cell containing the formula. Enter these values or labels exactly as they appear in the database.

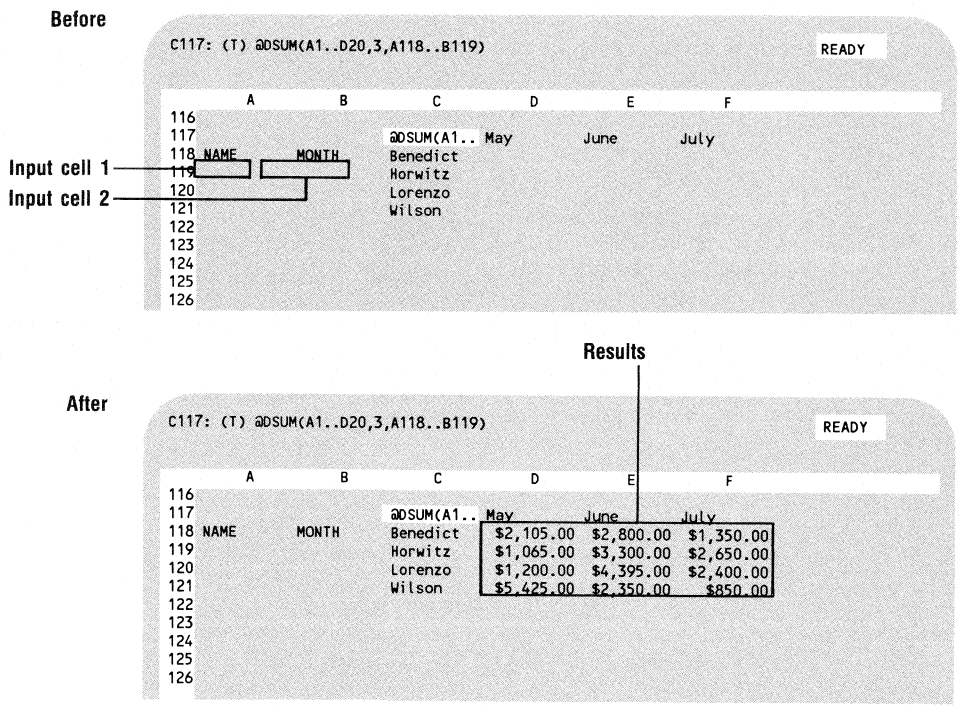


Figure 2-31

Figure 2-31 illustrates this application of a data table 2. It uses a data table 2 to find the total monthly sales for each employee in the database shown in Figure 2-26.

The formula for total sales is the database statistical @function, @DSUM (*input*, *offset*, *criterion*). For this database, the *input* range is A1..D20, which includes the field names and all records. The *offset* for the formula is 3, since SALES is three columns to the right of the left column in the database. The *criterion* range, A118..B119, contains copies of two of the field names, NAME and MONTH, and a blank cell below each field name. The blank cells are input cell 1 and input cell 2.

The @DSUM formula is entered in C117, the upper left cell of the table range. The employee names from the database field, NAME, corresponding to input cell 1, are in the first column of the table range, below the cell containing the formula. The names of the months from the database field, MONTH, corresponding to input cell 2, are in the top row of the table range, to the right of the cell containing the formula.

The table range is C117..F121, input cell 1 is A119, and input cell 2 is B119.

After /Data Table 2 executes, the total monthly sales for each employee appear in the results area of the data table. To make the illustration easier to read, the cell containing the formula has a Text format and the results area has a Currency format.

Related Commands

/Range Unprotect unprotects the data table range and the input cells if cell protection is enabled.

/Graph Type XY graphs information from a data table 2. The X range can be the range of values in the first column and the other ranges can be selected columns in the results area of the table, or the X range can be the range of values in the top row and the other ranges can be selected rows in the results area of the table.

/Data Sort

Data-Range	Primary-Key	Secondary-Key	Reset	Go	Quit

/DS rearranges the records in a database in the order you specify.

- /Data Sort rearranges all records located within a data range you specify.
- The primary-key is the field that 1-2-3 uses to determine the new order for your records. Records are rearranged so that the values in the primary-key field appear in either ascending or descending order.
- The secondary-key is the field that 1-2-3 uses to break ties that occur when two or more records have the same entries in the primary-key field.

Procedure

1. Select /Data Sort.
2. Select Data-Range.
3. Enter the data range at the prompt.

   The data range contains all the records you want to sort. Include all fields. Do not include the row of field names.
4. Select Primary-Key.
5. Enter the primary sort key at the prompt. 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.
6. Enter the primary sort order at the prompt: A for ascending order or D for descending order. See the section on Sort Order for further information.
7. (Optional) Select Secondary-Key if some records have the same entries in the primary-key field and you want these records arranged in a specific order.
8. (Optional) Enter the secondary sort key at the prompt. Enter the cell address of any cell in the field you want 1-2-3 to use to break ties in the primary-key field.
9. (Optional) Enter the secondary sort order at the prompt: A for ascending order or D for descending order.
10. Select Go.

    Quit: Returns you to READY mode before completing a sort.

    Reset: Cancels your current data range, primary-key, and secondary-key settings.

Your most recently specified data range, primary and secondary keys, and sort orders are retained with the worksheet for future sorts. These default settings appear the next time you select /Data Sort. You can press RETURN to use these previous settings, or modify these settings by making new entries at the appropriate prompts.

Be careful when sorting ranges containing formulas. If a cell containing a formula moves when you execute /Data Sort, 1-2-3 adjusts relative cell references in the formulas to reflect the new position of the cell. If /Data Sort moves a cell whose relative cell address appears in a formula elsewhere, 1-2-3 does not readjust the reference to that cell in the formula to reflect the new position of the cell. Therefore, avoid formulas with references to cells in different rows of the data range. Use relative cell addresses in formulas to refer to cells in other fields in the same record. Use absolute cell addresses in formulas to refer to any cells outside of the data range.

Sort Order

Ascending sorts arrange data in the following order, using the collating sequence you choose during Install:

- Numbers last: blank cells; labels beginning with letters in alphabetical order; labels beginning with numbers in numerical order; labels beginning with other characters. The sort ignores capitalization and most accent marks.
- Numbers first: blank cells; labels beginning with numbers in numerical order; labels beginning with letters in alphabetical order; labels beginning with other characters. The sort ignores capitalization and most accent marks.
- ASCII: blank cells; all labels, using their ASCII values.

Descending sorts reverse the above order. All sorts place numeric values or formulas after any labels. The sort order of records whose primary and secondary key entries are both equal is not predictable.

Related Commands

/Data Fill numbers records in a database prior to a sort. You can then use the field containing these numbers as the primary-key if you want to resort the records back to their original order.

Data Query Commands

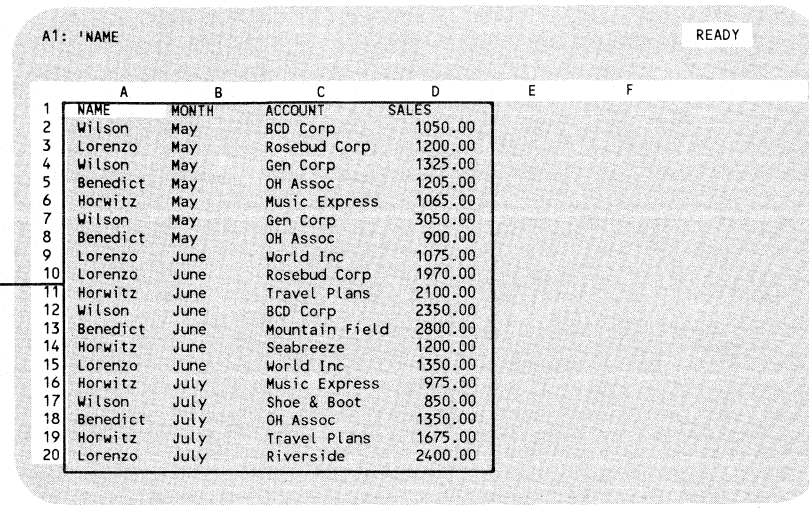
Data Query commands let you search a database for particular records, copy records from a database to a separate part of the worksheet, extract records with no duplication, and remove selected records.

/Data Query Find

/DQF locates the records in a database that match criteria you specify.

- Use /Data Query Find only in conjunction with a 1-2-3 database.
- Before selecting /Data Query Find, set up an input range and a criterion range.

Input Range The input range is the range of a database that you want 1-2-3 to search when you select a /Data Query command. The input range includes the database field names and all the records you want to search.



	A	B	C	D	E	F
1	NAME	MONTH	ACCOUNT	SALES		
2	Wilson	May	BCD Corp	1050.00		
3	Lorenzo	May	Rosebud Corp	1200.00		
4	Wilson	May	Gen Corp	1325.00		
5	Benedict	May	OH Assoc	1205.00		
6	Horwitz	May	Music Express	1065.00		
7	Wilson	May	Gen Corp	3050.00		
8	Benedict	May	OH Assoc	900.00		
9	Lorenzo	June	World Inc	1075.00		
10	Lorenzo	June	Rosebud Corp	1970.00		
11	Horwitz	June	Travel Plans	2100.00		
12	Wilson	June	BCD Corp	2350.00		
13	Benedict	June	Mountain Field	2800.00		
14	Horwitz	June	Seabreeze	1200.00		
15	Lorenzo	June	World Inc	1350.00		
16	Horwitz	July	Music Express	975.00		
17	Wilson	July	Shoe & Boot	850.00		
18	Benedict	July	OH Assoc	1350.00		
19	Horwitz	July	Travel Plans	1675.00		
20	Lorenzo	July	Riverside	2400.00		

Figure 2-32

Setting Up a Criterion Range Use the following guidelines to set up a criterion range.

- Entries in the criterion range tell 1-2-3 which records to search for in the database. You may include criteria that refer to one field in the database or to several fields.
- Choose a blank range in your worksheet, either several rows below your database or to the right of the database. This area will serve as your criterion range.
- In the first row of the criterion range, copy one, some, or all of the field names in the database. You must enter each field name exactly as it appears in the database. You need to copy only the names of the fields your criteria will be checking. Copying all the field names, however, will make it easier to change criteria (using any fields) whenever you want. The criterion range can contain up to 32 fields.

- Enter your criterion in the second row (and subsequent rows) of the criterion range. Enter each criterion below the copy of the appropriate field name. You may enter a label or a value exactly as it appears in the database if you want 1-2-3 to search for records that match the criteria exactly. You may also enter formulas.
- Enter several criteria in the same row if you want 1-2-3 to search only for records that satisfy every criterion.
- Enter multiple criteria one per row if you want 1-2-3 to search for records that satisfy any of the criteria.

  See the Writing Criteria section for information on creating single or multiple criteria to search for labels or values.

Figure 2-33 illustrates the proper layout for a criterion range. 1-2-3 will use the criteria June and +D2>1500 to search for all June records with sales figures greater than $1500.

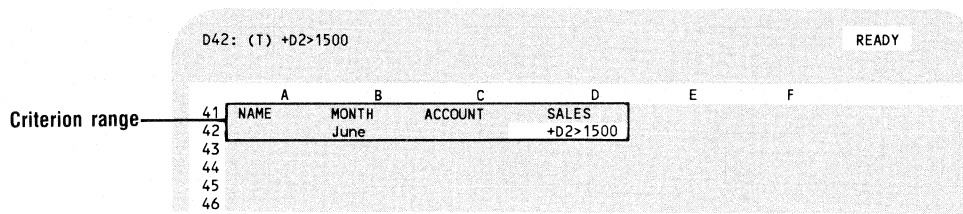
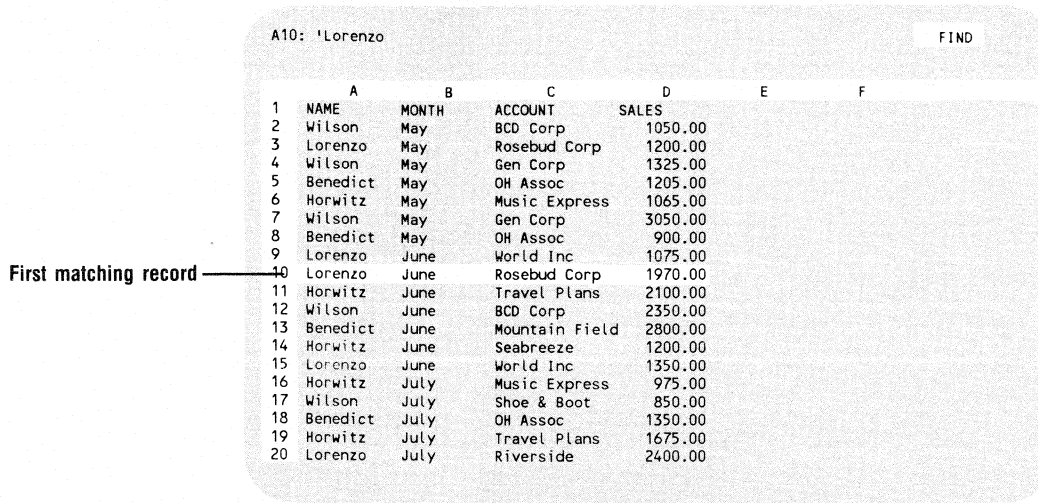


Figure 2-33



	A	B	C	D	E	F
1	NAME	MONTH	ACCOUNT	SALES		
2	Wilson	May	BCD Corp	1050.00		
3	Lorenzo	May	Rosebud Corp	1200.00		
4	Wilson	May	Gen Corp	1325.00		
5	Benedict	May	OH Assoc	1205.00		
6	Horwitz	May	Music Express	1065.00		
7	Wilson	May	Gen Corp	3050.00		
8	Benedict	May	OH Assoc	900.00		
9	Lorenzo	June	World Inc	1075.00		
10	Lorenzo	June	Rosebud Corp	1970.00		
11	Horwitz	June	Travel Plans	2100.00		
12	Wilson	June	BCD Corp	2350.00		
13	Benedict	June	Mountain Field	2800.00		
14	Horwitz	June	Seabreeze	1200.00		
15	Lorenzo	June	World Inc	1350.00		
16	Horwitz	July	Music Express	975.00		
17	Wilson	July	Shoe & Boot	850.00		
18	Benedict	July	OH Assoc	1350.00		
19	Horwitz	July	Travel Plans	1675.00		
20	Lorenzo	July	Riverside	2400.00		

Figure 2-34

Figure 2-32 shows the database input range after /Data Query Find executes. Note the highlight on the first record that matches the criteria in Figure 2-34.

Procedure

To execute /Data Query Find:

1. Select /Data Query.
2. Select Input.
3. Enter the input range at the prompt.

   The input range includes the field names and all the records you want to search.
4. Select Criterion.
5. Enter the criterion range at the prompt.

   The criterion range includes the copied field names and the cells containing criteria.
6. Select Find.

1-2-3 highlights the first record that matches the criteria. If there are no matching records, 1-2-3 beeps and returns to the Query menu.

Press DOWN or UP to move the cell pointer to other records that match the criteria. If there are no more matching records in that direction, 1-2-3 beeps.

Press LEFT or RIGHT to move the cursor from field to field within a highlighted record.

Press HOME to move the highlight to the first record in the database, or END to move the highlight to the last record in the database even if the records do not match the criteria.

Press RETURN or ESC to end the /Data Query Find and return to the Query menu.

Select Quit to return to READY mode.

Use /Data Query Find to quickly locate records that you want to edit. Press RIGHT and LEFT to move the cursor to the cell you want to edit and press EDIT to turn on EDIT mode.

Press QUERY to switch from FIND to READY mode. You can now use commands to alter your database. Press QUERY again to return to the most recently highlighted record in FIND mode.

Select Reset to clear the range specifications for the input and criterion ranges.

Press QUERY to repeat your most recent /Data Query command from READY mode.

Writing Criteria

You can write criteria that match label or value entries and you can use more than one criteria.

Searching for Labels

Enter your criterion in the criterion range, directly below the name of the field you want to search.

To search for exact matches, enter the label criterion as it appears in the database.

Two special characters allow you to search for similar label entries:

? matches any single character, so h?t matches hat, hot, and hut, but not huts; h??d matches head and hood, but not heel.

* matches all characters to the end of the label, so cat* matches cat, catsup, and catechism, but not cutthroat.

Precede a label with a tilde (~) to search for all labels except that one. (Empty cells, however, are never selected by any label-match criterion.) For example, ~Smith matches all records with an entry in that field other than Smith. ~S* matches all records with an entry in that field that do not begin with S.

Searching for Values

To search for exact matches, enter the value as the criterion.

To search for all values that meet a condition you set (such as all entries greater than 150), enter the condition as a logical expression, using the cell address of the appropriate field of the first record in the database. Use a logical operator (<, <=, >, >=, <>) in your formula to compare this cell entry to some value. For example, in the database illustrated in Figure 2-26, the criterion +D2>1500 will cause /Data Query commands to search for all records with SALES entries greater than 1500.00.

The logical formula generates a value of 1 if the condition is TRUE (in this case, if the entry in D2 is greater than 100) or a value of 0 if it is FALSE. This value appears in the criterion range unless you format the cell containing the formula with /Range Format Text, in which case you can see the actual formula. Although the formula contains only the cell address of the first record in the field, /Data Query commands will test all entries in that field sequentially. See the section on Formulas in Chapter 1 for more information.

Be sure to use a relative cell address in the formula to refer to the database fields. Use an absolute cell address to refer to values outside the database. For example, you would use the criterion +B2<>C2 if you wanted to search for records whose entry in the B field is not equal to its entry in the C field. You would use the criterion +B2<>J2 to search for records whose entry in the B field is not equal to some value entered in cell J2 outside of the database.

Using Multiple Criteria

Enter multiple criteria for different fields into the same row to search for only those records that match all these criteria at once. 1-2-3 treats criteria in the same row as if they are linked by the word AND. Figure 2-33 illustrates this type of multiple criteria.

Enter multiple criteria for different fields into separate rows to search for records that match any of the criteria. 1-2-3 treats criteria in separate rows as if they are linked by the word OR. In Figure 2-33 if the criterion June were in row 43, 1-2-3 would find all records from June and all records with SALES entries greater than $1500.

Use compound logical formulas if you want to create compound criteria that match more than one condition in the same field. Use #AND#, #NOT#, or #OR# in the formula to tie together the two conditions. For example, +D2>1500#AND#+D2<2200 will search for all records with SALES entries greater than 1500.00 but less than 2200.00.

Related Commands

/Data Query Extract copies all or part of the records that match your criteria into a separate range in the worksheet.

/Copy copies one or more field names from the database to the criterion range.

/Range Format Text lets you see the actual formula in the criterion range, rather than the value the formula generates.

/Worksheet Window lets you create a split screen so that you can simultaneously view parts of the input and criterion ranges that cannot be seen at the same time on a full screen.

/Data Query Extract

/DQE copies records that match criteria you specify from a database to a separate part of the worksheet.

- Use /Data Query Extract only in conjunction with a 1-2-3 database.
- You can extract all or part of a record.
- Before selecting /Data Query Extract, set up an input range, a criterion range, and an output range. Set up the input and criterion ranges as you would for /Data Query Find.

Setting up an Output Range

Use the following guidelines to set up an output range.

- Choose a blank range that will not overlap your input or criterion ranges. If this range is in the same columns as the database or the criterion range, locate the output range below them in the worksheet.
- Enter field names from the database in the first row of the output range. Include each of the fields that you want listed when 1-2-3 copies records that match your criteria. Each field name must be identical to the corresponding field name in the input and criterion ranges, but may appear in any order.

- You can specify a multiple-row output range that includes the top row of field names and enough additional rows to hold the records that 1-2-3 will copy there.
- You can specify a single-row output range that includes only the top row of field names. When you select /Data Query Extract, 1-2-3 will copy matching records and will erase all other data in the columns below the output range. Specify a multiple-row output range if there is any data below the output range that you want to keep.
- The maximum width of an output range is 32 fields.

Figure 2-35 illustrates a possible layout for an output range.

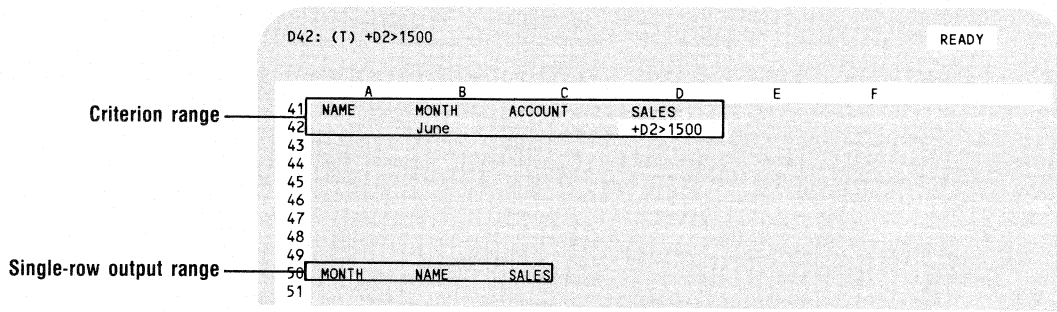


Figure 2-35

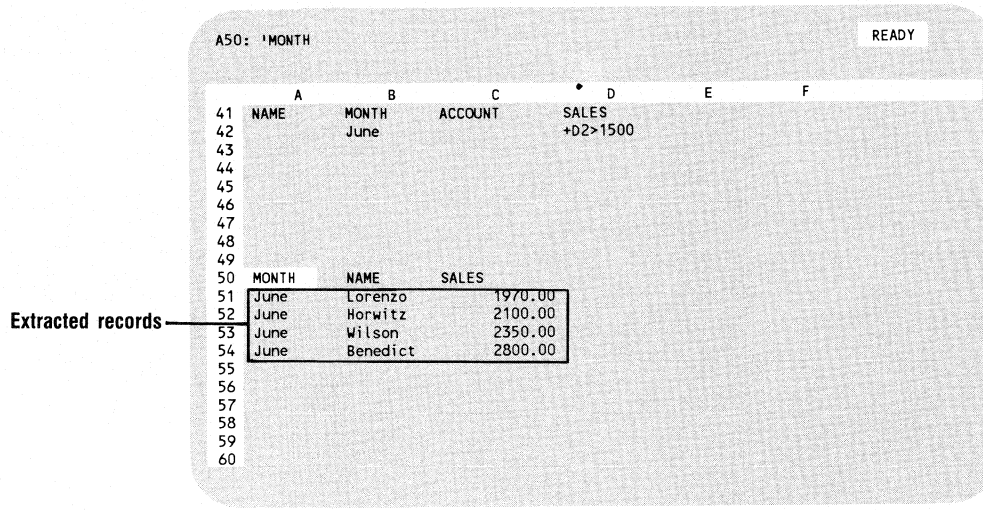


Figure 2-36

Figure 2-36 shows the contents of the output range for the database in Figure 2-32 after /Data Query Extract executes using the criteria in Figure 2-33.

Procedure

To execute /Data Query Extract:

1. Select /Data Query.
2. Select Input.
3. Enter the input range at the prompt.

   The input range includes the field names and all the records you want to search.
4. Select Criterion.
5. Enter the criterion range at the prompt.

   The criterion range includes the copied field names and the cells that contain your criteria.
6. Select Output.
7. Enter the output range when 1-2-3 prompts you for it.

The output range is a single-row range that includes the copied field names or a multiple-row range that includes the copied field names and several additional rows. Remember that specifying a single-row range will erase all existing data below the output range.

8. Select Extract.

   1-2-3 copies the fields from records that match your criteria into the appropriate columns below the field names in the output range.

   1-2-3 beeps and an error message appears if you specified a multiple-row output range and there are more matching records than can fit in the output range. Press ESC and begin the procedure again, specifying a larger multiple-row range, or if it is safe to do so, specifying a single-row range.

9. Select Quit to return to READY mode. Then you can move the cell pointer to the output range.

1-2-3 retains the most recently specified input, criterion, and output ranges with your worksheet. You can reuse any of these settings the next time you select /Data Query in the same worksheet by pressing RETURN or you may change these settings by entering new ranges.

Select Reset to clear the range specifications for the input, criterion, and output ranges.

Press QUERY to repeat your most recent /Data Query command from READY mode.

Related Commands

/Data Query Find highlights matching records in the database.

/Data Query Unique eliminates any duplicate records from the output range.

/Worksheet Window lets you create a split screen so that you can simultaneously view parts of the input, criterion, or output ranges that cannot be seen at the same time on a full screen.

/Data Query Unique

/DQU works exactly like /Data Query Extract, except that it eliminates any duplicate records from the records that 1-2-3 copies to the output range. It also eliminates any records that appear to be duplicates when you include only some of the database fields in the output range.

Follow the procedure for /Data Query Extract, but select Unique instead of Extract as the final step.

/Data Query Delete

/DQD erases the records in the input range that match the criteria and deletes the rows from the database. As a safety precaution, 1-2-3 prompts you for confirmation before the deletion.

Follow the procedure for /Data Query Find, but select Delete instead of Find as the final step. Then select Delete again if you actually want to delete these records or select Cancel if you chose this accidentally and want to return to the Data Query menu.

/Data Distribution

/DD creates a frequency distribution of the values in a range.

- A frequency distribution tells you how many values in a specified range fall within specified numeric intervals.
- Use /Data Distribution with a pre-existing set of values in a worksheet. The range containing these values is called the values range.
- Before you begin the command, choose two adjacent blank columns. The left column serves as the bin range. Enter the values you want to use as intervals into the bin range column. Enter the values in ascending order with the smallest value at the top.

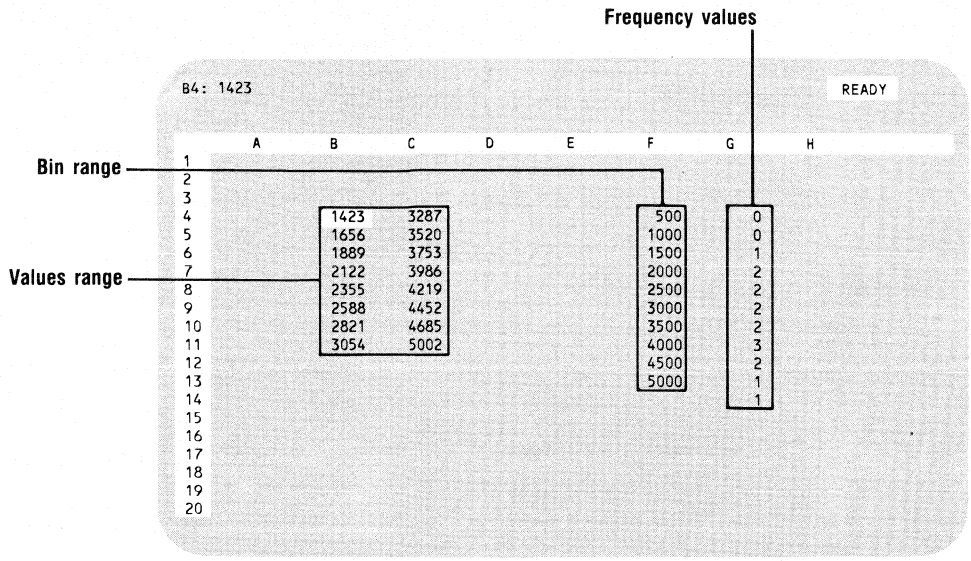


Figure 2-37

Procedure

1. Select /Data Distribution at the prompt.
2. Enter the Values range at the prompt.

   The values range is the range containing the values you want to analyze.

   If you used this command before, 1-2-3 displays the most recent values range. You can press RETURN to accept this range, or enter a new values range, range address, or range name.
3. Enter the Bin range at the prompt.

   The bin range is the column containing the intervals for the distribution.

The frequency values appear in the output range column to the right of the bin range.

The numbers in the output range represent how many values in the value range are less than or equal to the adjacent value in the bin range, but greater than the preceding value in the bin column. Blank and label cells have a count value of zero.

The output range always contains a value one row beyond the end of the bin column. This last value is the frequency of values that are greater than the last bin value.

Related Commands

/Data Fill produces a bin range with equal intervals.

/Data Matrix

/DM multiplies and inverts matrices formed by rows and columns of cell entries.

- You can invert only square matrices.
- When multiplying matrices, there must be the same number of columns in the first range of numbers as there are rows in the second range of numbers.
- The largest possible matrix for either matrix operation is 90 rows by 90 columns.

Procedure

To invert a matrix:

1. Select /Data Matrix.
2. Select Invert.
3. Enter a Range to invert at the prompt. You can enter the range address or range name of the matrix you want to invert.
4. Enter the Output range at the prompt. You can enter the range address where you want the inverted matrix to appear.

   You need to enter only the address of the upper left corner of the range.

To multiply matrices:

1. Select /Data Matrix.
2. Select Multiply.
3. Enter the First range to multiply at the prompt. You can enter the range address or range name of the first matrix.

4. Enter the Second range to multiply at the prompt.

   You can enter the range address or range name of the second matrix.

5. Enter the Output range.

   You can enter the range address where you want the product of the multiplication to appear.

/Data Regression

X-Range	Y-Range	Output-Range	Intercept	Reset	Go	Quit

/DR computes the coefficient values and constant for a formula that ties one or more ranges of independent variables to a range of dependent variables. It also indicates the statistical accuracy of these values.

- Use /Data Regression if you have several sets of values and you want to see how and whether one set is dependent on the other(s).
- Use /Data Regression to determine the slope(s) and the Y intercept(s) of the best fitting line(s) for a set of data points.
- Regression analysis allows you to predict a value for a dependent variable based on other values for one or more independent variables.
- You can specify up to sixteen independent variables for multiple regression.
- The Y axis intercept appears as the constant in the results.
- In the results, the X coefficient(s) are the slopes.
- The X range and Y range must have the same number of rows.
- When entering the output range, you can specify either a single cell (the upper left cell of the range), or the entire range. The range must be at least nine rows long and two columns wider than the number of independent variables; it must be a minimum of four columns wide.
- The intercept option allows you to choose between computing the Y intercept and forcing it to be zero. The default is to compute the Y intercept.
- There is no limit to the number of values you can enter in each column of variables, assuming that it does not exceed the number of rows in the worksheet.

Procedure

1. Select /Data Regression.
2. Select X-Range.
3. Enter the X range at the prompt.

   The X range is the range containing all the columns of data to be analyzed as independent variables.
4. Select Y-Range.
5. Enter the Y range at the prompt.

   The Y range is the range containing the column of data to be analyzed as dependent variables.
6. Select Intercept.
7. Select either Compute or Zero.
8. Select Output-Range.

   Enter the output range at the prompt.

   Use the cell address of the upper left cell of the range, the range name, or the range address.
9. Select Go.

   1-2-3 enters the following information into the output range: the constant, the standard error of the y estimate, the r squared value, the number of observations, the degrees of freedom, the x coefficients (for each of the independent variables), and the standard error of each of these coefficients.

   Select Reset to cancel all the current regression settings.

   Select Quit to return to READY mode before completing the Data Regression.

Figure 2-38 illustrates the use of multiple regression analysis to determine the possible relationship between certain baseball team statistics. It compares the teams' percentage wins (as the dependent variable) with their slugging percentages and their pitching earned-run averages (as independent variables).

You can graph the best fitting line by computing estimated Y values with an equation of the following form:

Y = Coefficient of X1 * X1 + Coefficient of X2 * X2 ..
+ Constant

Create a formula that uses the regression-generated coefficients and each set of values for X1 and X2 to determine estimated Y values.

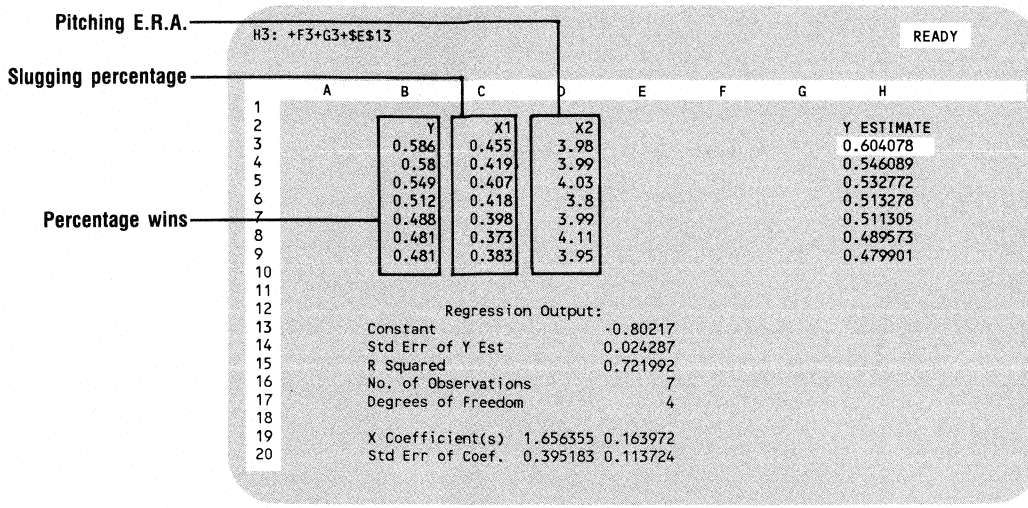


Figure 2-38

To graph a regression line of estimated Y values against actual Y values, select the XY graph type. Then assign the range of estimated Y values to both the X and A ranges of the graph. Assign the actual Y values to the B range of the graph. Set the format for the B range of the graph to symbols only. The resulting graph shows the regression line with real Y values as points.

/Data Parse

Format-Line	Input-Column	Output-Range	Reset	Go	Quit

/DP converts a column of long labels into several columns of labels or numbers.

Use /Data Parse to convert an ASCII text file you have imported into your worksheet with /File Import Text into a standard 1-2-3 worksheet or database.

- 1-2-3 treats data imported with /File Import Text as long labels of text. /File Import Text enters these labels in the column where your cell pointer was located when you executed the command. There are cell entries only in that single column, even though the data may look like it contains columns of text or numbers. Position the cell pointer in what appears to be the left column containing imported data. The cell contents on the control panel show that the cell

contains a long label, preceded by an apostrophe ('), indicating a left-aligned label. Then position the cell pointer in any other column that appears to contain imported data, and the cell contents on the control panel show that cell to be blank.

- You may use imported data in this form to view it on your screen or to print it.
- You must parse this data, breaking up the long labels into individual cell entries that 1-2-3 can utilize, if you want to perform any other 1-2-3 task, such as numeric analysis or graphing, with the data.
- Format lines, which are created as part of the /Data Parse procedure, control the manner in which a long label is divided into blocks of data that will become individual cell entries, one per column.

Format Lines

A format line sets the standard for how all the labels in the cells below it will be parsed into blocks of data.

1-2-3 creates format lines automatically during /Data Parse. 1-2-3 analyzes the label at the current position of the cell pointer, and inserts a format line of the same length above it in a new row. The format line that is created is 1-2-3's best guess of how the label should be parsed. 1-2-3 treats each group of characters separated by one or more blank spaces as a single block of data and identifies each of these blocks of data as a value, a date, a time, or a label.

The format line is a label, preceded by a split vertical bar (¦). The characters in the format line indicate the data type and the width of each block in the cell below it.

Format lines can contain the following symbols:

L = the first character of a label block
V = the first character of a value block
D = the first character of a date block
T = the first character of a time block
S = skip the character below when parsing
> = continuation of the block
* = blank space immediately below, currently undefined, but can become part of a block of data in following cells.

The Skip symbol (S) can only be entered manually. You can replace a symbol with an S when you edit the format line.

1-2-3 creates the following format line for the long label in the cell below it:

```
¦L>>>>************V>>>******V>>****V>>>
'Costs              1500      950     1200
```

/Data Parse will enter Costs as a label in one column, 1500 as a value in a second column, 950 as a value in a third column, and 1200 as a value in a fourth column.

This single format line will correctly parse both of the labels below it:

```
¦L>>>>************V>>>******V>>****V>>>
'Costs              1500      950     1200
'Revenues           1200     1000      900
```

There are a sufficient number of undefined spaces in the format line to accommodate the additional width of the label Revenues and the additional width of the value 1000.

You can edit a format line during the /Data Parse procedure if you find that the automatically created format line does not divide the long labels into the blocks you want. If you begin a block with an S, 1-2-3 does not copy that block into the output range when it parses the line below. The following four figures illustrate the various steps in the parse procedure.

