LOTUS™

1-2-3™

Legend Cards

To install:
Simply place the three legend cards in the slots above the function-key group on the Tandy® Model 2000 Computer keyboard.

Part No. 31009

Lotus™ 1-2-3™

Update

Tandy Model 2000 **June 8, 1984**

1. Page ii, **Transferring 1-2-3 Files to a Hard Disk** — Before transferring 1-2-3 files to a hard disk system, make sure that you have formatted the hard disk following the instructions in the *MS-DOS Commands Reference Manual.*

2. Page v, **Establishing 1-2-3's Standard Procedures** — The first paragraph in number 2 should read:

   Hard Disk System After the 1-2-3 startup screen appears, and after you press any key to clear it, a "Disk error" message appears. Make sure that the 1-2-3 System Disk is in the diskette drive. Press [ENTER] or [ESC] to clear the error message and proceed. Later you will need to change the startup current directory setting. Details are provided at the end of this section.

3. Page vi, **Establishing 1-2-3's Standard Procedures** — in the section on selecting Default Printer Settings,

/← [ENTER]	Selects the Quit command from the main menu.

4. Page vi, **Hard Disk System:** To specify a *startup current directory* — the standard location in which 1-2-3 should store data files — complete these steps:

   Be sure you are at the /Worksheet Global Default menu, then:

→ [ENTER]	Selects "Directory".
[ESC]	Erases the default setting, B:\.
Directory-name [ENTER]	Enter the name of the (sub)directory in which 1-2-3 should store data files (e.g., C:\123FILES).
→ → [ENTER]	Selects Update and stores the revised directory setting in the configuration file.

5. Page vii, **Preparing Data Disks** — Do not put the *write-protect tabs* on the disks until after you have copied them as directed on page viii.

6. Page viii, **Copying Other Lotus Disks** — should read:

   2. Be sure the MS-DOS A> prompt is displayed.

   Two Diskette System: Type:

   DISKCOPY A: B: [ENTER]

   Insert the disk to be copied in Drive A (source drive), and close the drive door. Insert a formatted disk in Drive B (target drive), close the drive door, and press any key.

   Hard Disk System: Type:

   DISKCOPY [ENTER]

   Insert the disk to be copied in Drive A and close the drive door. Press any key. You will be prompted to remove the disk from Drive A and insert a formatted disk.

   The paragraph after step 4 should read:

   After you have finished copying your Lotus disks, be sure to label the copies correctly, and put one of the small gummed tabs provided with the disks (called *write-protect tabs*) over the small notch to the left of the label. These tabs prevent disks from being inadvertently altered when they are in the computer.

7. Page 16-11, **Pie Charts** — Since a pie chart represents only the A range (and a range can only have one color), a pie chart is displayed in only the color associated with the A range.

8. Page 20-2, **Changing PrintGraph's Default Configuration** — In using PrintGraph, if you change the location of the Fonts Directory in the option Configure Files, be sure to re-enter the Font setting using Options.

9. Page 20-4, **Interface Option** — When choosing an Interface option for either the HP 7470A or the HP 7475A plotter, choose the Second Serial port, Option 4. Also, use the following parameters with your HP plotters: one stop bit and no parity. If problems occur running an HP plotter at a high baud rate, choose a slower baud rate.

10. Page 21-5, **Translate** — When translating files from *WKS* to *DBF* format, be sure that the data being translated has a heading for each column, does not contain blank lines or blank cells, and matches the structure of the database which will use it.

Differences between 1-2-3™ by Lotus on the Tandy® 2000 and other Microcomputers

If you are familiar with 1-2-3's operation on other microcomputers, you will want to note how 1-2-3's operation differs on the Tandy 2000.

1. The inherent speed of the Tandy 2000 allows faster computations and data sorting in Lotus 1-2-3 than most other microcomputers.

2. 1-2-3 takes full advanatge of the Tandy 2000's ability to display graphics in a higher resolution (640 *x* 400) than on most microcomputers.

3. The Tandy 2000 version of 1-2-3 gives you the added convenience of being ready to use. You do not need to install MS-DOS or drivers on the 1-2-3 disks.

4. The Disk Manager Utility, available in other microcomputer versions of 1-2-3, is not included in the Tandy version. Thus, DISKCOPY.COM, COMPDUPE.COM, CHKDSK.COM, and FORMAT.COM are available separately on the 1-2-3 Disks. Refer to the MS-DOS Reference Manual for operational instructions.

READ ME FIRST

All computer software is subject to change, correction, or improvement as the manufacturer receives customer comments and experiences. Radio Shack has established a system to keep you immediately informed of any reported problems with this software, and the solutions. We have a customer service network including representatives in many Radio Shack Computer Centers, and a large group in Fort Worth, Texas, to help with any specific errors you may find in your use of the programs. We will also furnish information on any improvements or changes that are "cut in" on later production versions.

To take advantage of these services, you must do three things:

(1) Send in the postage-paid software registration card included in this manual immediately. (Postage must be affixed in Canada.)

(2) If you change your address, you must send us a change of address card (enclosed), listing your old address exactly as it is currently on file with us.

(3) As we furnish updates or "patches," and you update your *software*, you must keep an accurate record of the current version numbers on the logs below. (The version number will be furnished with each update.)

Keep this card in your manual at all times, and refer to the current version numbers when requesting information or help from us. Thank you.

APPLICATIONS SOFTWARE VERSION LOG

01.00.00			

OP. SYSTEM VERSION LOG

LOTUS™

1-2-3™

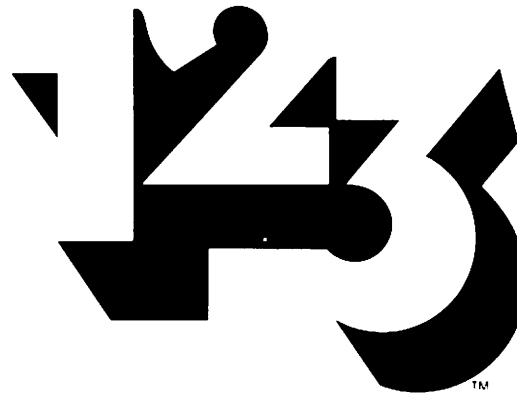
User's Manual

For the Tandy®
Model 2000 Computer

Release 1A

24108

LOTUS™



User's Manual

For the Tandy®
Model 2000 Computer

Release 1A

24108

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1-2-3's Compatibility with Available Hardware and Software

Lotus Development Corporation does not warrant that its 1-2-3 software package will function properly in every hardware/software environment. Lotus warrants only that 1-2-3 functions properly when used in combination with the hardware and software described in this User's Manual.

In particular, 1-2-3 may not be operable in combination with print-spooling programs or with modified versions of the operating system. 1-2-3 can drive a wide variety of printers, but may not be usable with particular printers supplied by independent manufacturers.

1-2-3 is designed to run under Revision 2.0 of the operating system.

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Lotus Access System

Getting Started

Getting Started

This introductory section describes several procedures that you must follow in order to use 1-2-3 on your Tandy® Model 2000. These are followed by some suggestions for how to begin using 1-2-3. However, we suggest that you first familiarize yourself with the computer, the Tandy documentation, and the Tandy-supplied software.

Here is an outline of the tasks that you will be doing:

1. Checking the 1-2-3 package for completeness.
2. Filling out the registration cards.
3. Transferring 1-2-3 files to a hard disk.
4. Establishing a set of standard operating procedures for 1-2-3 to use.
5. Preparing disks for storing data created during 1-2-3 sessions.
6. Making backup copies of the 1-2-3 Tutorial Disk, Utility Disk, and PrintGraph Disk.

Be sure to complete these steps in the prescribed order. Each step depends on performance of the preceding ones.

1. Checking for Completeness

The 1-2-3 package, as delivered to you by your dealer, contains several parts. Use the following checklist to make sure that your package has been assembled correctly.

✓ **1-2-3 User's Manual.** A loose-leaf binder in a cardboard slipcase. Flip through the manual, checking it against the Table of Contents, to make sure you have all of the pages.

✓ **Disks.** A set of five disks makes up the 1-2-3 software package. These are provided in a heavy envelope, labeled "Lotus License Agreement", at the back of the binder:

1-2-3 System Disk
1-2-3 System Disk (backup copy)
1-2-3 PrintGraph Disk
1-2-3 Utility Disk
1-2-3 Tutorial Disk

Opening this envelope constitutes your acceptance of the License Agreement. Please read the explanation on the outside of the envelope **before** *you open it.*

✓ **Quick Reference.** A booklet that summarizes 1-2-3 operating procedures and commands.

✓ **Legend Cards.** Three legend cards that fit in the slots above the keyboard's function keys to remind you of their meaning during a 1-2-3 session. They will be in a card pocket on the front of the manual.

✓ **Customer Support.** A page at the front of the binder that discusses customer support and how to obtain replacement disks for 1-2-3.

2. Filling Out the Registration Cards

Included in your 1-2-3 package are the following items to fill out:

- The Tandy Applications Software Version Log
- The Tandy Software Registration Card
- The Tandy Change of Address Card
- The Lotus Purchaser Registration Card

The Software Registration Card and the Lotus Purchaser Registration Card are found at the front of the manual. Fill out all the cards to make you eligible for customer support.

3. Transferring 1-2-3 Files to a Hard Disk

For a hard disk system, this procedure transfers files to the hard disk. If you have a hard disk system, follow these instructions carefully before using 1-2-3 for the first time.

1. After reading the Tandy and Lotus License Agreements, take all five 1-2-3 disks from the sealed envelope in which they were shipped.

2. Turn on the computer, place the 1-2-3 System Disk in Drive A (on the bottom) and close the drive door.

Press the black Reset Switch, which is under the red Power Switch to restart the computer.

After a short time, during which the system tests itself, you'll be prompted to enter the current date and time. Here's what you would type at 4:23 on June 16, 1985.

```
Current date is Tue 1-01-1980:
Enter new date: 6-16-85 [ENTER]
Current time is 0:00:07.68
Enter new time: 16:23 [ENTER]
```

Use the **[ENTER]** key to finish each entry. Separate the three parts of the date with hyphens. Separate the two or three parts of the time with colons—both the minutes and seconds are optional.

The MS™-DOS prompt appears:

A>

3. Make the hard disk the *default drive*—the drive where 1-2-3 and the operating system look first for a file. For instance, if the hard disk is Drive C, typing the following *drive specifier* will make Drive C the default drive:

C: [ENTER]

Note. If you wish to have the 1-2-3 program files reside in a subdivision (*subdirectory*) of the hard disk, create the subdirectory and make it the *current directory*. For instance, to create a subdirectory called "123FILES" in the root directory and make it the current directory, issue these commands:

MKDIR \123FILES [ENTER]
CHDIR \123FILES [ENTER]

For a more detailed explanation of creating and using subdirectories, see the Tandy MS-DOS Manual.

4. Place the 1-2-3 System Disk in the diskette drive and close the drive door.

5. Type the following to copy the 1-2-3 files to the hard disk:

A:HDMOVE [ENTER]

6. Repeat steps 4 and 5 for these other disks in the 1-2-3 package:

1-2-3 PrintGraph Disk
1-2-3 Utility Disk
1-2-3 Tutorial Disk (optional)

A Note to Hard Disk Users

Once you have transferred Lotus programs on your hard disk, it effectively becomes your 1-2-3 System Disk. You should interpret most references in Lotus documentation to the 1-2-3 System Disk as referring to the hard disk. However, there are two important exceptions:

1. When the 1-2-3 program begins execution, the 1-2-3 System Disk must be in the diskette drive (usually designated Drive A).

2. Your hard disk is capable of starting or resetting the computer, if Drive A does not contain a disk. After you have started the computer, insert the 1-2-3 System Disk in Drive A before executing any 1-2-3 program.

4. Establishing 1-2-3's Standard Procedures (Configuration)

1-2-3 often follows certain standard (*default*) procedures—in particular, procedures for sending data to the printer and for transferring data to and from disk storage.

Collectively, these standard procedures are called the **default configuration**. Lotus has supplied 1-2-3 with a default configuration, but you can change these "factory-installed" settings to fit your own needs and equipment.

For your first experience using 1-2-3, we're going to guide you thorough the steps necessary to make a slight change to the default configuration. This is only an example of how you can change 1-2-3's configuration. You may enter other default values than the ones used here or you may go through this procedure without actually saving the changes (do not select Update). (For complete details on the default configuration see Appendix A, "Configuring 1-2-3.")

1. Start your system. If you have a hard disk, make sure you have prepared it according to the instructions in "Transferring 1-2-3 Files to a Hard Disk".

Two-Diskette System: Turn on the computer. Place the System Disk in Drive A and press the black Reset Switch. The computer automatically passes control to the Lotus Access System. You will be prompted to enter the current date and time.

If your computer is already on, insert the 1-2-3 System Disk in Drive A. If necessary, issue a MS-DOS command to make the prompt read A>. Then type:

LOTUS [ENTER]

Hard Disk System: Make the hard disk or the (sub)directory into which you copied the 1-2-3 files, the current directory. Place the 1-2-3 System Disk in the diskette drive. Even if you have loaded the 1-2-3 files on the hard disk, the System Disk must be in the diskette drive when 1-2-3 begins execution. At the MS-DOS prompt, issue the command "LOTUS". For instance, if the 1-2-3 files are stored in subdirectory "123FILES" on Drive C, then type the following:

C: [ENTER]
CHDIR \123FILES [ENTER]
LOTUS [ENTER]

As its name implies, this program gives you access to 1-2-3 itself. (See Chapter 21 for more information on the Access System.)

The first few lines are a series of choices called a **menu**. The **menu pointer**, a color or reverse video highlight, is pointing to one of the options on the menu: "1-2-3". That is the one we want to select.

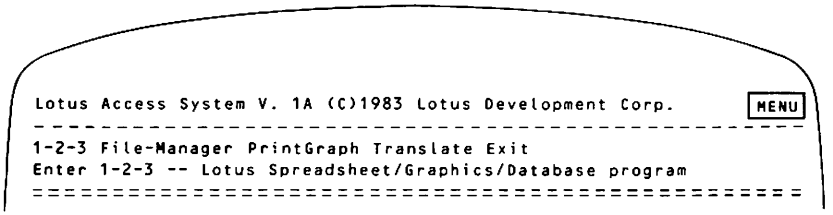


Figure A. Lotus Access System Menu

2. Press [ENTER] to start 1-2-3. When the 1-2-3 startup screen appears, press any key to clear it.

> **Hard Disk System.** An "Insert diskette for drive B:" message appears. Make sure the 1-2-3 System Disk is in the diskette drive, then press any key to proceed. Later you will need to change the startup current directory setting. Details are provided at the end of the section.

Now, you will issue a series of 1-2-3 **commands** that will change the default configuration. We list the instructions in table form: keystrokes on the left, explanations on the right.

> **Keyboard Preview.** You will be using the [ENTER] key quite a bit. You'll also be using the ← and → arrow keys, which are located next to the numeric keypad at the far right of your keyboard. The slash (/) key, which you will also need to use, is located at the lower right corner of the typewriter section on the same key as the question mark.

You can enter numbers using either the numeric keypad at the far right of the keyboard, or using the row of keys at the top of the typewriter section.

3. Update 1-2-3's default configuration:

Keys to Press	Meaning
/	Makes the 1-2-3 command menu appear at the top of the screen
[ENTER]	Selects "Worksheet".
[ENTER]	Selects "Global".
→ → → → → [ENTER]	Selects "Default".
[ENTER]	Selects "Printer".

The screen should look like this now:

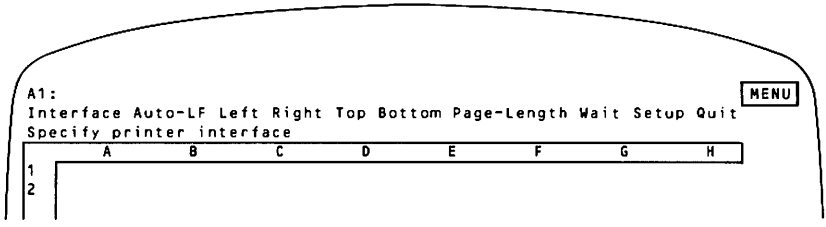


Figure B. Default Printer Settings

We will adjust the left margin and right margin settings.

A formatted disk must be in Drive B when you issue the Update command.

→ → [ENTER]	Selects "Left".
0 [ENTER]	Changes the left margin setting from 4 to 0 (i.e., no left margin).
→ [ENTER]	Selects "Right".
150 [ENTER]	Changes the right margin setting from 76 to 150.
→ → → → → → [ENTER]	"Quit" returns to the previous menu.
→ → → [ENTER]	Watch Drive A. Selecting "Update" has 1-2-3 store the revised settings in its *configuration file*.
→ [ENTER]	"Quit" ends the /Worksheet Global Default command.
/→ [ENTER]	Selects the Quit command.
→ [ENTER]	Selects "Yes" to confirm the command to end the 1-2-3 session.

The Lotus Access System menu returns. If you wish, perform this procedure again to return the margin settings to 4 and 76, or to any other values between 0 and 240. 1-2-3 will use these margin settings during print operations unless you override them.

Hard Disk System: To specify a *startup current directory*—the standard location in which 1-2-3 should store data files—complete these steps:

→ [ENTER]	Selects "Directory".
[ESC]	Erases the default setting, B:\.
Directory-name [ENTER]	Enter the name of the (sub)directory in which 1-2-3 should store data files. (e.g., C:\123FILES)

Although we don't include instructions here, you should also change the Configure Files setting in the PrintGraph program. Initially, PrintGraph assumes that Pictures are stored in the root directory of Drive B and that Fonts are stored in the root directory of Drive A. See Chapter 20 for details.

5. Preparing Data Disks

You store your 1-2-3 work on **data disks**—not on the 1-2-3 System Disk. Storing your work on the System Disk may result in loss of data. Before you begin working with 1-2-3 in earnest, be sure you have an adequate supply of data disks (at least six). However, just purchasing the disks isn't quite enough. You must prepare (*format*) a disk before you can use it.

You can prepare new disks if you have a two-diskette system, or if you have a hard disk system with a diskette drive that serves as Drives A and B using the following steps:

1. At the end of the last section, you were at the Access System menu.

If you are not at this menu now, restart the computer.

Select Exit from the Access System Menu and confirm your choice by typing "Y" in response to the confirmation prompt. You will be returned to the MS-DOS prompt:

A>.

2. Type:

FORMAT B: **[ENTER]**

3. The message:

Insert new diskette for Drive B:
and strike any key when ready

appears on the screen. Put a blank disk in Drive B, close the door, and press any key.

4. Control passes to an MS-DOS program named FORMAT.COM.

5. When the "Format complete" message appears and the light on Drive B has gone off, press "Y" and insert another diskette, or press "N" to return to the MS-DOS prompt. You can format as many disks as you like in this way.

6. When you've returned to the MS-DOS prompt, remove the diskettes from their drives. Before returning the disks to their protective sleeves, put the small gummed tabs provided with the disks (called *write-protect tabs*) over the small notch located to the left of the label. The write-protect tab prevents a disk from being inadvertently altered when it is in the computer.

6. Copying Other Lotus Disks

While disks have a long lifespan under normal use, they are susceptible to damage through inadvertent mishandling, dust, etc. For this reason, Lotus provides two copies of the 1-2-3 System Disk. These two disks cannot be copied. Copies you try to make with the MS-DOS DISKCOPY command will not function properly. Should either copy of the 1-2-3 System Disk become damaged, Customer Support provides a means of acquiring replacement disks.

Lotus recommends that you use the 1-2-3 System Disk and store the backup copy in a safe place.

The other three 1-2-3 disks can be copied using the procedure outlined below. We urge you to make at least one copy of each disk and keep it in a safe place.

You can copy disks using MS-DOS if you have a two-diskette system, or if you have a hard disk system with a diskette drive that serves as Drives A and B.

1. At the end of the last section, you formatted some blank diskettes using the MS-DOS FORMAT command.

2. With the MS-DOS A > prompt displayed, type the following MS-DOS command:

   DISKCOPY A: B: **[ENTER]**

Control passes to the MS-DOS program DISKCOPY.COM

> **Two-Diskette System:** Insert the disk to be copied in Drive A (source drive) and close the drive door. Insert a formatted disk in Drive B (target drive), and press any key.
>
> **Hard Disk System:** Insert the disk to be copied in Drive A and close the drive door. Press any key. You will be prompted to remove the disk from Drive A and insert a formatted disk.

3. The DISKCOPY program will copy the contents of the disk in Drive A to the disk in Drive B. When the process is complete, the message:

   Copy another (Y/N)?

will be displayed.

4. Repeat the copying process for the 1-2-3 Utility Disk, the Tutorial Disk, and the PrintGraph Disk, by typing "Y". To end the copying process, type "N" and the MS-DOS prompt will be redisplayed.

Be sure to label the copies correctly and return both the originals and the copies to their protective sleeves.

The 1-2-3 Electronic Tutorial

With any new program, it is useful and encouraging to have a helping hand. To meet this need, you have an electronic teacher. Tutor is a program that knows the ins and outs of 1-2-3 and knows how to teach them. Tutor guides you every step of the way.

Do I Really Need to Be Tutored?

We feel that there is something for everyone in these Tutor lessons. If you are an experienced spreadsheet user, you will probably want to browse quickly through Lesson A, which introduces the spreadsheet concept to those unfamiliar with it. (By the way, with 1-2-3 it's called a **worksheet**.) You'll also want to read the "Note to Experienced Electronic Spreadsheet Users" section, which begins on page xv.

Don't skip Lessons B through D, though. They go over material that is unique to 1-2-3. In addition, these lessons cover areas in which 1-2-3's approach differs from that of other spreadsheet programs.

Lessons E and F introduce information management and graphing, two areas in which 1-2-3 has pioneered all-in-one integration with worksheet analysis.

A topic-by-topic outline of these lessons appears in "Tutor Lessons".

Starting the Tutorial

Turn on your computer.

Two-Diskette System:

1. Insert the Tutorial Disk in Drive A and press the Reset Switch. Enter the time and date.

2. Make sure the Tutorial Disk has not been write-protected and issue the following command at the MS-DOS prompt:

   TUTOR [ENTER]

Hard Disk System

1. At the MS-DOS prompt, enter the time and date.

2. *If you have copied the Tutorial onto your hard disk*: make sure that the hard disk is the default drive. You may need to issue a MS-DOS command:

   x [ENTER] (*x* = the hard disk)

   Note. If appropriate, issue a MS-DOS command to make the (sub)directory into which you transferred the 1-2-3 programs the current directory (e.g., CHDIR\123FILES).

If you did not copy the Tutorial onto your hard disk: Make the diskette drive the default drive. Make sure the Tutorial Disk has not been write-protected, and then place the disk in the drive.

3. Issue the following command at the MS-DOS prompt:

   TUTOR [ENTER]

   Do not remove the 1-2-3 Tutorial Disk during a tutorial session.