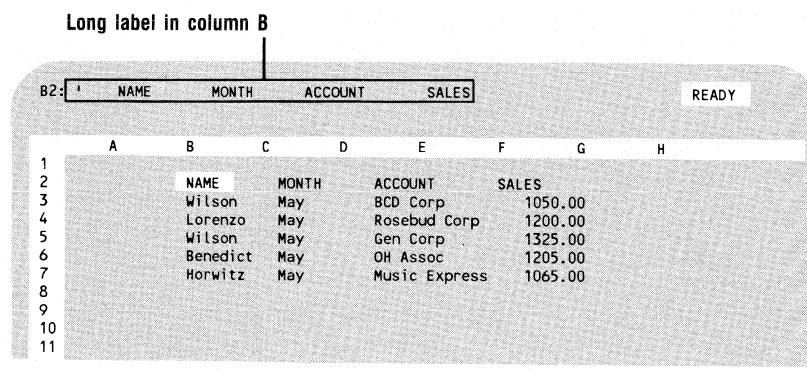


Figure 2-39

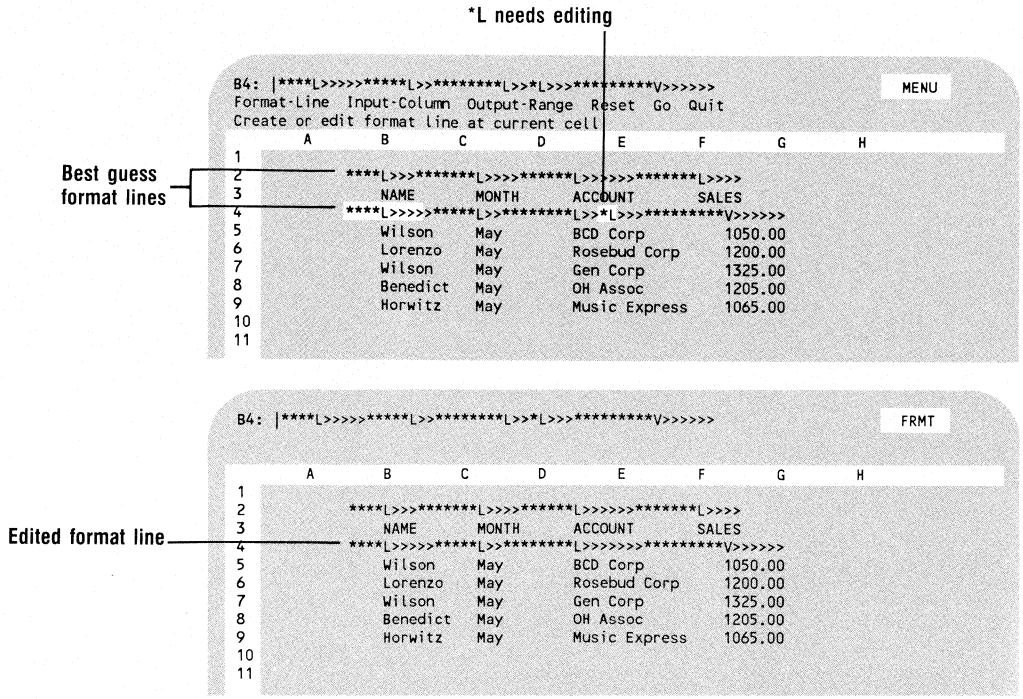

*L needs editing
B4: |****L>>>>>*****L>>********L>>*L>>>*********V>>>>>>
MENU
Format-Line Input-Column Output-Range Reset Go Quit
Create or edit format line at current cell
A B C D E F G H
Best guess format lines
****L>>>*******L>>>>*******L>>>>>*******L>>>>
NAME MONTH ACCOUNT SALES
****L>>>>>*****L>>********L>>*L>>>*********V>>>>>>
Wilson May BCD Corp 1050.00
Lorenzo May Rosebud Corp 1200.00
Wilson May Gen Corp 1325.00
Benedict May OH Assoc 1205.00
Horwitz May Music Express 1065.00
B4: |****L>>>>>*****L>>********L>>*L>>>*********V>>>>>>
FRMT
A B C D E F G H
Edited format line
****L>>>*******L>>>>*******L>>>>>*******L>>>>
NAME MONTH ACCOUNT SALES
****L>>>>>*****L>>********L>>>>>>>*********V>>>>>>
Wilson May BCD Corp 1050.00
Lorenzo May Rosebud Corp 1200.00
Wilson May Gen Corp 1325.00
Benedict May OH Assoc 1205.00
Horwitz May Music Express 1065.00

Figure 2-40

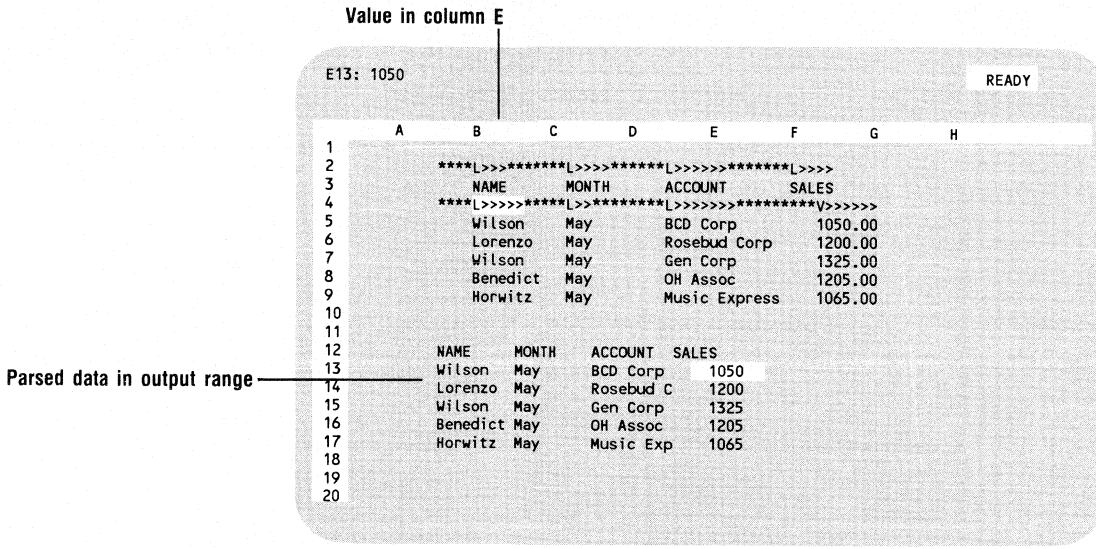


Figure 2-41

Procedure

To execute a Data Parse:

1. Position the cell pointer in the top cell of the column you want to parse.
2. Select /Data Parse.
3. Select Format-Line.
4. Select Create.

   1-2-3 inserts a format line in the cell above the previous position of the cell pointer. The characters in the format line reflect the data type and width of each of the blocks of data in the cell below.
5. (Optional) Edit this format line:

   If any block (including adjacent * characters) is not wide enough to accommodate any of the data that will be parsed in the rows beneath it.

   If any of the block widths or data type characters is incorrect.

   If any single block contains a space, since the format line treats it as two shorter blocks.

   See the procedure for editing a format line.

6. (Optional) Create one or more additional format lines:

   If any cell below the format line contains a block whose data type does not match that indicated in the format line.

   If any cell below the format line contains a block whose width should be different from that indicated in the format line.

   You will probably need to create additional format lines if your imported data contains titles, column headings, other descriptive labels, or a row of characters separating different parts of the worksheet, in addition to numeric entries.

   To create each additional format line, select Quit to return to READY mode, position the cell pointer in the next cell in the column requiring a new format line, and select /Data Parse Format-Line Create. Edit each new line if necessary.
7. Select Input-column.
8. Enter the range containing the column of format lines and the cells you want to parse at the prompt. Be sure to include the format lines. Remember that the range includes only one column.
9. Select Output-Range.
10. Enter at the prompt the cell address of the upper left corner of a blank range in the worksheet large enough to hold your rows and columns of parsed data.

    Be sure the output range is blank. Any current data in the output range will be destroyed.
11. Select Go.

1-2-3 produces a parsed copy of the imported data in the output range. Each block of data has been entered in an individual cell as a value, date, time, or label. When you move the cell pointer through the output range, the cell contents displayed in the control panel show that each column in the output range contains data entries.

Editing a Format Line

Procedure

1. Position the cell pointer in the cell containing the format line you want to edit, if it is not already there.
2. Select /Data Parse if you are in READY mode.
3. Select Format-Line.
4. Select Edit.

The cell pointer disappears. You can edit the format line on the worksheet itself. Note that the cursor is below the first character of the format line and that the status indicator reads OVR.

5. Edit the format line.

   The overstrike editing feature is activated. Use RIGHT and LEFT to move through the format line to the characters that you want to edit. Then type new characters in place of the incorrect ones. You may also use DELETE, BACKSPACE, END, BIG RIGHT, BIG LEFT, and INSERT as you would in EDIT mode.

   Press DOWN, UP, PAGE DOWN, or PAGE UP to scroll the rows below the format line to see rows that are not currently visible on your screen. You may also temporarily move a row directly below the format line so that you can check the format of that row more easily. You do not have to undo scrolling before pressing RETURN to finish editing the format line.

   Press ESC to erase the entire format line. This does not delete the row.

   Press HOME to return the cursor to its initial position in the format line and undo any scrolling.

   Press BREAK to cancel the format line edit and return to READY mode with the format line as it was before you began to edit it.

6. Press RETURN when you have completed editing the format line.

The new format line appears in your worksheet, and 1-2-3 returns you to the Data Parse menu so that you can continue with the parse procedure.

1-2-3 ignores any non-label cells in the input column.

1-2-3 determines the data type of a block of data by testing it in this order: value, date, and time. All other blocks are labels.

Related Commands

/Worksheet Delete Row deletes an unwanted format line.

/Worksheet Global Column-Width adjusts the column widths of parsed data.

/Worksheet Column Set-Width adjusts the width of a single column of parsed data.

System Command

/System /S lets you use the operating system while you are working with 1-2-3. /System lets you leave 1-2-3 temporarily, use a DOS command, and then return to your 1-2-3 work.

- /System is useful if you want to do something at the operating system (DOS) level without interrupting your work and without restarting 1-2-3. For example, you may want to copy some files or create a directory.
- Your DOS user's manual describes specific commands and procedures available to you.
- /System returns you to the operating system if you have copied COMMAND.COM onto your 1-2-3 System Disk as instructed in *Getting Started*. If not, you will get the message Cannot invoke DOS. In that case, hit ESCAPE, replace the System Disk with the DOS disk, and invoke /System again.

Procedure

1. Select /System.
2. Use any DOS command *except* commands like Print or Setclock that load another program into memory (these are sometimes called external DOS commands). If you load another program into memory, you will not be able to return to the 1-2-3 program.
3. To return to the 1-2-3 session, type EXIT and press RETURN at the operating system prompt.

   If you have inserted a DOS disk, remove it from the drive, return the 1-2-3 System Disk to the drive, type Exit, and then press RETURN.

Quit Command

/Quit /Q lets you leave 1-2-3.

CAUTION 1-2-3 does not automatically save your work when you leave the program. You must save your work first.

Procedure

1. Select /Quit.
2. Choose Yes to leave 1-2-3 or No to cancel the /Quit command and return to READY mode.

After you leave 1-2-3, you return either to the Access System or to your computer's operating system, depending on how you started 1-2-3 originally.

Chapter 3

Macros

Macros

Macros help you automate your work during a 1-2-3 work session. A macro is a set of instructions made up of a sequence of keystrokes and commands that you type into a worksheet as cell entries. After you have entered and named the macro, you can invoke it. Whenever you type the macro name, 1-2-3 reads the instructions and performs the specified tasks. When 1-2-3 finishes executing the macro, you can continue with your work.

A macro can automate almost any 1-2-3 task that you perform manually. Macros save you time and simplify worksheet operations by letting you use fewer keystrokes to execute a complex or repetitive task.

Macros are most useful for:

- Automating frequently used 1-2-3 commands
- Typing the same label many times in a worksheet
- Performing a repetitive procedure that requires a series of sequential commands
- Developing a customized worksheet for someone who is not familiar with 1-2-3

The information in this chapter is divided into three sections:

1. Macro Basics presents the basic concepts and procedures for creating and using 1-2-3 macros.
2. Advanced Macro Commands introduces a more advanced way of automating 1-2-3. You should not attempt to use these advanced macro capabilities unless you are an experienced 1-2-3 user, or are familiar with programming concepts and techniques.
3. The /X Macro Commands are the special programming commands that were available in previous releases of 1-2-3. The /X commands have corresponding advanced macro commands in this release.

Macro Basics

A macro is a series of cell entries typed in one or more cells in a single column. A macro cell entry must appear in the form of a label, whether it is a command, a number, or a formula. A macro can include 1-2-3 menu commands, special keys, and any type of cell entry.

1-2-3 reads a macro from left to right in a cell, continues to the cell below, and executes the keystroke sequence until it encounters a blank cell, a macro command indicating the end of a macro, or an invalid macro entry. Invalid macro entries include incorrect commands or formulas, and non-label cell entries.

Creating a Macro

You can create a macro in three steps:

1. Plan your macro and go through the steps of your task manually.
2. Enter the macro as one or more labels.
3. Name the macro.

Planning a Macro

Before writing a macro, plan the steps necessary to accomplish the desired task. When you have a good idea of all the required steps, go through each keystroke manually, carefully noting each key that you press. After confirming that the sequence of keystrokes is correct, you are ready to enter the macro.

Entering a Macro

Following are some guidelines for entering a macro, as well as some rules on macro structure:

- Use a blank area of the worksheet so that the macro does not affect any data that already exists.
- Type the entries for a macro in any column of cells. You can type more than one instruction or command sequence in the same cell.
- The instructions you type in a macro may include any of the standard keyboard characters (for example, h, 9, +), as well as any of 1-2-3's special keys. See Table 3-1.
- The instructions in each cell can be as short as a single keystroke, or as long as 240 characters. If the keystroke sequence is very long, divide it into more than one cell in a column to make it easier to read and edit. See Figure 3-1.
- Type all cell entries for a macro in the form of labels. When entering commands (beginning with a /), numbers, or formulas, you must begin the macro entry with a label-prefix character, such as '. Figure 3-2 shows how to enter a formula and a command in a macro.
- Leave the cell below the macro instructions blank so that 1-2-3 does not include any information immediately below the macro as part of the macro's instructions.

Figure 3-1 below contains two different versions of the same macro, illustrating that the number of keystrokes in a cell does not matter, as long as you enter them in the right order. The first set of macro instructions consists of a single long label in cell A1; the second set of instructions consists of several cells in column G.

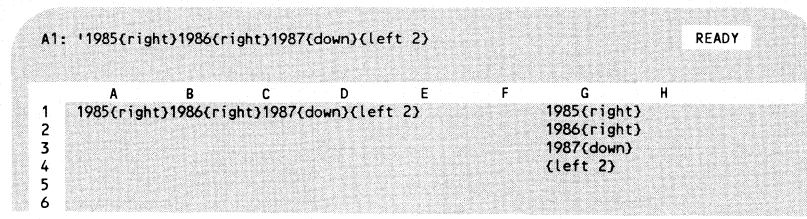


Figure 3-1

The macro in Figure 3-2 contains a formula that sums the three cells above the current cell and then formats the entire range as Currency, 2 decimal places. Note that the cell pointer must be in cell B4 when you invoke this macro.

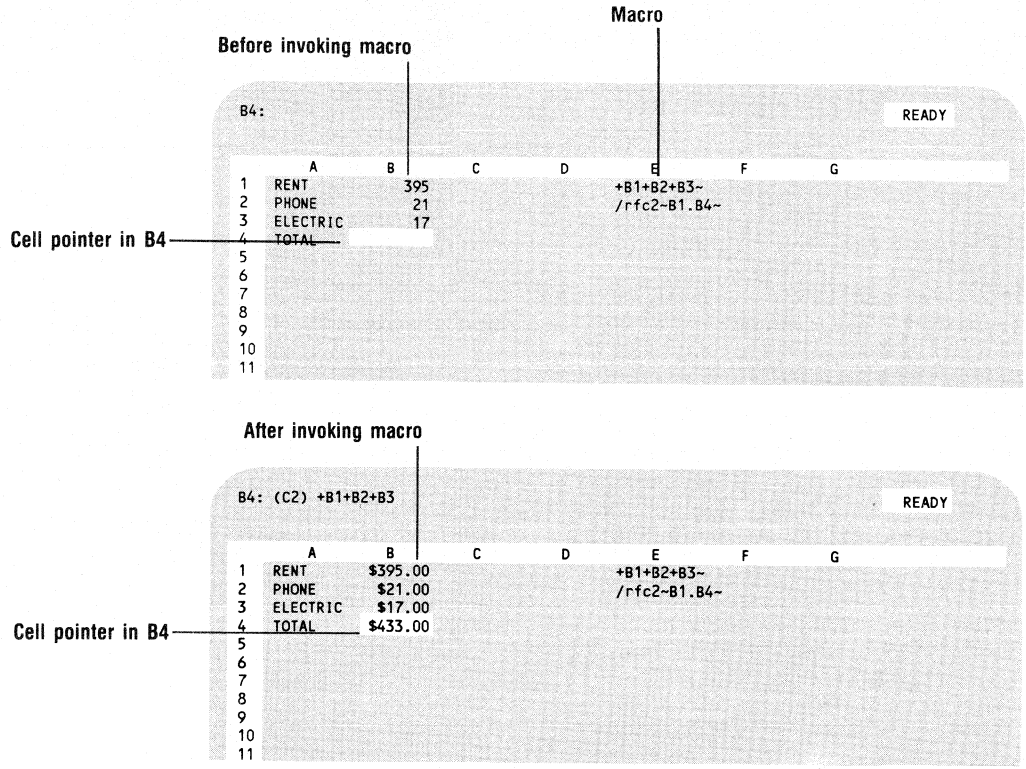


Figure 3-2

To enter the instructions for this macro, type '+B1+B2+B3~ in one cell, and press RETURN. Then, in the cell below, type '/rfc2~B1.B4~ and press RETURN.

You type the ' at the beginning of the formula and the command to enter them as labels in the macro. The tilde character (~) at the end of each sequence of macro instructions stands for RETURN. Typing it enters the instruction in the macro to press RETURN.

Special Key Indicators

You can enter most keystrokes in a macro simply by typing the appropriate key; however, you must type the special keys as they appear in Table 3-1.

You must enclose all the special keys (with the exception of the RETURN key symbol) in braces ({ and }). You can type uppercase or lowercase letters interchangeably when entering the key names.

Macro Key	Description
~	RETURN (referred to as tilde)
{down}	DOWN
{up}	UP
{left}	LEFT
{right}	RIGHT
{home}	HOME
{end}	END
{pgup}	PAGE UP
{pgdn}	PAGE DOWN
{bigleft}	BIG LEFT (move left one screen)
{bigright}	BIG RIGHT (move right one screen)
{edit}	EDIT
{name}	NAME
{abs}	ABS
{goto}	GOTO
{window}	WINDOW
{query}	QUERY
{table}	TABLE
{calc}	CALC
{graph}	GRAPH
{escape} or {esc}	ESCAPE
{backspace} or {bs}	BACKSPACE
{delete} or {del}	DELETE (use only in EDIT mode)
{~}	to have tilde appear as ~
{{} and {}}	to have braces appear as { and }

Table 3-1

Note: To specify two or more consecutive uses of the same key, you can include a repetition factor within the braces. For example,

{right 4}	instructs 1-2-3 to move the cell pointer four cells to the right
{del 4}	deletes the last four characters typed, in EDIT mode

Naming a Macro

1-2-3 executes a macro when you invoke its name. You must, therefore, name the range that contains the macro. To do this, use the /Range Name Create command. 1-2-3 recognizes only the letters A through Z, preceded by a backslash (\), as range names for macros.

To name the macro range:

1. Move the cell pointer to the first cell of the macro.
2. Select /Range Name Create.
3. At the prompt, type a name, consisting of a backslash (\) followed by a letter, and press RETURN.
4. At the next prompt, press RETURN to accept the first cell of the macro as the range. Make sure that the cell pointer is on the first cell of the macro sequence. If not, press ESCAPE to unanchor the cell pointer, and move it to the first cell.

Note: You do not need to specify the entire range of the macro; 1-2-3 only needs to know the starting location, or first cell, of the macro instructions.

After you name the macro, 1-2-3 stores the range name for the remainder of the current work session. To store this range name for future work sessions, you must save the worksheet file. The range name will appear in the Range Name menu unless you delete it using the /Range Name Delete command.

1-2-3 stores every macro you name in the Range Name menu. Each time you create a new macro, type its name in a cell to the left of the macro to make it easier for you to remember the name. Be sure to include a label-prefix character before the backslash (\) when entering the macro name in the cell. See Figure 3-3.

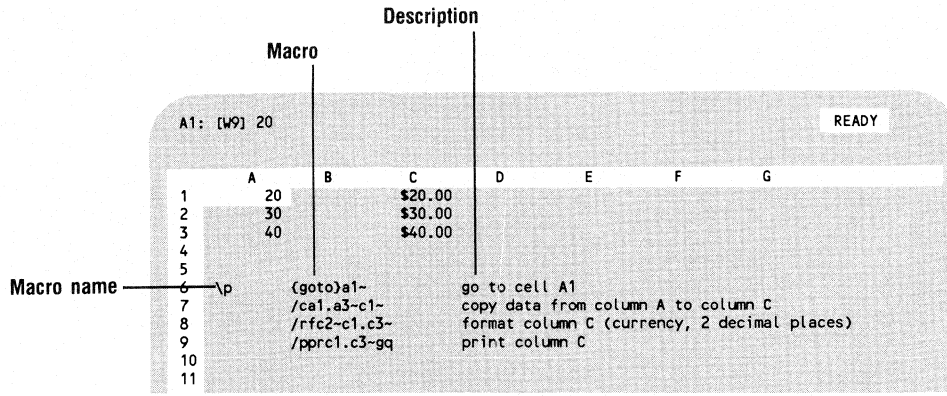


Figure 3-3

Documenting a Macro

If you write a complicated macro, you may want to write a description of the step-by-step instructions for the macro. Type these descriptions in the cells to the right of each keystroke sequence. Then, if you use this macro again later, or you give it to someone else to use, the purpose of each keystroke will be clear. Make sure that the descriptions are not in the same cells as the macro, so 1-2-3 does not confuse your notes with its macro instructions.

Invoking a Macro

After you name the macro, you can invoke it by pressing the MACRO key and the letter name simultaneously; you don't type backslash (\) before the macro name when you invoke it. If you try to execute a macro you have not named, 1-2-3 will beep.

When you invoke the macro, 1-2-3 carries out the keystroke sequence automatically. It executes the keystrokes of the macro beginning with the first cell in the instructions and continuing downward until the macro ends. To interrupt the macro at any time before it is completed, press BREAK. See Interrupting a Macro later in this chapter.

You can invoke a macro either when 1-2-3 is in READY mode, or during a command procedure. In the latter case, you can start a 1-2-3 command manually, use the macro to continue, and finish the command manually. Figure 3-4 shows how you can create a macro to enter the heading "DJ's Tennis Supplies" after you select the /Print Printer Options Header command. Name the macro range and invoke it as you do any macro.

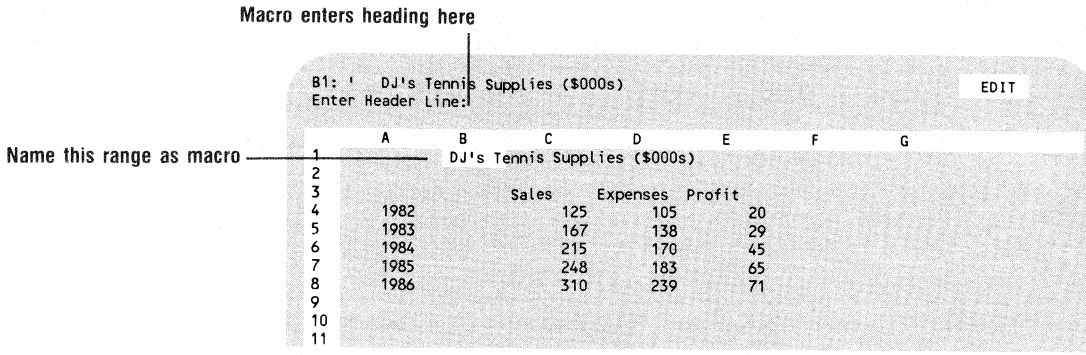


Figure 3-4

Interrupting a Macro

To interrupt a macro at any time during execution, press BREAK. 1-2-3 returns immediately to READY mode and lets you resume your work session. BREAK is useful for:

- Halting a lengthy macro sequence that you want to end early
- Ending a macro that is in an infinite loop. See {BRANCH} in the next section.

If an error occurs when you press BREAK, press ESCAPE to cancel the error and return to READY mode.

See also {BREAKON} and {BREAKOFF} in the next section for information on disabling and enabling macro interruption during macro execution.

Interactive Macros

You can combine macro execution with manual entries. One way to do this is by inserting a pause in the macro instruction sequence. 1-2-3 can pause one or more times for manual entries while it is executing a macro.

The {?} command causes the macro to pause for manual entries. You can enter {?} anywhere in the macro instruction sequence. When 1-2-3 reads a {?} command in the macro, it stops executing the macro until you type something and press RETURN.

When entering {?} in the macro instruction sequence, you must complete the cell entry with a ~ character, which instructs 1-2-3 to continue macro execution after you press RETURN. Figure 3-5 shows a macro that enters the salesperson's name, employee number, and sales region. It then pauses to accept manual entry of the daily sales totals, and formats this number as Currency, 2 decimal places.

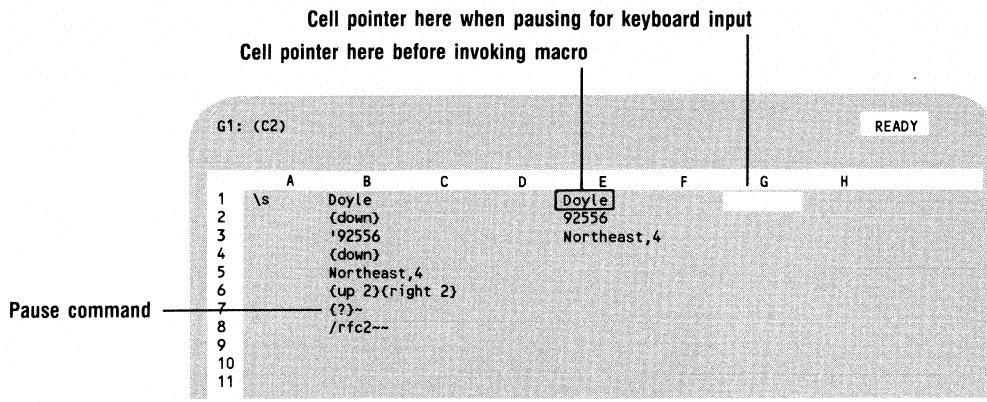


Figure 3-5

See Interactive Macros in the Advanced Macro Commands section for more information on how to use {?} and other interactive macro commands.

Auto-Execute Macro

An auto-execute macro is a special macro that specifies a task that 1-2-3 implements automatically when you first load the worksheet using the /File Retrieve command. This macro is useful for worksheets that you use often, or that you are preparing for others to use. It is also useful in combination with the auto-loading worksheet feature, which automatically retrieves a particular worksheet when you start 1-2-3. See the /File Retrieve command in Chapter 2 for details on the auto-loading worksheet feature.

You create an auto-execute macro the same way that you create any other macro. However, you give it a special name: \0 (zero). Do not use this name when naming any other macro.

1-2-3 will automatically invoke a macro named \0 when you retrieve the worksheet that contains it. You cannot, however, invoke an auto-execute macro manually during a work session by holding down MACRO and pressing 0. To use an auto-execute macro during a 1-2-3 work session, you must assign it an additional macro name, for example, \E.

A worksheet can contain only one auto-execute macro. If you no longer want the auto-execute macro to be invoked automatically, you must either give it a new name, or delete it and its range name from the worksheet.

Editing a Macro

Some cases in which you would edit a macro are as follows.

- You observe a typing error, or an omission of a keystroke. A common missing keystroke is the tilde (~) symbol representing RETURN.
- While the macro is executing, 1-2-3 encounters an error in your keystroke sequence, and displays an error message. You need to find and correct the error before you can successfully execute your macro.
- The existing macro, if altered slightly, could be used to perform a similar worksheet procedure, saving you the task of rewriting the entire macro.

To edit a macro, go to the range containing the macro keystroke sequence and edit the cells as you would any label. If the changes you need to make to the macro are obvious, use the EDIT key to alter the necessary keystrokes, just as you would edit any cell entries in 1-2-3.

When you edit a macro, you do not need to rename the macro range. 1-2-3 remembers the range where the keystrokes are stored; it does not remember the actual keystrokes themselves. As long as the macro begins in the same place as it did before, you can invoke it using its original name.

If you want to store the revised macro under a new name and retain the original macro as well, you must give the revised macro a new macro name. However, be sure to copy the original macro before you edit and rename it.

Debugging a Long Macro

The keystrokes causing an error in a lengthy and complicated macro may not be easy to find. To help you diagnose problems in a macro, 1-2-3 has a feature called single-step macro execution. This feature allows you to examine a macro one keystroke at a time, until you locate the error. This process is called debugging.

To turn on single-step macro execution, press STEP. A STEP indicator appears at the bottom of the screen. Then, invoke the macro as usual.

To proceed through the macro in STEP mode, press any key to execute the macro one step at a time. Keep pressing any key to proceed to the next step. In between each step, a flashing SST indicator replaces the STEP indicator at the bottom of the screen, reminding you that you are in STEP mode and that the macro is in process.

Note: If you have a {?} command indicating a pause in the macro, you must press RETURN to continue single-step macro execution.

Once you have found the error in the macro, you must stop the macro before you can edit it. If you encounter an error that produces an error message, press RETURN or ESCAPE to both clear the error and exit the macro. If you encounter an error that does not produce an error message (for example, a missing ~ symbol), you must press BREAK to stop the macro.

You do not need to leave STEP mode to edit a macro. When you exit the macro to edit it, the STEP indicator replaces the flashing SST indicator. This indicator reminds you that you are still in STEP mode, but that you have exited the macro. After editing the macro, you can invoke the macro again, remaining in STEP mode. You can then repeat the debugging procedure from the beginning of the macro, if necessary.

To leave STEP mode and turn off single-step macro execution, press STEP again.

Advanced Macro Commands

In addition to its keystroke memory feature, 1-2-3 includes a number of macro commands that create a powerful programming language. You implement each of these special macro commands with a 1-2-3 advanced macro keyword, such as {IF}, {BRANCH}, and {QUIT}. The 1-2-3 advanced macro keywords are listed in the Keyword Summary later in this chapter.

This section contains the following information:

- A general explanation of advanced macro commands, including grammar (syntax), arguments, subroutines
- A summary of advanced macro commands, by category
- A description of each macro command

Note: This section contains advanced 1-2-3 material. You should not attempt to use the information presented here unless you are an experienced user of 1-2-3 macros, or are familiar with programming concepts and techniques.

When writing your own macros, you can combine keystrokes with macro commands to accomplish complex tasks. The following is an example of a macro that includes both advanced commands and keystroke sequences.

```
         A                B                C                D
1
2
3 Since you are
4 {IF J1<10} a new {BRANCH A6}   ←{IF} and {BRANCH}
5 an old and valued                 macro commands
6 customer, we'd like to
7 extend this offer to you.~
```

This macro types a complete sentence as part of a form letter from a company to its customers. When the macro reaches cell A4, it tests whether a current number in cell J1 is less than 10. From this test, the {IF} command determines whether the sentence will include the phrase "a new" or the phrase "an old and valued."

If the {IF} command is TRUE, the macro continues to execute macro instructions in the same cell. In that case, it uses "a new," and the {BRANCH} command sends the macro to cell A6 to continue the sentence. If the {IF} command is FALSE, the macro immediately begins executing macro instructions in the cell below. In this case, it does not use "a new," but goes to cell A5 to continue the sentence.

Advanced Macro Grammar

Each macro command you create must have the correct grammatical structure. Figure 3-6 illustrates the format for writing advanced macro commands.

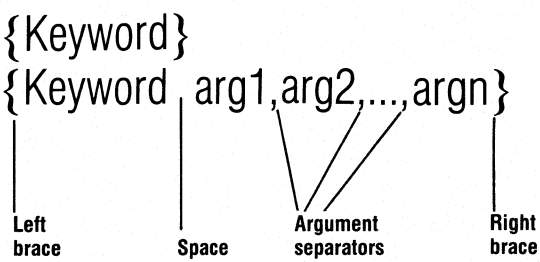


Figure 3-6

Examples:

{INDICATE Hello}
{LET B10,96.5}
{BRANCH C20}
{BREAKOFF}

In these commands, the advanced macro keywords are {INDICATE}, {LET}, {BRANCH}, and {BREAKOFF}. You must type an advanced macro keyword exactly as it appears in this chapter. Uppercase and lowercase letters are equivalent in an advanced macro keyword. See the complete list later in this chapter.

Most of the advanced macro commands require an additional word or two. These words are called arguments. Grammatically speaking, macro keywords are like verbs in a sentence. Arguments are like direct objects; they complete the command by indicating the what, where, or when of the particular action. In the example above, the {INDICATE} keyword tells 1-2-3 to display a new mode indicator in the upper right corner of the screen. The Hello argument tells 1-2-3 what to display.

You supply the arguments for advanced macro commands. For example, if you want 1-2-3 to place the number 96.5 in cell B10, use the {LET} command, which has this format:

{LET *location,value*}

You fill in the arguments as follows:

{LET B10,96.5}

If you want to store the label January in cell D100, you can compose this command:

{LET D100,January}

Incorrect macro commands result in an error when you invoke the macro, not when you compose it. Following are 1-2-3's rules of grammar for advanced macro commands:

- You must create advanced macro commands as label entries or string-valued formulas (a formula that generates a label).
- Each command must begin with a left brace ({) character followed by a macro command keyword.
- Following the keyword, type a single space character, then one or more arguments. Each argument must be the correct type — number, string, or location (cell address or range). Some macro commands require more than one type of argument. Others require no arguments at all.
- The two valid argument separators are the comma (,) and the semicolon (;). The comma is the default configuration for the argument separator; however, the semicolon is always valid no matter what the default configuration is. You can configure a different argument separator by selecting /Worksheet Global Default Other International Punctuation. Don't leave any space characters before or after an argument separator. The separator must be valid (configured) at the time you invoke the macro. It does not have to be valid when you create the macro.
- Each command must end with a right brace (}) character. The entire macro command must be within a single cell. You cannot have the beginning brace in one cell and the ending brace in another.
- You can store any number of macro commands in a single cell, as long as you do not enter more than 240 characters. You can mix advanced macro commands with individual keystrokes in the same cell.

The following advanced macro commands show the correct syntax, using the {BLANK *location*} command as an example. The {BLANK} command erases the contents of a specified cell or range.

{BLANK A1..G45}	
{Blank ALL_TOTALS}	if ALL_TOTALS is a range name
{blank G45}	a single cell address as a range argument

These commands are incorrect:

{BLANKB45.H56}	space missing after keyword
{BLANKE A100}	keyword misspelled

In many of the keyword descriptions, the meaning of the argument is combined with the type of argument. For instance, the grammar for the {GETLABEL} command is given as:

{GETLABEL *prompt-string,location*}

The first argument must be a string. When 1-2-3 performs a {GETLABEL} command, it uses this string as a prompt on the control panel.

Argument Types

1-2-3 advanced macro commands can have four types of arguments.

- *Number:* Any single number or expression (formula) that results in a numeric value. A number can be in standard form (1456.7) or in scientific notation (1.4567E3). An expression can be a cell address (J78) or a single-cell range name (THIS_CELL), or it can include several operations (A45*A66/100).
- *String:* Any sequence of characters up to 240. With a few exceptions, you cannot use a string-valued expression (formula) in a command that calls for a string argument. Exceptions are noted individually in this chapter.
- *Location:* Any range of one or more cells. You can specify a range with cell addresses or with a range name. 1-2-3 does not distinguish between G5 and G5..G5 as a single-cell range in macro commands, as it does with @functions. You don't need to define a range name at the time you create the macro, but you must define it before you invoke the macro.
- *Condition:* Any logical expression. The macro proceeds depending on the result of a true-false test specified in the *condition*. It compares values in two cells to determine if one is less than, greater than, or equal to another, or checks the result of a specified formula. The expression can contain any entry, number, or string-valued formula.

Note: In many cases, you must enclose a *string* argument in quotation marks.

Enclose any string or range name that contains an argument separator, either a semicolon or a comma, in quotation marks. For example:

- string: {LET A25,"Type a letter; then a number"}
- range name: {BLANK "TOTAL, 5 YEARS"}

You must also enclose in quotation marks any string argument or range name that includes the colon character (:).

In addition, enclose in quotation marks any formula that you want to appear as a label, or any string argument that may be confused with a range name.

CAUTION There is an important difference between macros and @functions; 1-2-3 does not adjust cell addresses in macros when you use the /Move, /Worksheet Insert, and /Worksheet Delete commands. If you write a macro containing cell addresses and then rearrange your worksheet, the macro may no longer work. To avoid this problem, use range names to refer to all individual cells, as well as ranges, in the worksheet. In addition, if the macro contains instructions to insert or delete a row, the results may affect macro execution following those instructions.

Declaring Argument Types

Some commands can process more than one type of argument. For example, a {LET} command can store either a label or a number in a cell. You can use the suffixes :value and :string to explicitly define the argument type. You can also use quotation marks to specify a string.

{LET A1,12+13} or
{LET A1,12+13:value} enters the number 25 in cell A1

{LET A1,"12+13"} or
{LET A1,12+13:string} enters the label '12+13 in cell A1

Some commands accept only certain argument types and may not allow the type of argument you specify.

Macro Subroutines

The Invoking a Macro section earlier in this chapter describes the process of starting a macro with the MACRO key. One macro can also invoke another macro. One way to do this is to use a {BRANCH} command.

When 1-2-3 reads a {BRANCH} command, it continues reading macro keystrokes and advanced macro commands at the specified location. In effect, one macro passes control of the 1-2-3 session to another macro. See the description for {BRANCH} later in this chapter for more details.

If you want to use a sequence of macro instructions in several different places in a macro program, you can create a subroutine. Instead of typing the entire macro sequence each time, or using a {BRANCH} command to send 1-2-3 somewhere else to get its instructions, you simply put the range name assigned to the sequence in braces at the appropriate location in the macro instructions. When 1-2-3 encounters this subroutine call command, it executes the sequence of instructions you named. When the sequence is finished, 1-2-3 returns to the original routine immediately after the subroutine call.

The following example shows a macro named MASTER that contains a command which calls another macro, named CLEANUP. When 1-2-3 encounters this command, it temporarily stops executing MASTER and starts executing CLEANUP. This is known as calling a subroutine. One macro can call another at any time—in the middle of a range specification, at a file name menu, and so on.

MASTER macro	CLEANUP macro
xxxx	xxxxxx
xxxxx	xxxxxxxxx
xxxx	xxx
{CLEANUP}	xxxxx
xxxx	xxxxx
xxxxx	{RETURN}

When it comes to the end of CLEANUP, or reads a {RETURN} command, 1-2-3 returns to the macro instructions in MASTER, located immediately below the {CLEANUP} command. This is known as returning from a subroutine. See also the description of {RETURN} later in this chapter.

CAUTION Do not use a subroutine name that is the same as one of the special macro keys in Table 3-1. If a duplication occurs, 1-2-3 performs the subroutine, not the keystroke.

Passing Arguments to Subroutines

In most 1-2-3 advanced macro commands, you specify a keyword followed by one or more arguments. For instance, the command {LET A1,999.5} assigns 999.5 to the location A1. In a similar manner, you can give values to the macro program subroutines that you create. This process is called passing arguments to a subroutine. If you create a subroutine named COMPUTE, you can pass it values to use in calculations by enclosing both the subroutine name and the arguments in braces {COMPUTE 52,G1}. This command is a subroutine

call in which two arguments are passed. You may want 1-2-3 to interpret the argument 52 as a number and the argument G1 as a cell address. The next section describes the way in which you tell 1-2-3 to interpret subroutine arguments.

The {DEFINE} Command

For each argument you specify in a subroutine, you must also specify a cell in which to store the value being passed. You may also need to tell 1-2-3 how to interpret the arguments in the subroutine call. To do this, begin the subroutine with a {DEFINE} command.

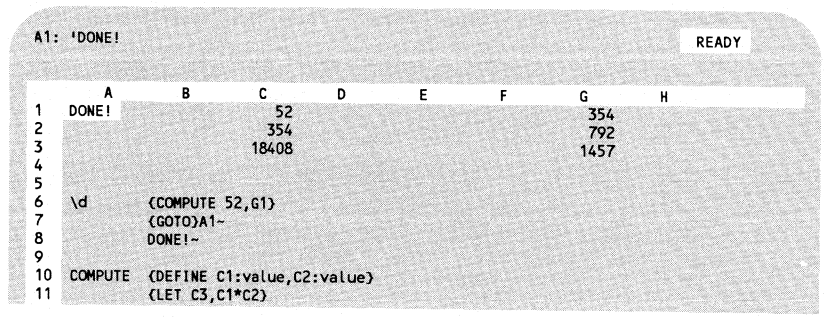


Figure 3-7

In this example, the subroutine named COMPUTE begins with the command {DEFINE C1:value,C2:value}. When 1-2-3 encounters the command {COMPUTE 52,G1} during macro execution, it first processes the {DEFINE} command. The C1:value and C2:value in the {DEFINE} command instruct 1-2-3 to do two things:

1. Interpret the first argument, 52, as a numeric value, rather than a two-character string, and store this value in cell C1.
2. Interpret the second argument, G1, as a cell address, rather than a two-character string, and store the current value of cell G1 in cell C2.

Later commands in the COMPUTE subroutine can use these values by referring to these two cells. In this example, the {LET} command tells 1-2-3 to store the product of cell C1 times cell C2 in cell C3.

In general, the :value suffix instructs 1-2-3 to evaluate the argument before storing it; that is, 1-2-3 considers the argument to be a number, a cell address, or a formula (string or numeric).

If you omit the :value suffix, or specify the suffix :string, 1-2-3 stores the argument as a label, exactly as it appears in the subroutine call. If the {DEFINE} command is either {DEFINE C1,C2} or {DEFINE C1:string,C2:string}, the subroutine call {COMPUTE SALES,@INT(G1)} tells 1-2-3 to store the five-character left-aligned label SALES in cell C1, and store the ten-character left-aligned label @INT(G1) in cell C2. If you change C2:string to C2:value, 1-2-3 evaluates the second argument (the integer part of the value in cell G1) before storing it in cell C2.

Note: In this discussion, the {DEFINE} command uses the cell addresses C1 and C2. In practice, using range names to indicate all cell locations is preferable, in case you rearrange data in your worksheet.

The number of arguments passed to a subroutine must match the number of arguments in the {DEFINE} command. Otherwise, 1-2-3 issues an error message.

If 1-2-3 cannot evaluate the :value argument, an error message occurs.

If you omit the {DEFINE} command altogether, no values are transferred. This means that the subroutine cannot use any arguments you specify in the subroutine call.

Updating Results of Advanced Macro Commands

Many advanced macro commands, such as {LET}, change the contents of one or more cells in the worksheet. 1-2-3 may not, however, automatically update or recalculate the worksheet after each macro command is executed. You may need to include the {calc} key at various points in a macro to keep the worksheet up to date. Similarly, you may need to include one or more extra keystrokes to update the worksheet after a macro containing certain advanced macro commands finishes execution.

In the list below, an asterisk indicates those commands that require extra keystroke instructions following the command to update the worksheet when macro execution is complete. In some cases a tilde (~), which executes a RETURN, will accomplish this. Commands without an asterisk require a {calc} to update the worksheet.

*{BLANK}
{CONTENTS}
{DEFINE}
{FILESIZE}
{GET}

*{GETLABEL}
*{GETNUMBER}
{GETPOS}
*{LET}
{LOOK}
{ONERROR}
{PUT}
{READ}
{READLN}

Keyword Summary

Throughout the remainder of this chapter, *italicized lowercase* words indicate the type of argument required by a macro keyword. UPPERCASE words indicate macro keywords. When you enter a macro, you can use either uppercase or lowercase characters. In the examples, range names also appear in UPPERCASE.

The following sections summarize the 1-2-3 advanced macro commands, divided into categories of related commands. Following these sections are complete descriptions of the command keywords and their arguments.

Controlling the Screen

You can use these commands to change the appearance of your screen display and to sound the bell.

{BEEP}	Sounds the computer's bell or tone.
{INDICATE}	Changes the indicator in the upper right corner of the screen.
{PANELOFF}	Suppresses redrawing of the control panel during macro execution.
{PANELON}	Restores control panel redrawing, undoing {PANELOFF}.
{WINDOWSOFF}	Suppresses redrawing the display screen during macro execution.
{WINDOWSON}	Restores standard screen redrawing, undoing {WINDOWSOFF}.

Allowing Keyboard Interaction

These advanced macro commands allow you to create interactive macros. Interactive macros pause during execution, allowing you to enter data and perform procedures manually. This list also includes commands that prevent users from interfering with a macro that is executing.

{?}	Halts macro execution temporarily for keyboard input.
{BREAKOFF}	Disables the BREAK key during macro execution.
{BREAKON}	Restores the BREAK key, undoing {BREAKOFF}.
{GET}	Halts macro execution temporarily and stores a single character you type in a specified cell.
{GETLABEL}	Halts macro execution temporarily, prompts you to type, and stores the characters as a label in a specified cell.
{GETNUMBER}	Halts macro execution temporarily, prompts you to type, and stores the characters as a number in a specified cell.
{LOOK}	During macro execution, checks to see if you have typed a character.
{MENUBRANCH}	Sets up a customized menu with user-defined choices.
{MENUCALL}	Calls a subroutine in a user-defined menu.
{WAIT}	Suspends macro execution until a specified time.

Controlling Program Flow

Many of the following commands are similar to flow of control commands that perform branching and looping in other programming languages.

{BRANCH}	Continues executing macro instructions located in a different cell.
{DEFINE}	Specifies cells that store arguments in a subroutine call.
{DISPATCH}	Branches indirectly to specified destination.
{FOR}	Repeatedly executes the macro subroutine that begins at a particular location.
{FORBREAK}	Cancels execution of current {FOR} loop.
{IF}	Conditionally executes the command that follows the {IF} command.
{ONERROR}	Continues execution at a specified location if a 1-2-3 error occurs.

{QUIT}	Terminates macro execution, returning control to the keyboard.
{RESTART}	Clears the subroutine stack.
{RETURN}	(Subroutine return) Continues macro execution just after the location of the last {routine-name} or {MENUCALL} command.
{routine-name}	Calls a subroutine

Manipulating Data

You can use the following commands to change the format of data in a worksheet, and to specify areas in a worksheet in which 1-2-3 stores this data.

{BLANK}	Erases the contents of a specified cell or range.
{CONTENTS}	Places the contents of one cell in another cell as a label.
{LET}	Stores a label or number in a specified cell.
{PUT}	Stores a label or number in one cell of a specified range.
{RECALC}	Recalculates the formulas in a specified range, row by row.
{RECALCCOL}	Recalculates the formulas in a specified range, column by column.

Working with Files

You can use the following commands to perform file-related tasks, such as moving data between files, during a macro.

{CLOSE}	Closes a file that has been opened with the {OPEN} command.
{FILESIZE}	Determines the number of bytes in a currently open file.
{GETPOS}	Determines the current position of the file pointer in an open file.
{OPEN}	Opens a specified file for reading, writing, or both.
{READ}	Reads characters from a file into a specified cell.
{READLN}	Copies a line of characters from the currently open file into a specified location.

{SETPOS}	Sets a new position for the file pointer in the currently open file.
{WRITE}	Copies characters into an open file.
{WRITELN}	Adds a carriage-return line-feed sequence to a string of characters and writes the string to a file.

Controlling the Screen

{BEEP}
{INDICATE}
{PANELOFF}
{PANELON}
{WINDOWSOFF}
{WINDOWSON}

BEEP

{BEEP <*number*>} sounds the bell or tone.

The *number* argument is optional.

{BEEP} causes 1-2-3 to sound the computer's bell. Typical uses of {BEEP} are to signal the end of a macro, to alert you to an error (see {ONERROR}), and to signal the end of a time period (see {WAIT}).

The *number* argument specifies the tone of the bell. There are four different beeps, invoked with the arguments 1, 2, 3, and 4. If you do not specify a number argument, 1-2-3 uses the beep invoked by number 1.

Example: The \B macro prompts you to enter some information, then beeps when you finish typing.

```
\B          Type your name here:~
            {?}~{BEEP}
```

INDICATE

{INDICATE <*string*>} changes the mode indicator in the upper right corner of the screen.

The *string* argument is optional.

1-2-3 replaces the mode indicator with the indicator *string* you specify. The new indicator remains on the screen, even if the mode subsequently changes when you execute a command or type an entry. The only way to clear the indicator is to execute another {INDICATE} command.

{INDICATE}, with no arguments, restores the READY mode indicator. To remove the mode indicator from the control panel entirely, use the command {INDICATE ""}.

1-2-3 uses only the first five characters of the string. You must type the string into the {INDICATE} command — you cannot use the address of a string-valued cell. To center an indicator, type some space characters before and after it. The number of space characters you need on either side of an indicator in order to center it varies, depending on how many characters the indicator contains.

Example: The command {INDICATE Hello} displays Hello as the mode indicator.

The command {INDICATE 1 } centers 1 in a highlight in the upper right corner, since space characters surround the character 1.

PANELOFF {PANELOFF} suppresses redrawing of the control panel during macro execution.

PANELON {PANELON} restores standard control panel redrawing.

{PANELOFF} and {PANELON} do not take arguments.

{PANELOFF} allows you to turn off the control panel during execution of a macro. {PANELOFF} terminates either when it encounters a {PANELON} command, or when the macro ends.

{PANELOFF} is useful only when the macro is executing 1-2-3 menu commands. You do not need it during advanced macro commands, such as {LET}, because 1-2-3 does not use the control panel at all for these commands.

Example: The \P macro erases the contents of cell A1.

```
\P          {PANELOFF}
            {goto}A1~
            /re~~
            {PANELON}
```

WINDOWSOFF {WINDOWSOFF} freezes the screen display, except for the control panel.

WINDOWSON {WINDOWSON} restores normal updating of the screen display, undoing a {WINDOWSOFF} command.

{WINDOWSOFF} and {WINDOWSON} do not take an argument.

{WINDOWSOFF} allows you to manipulate data without having changes flash on the screen. During normal macro execution, you can see each stage that the macro goes through during its

operation. Use this command to suppress visible macro activity — especially during a long macro. {WINDOWSOFF} also speeds up macro execution, as 1-2-3 does not have to keep redrawing the screen.

These commands are similar to {PANELOFF} and {PANELON}.

Allowing Keyboard Interaction

{?}
{BREAKOFF}
{BREAKON}
{GET}
{GETLABEL}
{GETNUMBER}
{LOOK}
{MENUBRANCH}
{MENUCALL}
{WAIT}

?

{?} halts macro execution temporarily, allowing you to type and move around the worksheet; macro execution continues when you press RETURN.

{?} does not take an argument.

When you press RETURN it indicates only that 1-2-3 should resume execution of the macro. If you also want 1-2-3 to execute a RETURN, you must include a ~ in the macro.

Example: The \H macro moves the cell pointer to cell A9 and types an instruction to the user. When you press RETURN to complete the entry, the macro updates the file, assuming that the file already has a name.

```
\H      {goto}a9~
        Type your name and today's date here:{RIGHT}
        {?}~
        /fs~r
```

The {?} command provides an alternative to {GET}, {GETLABEL}, {GETNUMBER}, {LOOK}, {MENUBRANCH}, and {MENUCALL} when implementing interactive macros.

BREAKOFF

{BREAKOFF} disables the BREAK key during macro execution.

BREAKON

{BREAKON} restores the BREAK key, undoing a {BREAKOFF} command.

{BREAKOFF} and {BREAKON} do not take arguments.

Unless a macro executes the {BREAKOFF} command, you can always stop the execution of a macro by pressing BREAK. If you are preparing an application for others to use but not change, you can make sure they stay under macro control with {BREAKOFF}. When BREAK is disabled, they cannot discontinue or interfere with the macro, either inadvertently or deliberately.

{BREAKOFF} stays in effect until canceled with {BREAKON}, or until the macro ends.

If {BREAKOFF} is in effect, 1-2-3 disables the BREAK key during macro execution and during printing within a macro. You will probably not want to disable the BREAK key while you are designing and testing macros.

CAUTION If {BREAKOFF} is in effect and the macro goes into an infinite loop, you cannot return to 1-2-3. The only way to stop the macro is to restart the computer.

Example: In the following excerpt from a longer macro, BREAK is disabled for the first part of the macro, then restored with {BREAKON} before the macro starts a print session. In this case, the user stays under macro control only until printing begins. Then the user has the option of using BREAK during a long printing session in case something goes wrong. If the macro continues after printing ends, you can disable BREAK once again. BREAK is automatically restored when macro execution ends.

```
{BREAKOFF}
...
...
{BREAKON}
/pprA1.H660~gq
{BREAKOFF}
...
...
```

GET {GET *location*} pauses for you to type a single character, then stores it at *location*.

The single character you type can be a standard typewriter key or a 1-2-3 standard key (for instance, CALC). The character or standard key is stored as a label entry at the upper left corner cell of *location*.

{GET} makes no provision for a prompt on the control panel. Use {GETLABEL} or {GETNUMBER} when such a prompt is required. These commands prompt you to type several characters, not a single character. The example below uses a worksheet cell to display a prompt.

The {?} command provides an alternative way for a macro to accept keyboard input.

Example: The \G macro prompts you to make a one-keystroke choice, then branches accordingly. If you choose an illegal letter (any letter except d or m), 1-2-3 beeps and starts again. 1-2-3 stores your choice (d or m) in the range named CHOICE.

```
\G          {GOTO}A1~
            Choose (D)aily or (M)onthly~
            {GET CHOICE}
            {IF CHOICE="d"}{BRANCH DAY}
            {IF CHOICE="m"}{BRANCH MONTH}
            {BEEP}{BRANCH \G}

CHOICE

DAY         {GOTO}e10~{quit}

MONTH       {GOTO}f10~{quit}
```

GETLABEL {GETLABEL *prompt-string,location*} pauses for you to type a character string, then stores it as a label entry at *location.*

GETNUMBER {GETNUMBER *prompt-string,location*} pauses for you to type a number, then stores it as a number entry at *location.*

The practical limit on the length of the *prompt-string* is the amount of room on the control panel. If you type a long response, the characters scroll off to the left of the control panel.

You must type the *prompt-string* argument into the macro command — you cannot specify a cell that contains a string value. If the *prompt-string* includes an argument separator, such as a comma or semicolon, you must enclose the string in quotation marks.

If you specify a range as the *location*, 1-2-3 uses the upper left corner cell of the range.

When 1-2-3 encounters a {GETLABEL} or {GETNUMBER} command, it displays the *prompt-string* on the control panel, and then pauses. You can type up to 80 characters, ending with RETURN.

- With {GETLABEL}, 1-2-3 stores the character string as a left-aligned label at the *location* cell.
- With {GETNUMBER}, you can type any numeric entry — a number, a formula, or the name of a range containing numeric values. 1-2-3 does not check to make sure the entry is numeric, however. If you type a label or a non-numeric formula, 1-2-3 places ERR in the *location* cell.

{GETNUMBER} and {GETLABEL} override a current {PANELOFF} condition.

The {?} command provides an alternative way for a macro to accept manual entries.

Example: The \L macro prompts you to type your first and last names, then enters them in the specified ranges.

```
\L          {GETLABEL "Type your first name ...",FIRST}~
            {GETLABEL "Now, your last name ... ",LAST}~

FIRST       David

LAST        Dujon
```

The \N macro prompts you to type a number, and tests the value entered.

```
\N          {GETNUMBER "How old are you? ",AGE}~
            {IF AGE=39}{NO_WAY}
            {INDICATE "OK"}~

NO_WAY      {BEEP}{INDICATE WHAT?}
            {GETNUMBER "I don't believe you ... ",AGE}~
            {IF AGE=39}{BRANCH NO_WAY}
            {RETURN}

AGE
```

LOOK {LOOK *location*} checks to see if you have typed a character.

If you have typed a character since the macro began executing, 1-2-3 stores the first character typed at the specified *location*. If no characters have been typed, 1-2-3 erases the *location* cell.

While a macro is running, 1-2-3 does not pay attention to the keyboard. If you type something while a macro is running, the operating system stores the characters in its "typeahead" buffer until 1-2-3 requests them. The typeahead buffer is usually rather small (for instance, 10 characters). When you fill this buffer, the computer beeps each time you press another key.

{LOOK} is similar to {GET}, except that {LOOK} does not suspend macro execution. {LOOK} leaves the character in the typeahead buffer for use by a {GET}, {GETNUMBER}, or {GETLABEL} command.

Put {LOOK} in a loop so that it periodically checks to see if you have typed something while your macro is running.

Example: The \T macro executes a "time-out" routine. It gives you five seconds to start typing, starting at the current time that is entered in START. It repeatedly checks the typeahead buffer to see whether you have typed a character. If you have, {LOOK} copies this character to IN_CHAR. Then, the macro branches to DONE, types a message, and ends.

If you have not typed a character, the first {IF} command is FALSE, and the macro continues to the next {IF} command. In this case, the macro keeps looping for five seconds. After five seconds, if you have not typed anything, the macro beeps, displays a message, and ends.

```
\T        {LET START,@now}
LOOP      {LOOK IN_CHAR}
          {IF IN_CHAR<>""}{BRANCH DONE}
          {IF @now<START+@time(0,0,5)}{BRANCH LOOP}
          {beep}Too late!{quit}

DONE      You made it in time!!{quit}

IN_CHAR

START
```

MENUBRANCH {MENUBRANCH *location*} halts execution temporarily to let you select a menu item, then branches accordingly.

MENUCALL {MENUCALL *location*} halts execution temporarily to let you select a menu item and executes the corresponding macro as a subroutine.

When 1-2-3 encounters a {MENUBRANCH} or {MENUCALL} command, it displays a menu on the control panel, based on the contents of the range whose upper left corner is *location*. When you choose a menu item, 1-2-3 continues reading macro keystrokes in the column containing the menu item you select.

{MENUBRANCH} passes control to another routine in much the same way as {BRANCH}. {MENUCALL} implements a subroutine call in much the same way as enclosing a subroutine name in braces.

{MENUBRANCH} and {MENUCALL} differ in what happens after 1-2-3 executes the last command in the column containing the menu item. Following a {MENUBRANCH} command, 1-2-3 ends the macro after the last command in the column. Following a {MENUCALL} command, 1-2-3 continues macro execution immediately after the {MENUCALL} command.

To construct a macro menu:

1. Place each menu item in a separate cell in the first row of the menu range.

   Blank cells are not allowed between menu items. You can include up to eight items in the menu. Keep the total number of characters small to avoid extending beyond the screen. The cell to the right of the final menu item must be blank.

2. Supply brief descriptions (they must be labels) for each menu item in the second row of the menu range. To create a blank label as a description, use a label that consists only of spaces.
3. Enter the macro instructions for each menu item in the cells below the menu descriptions.

Keep the following rules in mind:

- Begin each menu item with a different character so that you can select items by typing the first character. Otherwise, 1-2-3 will select the first entry, reading from left to right, whose first character matches the character you type.
- Uppercase and lowercase letters are equivalent when making a menu selection. For example, you can select Quit by typing q or Q.
- You can always select a menu item by moving the highlight and pressing RETURN.

If you press ESCAPE at a {MENUBRANCH} or {MENUCALL} menu, 1-2-3 cancels the menu selection process. Execution continues just after the macro command. This is the same point to which control returns after a {MENUCALL}.

{MENUBRANCH} or {MENUCALL} overrides a current {PANELOFF} condition.

Example: The \M macro has you choose between Add, Edit, and Quit. If you select Add or Edit, the macro branches to a location in the worksheet where you can perform the necessary tasks. If you select Quit, the macro ends.

If you press ESCAPE instead of selecting one of these items, macro execution continues at the cell below the {MENUBRANCH} command (the {goto}G45~ command). Otherwise, 1-2-3 never executes this command.

\M	{MENUBRANCH TOPMENU} {goto}G45~		
TOPMENU	Add	Edit	Quit
	Add an entry	Edit entries	End
	{BRANCH G20}	{BRANCH H20}	{QUIT}

When it executes the {MENUBRANCH} command, 1-2-3 displays the menu that begins at cell TOPMENU on the control panel:

Add Edit Quit *(menu items)*

Add an entry *(menu description)*

As you move the menu pointer among the items, the menu descriptions Edit entries and End come into view. You can select an item by pressing the initial character or by highlighting and pressing RETURN. Depending on the item, the program continues execution with one of the commands {BRANCH G20}, {BRANCH H20}, or {QUIT}.

If the first line of the \M macro had read {MENUCALL TOPMENU} instead of {MENUBRANCH TOPMENU}, control would automatically pass to {goto}G45~ after 1-2-3 executes one of the {BRANCH} commands.

WAIT {WAIT *time-serial-number*} waits until *time-serial-number.*

{WAIT} causes 1-2-3 to halt execution and display the WAIT indicator in the upper right corner. During this time, 1-2-3 will not respond to keystrokes. When the time specified by *time-serial-number* is reached, execution continues.

You can interrupt a {WAIT} command by pressing BREAK, unless you have executed a {BREAKOFF} command.

1-2-3 does not update the clock at the bottom of the screen during a {WAIT} command.

Example: The \W macro repeatedly moves the cell pointer down one row, pauses ten seconds, beeps, and moves the cell pointer down another row. This macro repeats until you press BREAK.

```
\W          {DOWN}
            {WAIT @NOW+@TIME(0,0,10)}
            {BEEP}{BRANCH \W}
```


Controlling Program Flow

{BRANCH}
{DEFINE}
{DISPATCH}
{FOR}
{FORBREAK}
{IF}
{ONERROR}
{QUIT}
{RESTART}
{RETURN}
{routine-name} (SUBROUTINE CALL)

BRANCH

{BRANCH *location*} continues macro execution at a different cell.

1-2-3 immediately begins reading keystrokes at the new *location*. You can specify a single cell or a range name as the *location*. Execution continues at the upper left corner cell of *location*.

Note: {BRANCH} is a "go to," not a subroutine call. You cannot return to the original routine except with another {BRANCH} command. A subroutine call returns macro control to the original routine, immediately after the subroutine call. To issue a subroutine call, enclose the name of the subroutine in braces. See Macro Subroutines earlier in this chapter for more details.

CAUTION Do not confuse {BRANCH} with the GOTO key. GOTO moves the cell pointer. {BRANCH} transfers macro execution to the location you specify.

Example: The \B macro branches to BIG or SMALL, depending on the value in cell A1.

```
\B          {If A1>100}{BRANCH BIG}
            {BRANCH SMALL}

BIG         {goto}D1~{QUIT}

SMALL       {goto}E1~{QUIT}
```

DEFINE {DEFINE *location1:type1,location2:type2,...*} allocates storage locations and declares argument types for arguments to be passed to a subroutine. See The {DEFINE} Command section earlier in this chapter.

{DEFINE} is used in subroutines to specify where variables passed to that subroutine are to be stored. It must be the first command in the subroutine.

The number of arguments in a {DEFINE} command must be the same as in the subroutine call command. Otherwise, 1-2-3 displays an error message when the subroutine is called. See the description of {routine-name} later in this section.

Each *location* specification may be a single cell, a range, or a range name. If you specify a range, 1-2-3 stores the argument value in the range's upper left cell. The *type* specification must be one of the :value or :string suffixes. Omitting a *type* suffix is equivalent to specifying :string.

1-2-3 has a simple scheme for passing arguments to subroutines. It checks each argument in a subroutine call against the *type* specified by the {DEFINE} command in the subroutine, then stores the argument in the cell specified by the {DEFINE} command, either as a string or as a value.

This is a typical subroutine call:

{SUBR_1 45*10,+"Dow"&"Jones",F10}

When the {DEFINE} command in SUBR_1 is executed, 1-2-3 checks each argument to see if it should be stored literally, as a string, or evaluated first. String arguments are always stored as left-aligned labels, regardless of the worksheet's current default label prefix. Value arguments may be stored as numbers or as left-aligned labels, depending on the argument itself. (See Declaring a Value Argument Type later in this chapter.)

In order for the subroutine SUBR_1 to use the passed arguments, the first item in the subroutine must be a {DEFINE} command that allocates three cells to store the argument values and declares each argument as either a string, which is the default, or a value.

Declaring a String Argument Type

1-2-3 stores the arguments specified in a {DEFINE} command just as they appear in the command. This is the default. Thus, 1-2-3 interprets the following {DEFINE} command as a string declaration.

{DEFINE X1,X2,X3}

If this command is the first item in SUBR_1, 1-2-3 stores the label 45*10 in cell X1, the label +"Dow"&"Jones" in cell X2, and the label F10 in cell X3.

Declaring a Value Argument Type

As an alternative to the process described above, you can instruct 1-2-3 to evaluate an argument before storing it by typing :value after the cell address in the {DEFINE} command. For example:

{DEFINE X1:value,X2:value,X3:value}

If this command is the first item in SUBR_1, 1-2-3 evaluates all three arguments before storing them. Thus, it stores the value of the first argument, 450, as a number in cell X1; the value of the second argument, the string Dow Jones, as a label in cell X2; and the value of the third argument, the contents of cell F10, as either a number or a label in cell X3.

DISPATCH

{DISPATCH *location*} branches to a destination that is specified in the *location* cell.

The location cell should contain the cell address or range name of another cell, the branch destination. If the location cell is blank or contains a numeric value, 1-2-3 ends macro execution and returns control to the user.

A typical use of {DISPATCH} would involve setting up the *location* cell as a variable cell, dependent on continually varying conditions in the worksheet. {DISPATCH} then allows you to branch conditionally to one of many alternative destinations, based on the current contents of the *location* cell.

Note: {DISPATCH} differs from {BRANCH} in that {BRANCH} can only execute instructions in the *location* cell; it cannot continue to execute instructions at another destination specified in the *location* cell.

If you use a range name to specify the *location* cell, make sure the range you name contains only one cell. Specifying a range containing more than one cell as the location makes {DISPATCH} equivalent to {BRANCH}.

Example: This excerpt from a macro sets up conditions that determine which range name (you_owe, we_owe, ... and so forth) to enter in the cell "switch," and then executes an indirect branch to the range "switch."

{IF D14>H54}{LET switch,you_owe}
{IF D14<H54}{LET switch,we_owe}
...
{DISPATCH switch}

FOR {FOR *counter-location,start-number,stop-number,step-number,starting-location*} repeatedly executes the macro that begins at a particular location.

{FOR} provides a loop capability (often called FOR-NEXT) similar to that provided by many other programming languages.

The *counter-location* is a cell in which 1-2-3 keeps track of which repetition of the macro routine it is executing. You do not need to enter anything at the *counter-location*. Initially, the value of the *counter-location* cell is the *start-number* value.

The *start-number* is the beginning value in the counter. The *stop-number* indicates the end of the counter. The *step-number* is the value by which the counter increases each time 1-2-3 executes the subroutine.

The *starting-location* is the first cell, or range name, of the subroutine to be executed.

Example: In the \F macro, the range (cell) named COUNTER acts as the *counter-location*. {FOR} instructs 1-2-3 to execute the subroutine FORMAT ten times, each time changing the width and numeric format of one column.

COUNTER	1 *(initialized to start-number value, 1)*
\F	{FOR COUNTER,1,10,1,FORMAT}
FORMAT	/wcs15~ /rfc2~ {down}{down} {down}{down}~ {right}

Processing the Loop To execute a {FOR} command, 1-2-3 first evaluates the *start-number*, *stop-number*, and *step-number* values. Then, and each subsequent time a repetition is about to begin, 1-2-3:

1. Compares the *stop-number* and *counter-location* values. If the *counter-location* value does not exceed the *stop-number* value, 1-2-3 executes the routine at *starting-location*. Otherwise, 1-2-3 continues reading keystrokes at the cell below the {FOR} command.
2. Returns to step 1 when the *starting-location* routine ends. The routine ends when 1-2-3 comes to a cell that is not a label, a string formula, or a {RETURN} command.
3. Increases the value in the *counter-location* cell by the *step-number* value.

It is possible that 1-2-3 does not perform the routine at all, as in case 4 in the table below; or, that the routine will fall into an infinite loop, as in case 5 below. In the latter case, you must press BREAK to stop the {FOR} loop.

Some typical combinations of *start-number*, *stop-number*, and *step-number*:

Start	Stop	Step	Repetition count
1	10	1	10
2	10	2	5
2	9	2	4
2	1	1	0 *(start value exceeds stop value at beginning)*
4	5	0	infinite *(counter never exceeds stop value)*

Table 3-2

Note: Ending the routine with {RETURN} is acceptable, but not necessary. Do not use {QUIT} to end the routine. If you do, the loop will always terminate after the first pass.

1-2-3 stores the *start-number*, *stop-number*, and *step-number* values internally. You cannot have the routine modify the *stop-number* or *step-number* value.

FORBREAK {FORBREAK} cancels execution of a {FOR} loop and continues processing at the first character after that {FOR} command.

CAUTION Use {FORBREAK} only within a subroutine called by a {FOR} command. Using {FORBREAK} in a subroutine called by a {routine-name} command, or in the main macro, causes error messages to occur.

{FORBREAK} does not take an argument.

{FORBREAK} immediately ends a subroutine called by a {FOR} command, and returns processing to the point immediately following the {FOR} command.

Example: In this excerpt from a {FOR} loop, {FORBREAK} is used as one of three branching alternatives. If G12 displays ERR, the {FOR} loop ends immediately; if G12 displays a value greater than 500, the {FOR} loop begins again without completing this iteration. Otherwise, execution of the current iteration of the {FOR} loop continues.

```
{IF @ISERR(G12)}{FORBREAK}
{IF G12>500}{RETURN}
...
...
```

IF {IF *condition*} conditionally executes the command that follows the {IF} command.

{IF} allows a macro program to branch depending on the result of a TRUE/FALSE test. 1-2-3 evaluates the *condition* argument, which can be any entry or expression, numeric or string-valued.

- If the expression does not have the numeric value zero, 1-2-3 considers it to be TRUE. Execution of the macro continues in the same cell, immediately after the {IF} command.
- If the expression has the numeric value zero, 1-2-3 considers it to be FALSE. Execution of the macro continues in the cell below the one with the {IF} command. A blank cell (but not a cell containing a blank string), string values, ERR, and NA are zero, or FALSE.

The {IF} command implements an IF-THEN-ELSE capability, similar to that in many other programming languages:

- The instructions in the cell after the {IF} command are the THEN clause.
- The instructions in the cell below the {IF} command are the ELSE clause.

Be careful in composing the THEN clause. In most instances, you should include a {BRANCH} or {QUIT} command to prevent the ELSE clause from being executed directly after the THEN clause.

Example: These commands implement a branch to either RTN1 or RTN2. If cell TESTVAL contains a TRUE formula, or any other entry that is not zero, the macro branches to routine RTN1. If TESTVAL=0, execution continues at RTN2.

```
{IF TESTVAL}{BRANCH RTN1}
{BRANCH RTN2}
```

Typically, TESTVAL contains a logical formula, such as +A14>45.5 or +B22<>"Abrams".

You can also enter the logical formula itself as the *condition* argument:

```
{IF A1>100}{BRANCH RTN1}
{BRANCH RTN2}
```

ONERROR {ONERROR *branch-location,<message-location>*} branches to *branch-location* if a 1-2-3 error occurs during macro execution; optionally records the error message that 1-2-3 would have displayed at *message-location*.

The *message-location* argument is optional. If you include this argument, 1-2-3 stores the error message that it would have displayed at the bottom of the screen in that cell. If you omit this argument, there is no way to tell what kind of error occurred because 1-2-3 does not display the message on the screen.

Structure your macro so that there is no possibility of an error occurring before 1-2-3 encounters the {ONERROR} command.

1-2-3 can use each {ONERROR} command only once. An {ONERROR} condition remains in effect until another {ONERROR} command supersedes it, until an error occurs, or until macro execution ends. Once an error has occurred, the {ONERROR} condition is canceled. To continue trapping errors, include another {ONERROR} command in the *branch-location* routine.

CAUTION Pressing BREAK causes an error. {ONERROR} takes effect if you press BREAK, unless you've executed a {BREAKOFF} command.

Example: The \E macro brings in data from a file, using the /File Combine command. Even if you have removed the disk from the disk drive, {ONERROR} keeps the macro running.

```
\E          {ONERROR OOPS,ERRMSG}
            /fcceDATA~

OOPS        {goto}MESSAGE_CELL~
            The following error has occurred:{DOWN}
            /cERRMSG~~{DOWN 2}
            Replace data disk. Press any key when ready.~
            {BRANCH \E}
```

QUIT {QUIT} terminates macro execution, returning control to the keyboard.

{QUIT} does not take an argument.

{QUIT} is often useful at the end of an {IF} command, or as a result of a {MENUCALL} choice. {QUIT} ends all macro execution, not just the subroutine it may be a part of.

Example: The \Q macro has you choose Continue or Quit. If you select Continue, processing continues at another menu, stored at location MENU1. If you select Quit, 1-2-3 updates the worksheet file and macro execution ends.

```
\Q          {MENUCALL MENU2}
            {MENUCALL MENU1}

MENU2       Continue                Quit
            Continue work           Save work and exit
            {RETURN}                /fs~r{QUIT}

MENU1
```

RESTART {RESTART} cancels a subroutine and clears the subroutine stack.

{RESTART} does not take an argument.

{RESTART} is only useful in a subroutine that has been called from at least one other macro or subroutine. Use {RESTART} if your subroutine is nested below the calling routines (the stack), which you no longer want it to return to.

When 1-2-3 encounters a {RESTART}, it will continue to execute the instructions that follow in that subroutine. The macro stops when it encounters a {RETURN} command or a blank cell. It will not return to any of the routines that called it.

Example: Suppose that the following excerpts appear in a subroutine and that checkstatus is "not ok":

{IF checkstatus = "not ok"}{RESTART}
....
{RETURN}

1-2-3 finishes executing the subroutine and then halts the macro when it reaches the {RETURN} command.

RETURN {RETURN} returns from a macro subroutine.

{RETURN} does not take an argument.

Use {RETURN} in conjunction with {routine-name} or {MENUCALL} to cause 1-2-3 to return to the calling routine. {RETURN} is not required if a subroutine ends because 1-2-3 encounters a blank or numeric cell. In such cases, control returns automatically to the calling routine.

{RETURN} and {QUIT} are not equivalent in a subroutine. {QUIT} ends macro execution and returns control of the 1-2-3 session to you. {RETURN} causes macro execution to continue just after the location of the last {routine-name} or {MENUCALL} command.

Example: The SAVE subroutine prompts you to type a letter. If you type N or n, the {RETURN} command performs an explicit return to the calling routine. Otherwise, the /File Save command is executed and, as there are no more macro commands, an implicit return is made to the calling routine.

```
SAVE    {GETLABEL "Do you want to save (Y/N):",INPUT}
        {IF INPUT="N"}{RETURN}
        /fs~r
```

routine-name {routine-name *<optional-argument>,<optional-argument>...*} calls a subroutine, optionally with one or more arguments.

Using subroutines allows you to assemble a macro out of a series of modules, each of which can be individually tested and then called from a master routine.

See Macro Subroutines earlier in this chapter for an explanation of this advanced macro facility.

To call a macro subroutine, you enclose the range name assigned to the subroutine's starting cell in braces:

{SUBR_1}

1-2-3 immediately begins reading keystrokes and macro commands at the location specified by the range name {SUBR_1}.

When 1-2-3 encounters a {RETURN} command or a cell that is not a label or string formula, macro execution continues at the point just after the subroutine call. A {QUIT} command terminates a subroutine and the entire macro program as well; control of the 1-2-3 session returns to the keyboard.