The Tutor Menu

Tutor begins by displaying a menu of lessons:

- To select a lesson from the menu, type the corresponding letter.
- To end the Tutor session, press the **[ESC]** key.

Tutor returns to this menu whenever a lesson ends, either on its own or by your command.

How Tutor Works

A Tutor lesson is a 1-2-3 work session—not a simulation, not a demonstration.

Tutor tells you exactly what keys to press and it makes sure that you press them. If you press a wrong key at any time, Tutor simply *beeps*—you cannot proceed unless you do exactly as prompted (Exception: See "Speed Typing"). If you press the right key, you see the effect immediately on the screen. This means that you must focus your attention in several places during a Tutor session:

- The bottom part of the screen: To read Tutor's instructions.
- The keyboard: To press the right keys.
- The top part of the screen: To view the effects of your keystrokes on 1-2-3. These effects show up both in the worksheet and in the control panel.

It may take a little while to get used to dividing your attention like this. However, Tutor is infinitely patient and will help you through the lessons as many times as you wish.

Speed Typing

One of the goals of the Tutor lessons is to have you get the feel of using the keyboard with 1-2-3. For that reason, we hope you will go through the lessons keystroke by keystroke.

However, if you want to pass quickly through a lesson, here is a convenient way to do it:

> *No matter what key Tutor is telling you to press, pressing* **[SPACE]** (the space bar) has the same effect as pressing that key.

Moving Page by Page

Each lesson is divided into pages (*screens*). At the end of each page, Tutor displays this highlighted prompt:

[SPACE] = Continue **[PG DN]** = Page ahead **[PG UP]** = Page back **[ESC]** = Quit

At this point you have several choices:

- Press **[SPACE]** to proceed to the beginning of the next page.

- Press [PG DN] to jump forward to the end of the next page. In effect, Tutor automatically presses the keys for you on the next page.
- Press [PG UP] to jump backward to the end of the previous page. This may take a few moments, since Tutor must retrace all its steps.
- Press [ESC] to end the lesson. The lesson menu returns. You can choose another lesson or press [ESC] again to end the Tutor session.

The Tutor Lessons

This section presents an outline of the topics presented in each of the Tutor lessons. You will find this section a useful reference as you learn 1-2-3 skills. For instance, if you've grown a bit "rusty" after a long layoff, you might use the outline to decide which lessons to review.

In many cases, you'll find the same topics listed more than once. Tutor repeatedly emphasizes and reinforces the aspects of 1-2-3 that are most important and most commonly used.

Lesson A: Getting Started

- The Keyboard: [ENTER], [ESC], pointer-movement keys, [BACKSPACE], [DELETE], [CAPS].
- The 1-2-3 Worksheet: window, cells, cell pointer, control panel, mode indicators.
- Moving the cell pointer.
- Typing cell entries: numbers and labels.
- Label alignments.
- Fixing typing errors with [BACKSPACE] and [ESC].
- Numeric formats, label formats, column-widths.
- Formulas: entered by typing and by pointing.
- Automatic recalculation of formulas.
- Saving a worksheet with a 1-2-3 command.

Lesson B: The Loan-Analysis Worksheet I

- Formula recalculation.
- Correcting entries: Edit Mode, [BACKSPACE], [DELETE].
- Using the on-line Help facility.
- Setting column-widths, individually and globally.
- Formulas and @ functions.
- Global numeric display formats, numeric formats for individual cells.
- Saving and retrieving worksheets from disk storage.

Lesson C: The Loan-Analysis Worksheet II

- Entering formulas: Relative and absolute cell addresses.
- Making many copies at once with the /Copy command.
- Copying formulas with the /Copy command.
- Storing worksheets on disk.

Lesson D: The Loan-Analysis Worksheet III

- Using the /Move command to transfer cell entries.
- Using the /Worksheet Insert and Delete commands to add and eliminate rows.
- Entering repeating labels.
- Making copies of ranges (labels and formulas).
- Using the /Data Fill command to enter a series of numbers.
- Using the @SUM function.
- Titles and Split Screen (the /Worksheet Titles and /Worksheet Window commands).
- Building a table of results with the /Data Table command.

Lesson E: Using a 1-2-3 Database

- Records, fields, and field names.
- The [PG UP], [PG DN] and [END] keys.
- The /Data Sort command: Primary and Secondary sort keys.
- The /Print File command.
- The /Data Query command.
- Input range, Criterion range, Output range.
- Defining selection criteria: exact matches, approximate matches, numeric comparisons, compound conditions (AND, OR).
- The Find and Extract operations.

Lesson F: 1-2-3 Graphing

- Graph types: Bar, Stacked-Bar, Pie, Line, XY.
- Data ranges; multiple ranges in one graph; resetting (cancelling) ranges.
- Using the X-range as axis labels and pie-slice labels.
- Titles and legends.
- Printing graphs.
- Graph names.

The 1-2-3 User's Manual

This manual is a reference tool, designed to be used in conjunction with the 1-2-3 Electronic Tutorial and the on-line Help facility. We recommend that you do not try to read it all in one sitting. After going through the Tutorial, read the sections of particular interest to you. (For some, the "Note to Experienced Spreadsheet Users" on page xv is a logical place to start.)

When you have a problem or want to learn more about some aspect of 1-2-3, there are a variety of ways to find the information you want in the manual:

1. Skim the **Table of Contents**. This is a good way to get a quick overview of the content and structure of the manual.

2. The **Index**, at the back of the manual, provides a listing of page references for each topic.

3. The **Functional Index**, preceding the Index, indicates the 1-2-3 command that performs the most common worksheet operations.

4. The **Glossary** lists the meaning of the special terms used in this manual.

5. Most of 1-2-3's **Help screens** include page cross-references to this manual.

6. Use the **1-2-3 Quick Reference** for a quick reminder of a particular 1-2-3 procedure.

The *1-2-3 User's Manual* contains several major sections:

The World of 1-2-3 introduces you to 1-2-3 concepts and terminology.

Basic Skills teaches the fundamental tasks to be mastered in using 1-2-3: how to enter information, how to use menus, how to get help, and how to issue commands, and more.

The **Command Skills** chapters describe the 1-2-3 commands in detail. Each chapter includes a narrative overview and a command-by-command how-to-do-it section.

The **Function Reference** describes the use of 1-2-3's rich set of @ functions, which provide computational power and convenience.

Printing Graphs explains how to produce printed copies of the graphs you define with 1-2-3.

The **Lotus Access System** chapter explains the use of the "switchboard" program included with 1-2-3. This program allows you to perform your data processing and housekeeping chores in a consistent, simple manner.

The **Appendices** provide additional information in several areas: *configuring* 1-2-3; issuing printer-control codes; and an error message reference.

Several **Indexes** provide fast access to important 1-2-3 information.

Typographical Conventions

A few simple typographical conventions are used in the *1-2-3's User's Manual*:

• When a glossary term is introduced, it is printed in **boldface**. When the glossary term is used subsequently or when other special terms are used, they are often *italicized*.


This symbol means "Caution". It is used to indicate that making a mistake at this particular point could cause a significant data loss.


This symbol is used to call your attention to other important points.

A Note to Experienced Electronic Spreadsheet Users

If you are used to other spreadsheet programs (e.g., VisiCalc), you'll find that 1-2-3 not only significantly expands the spreadsheet capability you're already familiar with, but it adds graphing and information management facilities.

Other sections of this manual describe all the features and capabilities of 1-2-3. In this section, we provide a glance at some of the major features that differentiate 1-2-3 from other programs.

Major Differences

When a 1-2-3 session begins, the screen will probably look familiar, but the resemblance ends there. When you type the slash (/) key to begin a command, 1-2-3 displays a **menu** of command keywords, not just a series of single letters. You can select any command by *pointing* the highlight at your choice—using → and ← to move the highlight and then pressing [ENTER] to make your selection. Or you can just type the first letter of the command keyword.

A short description of each command is displayed on the line below the menu. Some of the commands that directly affect worksheet operation may have familiar names, but their implementation differs. 1-2-3 distinguishes between **global** operations affecting the entire worksheet and **range** operations affecting a single cell or group of cells.

1-2-3 Commands

Operations involving deletion or insertion of columns or rows, erasing the worksheet, setting column widths, etc., are grouped under the /Worksheet command. Operations that affect an individual cell or range of cells are grouped under the /Range command.

The /Copy command allows you to copy a single cell or range of cells to a target cell or range of cells. /Copy replaces the Replicate function found in many spreadsheet programs. In other programs, replication typically requires formula references to cells to be specified as **relative** or "no change" at the time of replication. In 1-2-3, this information is specified in the formula itself, rather than at the time of copying.

Copying is not restricted to a single row or column, and 1-2-3's expandable pointer lets you "highlight" the area of the worksheet you are defining for the copy.

The /Move command is fundamentally different. It lets you "pick up" a group of cell entries in the worksheet and "put it down" at another location. All formulas are automatically adjusted. And because of expandable pointer highlighting, you can see the block of entries you are moving.

The table below shows the major VisiCalc commands and their 1-2-3 equivalents. See page I-1 for a complete 1-2-3 command list.

VisiCalc		1-2-3	
/B	Blank cell	/RE	Erase a range of cells
/C	Clear spreadsheet	/WE	Erase worksheet
/D	Delete row or column	/WD	Delete one or more rows or columns
/E	Edit cell entry	[F2/EDIT]	Edit cell entry
/GF	Global format	/WGF	Global numeric format
/F	Format a cell	/RF	Format one or more cells
/G	Set global parameters	/WG	Set global parameters
/I	Insert row or column	/WI	Insert one or more rows or columns
/M	Move a column or row	/M	Move a range of cells (not directly equivalent)
/P	Print to printer	/P	Print to printer or file
/R	Replicate one or more cells	/C	Copy one or more cells
/S	Storage commands	/F	File commands
/T	Titles	/WT	Titles
/V	Program version	...	Displayed at startup only
/W	Split screen	/WW	Split screen
/-	Repeating label	...	Label-prefix character "\"

Additional 1-2-3 Features

Graphing Facilities. 1-2-3 allows you to make line, bar, XY, pie, stacked-bar, and scatter charts using data from the worksheet. The graph data and formats are saved along with the worksheet. Graph images are stored as separate **graph files**. New graphs can be redrawn each time you change the worksheet by using the [F10/GRAPH] function key.

Database Facilities. From within the worksheet, data records are entered using the familiar column-row format. (1-2-3 allows up to 2047 records and 256 fields, subject to the limitations of main memory.) There are commands to manipulate records, including the ability to search for and extract records that meet your defined criteria. In addition, you may sort, build data tables, calculate distributions, and perform other statistical analyses of the records in the database. Data contained in the database can be used in worksheet calculations, in graphing, or both.

Speed of Execution. 1-2-3 is the fastest spreadsheet program currently available for the Model 2000.

Natural Recalculation Order. Automatically eliminates all forward references.

On-line Help Facility. 1-2-3 gives you assistance when you need it most. If you can't remember what a command does, if you are not sure what to do next, or if you simply don't like reading reference manuals, you can press the **[F1/HELP]** function key, and receive instant help on the current problem. Help can be invoked at virtually any time, even during data entry. Not only do you get help on the current command, but you can access related topics and even an index of all Help topics by pointing at the name of the item you need help with.

Dedicated Function Keys. Frequently used 1-2-3 operations (Graph, Calc, GoTo, etc.) can be executed with a single keystroke. Three legend cards, which fit in the slots above the function keys, show these special functions.

Extended Mathematical Functions. 1-2-3 extends the mathematical capability usually found in spreadsheet programs. Besides the familiar array of mathematical and logical operators, 1-2-3 provides additional functions such as future value, payment, and date functions. Statistical functions such as standard deviation and variance are also included. A complete summary of these functions will be found in Chapter 19, "1-2-3 Function Reference".

Printer Control. 1-2-3 allows extensive formatting of a worksheet before it goes to the printer. You may print selected portions of a worksheet and add headings, footings, margins, borders, titles, and even the date and page numbers to make your printed worksheet into a final report.

Macro Capability. 1-2-3 further extends your ability to manipulate the worksheet by allowing you to create command macros using the **Typing Alternative**. This powerful feature allows you to "attach" a series of frequently used keystrokes to a letter key. 1-2-3 will save the macro along with the worksheet so that it is ready to use the next time you need it.

Importing and Exporting Files. 1-2-3 can import and export standard ASCII text files, making it easy to exchange data with other programs.

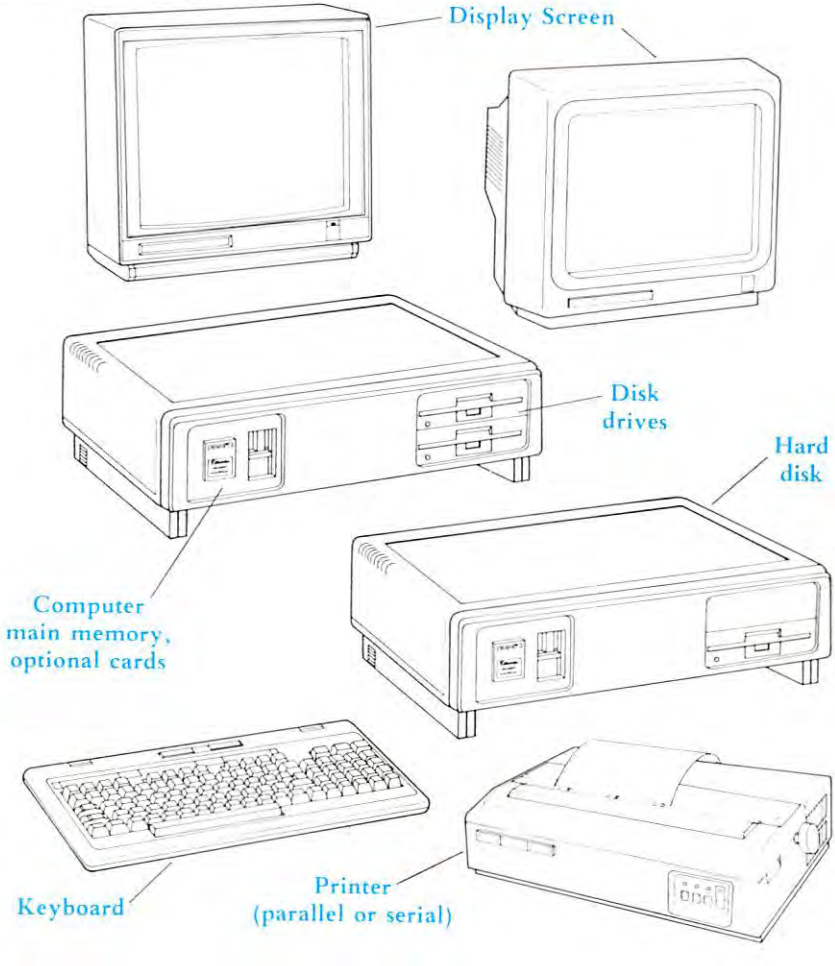
We have barely scratched the surface of 1-2-3's capabilities. Since you are already an experienced spreadsheet user, you might want to jump right in and get started, but we hope you will also use the 1-2-3 Electronic Tutorial.

World of 1-2-3

1. The World of 1-2-3

1-2-3 turns your computer's memory into a giant **worksheet**. The worksheet is similar to a financial ledger sheet—it's ruled into rows and columns. Each of the spaces in the worksheet, called **cells**, can store a piece of information: a number, letters, words, or an instruction to calculate a value.

This chapter introduces your computer system and 1-2-3 itself. We've organized it around what you can see—the physical equipment (*hardware*) that makes up your Model 2000 (Figure 1-1). Consult the manual that came with your computer for details on setting up the system.



The Keyboard

Typewriter Keypad

The typewriter section is like a typewriter keyboard. The letter keys are in their usual places. To produce an uppercase letter, hold down the [SHIFT] key and press the letter key. (In many 1-2-3 situations, uppercase and lowercase letters are equivalent.) Holding down [SHIFT] and pressing a number or punctuation key on the typewriter keypad produces the key's upper symbol.

Instead of a shift lock, there is a [CAPS] key, which affects only the letters—you must still use [SHIFT] to type the upper symbols on non-letter keys. When [CAPS] is "on", the word *CAPS* appears in a color or reverse video block in the lower right corner of your screen. Holding down [SHIFT] and typing a letter at this point produces an uppercase letter.

Another kind of shift function is performed by pressing the [ALT] key. If you find yourself repeating the same sequence of keystrokes, you can "name" that sequence with a letter. Then, if you press [ALT] and press that letter, the entire sequence will be entered automatically (Chapter 9, "Using Keyboard Macros").

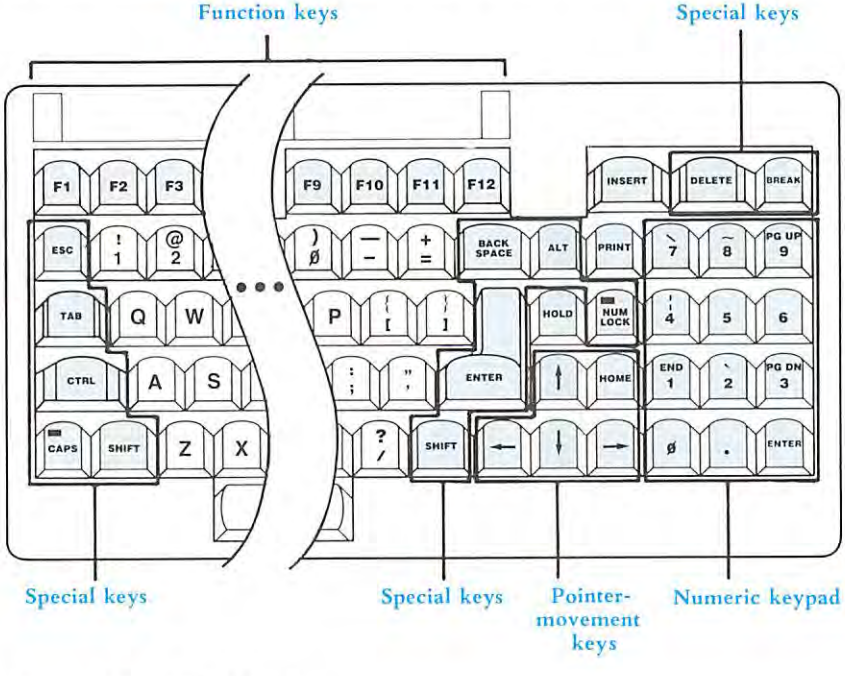


Figure 1-2. The Keyboard

Like many typewriters, your keyboard has a tab key. In many situations, pressing **[TAB]** shifts 1-2-3's attention to the right. (The exact meaning depends on the context.) Unlike most typewriters, you can also backtab with your keyboard. Hold down **[SHIFT]** and press **[TAB]**. This shifts 1-2-3's attention to the left.

There are some differences between your keyboard and a typewriter's:

- You cannot use the lowercase letter *l* ("el") as a substitute for the number *1* (one). 1-2-3 always distinguishes them.
- 1-2-3 uses the standard symbols for addition (+) and subtraction (−). 1-2-3 uses an asterisk (*) to indicate multiplication, not an "×"; and the sign for division is a slash (/) rather than "÷".

Pointer-Movement Keys

The pointer-movement keys are used to direct 1-2-3's attention—to a particular cell in the worksheet, to a particular menu choice, etc. (Chapter 4, "Moving Around the Worksheet"). They are located next to the numeric keypad at the bottom of your keyboard.

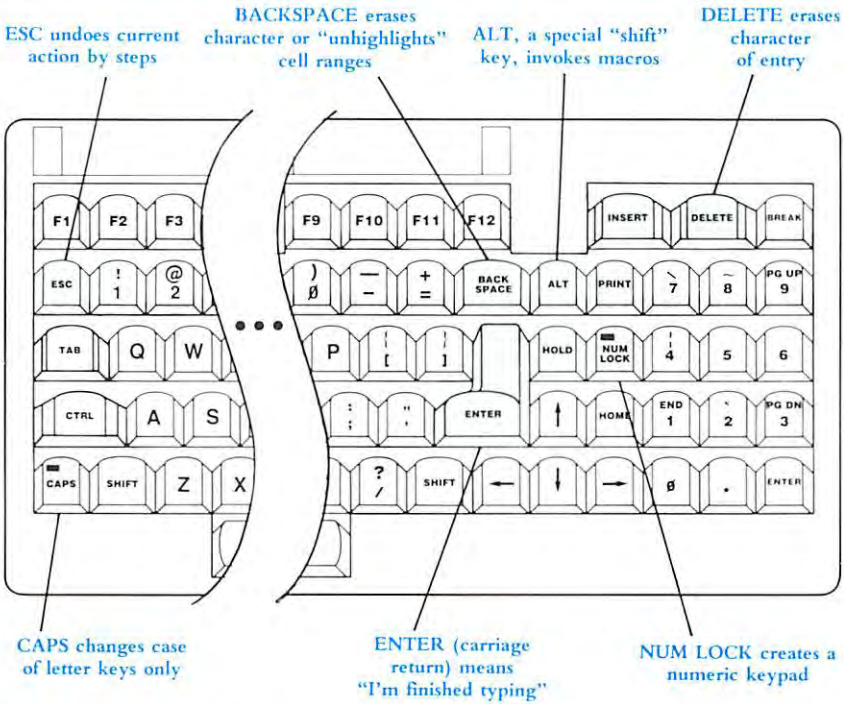


Figure 1-3. Special Keys

Numeric Keypad

The numeric keypad at the far right of the keyboard can be used to enter numbers.

Function Keys

The function keys located at the top of the keyboard perform various 1-2-3 operations. These keys are described where appropriate in the manual. Place the three plastic legend cards in the slots above the function keys to help remind you of each key's meaning.

Special Keys

We have already introduced several of the "special" keys (Figure 1-3) that appear on your keyboard, but not on the standard typewriter.

[SHIFT]. Changes the meaning of the typewriter keys and the pointer-movement keys.

[ALT]. Changes the meaning of letter keys. When you hold [ALT] and press a letter key, it invokes a **keyboard macro**.

[NUM LOCK]. Changes the original function of the numeric keypad to all numbers. When the [NUM LOCK] function is 'on', press [SHIFT] to produce the functions and symbols on the top half of the keys.

[CAPS]. Changes the case of letter keys only.

[TAB] and [SHIFT]-[TAB]. Perform rightward and leftward page (*screen*) movement.

There are several other special keys that we haven't introduced yet:

[BACKSPACE]. In typing situations, means "Erase the last character I typed". In pointing situations, means "Go back to where I started."

[DELETE]. In typing situations, means "Erase the character I'm pointing at".

[PRINT]. Hold down [SHIFT] and press [PRINT] together, twice, to send the contents of the display screen to the printer.

[CTRL]. Performs a special "shift" function, changing the meaning of some keys.