Here are some guidelines for the {routine-name} command:

- The {routine-name} location must be a range name assigned to a single cell or a range. Specifying a range does not restrict the size of the subroutine to the size of the range. Only a {RETURN} command, a blank cell, or a nonstring-value cell (a cell that does not contain a label or string-valued formula) can indicate the end of a subroutine.
- Do not use a {routine-name} that is the same as one of the key names in Table 3-1 (for example, NAME). If a duplication occurs, 1-2-3 performs the subroutine, not the keystroke.
- Do not use a cell address as the {routine-name} location.
- You can specify one or more arguments, which 1-2-3 evaluates and stores in separate cells before executing the subroutine. See the description of {DEFINE} for details.

Example: The \S macro program below calls the subroutine SUBR1 three times. Each time, it changes the width of the current column and assigns the D1 date display format to a column of 10 cells. After each performance of the subroutine, 1-2-3 returns to the \S macro just after the SUBR1 call. For instance, after the first subroutine call, it returns to the \S program which begins at {goto}G45~.

```
\S              {goto}A45~
                {SUBR1}
                {goto}G45~
                {SUBR1}
                {goto}L45~
                {SUBR1}
                {goto}MESSAGE_CELL~All done!~

SUBR_1          /wcs25~
                /rfD1{down 9}~
                {RETURN}
```

Manipulating Data

{BLANK}
{CONTENTS}
{LET}
{PUT}
{RECALC}
{RECALCCOL}

BLANK

{BLANK *location*} erases the contents of cells in a range.

{BLANK} produces the same results as the /Range Erase command. 1-2-3 erases the entry from every cell in the specified range. {BLANK} does not affect numeric format and protection settings.

{BLANK} is often more convenient to use than the /Range Erase command. For example, use {BLANK} to erase a cell or range in the middle of a menu command sequence in a macro.

Example: This macro erases the contents of cells A1 through A10 and stores a new entry in cell A1.

```
{BLANK A1..A10}
{GOTO}A1~
Rennie's Tennis and Fitness Center~
```

CONTENTS

{CONTENTS *destination-location,source-location,*<width-number>,<*format-number*>} yields a string value that represents the current numeric contents of another cell.

The *width-number* and *format-number* arguments are optional.

The {CONTENTS} command is similar to the {LET} command. The commands differ in that {LET} can store either a number or a label in a specified cell, while {CONTENTS} stores a label that looks like a number in a cell.

When it executes a {CONTENTS} command, 1-2-3 evaluates the contents of the *source-location*. If you specify a range, 1-2-3 uses the upper left corner cell of the range. 1-2-3 then stores this value at the *destination-location* as follows:

- *Numeric value:* If you don't specify the optional arguments, 1-2-3 uses the current column width and numeric format of the *source-location* cell.

  If you specify the optional *width-number* argument, 1-2-3 treats the *source-location* cell as having that column width; it does not actually change its column width. If you specify the optional *format-number*, 1-2-3 treats the *source-location* cell as having the corresponding numeric format.

  The resulting display — incorporating a number, a width, and a format — is stored as a left-aligned label in the *destination-location* cell.

- *String Value:* If the *source-cell* has a string value, a corresponding left-aligned label is created in the *destination-location* cell.

Optional Arguments

You can specify an optional *width-number* without also specifying a *format-number*. If you specify a *format-number*, you must precede it with a *width-number*. Table 3-3 contains a complete list of the numeric format code numbers.

Code	Corresponding numeric format
0	Fixed, 0 decimal places
1	Fixed, 1 decimal place
2 to 15	Fixed, 2 to 15 decimal places
16 to 32	Scientific, 0 to 15 places
33 to 47	Currency, 0 to 15 places
48 to 63	%, 0 to 15 places
64 to 79	, (comma), 0 to 15 places
112	+/- (horizontal bar graph)
113	General
114	D1 (DD-MMM-YY)
115	D2 (DD-MMM)
116	D3 (MMM-YY)
121	D4 (Full Int'l — varies with Configuration settings)
122	D5 (Partial Int'l — varies with Configuration settings)
119	D6 (HH:MM:SS AM/PM)
120	D7 (HH:MM AM/PM)
123	D8 (Full Int'l — varies with Configuration settings)
124	D9 (Partial Int'l — varies with Configuration settings)
117	Text display (formulas shown as entered)
118	Hidden (prevents the cell's contents from appearing on the screen)
127	Worksheet's default numeric display format

Table 3-3

Note: Although {CONTENTS} is designed to handle numeric values, you can also use it to transfer a string value. However, you may find it easier to use {LET} or the /Move, /Copy, or /Range Value commands to transfer string values.

Using {CONTENTS} with the Text display format number 117 provides a quick way to retrieve the text of a formula.

Example: Suppose cell A45 contains the number 167.24 and the width of column A is 9:

{CONTENTS B45,A45}~	Places the 9-character label 167.240 in cell B45 if cell A45 is assigned the F3 numeric format.
{CONTENTS B45,A45}~	Places the 9-character label 1.67E+02 in cell B45 if cell A45 has no numeric display format and the worksheet's default numeric format is S2.
{CONTENTS B45,A45,3}~	Places the 3-character label *** in cell B45, because 1-2-3 interprets the column width as 3 — not wide enough to accept the number.
{CONTENTS B45,A45,15,34}~	Places the 15-character label $167.24 (currency, 2 decimal places) in cell B45.

LET {LET *location,number*} stores a number entry at cell *location*.

{LET *location,string*} stores a label entry at cell *location*.

{LET} stores an entry in a specified cell *location*. If you specify a range as the *location*, 1-2-3 stores the entry in the upper left corner cell.

{LET} can create either a label entry or a number entry. This is one of the few commands in which you can specify a string-valued expression. For instance:

- {LET G34,15*14:string} stores the label 15*14 in cell G34.
- {LET G34,15*14:value} stores the number 210 in cell G34.
- {LET G34,+"Hello, "&X22:value} stores the label Hello, Denise in cell G34 if cell X22 contains the label Denise.

If you specify neither the :string nor the :value suffix, 1-2-3 attempts to evaluate the argument as a numeric or string expression. If successful, 1-2-3 creates a number or label entry at *location*. Otherwise, 1-2-3 creates a label entry that contains the characters in the argument.

PUT {PUT *location,col-number,row-number,number*} stores *number* at a specified location within a range.

{PUT *location,col-number,row-number,string*} stores *string* at a specified location within a range.

{PUT} is a variant of {LET}. {LET} stores a label or number in a specified cell. {PUT} processes a label or number in exactly the same way, but instead of storing the result in a particular cell, it stores the result at a particular column and row of a specified *location*.

Specify a range as the *location*. If you specify a single cell, an error results unless both *col-number* and *row-number* equal zero. The first column of the *location* range is numbered 0, as is the first row.

Note: Specifying a column or row location outside the *location* causes an error, which you cannot trap with the {ONERROR} command.

Example:

	A	B	C
1			
2			
3		45	
4			
5			January

{PUT A1..C5,0,2,45} places the number 45 in cell A3.

{PUT A1..C5,2,4,January} places the left-aligned label January in cell C5.

{PUT A1..C5,0,8,500} causes an error, since the specified range has 5 rows and the *row-number* value is 8.

RECALC {RECALC *location,<condition>,<iteration-number>*} recalculates the formulas in a specified *location*, proceeding row by row.

RECALCCOL {RECALCCOL *location,<condition>,<iteration-number>*} recalculates the formulas in a specified *location*, proceeding column by column.

These commands are helpful for recalculating sections of large worksheets when you are using Manual Recalculation. They save you time by only recalculating a small, specified region of the worksheet.

The *condition* and *iteration* arguments are optional.

1-2-3 evaluates the *condition* after it executes the range *location* calculation. If the *condition* is FALSE, it calculates the range again. The *iteration* argument specifies the number of times 1-2-3 calculates the range. This argument is reduced and compared once each time the range is calculated. Recalculation will continue until the *condition* is TRUE, or until the iteration count is FALSE, whichever comes first.

If you include {calc} in a macro to indicate pressing the CALC key, 1-2-3 recalculates the entire worksheet. Only the {RECALC} and {RECALCCOL} commands perform partial recalculations. The difference between the {RECALC} and {RECALCCOL} commands is the order of recalculation. See /Worksheet Global Recalculation in Chapter 2 for more information.

Use {RECALC} to recalculate a formula that is located below and to the left of the cells it refers to in the worksheet. Use {RECALCCOL} if the formula is above and to the right of cells on which it depends. Use {calc} if the formula is both above and to the left of cells whose value has changed.

You may need to use {calc}, {RECALC}, or {RECALCCOL} after macro commands such as {LET} and {GETNUMBER}, which change the data in the worksheet. You do not need to use these commands after invoking 1-2-3 commands such as /Copy and /Move; 1-2-3 automatically recalculates the worksheet after such commands, even during macro execution.

To redraw the screen to reflect the recalculation, include a {WINDOWSOFF} and {WINDOWSON} following the {RECALC} or {RECALCCOL} in a macro. Otherwise, any subsequent cell entry will redraw the screen.

CAUTION Recalculating a portion of the worksheet can cause some formulas — the ones you don't process with {RECALC} or {RECALCCOL} — to fail to reflect the current data. Be sure to perform a general recalculation with {calc} at the end of a macro routine that uses {RECALC} or {RECALCCOL}.

Example: Your macro changes a value in cell D4, and you are interested in the value in cell A8, which depends on cell D4. This macro gives the correct result in cell A8:

{RECALC A8..D4}

Because recalculation proceeds row by row, 1-2-3 recalculates cell D4 before cell A8, and the result is accurate.

The macro {RECALC PAYMENT,(A1<100),50}
will cause the PAYMENT range to be continuously calculated until the value in cell A1 falls below 100, or the number of iterations equals 50.

Working with Files

{CLOSE}
{FILESIZE}
{GETPOS}
{OPEN}
{READ}
{READLN}
{SETPOS}
{WRITE}
{WRITELN}

Note: You should use the commands in this section only when working with ASCII files.

CLOSE

{CLOSE} closes a file that was opened with the {OPEN} command.

{CLOSE} does not take an argument.

Read and write access to the currently open file is terminated. It is not necessary to specify the file name.

Note: If no file is open, {CLOSE} has no effect; 1-2-3 continues executing the macro as though the command were not there.

Example:
```
{OPEN Tennis,W}
{WRITE "Additional data"}
{CLOSE}
```

{CLOSE} closes the file called Tennis after writing the string "Additional data" to it.

FILESIZE

{FILESIZE *location*} determines the number of bytes in currently open file and then records finding in cell specified by *location*.

The *location* is a cell address or range name where 1-2-3 should display the file size. The total size of the currently open file is placed as a numeric value in the specified cell location.

Macro execution continues after completion of the {FILESIZE} command. If no file is currently open, 1-2-3 ignores {FILESIZE} and macro execution continues in the current cell.

Example: This excerpt from a macro opens the file called Games for reading and then determines and displays the number of bytes in the file in the cell named BYTES.

```
{OPEN Games,r}
{FILESIZE BYTES}
```

GETPOS {GETPOS *location*} determines current position of file pointer in open file, and displays it in *location* cell.

Location can be a cell address or range name. The current position of the file pointer in the open file appears as a number in *location*.

Macro execution continues after completion of the {GETPOS} command. If a file is not currently open, 1-2-3 ignores {GETPOS} and macro execution continues in the current cell.

The first position in a file is 0, not 1.

Example: This excerpt from a macro opens the file called Cricket for reading and reads a line beginning at the current position of the file pointer into cell A1. It then displays the location of the file pointer in the cell named POINTER.

```
{OPEN Cricket,r}
{READLN A1}
{GETPOS POINTER}
```

OPEN {OPEN *filename,access-mode*} opens a specified file for reading, writing, or both.

Filename is either a string, a range name referring to a single cell that contains a string, or an expression resulting in a string. The string is the path name of the file you want to open. The string cannot exceed 64 characters. If the file you want to open is not in the current directory, *filename* should specify a drive location and subdirectory path.

CAUTION If the *filename* has an extension, you must include it when you specify it in an {OPEN} command.

Access-mode is a single-character string indicating the type of file access you want:

- R (Read) opens an existing file with the specified name, and allows access with the {READ} and {READLN} commands. You cannot write to a file opened with Read access mode.
- W (Write) opens a new file, assigns it the specified name, and allows access with the {WRITE} and {WRITELN} commands, as well as the {READ} and {READLN} commands. 1-2-3 erases and replaces any existing file with the specified name with the new file.

- M (Modify) opens an existing file with the specified name and allows access with both read ({READ}, {READLN}) and write ({WRITE}, {WRITELN}) commands.

{OPEN} succeeds if the correct conditions for the desired access mode exist. If you try to open a file with read or modify access and the file does not exist, the {OPEN} command fails and macro execution continues in the current cell. If you try to open a read-only file for writing, an error may occur.

{OPEN} with write access always succeeds (unless you specify a nonexistent drive or directory) because it opens a new file; macro execution continues in the cell immediately following the {OPEN} command.

Example: The following macro command opens an existing file called Pastdue in the current drive/directory and allows read access. If Pastdue is not found in the default location, the macro proceeds to a fall-back subroutine at PLAN_B.

{OPEN Pastdue,R}{PLAN_B}

The following macro command opens a new file called Pastdue in drive C, directory ks, subdirectory south_dist and allows write access.

{OPEN "c:\ks\south_dist\Pastdue",W}

The following macro command opens an existing file called Pastdue in drive B and allows both read and write access. Again, a contingency subroutine is provided in case 1-2-3 cannot find the desired file.

{OPEN "b:Pastdue",M}{PLAN_B}

READ {READ *bytecount,location*} reads characters from a file into the cell specified as *location*.

Beginning at the current position of the file pointer in the file, {READ} copies the specified number of characters (*bytecount*) from the file to the worksheet, placing them into a left-aligned label in the specified cell (*location*). If *bytecount* is larger than the number of characters left in the file, 1-2-3 reads the remaining characters.

Bytecount must be a number or an expression that results in a number. The number must be between 0 and 240. A negative *bytecount* is equivalent to the maximum positive *bytecount* of 240.

Location may be a cell address or a range name. Using a range name is equivalent to specifying the upper left corner cell of the range.

The file pointer advances by the number specified as *bytecount*, so a subsequent {READ} command begins reading at the next character.

If a file is not currently open, {READ} is ignored and macro execution continues in the same cell. Otherwise, when {READ} is completed, macro execution continues in the next cell.

Example: Suppose that the file pointer is positioned at the first character of the hidden string, Total Sales for the Year Ending 1986. The macro {READ 6,G12} creates the label 'Total in cell G12 and advances the file pointer 6 characters to the beginning of the next word.

READLN {READLN *location*} copies a line of characters from the currently open file into the specified *location*.

{READLN} works the same way {READ} does, except that instead of reading a specified number of characters, {READLN} reads a whole line beginning with the current position of the file pointer, and ending with a carriage return line feed. Thus, a bytecount argument is not needed for this command.

The file pointer advances to the beginning of the next line, so a subsequent {READLN} command begins there. The carriage return is not copied with the line of text.

Example: Suppose that the file pointer is at the beginning of the following lines, each of which ends with a carriage-return line-feed:

January
February
...
{READLN G12}

{READLN} creates the label 'January in cell G12. The next {READLN} command will create the label 'February, and so on.

SETPOS {SETPOS *file-position*} sets a new position for the file pointer in the currently open file.

File-position is a number, or expression resulting in a number, that specifies the character at which you want to position the pointer. The first character in the file is at position 0, the second at position 1, and so on.

If a file is not currently open, {SETPOS} is ignored and macro execution continues in the same cell. Otherwise, when {SETPOS} is completed, macro execution continues in the next cell.

CAUTION 1-2-3 does not prevent you from placing the file pointer past the end of the file. Use the {FILESIZE} command to determine the number of the last character in the file.

Example: Suppose the file pointer is currently at the beginning of the file and the first line in the file is: This is a report on the state of...

{SETPOS 10}

The {SETPOS} command moves the pointer to the first *r* in the word *report*.

WRITE {WRITE *string*} copies characters into an open file.

{WRITE} copies a string from the worksheet to the current position of the file pointer in a file that was opened with either write or modify access mode.

String may be a literal string, a range name assigned to a single cell, or a string-valued expression.

1-2-3 evaluates the argument to produce a character string, then converts each character to a DOS code before sending it to the open file. If necessary, 1-2-3 extends the length of the file to accommodate the incoming string. The file pointer advances just beyond the last character written. A subsequent {WRITE} command will pick up where this one left off, unless you reset the pointer with the {SETPOS} command.

Example: This macro excerpt writes the single text line, OneTwoThree to the currently open file:

{WRITE "One"}
{WRITE "Two"}
{WRITE "Three"}

WRITELN {WRITELN *string*} adds a carriage-return line-feed sequence to a string of characters and writes the string to a file.

{WRITELN} works the same way {WRITE} does, except that it adds a carriage-return line-feed sequence to the end of the string in the file.

As with {WRITE}, *string* may be a literal string, a range name assigned to a single cell, or a string-valued expression.

{WRITELN} can be used with an empty string ("") argument to add a CR-LF sequence to the end of a line: {WRITELN ""}

Example: This macro excerpt writes three separate text lines, each with its own CR-LF terminator, to the currently open file:

```
{WRITELN "One"}
{WRITELN "Two"}
{WRITELN "Three"}
```


The /X Macro Commands

1-2-3's macro facility has another group of programming commands — the /X commands. 1-2-3 does not recognize /X unless it occurs within a macro, so do not try to use a /X command as a worksheet menu command in READY mode.

Note: All of the /X commands have corresponding advanced macro commands, as explained in the previous section. The /X commands are included to maintain compatibility with previous releases of 1-2-3. You can use them as alternative to their corresponding advanced macro commmands.

Following is a summary of the /X commands, which are all described in detail below.

Command	Function	Advanced Macro Command
/XI*condition*~...	If-then	{IF}
/XG*location*~	Go to	{BRANCH}
/XC*location*~	Call a subroutine	{routine-name}
/XR	Return from subroutine	{RETURN}
/XQ	Quit macro execution	{QUIT}
/XL*message*~ *location*~	Display a message in the control panel, prompting user input	{GETLABEL}
/XN*message*~ *location*~	Display a message in the control panel, prompting user input	{GETNUMBER}
/XM*location*~	Construct a user-defined menu	{MENUBRANCH}

Table 3-4

/XI /XI*condition*~... corresponds to the {IF} macro command

/XI is an IF-THEN-ELSE statement that tests the result of a specified *condition*. The *condition* can compare values in two different cells, or check the result of a formula.

If the condition is TRUE, 1-2-3 continues to read the keystroke instructions that follow in the same cell of the macro. If the condition is FALSE, 1-2-3 moves to the cell below the /XI command, and continues to read macro instructions. The condition in a /XI command is always followed by a ~ (RETURN).

/XG /XG*location*~ corresponds to the {BRANCH} macro command

/XG tells 1-2-3 to read the macro instructions at a specified location. The location can be a cell address or a range name. When 1-2-3 encounters the /XG command, it immediately leaves the current cell and goes to the specified location, where it continues to read macro instructions.

CAUTION Do not confuse this command with the GOTO key. An /XG command causes macro instructions to be read at the specified location; the GOTO key moves the cell pointer to the specified location.

/XQ /XQ corresponds to the {QUIT} macro command.

/XQ tells 1-2-3 to stop executing the macro. When 1-2-3 encounters the /XQ command, it returns to READY mode. /XQ is particularly useful in a looping macro, which continues indefinitely unless instructed to end by the /XQ command, or unless you press BREAK.

Figure 3-8 illustrates the use of all three of the above /X commands. These three commands are frequently used together, especially in a macro that has to repeat a task several times, as the example illustrates.

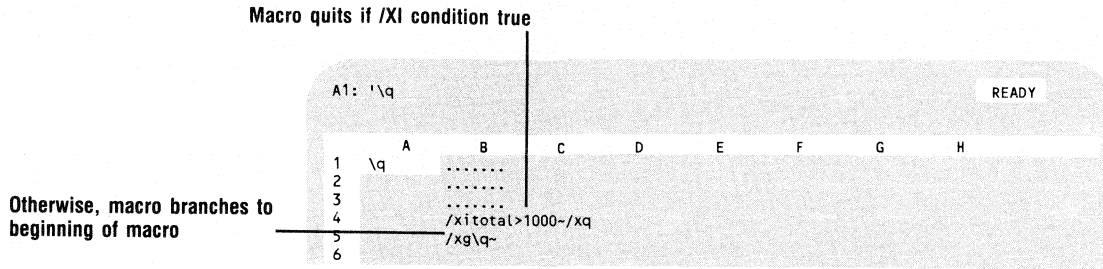


Figure 3-8

/XC /XC*location*~ corresponds to the {routine name} macro command.

/XR /XR corresponds to the {RETURN} macro command.

You use these two commands together in a macro. /XC calls a macro subroutine, and /XR returns from the subroutine. /XC instructs 1-2-3 to go to a specified location and to continue reading the macro instructions at that location until it encounters a /XR command. /XR then instructs 1-2-3 to return to the main macro routine and to continue reading the macro instructions in the cell immediately below the /XC*location*~ command.

If there is no /XR command, 1-2-3 continues to read macro instructions until the subroutine ends, then returns to the main macro immediately after the /XC command. If there is no /XC command in the main macro, a /XR command in a subroutine will not work.

An example of /XC and /XR is illustrated in Figure 3-9.

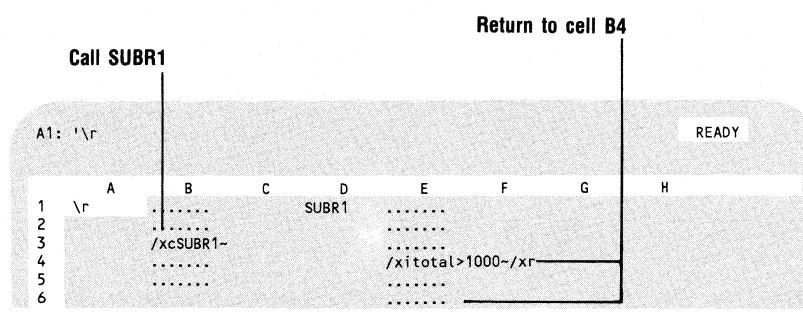


Figure 3-9

The /X commands that follow offer an alternative to using the {?} command for implementing interactive macros.

/XL /XL*message*~*location*~ corresponds to the {GETLABEL} macro command.

With this command, 1-2-3 displays a message up to 39 characters long on the second line of the control panel, and then pauses for you to enter any characters up to 240. You must then press RETURN to enter the characters in the location specified in the macro. You can specify a range name or cell address as the location. If you don't specify a location, make sure before you execute the macro that the cell pointer is in the cell in which you want 1-2-3 to enter the information specified in the /XL macro. {GETLABEL} accepts a message up to 80 characters long.

You can enter either letters or numbers with the /XL command. However, 1-2-3 enters all characters, including formulas, as left-aligned labels. Figure 3-10 illustrates using /XL to enter both letter and number characters.

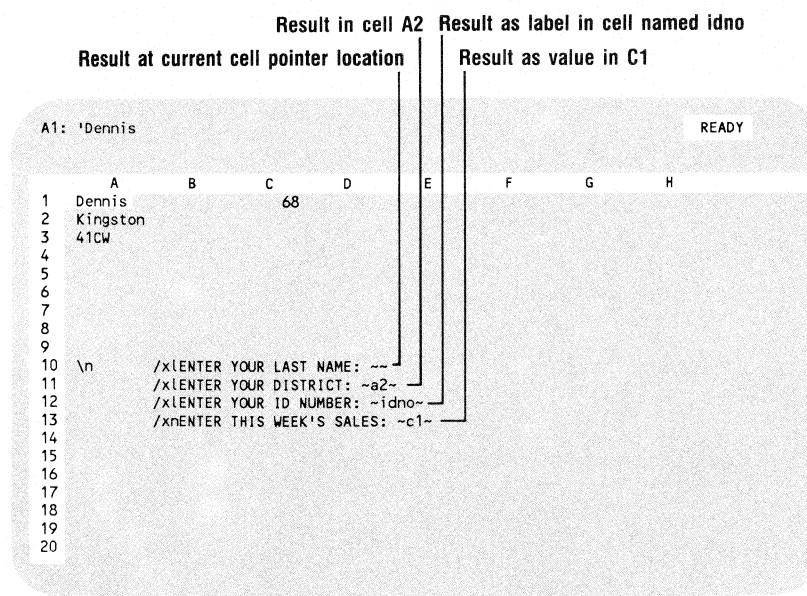


Figure 3-10

/XN /XN*message*~*location*~ corresponds to the {GETNUMBER} macro command.

With this command, 1-2-3 displays a message up to 39 characters long on the second line of the control panel, and then pauses for you to enter any number or formula, including range names and @functions. ({GETNUMBER} will accept a message up to 80 characters long.)

When you press RETURN, 1-2-3 enters the numeric value in the location specified in the macro. You can specify a range name or cell address as the location. If you don't specify a location, make sure that the cell pointer is in the cell in which you want 1-2-3 to enter the information specified in the /XN macro before you execute the macro.

You cannot enter labels with /XN. If you type an entry that 1-2-3 cannot interpret as a numeric value, 1-2-3 displays an error message. Cancel the error with ESCAPE or RETURN, and try again.

See Figure 3-10 for an illustration of the /XN macro command.

/XM /XM*location*~ corresponds to the {MENUBRANCH} macro command.

/XM allows you to construct a customized menu offering up to eight items, two levels deep. The *location* is the upper left corner of the menu range. You may specify a range name or cell address as the location.

/XM is useful for defining specific menu options in a worksheet designed to perform specific tasks, or in a worksheet created for someone who does not know how to use 1-2-3.

/XM menus look and act like standard 1-2-3 menus. To create a /XM macro, begin by typing entries in consecutive columns in a row. These entries become the menu items, displayed on the second line of the control panel. You must observe the following guidelines when creating these entries.

- Do not enter more than eight menu items in the first row of the menu range.
- Keep the cell to the right of the final menu entry blank.
- Do not leave blank cells between the menu entries.

- Keep the menu entries as short as possible, to avoid extending beyond the screen.
- Avoid creating menu entries that begin with the same character so that you can select items by typing the first character. (1-2-3 does not distinguish uppercase from lowercase letters.) If two menu items begin with the same character, 1-2-3 selects the one farthest to the left. See Figure 3-11.

In the row below the menu items, type a description or instruction for each item. A /XM menu works like a standard 1-2-3 menu; when you highlight a particular menu item, the third line of the control panel displays an explanation for that item.

When you finish typing the menu entries for both levels of the menu, you must then write the macros that contain the instructions for performing the tasks described in the menu. It is helpful to enter these macro instructions in the cells directly below the /XM menu.

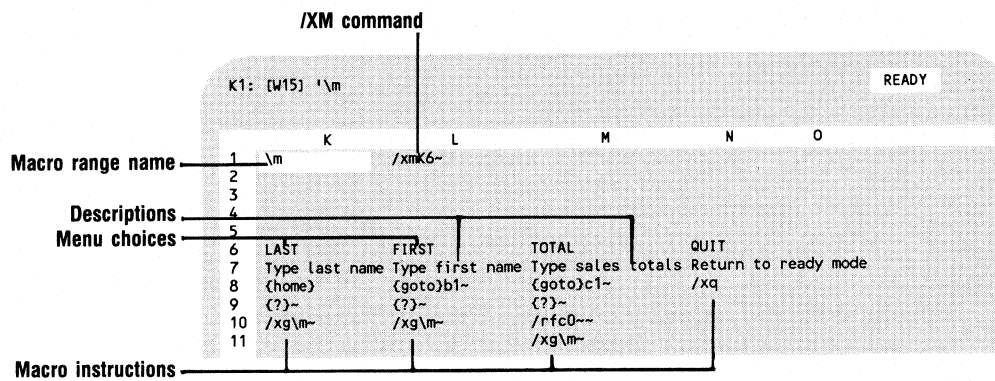


Figure 3-11

When you finish typing the menu items and their corresponding macro instructions, enter the /XM command to indicate to 1-2-3 where to begin executing the macro. The /XM command must point to the cell containing this first menu item. The location is either the cell address or a range name assigned to the first cell of the menu.

Finally, assign a macro range name to the cell containing the /XM command. Execute the /XM macro as you would any other macro. 1-2-3 will also invoke a /XM command that is within a macro. To exit from a /XM menu and return to READY mode, press BREAK.

Note: If you want a /XM menu to appear when you first retrieve a file, use the \0 range name. 1-2-3 will automatically execute the /XM menu when you retrieve the file.

Following is an outline of /XM command execution:

1. You invoke the macro.
2. 1-2-3 reads the macro keystrokes, pausing to allow user interaction.
3. 1-2-3 displays a menu on the control panel.
4. You make a choice from the menu as you would with a standard 1-2-3 menu; use either the pointer-movement keys, or type the first character of the menu item.
5. 1-2-3 continues reading macro instructions to perform the task you select.

There is only one difference between an /XM menu and a standard 1-2-3 menu. If you press ESCAPE in an /XM menu, 1-2-3 will cancel the command on the control panel, and continue to read the macro instructions immediately following the /XM command.

Chapter 4

@Functions

@Functions

1-2-3's @functions are built-in formulas that perform specialized calculations. Instead of adding a range of numbers, +A5+A6 +A7+A8+A9+A10+A11, you can use the function @SUM(A5..A11) to do the work for you. You can use an @function by itself in a cell, or combine it with other functions and formulas.

Most of 1-2-3's @functions calculate numeric values. Some @functions manipulate sequences of text, called strings. @LENGTH(B9) counts the number of characters in cell B9, when B9 contains text.

The first section of this chapter presents general information about @functions and their arguments, and lists the 1-2-3 @functions in related groups, such as logical or financial. The remainder of the chapter is divided into sections containing descriptions and examples of each @function. Each section begins with a list of specific rules and procedures for that group of @functions. The @functions within each section are organized alphabetically.

@Function Format

The general format of an @function is:

@function name(*argument1*,*argument2*,...)

The function name tells 1-2-3 which calculation to perform. The arguments that you enter are the values 1-2-3 uses in the function's calculations. In the function @SUM(A5..A11), @SUM is the function name, and A5..A11 is the function's argument. In this chapter, function names are in uppercase letters, and argument names are in *italics*. You can type a function name in either uppercase or lowercase letters; 1-2-3 converts function names to uppercase automatically.

Every @function produces, or returns, a single value, depending on the arguments you give it to evaluate.

Arguments

There are three argument types: numeric values, range values, and string values. Different @functions require different types of data as arguments. The @function @INT*(x)* is asking you to substitute a numeric value for *x*. The @function @SUM*(list)* is asking you to substitute one or more ranges of numeric values for *list*. The @function @LENGTH*(string)* is asking you to substitute a text string value for *string*.

You can enter arguments as actual numeric or string values, or as cells or ranges containing the values you want to use.

This table gives examples of the ways you can enter arguments in @functions.

Types of arguments	Examples
Numeric values by:	
actual value	@INT(375.68)
cell address	@INT(D6)
cell range name	@INT(TOTAL)
formula	@INT((25 + 47)/5)
@function	@INT(@SUM(A5..A11))
combination	@INT(@SUM(D2..D8) + TOTAL + 33.5)
Range values by:	
range address	@SUM(A5..A11)
range name	@SUM(RANGE2)
combination	@SUM(RANGE2,D2..D8,TOTAL)
String values by:	
actual value	@LENGTH("Monthly Profits")
cell address	@LENGTH(B9)
cell name	@LENGTH(TITLE)
formula	@LENGTH("Monthly "&"Profits")

Table 4-1

Entering Arguments in @Functions

Use these general guidelines when you write @functions:

- Do not include any spaces between the function name and function arguments; for example, use @AVG(B6..B12) not @AVG (B6..B12).
- Separate multiple arguments in a function with a comma (,) or a semicolon (;); for example, use @MAX(85,A5,A9) or @MAX(85;A5;A9). Do not use spaces between arguments.
- Enclose an @function's arguments in parentheses.
- When you use an @function as an argument, enclose its arguments in parentheses and enclose the @function, indicating its arguments, in another set of parentheses. For example, in @INT(@SUM(A5..A11)), the range A5..A11 is the argument for the @SUM function, and the function @SUM(A5..A11) is the argument for the @INT function.
- Use a pair of double quotes (" ") around the actual string values you use as arguments; for example, write @LENGTH("Monthly Profits").

- Seven functions do not require arguments: @RAND, @PI, @FALSE, @TRUE, @ERR, @NA, and @NOW. Write them without parentheses.
- The functions @CELL, @N, and @S take single cell values as arguments, but require you to enter these values as ranges. You can enter single cell ranges in two ways: with the range address format @N(G5..G5), or with the cell address preceded by an exclamation point (!) @N(!G5). Both are valid ways to designate a single cell range. @N(G5) is not valid.
- Use only the required argument type in an @function. For example, you cannot use a string value in a function that requires a numeric value. @SUM(JAN_SALES) is valid when JAN_SALES is a range name containing numbers. @SUM("January Sales") is not, because it is a string value.
- If you make an error in entering any function argument, 1-2-3 returns the value ERR in the cell in which you entered the @function.
- If you type a function name incorrectly or enter a function in an incorrect format, 1-2-3 beeps and puts you in EDIT mode.

Types of Functions

Mathematical Functions

Functions that compute calculations using numeric values.

This function	Returns
@ABS(*x*)	the absolute (positive) value of *x*
@ACOS(*x*)	the arc cosine of *x*
@ASIN(*x*)	the arc sine of *x*
@ATAN(*x*)	the arc tangent of *x* (2 quadrant)
@ATAN2(*x*,*y*)	the arc tangent of *y*/*x* (4 quadrant)
@COS(*x*)	the cosine of angle *x*
@EXP(*x*)	the number *e* raised to the *x*th power
@INT(*x*)	the integer part of *x*
@LN(*x*)	the natural log (base *e*) of *x*
@LOG(*x*)	the log (base 10) of *x*
@MOD(*x*,*y*)	the remainder of *x*/*y*
@PI	the number π (approximately 3.1415926)

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This function	Returns
@RAND	a random number between 0 and 1
@ROUND(*x,n*)	*x* rounded to *n* places
@SIN(*x*)	the sine of angle *x*
@SQRT(*x*)	the positive square root of *x*
@TAN(*x*)	the tangent of angle *x*

Table 4-2

Logical Functions

Functions that produce values based on the result of conditional statements.

This function	Returns
@FALSE	the logical value 0
@IF(*cond,x,y*)	*x*, if *cond* is TRUE, and *y* if *cond* is FALSE
@ISERR(*x*)	1 (TRUE) if *x* contains the value ERR; otherwise, it returns 0 (FALSE)
@ISNA(*x*)	1 (TRUE) if *x* contains the value NA; otherwise, it returns 0 (FALSE)
@ISNUMBER(*x*)	1 (TRUE) if *x* contains a numeric value; otherwise, it returns 0 (FALSE)
@ISSTRING(*x*)	1 (TRUE) if *x* contains a string value; otherwise, it returns 0 (FALSE)
@TRUE	the logical value 1

Table 4-3

Special Functions

Functions that perform advanced tasks.

This function	Returns
@@(*cell address*)	the contents of the cell referenced by *cell address*
@CELL(*attribute, range*)	the code representing the *attribute* of *range*
@CELLPOINTER (*attribute*)	the code representing the *attribute* of the highlighted cell
@CHOOSE (*x,v0,v1,...,vn*)	the *x*th value in list *v0,v1,...,vn*
@COLS(*range*)	the number of columns in *range*
@ERR	the value ERR (error)

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This function	Returns
@HLOOKUP *(x,range, row number)*	the contents in the cell that is the specified *row number* from the cell in the top row of *range* that matches *x*
@INDEX *(range,column,row)*	the value of the cell located at the intersection of *column* and *row* in *range*
@NA	the value NA (not available)
@ROWS*(range)*	the number of rows in *range*
@VLOOKUP *(x,range, column number)*	the contents in the cell that is the specified *column number* from the cell in the first column of *range* that matches *x*

Table 4-4

String Functions

Functions that calculate with strings and produce string values.

This function	Returns
@CHAR*(x)*	the ASCII/LICS character that corresponds to the code number *x*
@CODE*(string)*	the ASCII/LICS code number for the first character in *string*
@EXACT *(string1,string2)*	1 (TRUE) if *string1* and *string2* are exactly alike; otherwise, it returns 0 (FALSE)
@FIND*(search string, string,start number)*	the position at which the first occurrence of *search string* begins in *string*
@LEFT*(string,n)*	the first *n* characters in *string*
@LENGTH*(string)*	the number of characters in *string*
@LOWER*(string)*	all letters in *string* in lowercase
@MID*(string, start number,n)*	*n* characters from *string*, beginning with the character at *start number*
@N*(range)*	the numeric value in the upper left corner cell in *range*
@PROPER*(string)*	all words in *string* with the first letter in uppercase and the rest in lowercase
@REPEAT*(string,n)*	*string*, duplicated *n* times
@REPLACE *(original string, start number, n, new string)*	removes *n* characters from *original string*, beginning at *start number*, and then inserts *new string* in the same place

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This function	Returns
@RIGHT(*string,n*)	the last *n* characters in *string*
@S(*range*)	the string value in the upper left corner cell in *range*
@STRING(*x,n*)	numeric value *x* as a string, with *n* decimal places
@TRIM(*string*)	*string* with no leading or trailing spaces, and no consecutive spaces
@UPPER(*string*)	all letters in *string* in uppercase
@VALUE(*string*)	*string* that looks like a number in its actual numeric value

Table 4-5

Date and Time Functions

Functions that generate serial date and time numbers.