Two other special keys are very important to 1-2-3 users:

[ENTER]. The [ENTER] key performs a function similar to that of the carriage return key on electric typewriters and on many other computers. Pressing [ENTER] tells 1-2-3 "I'm finished, now go". You use it when you have finished typing an entry, to make a selection from a menu, etc.

[ESC]. The [ESC] key is the opposite of [ENTER]. It tells 1-2-3 "Go back a step". The exact meaning of this depends on the context. (See pages 5-8 and 6-7).

[HOLD]. The [HOLD] key has no function in 1-2-3.

The Display Screen

During a 1-2-3 session, the display screen typically is divided into three sections (Figure 1-4). At the top is the **control panel**. Most of the rest of the screen is usually taken up by a section of the *worksheet*. Separating the two is a color or reverse video **border** showing the column letters and row numbers of the section of the worksheet you are viewing.

1-2-3 uses the last line of the screen to display **error messages** and **indicators** that signal various program conditions.

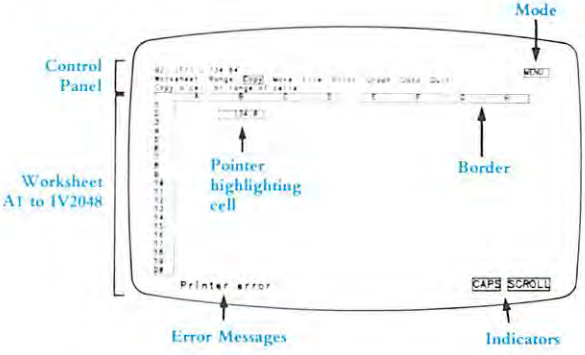


Figure 1-4. The Display Screen

The Worksheet

Think of the worksheet as a piece of ruled paper spread out in front of you. Each entry you type is placed in a *cell*—each with its own **cell address** that describes its column-row location (e.g., A23). This would be a huge piece of paper—if each cell in the worksheet were 1/4 inch high and 1 inch wide, the entire worksheet would be more than 21 feet wide and twice as high!

You focus 1-2-3's attention on a particular cell or range of cells (see below) with a color or reverse video highlight called the **cell pointer**.

Since the entire worksheet is too large to fit on the display screen, you can see only a section (*page*) of it at a time. Think of it as looking through a **window** onto a small portion of the worksheet. However, you can move this window to different parts of the worksheet quickly and easily (Figure 1-5).

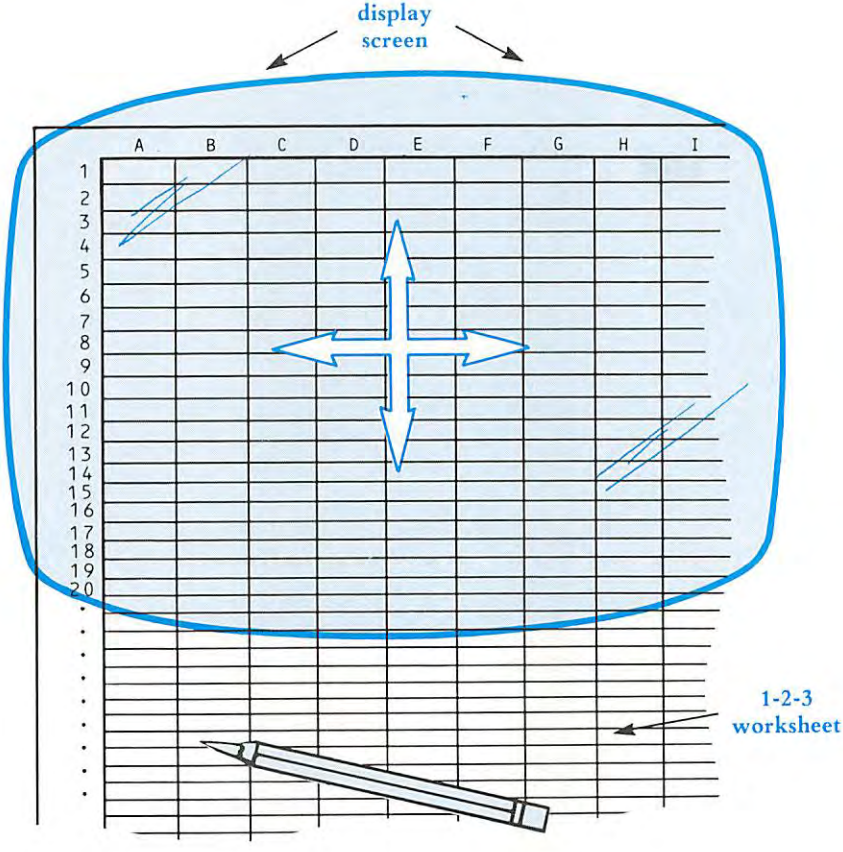


Figure 1-5. The Window

Ranges

One or more cells that form a rectangular block is called a **range** (Figure 1-6). In many situations, you specify a range for 1-2-3 to process. You can specify a range in several ways: by typing the addresses of its corner cells, by highlighting the entire range with the cell pointer, or by giving it a **range name**. (For details, see Chapter 7, "Indicating Cell Ranges".)

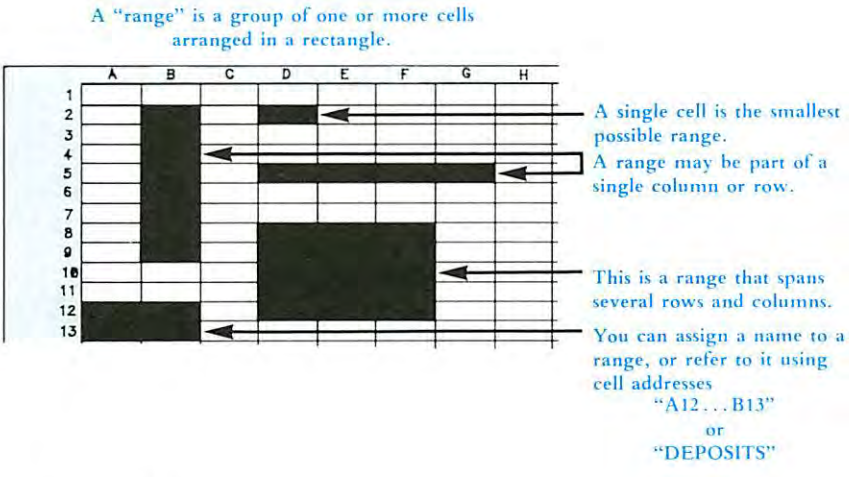


Figure 1-6. Ranges

In many cases, 1-2-3 remembers a range you specified and offers to reuse it the next time you are in a similar situation. This makes it easy to perform a set of similar tasks quickly.

Cell Entries. You can *enter* a number as large as ± 10 to the 99th power or as small as ± 10 to the − 99th power. These are the largest/smallest numbers that 1-2-3 can display in a cell. However, 1-2-3 can *store* numbers (as a result of calculations) as large as ± 10 to the 308 power or as small as ± 10 to the − 308th power. Numbers which can be stored, but are too large to be displayed are shown as asterisks (****) in the cell.

Formulas. A formula is an instruction for 1-2-3 to calculate a value. You use formulas to define the relationships among the cells in the worksheet—how one cell's value depends on another's, or many others'. Whenever a cell entry changes, 1-2-3 can automatically **recalculate** the values of all the formulas in the worksheet. You see immediately how a change in one number affects one or more other numbers. This is the essence of "what if" analysis.

Usually, only the current numeric value of a formula is displayed on the screen (Figure 1-7).

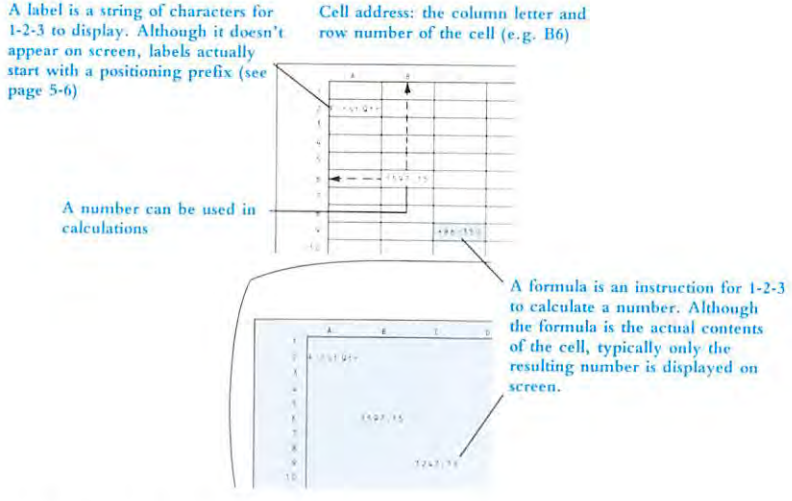


Figure 1-7. Cell Entries

Display Formats and Label Alignments

You can control the way in which 1-2-3 displays numbers and formula values in the worksheet's cells. 1-2-3 lets you control each cell's **numeric display format** independently of the cell's entry (page 10-13).

Labels can be left-aligned, right-aligned, or centered in their cells. It's easy to change a label's alignment, even after you've entered it.

Column Widths

Each cell in the worksheet can store up to 240 characters. But you probably wouldn't want 1-2-3 to display the entire capacity of each cell. You can control the display **column width** of each column—the number of characters that appear on the screen (page 10-15).

Cell Protection

1-2-3 has a facility that allows you to control which cells in the worksheet can be changed. This **cell protection** scheme (page 10-7) allows you to prevent accidental erasure or overwriting of formulas and other entries.

Titles and Split Screen

1-2-3 has two facilities for helping you cope with one unavoidable problem: The worksheet is much too large to be displayed all at once on the screen. The **Titles** facility (page 10-9) allows you to "freeze" certain rows and/or columns onscreen. The **Split Screen** facility (page 10-10) allows you to see two parts of the worksheet at the same time, each in its own window (Figure 1-8).

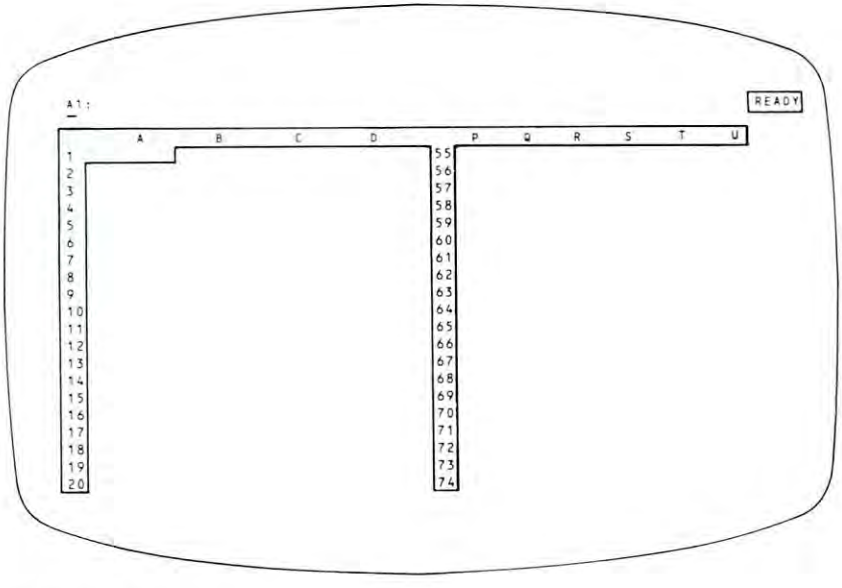


Figure 1-8. Split Screen

The Border Area

The horizontal border area above the worksheet window contains letters identifying each column: A-Z, then AA-AZ, then BA-BZ, and so on to IV, for a total of 256 columns. The vertical border at the left edge of the screen contains row numbers: 1-2048.

As you move the cell pointer around the worksheet, the border helps you determine where you are.

The Control Panel

The control panel has three lines (Figure 1-9):

Line 1. Contains information concerning the **pointer location**, the cell which the cell pointer is currently highlighting. This information includes the cell address, the protection status (page 10-23), the numeric display format (page 10-13), and the cell's contents. At the far right of this line, 1-2-3 displays a color or reverse video **mode indicator**. This is important, since 1-2-3 responds differently to keystrokes in different modes.

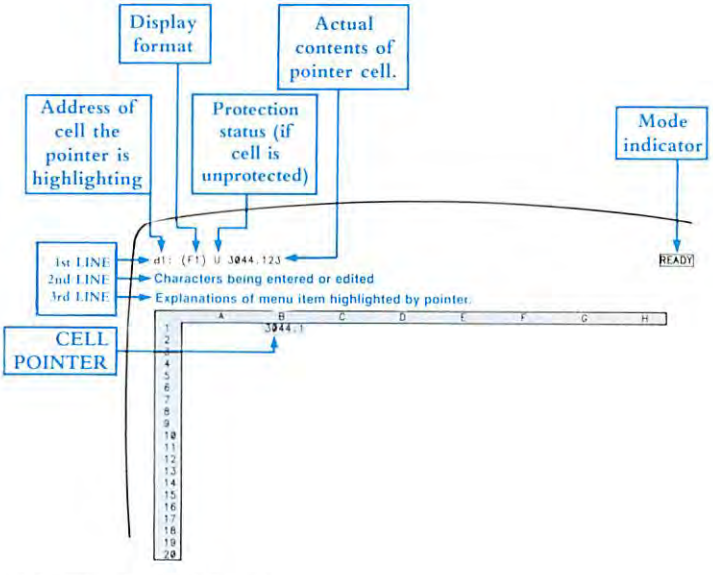


Figure 1-9. The Control Panel

Line 2. The "input line" displays the characters of cell entries as you type and edit them. 1-2-3 uses it to display **prompts**—instructions to make particular entries. Your responses to these prompts also appear on this line. In addition, 1-2-3 uses this line to display menus, lists of command words or names for you to choose from.

Line 3. When you are issuing a **1-2-3 command** (page 6-1), this line displays **long prompts**—one-line summaries of the 1-2-3 commands currently being offered. As you move the menu pointer (*highlight*) among the various command words, line 3 changes in order to display the explanatory text for the currently highlighted word.

The Printer

There are many good-quality printers available for use with the Model 2000. Lotus Development Corporation does not endorse any one printer. 1-2-3 and its companion program, PrintGraph (page 20-1), can run many different types of character and graphics printers.

Your sales representative can give you a complete list of printers supported by 1-2-3.

What kind of printouts can you get? By itself, 1-2-3 can use a character printer to produce a copy of:

- Part or all of the worksheet.
- A cell-by-cell report of the entries stored in any part of the worksheet, or the entire worksheet.

You can create a worksheet printout any time during a 1-2-3 session. Alternatively, you can store the information to be printed in a **print file**, for printing or editing later.

To make a printed version of the graphs you create and save, you must use the PrintGraph program and have a graphics printer. You can print any graph that you've defined and saved in a **graph file**, using 1-2-3's /Graph command (page 16-19). You can print a graph even if you do not have a graphics display screen on which to view it.

Main Memory and Disk Storage

1-2-3 maintains the **current worksheet**—the one on your display screen—entirely within the computer's **main memory**. (Main memory typically is described as *random access memory—RAM.*) This strategy yields advantages in speed and flexibility. But main memory is erased, when you end a 1-2-3 session, turn off your computer, or have a power failure.

To make a permanent record of your worksheet, you must save it in a **worksheet file** on a magnetic medium—typically a disk.

Think of the disk as a file cabinet and each file as a folder containing a certain set of papers. You pull the file out and lay it on your desk when you want to make entries. And you close it up and return it to the file cabinet when you're done.

With 1-2-3, you are actually pulling out an exact copy of the file. The original stays safely on the disk, where it can be retrieved, or replaced with updated information.

1-2-3 has a sophisticated facility for transferring information between the current worksheet in main memory and worksheet files in disk storage. It can also store information in *print files* and *graph files*, as explained in the previous section.

Typical Disk Configuration

Like the data you create and use, the 1-2-3 programs themselves are stored on disks. Whenever you start a 1-2-3 session, the 1-2-3 System Disk must be in a disk drive—even if you have copied the 1-2-3 files onto the hard disk—so that the program itself can be "loaded" into main memory.

In the standard two-diskette system, you typically keep the 1-2-3 disks in the bottom drive (Drive A). Occasionally, you will be prompted to switch disks in this drive. The data disks, on which you store worksheet files, print files, and graph files, typically are placed in Drive B, the top drive. Since you can switch disks in this drive at almost any time (not while the light is on), your permanent data storage capacity is virtually unlimited.

In the standard hard disk system, both the 1-2-3 files and your data files are stored on the (subdirectory of the) hard disk. You can also store data files on a disk by using your diskette drive.

Saving Your Work

Saving your work is a vital part of using 1-2-3 and every other computer program. Save your work regularly while you are creating a worksheet to avoid the loss of data that may occur from human error, power failures, or other mishaps. (See /File Save, page 14-7.)

To protect yourself against a disk being damaged, lost, or simply wearing out, it is extremely important to make at least one extra copy of every disk you use . For extra safety, make copies of all important disks and store them in a secure place (perhaps a fireproof safe) separately from your day-to-day disk library.

Having presented this brief overview of the world of 1-2-3, we hope you are ready to move forward with confidence. When you have questions, return to this section for a refresher or consult the Table of Contents, the Glossary, and the Indexes.

Basic Skills

Contents

2. Starting and Ending a 1-2-3 Session

Many people find that one of the most perplexing things about a new computer program is learning how to start a session and how to end one.

Starting a 1-2-3 Session

You can start a 1-2-3 session in two ways:

- You can start your computer with the 1-2-3 System Disk—control automatically passes to the Lotus Access System.
- You can start your computer with MS-DOS and then run 1-2-3.

Starting a Session with the 1-2-3 System Disk

When your computer is off (Two-Diskette System):

1. Turn on the computer's electrical power.

2. Place the 1-2-3 System Disk in Drive A (on the bottom) and press the black Reset Switch below the red Power Switch.

3. After a short time, during which the system tests itself, you'll be prompted to enter the current date and time. Here's what you would type at 4:23 PM on June 16, 1985.

   Current date is Tue 1-01-1980:
   Enter new date: **6-16-85** [ENTER]

   Current time is 0:00:07.68
   Enter new time: **16:23** [ENTER]

Use the [ENTER] key to finish each entry. Separate the three parts of the date with hyphens. Separate the two or three parts of the time with colons—both the minutes and seconds are optional.

4. The computer automatically passes control to the Lotus Access System after you have entered the current date and time. When the Access System menu appears, the highlight will indicate that 1-2-3 is the first choice. Press [ENTER] to select 1-2-3.

5. The 1-2-3 startup screen appears. Press any key to clear the screen, and you are ready to go.

When your computer is on:

1. Place the 1-2-3 System Disk in Drive A (on the bottom).

Note. Even if you have copied the 1-2-3 files onto the hard disk, the 1-2-3 System Disk must be in the diskette drive when you try to start a 1-2-3 session.

2. If you have a two-diskette system, make sure the prompt reads A>. You may need to issue the MS-DOS command:

A: [ENTER]

If you have a hard disk system, make the hard disk or the (sub)directory into which you copied the 1-2-3 files, the current directory.

3. At the MS-DOS prompt type the command:

123 [ENTER]

to enter 1-2-3 directly or type the command:

LOTUS [ENTER]

to enter the Lotus Access System. If you choose the Access System, the Access System menu will appear, with the highlight indicating that 1-2-3 is the first choice. Press [ENTER] to select 1-2-3.

4. The 1-2-3 startup screen appears. Press any key to clear the screen, and you're ready to go.

Ending a 1-2-3 Session

The /Quit command ends a 1-2-3 session. You must be in 1-2-3's Ready mode to issue this command.

1. If necessary, press [ESC] one or more times to cancel what you are currently doing and return to Ready mode. Watch for the *READY* indicator to appear in the upper right corner of the screen.

2. Press the / (slash) key to display the 1-2-3 command menu.

3. Press → enough times to move the menu pointer (highlight) to "Quit" or type "Q". Then press [ENTER].

4. Press → once to move the pointer to "Yes". Then press [ENTER]. The 1-2-3 session ends, and you return to the Lotus Access System or to the MS-DOS prompt.

3. Using the Help Facility

The 1-2-3 Help facility is a reference manual that is always open to the right page. At virtually any time while using 1-2-3, you can press the [F1/HELP] key—between commands, in the middle of typing a command or entry, whenever you need it. After getting help, the work session continues exactly where you left off.

When you press [F1/HELP], 1-2-3 temporarily suspends the session. It clears the worksheet from the display screen, but leaves the control panel as a reminder of where you paused. Then it displays a screenful of information tailored to your current situation.

The Help screens are interconnected and cross-referenced. Frequently, a Help screen includes a menu of "further-help" topics at the bottom of the screen. You can get more help on any or all of these topics before returning to the worksheet.

The Help facility has some particularly useful features:

- Most 1-2-3 commands involve several steps. Each step has its own Help screen, which includes the further-help topic "Next Step".
- At each Help screen, you can go to the Help Index, which provides access to the entire set of Help screens (more than 200 in all).
- Many Help screens list pages in this manual where you can find further information on the topics.

Getting Further Help

When 1-2-3 is displaying a Help screen, it displays a *HELP* indicator in the upper right corner of the control panel. Once in Help mode, you can either return to the worksheet or continue getting help.

To Get Further Help. The topics are connected in both the left-right and up-down senses (Figure 3-1). Use these pointer-movement keys to highlight the Help topic you want to select:

Key	Function
→	Next topic to right
←	Next topic to left
↑	Topic above
↓	Topic below
[HOME]	First topic
[END]	Last topic

Then press [ENTER] to display the Help screen for the topic you selected.

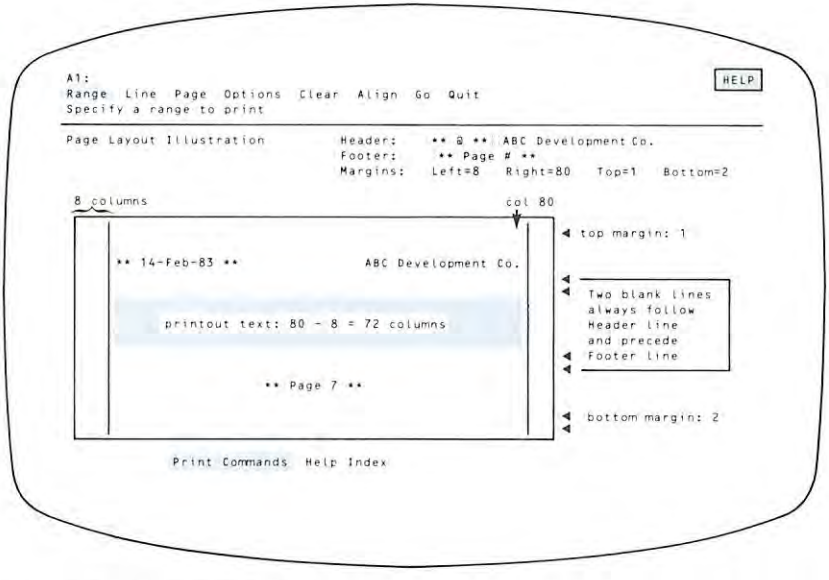


Figure 3-1. A 1-2-3 Help Screen

To View Previous Help Screens Again. Press [BACKSPACE] one or more times. 1-2-3 remembers up to 15 previous screens. However you cannot use [BACKSPACE] to retrieve a Help screen you viewed during a previous Help pause. If you press [F1/HELP] again, 1-2-3 returns to the first Help screen you viewed during the current Help break.