This function	Returns
@DATE(*yr,month,day*)	the date number of *yr,month,day*
@DATEVALUE (*date string*)	the date number of *date string*
@NOW	the serial number for the current date and time
@TIME(*hr,min,sec*)	the time number of *hr,min,sec*
@TIMEVALUE (*time string*)	the time number of *time string*

Table 4-6

Functions that use serial date and time numbers.

This function	Returns
@DAY(*date number*)	the day number of *date number*
@HOUR(*time number*)	the hour number of *time number*
@MINUTE (*time number*)	the minute number of *time number*
@MONTH (*date number*)	the month number of *date number*
@SECOND (*time number*)	the second number of *time number*
@YEAR(*date number*)	the year number of *date number*

Table 4-7

Financial Functions

Functions that calculate loans, annuities, and cash flows over a period of time.

This function	Returns
@CTERM(*int,fv,pv*)	the number of compounding periods for an investment of present value *pv*, to grow to future value *fv*, earning a fixed periodic interest rate *int*
@DDB(*cost,salvage, life,period*)	double-declining depreciation allowance of an asset, given the original *cost*, predicted *salvage* value, the *life* of the asset, and the specific *period*
@FV(*pmt,int,term*)	the future value of a series of equal payments, each of amount *pmt*, earning periodic interest rate *int*, over the number of payment periods in *term*
@IRR(*guess,range*)	the internal rate of return for the series of cash flows in *range*, based on the approximate percentage *guess* of the IRR
@NPV(*int,range*)	the present value of the series of future cash flows in *range*, discounted at periodic interest rate *int*
@PMT(*prin,int,term*)	the amount of the periodic payment needed to pay off principal *prin*, at periodic interest rate *int*, over the number of payment periods in *term*
@PV(*pmt,int,term*)	the present value of a series of equal payments, each of amount *pmt*, discounted at periodic interest rate *int*, over the number of payment periods in *term*
@RATE(*fv,pv,term*)	the periodic interest rate necessary for present value *pv*, to grow to future value *fv*, over the number of compounding periods in *term*
@SLN(*cost,salvage,life*)	the straight-line depreciation allowance of an asset for one period, given the *cost*, the predicted *salvage* value, and *life* of the asset

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This function	Returns
@SYD(*cost,salvage, life,period*)	the sum-of-the-years'-digits depreciation allowance of an asset for a *period*, given the *cost*, the predicted *salvage* value, the *life* of the asset and the specific *period*
@TERM(*pmt,int,fv*)	the number of payment periods of an investment, given the amount of each payment *pmt*, the periodic interest rate *int*, and future value of the investment *fv*

Table 4-8

Statistical Functions

Functions that calculate lists of values.

This function	Returns
@AVG(*list*)	the average of the values in *list*
@COUNT(*list*)	the number of non-blank entries in *list*
@MAX(*list*)	the maximum value in *list*
@MIN(*list*)	the minimum value in *list*
@STD(*list*)	the population standard deviation of the values in *list*
@SUM(*list*)	the sum of the values in *list*
@VAR(*list*)	the population variance of the values in *list*

Table 4-9

Database Statistical Functions

These @functions perform statistical calculations on a database. The database, called the input range, consists of records, fields, and field names. A criterion range must be set up to select the records from the database that each function uses. You can learn about 1-2-3's database management in the Data commands section of Chapter 2.

This function	Returns
@DAVG(*input,offset, criterion*)	the average of the values in the *offset* column of the *input* range that meet the criteria in the *criterion* range
@DCOUNT(*input, offset,criterion*)	the number of non-blank cells in the *offset* column of the *input* range that meet the criteria in the *criterion* range
@DMAX(*input,offset, criterion*)	the maximum value in the *offset* column of the *input* range that meet the criteria in the *criterion* range
@DMIN(*input,offset, criterion*)	the minimum value in the *offset* column of the *input* range that meet the criteria in the *criterion* range
@DSTD(*input,offset, criterion*)	the population standard deviation of the values in the *offset* column of the *input* range that meet the criteria in the *criterion* range
@DSUM(*input,offset, criterion*)	the sum of the values in the *offset* column of the *input* range that meet the criteria in the *criterion* range
@DVAR(*input,offset, criterion*)	the population variance of the values in the *offset* column of the *input* range that meet the criteria in the *criterion* range

Table 4-10

Mathematical Functions

1-2-3's mathematical @functions perform a variety of calculations with numeric values, including the trigonometric functions.

- Every mathematical @function except @PI takes numeric values as arguments.
- Each mathematical @function produces, or returns, a numeric value.
- Single numeric arguments can be in the form of numbers, cell addresses, formulas, or other @functions.

- All angles you enter for the sine, cosine, and tangent @functions must be expressed in radians. To convert degrees to radians, multiply the number of degrees by @PI/180.
- The arc sine, arc cosine, and arc tangent @functions return all angles in radians. To convert radians to degrees, multiply the number of radians by 180/@PI.

@ABS @ABS(*x*) returns the absolute, or positive, value of *x*.

Examples: @ABS(1.258) = 1.258

@ABS(−6.2) = 6.2

@ABS("Jones") = 0, because *x* is a string value

@ACOS @ACOS(*x*) returns the angle, in radians, whose cosine is *x*. The result always lies between 0 and π, representing a quadrant I or II angle.

Argument *x* must be between −1 and 1, inclusive.

Examples: @ACOS(−.3) = 1.875488 (radians)

@ACOS(.5) = 1.047197 (radians)

@ACOS(.5)*180/@PI = 60 (degrees)

@ACOS(4.5) = ERR, because *x* is greater than 1

@ASIN @ASIN(*x*) returns the angle, in radians, whose sine is *x*. The result always lies between $\pi/2$ and $-\pi/2$, representing a quadrant I or IV angle.

Argument *x* must be between −1 and 1, inclusive.

Examples: @ASIN(−.246) = −0.24855 (radians)

@ASIN(ANGLE) = 0.523598 (radians) if the cell named ANGLE contains .5

@ASIN(1) = 1.570796 (radians)

@ASIN(1)*180/@PI = 90 (degrees)

@ATAN @ATAN(*x*) returns the angle, in radians, whose tangent is *x*. The result always lies between $\pi/2$ and $-\pi/2$, representing a quadrant I or IV angle.

There is no restriction on the value of argument *x*.

Examples: @ATAN(1) = 0.785398 (radians)

@ATAN(1.101E+12) = 1.570796 (radians)

@ATAN(@SQRT(3))*180/@PI = 60 (degrees)

@ATAN2 @ATAN2(*x,y*) returns the angle, in radians, whose tangent is *y/x*.

Arguments *x* and *y* can be any numeric value. If both *x* and *y* are 0, the result is ERR.

@ATAN2 differs from @ATAN in that its result lies anywhere between $-\pi$ and π, representing any quadrant. Table 4-11 lists the possible ranges of values of @ATAN2.

If *x* is	And *y* is	@ATAN2(*x,y*) returns
positive	positive	between 0 and $\pi/2$
negative	positive	between $\pi/2$ and π
negative	negative	between $-\pi$ and $-\pi/2$
positive	negative	between $-\pi/2$ and 0

Table 4-11

Examples: @ATAN2(1.5,2) = 0.927295

@ATAN2(−1.5,2) = 2.214297

@ATAN2(−1.5,−2) = −2.21429

@ATAN2(1.5,−2) = −0.92729

@ATAN2(1.5,0) = 0

@COS @COS(*x*) returns the cosine of angle *x*. The result lies between −1 and 1, inclusive.

Angle *x* must be expressed in radians.

Examples: @COS(30*@PI/180) = 0.866025

@COS(45*@PI/180) = 0.707106

@COS(60*@PI/180) = 0.5

@EXP @EXP(*x*) returns the number *e*, approximately 2.718282, raised to the *x*th power. To incorporate the value *e* in any calculation, use the function @EXP(1) in that calculation. @EXP is the inverse function of @LN.

Argument *x* cannot be larger than 709, because the result would be too large for 1-2-3 to store. If *x* is larger than 230, 1-2-3 can calculate and store the value of @EXP, but cannot display it. 1-2-3 cannot display a number greater than 9.9E99.

Examples: @EXP(1.25) = 3.490342

@LN(@EXP(1.25)) = 1.25

@EXP(1) = 2.718281

@EXP(B1) = *e* raised to the power of the value in cell B1

@EXP(18.5) = 1.1E+08

@INT @INT*(x)* returns the integer part of *x*. It truncates *x* at the decimal point, but does not round it. To round a number, use @ROUND.

Examples: @INT(35.45) = 35

@INT(35.75) = 35

@INT(-35.45) = -35

@INT(@NOW) = the date number of the serial number for the current date and time.

@LN @LN*(x)* computes the natural logarithm (base *e*) of *x*. Natural logarithms use the number *e* (approximately 2.718282) as a base. @LN is the inverse function of @EXP. To incorporate the value *e* in any calculation, use the function @EXP(1) in that calculation.

Argument *x* must be greater than 0.

Examples: @LN(2) = 0.693147

@LN(4) = 1.386294

@LN(@EXP(4)) = 4

@LN(-1) = ERR, because *x* is not greater than 0

@LOG @LOG*(x)* computes the common logarithm (base 10) of *x*. @LOG is the base 10 exponent of a number.

Argument *x* must be greater than 0.

Examples: @LOG(100) = 2

@LOG(10^5.67) = 5.67

@LOG(2) = 0.301029

@LOG(4) = 0.602059

@MOD @MOD*(x,y)* returns the remainder (modulo) of *x/y*.

Argument *x* can be any positive or negative number. Argument *y* must be a number other than 0. The sign (+ or -) of the result is always the same as the sign of *x*.

Examples: @MOD(4,3) = 1

@MOD(14,3) = 2

@MOD(-14,3) = -2

@MOD(@DATE(85,11,18),7) = 2, because that date falls on a Monday, day 2 of the week.

@MOD(@DATE(85,11,23),7) = 0, because that date falls on a Saturday, day 7 of the week.

1-2-3's date calendar begins on a Sunday; therefore, every Sunday is day 1 of the week, and every Saturday is day 7 of the week. Every Sunday serial number produces the same remainder, 1, when divided by the number of days in the week.

@PI @PI returns the number π (approximately 3.1415926). π is the ratio of the circumference of a circle to its diameter.

Examples: @SIN(30*@PI/180) = 0.5

@PI*4^2 = 50.26548, the area of the circle whose radius is 4

@PI*B3^2 = the area of the circle whose radius is in cell B3

@RAND @RAND generates a random number between 0 and 1. 1-2-3 calculates the same random values, in the same order, during every work session.

Each time 1-2-3 recalculates the worksheet, the value of @RAND changes. To generate random numbers in larger numeric intervals, multiply @RAND by the size of the interval and add the lower limit of the range.

Examples: @RAND generates a random number between 0 and 1

@RAND*10+1 generates a random number between 1 and 10

@RAND*100 generates a random number between 0 and 100

@RAND*100+900 generates a random number between 900 and 1000

@INT(@RAND*50)+1 generates a random integer between 1 and 50

@ROUND @ROUND*(x,n)* rounds number *x* to *n* places. 1-2-3 can round on either side of the decimal point; *n* specifies the power of 10 to which 1-2-3 rounds *x*.

Argument *n* must be a value between −15 to 15, inclusive.

If *n* is positive, 1-2-3 rounds *x* to *n* digits to the right of the decimal point.

If *n* is negative, 1-2-3 rounds *x* to the positive *n*th power of 10. For example, if *n* is −2, 1-2-3 rounds *x* to the nearest hundred.

If *n* is zero, 1-2-3 rounds *x* to an integer.

If *n* is not an integer, 1-2-3 uses only its integer part.

Examples: @ROUND(134.578,2) = 134.58

@ROUND(134.578,1) = 134.6

@ROUND(134.578,0) = 135

@ROUND(134.578,−1) = 130

@ROUND(134.578,−2) = 100

@ROUND(@ATAN(1.732)*180/@PI,0) = 60, rounded from 59.99927

@SIN @SIN*(x)* returns the sine of angle *x*.

Angle *x* must be expressed in radians.

Examples: @SIN(@PI/6) = 0.5

@SIN(90*@PI/180) = 1

@SIN(30*@PI/180) = 0.5

@SQRT @SQRT*(x)* returns the positive square root of *x*.

Argument *x* must be a positive number.

Examples: @SQRT(12) = 3.464101

@SQRT(100) = 10

@SQRT(−2) = ERR, because *x* is negative

@TAN @TAN*(x)* returns the tangent of angle *x*.

Angle *x* must be expressed in radians.

Examples: @TAN(@PI/4) = 1

@TAN(30*@PI/180) = 0.5

@TAN(.52) = 0.572561

Logical Functions

1-2-3's logical @functions produce values based on the results of conditional statements.

- A conditional statement evaluates a condition in the form of an equation. The condition is either true or false. For example, @ISNUMBER tests to see if a value in a cell is numeric. If the value is numeric or the cell is blank, @ISNUMBER returns the logical value 1 (TRUE). If the value is not numeric, @ISNUMBER returns the logical value 0 (FALSE).
- ERR and NA are special values in 1-2-3, generated either by 1-2-3 or by you when you use the @ERR or @NA functions. ERR denotes an error in a formula, and NA denotes that a number needed to complete a formula is not available. Both ERR and NA have a ripple-through effect on formulas, meaning that any formula that is dependent upon a formula containing ERR or NA will also result in ERR or NA. It also means that when you correct the formula containing ERR or provide the unavailable number to the formula containing NA, the results of dependent formulas will also become correct.
- The @ISERR, @ISNA, @ISNUMBER, and @ISSTRING functions stop this ripple-through effect because they can test for these values before you perform a calculation.
- ERR and NA are both numeric values.
- A blank cell has the value 0.
- The arguments for @ISERR, @ISNA, @ISNUMBER, and @ISSTRING are generally cell addresses or range names. If you use a range name that represents a multiple-cell range, 1-2-3 tests the upper left corner cell.

@FALSE @FALSE returns the logical value 0. You can use @FALSE with other @functions to create logical arithmetic formulas that are easy to read.

Examples: +PASSWORD="music" = 0, when the string value in the cell named PASSWORD is not music

@IF(PASSWORD="music",@TRUE,@FALSE) = 0, when the value in the cell named PASSWORD is not music

@IF @IF*(cond,x,y)* returns the value *x* if *cond* is TRUE, or the value *y* if *cond* is FALSE.

cond must be a numeric value, or any type of formula resulting in a numeric value. Arguments *x* and *y* can be either numeric or string values.

Examples: @IF(9>8,C3,D3) = the value in C3

@IF(B3-C3>=0,B3-C3,0) = B3-C3, when B3-C3 is positive; otherwise, it returns 0

@IF(BALANCE>=0,BALANCE,"Overdrawn") = the value in the cell named BALANCE if BALANCE is positive; otherwise, it returns Overdrawn

@ISERR @ISERR*(x)* tests to see if *x* contains the value ERR. @ISERR returns 1 if *x* is the value ERR; otherwise, it returns 0. This function stops the ripple-through effect of the values ERR and NA.

Examples: @ISERR(B1) = 1, when cell B1 contains the value ERR; otherwise, it returns 0

@ISERR(45/0) = 1

@ISERR(100+B3) = 1, when cell B3 contains a string value; otherwise, it returns 0

@ISNA @ISNA*(x)* tests to see if *x* contains the value NA. @ISNA returns 1 if *x* is the value NA; otherwise, it returns 0. This function also stops the ripple-through effect of the values ERR and NA.

Examples: @ISNA(B1) = 1, when cell B1 contains the value NA; otherwise, it returns 0 (FALSE)

@ISNA(B4+B5+B6+@NA) = 1

@ISNA("NA") = 0, because "NA" is a string

@ISNUMBER @ISNUMBER*(x)* tests to see if *x* contains a numeric value. @ISNUMBER returns 1 if *x* is a number or a formula resulting in a numeric value; otherwise, it returns 0. This function also stops the ripple-through effect of the values NA and ERR.

Examples: @ISNUMBER(745) = 1

@ISNUMBER("745") = 0

@ISNUMBER(@VALUE("745")) = 1, because @VALUE converts a string value to a numeric value

@ISNUMBER(745/@NA) = 1, because 1-2-3 sees the value NA as numeric

@ISNUMBER(B5) = 1, when B5 is a blank cell, because 1-2-3 assigns the value 0 to blank cells

@ISSTRING @ISSTRING*(x)* tests to see if *x* contains a string value. @ISSTRING returns 1 if *x* is a string, even if the string contains only a space character or an empty string. If *x* contains any other value, @ISSTRING returns 0. This function also stops the ripple-through effect of the values NA and ERR.

Examples: @ISSTRING(745) = 0

@ISSTRING("745") = 1

@ISSTRING(@ERR) = 0, because 1-2-3 sees the value ERR as numeric

@ISSTRING(B5) = 0, when B5 is a blank cell, because 1-2-3 assigns the value 0 to blank cells

@TRUE @TRUE returns the logical value 1.

1-2-3 sees the value TRUE as a condition that produces a positive result. For example, the formula @IF(25=5*5,"yes","no") returns yes because 25=5*5 is a true condition.

When you use the value TRUE in a formula, you can use either @TRUE or the number 1. Using the number 1 may make the meaning of the formula unclear. Using @TRUE prevents possible ambiguity.

Examples: @IF(PASSWORD="music",@TRUE,@FALSE) = 1, when PASSWORD contains the string music

+PASSWORD="music" = 1, when the cell named PASSWORD contains the string music

Special Functions

Special @functions perform a variety of advanced tasks, notably the ability to look up a value in a table.

- @@ acts as a pointer by referencing a specific cell whose contents is another cell address.
- @CELL and @CELLPOINTER provide information on a cell's contents, format, and location in a worksheet.
- @CHOOSE returns a specific numeric or string value from an argument list.
- @COLS, @HLOOKUP, @INDEX, @ROWS, and @VLOOKUP locate values in specific cells in a table.
- @ERR and @NA mark cells containing formulas with errors (@ERR) or unavailable values (@NA). They also cause every cell that depends upon formulas containing ERR or NA to have those values. This is called a ripple-through effect on the worksheet.
- An empty string has a length of 0. An empty string is one that you enter into a cell by typing the label-prefix character ",^, or '. The cell looks blank, but it has a string value.

@@ *@@(cell address)* returns the value in the cell referenced by the *cell address*.

cell address can contain a cell name, a cell address preceded by a label prefix, or a string-valued formula resulting in a cell address.

Contents of *cell address*	**Examples**
A cell address written as a label	'A33
A range name assigned to the cell	INPUT, where INPUT is the name of cell A33.
A string formula whose value is a cell address or name	+"A"&"33"

Table 4-12

Examples: @@(D4) = 37, when cell D4 contains the label 'F5, and cell F5 contains the value 37.

@@(D4) = Balance, when D4 contains the label INPUT, INPUT is the name of cell F6, and cell F6 contains the string Balance.

@CELL @CELL*(attribute,range)* returns a particular piece of information, called an attribute, about a given cell after you enter a *range* name or address for the cell and an *attribute* string from the following attribute table.

The *attribute* must be enclosed in quotation marks (" "), and can be in either uppercase or lowercase letters, such as "width", "WIDTH", and "Width". You can also enter an *attribute* by typing a cell address that contains one of the *attribute* strings. You can enter B2 as the *attribute* if B2 contains the label WIDTH (or Format, TYPE, contents, and so on).

The *range* can be a single-cell range or a multiple-cell range. If you enter a single-cell *range*, you must express it as a range address, not a cell address. For example, you can enter cell H7, a single-cell *range*, as either H7..H7 or !H7. If *range* consists of more than one cell (H7..K14), 1-2-3 uses the upper left corner cell.

@CELL returns a result for the cell *attribute* you request about the specified cell. You must press CALC to update cell attributes.

If *attribute* is	**The result is**
"address"	the current cell address (for example, B7 or B7)
"row"	the current row number (between 1 and 8192)
"col"	the current column number (between 1 and 256)
"contents"	the current cell contents
"type"	the current type of data in the cell: b, if the cell is blank (that is, has no cell entry) v, if the cell contains a numeric value or formula or a string-valued formula l, if the cell contains a label
"prefix"	the current label prefix: ', if the cell contains a left-aligned label ", if the cell contains a right-aligned label ^, if the cell contains a centered label blank, if the cell is empty, contains a number, or contains any kind of formula
"protect"	the current protection status: 1, if cell is protected 0, if cell is not protected
"width"	the current column width (between 1 and 240 in the current window

continued on next page

continued from last page

If *attribute* is	The result is
"format"	the current numeric format: F0 to F15, if Fixed, 0 to 15 decimal places S0 to S15, if Scientific, 0 to 15 decimal places C0 to C15, if Currency, 0 to 15 decimal places G, if General P0 to P15, if Percent, 0 to 15 decimal places D1, if DD-MMM-YY D2, if DD-MMM D3, if MMM-YY D4, if MM/DD/YY, DD/MM/YY, DD.MM.YY, or YY-MM-DD D5, if MM/DD, DD/MM, DD.MM, or MM-DD D6, if HH:MM:SS AM/PM D7, if HH:MM AM/PM D8, if HH:MM:SS 24hr, HH.MM.SS 24hr, HH,MM,SS 24hr, or HHhMMmSSs D9, if HH:MM 24hr, HH.MM 24hr, HH,MM, or HHhMMm T, if Text format (cell formula appears in cell) H, if Hidden format a blank, if the cell contains an empty string

Table 4-13

Examples: @CELL("row",J5..J5) = 5

@CELL("row",J5) = ERR, because *range* is not in the correct format

@CELL("row",!J5) = 5

If the label TOTAL is in cell G12 and its column width is 14, then:

@CELL("contents",!G12) = TOTAL, because G12 contains the label TOTAL

@CELL("width",!G12) = 14, because the column width of G12 is 14

And if cell B2 contains the label WIDTH:
@CELL(B2,!G12) = 14, because the column width for cell G12 is 14, and B2 contains the word WIDTH

@CELLPOINTER @CELLPOINTER*(attribute)* returns information, called an attribute, about the current cell, and is useful when you are testing cell values in a macro.

This function is similar to the @CELL function. @CELL yields information about a cell whose address or range name you specify. @CELLPOINTER yields information about the current cell — the cell that the cell pointer is currently highlighting. The value of this function changes to reflect the *attribute* of the cell that the cell pointer was on the last time there was a recalculation.

Use the table listed in the @CELL function to enter a cell *attribute*.

Examples: @CELLPOINTER("row") = 4, if the cell pointer was in row 4 at the time of the last recalculation

@CELLPOINTER("col") = 26, if the cell pointer was in column Z at the time of the last recalculation

@CHOOSE @CHOOSE*(x,v0,v1,...,vn)* uses *x* to select a value from list *v0,v1,...,vn*. *x* indicates which value in the list @CHOOSE should select. The first value in the list is 0; therefore, if *x* is 1, @CHOOSE selects the second value in the list.

You must enter selector *x* and at least one value for the list. *x* must be a numeric value, and cannot be greater than the number of values in the argument list. If you enter a blank cell as *x*, value 0 is selected. If you enter a non-integer as *x*, 1-2-3 uses the integer part of the number.

You can have as many values in the list as you want, as long as the list does not exceed 240 characters per cell. The values can be either string or numeric, and you can mix different value types in a single list.

Examples: @CHOOSE(1,"Profit","Loss","Bankruptcy") = Loss

@CHOOSE(H5,B1,B2,B3) = the value in cell B2 if H5 contains the value 1.3

@CHOOSE(H5,12,B1,LAST) = the value in the cell named LAST if H5 contains the value 2

@COLS @COLS*(range)* returns the number of columns in *range*. This function is helpful when used with range names.

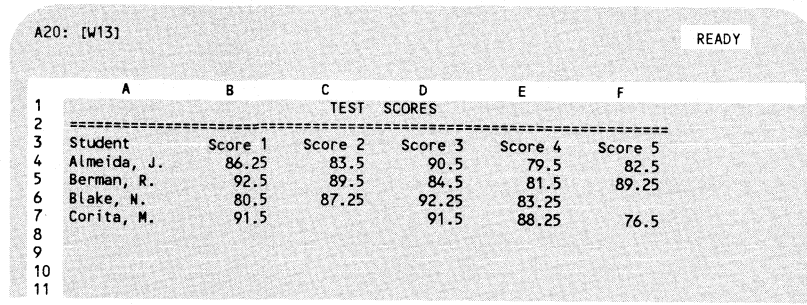


Figure 4-1

Examples: @COLS(A3..F7) = 6

@COLS(SCORES) = 6, if the range A3..F7 is named SCORES

@COLS(A6..F6) = 6

@COLS(BLAKE) = 6, if the range A6..F6 is named BLAKE

@COLS(A3) = ERR, because it is not a range

@ERR

@ERR returns the numeric value ERR.

Use @ERR to force a cell to have the value ERR. All cells containing formulas that depend on this cell's value also assume the value ERR, causing a ripple-through effect on the worksheet.

You cannot substitute the label "ERR for the value ERR.

The functions @COUNT, @ISERR, @ISNA, @ISNUMBER, @ISSTRING, @CELL, and @CELLPOINTER stop the ripple-through effect of ERR values.

Example: @IF(B14>3.2,@ERR,B14) returns ERR if the value in cell B14 is greater than 3.2; otherwise, the value in B14 is returned.

@HLOOKUP

@HLOOKUP*(x,range,row number)* performs a horizontal table lookup. A horizontal table lookup compares the value *x* to each cell in the top row, or index row, in *range*. When it locates a cell containing a value that matches *x*, it stops moving horizontally across the index row. @HLOOKUP then moves down that column the number of rows specified by *row number* to return the answer.

If you include formulas in a lookup table, make sure the lookup range includes the row specified by *row number*.

@HLOOKUP searches the index row of *range* until it finds a cell containing a numeric value that is larger than the value *x*. It then moves back one cell, so that it stops at the cell whose value is the highest number that is less than or equal to the value *x*. For example, if the index row contains the values 10, 20, 30, 40, and 50, and *x* is 33, @HLOOKUP stops at the cell containing 40 and then backs up to the cell containing 30. At this point, @HLOOKUP moves the number of rows specified by *row number*.

If *x* matches a value exactly, it stops at that cell. If *x* is smaller than the first value in the *range*, @HLOOKUP returns ERR. If *x* is larger than the last value in the *range*, it stops at the last cell in *range*. For a table lookup to work correctly, the values in the index row of *range* must be in ascending order.

If *row number* is positive, 1-2-3 moves down; if *row number* is 0, 1-2-3 stays in that row.

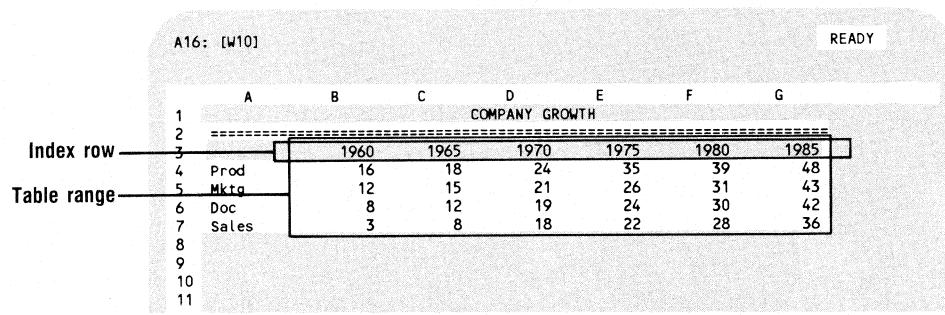


Figure 4-2

Numeric Examples:

@HLOOKUP(1973,B3..G7,3) = 19

@HLOOKUP(1974,B3..G7,3) = 19

@HLOOKUP(1975,B3..G7,3) = 24

@HLOOKUP(1986,B3..G7,3) = 42

@HLOOKUP(1959,B3..G7,3) = ERR, because *x* is too small

@INDEX @INDEX*(range,column,row)* returns the value of the cell in *range* at the intersection of *column* and *row*.

@INDEX uses *range* as its table range. *column* and *row* specify the number of columns to count over from the first column and how many rows to count down from the top row. The first column is column 0, and the top row is row 0.

If either *column* or *row* is not a whole number, 1-2-3 uses its integer part. If either argument is larger than the number of columns or rows in *range*, or if either argument is negative, @INDEX returns ERR.

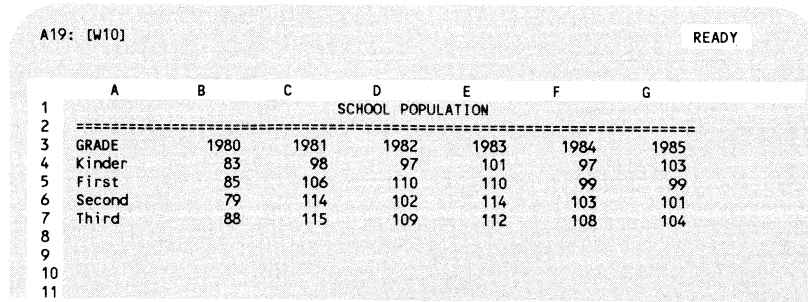


Figure 4-3

Examples: @INDEX(A3..G7,0,2) = First

@INDEX(A3..G7,3,0) = 1982

@INDEX(A3..G7,3,2) = 110

@INDEX(A3..G7,6,4) = 104

@INDEX(A3..G7,4,11) = ERR, because *row* is outside of range

@INDEX(A3..G7,−3,2) = ERR, because *row* is a negative number

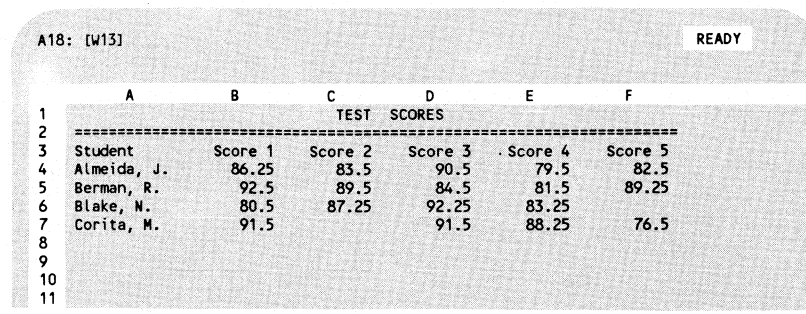
@NA @NA returns the numeric value NA, when a number is not available to complete a formula. This function enters NA in the current cell, and in all other cells that depend on the formula in this cell.

@NA is useful when you are building a worksheet that will contain data that has not yet been determined. You can use @NA in cells where that data is to be entered; formulas that reference those cells will have the value NA until you supply the correct data. Because NA appears in every cell that depends upon the cell containing NA, this @function ripples through the worksheet. You cannot substitute the label "NA for the value NA.

The functions @COUNT, @ISERR, @ISNA, @ISNUMBER, @ISSTRING, @CELL, and @CELLPOINTER stop the ripple-through effect of NA values.

Example: @IF(B14>3.2,@NA,B14) = NA, if the value of cell B14 is greater than 3.2

@ROWS @ROWS(*range*) returns the number of rows in *range*. This function is helpful when used with named ranges.



A18: [W13] READY

	A	B	C	D	E	F
1			TEST	SCORES		
2	==========	==========	==========	==========	==========	==========
3	Student	Score 1	Score 2	Score 3	Score 4	Score 5
4	Almeida, J.	86.25	83.5	90.5	79.5	82.5
5	Berman, R.	92.5	89.5	84.5	81.5	89.25
6	Blake, N.	80.5	87.25	92.25	83.25	
7	Corita, M.	91.5		91.5	88.25	76.5
8						
9						
10						
11						

Figure 4-4

Examples: @ROWS(A3..F7) = 5

@ROWS(B3..B7) = 5

@ROWS(SCORE1) = 5, if SCORE1 names the range B3..B7

@ROWS(SCORE2) = 4, if SCORE2 names the range C3..C6

@VLOOKUP @VLOOKUP(*x,range,column number*) performs a vertical table lookup. A vertical table lookup compares the value *x* to each cell in the first column, or index column, in *range*. When it locates a cell containing a value that matches *x*, it stops moving vertically down the index column. @VLOOKUP then moves across that row the number of columns specified by *column number* to return the answer.

If you include formulas in a lookup table, make sure the lookup range includes the column specified by *column number*.

@VLOOKUP searches the index column of *range* until it finds a cell containing a numeric value that is larger than the value *x*. It then moves up one cell, so that it stops at the cell whose value is the highest number that is less than or equal to the value *x*. For example, if the index column contains the values 10, 20, 30, 40, and 50, and *x* is 33, @VLOOKUP stops at the cell containing 40 and then moves up to the cell containing 30. At this point, @VLOOKUP moves across the number of columns specified by *column number*.

If *x* matches a value exactly, it stops at that cell. If *x* is smaller than the first value in the *range*, @VLOOKUP returns ERR. If *x* is larger than the last value in the *range*, it stops at the last cell in *range*. For a table lookup to work correctly, the values in the first column of *range* must be in ascending order.

If *column number* is positive, 1-2-3 moves to the right; if *column number* is 0, 1-2-3 stays in that column.

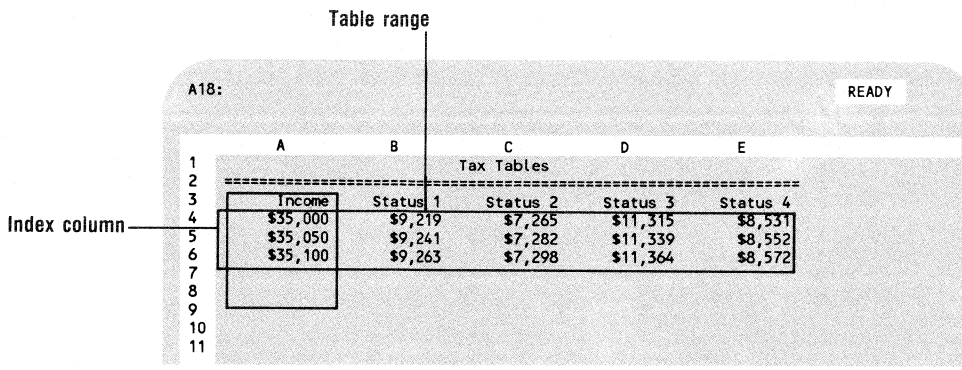


Figure 4-5

Examples: @VLOOKUP(35033,A4..E6,2) = 7265

@VLOOKUP(35050,A4..E6,2) = 7282

@VLOOKUP(35055,A4..E6,2) = 7282

@VLOOKUP(38900,A4..E6,2) = 7298

@VLOOKUP(34500,A4..E6,2) = ERR, because *x* is too small

@VLOOKUP(35033,A4..E6,6) = ERR, because *column number* is outside *range*

String Functions

String @functions manipulate series of characters called strings, make calculations using strings, and produce string values. Strings can be letters, numbers, and special characters, as long as they are label data types.

- When you enter actual string values as arguments, enclose them in a pair of quotation marks (" "). When you enter string values by cell address or range name, you do not need to use quotation marks. For example, @LEFT("Monthly Expenses",5) returns the word Month. If the string Monthly Expenses was in cell G8, you could also write @LEFT(G8,5).
- Many string functions use position numbers to locate the characters in a string. Character positions always start at position 0. The string Red Shoes contains 9 characters. The R is at position 0, the first e is at position 1, d is at position 2, the space is at position 3, and the last s is at position 8. The last position number is always one less than the length of the string.
- Use positive integers when indicating a position number. 1-2-3 interprets an entry with a negative position number as an invalid entry, and returns ERR. If you type 4.5 as a position number, 1-2-3 truncates it to 4.
- @functions can read 240 characters in one string. Therefore, character position numbers can be from 0 to 239 for each string value.
- @N and @S require range values as arguments. If you enter a single cell range, you can write it two ways: by a range address (B3..B3), or by a cell address preceded by an exclamation point (!B3).
- You can create a string that has no letters, numbers, spaces, or special characters by typing a label-prefix character in a cell. This is called an empty string, and has a length of 0. It is different from a blank cell. Its LICS code is 0, whereas a blank cell has no LICS code value.

@CHAR @CHAR*(x)* returns the ASCII/LICS character that corresponds to the code number *x*. 1-2-3 stores each character displayed on the screen as one of the numeric character codes in the Lotus International Character Set (LICS). LICS is an extension of the ASCII character set.

Argument *x* can be any numeric value between 1 and 255. Values outside this range yield ERR. 1-2-3 truncates any fractional numbers to integers.

If your computer does not have a display character for *x*, @CHAR returns either a character that resembles the desired character, or a blank. For characters outside the printable ASCII character set (codes below 32), the LICS code may not correspond to the codes your computer uses. The display driver you include in the 1-2-3 driver set takes care of any required translation.

Examples: @CHAR(52) = 4

@CHAR(59) = ;

@CHAR(65) = A

@CHAR(97) = a

@CODE @CODE*(string)* returns the ASCII/LICS code number of the first character in *string*.

The @CHAR and @CODE functions let you switch back and forth between the displayed characters and the LICS character codes that identify them.

Examples: @CODE(PROFIT) = 36, if PROFIT is a cell containing the string value $65.00

@CODE("4.5") = 52

@CODE("A") = 65

@CODE("Address") = 65

@CODE("Ms. Jones") = 77

@CODE(B5) = ERR, if B5 is a blank cell

@EXACT @EXACT*(string1,string2)*, tests whether two strings are exactly the same. If *string1* is exactly the same as *string2*, @EXACT returns 1; otherwise, it returns 0.