Returning to the Worksheet

To end a Help pause, press [ESC]. 1-2-3 redisplays the worksheet and lets you continue exactly where you left off.

4. Moving Around the Worksheet

The 1-2-3 worksheet is a collection of *cells*, organized into rows and columns. Each cell can store a single piece of information—number, formula, or label. The display screen is a *window* into the worksheet. At any moment, you can see part of the worksheet, but not all of it.

A color or reverse video bar, called the *cell pointer*, always highlights one of the cells in the window, indicating which cell is the current focus of 1-2-3's attention. Using the cell pointer is probably the most important new skill to master in learning to use 1-2-3 (Figure 4-1). That is because you fill in the worksheet by repeatedly performing the following actions:

1. Moving the cell pointer to a particular cell.

2. Typing an entry or issuing a command that affects the cell.

This description doesn't tell the whole story. Many 1-2-3 commands process an entire group of cells—a *range*—all at once. In such situations, you can indicate the range by expanding the cell pointer to highlight all the cells. For now, we'll concentrate on mastering the technique of pointing to a single cell. (See "Expanding the Cell Pointer" in Chapter 7, "Indicating Cell Ranges".)

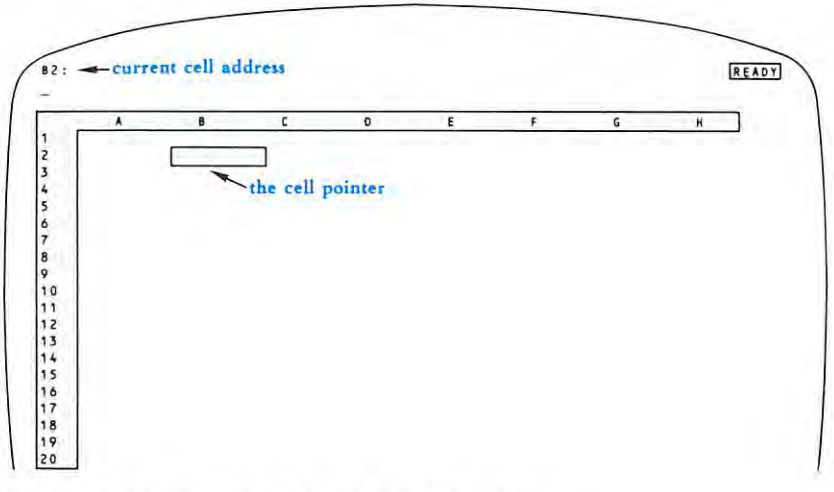


Figure 4-1. The Current Cell and the Cell Pointer

Moving One Cell at a Time

The arrow keys on the numeric keypad move the cell pointer one cell at a time (Figure 4-2). The keyboard's auto-repeat feature works well with these keys. Try it by holding an arrow key down for a few seconds.

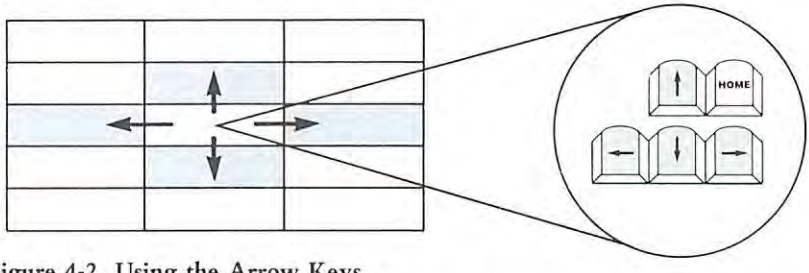


Figure 4-2. Using the Arrow Keys

If you try to move the cell pointer off the worksheet (e.g., above row 1), the program *beeps* to say that you can't do that.

Moving the Window. On the other hand, you can move the pointer downward if you're at row 20, the last visible row (Figure 4-3). The pointer moves to row 21 and the display screen changes accordingly.

Does the worksheet move up, or does the screen move down? Think of it this way: The display screen acts as a movable window, through which you can see part of the worksheet. The worksheet itself always remains stationary.

You can never make the cell pointer disappear. Whenever the cell pointer moves in a way that would take it offscreen, 1-2-3 automatically adjusts the window. In particular, when you make the pointer "push against the side of the window", the window moves.

It is also possible to do the opposite—move the window with the arrow keys, which pulls the cell pointer along with it ("The Scroll Lock Facility", page 4-5).

Moving Directly to the Destination

Moving one cell at a time is easy, but it's not the fastest way to move the cell pointer a great distance. You can move the cell pointer to any cell in a single bound just by pressing **[F5/GOTO]** and entering the cell's address (Figure 4-4).

If that destination is offscreen, 1-2-3 automatically adjusts the window to place the cell you're moving to in the upper left corner of the screen. 1-2-3 will accept a range name instead of a cell address in a **[F5/GOTO]** operation (Chapter 11, "Range Commands"). 1-2-3 "goes to" the cell in the upper left corner of the range.

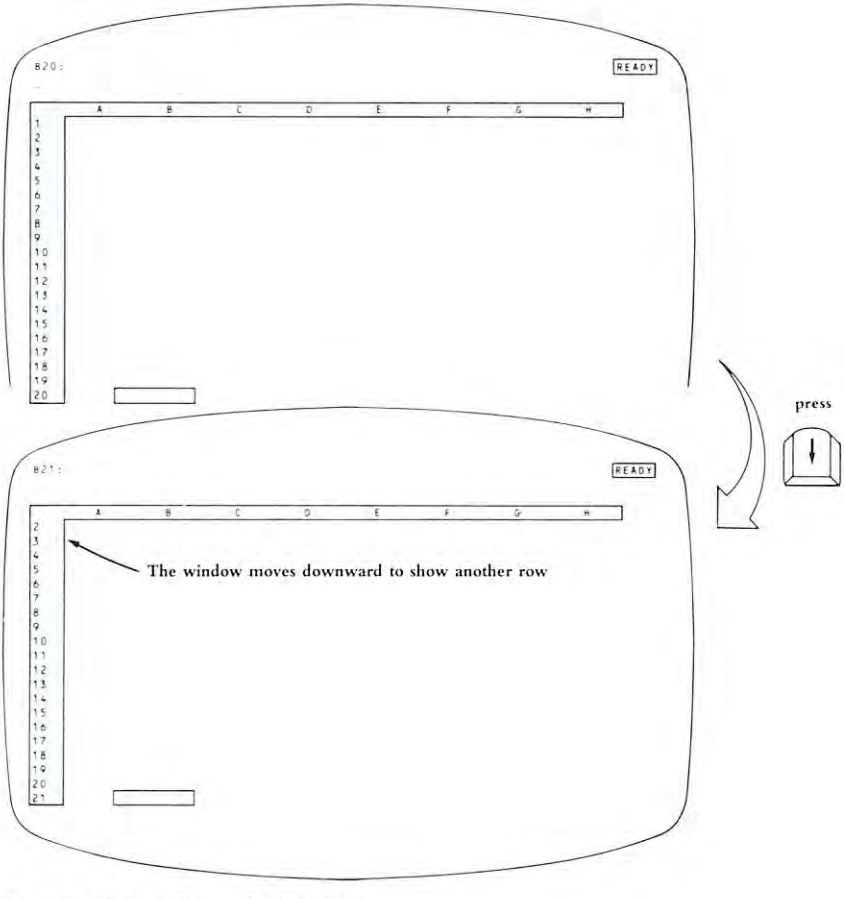


Figure 4-3. Scrolling the Window

The [HOME] Key. **[HOME]** is a special version of **[F5/GOTO]**. When you press this key in Ready mode, the cell pointer returns to the cell in the upper left corner of the worksheet. If necessary, 1-2-3 adjusts the window to include this cell. Typically, this is cell A1, but not always. If you have expanded the worksheet's border using /Worksheet Titles (page 10-9) to include the first few row(s) and/or column(s), the upper left corner might be cell A5, cell D1, cell C10, etc.

You can also use **[HOME]** in combination with **[END]** to move the pointer to the lower right corner of the *active area* of the worksheet. (For details, see "Moving to the End of the Active Area", page 4-8.)

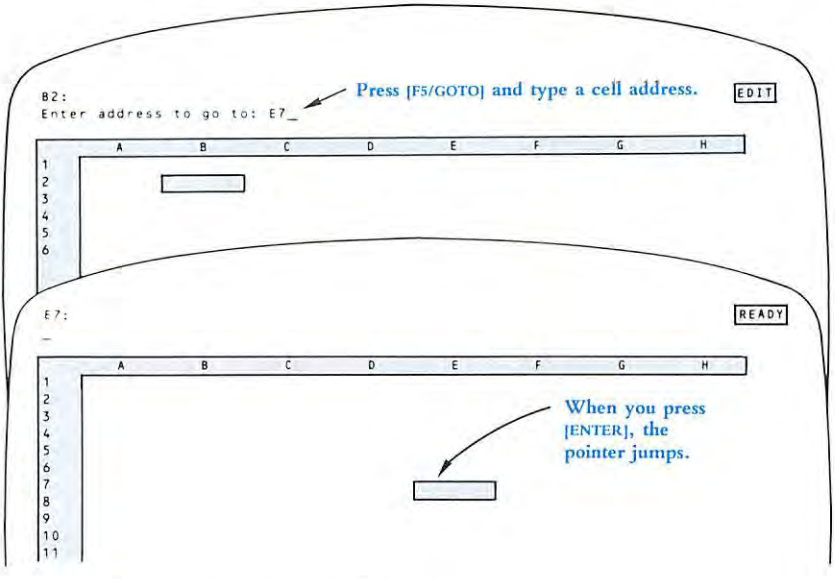


Figure 4-4. Using the [F5/GOTO] Key

Moving the Window by Pages

You can think of the entire worksheet as being divided into pages or (*screens*). Typically, pages are 20 rows high and several columns wide. (The *Titles* and *Split Screen* facilities alter the effective size of the window. See page 10-10.)

Just as the arrow keys allow you to move the pointer cell-by-cell, several window-movement keys allow you to move the window around the worksheet page-by-page (Figure 4-5):

Key	Function
[TAB] key	Move one page to the right
[SHIFT]-[TAB] backward tab key	Move one page to the left
[PG DN] key	Move one page down
[PG UP] key	Move one page up

Note what happens to the cell pointer during this movement: With [PG UP] and [PG DN], it moves to the same relative position on the new page; with [TAB] and [SHIFT]-[TAB], it moves to the first column of the next page, staying in the same row.

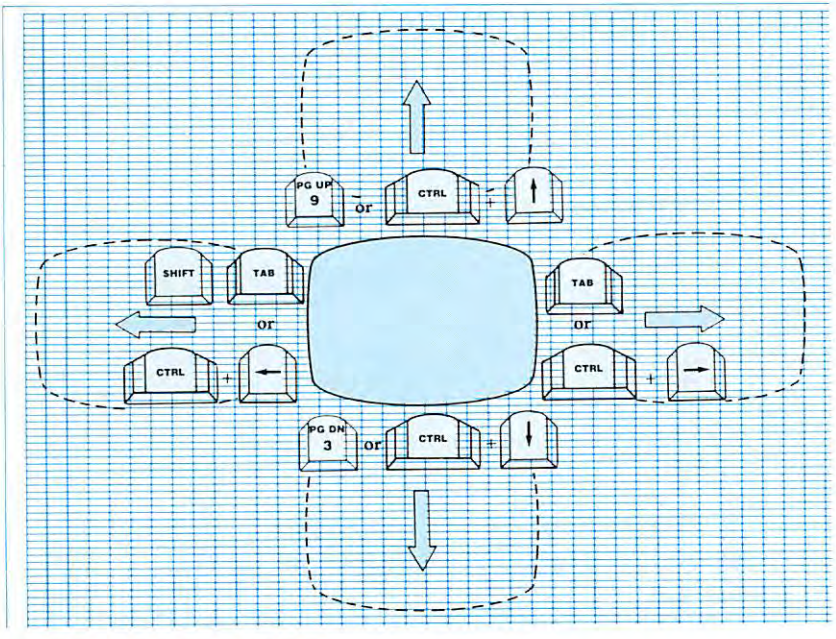


Figure 4-5. Moving by Pages

The Scroll Lock Facility

We saw above that when you move the cell pointer with the arrow keys, it sometimes pushes the window in the direction of movement. Sometimes, though, you will want to move the window just a bit—without necessarily moving the cell pointer. That's where the *Scroll Lock* facility comes in.

Pressing the **[F12/SCROLL LOCK]** key turns the Scroll Lock facility "on". A *SCROLL* indicator appears in the lower right corner of the screen to confirm this. Pressing the key again turns *Scroll Lock* "off", erasing the indicator at the same time.

What does this key do? Figure 4-6 shows how the meaning of ↓ is affected by pressing **[F12/SCROLL LOCK]**.

Notice how the cell pointer creeps toward the top of the screen when you use ↓ in conjunction with **[F12/SCROLL LOCK]**. Eventually, the pointer will hit the top of the screen. If you keep moving the window with ↓, the pointer will get "pulled along". So we have a symmetrical situation:

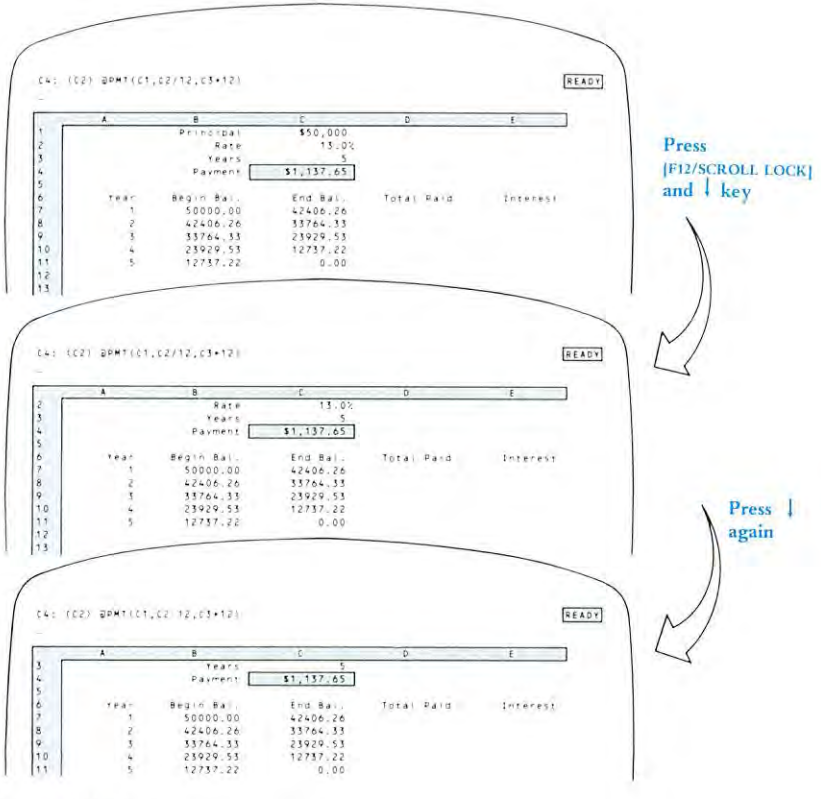


Figure 4-6. Using [F12/SCROLL LOCK]

Scroll Lock OFF. The arrow keys move the cell pointer. At the edge of the window, moving the cell pointer "pushes" the window in the direction of movement.

Scroll Lock ON. The arrow keys move the window. When the pointer is at the edge of the window, moving the window "pulls" the cell pointer in the direction of movement.

The [END] Key

When you use [END] in conjunction with any of the arrow keys, the pointer moves in the direction of the arrow to the next boundary between empty space (i.e., empty cells) and filled space (i.e., cells containing entries).

Figure 4-7 shows how pressing [END]-↓ would move the cell pointer in a particular worksheet.

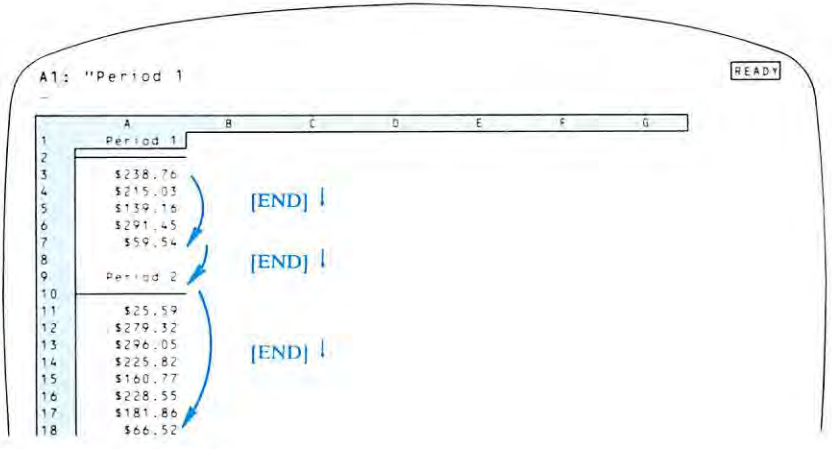


Figure 4-7. Using [END]

In general, an [END]-arrow key combination works as follows:

When you press [END] in Ready or Point mode, an *END* indicator appears in the lower right corner of the screen. If the next key you press is an arrow key, then:

- If the pointer is on an empty cell, it moves in the arrow's direction to the first non-empty cell (or to the edge of the worksheet).
- If the pointer is on a non-empty cell, it moves in the arrow's direction to the last non-empty cell before an empty cell (or to the edge of the worksheet).

And here's what happens if the next key you press is not an arrow key:

- [HOME]: Pressing [END] then [HOME] moves the pointer to the lower right corner of the worksheet's active area. See the next section and Figure 4-8 for an explanation.
- Other: If you press any other key after [END], 1-2-3 remembers the [END] and keeps displaying the *END* indicator to help you remember. You can type an entry, issue a command, and generally proceed with your work. But the next time you press an arrow key to move the cell pointer, 1-2-3 will perform an [END]-type jump rather than move a single cell.

Note. We don't recommend that you use the [END] key facility in this way. Even with the *END* indicator to help, you might forget having pressed [END] and wind up with an unexpected result.

Pressing [END] twice in a row is a special case. The second [END] means "Never mind" and cancels the first one.

Moving to the End of the Active Area

At any time, you are using only part of the entire 256-column, 2048-row worksheet. Figure 4-8 shows what 1-2-3 considers to be the lower right corner of the worksheet's *active area*.

> The active area of a worksheet is the rectangle with its upper left corner at cell A1 and its lower right corner at the intersection of the last column and the last row in which you have made an entry (page 5-1), set a display format (page 11-2), or altered the protection status (page 11-6).

There are many situations in which you might want to move the cell pointer to the end of the active area: printing the entire worksheet, splitting a worksheet into screen-size pages, etc.

1-2-3 allows you to do just that. In Ready or Point mode, pressing **[END]** then **[HOME]** moves the cell pointer to the lower right corner of the active area of the worksheet.

In general, a larger active area requires more main memory to store it. It is possible to exhaust the computer's main memory, even if you haven't filled all the cells in the worksheet. In such situations, 1-2-3 *beeps* and displays a "Memory Full" error message. To avoid this, try to keep the active area compact. (See the /Worksheet Status command, pages 10-8 and 10-23.)

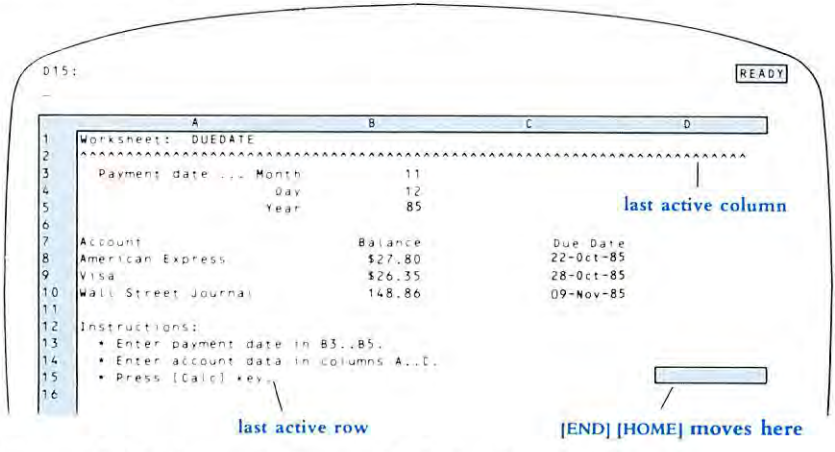


Figure 4-8. Moving to the End of the Active Area

Moving the Cell Pointer with Special Windows (Titles, Split Screen)

We've used illustrations in which the worksheet is displayed using the standard 1-2-3 window. The situation is similar when you use the alternatives—*Titles* and *Split Screen* either separately or together.

The *Titles* facility expands the border around the upper left corner of the worksheet to include the first rows and/or columns (Chapter 10, "Worksheet Commands"). In Ready mode, this border is impenetrable—trying to move the cell pointer there with the arrow keys just causes the program to *beep*. Since the border is enlarged, the effective size of the window into the worksheet is reduced.

But 1-2-3 does let you move the pointer into the Titles area when you are in Point mode—while typing a formula or pointing to cells during a command. In these situations, duplicate copies of the Titles cells will appear on the screen.

The *Split Screen* facility allows the display screen to provide two independent windows into the worksheet (Chapter 10, "Worksheet Commands"). The arrow keys and window-movement keys all work the way you'd expect them to—it's just that each worksheet window is now smaller. To move the cell pointer from one worksheet window to the other when using *Split Screen*, press **[F6/WINDOW]**.

5. Creating Cell Entries

One of the basic 1-2-3 skills is filling in cells with entries: numbers, formulas, and labels. We can't tell you exactly what entries to make—that depends on your particular needs. But we can tell you how.

This chapter presents an overview of three basic ways to make an entry into a cell;

1. Typing it yourself.

2. Using the /Copy or /Move commands to transfer an existing entry from another cell in the worksheet.

3. Retrieving data from a disk file—one created with 1-2-3 itself or one created with another program.

Typing Entries

To type an entry into a particular cell, you must move the cell pointer there—making that cell the current cell. Then, type the entry, ending with [ENTER]. As you type, each letter appears on the second line of the control panel (Figure 5-1).