This function provides a more precise alternative to the equal operator (=) in a formula because @EXACT distinguishes between uppercase and lowercase letters, and between letters with and without accent marks, whereas the equal operator (=) does not.

Examples: @EXACT("LONDON","London") = 0 (FALSE)

+"LONDON"="London" = 1 (TRUE), because this formula is not sensitive to uppercase and lowercase letters

@EXACT("400","400") = 1 (TRUE)

@EXACT("400",400) = ERR, because they are not both string values

@FIND @FIND(*search string,string,start number*) finds the position at which the first occurrence of *search string* begins in *string*. @FIND begins searching *string* at *start number*. If the search fails, the result is ERR.

If you use a *start number* that includes a fraction, 1-2-3 only uses the integer part. A negative *start number* value results in an ERR.

To extract a substring after locating its starting position with @FIND, use the @MID function.

Examples: @FIND("even","Seven is not even",0) = 1.

@FIND("even","Seven is not even",1) = 1.

@FIND("even","Seven is not even",2) = 13.

@FIND("even","Seven is not even",14) = ERR.

@FIND("e","THE",0) = ERR.

@LEFT @LEFT(*string,n*) returns the first *n* characters in *string*.

Examples: @LEFT("Allons enfants de la",6) = Allons

@LEFT(" An indented string",3) = three spaces

@LENGTH @LENGTH(*string*) returns the number of characters found in *string*.

Examples: @LENGTH("computer") = 8

@LENGTH("") = 0

@LENGTH(A5&G12) = The total number of characters found in cells A5 and G12

@LENGTH(745) = ERR, because it is not a string

@LOWER @LOWER(*string*) converts all letters in *string* to lowercase.

Examples: @LOWER("A FinE THiNG") = a fine thing

@LOWER(@LEFT(B15,1)) = m, if cell B15 begins with either M or m

@MID @MID(*string,start number,n*) extracts *n* characters from *string*, beginning with the character at *start number*.

The @LEFT and @RIGHT functions are special cases of @MID. They extract a substring from either end of a string value.

If *start number* is beyond the end of the *string*, the result is an empty string, consisting of no characters.

If *n* is 0, the result is an empty string.

You can use a large number for *n*, if you don't know the length of the string and want to make sure you get all of it. The extra length has no effect on the result.

Examples: @MID("Our finest hour",4,6) = finest

@MID("Our finest hour",4,60) = finest hour

@MID("Our finest hour",25,6) = an empty string

@MID("Data"&"base",0,4) = Data

@MID("Data"&"base",2,3) = tab

@N @N*(range)* returns the value of the upper left corner cell in *range* as a numeric value.

The formula +A1+A2 returns A1 if cell A1 contains a numeric value and cell A2 contains a string value.

You can precede a cell address or single-cell range name with an exclamation point (!) to designate it as a range. For example, if the name RESULT is assigned to cell M24, you can use it as the argument for @N by typing @N(!RESULT).

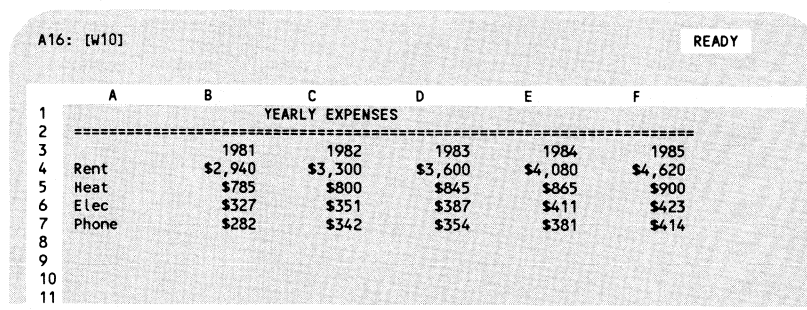


Figure 4-6

Examples: @N(!A3) = 0

@N(B3..B7) = 1981

@N(A4..A7) = 0

100+A6 = 100

100+@N(A6..A6) = 100

@PROPER @PROPER*(string)* converts the letters in *string* to proper capitalization; the first letter of each word in uppercase, and all others in lowercase.

1-2-3 considers a word to be a consecutive set of letters that does not include any spaces.

This function does not affect nonalphabetic characters.

Examples: @PROPER("A FINE THING") = A Fine Thing

@PROPER(@LEFT(B15,4)) = Then, if cell B15 begins with then, Then, THEN, or TheN

@PROPER("354-a babcock") = 354-A Babcock

@REPEAT @REPEAT*(string,n)* duplicates *string* the number of times specified by *n*.

@REPEAT differs from a repeating label (a cell entry that begins with a label-prefix backslash), in that the repeating label only repeats the label to fill the current column width. @REPEAT duplicates the string as many times as you specify; it is not limited by the current column width.

Examples: @REPEAT("Hello ",3) = Hello Hello Hello

@LENGTH(@REPEAT("Hello ",3)) = 18

+"She Loves You, "&@REPEAT("Yeah ",3) = She Loves You, Yeah Yeah Yeah

@REPLACE @REPLACE*(original string,start number,n,new string)* removes *n* characters from *original string*, beginning at *start number*, and then inserts *new string* in the same place.

There are several procedures you can perform with @REPLACE:

- By making *n* equal to the number of characters in *original string*, you can replace the entire *original string* with *new string*.
- By specifying a position immediately beyond the end of *original string* as *start number*, you can add *new string* to *original string*.
- By making *n* equal to 0, you can insert a new string.
- By making *new string* an empty string, you can delete a string.

Examples: @REPLACE("This is the only one",12,4,"first") = This is the first one

@REPLACE("bake",@FIND("k","bake",0),1,"s") = base. First @FIND locates the first occurrence of the letter k in bake and returns its position, 2. Then @REPLACE removes the k at that position and replaces it with s

@RIGHT @RIGHT*(string,n)* returns the last *n* characters in *string.*

Examples: @RIGHT("Allons enfants de la",5) = de la

@RIGHT("Allons enfants de la",−1) = ERR, because *n* is negative

@S @S*(range)* returns the value in the upper left corner cell in *range* as a string value.

You cannot mix numeric and string values directly in a calculation. For example, +A1&A2 returns ERR if either cell contains a numeric value. You can use @S to prevent calculations from returning ERR. In this way @S is similar to @N.

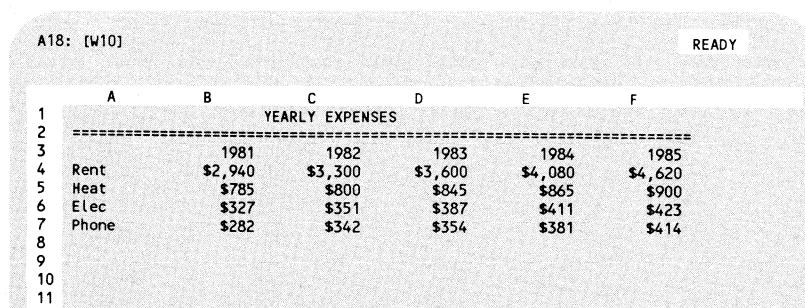


Figure 4-7

Examples: @LENGTH(C4) = ERR, because it contains a numeric value

@LENGTH(@S(!C4)) = 0, because it becomes an empty string, which has a length of 0

@S(A4..A7) = Rent

@S(A3..A7) = a blank, because A3 is a blank cell, and @S converts it to an empty string

@STRING @STRING*(x,n)* converts numeric value *x* to a string, with *n* places to the right of the decimal point. This function formats the string as if it were a number, using the fixed numeric format. @STRING also rounds the formatted string value to the number of specified decimal places, just as it would when formatting a number.

To convert a string to its numeric equivalent, use @VALUE.

n specifies the number of decimal places (0 to 15).

Examples: @STRING(1234,3) = the string value 1234.000

@STRING(1.23587,2) = the rounded string value 1.24

@STRING(1.23587,3) = the rounded string value 1.236

@TRIM @TRIM*(string)* removes excess space characters from *string*. It removes all spaces that precede the first non-space character and follow the last non-space character. It also replaces all consecutive spaces within the string with single spaces.

Examples: @TRIM(" 45 3/8") = 45 3/8

@TRIM(" 500 South St .") = 500 South St.

@TRIM("too much space") = too much space

@UPPER @UPPER*(string)* converts all letters in *string* to uppercase.

Examples: @UPPER("A Fine Thing") = A FINE THING

@UPPER(@LEFT(B15,4)) = THEN, if cell B15 begins with Then, then, or THEN.

@VALUE @VALUE*(string)* converts the number *string* to its corresponding numeric value. The string may appear as a standard number (456.7), a number in scientific format (4.567E2), or a mixed number (45 7/8).

1-2-3 ignores numeric values, and returns 0 for blank cells and empty strings.

Leading and trailing space characters do not affect the result. In some cases, however, a string that contains editing symbols (for instance, a two-character trailing currency sign) yields ERR.

Examples: @VALUE("543") = the numeric value 543

@VALUE(B3) = 49.75, if cell B3 contains the string value "49 3/4"

@VALUE(345) = 345

Date and Time Functions

Date and time @functions generate and use serial numbers to represent dates and times. Because of this, you can use dates and times in calculations.

- Each date between January 1, 1900 and December 31, 2099 has an integer serial number, called a date number. The first serial date number is 1 and the last date number is 73050. January 1, 1900 corresponds to 1, and December 31, 2099 corresponds to 73050.
- Each moment during the day corresponds to a fractional serial number, called a time number. 0.000 is midnight, .5 (or 1/2) is noon, and 0.99999 is just before midnight. You can enter a time number as a fraction or as a decimal.
- Even though 1-2-3 stores dates and times as serial numbers for calculations, you can format them on the screen so they appear as actual dates and times. For example, @DATE(86,10,12) generates the date number 31697. You can format this number to appear on the screen as 12-Oct-86. @TIME(23,59,59) generates the serial time number 0.99999. You can format this number to appear as 23:59:59.
- To format dates and times, use the /Range Format command. 1-2-3 has five possible date formats to choose from. The first three formats are permanent. You can, however, reset the last two formats with the the /Worksheet Global Default Other International Date command. 1-2-3 has four time formats to choose from. The first two are permanent 1-2-3 formats. You can reset the last two formats, using the /Worksheet Global Default Other International Date command.
- The date and time functions that generate serial numbers are: @DATE, @DATEVALUE, @NOW, @TIME, and @TIMEVALUE.
- The date and time functions that use serial numbers are: @DAY, @MONTH, and @YEAR; and @HOUR, @MINUTE, and @SECOND.
- If you enter mixed numbers as date numbers in arguments, 1-2-3 uses their integer part; for example, if you enter 31790.45 as a date number, 1-2-3 uses 31790.
- If you enter integers as arguments for time numbers, 1-2-3 interprets the fractional part as 0. For example, if you enter 31795 as a time number, 1-2-3 sees it as 31795.0 and uses .0 as the time number.

@DATE @DATE*(yr,month,day)* returns the serial date number of the *yr*, *month*, and *day*.

You can extract the year, month, and day from a date number with @YEAR, @MONTH, and @DAY. You can use @MOD to determine the day of the week for a given date.

yr must be a number between 0 (1900) and 199 (2099), inclusive.

month must be a number between 1 and 12, inclusive.

day must be a number between 1 and 31, inclusive. It must be a valid date for the given month. For example, you cannot use 31 for April.

If *yr*, *month*, and *day* are not valid numbers, 1-2-3 returns the value ERR.

Note: Even though there was no February 29, 1900 (it was not a leap year), 1-2-3 assigns a date number to this "day." This does not invalidate any of your date calculations, unless you use dates between January 1, 1900 and March 1, 1900.

Examples: @DATE(82,9,27) = 30221 (or 27-Sep-82 in D1 format)

@DATE(82,9,27) = 30221 (or 9/27/84 in D4 format)

@DATE(88,9,31) = ERR, because September has only 30 days

@DATEVALUE @DATEVALUE*(date string)* returns the serial date number of the string value stating the year, month, and day.

@DATEVALUE is similar to @DATE in that it generates the serial date number for a particular date between January 1, 1900 and December 31, 2099. The difference is that @DATE uses three numeric values as arguments, and @DATEVALUE uses a single string value as its argument.

The *date string* must be in one of the five 1-2-3 date formats, and must be enclosed in double quotes. 1-2-3's three permanent date formats are: D1, DD-MMM-YY; D2, DD-MMM, with the current year automatically included; D3, MMM-YY, with the date stored as the first of the month.

The two additional formats in which you can enter a date are D4 and D5, which have more than one option in each format.
If you set the D4 format as DD.MM.YY:
@DATEVALUE("23.12.85") = 31404.
If you set the D4 format as MM/DD/YY:
@DATEVALUE("12/23/85") = 31404.

You need to press CALC to see the results when you change a Date format.

Examples: @DATEVALUE("23-Aug-86") = 31647

@DATEVALUE("23-Aug") = 31647 if 1986 is the current year

@DATEVALUE("Aug-86") = 31625

@DATEVALUE(B3) = date number of the date string in B3, if it is a correct Date format

@DAY @DAY*(date number)* returns the day of the month (1 to 31) of the *date number*.

date number must be the serial number of the desired date, generated by the @DATE, @DATEVALUE, or @NOW functions.

Examples: @DAY(@DATE(85,3,27)) = 27

@DAY(B4) = the day of the month (1 to 31) of the date whose *date number* is in cell B4

@MONTH @MONTH*(date number)* returns the month (1 to 12) of the year of the *date number*.

date number must be the serial number of the desired date, generated by the @DATE, @DATEVALUE, or @NOW functions.

Example: @MONTH(@DATE(85,3,27)) = 3

@YEAR @YEAR*(date number)* returns the year (0 to 199) of the *date number*.

date number must be the serial number of the desired date, generated by the @DATE, @DATEVALUE, or @NOW functions.

Example: @YEAR(@DATEVALUE("14-Feb-2019")) = 119

@NOW @NOW returns the serial number for the current date and time. This includes both a date number (integer part) and a time number (fractional part). Every time 1-2-3 recalculates, it updates the value of @NOW.

You can format the value of @NOW in one of the date formats or one of the time formats. With a Date format, 1-2-3 ignores the fractional part of the number; with a Time format, 1-2-3 ignores the integer part of the number. In both cases, 1-2-3 records the date and time.

Examples: @NOW = 31048.5 at noon on January 25, 1985

@INT(@NOW) = 31048 at the same time

@NOW = 32688.395 at 9:45 AM, June 29, 1989

@MOD(@NOW,7) = a value between 0 and 6, from which you can determine the day of the week. @MOD produces the remainder of the serial number generated by @NOW/7. 1-2-3 sees Sunday as the first day of the week and Saturday as the 7th day. If the result of this @function is 1, the day is Sunday; if the result is 2, the day is Monday; if the result is 0, the day is Saturday.

@TIME @TIME*(hr,min,sec)* returns the serial time number of *hr*, *min*, and *sec*. You can extract the hour, minute, and second from a time number with the @HOUR, @MINUTE, and @SECOND functions.

hr must be between 0 and 23.

min must be between 0 and 59.

sec must be between 0 and 59.

If *hr*, *min*, and *sec* are not valid numbers, 1-2-3 returns the value ERR.

Examples: @TIME(8,19,27) = 0.346840 (or 8:19:27 AM in D6 format)

@TIME(20,19,27) = 0.846840 (8:19:27 PM in D6 format or 20:19:27 in D8 format)

@TIME(20,19,0) = 0.846527 (8:19 PM in D7 format)

@TIME(26,5,8) = ERR, because *hr* is too big

@TIMEVALUE @TIMEVALUE*(time string)* returns the serial time number of the string value stating the hour, minute, and second.

@TIMEVALUE is similar to @TIME in that it generates the serial number fraction that corresponds to a particular time of day. The difference is that @TIME uses three numeric values as arguments, and @TIMEVALUE uses a single string value as its argument.

time string must be in one of the four 1-2-3 time formats, and must be enclosed in double quotes. 1-2-3's two permanent time formats are: D6, HH:MM:SS AM/PM; and D7, HH:MM AM/PM.

The two additional formats in which you can enter a time are D8 and D9, which have more than one option in each format.

If you set the D8 format as HH:MM:SS 24hr:
@TIMEVALUE("15:12:00") = 0.6333
If you set the D8 format as HH.MM.SS 24hr:
@TIMEVALUE("15.12.00") = 0.6333.

You need to press CALC to see the results when you change a Time format.

Examples: @TIMEVALUE("3:5 PM") = 0.628472 (D7 format)

@TIMEVALUE("3:12:00 PM") = 0.6333 (D6 format)

@TIMEVALUE("3:12 PM") = 0.6333 (D7 format)

@HOUR @HOUR*(time number)* extracts the hour value from a *time number*, and returns a value between 0 (midnight) and 23 (23:00 or 11:00 PM).

time number can be any fraction, or a fractional serial number generated by @TIME, @TIMEVALUE, or @NOW.

Examples: @HOUR(31774) = 0 (midnight, because 1-2-3 adds a fractional value of 0 to an integer)

@HOUR(31774.5) = 12 (noon)

@HOUR(0.5) = 12 (noon)

@HOUR(1/3) = 8 AM

@HOUR(@TIME(13,45,13)) = 13 (1:00 P.M.)

@MINUTE @MINUTE*(time number)* extracts the minute value from a *time number*, and returns a value between 0 and 59.

time number can be any fraction, or a fractional serial number generated by @TIME, @TIMEVALUE, or @NOW.

Examples: @MINUTE(0.4692708) = 15

@MINUTE(@TIME(11,15,45) = 15

@MINUTE(0.333) = 59

@MINUTE(45) = 0

@SECOND @SECOND*(time number)* extracts the second value from a *time number*, and returns a value between 0 and 59.

time number can be any fraction or a fractional serial number, generated by @TIME, @TIMEVALUE, or @NOW.

Examples: @SECOND(0.333) = 31

@SECOND(@TIME(11,15,45)) = 45

@SECOND(33) = 0

Financial Functions

The 1-2-3 financial @functions make calculations concerning loans, annuities, and cash flows that occur over a term, or period of time.

- Enter interest rates as either percents or decimal fractions. You can type 15.5% either as 15.5% or as .155. 1-2-3 automatically converts all percentages to decimal values.
- Express the term and the interest rate in the same units of time. To calculate a monthly payment when the interest and term are given in years, divide the yearly interest rate by 12 to find the monthly interest rate, and multiply the term by 12 to get the number of monthly payment periods.
- An annuity is an investment in which a series of equal payments are made. An ordinary annuity is an annuity in which a payment is made at the end of each period; an annuity due is an annuity where each payment is made at the beginning of each period. The financial @functions make calculations by assuming that investments are ordinary annuities.
- In the financial examples, monetary results are in cells formatted as Currency; percentage results are in cells formatted as Percent.

@CTERM @CTERM*(int,fv,pv)* computes the number of compounding periods it will take an investment of present value *pv* to grow to a future value of *fv*, earning a fixed interest rate *int* per compounding period.

@CTERM uses this formula to compute the term:

$$\frac{\ln(fv/pv)}{\ln(1+int)}$$

where: fv = future value
pv = present value
int = periodic interest rate
ln = natural logarithm

Example: You have just deposited $10,000 in an account that pays an annual interest rate of 10%, compounded monthly. You want to determine how long it will take to double your investment.

@CTERM(10%/12,20000,10000) returns 83.52, which tells you that it will take 83.52 months, or about seven years, to double your $10,000.

@DDB @DDB(*cost,salvage,life,period*) computes the depreciation allowance on an asset for a specified period of time, using the double-declining balance method.

The double-declining balance method accelerates the rate of depreciation, so that more depreciation expense occurs (and can be written off) in earlier periods than in later ones. Depreciation stops when the book value of the asset reaches the salvage value. The book value in any period is the total cost minus total depreciation over all prior periods.

@DDB uses this formula to compute the double-declining balance depreciation for any period:

$$\frac{(bv*2)}{n}$$

where: bv = book value in that period
n = life of the asset

1-2-3 adjusts the result of the formula when necessary, to ensure that total depreciation taken over the life of the asset equals the asset's cost minus its salvage value.

You give @DDB this information as arguments:

cost is the amount you paid for asset

salvage is the value of asset at the end of its life

life is the number of periods it will take to depreciate to salvage value

period is the time period for which you want to find depreciation allowance

Example: You have just purchased an office machine for $10,000. The useful life of this machine is considered to be eight years, and the salvage value after eight years is $1200. You want to compute the depreciation expense for the fifth year, using the double-declining balance method.

@DDB(10000,1200,8,5) returns $791, which tells you that the depreciation expense for the fifth year will be $791.

@FV @FV(*pmt,int,term*) determines the future value of an investment. It computes the future value based on a series of equal payments, each of amount *pmt*, earning periodic interest rate *int*, over the number of payment periods in *term*.

@FV uses this formula to compute future value:

$$pmt \frac{(1+int)^n - 1}{int}$$

where: pmt = periodic payment
int = periodic interest rate
n = number of periods

@FV makes its calculations by assuming that the investment is an ordinary annuity.

Ordinary Annuity Example: You plan to deposit $2,000 each year for the next 20 years into a bank account. The account is paying 10% interest, compounded annually; interest is paid on the last day of each year. You want to compute the value of your account in 20 years. You make each year's contribution on the last day of the year.

@FV(2000,10%,20) returns $114,550, the value of your account at the end of 20 years

To compute the future value of an *annuity due*, use the formula: @FV(pmt,int,term)*(1+int)

Annuity Due Example: If you make each year's contribution on the first day of the year, you would compute the amount for an annuity due.

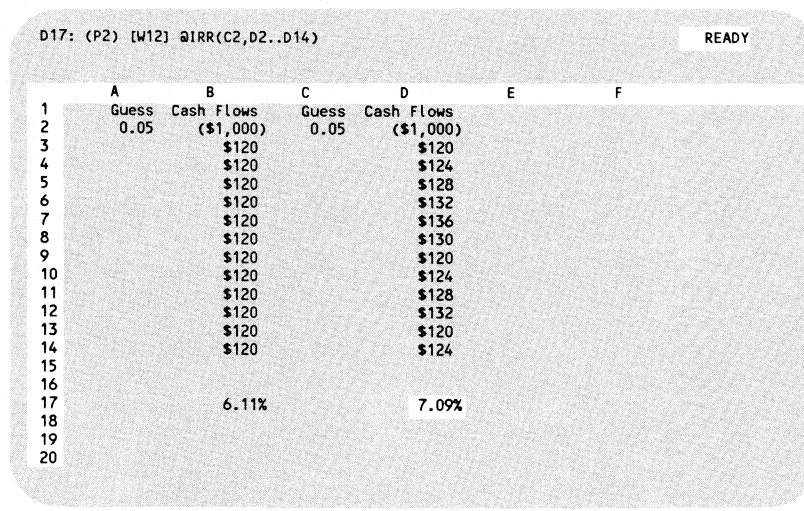
@FV(2000,10%,20)*(1+10%) would return $126,005, the value of your account in 20 years — an additional $11,455 over the ordinary annuity.

@IRR @IRR(*guess,range*) computes the internal rate of return for a series of cash flow values generated by an investment. In general, the IRR is the rate that equates the present value of an expected future series of even or uneven cash flows to the initial investment. 1-2-3 assumes the cash flows are received at regular intervals.

1-2-3 bases its calculation on a series of approximations for the internal rate of return. Because this function uses approximations, you enter a *guess* as the first argument. Enter a *guess* that you feel is reasonable for the IRR. Because there may be more than one solution, try another *guess* if the result doesn't seem correct. If you get unexpected results with @IRR, you may want to use @NPV to analyze the cash flow.

guess is a percentage that represents your estimate of the internal rate of return. In general, specify a *guess* between 0 and 1. If the iteration cannot approximate the result to within 0.0000001 after 20 tries, the result will be the value ERR.

range is the cell range containing the cash flow amounts. 1-2-3 considers negative numbers as cash outflows, and positive numbers as cash inflows. The first cash flow in *range* must be a negative number.



	A	B	C	D	E	F
1	Guess	Cash Flows	Guess	Cash Flows		
2	0.05	($1,000)	0.05	($1,000)		
3		$120		$120		
4		$120		$124		
5		$120		$128		
6		$120		$132		
7		$120		$136		
8		$120		$130		
9		$120		$120		
10		$120		$124		
11		$120		$128		
12		$120		$132		
13		$120		$120		
14		$120		$124		
15						
16						
17		6.11%		7.09%		
18						
19						
20						

Figure 4-8

Examples: @IRR(A2,B2..B14) returns 6.11% over a 12-month term, if the initial payment is $1000 and the 12 periodic receipts are each $120. In range B1..B13, B1 contains the value −1000, and B2..B13 each contain the value 120.

@IRR(C2,D2..D14) returns 7.09% over a 12-month term, if the initial payment is $1000 and the 12 periodic receipts are: $120, $124, $128, $132, $136, $130, $120, $124, $128, $132, $120, and $124.

@NPV @NPV*(int,range)* computes the present value of a series of future cash flows, discounted at a fixed periodic interest rate. 1-2-3 assumes that the cash flows occur at equal time intervals, that the first cash outflow occurs at the end of the first period, and subsequent cash outflows occur at the end of subsequent periods.

The *int* is the periodic interest rate, and the *range* is the range you use to store the series of cash flows.

@NPV uses this formula:

$$\sum \frac{V_i}{(1+\text{int})^i}$$

where: $V_i...V_n$ = series of cash flows in *range*
int = interest rate
n = number of cash flows
i = the current iteration (1 through n)

Example: @NPV(10%,D2..D13) = $340.69, if the assumed interest rate is 10% and D2..D13 contains twelve future cash flows, each of which is $50.

To find the net present value of an investment where you make an initial cash outflow immediately, and follow it by a series of future inflows, you must factor the initial outflow separately, because it is not affected by the interest.

If INITIAL is your initial outflow, SERIES is a range of future cash flows, and RATE is the periodic interest rate, then the overall net present value is calculated by +INITIAL+@NPV(RATE,SERIES).

Example: +INITIAL+@NPV(RATE,SERIES) = $904.07, when:

INITIAL = ($4,700.00)
RATE = 14%
SERIES = $1,600.00
$1,600.00
$1,600.00
$1,700.00
$1,700.00

@PMT @PMT*(prin,int,term)* computes the amount of the periodic payment on a loan. Most installment loans are computed like ordinary annuities, in that payments are made at the end of each payment period. *prin* is the principal of the loan; *int* is the periodic interest rate; and *term* is the number of payment periods.

@PMT uses this formula:

$$\text{prin} * \frac{\text{int}}{1-(\text{int}+1)^{-n}}$$

where: prin = principal
int = periodic interest rate
n = term

Example: You are considering taking out a $50,000 mortgage for 30 years at an annual interest rate of 12.5%. You want to determine your monthly payment.

@PMT(50000,12.5%/12,30*12) returns your monthly payment, $533.63.

To compute the periodic payment of an annuity due, use the following formula: @PMT(prin,int,term)/(1+int)

@PV @PV*(pmt,int,term)* determines the present value of an investment. It computes the present value based on a series of equal payments, each of amount *pmt*, discounted at periodic interest rate *int*, over the number of periods in *term*.

@PV uses this formula:

$$\text{pmt} * \frac{(1-(1+\text{int})^{-n}}{\text{int}}$$

where: pmt = periodic payment
int = periodic interest rate
n = term

Ordinary Annuity Example: You have just won a million dollars. The prize is awarded in 20 annual payments of $50,000 each (a total of $1,000,000 over 20 years). Annual payments are received at the end of each year. You are given the option of receiving a single lump-sum payment of $400,000 instead of the million dollar annuity. You want to find out which option is worth more in today's dollars.

If you were to accept the annual payments of $50,000, you assume that you would invest the money at a rate of 12%, compounded annually.

@PV(50000,12%,20) returns $373,472, which tells you that the $1,000,000 paid over 20 years is worth $373,472 in present dollars. Based on your assumptions, the lump-sum payment of $400,000 is worth more than the million-dollar ordinary annuity, in present dollars (before taxes).

To compute the present value of an annuity due, use this formula: @PV(pmt,int,term)*(1+int)

Annuity Due

Example: If the annual payments of $50,000 were made at the beginning (rather than at the end) of each year, use the annuity due formula.

@PV(50000,12%,20)*(1+12%) returns $418,289. Using the same assumptions, if the annual payments were made at the beginning of each year, the million-dollar annuity would be worth more than the lump-sum payment in present dollars (before taxes).

@RATE @RATE*(fv,pv,term)* returns the periodic interest necessary for a present value of *pv* to grow to a future value of *fv* over the number of compounding periods in term. If the investment is compounded monthly, for example, you multiply the value of @RATE by 12 to compute the annual rate.

@RATE uses this formula to compute the periodic interest rate:

$$\left(\frac{fv}{pv}\right)^{1/n} - 1$$

where: fv = future value, pv = present value, n = term

Example: You have invested $10,000 in a bond. The bond matures in five years, and has a maturity value of $18,000. Interest is compounded monthly. You want to determine the periodic interest rate for this investment.

@RATE(18000,10000,5*12) returns .00984, which tells you that the periodic (monthly) interest rate is 0.984%, just under 1% per month.

To determine the annual rate, multiply the above formula by 12, which yields a result of 11.8%.

@SLN @SLN*(cost,salvage,life)* computes the straight-line depreciation of an asset for one period.

The straight-line method of depreciation divides the depreciable cost (*cost-salvage*) evenly over the useful life of an asset. The useful life is the number of periods (typically years) over which an asset is depreciated.

@SLN uses this formula to compute depreciation:

$$\frac{(c-s)}{n}$$

where: c = cost of the asset
s = salvage value of the asset
n = useful life fo the asset

You give @SLN this information as arguments:

cost is the amount you paid for asset

salvage is the value of asset at the end of its life

life is the number of years it will take to depreciate to salvage value

Example: You have purchased an office machine for $10,000. The useful life of this machine is eight years, and the salvage value in eight years will be $1200. You want to compute yearly depreciation expense, using the straight-line method.

@SLN(10000,1200,8) returns $1100, the yearly depreciation allowance

@SYD @SYD*(cost,salvage,life,period)* returns the sum-of-the-years' digits depreciation for a specified period.

The sum-of-the-years'-digits method of depreciation accelerates the rate of depreciation, so that more depreciation expense occurs in earlier periods than in later ones. The depreciable cost is the actual cost minus salvage value. The useful life is the number of periods (typically years) over which an asset is depreciated.

@SYD uses this formula to compute depreciation:

$$\frac{(c-s)*(n-p+1)}{(n*(n+1)/2)}$$

where: c = cost of the asset
s = salvage value of the asset
p = period for which depreciation is being computed
n = useful life of the asset

You give @SYD this information as arguments:

cost is the amount you paid for asset

salvage is the value of asset at the end of its life

life is the number of periods it will take to depreciate to salvage value

period is the time period for which you want to find depreciation allowance

Example: You have just purchased an office machine for $10,000. The useful life of this machine is eight years, and the salvage value after eight years will be $1200. You want to compute depreciation expense for the fifth year, using the sum-of-the-years'-digits method.

@SYD(10000,1200,8,5) returns $978, the depreciation allowance for the fifth year

@TERM @TERM*(pmt,int,fv)* returns the number of payment periods in the term of an ordinary annuity necessary to accumulate a future value of *fv*, earning a periodic interest rate of *int*. Each payment is equal to amount *pmt*.

@TERM uses this formula to compute the term:

$$\frac{\ln(1+(fv*int/pmt))}{\ln(1+int)}$$

where: pmt = periodic payment
fv = future value
int = periodic interest rate
ln = natural logarithm

Examples: You deposit $2,000 at the end of each year into a bank account. Your account earns 10% a year, compounded annually. You want to determine how long it will take to accumulate $100,000.

@TERM(2000,10%,100000) returns 19 (when the cell format is Fixed, 0), the number of years it will take to accumulate $100,000 in your account.

You want to know how long it will take to pay back a $10,000 loan at 10% yearly interest, making payments of $1,174.60 per year. You can calculate the term necessary to pay back a loan by inputting the *fv* as a negative number.

To compute the term of an annuity due, use this formula: @TERM(pmt,int,fv/(1+int))

Statistical Functions

1-2-3's statistical @functions perform calculations on lists of values.

- Every function in this accepts numeric and string values as single arguments.
- Numeric arguments can be numbers, cell addresses, cell names, range addresses, and range names.
- String arguments can be strings enclosed in quotation marks, cell addresses, cell names, range addresses, and range names.
- A list contains one or more arguments. Each argument in a list can be a single value or a range. A list can contain both single values and ranges. For example, the argument list in the function @COUNT(B3..B8,C3..C8,D9,J3) is a valid argument list.
- A list can include blank ranges.
- 1-2-3 ignores blank cells in multiple-cell ranges. For example, if you use @AVG to average the values in a range that spans 8 cells, and there is a blank cell in that range, 1-2-3 divides the sum by 7 to find the correct average.
- 1-2-3 sees a blank cell used as a single argument in a list as the value 0.
- CAUTION When you use a range to calculate with the statistical functions, 1-2-3 assigns the value 0 to all labels within that range and includes them in calculations.

All examples in this section are based on the Weekly Sales worksheet in Figure 4-9. All monetary results are returned in Currency format. All dates are returned in D1 format.

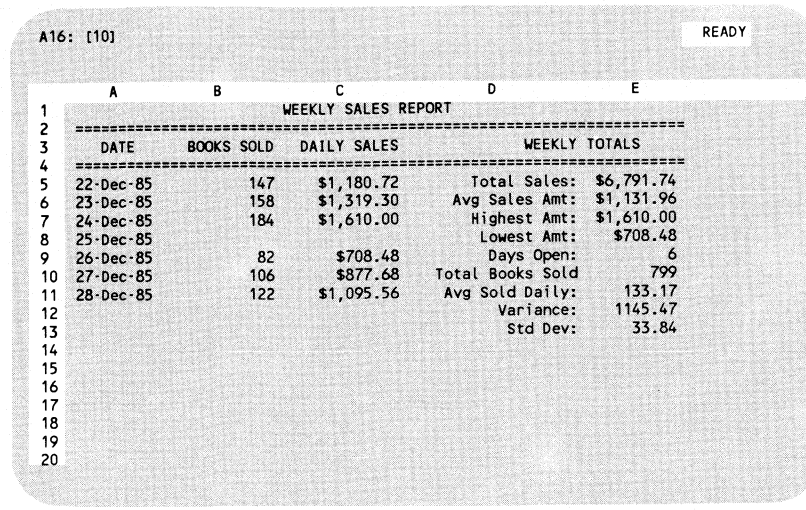


Figure 4-9

@AVG @AVG*(list)* computes the average of all values in *(list)*.

@AVG(*list*) is equivalent to the formula @SUM(*list*)/@COUNT(*list*).

Examples: @AVG(C5..C11) = $1,131.96, the average sales amount for the week

@AVG(B5..B11) = 133.17, the average number of books sold daily for that week

@COUNT @COUNT*(list)* counts the number of cells in *list*. @COUNT is one of the @functions that stops the ripple-through effect of the values NA and ERR, explained in the Logical Functions section.

If *list* includes only blank ranges, the result is 0. @COUNT(A1..A4) = a value between 0 and 4. If every cell in range A1..A4 is blank, @COUNT returns 0. If A1..A4 contains one filled cell, it returns 1, and so on.

Each single value in *list* adds 1 to the count, even if it is blank; therefore, you should use @COUNT with range arguments. For example, @COUNT(H54) = 1, even if cell H54 is blank.

Examples: @COUNT(B5..B11) = 6, the number of days open that week

@COUNT(B8) = 1

@MAX @MAX(*list*) returns the maximum value in *list*.

Examples: @MAX(C5..C11) = $1,610.00, the highest daily amount taken in that week

@MAX(B5..B11) = 184, the greatest number of books sold in one day

@MAX(A5..A11) = 28-Dec-85, the last day of that week (dates are from the @DATE function)

@MIN @MIN(*list*) returns the minimum value in *list*.

Examples: @MIN(C5..C11) = $708.48, the lowest daily amount taken in that week

@MIN(B5..B11) = 82, the fewest books sold in one day

@MIN(A5..A11) = 22-Dec-85, the first day of that week (dates are from the @DATE function)

@STD @STD(*list*) computes the population standard deviation of the values in *list*. The standard deviation is the square root of the variance.

Standard deviation measures the degree to which individual values in a list vary from the mean (average) of all values in the list. The lower the standard deviation, the less individual values vary from the mean, and the more reliable the mean. A standard deviation of 0 indicates that all values in the list are equal.

@STD uses the n method (biased) to compute the standard deviation of population data, which uses the following formula:

$$\sqrt{\frac{\sum (V_i\text{-AVG})^2}{n}}$$

where: n = number of items in *list*
V_i = the *i*th item in *list*
AVG = average of values in *list*

Example: @STD(B5..B11) = 33.84, the standard deviation for daily average of books sold that week

If you want to compute the standard deviation of sample data, use the n-1 method (unbiased) by entering the following formula:

@SQRT(@COUNT(*list*)/(@COUNT(*list*)-1))*@STD(*list*)

@SUM @SUM(*list*) adds the values in *list*.

Examples: @SUM(C5..C11) = $6,791.74, the total sales for that week @SUM(B5..B11) = 799, the total number of books sold that week

@VAR @VAR*(list)* computes the population variance of the values in *list*.

Variance is a measure of the degree to which individual values in a list vary from the mean (average) of all values in the list. The lower the variance, the less individual values vary from the mean, and thus the more reliable the mean. A variance of 0 indicates that all values in the list are equal.