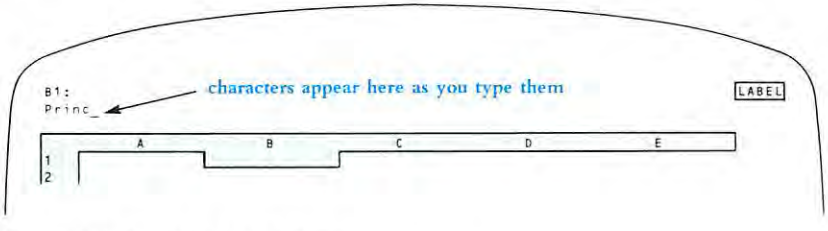


Figure 5.1. Typing a Cell Entry

An underscore, called the **cursor**, indicates where the next character you type will appear. This may seem a bit unnecessary, but it is important. You will need to move the cursor to make changes in the middle of an entry ("Edit mode", page 5-9).

To tell 1-2-3 that you are finished typing an entry, press the key marked [ENTER]. When you do so, 1-2-3 stores the entry in the current cell. If something was already stored in the cell, the new entry replaces it. There is no way to recover the old entry.

After you complete an entry, the second line of the control panel is cleared, and 1-2-3 displays the entry on the first line (Figure 5-2).

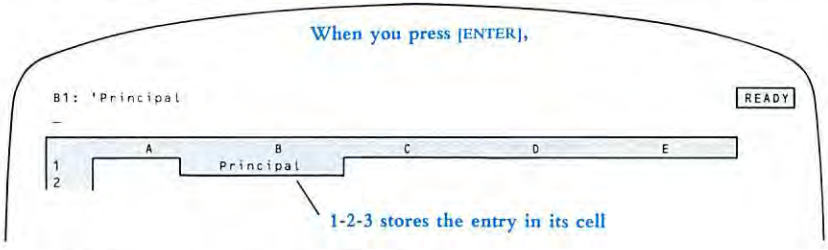


Figure 5-2. Completing an Entry with [ENTER]

Long Entries. A cell entry can be up to 240 characters long, more than 1-2-3 can display on the second line of the control panel. The previously typed characters begin to scroll off to the left as you fill this line, allowing you to see the additional characters as you continue typing.

Using the Pointer-Movement Keys

After you finish one entry, you will probably want to move the pointer to another cell and type another entry. To speed up this process, you can finish an entry by pressing any of the keys that move the cell pointer, instead of pressing **[ENTER]**:

Key	Function
→	Move one cell right
←	Move one cell left
↑	Move one cell up
↓	Move one cell down
[TAB]	Move one page right (see note below)
[SHIFT]-[TAB]	Move one page left (see note below)
[PG DN]	Move one page down
[PG UP]	Move one page up

You can even use the **[END]** key (page 4-6) to finish an entry.

Note. Pressing the **[TAB]** key alone invokes the **[TAB]** (forward tab) function. Holding down **[SHIFT]** and pressing **[TAB]** invokes the **[SHIFT]-[TAB]** (backward tab) function. **[CTRL]-→** performs the same function as **[TAB]**, and **[CTRL]-←** is equivalent to **[SHIFT]-[TAB]**.

These keystrokes have two effects. They:

- Record the entry in the current cell.
- Move the pointer to another cell (Figure 5-3).

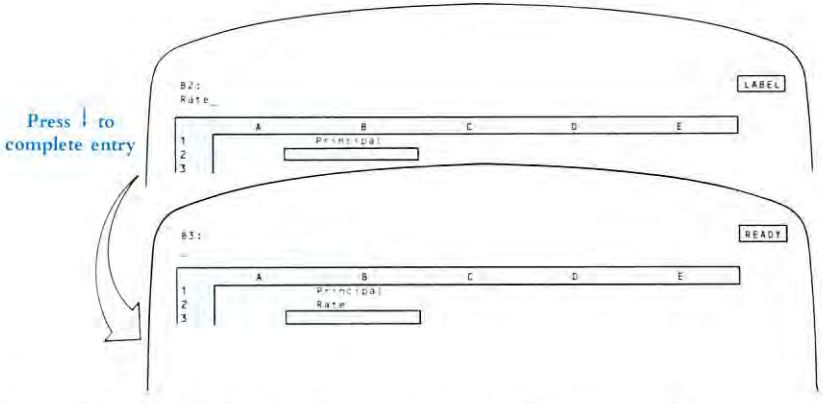


Figure 5-3. Using a Pointer-Movement Key to Complete an Entry

After You Press the [ENTER] Key

When you complete a cell entry by pressing [ENTER] or a pointer-movement key, the following things happen:

1. 1-2-3 checks the entry for errors. If there are none, 1-2-3 stores the entry in the current cell. If it finds an error, 1-2-3 *beeps*, places the cursor at the location of the problem (or at the end of the entry, if 1-2-3 isn't sure where the problem is), and switches to Edit mode. (For a discussion of entry errors, see "Rules for Entering Numbers", page 5-4, and Chapter 8, "Writing Formulas".)

2. If you have left 1-2-3 in its initial Recalculation setting of *Automatic*, 1-2-3 recalculates every formula in the worksheet. The order in which it does so is determined by the Recalculation order setting (page 10-16). It is also possible to have 1-2-3 perform several recalculation cycles at once (page 10-16).

3. 1-2-3 updates the display screen—incorporating the new entry, its effect upon the rest of the worksheet, and the result of pressing a pointer-movement key rather than [ENTER].

4. 1-2-3 returns to Ready mode, displaying the *READY* indicator in the upper right corner of the screen.

When you make a cell entry during a /Range Input command or when using a keyboard macro, things work a bit differently. (See pages 9-8 and 11-17 for details.)

Types of Entries

You can create three types of entries:

- Numbers.
- Formulas.
- Labels.

Entering Numbers and Formulas

If you start an entry with one of these characters, 1-2-3 assumes that you're entering a number or formula:

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

1-2-3 announces this assumption as soon as you type the first character, by changing the *READY* indicator in the upper right corner to *VALUE*.

It is easy to see why 1-2-3 would think that you're making a numeric entry with the first few of these characters. They are the basic building blocks of numbers and simple arithmetic expressions. The characters "@" and "#" are used to form more sophisticated formulas, those involving **functions** and **logical conditions**. The "$" is used for a similar purpose—to create **absolute cell addresses** in formulas. (For details regarding these topics, see Chapter 8, "Writing Formulas".)

Rules for Entering Numbers

There are a few rules you must follow when entering numbers. If an entry does not follow these rules, 1-2-3 will not accept it. When you press [ENTER], 1-2-3 will *beep* and switch to Edit mode (page 5-9).

Here are the rules for entering numbers:

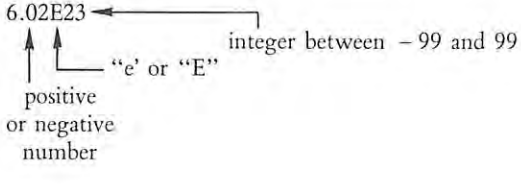
1. A number may begin with a digit (0..9), a " + " or " - " sign, a period (.), or "$".

2. A number may end with "%" to indicate percent. This character has the same effect as /100—it divides the preceding number by 100.

3. A number may only have one decimal point (the period character).

4. You may not use any commas or spaces when entering a number. But you can have 1-2-3 display numbers with commas and other formatting characters (Chapter 10, "Worksheet Commands").

5. You may end a number with a power-of-10 scaling factor called *scientific format*. For instance:



Rules for Entering Formulas

The rules for specifying calculations based on cell entries are more involved. (For details, see Chapter 8, "Writing Formulas".)

Two Special Numbers—NA and ERR

You will want the worksheets you construct to reflect the relationships between cells. Suppose you write a formula that makes the value of cell A15 depend on the value of cell A9. Any of the following situations might arise:

- You don't know what value to enter into cell A9—the value is "not available".
- Cell A9 contains a formula that defines an impossible calculation (e.g., divide a number by zero).
- Cell A9 is mistakenly obliterated by a 1-2-3 command: /Move or /Worksheet Delete.

1-2-3 handles these situations by using two special numbers:

NA. You can enter @NA into any cell instead of a number. 1-2-3 displays the cell's value as *NA*, meaning "not available". When it recalculates formulas, 1-2-3 ripples this lack of data through the worksheet. Any cell whose value depends on an *NA* cell also has the value *NA*.

Exception: See the @COUNT function, page 19-6.

ERR. The @ERR function is similar to @NA. 1-2-3 displays the cell's value as *ERR*, meaning "error". The *ERR* value ripples through the worksheet when 1-2-3 recalculates formulas.

Exception: See the @COUNT function, page 19-6.

You can use @ERR entries to build worksheets that will alert you when you enter a value that you have previously decided is "illegal". And 1-2-3 itself sometimes makes the value of a cell *ERR*. Whenever a cell contains a formula that defines an impossible calculation, 1-2-3 displays *ERR* there.

Figure 5-4 provides an example in which both these situations occur. (The @HLOOKUP function is described on page 19-9.)

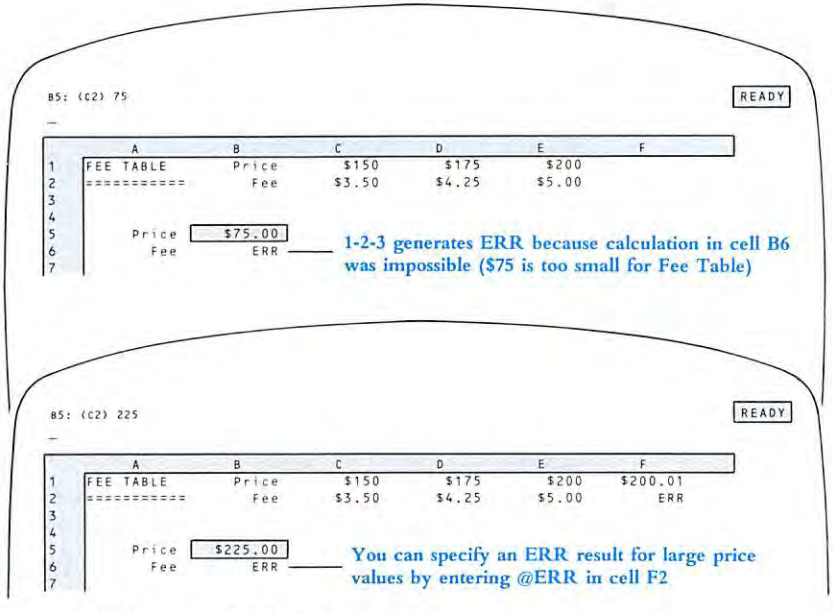


Figure 5-4. The Special Number ERR

Entering Labels

If the first character you type is not among those number indicators listed in the previous section, 1-2-3 assumes that you are entering a label. As soon as you type the first character, 1-2-3 changes the *READY* indicator to *LABEL*.

Exceptions: The slash character (/) starts a 1-2-3 command. Function keys F1 through F12 invoke 1-2-3 functions.

Label-Prefix Characters

You can use special characters to start a label entry. These tell 1-2-3 that the entry being typed is a label and not a number or formula. In addition, these **label-prefix characters** specify how 1-2-3 is to display the label text in the cell—left-aligned, right-aligned, centered, or repeating (Figure 5-5):

Prefix-character	Label alignment
' (apostrophe)	left-aligned
" (double quote)	right-aligned
^ (caret)	centered
\ (backslash)	repeating

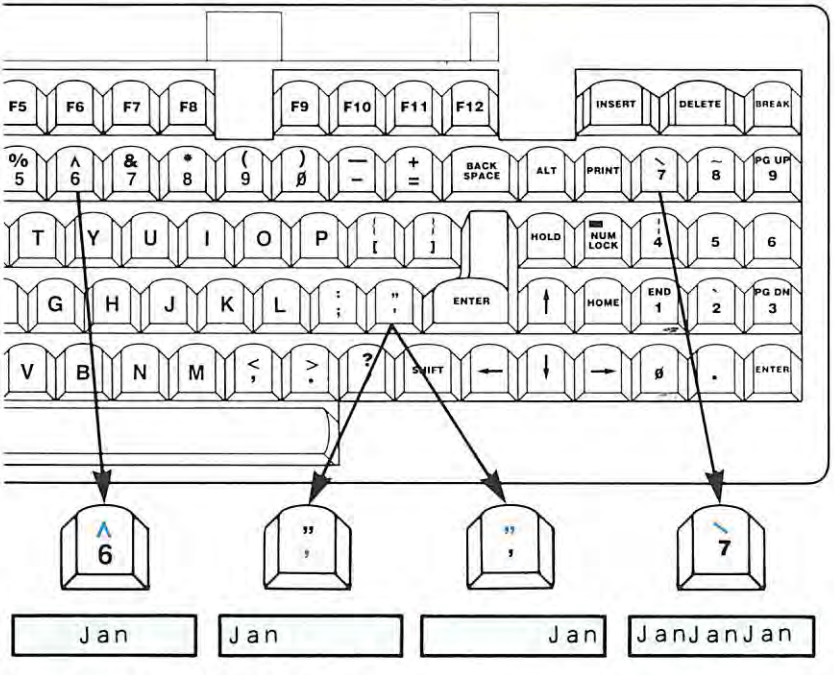


Figure 5-5. Label-Prefix Characters

Must you start a label with a prefix character? In most cases, the answer is "no". Since 1-2-3 often assumes from your first keystroke that you are typing a label, you need not enter a prefix. In this case, 1-2-3 automatically places a prefix-character at the beginning of your label when you press **[ENTER]**. (For details, see the /Worksheet Global Label-Prefix command, page 10-15.)

You will want to start a label with a prefix-character in two situations:

1. **To force a particular label alignment**. For instance, if left-aligned labels are the current standard, you can force a label to be right-aligned by starting it with a double quote ("):

   "Monthly Rate

2. **To prevent 1-2-3 from assuming the entry is numeric**. Label-prefix characters are the answer to a question that may have occurred to you:

   If 1-2-3 uses the first character to decide *LABEL* vs. *VALUE*, how do you enter a label like:

   78 Highland Avenue

The answer is: Start the entry with a label-prefix character. If you try to make an entry like this without a prefix, 1-2-3 will *beep* and switch to Edit mode.

Is the prefix really part of the label? Well, yes and no:

Yes. 1-2-3 stores the prefix character you type as part of the cell entry. Once a label has been entered, you can see its prefix character by moving the cell pointer to the cell and looking at the control panel. The current contents of the highlighted cell (i.e., the pointer location) are displayed on line 1. The prefix character is also displayed. 1-2-3 uses this character to align the label each time it displays the cell.

No. The prefix character itself does not appear in the worksheet when 1-2-3 displays the cell.

Value Mode and Label Mode

Why does 1-2-3 distinguish between the processes of entering a numeric value and entering a label? After you complete an entry, 1-2-3 must draw the distinction between a value and a label because one is an instruction to calculate, and the other merely a string of characters to be displayed.

But why distinguish the entries while you are typing them? The answer is that 1-2-3 allows you to do something extra when you're entering a number or formula. You can use the cell pointer to indicate the cells to be used in a formula, rather than typing their addresses. This is called *pointing*. ("Pointing" is described in Chapter 8, "Writing Formulas".)

Fixing Mistakes—Changing Your Mind

1-2-3 allows you to change your mind with relative ease. You can change an entry while you're in the middle of typing it. Or you can return to the entry later and revise or replace it. The same facilities are also handy on those rare occasions when you make a mistake.

We'll describe the various ways in which you can change entries, proceeding from the simple to the sophisticated.

The [BACKSPACE] Key

The [BACKSPACE] key, located above [ENTER], works very much like the backspace key on a typewriter. In Value or Label mode, pressing [BACKSPACE] erases the last character you typed.

Cancellation: [ESC]

Whenever you are typing an entry—in Value mode or Label mode—you can cancel the entire entry and return to Ready mode just by pressing [ESC]—if you have not already pressed [ENTER] or a pointer-movement key.

If you are entering a formula in Point mode when you decide to cancel, you may have to press [ESC] two or more times.

As a shortcut, you can issue a *Break* by pressing [BREAK]. This is the closest thing 1-2-3 has to a "panic button". [BREAK] cancels whatever you are doing and returns you to Ready mode.

Replacement: [ENTER] Again

The easiest way to change a short entry after it has been entered is to replace it with another. Just move the cell pointer to the cell and type another entry, ending with [ENTER]. The cell's original contents are lost, so make sure you are replacing the right cell's contents and not losing something valuable.

Erasure

Use the /Range Erase command to erase the contents of one or more cells. Erasing is not the same as replacing an entry with a few [SPACE] characters. A cell that has been erased contains no characters at all.

These methods are simple, but there is also a way to change an entry character-by-character, rather than simply starting over again. This is called Edit mode.

Edit Mode

Sometimes, it is necessary to make a change to an entry other than erasing the last character you typed. For instance:

- You are typing the label "Forth Quarter Profits—1985" and realize that you have omitted the "u" from the first word.
- In reviewing a worksheet you have already created, you decide to replace "C3" with "C15" in the formula:

  +D4*C3*@HLOOKUP(A7,D6..G14,3)

To allow this sort of change, 1-2-3 has an Edit mode. You can invoke Edit mode while you're typing an entry. Or you can move the cell pointer to any cell that requires a change and revise the entry previously made there.

Entering Edit Mode. To enter Edit mode while you are typing an entry or while you're moving about the worksheet, press the [F2/EDIT] key. The indicator in the upper right corner changes to *EDIT*.

Sometimes, 1-2-3 automatically switches to Edit mode. If you enter a number or formula that it can't understand, 1-2-3 *beeps* and permits you to edit the entry. For instance, this occurs when you type a label that starts with a digit and have forgotten to type a label-prefix character.

In Edit mode, 1-2-3 places a copy of the cell's contents (i.e., number, label, or formula) on line 2 of the control panel and places the cursor at the end of the entry. You can change the entry by moving the cursor, deleting characters, and inserting characters.

Moving the Cursor. In Edit mode, these keys have different meanings than they do in Ready mode:

Key	Function
←	Move cursor 1 character to left
→	Move cursor 1 character to right
[SHIFT]-[TAB]	Move cursor 5 characters to left (see note below)
[TAB]	Move cursor 5 characters to right (see note below)
[HOME]	Move cursor to first character
[END]	Move cursor to last character

Note. Pressing the [TAB] key alone invokes the [TAB] (forward tab) function. Holding down [SHIFT] and pressing [TAB] invokes the [SHIFT]-[TAB] (backward tab) function. [CTRL]-→ is equivalent to [TAB]. [CTRL]-← is equivalent to [SHIFT]-[TAB].

Deleting. 1-2-3 has two different ways to delete individual characters: [BACKSPACE] works right-to-left and [DELETE] works left-to-right.

Key	Function
[BACKSPACE]	Delete character preceding cursor and close space
[DELETE]	Delete character at cursor and close space

Inserting. Type new characters to be inserted at the cursor position. 1-2-3 always inserts new characters in Edit mode. There's no way to overstrike or replace characters.

The [F9/CALC] Key. In Ready mode, pressing [F9/CALC] causes 1-2-3 to perform a recalculation pass on all formulas in the worksheet. You can also use [F9/CALC] in Edit mode when you are editing a formula. It converts the formula into a number—the formula's current value. No general recalculation takes place.

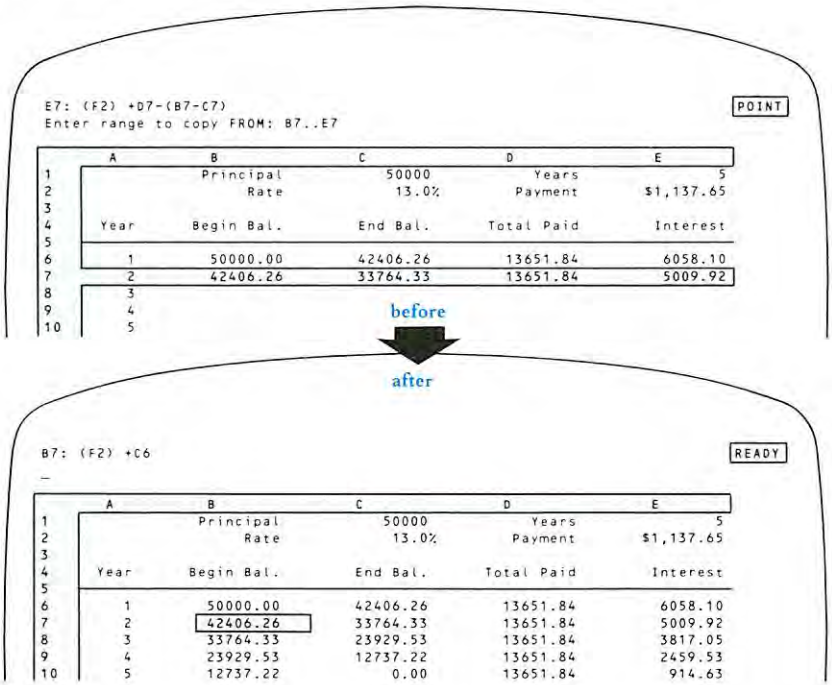
However, be careful—there is no way to convert the number back into a formula.

Getting Out of Edit Mode

When you have finished editing any entry, you can press [ENTER] to store the revised entry in the cell. 1-2-3 treats it exactly like any other new entry.

If you want to get fancy, there are some alternatives. The vertical-movement keys—↑, ↓, **[PG UP]**, **[PG DN]**—all store the edited entry and move the pointer, as previously described. Be careful, though—the other pointer-movement keys have different meanings in Edit mode than they do in Label and Value mode.

If you invoked Edit mode from Value or Label mode, you can return there by pressing **[F2/EDIT]** again. You can use **[F2/EDIT]** repeatedly while making a single entry to switch back and forth between Edit mode and Value or Label mode.