@VAR uses the n method (biased) to compute the variance of population data with the following formula:

$$\frac{\sum(V_i\text{-AVG})^2}{n}$$

where:

- n = number of items in *list*
- V_i = the *i*th value in *list*
- AVG = average of values in *list*

Examples: @VAR(B5..B11) = 1145.47, the variance of the daily average of books sold that week

If a range named SAT_SCORES contains the SAT scores for an entire incoming freshman class, and the cell COUNT contains the formula @COUNT(SAT_SCORES):

@VAR(SAT_SCORES) computes the variance in SAT scores for the entire freshman class.

If you want to compute the variance for sample data, use the n-1 method (unbiased) by entering the following formula:

@COUNT(*list*)/(@COUNT(*list*)-1)*@VAR(*list*)

In the example above, +COUNT/(COUNT-1)*@VAR(SAT_SCORES) computes the variance for the whole freshman class when SAT_SCORES includes a random sample of all scores.

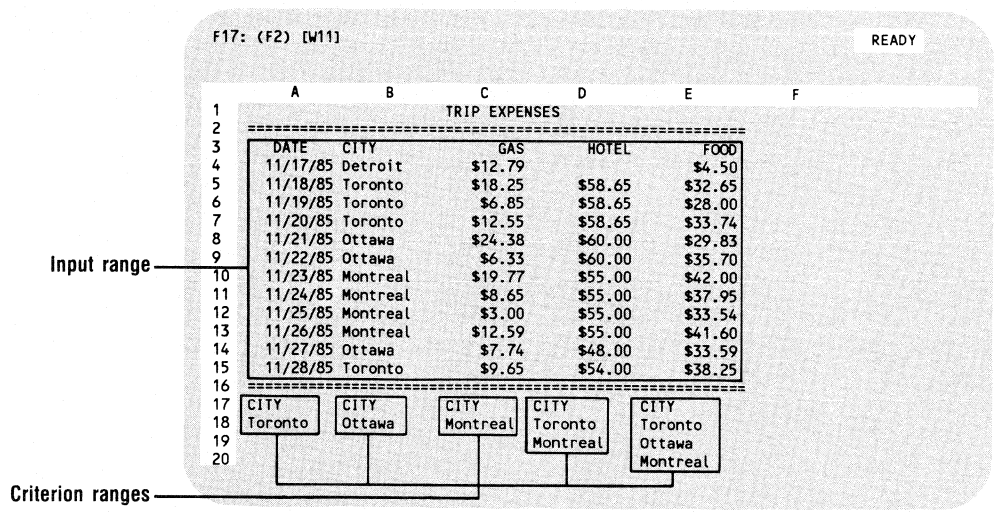
Database Statistical Functions

The database statistical @functions perform the same calculations on a field of a database as the statistical @functions perform on a list. Therefore, to use database statistical @functions, you must set up a database in a worksheet and establish a criterion range. If you have not yet created a database in 1-2-3, read the Data Commands section in Chapter 2.

Each database statistical @function scans the database, selects the records that match the criteria in the criterion range, and then performs the calculation on the selected values in the field you specify.

Each database statistical @function has three arguments:

- *input* is the range. This range must include all the database records and their field names.
- *offset* is the column number containing the field. The first column of the input range is field 0, the second column is field 1, the third column is field 2, and so on.
- *criterion* is the criterion range you set up. The criterion range must contain the same field names as the input range and must include the criteria directly below each field name.
- The first row in both the *input* and *criterion* ranges must contain the field names of each column, as in the worksheet below. You can set up as many criterion ranges as you want to select values.



	A	B	C	D	E	F
1			TRIP EXPENSES			
2						
3	DATE	CITY	GAS	HOTEL	FOOD	
4	11/17/85	Detroit	$12.79		$4.50	
5	11/18/85	Toronto	$18.25	$58.65	$32.65	
6	11/19/85	Toronto	$6.85	$58.65	$28.00	
7	11/20/85	Toronto	$12.55	$58.65	$33.74	
8	11/21/85	Ottawa	$24.38	$60.00	$29.83	
9	11/22/85	Ottawa	$6.33	$60.00	$35.70	
10	11/23/85	Montreal	$19.77	$55.00	$42.00	
11	11/24/85	Montreal	$8.65	$55.00	$37.95	
12	11/25/85	Montreal	$3.00	$55.00	$33.54	
13	11/26/85	Montreal	$12.59	$55.00	$41.60	
14	11/27/85	Ottawa	$7.74	$48.00	$33.59	
15	11/28/85	Toronto	$9.65	$54.00	$38.25	
16						
17	CITY	CITY	CITY	CITY	CITY	
18	Toronto	Ottawa	Montreal	Toronto	Toronto	
19				Montreal	Ottawa	
20					Montreal	

Figure 4-10

All examples refer to the Trip Expenses worksheet. All monetary results are in currency format, and all date results are in D4 format.

@DAVG @DAVG*(input,offset,criterion)* averages the values in the *offset* column of the *input* range that meet the criteria in the *criterion* range.

Example: @DAVG(A3..E15,2,A17..A18) = $11.83, the average spent on gas in Toronto

@DAVG(A3..E15,4,A17..A18) = $33.16, the average spent on food in Toronto

@DCOUNT @DCOUNT*(input,offset,criterion)* counts the non-blank cells in the *offset* column of the *input* range that meet the criteria in the *criterion* range.

Example: @DCOUNT(A3..E15,1,B17..B18) = 3, the number of days spent in Ottawa

@DCOUNT(A3..E15,1,C17..C18) = 4, the number of days spent in Montreal

@DMAX @DMAX*(input,offset,criterion)* finds the maximum value in the *offset* column of the *input* range that meets the criteria in the *criterion* range.

Example: @DMAX(A3..E15,0,A17..A18) = 11/28/85, the last day spent in Toronto

@DMAX(A3..E15,4,E17..E20) = $42.00, the most spent on food in one day in the three Canadian cities

@DMIN @DMIN*(input,offset,criterion)* finds the minimum value in the *offset* column of the *input* range that meets the criteria in the *criterion* range.

Example: @DMIN(A3..E15,1,B17..B18) = 11/21/85, the first day spent in Ottawa

@DMIN((A3..E15,4,C17..C18) = $33.54, the least spent on food in one day in Montreal

@DSTD @DSTD*(input,offset,criterion)* computes the population standard deviation for values in the *offset* column of the *input* range that meet the criteria in the *criterion* range.

Example: @DSTD(A3..E15,3,C17..C18) = 0, because the hotel price did not change in Montreal

@DSTD(A3..E15,3,E17..E20) = 3.37, the standard deviation of hotel prices in the three cities

@DSUM @DSUM*(input,offset,criterion)* adds the values in the *offset* column of the *input* range that meet the criteria in the *criterion* range.

Example: @DSUM(A3..E15,3,C17..C18) = $220.00, the total hotel cost in Montreal

@DSUM(A3..E15,4,C17..C18) = $155.09, the total food cost in Montreal

@DVAR @DVAR*(input,offset,criterion)* computes the population variance for values in the *offset* column of the *input* range that meet the criteria in the *criterion* range.

Example: @DVAR(A3..E15,3,C17..C18) = 0, because the hotel price did not change in Montreal

@DVAR(A3..E15,3,E17..E20) = 11.34, the variance of hotel costs in the three cities

Chapter 5

The PrintGraph Program

The PrintGraph Program

The PrintGraph program lets you print graphs from files you create with the /Graph Save command. /Graph Save stores a description of the current graph in a graph file and adds the extension .PIC to the file's name. These are the only files PrintGraph can print.

PrintGraph can only print graphs on a graphics printer or plotter. Before you print the graph, you must choose settings in PrintGraph. Your choice of settings determines layout, proportions, angle, typeface styles, and colors. You also use the settings to configure PrintGraph to your particular graphics printer and to specify the order in which you want to print a series of graphs.

Figure 5-1 shows the PrintGraph menu tree.

The table below summarizes the PrintGraph commands.

Command	Description
Image-Select	Lets you specify one or more graph files (file extension .PIC) to be printed.
Settings	Controls all PrintGraph settings, including: the size and proportion of the graph; fonts; colors (if any); and the hardware you want to use.
Go	Starts printing.
Align	Tells PrintGraph that the paper is currently positioned at the top of the page.
Page	Advances the paper to the top of the next page.
Exit	Ends the PrintGraph session.

Table 5-1

Using PrintGraph

See *Getting Started* for instructions on how to start PrintGraph on your computer system and for a description of the requirements for your particular hardware.

PrintGraph does not work with all printers. You can use your printer with PrintGraph only if you specify an appropriate driver for it in the driver set that you build during the Install program. Your printer may appear as one of the choices in the Install program, or you may have acquired a driver for your printer, in which case you can add it as a single driver. For more information on using the Install program, see *Getting Started*.

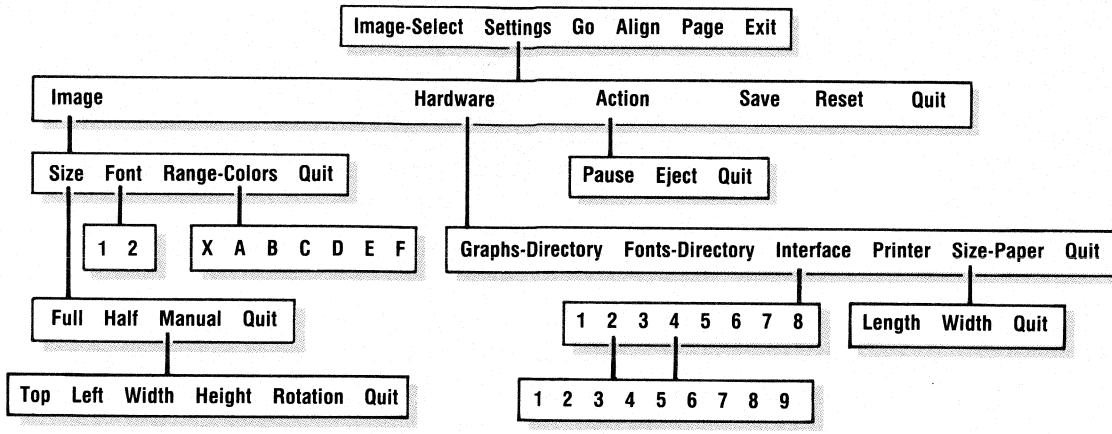


Figure 5-1

When PrintGraph starts, the PrintGraph settings appear on your screen. They remain on the screen throughout the session. The PrintGraph menu appears on the control panel when PrintGraph starts. You do not need to press slash (/) to make the menu appear.

PrintGraph Commands

You issue a command by making a selection from the PrintGraph menu. See Figure 5-1. To move the menu pointer to your selection, use RIGHT and LEFT or the space bar, and press RETURN. You can also type the first letter of your selection. If you forget what a command or setting does, press HELP to display the corresponding Help screen.

The steps below summarize the procedure for printing a graph that you created in 1-2-3:

1. Save the graph in 1-2-3 using the /Graph Save command. This stores a graph file with the extension .PIC.
2. Enter PrintGraph. You can enter PrintGraph from DOS by typing PGRAPH at the operating system prompt, or from the Access System by selecting PrintGraph from the Access menu. (You must leave 1-2-3 first.)
3. Select Settings from the PrintGraph menu to make any necessary changes. Make sure that the file that contains the graph you want to print is in the directory specified in the Hardware settings. (If not, change the graphs directory in the Hardware settings.)
4. Select Image-Select. Follow the instructions on the screen to indicate the graphs you want to print,
5. Select the printer type (Settings Hardware Printer).
6. Make sure the printer is correctly set up, and that the paper is in the right position. Then select Align.
7. Select Go to begin printing.
8. Select Page to advance the page when printing is complete.
9. You can then repeat any of the above steps, or end PrintGraph by selecting Exit. When you end PrintGraph, you return to DOS or the Access System, depending on how you entered PrintGraph.

Note: You cannot make changes to a graph file when you are in PrintGraph. You must return to 1-2-3 and recreate the graph (you cannot retrieve a .PIC file in 1-2-3). After you recreate the graph, you must save it before returning to PrintGraph.

The following sections describe the PrintGraph commands in the order in which they appear in the PrintGraph menu.

Image-Select Command

The Image-Select command lets you specify which graph files you want to print. When you select Go, the selected graphs print in the order in which you choose them. You can also use this command to look at a graph while in PrintGraph.

Image-Select I specifies graphs to print.

Procedure

1. Select Image-Select.

   PrintGraph displays an alphabetical menu of graph files in the specified directory. The menu shows when you created each file and the file's size in bytes. PrintGraph marks a file you already selected for printing with a # symbol.

2. Select the graph files you want to print.

   Use UP and DOWN to highlight your choice. To view the highlighted graph (if your monitor can display graphs), press GRAPH; when you are finished, press ESCAPE to return to the file menu.

   Press the space bar to mark or unmark a choice. The current PrintGraph settings apply to all the graphs you select, so select only the graphs you want to print with these settings.

3. Press RETURN to enter your selections and return to the PrintGraph menu.

Results

The next time you select Go, PrintGraph will print the graph files marked with a # symbol in the order in which you selected them. The names of the graph files you select appear on the Image-Select screen.

Related Commands

While the list of graph files is on the screen, you can press GRAPH to preview a highlighted graph. The graph that appears may not reflect the PrintGraph settings you have chosen; PrintGraph always uses the Block1 font for titles, legends, or scale numbers. See Settings Image Font in this chapter.

Note: A previewed graph in PrintGraph may look clearer, and be scaled differently, than a graph that 1-2-3 displays. The printed graph prints the correct scaling and the clearer picture.

To change the directory PrintGraph uses when it displays the available files, select Settings Hardware Graphs-Directory. PrintGraph automatically looks in drive A for files to be printed unless you change the directory setting.

Example: Your data disk contains the following .PIC files: EXPENSE, INCOME, MONTHLY, and YEARLY. You want to print MONTHLY first, and then EXPENSE. Highlight MONTHLY, press the space bar, highlight EXPENSE, and press the space bar again. The # symbol appears next to MONTHLY and EXPENSE:

PICTURE	DATE	TIME	SIZE
# EXPENSE	11-03-85	15:02	8832
INCOME	11-26-85	15:40	15488
# MONTHLY	11-26-85	14:20	13568
YEARLY	12-10-85	14:23	33289

Press RETURN. MONTHLY and EXPENSE are now listed under Graph Images Selected in the order in which you chose them. PrintGraph will print both when you select Go.

Settings Commands

The PrintGraph settings specify what graphics printer and interface you are using, how you want your graph to look, when PrintGraph should do certain things such as eject paper, and whether PrintGraph should save or reset the current settings. Figure 5-2 shows the PrintGraph settings screen with the settings that 1-2-3 supplies. (The default settings may be different for your system.) See Figure 5-1 for the Settings menu tree.

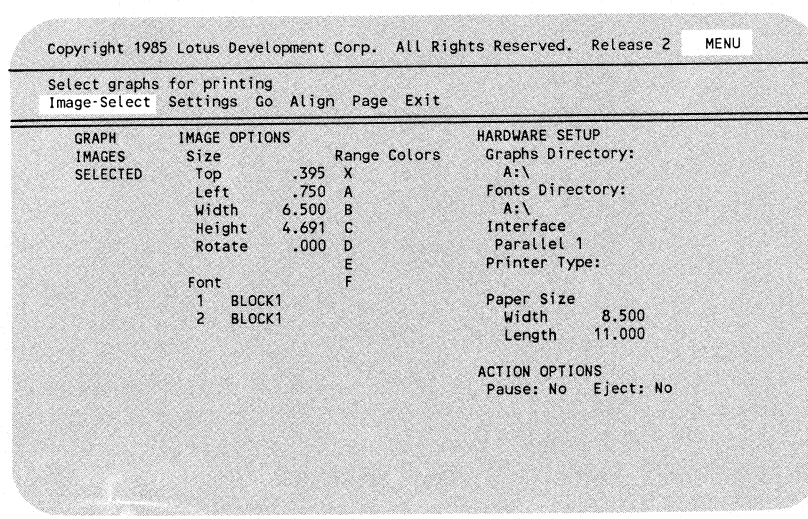


Figure 5-2

Procedure

Specifying and changing settings is similar to issuing a command.

1. Make a menu selection.
2. When PrintGraph prompts you, type an entry or edit the existing entry.

Use BACKSPACE to erase characters, and use RIGHT and LEFT to move between existing characters. Use ESCAPE to clear the entry and start again.

Quit appears on several menus. Like ESCAPE, Quit returns you to the previous menu.

Results

When you change one of the settings, PrintGraph updates the screen display. When you select Go, PrintGraph prints the selected graph images using the current settings. The settings remain current until you change them or end the PrintGraph session.

Related Commands

At the start of each PrintGraph session, PrintGraph reads settings from the file PGRAPH.CNF. To change these default settings, use the Settings commands to tailor the settings, then select Settings Save.

To recover the most recently saved settings, use Settings Reset.

Use Image-Select to change the graphs listed under Graph Images Selected.

The following sections describe each Settings command. The commands are listed in the order in which they appear in the Settings menu.

Settings Image SI controls the appearance of a graph.

The Image settings control the way PrintGraph prints the graph: size, fonts (typefaces), color, angle of rotation, and top and left margins.

Settings Image Size SIS determines the size and proportions of the graph on the paper.

See the settings in the table below. Each choice controls the values (in inches) for margins, height and width, and (in degrees) for rotation. The Height setting always measures the graph vertically (from top to bottom, as the paper feeds into the printer). The Width setting always measures the graph horizontally (across the page, as it feeds into the printer).

Note: If you use Full or Half, PrintGraph sets Height and Width automatically. PrintGraph optimizes these settings for use with 8.5x11-inch paper. The Height and Width settings do not change when you change the Hardware Size-Paper setting.

Setting	Meaning
Full	Sets rotation to 90 degrees to print the graph sideways on the page. (The X axis is drawn along the height of the page.) Proportions are close to those you see displayed on the screen. With 8.5x11-inch paper, this setting prints one graph per page.
Half	Sets rotation to 0 degrees. (The X axis spans the width of the page). Proportions are close to those you see displayed on the screen. With 8.5x11-inch paper, this setting lets you print two graphs per page. (Default)
Manual	You set all variables as shown in the table below. Proportions depend on your settings.

Table 5-2

When you set the values with Settings Size Manual, PrintGraph may display settings slightly different from those you entered. Differences on the printed graph, however, will not be noticeable. The following table details the settings you need to specify.

Setting	Meaning
Top	Sets the size of the top margin in inches.
Left	Sets the size of the left margin in inches.
Width	Sets the width of the graph (horizontal distance) in inches.
Height	Sets the height of the graph (vertical distance) in inches.
Rotate	Sets the number of degrees the graph is turned counterclockwise. (90 degrees produces a quarter turn to the left.)

Table 5-3

Three of these settings affect the proportions of your graph: Width, Height, and Rotation. If you set these manually and want to retain the standard proportions of the graph, you must consider several things:

- When PrintGraph sets a graph's size automatically, it preserves the aspect ratio, or the ratio of the graph's width to its height: approximately 1.385 (X axis) to 1 (Y axis). If you want to maintain these proportions, you must calculate this ratio. For instance, if X = 3.0, then Y = 2.165 (because Y = X/1.385). If Y = 4.5, then X = 6.237 (because X = Y*1.385).

  If, however, you change the Rotation to anything except 0, you must calculate the aspect ratio again to retain the standard proportions. Height and Width are always measured in relation to the page, not in relation to the graph's axes. Thus, if rotation is set to 0 degrees, the Height setting refers to the Y axis. If rotation is set to 90 degrees, the Height setting refers to the X axis. To maintain the same proportions when setting rotation from 0 to 90 degrees, you must invert the Width and Height settings.

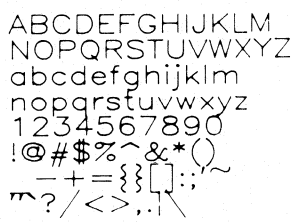
- Rotation settings that turn rectangular graphs along vertical or horizontal axes (0, 90, 180, or 270 degrees) always create right-angled corners. If you select other rotations, you must make another calculation to preserve the right-angled corners. Without this calculation, your graphs will be drawn as rhomboids, and your pie charts as ellipses.

- Pie charts must always retain the standard aspect ratio of 1 (Y axis) to 1.385 (X axis) to preserve their circular shape. The first radial line drawn always runs from the center of the pie towards the title line at the top of the graph. PrintGraph interprets this line as the Y axis when rotating the pie chart.

Settings Image Font SIF determines which font (typeface) PrintGraph uses in printing the graph's text portions.

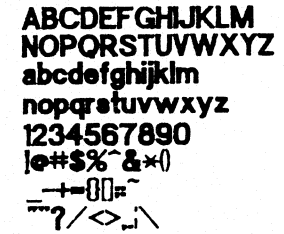
Follow these steps to establish which typeface PrintGraph uses when printing your graphs:

1. Select 1 or 2. A list of available fonts appears. See Figure 5-3.
2. Highlight your choice using UP and DOWN. Mark it by pressing the space bar. The # symbol appears to the left of your choice. To remove the # symbol from a selection, highlight the selection and press the space bar again.
3. Press RETURN to enter your selection and return to the previous menu. Use ESCAPE to return from the font listings without making any changes.

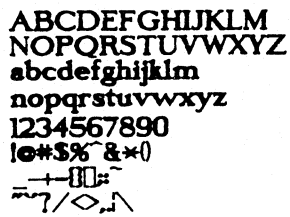


Block 1

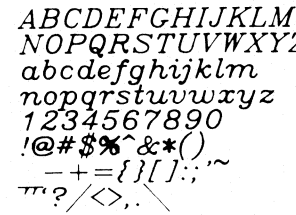
Block 2



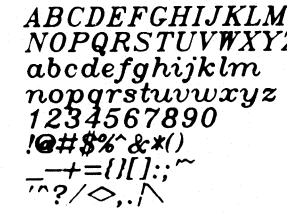
Bold



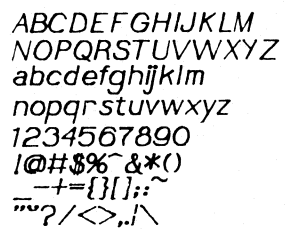
Forum



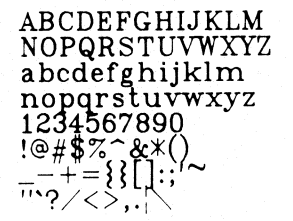
Italic 1



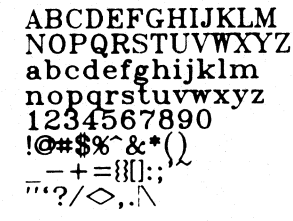
Italic 2



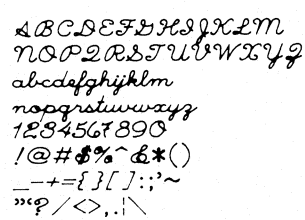
Lotus



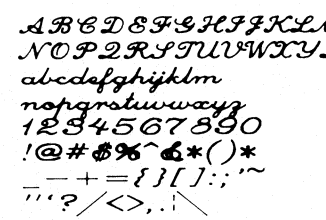
Roman 1



Roman 2



Script 1



Script 2

Figure 5-3

PrintGraph uses Font 1 for the first line of the graph's title, and Font 2 for all other alphanumeric characters in the graph, including the other titles, legends, and scale numbers. If you do not select Font 2, PrintGraph uses Font 1 for the entire graph.

Before you print a graph, make sure that the fonts directory setting is correct. If you need to change it, select Settings Hardware Fonts-Directory and specify the correct directory.

The numbers at the end of similar font names indicate how heavy (dark) each font is; for example, SCRIPT2 is heavier than SCRIPT1. The heavier font produces high-quality graphs only with high-resolution printers and plotters.

Note: Some PrintGraph fonts are designed for plotters, not raster graphics printers such as dot-matrix and inkjet printers. In particular, the Italic and Script fonts will probably be unsatisfactory if you use them with a dot-matrix printer. The Bold, Forum, and Roman fonts work well on raster printers if you choose a high enough density. The Block fonts provide the best results with a raster printer.

CAUTION If the fonts PrintGraph uses are stored on a removable disk (for instance, in a two-diskette system), don't remove the disk from the drive during the PrintGraph session.

Settings Image Range-Colors

SIR assigns colors to graph ranges.

When you select Range-Colors, PrintGraph displays a menu that lists the graph ranges (X, A through F). Each range is associated with an available color. Depending on the type of printer you are using, this menu may offer several colors or only black. Use RIGHT and LEFT to move through the menu and see what colors your system offers.

The color you assign to the X range determines the color of the grid (the box that contains the graphed data and everything, except legends, outside the box). The grid includes scale numbers, titles, and exponents. PrintGraph uses the colors you assign to ranges A through F to draw the graphed data and the legends.

You cannot select Range-Colors until you have specified a printer or plotter.

Pie Charts When you print a pie chart, two things determine the colors of wedges: the values in the B range when you saved the graph in 1-2-3 (/Graph Save), and the colors assigned in PrintGraph (Range-Colors). Each B range value in 1-2-3 corresponds to a range in PrintGraph as follows:

B range values in 1-2-3	Range in PrintGraph
1	X
2	A
3	B
4	C
5	D
6	E
7	F

Table 5-4

PrintGraph uses the color you assign to a range in each wedge that has the corresponding B range value. For example, if the B range value of a wedge is 4 (or 104, for exploded), PrintGraph prints the wedge in the color assigned to range C using Range-Colors; if the B range value of a wedge is 6, PrintGraph prints it in the color assigned to range E; and so on.

PrintGraph uses the color assigned to the X range for labels and titles. It uses the color assigned to the A range for the pie's border.

Plotter Pens If you are using a plotter, 1-2-3 prompts you to load the pens in a specific order when you select Go. Depending on the plotter, PrintGraph beeps when it is time to change the color of a pen and prompts you to do so. Refer to your plotter's documentation for information on using different pens.

Note: When you print a graph on a remote plotter, the number of pens in the plotter limits the number of colors you can use. In addition, the number of colors you specify when you are using a remote plotter cannot exceed the number of pen stalls in the plotter.

Settings Hardware SH tells PrintGraph how to find and print a graph.

These settings tell PrintGraph what kind of printer you are using, where your files are located, which interface you require, and what paper size you are using. Unless you change printers, you can usually leave these settings unchanged.

The table below shows sample Hardware settings. They tell PrintGraph that the graph files are in drive C in a subdirectory called DRAW; that the fonts (typeface styles) are stored in the root directory of the disk in drive A; that the printer is connected to the parallel port; and that you are using an Epson™ FX-80 printer in high-density mode with 8.5x11-inch paper.

Category	Assigned setting
Graphs Directory	C:\DRAW
Fonts	Directory A:\
Interface	Parallel
Printer	Epson FX,LQ/Hi
Paper	Width 8.500
Paper	Length 11.000

Table 5-5

The following table shows the settings you would use if you planned to use graph files stored on the disk in drive B, and fonts stored in the root directory on the disk in drive A.

Directory	Specification
Graphs	B:\
Fonts	A:\

Table 5-6

These are only examples; you must choose settings that reflect your system. Check the documentation of your operating system and printer for details.

The sections below describe each selection in the Settings Hardware menu.

Settings Hardware Graphs-Directory

SHG specifies the directory, including drive, that PrintGraph searches for graph files (file extension .PIC).

Settings Hardware Fonts-Directory

SHF specifies the directory, including drive, that PrintGraph searches for font files. PrintGraph searches the directory you specify here before it prints or displays a graph.

Settings Hardware Interface

SHI sets the communication channel between PrintGraph and your printer. The table below shows sample settings. Your choice for this setting depends on your computer.

Setting	Meaning
1	Parallel (standard interface for personal computers)
2	Serial
3	Second Parallel
4	Second Serial
5	DOS Device LPT1
6	DOS Device LPT2
7	DOS Device LPT3
8	DOS Device LPT4

Table 5-7

Note: These are sample settings only. PrintGraph needs to know the correct settings for your hardware. If you are unsure about interface types, ports, and baud rates, consult your printer's manual or your dealer. Settings 1 through 4 are for printers physically linked to your system. The rest are for logical devices and are generally used to connect printers over a local area network.

CAUTION If you use a logical device to print a graph file on a raster printer, you may use substantial disk space on the machine to which the printer is attached. A low-density raster printer used this way requires about 40K bytes of disk space; a high-density printer requires about 500K.

Baud Rates for a Serial Printer

If you specify a serial interface for this setting, you must also tell PrintGraph which baud rate your printer is set for. Baud rate is the speed at which PrintGraph transfers data. You can probably adjust the baud rate your printer uses. If so, pick the fastest baud rate that will correctly transmit data without losing it. See your printer's manual for details.

The following table lists baud rates in order of increasing speed.

Setting	Baud Rate
1	110
2	150
3	300
4	600
5	1200
6	2400
7	4800
8	9600
9	19200

Table 5-8

Before you use a serial printer to print 1-2-3 graphs, you must also configure it to the settings below:

Setting	Value
Data bits	8
Stop bits	If 110 baud, 2; otherwise, 1
Parity	None

Table 5-9

You must change these settings on your printer, not in PrintGraph. See your printer's manual for details.

Settings Hardware Printer

SHP tells PrintGraph which printer you are using and, in some cases, how densely to print the graph.

When you select Printer, PrintGraph displays a list of graphics printers you selected with the Install program. Select the type of printer you are currently using. See *Getting Started* for more information about creating and updating your list of printers. Follow these steps to select the printer from the list PrintGraph displays on your screen:

1. Highlight your choice using UP and DOWN.
2. Mark your selection by pressing the space bar.

   The # symbol appears to the left of your choice. To remove the # symbol from a selection, highlight the selection and press the space bar again.

3. Press RETURN to enter your selection and return to the previous menu.

Some printer names on the list are described as low or high density, indicating the relative density, or resolution, of the printing. Denser printing means finer detail in your graphs, but it also means much slower printing. If you are using a dot-matrix printer, some fonts will work only if you are using high density. See the section on Settings Image Font earlier in this chapter for details.

Settings Hardware Size-Paper

SHS identifies the size of paper you are using in your graphics printer. Fill in both settings as shown in the table below. The default is 8.5x11 inches.

Dimension	Meaning
Length	Sets page length (inches)
Width	Sets page width (inches)

Table 5-10

To specify a length of printer paper that is different from the default length of 11 inches, do the following:

1. Change the Length setting in PrintGraph using Settings Hardware Size-Paper.
2. Manually adjust the settings for paper length (sometimes called form length) on your printer. See your printer's manual for information on changing the paper length setting.

If you cannot adjust the paper length setting on your printer manually, leave the PrintGraph default setting of 11 inches.

To adjust the paper's width, just change the Width setting in PrintGraph.

Settings Action SA controls what PrintGraph does between printing graphs.

Settings Action Pause SAP controls whether PrintGraph pauses before printing each graph.

Setting	Meaning
Yes	PrintGraph pauses before printing each graph and signals the pause by beeping continuously. Use this setting when you need to change paper or switch settings on a printer between graphs. Press the space bar to continue.
No	PrintGraph does not pause before printing each graph.

Table 5-11

Note: When printing on a network device, Settings Action Pause has no effect on the printer. PrintGraph pauses, but does not let you know what is happening at the network device.

Settings Action Eject SAE controls whether PrintGraph automatically advances the paper to the next page after printing a graph.

Setting	Meaning
Yes	Paper advances to the next page after each graph is printed. Use this setting to print one graph per page. On continuous form-feed paper, the paper advances to the top of a new page before printing resumes. On a plotter, PrintGraph prompts you to insert a new sheet of paper before printing resumes.
No	Paper does not advance after each graph is printed. If PrintGraph determines that the next graph is too long for the current page, the paper advances to the top of the next page. This depends on the Size-Paper setting.

Table 5-12

Settings Save SS stores PrintGraph settings (except graph images).

Each time you start a session, PrintGraph reads settings from PGRAPH.CNF. You can change these settings any time during the current session. Use Save to copy your changes to PGRAPH.CNF so that they become the new standard for your PrintGraph sessions. 1-2-3 stores the settings, except for the selected graph images, in the file PGRAPH.CNF.

PrintGraph does not remember the settings you change during a session unless you use Settings Save. Each time you start a session or select Reset, PrintGraph reads the most recently saved settings.

If you use PrintGraph directly from the disk that contains the PrintGraph program, make sure it is in the disk drive with its write-protect tab removed before you select Save.

Settings Reset SR replaces the current settings with those in PGRAPH.CNF.

Use Reset if you have changed, but not saved, the settings during the current session and you want to restore the settings you had when you started the session.

Go Command

Go tells PrintGraph to print the graphs you choose. Before you select Go, make sure that you have established the right settings and selected all the graphs you want to print.

Go G prints the specified graphs.

Procedure

Select Go. There is no confirmation step.

If you are using a one-drive system, prompts tell you when to change disks.

If you are using a plotter, PrintGraph prompts you to load the pens in the order of the list PrintGraph displays. When you finish loading the pens, press the space bar.

Results

There may be a brief pause before printing actually begins. PrintGraph uses the settings you selected to format and print the selected graphs on your printer or plotter. As PrintGraph works, the control panel displays messages about PrintGraph's activities. During printing, your printer or plotter may pause for several seconds.

When PrintGraph finishes printing, the control panel returns to the main PrintGraph menu.

Related Commands

To stop printing a graph, press BREAK.

If you are on a network and PrintGraph returns to the main menu before printing begins, you can select Page to start printing the graph.

Align Command

PrintGraph automatically assumes that the paper is aligned at the top of the print page only at the beginning of a PrintGraph session. If you adjust the paper's position manually after the start of the session, use Align to tell PrintGraph that the current paper position is the top of the page.

Align A tells PrintGraph where the top of the page is.

Procedure

1. Adjust the paper so that the top of the page is at the right place to start printing.

   Turn the printer off and on again after adjusting the paper; the printer remembers previous settings.

2. Select Align.

Results

No paper movement takes place, but PrintGraph now assumes that the paper is correctly positioned at the top of the page in the printer.

If you are using a plotter, PrintGraph prompts you to set up the plotter and press the space bar.

Related Commands

With some printers, you must also set the printer's Top of Page or Home position. See your printer's manual.

Use Page to advance the paper to the top of the next page.

Page Command

Page advances the paper in your printer or plotter. Use it to separate batches of graphs, or whenever you want a blank page.

Page P advances the paper to top of next page.

Procedure

Select Page.

Results

PrintGraph advances the paper in the printer one page.

Related Commands

Use Align to tell PrintGraph where the top of the paper is. If you have not manually adjusted the printer since the beginning of the session, you do not need to use Align.

Use Settings Hardware Size-Paper to select page length.

Exit Command

Select Exit to end the PrintGraph session.

CAUTION PrintGraph does not automatically save your current settings. If you want to use them in future sessions, save them before you select this command.

Exit E ends the PrintGraph session.

Procedure

1. Select Exit.
2. Select Yes or No.

Results

If you select Yes, PrintGraph ends, returning you to the program from which you started PrintGraph (DOS or the Access System). If you select No, the PrintGraph session continues.

Appendix 1

Transferring Files

Appendix 1
Transferring Files Between Programs

The Translate Utility allows you to exchange data files between 1-2-3 and other programs.

Starting Translate

To start the Translate Utility, select Translate from the Access menu. See *Getting Started* for instructions on using the Access System.

1. Make sure the Access menu is on your screen.
2. Press RIGHT to move the menu pointer to Translate; then press RETURN.
3. Follow the instructions on the screen if the program asks you to insert another disk.

Starting from DOS

You can also start the Translate Utility from DOS.

Make sure the disk that contains the Translate Utility is in the correct disk drive, and type TRANS at the DOS prompt.

Using Translate

Instructions on the screen and the on-line Help facility provide information about how to use the Translate Utility, including a list of programs to and from which you can translate files. To see the Help screens at any point during a Translate session, press HELP.

Leaving Translate

1. Press ESCAPE until the prompt appears at the bottom of the screen.
2. Type E to leave the Translate Utility.
3. Type Y when Translate asks you if you want to leave the program.

Appendix 2

Lotus International Character Set

Appendix 2
Lotus International Character Set

1-2-3 uses the Lotus International Character Set (LICS) when it displays, transmits, stores, and prints characters. LICS characters are represented by 256 codes (decimal codes 0 through 255). Codes 0 through 31 are control characters that you use by pressing CONTROL and a letter simultaneously.

Codes 32 through 127 represent the same characters as the ASCII codes. You use these characters simply by pressing a character key on your keyboard. Some European keyboards do not have all of the following characters: # @ \ | { } [,] ' , _ ^. If this is true for your keyboard, read the following section on compose sequences.

Codes 128 through 255 represent various international characters, such as (£) British pound and (¥) Japanese yen.

Compose Sequences

A compose sequence is a series of keystrokes you use to enter a character that is not on your keyboard. You enter these characters by pressing COMPOSE and the appropriate compose sequence listed in the table at the end of this Appendix. For example, to enter the character £, you press COMPOSE and type L=.

You can use more than one compose sequence to create some characters. In these cases, the table lists all possible compose sequences.

You must enter some compose sequences in the order shown in the table, but most are not order-sensitive. Those that are order-sensitive are marked with an asterisk (*) in the table. Do not type the asterisk as a part of the compose sequence; it only identifies the order-sensitive compose sequences.

Merge characters let you use the COMPOSE key to print characters that are not in the Lotus International Character Set. For example, to create y with an acute accent, type y, press COMPOSE, and type mg'. Your monitor displays y←', but certain printers print the character correctly. If you use any character frequently, you can store it in your worksheet as a macro.

Printer and Monitor Output

Some printers and monitors cannot directly represent all LICS characters. In these cases, there are fallback printer and display presentations. The intention of the fallback presentation is to maintain the sense of the character wherever possible. In printing, the fallback presentation sometimes affects the appearance of the line that contains the characters. The fallback printer and monitor presentations are listed in the table that follows. In the table, BS indicates BACKSPACE.

1-2-3 Setup Strings

A setup string is a character code sequence that performs printer functions, such as changing the font size or printing special characters.

You indicate a control character by preceding its three-digit decimal code with a backslash (\), or by preceding the control character itself with a backslash. For example, you specify the LICS character Control A in a setup string by typing \001 or \A.

You can specify any other LICS character in a setup string as well. You indicate a LICS character (other than control characters) by preceding its three-digit decimal code by a backslash (\), or by simply typing the character itself with no backslash. For example, you specify uppercase B in a setup string by typing \066 or B.

See your printer manual for a complete listing of the control codes available on your printer.

LICS Code	Character	Description	Compose Sequence	Fallback Monitor Presentation	Fallback Printer Presentation
0	Control @				
1	Control A				
2	Control B				
3	Control C				
4	Control D				
5	Control E				
6	Control F				
7	Control G				
8	Control H				
9	Control I				
10	Control J	Line feed			
11	Control K				
12	Control L	Form feed			
13	Control M	Return			
14	Control N				
15	Control O				
16	Control P				
17	Control Q				
18	Control R				
19	Control S				
20	Control T				
21	Control U				
22	Control V				
23	Control W				
24	Control X				
25	Control Y				
26	Control Z				
27	[Escape]				
28	FS				
29	GS				
30	RS				
31	US				
32	(Space)				
33	!				
34	"				
35	#		+ +		
36	$				
37	%				
38	&				
39	'	Apostrophe			
40	(				
41	)				
42	*				
43	+				
44	,				
45	-				
46	.				
47	/				
48	0				
49	1				
50	2				
51	3				
52	4				
53	5				
54	6				
55	7				
56	8				
57	9				
58	:				
59	;				
60	<				
61	=				
62	>				
63	?				

(Note: Character codes 0 through 31 are not LICS codes.)

:S le	Character	Description	Compose Sequence	Fallback Monitor Presentation	Fallback Printer Presentation
64	@		a a A A		
65	A				
66	B				
67	C				
68	D				
69	E				
70	F				
71	G				
72	H				
73	I				
74	J				
75	K				
76	L				
77	M				
78	N				
79	O				
80	P				
81	Q				
82	R				
83	S				
84	T				
85	U				
86	V				
87	W				
88	X				
89	Y				
90	Z				
91	[		((		
92	\		/ /		
93	]		))		
94	^		v v		
95	_				
96	`				
97	a				
98	b				
99	c				
00	d				
01	e				
02	f				
03	g				
04	h				
05	i				
06	j				
07	k				
08	l				
09	m				
10	n				
11	o				
12	p				
13	q				
14	r				
15	s				
16	t				
17	u				
18	v				
19	w				
20	x				
21	y				
22	z				
23	{		(-		
24	¦		^/		
25	}		)-		
26	~	Tilde	--		
27	DEL				

LICS Code	Character	Description	Compose Sequence	Fallback Monitor Presentation	Fallback Printer Presentation
128	`	Uppercase grave	* ` space		
129	´	Uppercase acute	* ´ space		
130	^	Uppercase circumflex	* ^ space		
131	¨	Uppercase umlaut	* " space	"	"
132	~	Uppercase tilde	* ~ space		
133					
134					
135					
136					
137					
138					
139					
140					
141					
142					
143					
144	`	Lowercase grave	* space `		
145	´	Lowercase acute	* space ´		
146	^	Lowercase circumflex	* space ^		
147	¨	Lowercase umlaut	* space "	"	"
148	~	Lowercase tilde	space ~		
149	ı	Lowercase i without dot	i space	i	
150	_	Ordinal indicator	_ space		
151	▲	Begin attribute (display only)	b a		
152	▼	End attribute (display only)	e a		
153	▪	Unknown character (display only)			
154	•	Hard space (display only)	space space		
155	←	Merge character (display only)	m g		
156					
157					
158					
159					
160	ƒ	Dutch Guilder	f f		f
161	¡	Inverted exclamation mark	! !		¡
162	¢	Cent sign	c| C| c/ C/		c⟨BS⟩|
163	£	Pound sign	L= l= L– l–		L⟨BS⟩=
164	„	Low opening double quotes	" ^	"	„
165	¥	Yen sign	Y= y= Y– y–		Y⟨BS⟩=
166	₧	Pesetas sign	* P T p t P t	Pt	Pt
167	§	Section sign	S O s o S 0 s 0		Sc
168	¤	General currency sign	X O x o X 0 x 0		O⟨BS⟩X
169	©	Copyright sign	C O c o C o c 0	c	(c)
170	ª	Feminine Ordinal	a _ A _		a⟨BS⟩_
171	«	Angle quotation mark left	< <		<<
172	Δ	Delta	d d D D		D
173	π	Pi	* P I p i P i		pi
174	≥	Greater-than-or-equals	* > =		>=
175	÷	Divide sign	: –		/
176	°	Degree sign	^ Ø		o(superscripted, if possible)
177	±	Plus/minus sign	+ –		+⟨BS⟩_
178	²	Superscript 2	^ 2		2 (superscripted, if possible
179	³	Superscript 3	^ 3	3	3 (superscripted, if possible
180	‚	Low closing double quotes	" v	"	"
181	µ	Micro sign	* / u		u
182	¶	Paragraph sign	! p ! P		Pr
183	·	Middle dot	^ •		•(superscripted, if possible)
184	™	Trademark sign	* TM Tm tm	T	TM
185	¹	Superscript 1	^ 1	1	1 (superscripted, if possible
186	º	Masculine ordinal	o _ O _		o⟨BS⟩_
187	»	Angle Quotation mark right	> >		>>
188	¼	Fraction one quarter	* 1 4		1/4
189	½	Fraction one half	* 1 2		1/2
190	≤	Less-than-or-equals	* =<		=<
191	¿	Inverted question mark	? ?		?

LICS Code	Character	Description		Compose Sequence	Fallback Monitor Presentation	Fallback Printer Presentation
192	À	Uppercase A with grave		A `	A	A
193	Á	Uppercase A with acute		A ´	A	A
194	Â	Uppercase A with circumflex		A ^	A	A
195	Ã	Uppercase A with tilde		A ~	A	A
196	Ä	Uppercase A with umlaut		A "		A
197	Å	Uppercase A with ring		A *		A
198	Æ	Uppercase A with ligature	*	A E		AE
199	Ç	Uppercase C with cedilla		C ,		C ⟨BS⟩
200	È	Uppercase E with grave		E `	E	E
201	É	Uppercase E with acute		E ´		E
202	Ê	Uppercase E with circumflex		E ^	E	E
203	Ë	Uppercase E with umlaut		E "	E	E
204	Ì	Uppercase I with grave		I `	I	I
205	Í	Uppercase I with acute		I ´	I	I
206	Î	Uppercase I with circumflex		I ^	I	I
207	Ï	Uppercase I with umlaut		I "	I	I
208	Ð	Uppercase eth (Icelandic)		D –	D	D ⟨BS⟩ –
209	Ñ	Uppercase N with tilde		N ~		N
210	Ò	Uppercase O with grave		O `	O	O
211	Ó	Uppercase O with acute		O ´	O	O
212	Ô	Uppercase O with circumflex		O ^	O	O
213	Õ	Uppercase O with tilde		O ~	O	O
214	Ö	Uppercase O with umlaut		O "		O
215	Œ	Uppercase OE diphthong	*	O E	O	OE
216	Ø	Uppercase O with slash		O /		O ⟨BS⟩ /
217	Ù	Uppercase U with grave		U `	U	U
218	Ú	Uppercase U with acute		U ´	U	U
219	Û	Uppercase U with circumflex		U ^	U	U
220	Ü	Uppercase U with umlaut		U "		U
221	Ÿ	Uppercase Y with umlaut		Y "	Y	Y
222		Uppercase thorn (Icelandic)		P –	P	P ⟨BS⟩
223	ß	Lowercase German sharp s		s s		ss
224	à	Lowercase a with grave		a `		a ⟨BS⟩ `
225	á	Lowercase a with acute		a ´		a ⟨BS⟩ ´
226	â	Lowercase a with circumflex		a ^		a ⟨BS⟩ ^
227	ã	Lowercase a with tilde		a ~	a	a ⟨BS⟩ ~
228	ä	Lowercase a with umlaut		a "		a ⟨BS⟩ ¨
229	å	Lowercase a with ring		a *		a
230	æ	Lowercase ae with ligature		a e		ae
231	ç	Lowercase c with cedilla		c ,		c ⟨BS⟩ ¸
232	è	Lowercase e with grave		e `		e ⟨BS⟩ `
233	é	Lowercase e with acute		e ´		e ⟨BS⟩ ´
234	ê	Lowercase e with circumflex		e ^		e ⟨BS⟩ ^
235	ë	Lowercase e with umlaut		e "		e ⟨BS⟩ ¨
236	ì	Lowercase i with grave		i `		i ⟨BS⟩ `
237	í	Lowercase i with acute		i ´		i ⟨BS⟩ ´
238	î	Lowercase i with circumflex		i ^		i ⟨BS⟩ ^
239	ï	Lowercase i with umlaut		i "		i ⟨BS⟩ ¨
240	ð	Lowercase eth (Icelandic)		d –	d	d ⟨BS⟩ -
241	ñ	Lowercase n with tilde		n ~		n ⟨BS⟩ ~
242	ò	Lowercase o with grave		o `		o ⟨BS⟩ `
243	ó	Lowercase o with acute		o ´		o ⟨BS⟩ ´
244	ô	Lowercase o with circumflex		o ^		o ⟨BS⟩ ^
245	õ	Lowercase o with tilde		o ~	o	o ⟨BS⟩ ~
246	ö	Lowercase o with umlaut		o "		o ⟨BS⟩ ¨
247	œ	Lowercase oe with diphthong	*	o e	o	oe
248	ø	Lowercase o with slash		o /		o ⟨BS⟩ /
249	ù	Lowercase u with grave		u `		u ⟨BS⟩ `
250	ú	Lowercase u with acute		u ´		u ⟨BS⟩ ´
251	û	Lowercase u with circumflex		u ^		u ⟨BS⟩ ^
252	ü	Lowercase u with umlaut		u "		u ⟨BS⟩ ¨
253	ý	Lowercase y with umlaut		y "		y ⟨BS⟩ ¨
254		Lowercase thorn (Icelandic)		p –	p	p ⟨BS⟩
255						

**Indicates that you must enter the compose sequence in the order shown. Do not type the asterisk (*)*

Appendix 3

Printer Control Codes

Appendix 3
Printer Control Codes

Printers often require special characters, called ASCII control codes, to complete specialized printing tasks. If your printer supports special functions such as color, compressed type sizes, or italics, you probably need to use printer control codes to perform them. Each printer recognizes its own set of control codes, so be sure to consult your printer manual for the appropriate listing.

1-2-3 lets you send printer control codes to your printer using the /Print Printer Options Setup or /Print File Options Setup commands. These commands can send a single control character or a group of control characters to your printer in a setup string.

There are a total of one hundred and twenty-seven control codes that you can use for specialized printing. Of these, you must type the first thirty-two ASCII control codes in the format shown below:

\nnn where nnn = the three-digit ASCII code for the character

You can enter the remaining codes by typing the actual character, *or* by typing the equivalent 1-2-3 setup string listed in the table below.

Example: To turn on compressed print and italics for an Epson printer, you use the setup sequence: [CTRL]O[ESC]4

In 1-2-3, you enter this sequence as either \015\0274 or \015\027\052

The following table shows the standard ASCII control codes, their character equivalents, and their 1-2-3 setup string equivalents. The CTRL key is represented by ^. For example, ^A is the same as [CTRL]A.

Decimal ASCII code	Character	1-2-3 Setup String
0	^@	\000
1	^A	\001
2	^B	\002
3	^C	\003
4	^D	\004
5	^E	\005
6	^F	\006

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Decimal ASCII code	Character	1-2-3 Setup Strng
7	^G	\007 (bell)
8	^H	\008
9	^I	\009 (tab)
10	^J	\010 (line feed)
11	^K	\011
12	^L	\012 (form feed)
13	^M	\013 (carriage return)
14	^N	\014
15	^O	\015
16	^P	\016
17	^Q	\017
18	^R	\018
19	^S	\019
20	^T	\020
21	^U	\021
22	^V	\022
23	^W	\023
24	^X	\024
25	^Y	\025
26	^Z	\026
27	ESCAPE	\027
28	FS	\028
29	GS	\029
30	RS	\030
31	US	\031
32	SPACE	\032
33	!	\033
34	"	\034
35	#	\035
36	$	\036
37	%	\037
38	&	\038
39	'	\039
40	(	\040
41	)	\041
42	*	\042
43	+	\043
44	,	\044
45	–	\045
46	.	\046
47	/	\047
48	0	\048

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Decimal ASCII code	Character	1-2-3 Setup String
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	:	\058
59	;	\059
60	<	\060
61	=	\061
62	>	\062
63	?	\063
64	@	\064
65	A	\065
66	B	\066
67	C	\067
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

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Decimal ASCII code	Character	1-2-3 Setup String
91	[	\091
92	\	\092
93	]	\093
94	^	\094
95	_	\095
96	`	\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
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	{	\123
124	|	\124
125	}	\125
126	~	\126
127	DEL	\127

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absolute cell address A cell address that always refers to the same cell, even if you copy the formula that contains the cell address. Dollar signs ($) precede the column letters and row numbers (A4 or IV270). Use an absolute cell address in a formula when you want to refer to the same cell, even if you copy the formula to a new location. Thus, to calculate with a constant interest rate and varying principal amounts, you can create a formula that uses an absolute cell address to refer to the cell that contains the interest rate.

Access System The 1-2-3 menu that allows you to move among 1-2-3 and its companion programs (Install, PrintGraph, and Translate).

active area The part of the current worksheet that contains cell entries or cell settings. If you have specified a numeric format for a cell, 1-2-3 includes the cell in the active area even if the cell is blank. The size of the active area is one factor that affects the amount of memory a worksheet requires.

alignment The position of a label in a cell. A label can be aligned with the left or right side of the cell, or centered in the cell. To control alignment, you use **label-prefix characters**.

anchor cell The cell in which you begin to highlight a **range** of cells. To anchor the highlight, you type a period.

argument A value or set of values that you provide for an @function or macro. @Function arguments follow the function name in parentheses and must be separated by commas or semicolons: @SUM(B3..B25,C3..C25,D3..D25). Macro arguments follow the command and are separated by commas or semicolons: {GETLABEL "Monthly Totals",B2}.

arithmetic formula A mathematical expression that uses arithmetic operators and/or @functions and results in a numeric value.

ASCII code (American Standard Code for Information Interchange) The standard set of character codes many computers and communications devices use. **Lotus International Character Set (LICS)** codes 32 through 127 represent the same characters as ASCII codes 32 through 127.

aspect ratio The ratio between the vertical and horizontal measurement of a graph. The standard Lotus aspect ratio is 1 to 1.38.

bar graph A graph that shows numeric data as a set of evenly spaced bars. Each bar represents a value in the range you are graphing.

border The horizontal bar at the top of the 1-2-3 screen that contains the column letters (A through IV), and the vertical bar at the left of the 1-2-3 screen that contains the row numbers (1 through 8192). When you print your work, you can also create repeating borders with /Print Printer Options Borders.

CALC indicator When Recalculation is set to Manual, the CALC indicator appears in the lower right corner of the screen whenever you change a cell's contents. To recalculate worksheet values, press the CALC key in READY mode

cell The basic unit of the worksheet in which you store data and formulas. The intersection of a column and row forms a cell.

cell address The location of a particular cell in the worksheet, identified by a column letter and row number (A25 or BC36).

cell entry Data entered into a cell. A cell entry can be a number, label, or formula.

cell pointer The highlight that indicates the current cell. In POINT mode, you can expand the cell pointer to highlight a **range**.

character code A numeric system for representing characters that appear on the screen and in a **print file**.

circular reference A circular reference occurs when a formula refers to the cell that contains the formula, either directly or indirectly. For example, a circular reference occurs if you enter the formula +B1+1 in cell B1, or if you enter the formula +B1+1 in cell E1 when cell B1 contains a formula that refers to cell E1. When you are using Natural recalculation, 1-2-3 displays the CIRC indicator in the lower right corner of the screen whenever it detects a circular reference.

clear To erase a previously specified setting, range, or value.

column A vertical block of cells in a worksheet. A column is one cell wide and runs the entire length of the worksheet. For example, column B contains cells B1 through B8192. There are 256 columns in a worksheet.

column labels The letters A through IV in the top border. Each letter or pair of letters identifies one column (for example, column A, or column BC).

column width The number of characters that a column displays on the screen. The initial column width is 9 characters, but you can assign a column any width from 1 to 240 characters. No matter what its column width, a cell can store up to 240 characters, even if it cannot display them all.

command An instruction you give 1-2-3. To select a command, you choose menu items from the **menu** that appears when you press the slash (/). You use commands throughout 1-2-3 and PrintGraph.

command menu See **menu**.

compose sequence A series of keystrokes you use to enter a character that is not on your keyboard. You can use a compose sequence to produce any character in the **Lotus International Character Set (LICS)**.

concatenation Joining together text values with a **string formula**. The string formula +"Benjamin "&"Maher" concatenates the two values into the string Benjamin Maher.

configuration The settings that control how 1-2-3 communicates with printers and disk drives and how it performs standard procedures. For example, 1-2-3's initial configuration lets you save and retrieve files from the disk in drive A.

control panel The top three lines of the 1-2-3 screen. The control panel displays information about the current cell and the current mode. It also displays entries while you type or edit them. If you press the slash (/), the control panel displays a **menu**, prompts, and your responses to those prompts.

Copy command The command you use to copy the contents of a cell or range to another location in the worksheet. Copying a formula may change cell addresses in the formula, depending on whether the addresses are absolute, mixed, or relative.

corner cell A cell that is at the corner of a range, and can be part of the range address. To move the corner cell in a highlighted range, type a period.

criteria Cell entries you enter in a criterion range that 1-2-3 interprets as tests for the records in a database. When you use many of the **Data commands**, the current criteria determine whether the command affects a particular record. For example, the command /Data Query Delete deletes only records that match the current criteria. You can use **matching criteria**, in which record values must match the criteria you set, or **formula criteria**, which use logical formulas and @functions to test record values.

criterion range The range you set up in a worksheet to contain **criteria**.

crosshatching The display pattern 1-2-3 uses to distinguish among data ranges in bar graphs, stacked bar graphs, and pie charts.

current cell The current location of the **cell pointer**. In POINT mode, a cursor indicates the position of the current cell within the highlighted range. The **control panel** contains information about the current cell.

current worksheet The 1-2-3 worksheet that currently appears on the screen.

cursor The underline that shows the position of the next character you type when you are entering data or editing an entry. The cursor also appears in the current cell when you are highlighting a range.

data Information you enter in a worksheet. You can enter three types of data in 1-2-3: numbers, labels, and formulas.

Data commands The set of 1-2-3 commands that manipulate data in a database.

data disk The disk you use to store your work.

data labels The labels you attach to data points on a graph with the /Graph Options Data-Labels command.

data range The range of values you use to create a graph.

database An organized collection of related information. A 1-2-3 database consists of **fields**, which contain one kind of information, and **records**, which contain entries in each field for one item. 1-2-3 stores fields in columns and records in rows; each cell in the database contains one field entry. For example, an employee database contains fields such as Last Name, First Name, and so on. Each record, or row in the database, contains information about one employee. You use the **Data commands** and database @functions to manage the database.

date format One of the four ways 1-2-3 can display a date on the screen. The date formats affect the display of date **serial numbers**. The four date formats are:

Date Format	Produces
1. DD-MMM-YY	18-Nov-85
2. DD-MMM	18-Nov
3. MMM-YY	Nov-85
4. MM/DD/YY	11/18/85

data table A table that records the effects of changing one or two values in one or more formulas.

debug To make corrections in a macro or subroutine so that it performs correctly.

default setting The initial setting 1-2-3 automatically uses unless you specify another setting. For example, the default numeric format setting is General.

default configuration The initial or original global configuration for a 1-2-3 session.

directory A logical subdivision of a disk. A directory is a special kind of file you create to organize the files stored on a disk, much like a cabinet that holds many file folders.

disk A permanent storage medium for your work. The 1-2-3 manuals refer to any permanent storage medium as a disk, including a floppy diskette, microdiskette, hard disk, and so on.

disk drive The device that holds the disks you are using. The disk drive reads data stored on disks and writes new data on them.

DOS (Disk Operating System) A collection of routines that perform various tasks, such as allocating memory and managing other programs, like 1-2-3, that are running on your computer.

drive name The two characters (a letter and a colon) that identify which **disk drive** you want to use. C:\HEATHER specifies the file HEATHER in the root directory on drive C.

driver A program that tells 1-2-3 how to communicate with equipment, such as a printer or monitor, or how to perform particular tasks, such as sorting (the **text collation** driver).

driver set The collection of drivers you create when you use the Install program. You can create as many driver sets as you like. For example, you may want a driver set for your computer at work, and another for your computer at home.

dual mode The mode in which you have a monochrome monitor and a graphics monitor connected to your computer. 1-2-3 displays text on the monochrome monitor and graphs on the graphics monitor.

EDIT mode The mode in which you can correct or revise cell entries. To enter EDIT mode, press EDIT. The mode indicator in the upper right corner of the screen says EDIT and the cell entry appears on the control panel. 1-2-3 automatically enters EDIT mode if it detects an error in an entry when you try to enter it in a cell.

entry See **cell entry**.

error message A message that appears in the lower left corner of the screen (accompanied by a beep) when 1-2-3 detects a mistake or cannot perform a task.

field A labeled column in a 1-2-3 database that contains the same kind of information for each record. For example, the Last Name field contains all the last names in a database.

field names Labels in the first row of a database that identify the contents of each column. For example, an employee database usually contains field names such as First Name, Last Name, Employee Number, and so on. The first row of a database *must* contain field names.

file A named collection of data stored on a disk. With 1-2-3, you can store data in a worksheet file or a **print file**. You can also save a graph in a **graph file**.

File commands The set of commands you use to save and retrieve files, and to perform a variety of other functions on files stored on a disk.

file extension A three-letter suffix that 1-2-3 adds to a file name when you save a file. The file extensions 1-2-3 uses are: .WK1 for worksheet and database files; .PIC for graph files; and .PRN for print files.

file name The name you give to a worksheet, database, or graph when you save or retrieve files on a disk. 1-2-3 file names can be up to eight characters long and can contain letters (A..Z), numbers (0..9), and the underscore (_). 1-2-3 shortens longer file names to eight characters. You can type a file name in uppercase or lowercase letters; 1-2-3 stores all file names in uppercase. The file names FILE_3, 3rdFile, and HEATH are acceptable. The file names FILE 3, File-3, and HEATHCLIFF are not.

file pointer The starting location of a group of contiguous bytes in a file.

flow of control The method you use to control the way a macro or subroutine performs (such as loops or {branch} commands).

font A typeface that the PrintGraph program uses in printing or plotting graphs. The PrintGraph Program Disk comes with files that contain several different fonts.

formula A mathematical expression that defines the relationship among two or more cells in a worksheet or database. A 1-2-3 formula can calculate with numeric or string values, and can use values you supply or values stored in the worksheet. A 1-2-3 formula can include **@functions**, and can be an **arithmetic formula**, a **string formula**, or a **logical formula**.

formula criteria Formula criteria use **logical formulas** to determine whether a record is selected. The formula criterion +AGE>59 selects the records of all employees aged 60 and over by testing each value in the AGE field to see if it is greater than 59.

free cell The **current cell** when it is diagonally opposite the **anchor cell** in a **range highlight**.

@function A built-in formula that performs a calculation automatically when you use it in a formula. For example, the formula @SUM(B2..B15) uses the @SUM function to add a range of numbers.

global A setting that affects the entire worksheet (for example, default numeric format).

Graph commands The set of commands you use to create and display graphs.

graph file A file in which you store a graph. You must save a graph in a graph file with the /Graph Save command before you can print it with the PrintGraph program. Graph files have the **file extension** .PIC.

hard disk A permanent storage medium that usually has a much greater storage capacity than a diskette.

Help 1-2-3's on-line reference manual. To get Help about the procedure you are currently doing, press the HELP key at any time during a 1-2-3 session.

highlight To indicate a **range**. You expand the highlight (a bright, light, or colored background) with the pointer movement-keys. The cell pointer, menu pointer, and indicators are also highlighted.

indicator A highlighted word that provides information about program or special key status. **Status indicators** appear at the bottom of the screen. **Mode indicators** appear in the upper right corner of the screen.

Install program The program you use to create a **driver set** so that 1-2-3 can work with your equipment.

iteration count The number of times 1-2-3 cycles through the entire set of formulas during **recalculation**.

label Any entry that starts with a letter or a **label-prefix character**. 1-2-3 automatically inserts a label-prefix character when you type a letter. You must insert a label-prefix character when you type a label that starts with a number or special character.

label alignment The way a label appears in a cell: flush left, flush right, centered, or repeating across the cell. The label-prefix character controls the alignment of a label.

label-prefix character One of the four characters you use to indicate that you are entering a label and to indicate the way you want the label aligned in the cell. You must use a label-prefix character with label entries that begin with a number or with +, −, $, (, #, or @ if you want 1-2-3 to treat them as labels.

Label-prefix	Alignment	Worksheet
'	left-aligned	LABEL
^	centered	LABEL
"	right-aligned	LABEL

legend The patterns or symbols used in a graph, and text that defines them.

line graph A graph that represents numeric data as a set of points along a line. A line graph is useful for showing change over time.

logical formula A formula that evaluates a condition by using a **logical operator** or a **logical function**. A logical formula results in a value that you can use in other calculations (1 for TRUE, 0 for FALSE). For example, in the formula @IF(A7>0,A7−A8,"OVERDRAWN"), if the value in A7 is greater than 0, the value in A8 is subtracted from the value in A7. If the value in A7 is 0 or less, the word OVERDRAWN appears in the cell.

logical functions An @function that tests a statement to see if it is true or false. A logical function results in a value of 1 (TRUE) or 0 (FALSE). For example, the result of @ISNUMBER (B27) is 1 if cell B27 contains a numeric value, 0 if it contains a label.

logical operator An operator you use in a logical formula to evaluate equality or inequality.

Logical Operator	Meaning
=	equal
<	less than
>	greater than
<=	less than or equal to
>=	greater than or equal to
<>	not equal
#NOT#	logical NOT
#AND#	logical AND
#OR#	logical OR

long label A label that is longer than a cell's column width. If the cell to the right is blank, the long label extends into the next column. If the cell to the right is not blank, 1-2-3 displays as much of the label as possible. Even if it cannot display the complete label, 1-2-3 stores the entire label in the cell. To see the whole label, make the column wider.

Lotus International Character Set (LICS) The 256 codes (0 to 255) 1-2-3 uses to display, store, and print characters. Codes 32 through 127 are equivalent to **ASCII codes** 32 through 127.

macro A macro performs a task automatically. To create a macro, you create a set of entries that describes a particular task keystroke by keystroke, and then name the range that contains the entries. To use a macro, you invoke it by pressing MACRO and typing the name of the macro.

matching criteria Criteria that a record value must match exactly. For example, to select only records of employees who are 65, you use a matching criterion of 65 in the Age field. You can use both numbers and labels as matching criteria.

menu The series of choices that appear on the control panel after you type a slash (/) in READY mode. To select menu items, move the menu pointer to your choice and press RETURN, or type the first letter of the menu item. A description of the menu item that the menu pointer is on appears on the control panel.

menu pointer The highlight you use to select an item from a menu or to display the brief description of each menu item.

merge character A character you use in conjunction with other characters to print characters that are not in the **Lotus International Character Set**. The **compose sequence** for the merge character is COMPOSE mg. To print a y with an acute accent, type y, press COMPOSE, and type mg'.

mixed cell address A cell address that is part **relative** and part **absolute**. A dollar sign precedes the part of the address that is absolute — column label or row number. For example, if a formula in cell B2 contains the cell address A$1, and you copy the formula to cell G8, the cell address becomes F$1.

mode A 1-2-3 condition, or a state in which you can perform a particular process. For example, READY mode means that 1-2-3 is ready to accept cell entries or commands. POINT mode is the mode in which you can highlight a range.

mode indicator The indicator, located in the upper right corner of the screen, that tells you 1-2-3's current mode of operation. 1-2-3 uses these mode indicators:

Indicator	Meaning
EDIT	Editing an entry
ERROR	Waiting for ESC or RETURN to respond to an error
FILES	A menu of file names is displayed
FIND	1-2-3 is performing a /Data Query Find
FRMT	Editing a format line during /Data Parse
HELP	Using the Help facility
LABEL	Entering a label
MENU	Selecting a menu item
NAMES	Displaying menu of existing range names or graph names
POINT	Pointing to a cell or range
READY	Waiting for command or cell entry
STAT	Displaying worksheet status information
VALUE	Entering a number or formula
WAIT	1-2-3 is calculating and cannot process commands

Move command This command moves the contents of a cell or range from one part of the worksheet to another. Moving formulas does not affect cell addresses in the formulas.

named range A single cell or range of cells that you named using the /Range Name Create command.

numeric format The way in which 1-2-3 displays a numeric value in a cell. A number can appear in Currency format with 2 decimal places ($45.00), in General format with no decimal places (45), or in Scientific format (4.50+E1), among others.

operator A symbol you use in a formula to indicate the relationship between two values or the operation to be performed. For example, the division operator (/) indicates that one number is to be divided by another. 1-2-3 uses **logical operators**, a **string operator**, and the standard mathematical operators: + (addition), – (subtraction), * (multiplication), / (division), and ^ (exponentiation).

picture file See **graph file**

pie chart A graph that compares parts to the whole. In a pie chart, each value in a range is a wedge of the pie. The size of each wedge corresponds to the percentage of the total each value represents.

point To use the cell pointer to specify a cell or range, or to use the menu pointer to choose a menu option.

pointer See **cell pointer**, **file pointer**, **menu pointer**.

precedence The order in which 1-2-3 performs operations in a formula that has several operators. 1-2-3 assigns precedence numbers to each operation, and performs operations with higher precedence numbers, such as multiplication, before operations with lower precedence numbers, such as subtraction. You can use parentheses to override precedence numbers. For example, multiplication is performed before subtraction, so the result of the formula 5–4*2 is –3. 1-2-3 calculates values in parentheses first, however, so the result of the expression (5–4)*2 is 2.

Print commands The set of commands you use to format and print the current worksheet on a printer or to store it in a **print file**.

print file A standard ASCII text file with the file extension .PRN. You create a print file with the /Print File command.

PrintGraph program The program that prints **graph files** you create with /Graph Save.

program disk One of the disks containing Lotus programs, such as the System Disk and the PrintGraph Program Disk.

prompt Any message 1-2-3 displays when you are using a command.

protect To prevent changes to a range or ranges in the worksheet. Protection is a two-step process: first, you must specify the ranges you want to protect with /Range Protect, and then you must turn protection on with /Worksheet Global Protection.

Quit command Selecting /Quit returns you to the menu one level above the current level. In the Main menu, choose /Quit to end 1-2-3. If you started 1-2-3 from DOS, selecting /Quit returns you to DOS. If you started 1-2-3 from the Access System, selecting /Quit returns you to the Access menu.

RAM (Random Access Memory) The temporary storage area, also called main memory, in which your computer holds both programs and data. Both 1-2-3 and your current worksheet are held in RAM.

range A cell or rectangular group of adjoining cells in the worksheet.

range address The location of a range in the worksheet. A range address consists of the **cell addresses** of the upper left and lower right **corner cells** of the range, separated by two periods (A12..C20).

Range commands The set of commands you use to perform various procedures on single cells or ranges of cells.

range highlight See **highlight**.

range name A name you use to identify a range on the worksheet. A range name can be up to 15 characters long. See also **named range**.

recalculation Reevaluation of formulas in the worksheet using current cell values.

recalculation method One of two ways 1-2-3 can recalculate a worksheet. Automatic recalculates every time you make a cell entry, and Manual recalculates only when you press CALC.

recalculation order Every time 1-2-3 recalculates the worksheet, it does it in a specific order. The three orders are Natural (least dependent to most dependent), Columnwise (by column), and Rowwise (by row).

record A set of database information, in one row, that contains an entry for each **field** in the database. For example, an employee database contains a record for each employee.

relative cell address A cell address that refers to a cell's position rather than to the cell itself. When you copy a formula that contains relative cell addresses to another part of the worksheet, the cell addresses in the formula refer to cells in the same relative positions as in the original formula. For example, if you enter the cell address A1 in a formula in cell D1, 1-2-3 uses the value in the cell three columns to the left. If you copy the cell address to cell E2, 1-2-3 still uses the value in the cell three columns to the left — cell B2. If you do not want a cell address to change when you copy it, use an **absolute cell address** or a **mixed cell address**.

repeating label A label that repeats across the entire width of a cell. You indicate a repeating label with the backslash (\) label-prefix character. For example, typing \- prints a succession of dashes across a cell.

reset To cancel a previous setting or restore default settings.

retrieve To bring a worksheet **file** from a disk into **RAM**, making it the current worksheet.

root directory The directory DOS creates when you format a disk.

row A horizontal block of cells in a worksheet. A row is one cell long and runs across the entire width of the worksheet. For example, row 4 contains cells A4..IV4. There are 8192 rows in a worksheet.

row numbers The numbers 1 through 8192 in the left border. Each number identifies one row (row 1, or row 275).

save To store a file on a disk. Save your work frequently using /File Save to avoid losing data.

screen The currently displayed worksheet window. Also, the computer's monitor.

scrolling Moving more than one screen horizontally or vertically through the worksheet. To scroll through the worksheet, press SCROLL LOCK and use the pointer-movement keys.

serial number A unique number that 1-2-3 assigns to each moment of the day and each date between January 1, 1900, and December 31, 2099. Integers represent dates and fractions represent times; the serial number for October 25, 1983, is 30614, and the serial number for 9:10 pm is 0.88194. To convert dates and times to serial numbers, you use date and time @functions. Use **date formats** and **time formats** to make

serial numbers appear as the dates and times they represent. Serial numbers are useful when you need to calculate with dates and times.

setup string A series of characters that controls printer settings. For example, you can send a setup string that causes the printer to print with compressed type by choosing /Print Printer Options Setup and entering the setup string at the prompt. See your printer's manual for setup strings that work with your printer.

sort To arrange the records in a database in a particular order, according to the contents of one field. For example, you can sort records in an employee database alphabetically by last name, or chronologically by date of hire. You can sort database records as often as you like.

spreadsheet A tool used in financial analysis and modeling that establishes mathematical relationships among numbers and formulas that appear in rows and columns. The 1-2-3 worksheet is an electronic spreadsheet.

stacked bar graph A graph that compares totals as well as individual values. Each part of a stacked bar graph represents a value in one of the data ranges.

standard keys Many of the keys on your keyboard have special 1-2-3 functions. To identify these keys and their functions, see the Keyboard Guide.

status indicator A highlighted word that appears on the bottom line of the screen. A status indicator describes a program or special key condition. For example, the CIRC indicator tells you that a circular reference exists in the worksheet, and the CAPS indicator tells you that the CAPS LOCK key is on.

string formula A formula that uses or produces string values in its calculations. The formula +"Benjamin "&"Maher" combines two strings to produce the string value Benjamin Maher. String functions also use string values in formulas.

string operator The ampersand (&) is the only string operator. It combines, or **concatenates**, two string values in a formula.

string value A label used in or produced by a formula or @function. You must enclose string values in quotation marks when you use them in formulas (for example, @PROPER("TESSA LANE")).

subdirectory A subdivision of the **root directory** or another subdirectory.

subroutine A macro that is executed within another macro. When the original macro calls the subroutine, control passes to the subroutine. After the subroutine is executed, control returns to the original macro.

subroutine call A macro command that invokes and completes all of the steps in another macro before going on to the next macro command.

text collation The order 1-2-3 uses for numbers and symbols when you **sort** values alphabetically or when you compare string values. Numbers and symbols can appear first or last (1,2,3,a,b,c *or* a,b,c,1,2,3). To change the method of text collation, you must use the Install program.

time format One of the four ways 1-2-3 can display a time **serial number** on the screen. The four time formats are:

Time Format	Produces
1. HH:MM:SS AM/PM	8:45:23 PM
2. HH:MM AM/PM	8:45 PM
3. HH:MM:SS 24 Hour	20:45:23
4. HH:MM 24 Hour	20:45

title Rows or columns that are frozen in place on the top and left of the worksheet window. These frozen titles always remain on the screen when you scroll down and across the worksheet.

You can also place titles you create on graphs using /Graph Options Titles.

Translate Utility The 1-2-3 utility that allows you to use data created in other programs.

value A number or the result of a formula or @function. The result of a string function can be a numeric value or a **string value**. The string function @LENGTH("Marie-Claire") results in a numeric value, but the string function @PROPER("LANE") results in a string value.

window The currently displayed portion of the worksheet.

worksheet 1-2-3's electronic representation of a financial spreadsheet. The worksheet is divided into 256 columns and 8192 rows. You use the worksheet to enter and manipulate spreadsheet data and database entries. 1-2-3 graphs are based on cell entries in the worksheet.

Worksheet commands The set of commands you use to control settings for the entire current worksheet.

/X commands The commands you can use within a **macro**, that control the processing order of the macro's instructions. Each /X command is equivalent to a macro command. For example, /XGlocation~ is equivalent to {BRANCH location}, so /XG B25 and {BRANCH B25} both tell 1-2-3 to read instructions at location B25.

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