	A	B	C	D	E
1		Principal	50000	Years	5
2		Rate	13.0%	Payment	$1,137.65
3					
4	Year	Begin Bal.	End Bal.	Total Paid	Interest
5					
6	1	50000.00	42406.26	13651.84	6058.10
7	2	42406.26	33764.33	13651.84	5009.92
8	3				
9	4				
10	5				

	A	B	C	D	E
1		Principal	50000	Years	5
2		Rate	13.0%	Payment	$1,137.65
3					
4	Year	Begin Bal.	End Bal.	Total Paid	Interest
5					
6	1	50000.00	42406.26	13651.84	6058.10
7	2	42406.26	33764.33	13651.84	5009.92
8	3	33764.33	23929.53	13651.84	3817.05
9	4	23929.53	12737.22	13651.84	2459.53
10	5	12737.22	0.00	13651.84	914.63

Figure 5-6. Creating New Entries with the /Copy Command

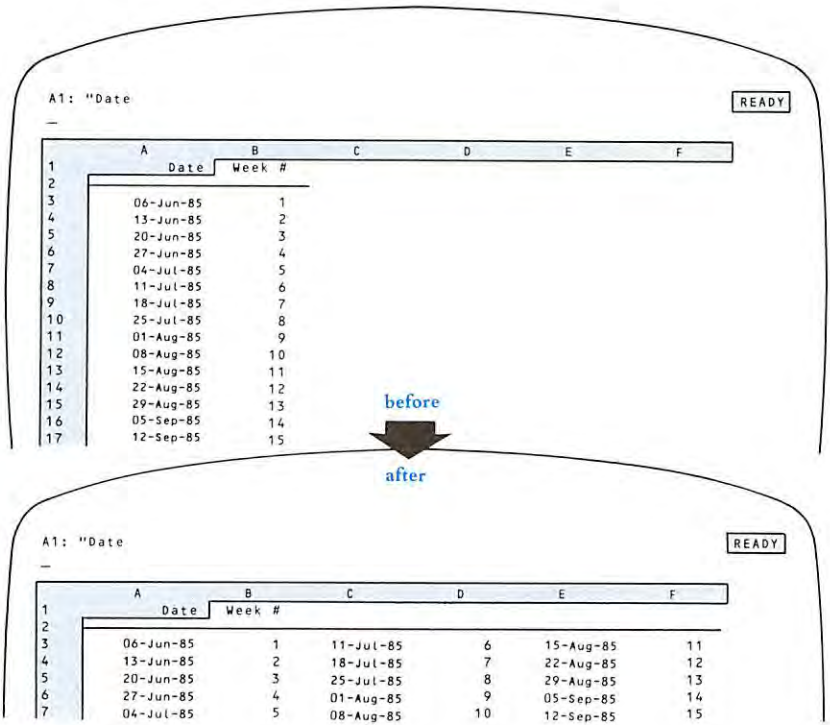


Figure 5-7. Transferring Entries with the /Move Command

Transferring Entries from Other Cells

Two of 1-2-3's most powerful commands—/Copy and /Move—transfer entries from cell to cell. The /Copy command saves you the trouble of typing the same thing over and over again. It's useful in building worksheets that use similar formulas in many different cells. For instance, /Copy can quickly create a five-year projection (Figure 5-6).

The /Move command helps you to redesign a worksheet without having to retype formulas. You can quickly transform the appearance of a worksheet (Figure 5-7).

Retrieving Entries from Files

You can load data from disk storage into a worksheet as numeric (number and formula) entries and/or as label entries. The most common use is to reload a worksheet that you created previously and stored (/File Save and /File Retrieve). But you can also perform more sophisticated data retrieval operations, such as combining worksheets (/File Combine), loading partial worksheets (/File Combine again), and "importing" data produced by other programs (/File Import).

For details on using 1-2-3 to process information in files, see Chapter 14, "File Commands".

6. Using 1-2-3 Commands

During every 1-2-3 session, you issue **commands**. For instance, the way to end a 1-2-3 session is to issue the /Quit command. Other 1-2-3 commands perform such functions as:

- Copying, moving, and deleting data from the worksheet.
- Transferring data between the worksheet and disk storage.
- Printing reports.
- Drawing graphs.
- Processing databases.

Complete details concerning the individual 1-2-3 commands appear in the "Command Skills" section. This chapter is a general discussion of the techniques you use to issue commands.

1-2-3 commands are easy to use because they are interactive. A command may have one or more steps. At each step, 1-2-3 tells you what to enter next: a number, a range, a filename, etc. Messages from 1-2-3, called **prompts**, appear on the second and third lines of the control panel. Here are some examples:

Second Line Prompts (What to Do)

Enter range to copy FROM:
Enter name of file to retrieve:
Enter Sort order (A or D):

Third Line Prompts (Menu Choice Explanations)

Copy a cell or range of cells
Cancel graph settings
Percent format (x.xx%)
End 1-2-3 session (Have you saved your work?)

After you have entered all the specifications, 1-2-3 executes the command and (usually) returns to Ready mode. Let's take a closer look at each of the steps involved in using a 1-2-3 command:

1. Selecting a command.
2. Responding to prompts.
3. Executing a command.

Selecting a Command

Each 1-2-3 command has a name, consisting of one or more **command keywords**. For example:

/Copy
/Range Erase
/Worksheet Column-Width Set
/Quit
/Graph Options Titles

1-2-3's commands are organized into a multi-level *menu* system. You build up a command name by selecting one keyword at a time from menus that 1-2-3 displays in the control panel. The only thing that 1-2-3 doesn't automatically tell you is how to start:

To start a command, press / (slash) when you are in Ready mode.

Thereafter, 1-2-3 displays menus of keywords to keep you informed of the choices (Figure 6-1). You can select a keyword from each menu in either of two ways:

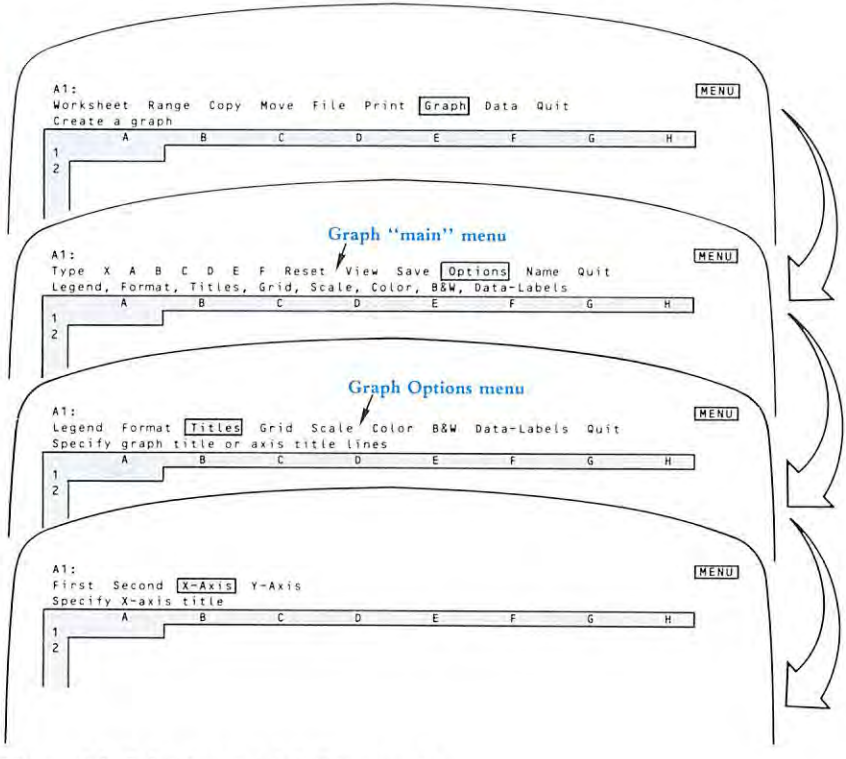


Figure 6-1. Selecting a 1-2-3 Command

Move the menu pointer to a keyword, then press [ENTER]. Use the pointer-movement keys to move the menu pointer—not the cell pointer. As you move the pointer among the keywords, an explanatory prompt for each one appears on the line below. (For additional details see "Using Menus", page 6-8.)

Type the keyword's first letter. Type in uppercase or lowercase—they are equivalent in 1-2-3 commands. The location of the pointer when you do this is irrelevant. 1-2-3's command menus are constructed so that each command keyword in a given menu begins with a different letter.

Typing is the faster of the two methods. But you can mix methods. It depends on what you feel most comfortable with. After a few 1-2-3 sessions, many people begin to think of the commands they use most often in terms of their code letters:

/Worksheet Insert Column is the /WIC command
/Graph Options Legend is the /GOL command

Responding to Prompts

After you select a command, 1-2-3 prompts you to supply more information. Sometimes you supply this information through additional menu choices in which menus blend together—and, in fact, there's no particular need to distinguish among them. In other cases, 1-2-3 prompts you to enter information on the second line of the control panel—a filename, a range specification, a label for a graph you're constructing, a number, etc. Here are some general notes about this process.

Filenames and Graph Names. Whenever 1-2-3 prompts you to enter a filename, it displays a menu that lists all files of the appropriate type that are stored in the current directory. You can select one of these names by pointing to it. Or you can enter any filename by typing the entire name.

Similarly, 1-2-3 prompts you with a list of existing *graph names* when you are creating, deleting, or using a particular graph name (page 16-12).

Range Names. When 1-2-3 prompts you to indicate a range, pressing [F3/NAME] displays a menu of the currently defined *range names*. You can select one of these names by pointing to it. Or you can specify any range by typing its name, or by typing the cell addresses of two diagonally opposite corners (Chapter 7, "Indicating Cell Ranges").

Typing New Entries. In many cases, 1-2-3 prompts you to type a new entry (Figure 6-2). Note that 1-2-3 automatically goes into Edit mode so that you can use the pointer-movement keys to revise your response while you are typing it.

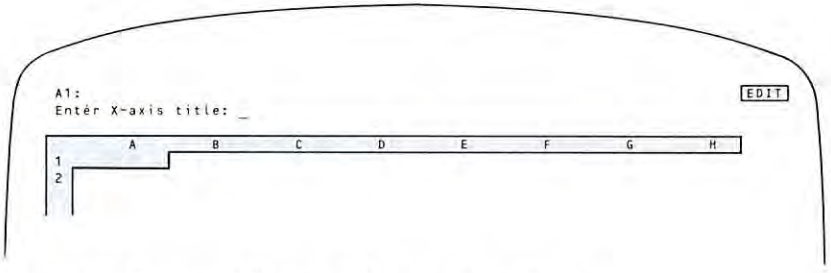


Figure 6-2. Command Prompt—Typing a New Entry

Revising Entries. In other cases, 1-2-3 both displays a prompt and starts you out with some text—a default value or an entry that you previously made at the same prompt (Figure 6-3). The idea is that it's probably easier for you to accept or revise an existing entry than to type a new one.

- To accept the entry, just press **[ENTER]**.
- You are in Edit mode, so you can revise the entry using the pointer-movement keys, **[DELETE]**, and **[BACKSPACE]**.
- If you'd rather type a new entry, press **[ESC]** to clear the text from the prompt line, then start typing. This is the way Edit mode always works.

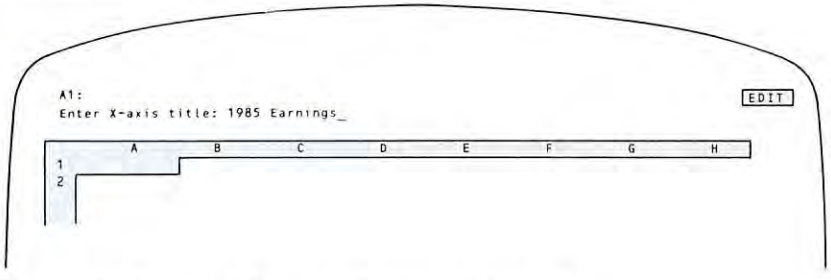


Figure 6-3. Command Prompt—Revising Existing Text

Exception: In some cases, 1-2-3 displays an existing or default value, but you can revise it. Your choices are to press **[ENTER]** to accept the value or to type a new value to replace it (Figure 6-4).

Executing a Command

When you've supplied 1-2-3 with all the information it needs, it executes the command. After command execution, a formula recalculation pass may take place. If the current recalculation method is *Automatic* and the command has changed the contents of any cell, then 1-2-3 recalculates every formula in the "new" worksheet at least once. (For a discussion of how 1-2-3 recalculates formulas, see page 10-5.)

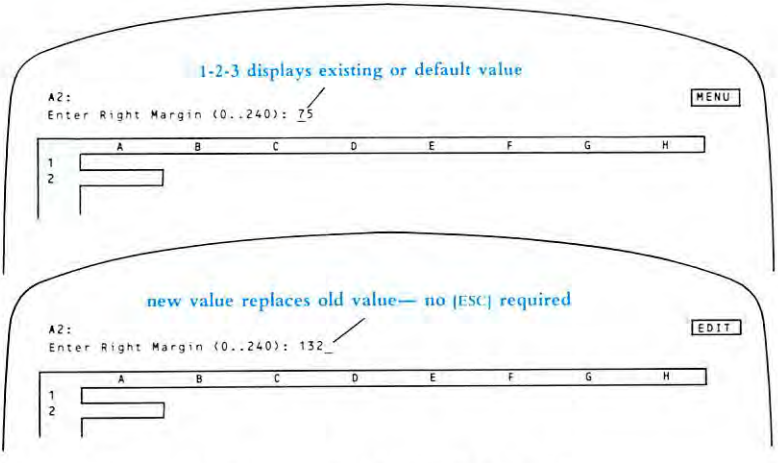


Figure 6-4. Command Prompt—Replacing Existing Text

After Command Execution

After 1-2-3 executes a command, it usually returns to Ready mode. You can then enter another command, move the cell pointer, or type an entry.

"Sticky" Menus. In some cases, however, 1-2-3 anticipates that you'll want to issue several related commands in succession. For this reason, 1-2-3 does not return to Ready mode, but "sticks" in the menu of related commands (Figure 6-5).

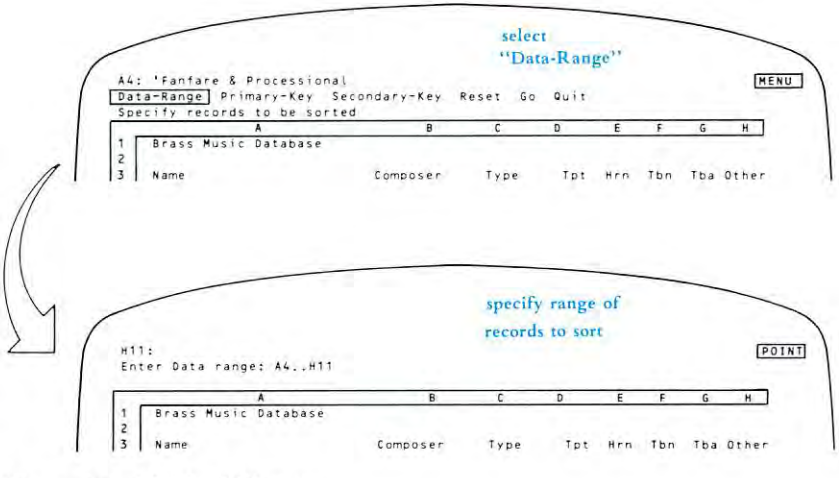


Figure 6-5. "Sticky" Menus

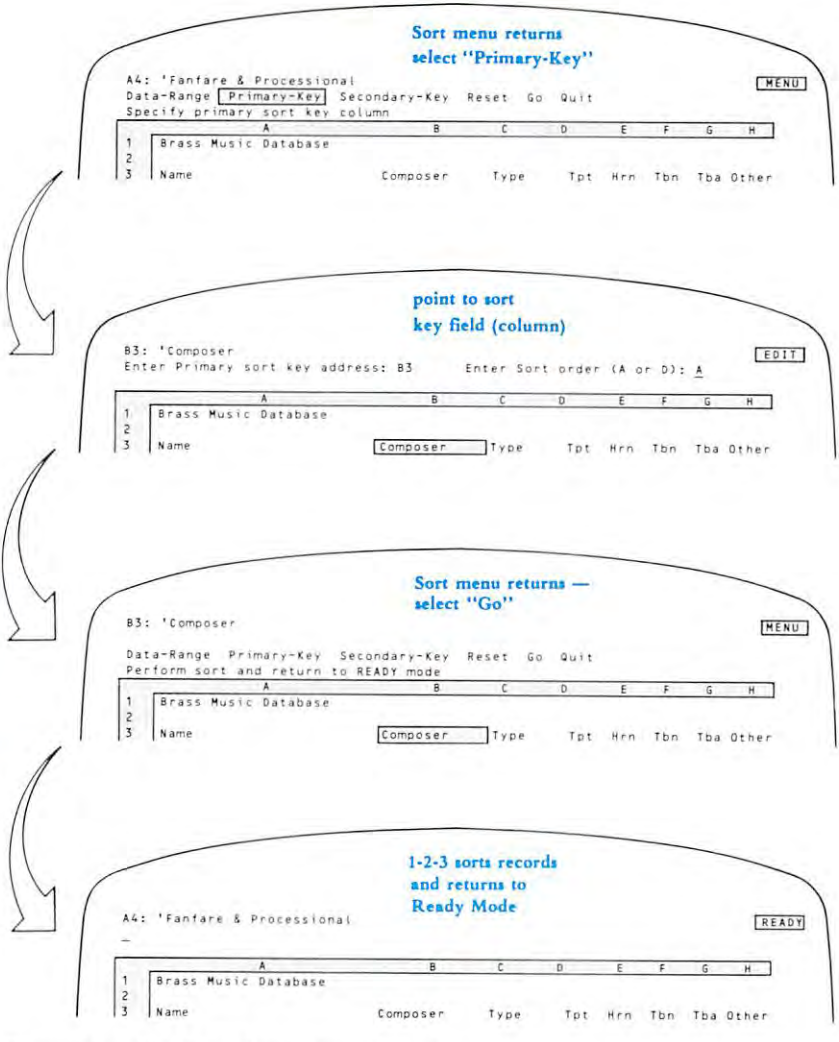


Figure 6-5. "Sticky" Menus (continued)

These "sticky" menus have Quit options so that you can return to Ready mode. In some cases, several such menus stand between you and Ready mode, requiring several Quits. As an alternative to Quit, you can return to Ready mode by "undoing" the command, as explained in the next section.

Undoing Commands

What happens if you issue the wrong command by mistake? If you catch yourself before 1-2-3 has executed the command, then it's simple:

[ESC]. Each time you press **[ESC]** while you are entering a command, 1-2-3 backs up a step (Figure 6-6).

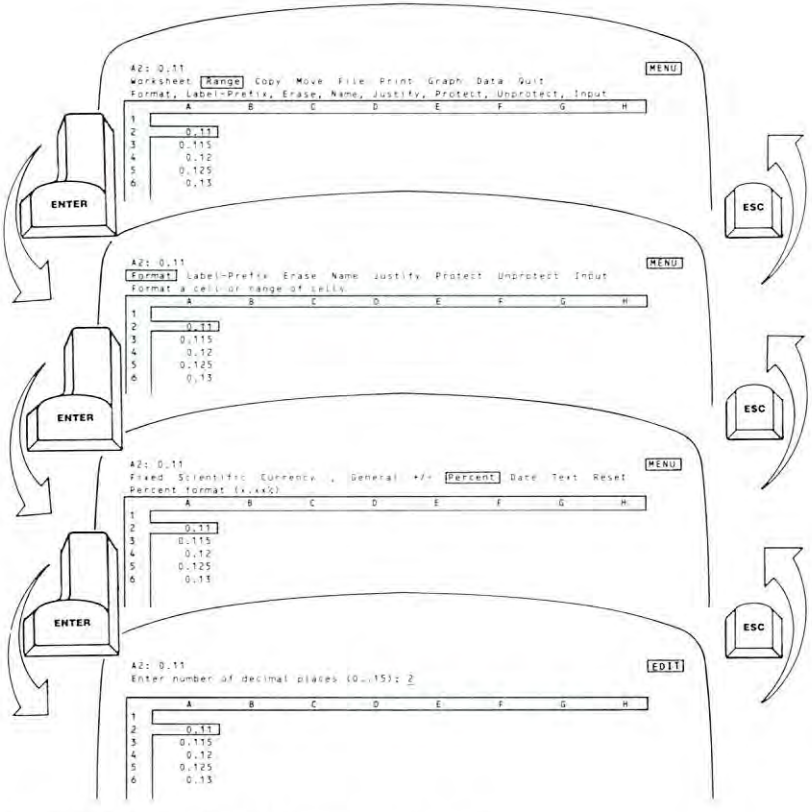


Figure 6-6. "Undoing" a Command Selection

[BREAK]. Pressing **[BREAK]** cancels a command and returns you to Ready mode. A *Break* is equivalent to pressing **[ESC]** enough times to completely undo whatever you started.

But how do you undo a command that you've already executed? This is harder. See the "Command Skills" section of this manual to determine the best way to proceed.

Using Menus

One of the basic rules of the computer world is:

The more characters you type, the greater your chances of making a mistake.

And one of the main questions asked by users of computer programs is:

What do I do next?

In recognition of both these points, 1-2-3 often uses *menus* to communicate with you. A menu is simply a list displayed in the control panel that informs you of your options and lets you select one of them. Menus play a role in several 1-2-3 command situations (Figure 6-7). (The Lotus Access System, discussed in Chapter 21, is also menu-driven.)

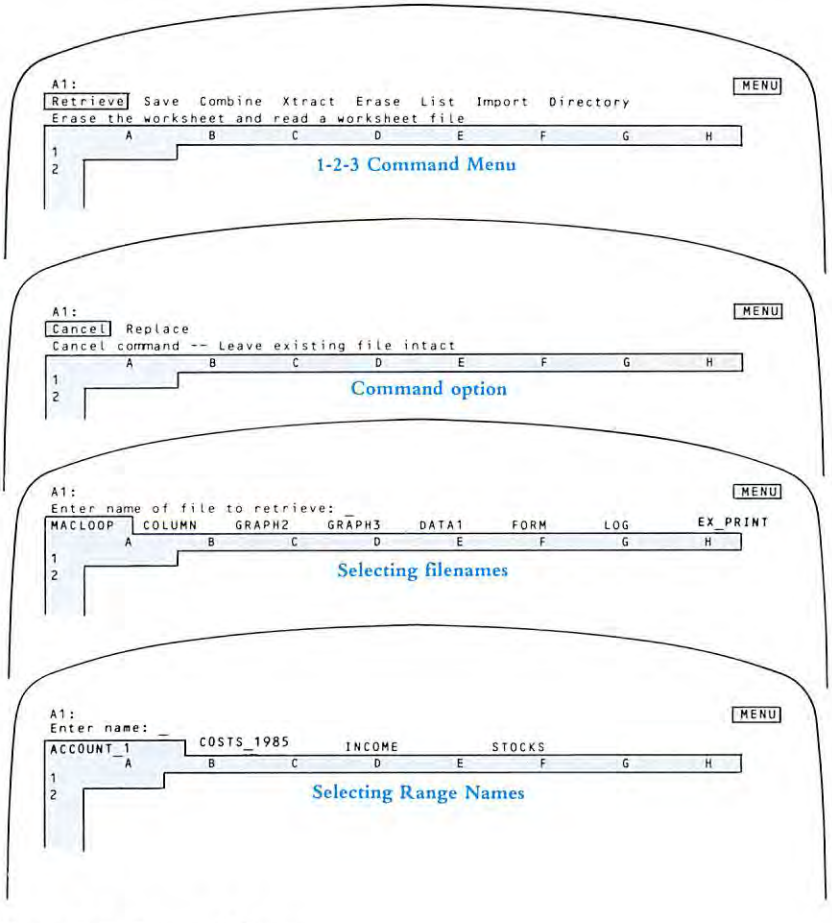


Figure 6-7. Types of Menus

In some cases, the list of options is complete. When 1-2-3 shows you a list of command keywords, for example, that's all there is. You must select one of these keywords in order to proceed with the command.

In other cases, the menu is not restrictive. For example, when you issue the /File Retrieve command, 1-2-3 displays a menu of currently existing worksheet files from which you can select files.

What's in a Menu?

A menu is a list of words. In the simplest cases (e.g., command keyword menus), the entire list fits on a single line, and the menu has a simple "ring" structure. The first and last entries are next to each other (Figure 6-8).

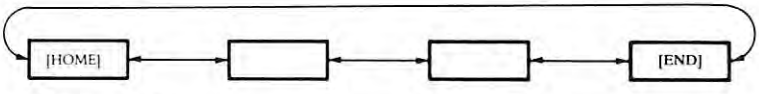


Figure 6-8. One-Line Menu

Multiple-Line Menus

When there are more items in the menu than can fit in a single line, the list has a two-dimensional structure—there's an up-down sense in addition to a left-right sense (Figure 6-9). Note that the first and last entries are still "next to" each other, even if they are several lines distant. And the several lines are linked together, again producing a "ring" structure.

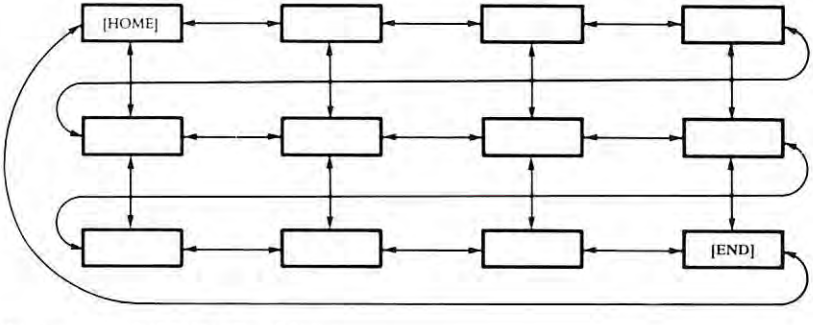


Figure 6-9. Multiple-Line Menu

Selecting Menu Choices

There are two ways to select an item from a menu: by pointing and by typing.

Pointing to Menu Choices

When 1-2-3 displays a menu, it changes the mode indicator in the upper right corner to *MENU*. In Menu mode:

Move the menu pointer to highlight a menu item, then press [ENTER] to select the item.

The arrow keys move the pointer to the next item in a particular direction. [HOME] and [END] jump to the menu's first and last items, which may be on different lines.

Repeatedly pressing → or ← makes the pointer visit every item on the menu, moving between the end of one line and the beginning of the next. ↑ and ↓ work only with multiple-line menus.

Typing Menu Choices

As an alternative to pointing to your choice, you can type it. Here are two important points.

- When selecting a command keyword by typing, just press the first letter (uppercase or lowercase). 1-2-3 immediately goes to the next step of the command.
- When creating a new filename, range name, or graph name, you must type it in its entirety, ending with [ENTER].

As soon as you begin typing a name, 1-2-3 realizes that you are not using the *pointing* method. Accordingly, it erases the menu and places you in Edit mode, changing the indicator in the upper right corner to *EDIT*. This means that while you are typing, you can use the pointer-movement keys to revise the name.

Returning to Menu Mode

What if you start typing a filename, range name, or graph name, then decide to point to a menu choice after all? Just press [ESC] twice:

1. The first [ESC] erases what you've typed so far. You could start typing a name again at this point.

2. The second [ESC] returns you to Menu mode. The menu reappears and the pointer-movement keys will move the menu highlight.

The example in Figure 6-10 illustrates how everything fits together.

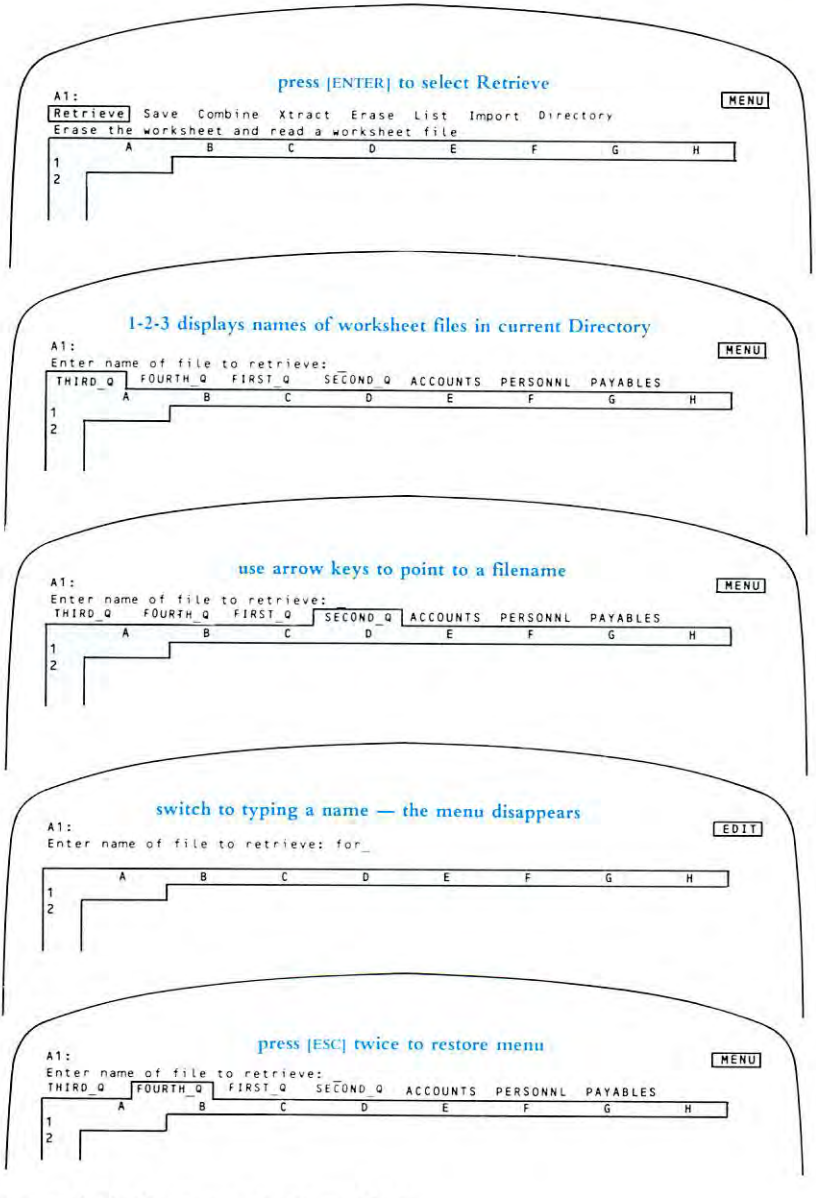


Figure 6-10. Returning to Menu Mode

Range Name Menus

In many situations, 1-2-3 prompts you to indicate a range of cells to be processed. In such cases, you can press the **[F3/NAME]** key to display a menu of currently defined *range names*, then select a name (page 7-13).

7. Indicating Cell Ranges

In many different situations, you specify a **range** of cells for 1-2-3 to process as a unit. Sometimes 1-2-3 prompts you to indicate a range. For example:

- In the /Data Fill command, you indicate a range of cells to be filled with numbers.
- In the /Move command, you indicate the range of cell entries to be relocated to another part of the worksheet.
- In the /Print command, you indicate a range of cells to be printed.

You may also specify ranges as arguments to some of 1-2-3's functions. In such cases, the program doesn't prompt you to indicate a range—you must be aware of the correct way to use the function.

@SUM(B10..B17)
@HLOOKUP(G25,K25..P35,3)

(*Functions* and *arguments* are explained in the "Functions" section (page 8-22) and in Chapter 19, "1-2-3 Function Reference".)

What's in a Range?

A range is a group of one or more cells in a rectangular block (Figure 7-1).

Since a range is a rectangle, you can identify it by naming the cells in two diagonally opposite corners. These four phrases all describe the same range:

FROM cell B5 *TO* cell E9
FROM cell B9 *TO* cell E5
FROM cell E9 *TO* cell B5
FROM cell E5 *TO* cell B9

Indicating Ranges

How do you indicate a range to 1-2-3? The examples of functions above illustrate one way—typing cell addresses. There are three ways:

1. Typing cell addresses.
2. Expanding the cell pointer to highlight the entire range.
3. Using a range name.

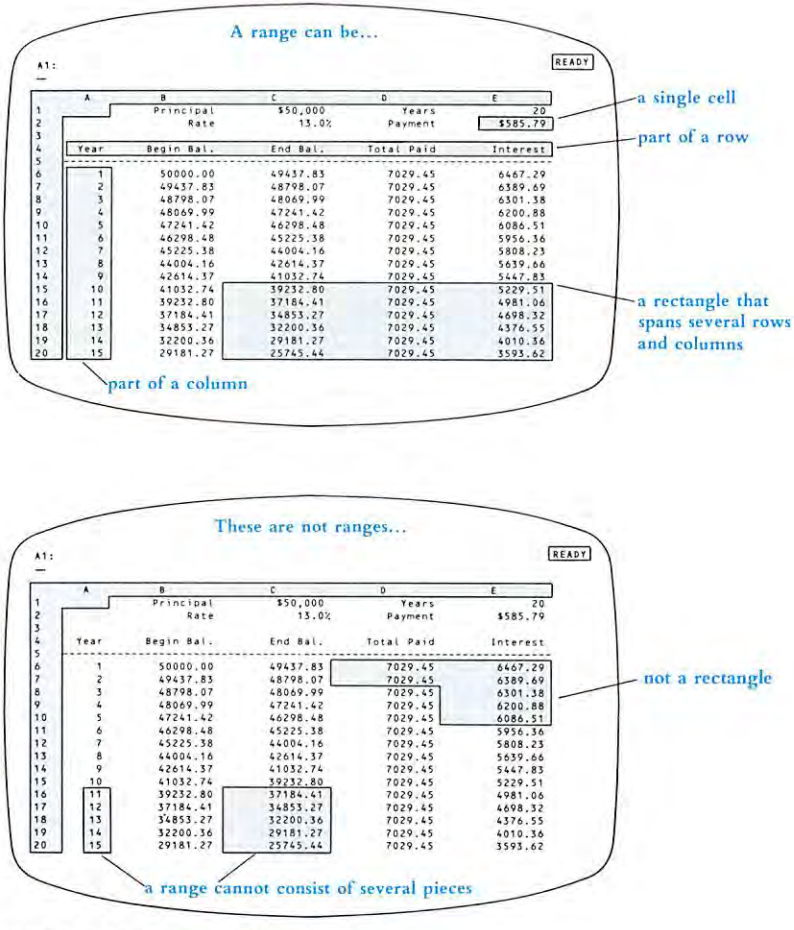


Figure 7-1. Ranges and Non-Ranges

Typing Cell Addresses

You can specify a range by typing the address of any two diagonally opposite corners (e.g., A14..C11). You must use at least one period to separate the two addresses; more than one is fine. 1-2-3 always edits your entry down to exactly two periods. However, spaces are forbidden in range specifications.

If you are typing a range specification in response to a 1-2-3 prompt, be sure to press **[ENTER]** when you're finished:

Enter Data range: A5....F150 **[ENTER]**
Enter range to format: G11..A20 **[ENTER]**

If you are indicating the range in the middle of a formula, do not press [ENTER] right away—you have to finish the formula first. For example:

@MAX(12.5,F101..H110,D50) [ENTER]
+ 100 – @SUM(B4..B16)/12 [ENTER]

Single-Cell Ranges

In many situations calling for a range, you can use a single cell address. That's because a single cell is a range—the smallest possible one. Some commands and functions, however, require you to indicate a range consisting of more than one cell.

Conversely, there are many situations in which 1-2-3 expects the address of a single cell, but will also accept a range. This flexibility is of particular use when you use range names to identify individual cells.

Typing Absolute Ranges

Range specifications in formulas can be **relative**, **absolute**, or **mixed**—just like individual cell addresses. (For a complete explanation of these terms, see Chapter 8, "Writing Formulas".) You indicate these choices by selectively including the "$" character when typing range specifications. This chart shows the meanings of similar range specifications in a formula:

Range	Meaning in a formula typed in cell G11
G5..G8	*FROM:* the cell 6 rows above this one *TO:* the cell 3 rows above this one
$G$5..$G$8	*FROM:* cell G5 *TO:* cell G8
$G5..G$8	*FROM:* the cell 6 rows above in column G *TO:* the cell in row 8 of this column
$G$5..G8	*FROM:* cell G5 *TO:* the cell 3 rows above this one

Note. It is not necessary to use an absolute range specification while issuing a 1-2-3 command. 1-2-3 distinguishes between absolute and relative ranges only in formulas. (However, specifying an absolute range at a command prompt doesn't do any harm, either.)

Expanding the Cell Pointer

In Ready mode, the cell pointer highlights a single cell in the worksheet. But when you are entering a formula or responding to certain 1-2-3 prompts, you can expand the pointer to highlight an entire range.

The same keys that move the cell pointer also cause it to expand, but only after one corner of the pointer has been "anchored". We'll take a closer look using two examples, then explain the general rules.

B6: (F2) +C1 READY

	A	B	C	D	E
4	Year	Begin Bal.	End Bal.	Total Paid	Interest
5	------	------	------	------	------
6	1	50000.00	42406.26	13651.84	6058.10
7	2	42406.26	33764.33	13651.84	5009.92
8	3	33764.33	23929.53	13651.84	3817.05
9	4	23929.53	12737.22	13651.84	2459.53
10	5	12737.22	0.00	13651.84	914.63
11	------	------	------	------	------

Move pointer to B6 and invoke /Range Format command. Select the "Comma,2" format. 1-2-3 prompts for a range and anchors one corner of pointer.

B6: (F2) +C1 POINT
Enter range to format: B6..B6

	A	B	C	D	E
4	Year	Begin Bal.	End Bal.	Total Paid	Interest
5	------	------	------	------	------
6	1	50000.00	42406.26	13651.84	6058.10
7	2	42406.26	33764.33	13651.84	5009.92
8	3	33764.33	23929.53	13651.84	3817.05
9	4	23929.53	12737.22	13651.84	2459.53
10	5	12737.22	0.00	13651.84	914.63
11	------	------	------	------	------

Use → and ↓ to expand pointer

E10: (F2) +D10-(B10-C10) POINT
Enter range to format: B6..E10

	A	B	C	D	E
4	Year	Begin Bal.	End Bal.	Total Paid	Interest
5	------	------	------	------	------
6	1	50000.00	42406.26	13651.84	6058.10
7	2	42406.26	33764.33	13651.84	5009.92
8	3	33764.33	23929.53	13651.84	3817.05
9	4	23929.53	12737.22	13651.84	2459.53
10	5	12737.22	0.00	13651.84	914.63
11	------	------	------	------	------

Press [ENTER] to execute the command. 1-2-3 redisplays the range with commas inserted.

B6: (,2) +C1 READY

	A	B	C	D	E
4	Year	Begin Bal.	End Bal.	Total Paid	Interest
5	------	------	------	------	------
6	1	50,000.00	42,406.26	13,651.84	6,058.10
7	2	42,406.26	33,764.33	13,651.84	5,009.92
8	3	33,764.33	23,929.53	13,651.84	3,817.05
9	4	23,929.53	12,737.22	13,651.84	2,459.53
10	5	12,737.22	0.00	13,651.84	914.63
11	------	------	------	------	------

Figure 7-2. Indicating a Range in a 1-2-3 Command

Example 1: Indicating the range B6..E10 in the /Range Format command (see Figure 7-2).

1. Move the cell pointer to cell B6.

2. Type /RF to invoke the /Range Format command. After , *(comma)* 2 format is selected, 1-2-3 makes cell B6 one corner of the range to be formatted, and automatically anchors the cell pointer there. To show this, 1-2-3 displays a prompt in the second line of the control panel:

Enter range to format: B6..B6

A cursor appears in the middle of cell B6, indicating that the pointer's "free" corner is also located there.

3. Using → and ↓, expand the cell pointer so that it covers the entire range from cell B6 to cell E10. Note how the cursor always indicates the free corner of the expanded pointer.

4. Press [ENTER] to finish the command. 1-2-3 obliges by formatting all 20 cells in the range.

Example 2: Entering the formula @SUM(D10..D6) in cell D12 (see Figure 7-3 on page 7-6).

1. Move the pointer to cell D12 and start typing the formula:

@SUM(

2. Use ↑ to move the cell pointer to cell D10. 1-2-3 displays each of the addresses D11 and D10 in the formula as you pass through each of these cells.

@SUM(D10

3. Press the period key (.). This locks the address D10 into the formula and anchors one corner of the cell pointer on cell D10. 1-2-3 confirms this by displaying in the control panel:

@SUM(D10..D10

The use of a period (.) here parallels its use when you type cell addresses.

4. Press ↑ again. This time, it expands the cell pointer upward. Each time you press ↑, it expands the pointer another row. Stop at cell D6.

5. Finish the formula by typing the ")" character then pressing [ENTER]. Note:

- The cell pointer returns to D12 (the formula cell).
- The character ")" itself is entered into the formula.

Pointing to Ranges: The Whole Story

With these examples in mind, let's consider the whole issue of indicating ranges with the cell pointer. The expanded cell pointer always covers the rectangle determined by the **anchor cell** and the **free cell**:

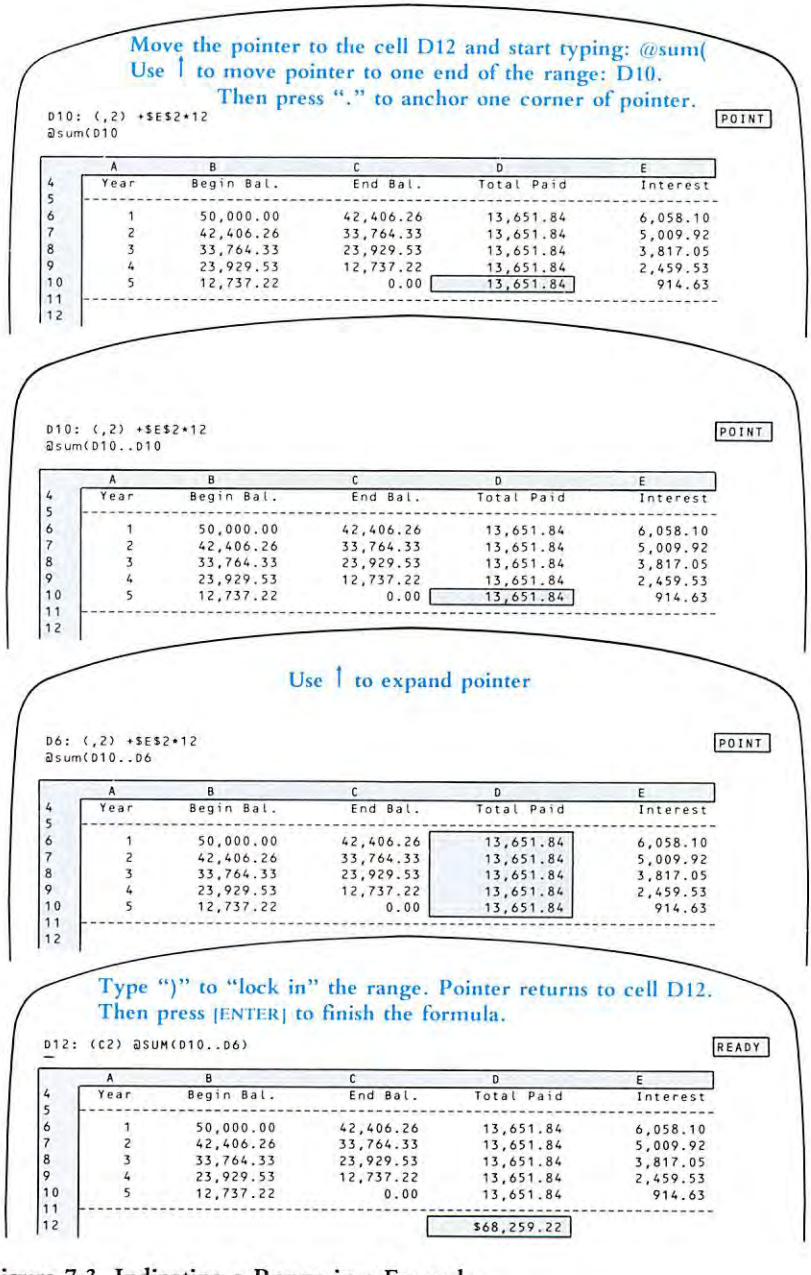


Figure 7-3. Indicating a Range in a Formula

Anchor Cell. One corner of the pointer is "anchored" to a particular cell, which we call the *anchor cell*.

Free Cell. The corner diagonally opposite the anchored corner is free to move anywhere in the worksheet. The location of this "free" corner is called the *free cell*. As you move the free corner around the worksheet, 1-2-3 adjusts the window, if necessary, to keep this corner onscreen. 1-2-3 displays a cursor in the middle of the free cell to remind you where it is (Figure 7-4).

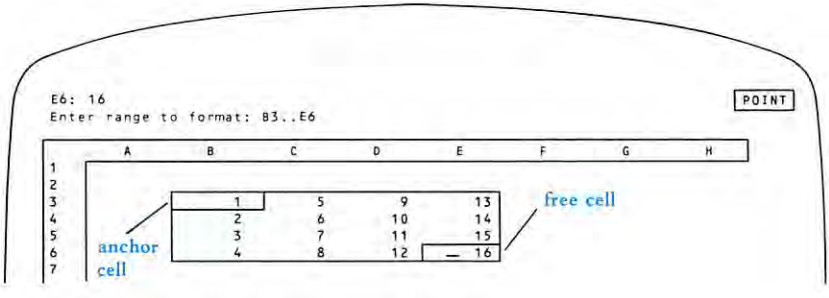


Figure 7-4. Free Cell and Anchor Cell

You move the free corner just as you move the cell pointer in Ready mode, by using the pointer-movement keys (Figure 7-5):

Key	Function
→	Move one cell right
←	Move one cell left
↑	Move one cell up
↓	Move one cell down
[TAB]	Move one page right (see note below)
[SHIFT]-[TAB]	Move one page left (see note below)
[PG DN]	Move one page down
[PG UP]	Move one page up
[HOME]	Move to upper left corner of worksheet
[END]-[HOME]	Move to lower right corner of active area

Note. Pressing the [TAB] key alone invokes the [TAB] (forward tab) function. Holding down [SHIFT] and pressing [TAB] invokes the [SHIFT]-[TAB] (backward tab) function. [CTRL]-→ is equivalent to [TAB]. [CTRL]-← is equivalent to [SHIFT]-[TAB].

Anchoring and Unanchoring the Cell Pointer

When it prompts you to enter a range, 1-2-3 often automatically anchors the cell pointer on the current cell. However, there are many situations, in which you have to do your own anchoring (and unanchoring). Your tools are the period key (.), the [ESC] key and the [BACKSPACE] key.

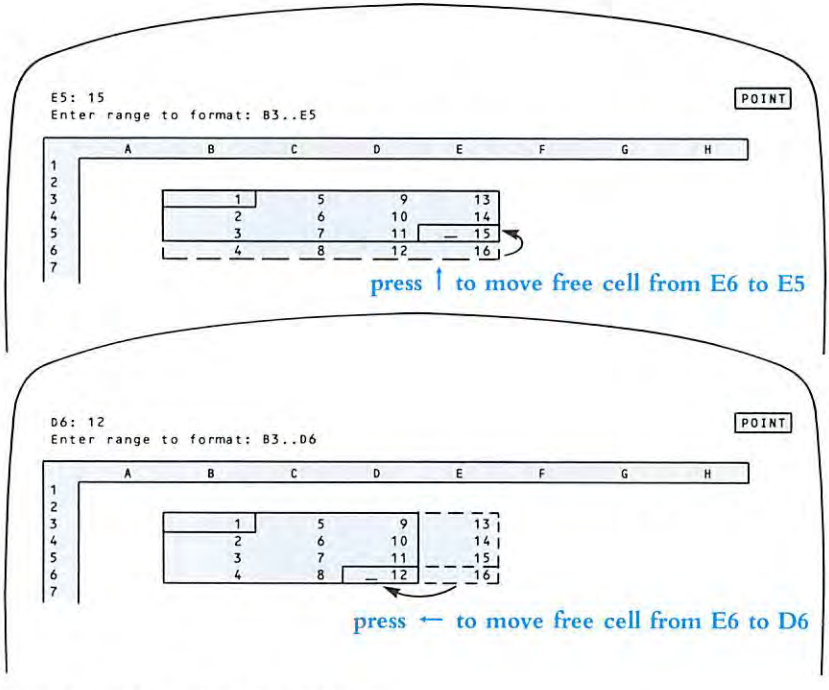


Figure 7-5. Expanding the Cell Pointer

The Period (.) Key. *If the pointer is not already anchored*: Pressing "." anchors one corner of the cell pointer to the current cell. The free corner is also on this cell for the moment, so that the current cell is the entire range. 1-2-3 shows this by displaying the one cell range in the control panel (Figure 7-6).

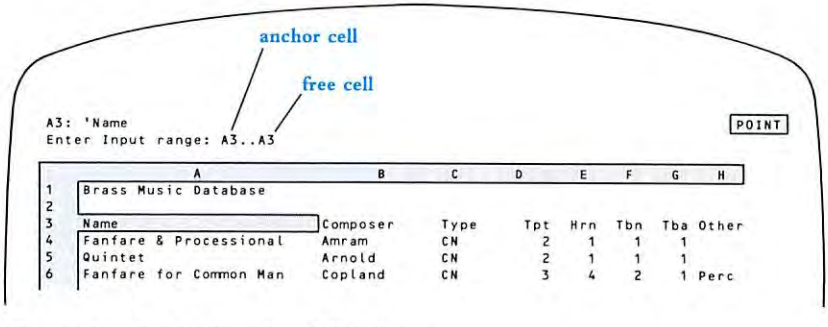


Figure 7-6. Anchoring the Cell Pointer

If the pointer is already anchored: Pressing "." moves the anchor to the next corner of the expanded pointer, usually in the clockwise direction. The direction depends on how you've expanded the pointer previously.

As a result, the free corner indicated by the blinking cursor also moves to be diagonally opposite the new anchor. 1-2-3 may readjust the window at this point, in order to keep the free corner onscreen.

Note. This doesn't change the range the expanded pointer indicates. It only reassigns the free cell and anchor cell (Figure 7-7).

The [ESC] Key. *If the pointer is not already anchored*: Pressing [ESC] when 1-2-3 is prompting you to indicate a range returns you to the previous command step. In a formula, pressing [ESC] returns the cell pointer to the current cell and erases the cell address from the end of the formula.

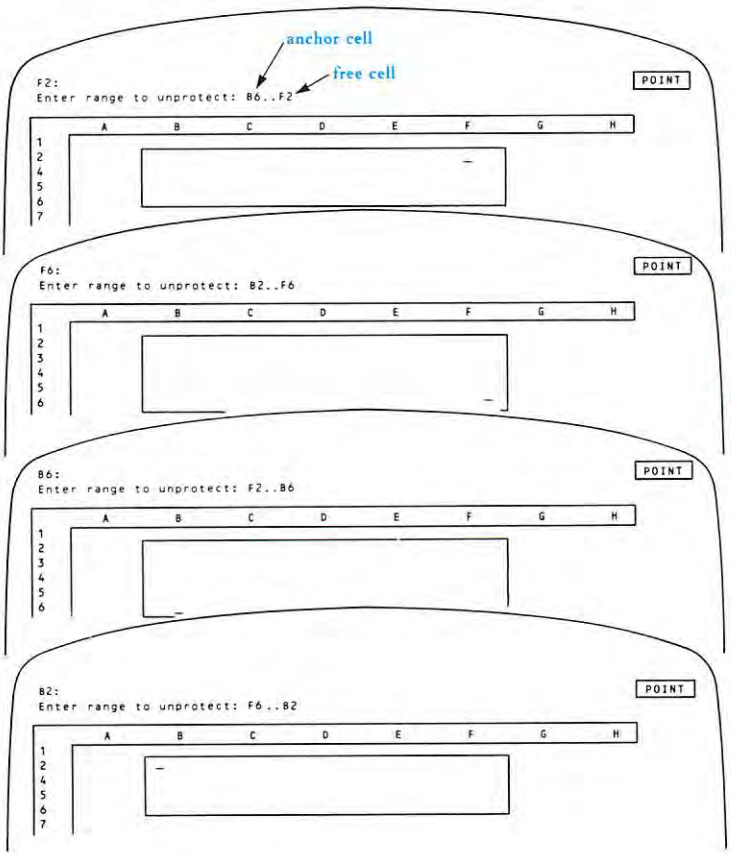
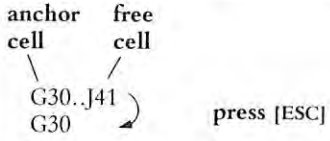
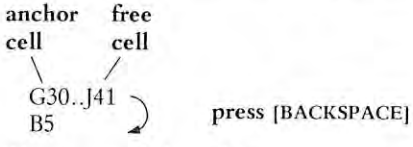


Figure 7-7. "Riding the Range"

If the pointer is already anchored: Pressing [ESC] once has a double effect: (1) It shrinks the expanded pointer so that it covers only the anchored cell, and (2) It removes the anchor. This allows you to relocate the pointer, and re-anchor it using the pointer-movement keys and the period (.) key:



The [BACKSPACE] Key. *Whether or not the pointer is anchored*: Pressing [BACKSPACE] cancels the range specification and returns the cell pointer, unanchored, to the current cell—the pointer location when you began the command or formula. As with [ESC], 1-2-3 remains in Point mode, so you can begin the range specification process again.

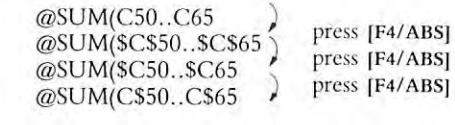


This is particularly useful when you want to point to a range that begins at the current cell, but 1-2-3 offers to reuse another, previously specified range. Pressing [BACKSPACE] effectively tells 1-2-3 to forget the previous range specification.

Pointing to Absolute Ranges

We've already described how to type "$" characters in a range specification in order to indicate a range with *absolute* or *mixed* cell addresses ("Typing Absolute Ranges", page 7-3). The [F4/ABS] key allows you to do this while you are indicating a range by *pointing* (Figure 7-8).

Pointing to Mixed Ranges. You can enter a range specification consisting of mixed addresses by typing "$" or by repeatedly pressing [F4/ABS] when pointing cell addresses into a formula:



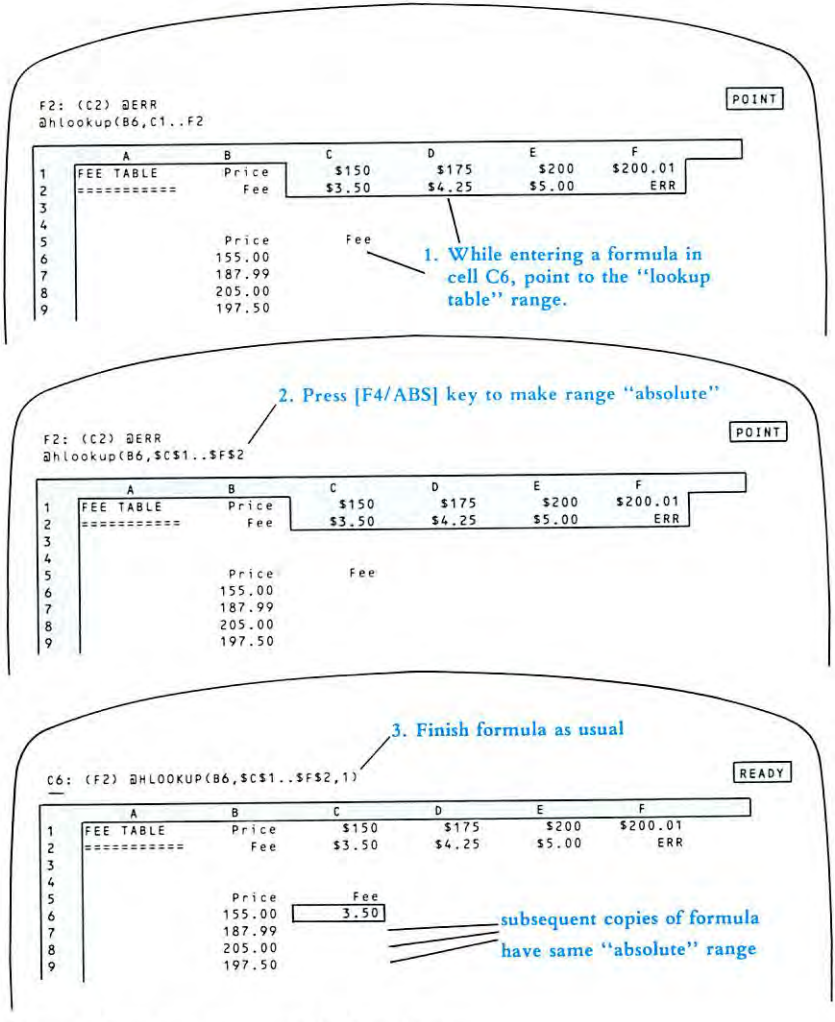


Figure 7-8. Pointing to an Absolute Range

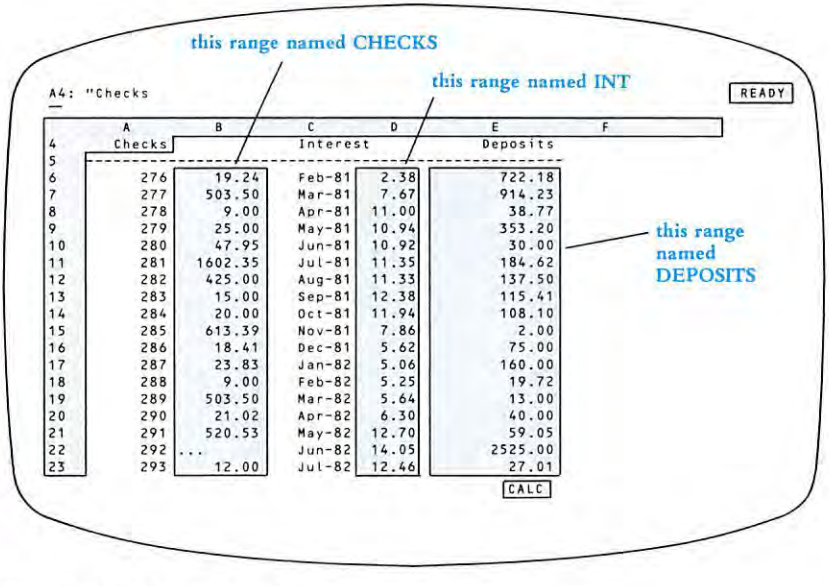
Using Range Names

1-2-3's column-row address system is simple enough, but it gives you no clue about what information a cell contains. Cell B47 might be storing something as important as the projected cash flow for an entire year, or as unimportant as a series of dashes.

A similar situation holds for ranges of cells. The formula @SUM(E6..E23) makes sense, but not quite as much sense as @SUM(DEPOSITS). And wouldn't it be more convenient to type "REGION5" to get a printout of your Region 5 salespeople instead of having to remember that their records are stored in range H30..Q70? Better yet, how about selecting "REGION5" from a menu that 1-2-3 displays?

There can be a substantial advantage in the ability to assign names to individual cells and to cell ranges.

1-2-3 allows you to attach a name of up to 15 characters long to any range—from a single cell to a large part of the worksheet. In situations where you might type cell addresses or expand the cell pointer to indicate the range, you can simply use the name instead (Figure 7-9).



	A	B	C	D	E	F
4	Checks		Interest		Deposits	
5						
6	276	19.24	Feb-81	2.38	722.18	
7	277	503.50	Mar-81	7.67	914.23	
8	278	9.00	Apr-81	11.00	38.77	
9	279	25.00	May-81	10.94	353.20	
10	280	47.95	Jun-81	10.92	30.00	
11	281	1602.35	Jul-81	11.35	184.62	
12	282	425.00	Aug-81	11.33	137.50	
13	283	15.00	Sep-81	12.38	115.41	
14	284	20.00	Oct-81	11.94	108.10	
15	285	613.39	Nov-81	7.86	2.00	
16	286	18.41	Dec-81	5.62	75.00	
17	287	23.83	Jan-82	5.06	160.00	
18	288	9.00	Feb-82	5.25	19.72	
19	289	503.50	Mar-82	5.64	13.00	
20	290	21.02	Apr-82	6.30	40.00	
21	291	520.53	May-82	12.70	59.05	
22	292	...	Jun-82	14.05	2525.00	
23	293	12.00	Jul-82	12.46	27.01	

Figure 7-9. Range Names

Range names are created (*assigned*), edited, and deleted with /Range Name commands (page 11-2). In this discussion, we'll assume that the names have already been created.

For instance, suppose you assign the name "DEPOSITS" to the range E6..E23. In the /Range Format command, you could indicate the range by naming it at 1-2-3's prompt:

Enter range to format: DEPOSITS [ENTER] is equivalent to

Enter range to format: E6..E23 [ENTER]

If you precede a range name with "$", it makes the addresses *absolute* (Chapter 8, "Writing Formulas"):

@SUM(DEPOSITS) is equivalent to @SUM(E6..E23)

@SUM($DEPOSITS) is equivalent to @SUM($E$6..$E$23)

If you /Copy the second formula to another cell, it will still process the cells in range E6..E23.

Note. Starting a range name with a dollar sign ($) when 1-2-3 prompts you to indicate a range isn't really necessary. Absolute and relative addresses come into play only when formulas are copied. But starting a range name with $ at a command prompt doesn't do any harm, either.

Changing Range Name Definitions

When you change the definition of a range name, 1-2-3 automatically adjusts all specifications for which you've used this name. For instance, if you expand the range named "DEPOSITS" to include ten additional rows, 1-2-3 will automatically adjust the meaning of formulas such as @SUM(DEPOSITS). And if you've specified "DEPOSITS" as a print range, issuing a /Print Printer Go command will automatically print the extra rows.

(For details regarding this process and the way 1-2-3 remembers ranges, see "Command Ranges and Range Names" on page 7-14.)

Selecting Range Names from a Menu

1-2-3 maintains a list of all currently defined range names. Whenever the program prompts you to indicate a range, pressing **[F3/NAME]** displays this list as a menu (Figure 7-10). You can indicate one of these names either by typing it, or by highlighting it with the menu pointer and then pressing **[ENTER]** to select it. You must specify a range name that has already been created with a /Range Name command (page 11-2).

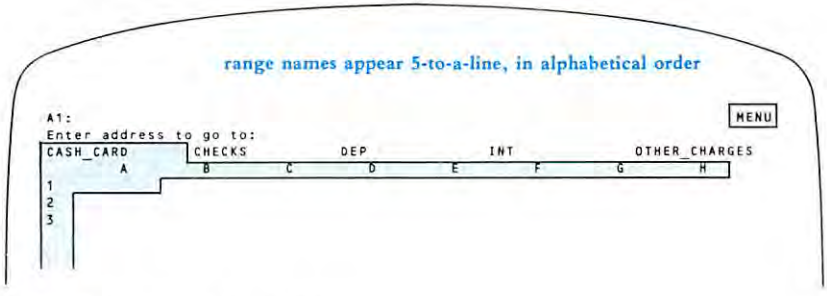


Figure 7-10. Range Name Menu

1-2-3 Remembers Command Ranges

Many 1-2-3 commands require you to indicate a range to be processed. Chances are that if you issue a command several times during a session, you'll want to use the same range again and again. 1-2-3 helps you by remembering the **command ranges** you indicate with most commands. The next time you issue the same command, 1-2-3 expands the cell pointer to cover the range, and displays the cell addresses that define the range (upper left and lower right corners) in the control panel.

At this point, you can:

1. **Accept the current definition.** Press [ENTER] to leave the range specification unchanged.

2. **Modify or replace the definition.** Use the pointer-movement keys to change the highlighted range, then press [ENTER]. To specify a completely new range, press [BACKSPACE] to return the pointer to the current cell, or press [ESC] to reduce the expanded pointer to its anchor cell.

3. **Enter a new definition.** Type cell addresses, type a range name, or select a range name from the range-name menu (press [F3/NAME] to display the menu).

Note. 1-2-3 does not change or replace a range specification until you press [ENTER]. If you interrupt a command with [BREAK] or several [ESC]s, 1-2-3 continues to remember the old range specification.

You can get 1-2-3 to forget certain command ranges by issuing the appropriate Reset command (e.g., /Data Query Reset). The /Worksheet Erase command clears 1-2-3's range memory along with everything else.

Command Ranges and Range Names—Implementation Details

For the most part, you need not concern yourself with the details of 1-2-3's bookkeeping. But in the cases of "remembered" ranges (both command ranges and named ranges), a few background facts may make it easier for you to understand how 1-2-3 adjusts to changes.

1-2-3 records the definitions of all remembered ranges—command ranges and range names—in the same way. A remembered range is the addresses of its upper left and lower right corner cells. After you've attached a range name to a cell range, a reference to the range by name is equivalent to a reference by these two cell addresses.

Direct Changes to Range Names

You can use the /Range Name Create command to assign a different cell range to an existing range name. When this change takes place, 1-2-3 transforms references to the original range into references to the new range. This includes:

- **Synonyms.** Other range names assigned to the original range.
- **Formulas.** References to the original range in formulas.
- **Commands.** Remembered command ranges (e.g., /Data Fill) using the original range.

The references are modified whether they were originally made by cell addresses or by name.

Using /Range Name Delete or /Range Name Reset to eliminate a range name does not cancel references to the range. Instead, the range name simply ceases to be associated with the range. /Range Name Labels is similar to /Range Name Delete followed by /Range Name Create.

Example 1. You create the range name "DEPOSITS", assigning it to the range E6..E23. In addition, you specify this range—either by name or by cell addresses—in several situations: (1) You assign the range name "DEPS" to the cell range E6..E23; (2) You type "DEPOSITS" at the /Data Sort Data-Range prompt; (3) You enter the formula @COUNT(E6..E23) in cell N1.

Subsequently, you use the /Range Name Create command to change the definition of "DEPOSITS" to B1..C50. 1-2-3 automatically:

1. Changes the definition of "DEPS" to B1..C50.
2. Changes the /Data Sort Data-Range to B1..C50.
3. Changes the formula in cell N1 to @COUNT(B1..C50). 1-2-3 continues to display this formula on the first line of the control panel as @COUNT(DEPOSITS).

Later still, you use the /Range Name Delete command to cancel the range name "DEPOSITS":

1. The definition of "DEPS" remains the same: B1..C50.
2. The /Data Sort Data-Range remains B1..C50, but no longer is associated with the name "DEPOSITS".
3. The formula in cell N1 remains @COUNT(B1..C50). The formula is no longer displayed as @COUNT(DEPOSITS) but as @COUNT(DEPS).

Exception: If you redefine a range name from a single cell to a multiple cell range, 1-2-3 does not alter formulas involving the original definition.

Example 2. You define the range name "ONECELL" to be A77, and enter the formula "+ONECELL+14" in another cell. The formula has the meaning "+A77+14". Later, you use the /Range Name Create command to change the definition of ONECELL to A77..A82.

Result: 1-2-3 removes the range name from the formula. The formula remains +A77+14, and is no longer displayed in the control panel as +ONECELL+14.

Implicit Changes to Range Names

Several 1-2-3 commands—/Move, /Worksheet Insert, and /Worksheet Delete—can change the definition of a range name implicitly. This occurs when one of these commands moves or obliterates the upper left or lower right corner cell of a remembered range.

Moving Cell Entries

If the upper left or lower right corner cell of a named range moves, the definition of the range name changes accordingly. As a result, 1-2-3 also makes the three types of changes listed above: to synonyms, to formulas, and to remembered command ranges.

Example 3. As in Example 1, you create the range name "DEPOSITS", assigning it to the range E6..E23. And (1) You assign the range name "DEPS" to the same range; (2) You enter "DEPOSITS" as the /Data Sort Data-Range; (3) You enter the formula @COUNT(E6..E23) in cell N1.

Then you issue a /Move command that affects the lower right corner cell, E23, of the "DEPOSITS" range: *FROM* range B22..E25; *TO* cell F22. This moves E23 to I23. 1-2-3 automatically:

1. Changes the definition of "DEPOSITS" and "DEPS" to E6..I23.
2. Changes the /Data Sort Data-Range to E6..I23.
3. Changes the formula in cell N1 to @COUNT(E6..I23). 1-2-3 continues to display this formula on the first line of the control panel as @COUNT(DEPOSITS).

Obliterating Cell Entries

If an upper left or lower right corner cell of a remembered range is obliterated by a /Worksheet Delete command or by being the destination of a /Move, the remembered range is cancelled.

Example 4. Suppose that in the Example 3 situation, you issue a /Worksheet Delete Column command instead of a /Move command. The Delete command eliminates column D from the worksheet. 1-2-3 automatically:

1. Cancels the definitions of "DEPOSITS" and "DEPS".
2. Cancels the /Data Sort Data-Range specification.
3. Changes the formula in cell N1 to @COUNT(ERR). Cell N1, and any other cells whose values depend on N1, will be displayed as *ERR*.

Direct Changes to Command Ranges

In the previous sections, we've discussed the way in which changes to a range name affect a command specification referring to that range. The opposite case does not hold true: Changes to a command specification do not alter range names.

Example 5. You specify the /Data Sort Data-Range to be "DEPOSITS", whose definition is E6..E23. In a subsequent /Data Sort command, you modify the Data-Range to be K1..K50. The definition of "DEPOSITS" does not change, but this range name ceases to be associated with the Data-Range.

Indirect Changes to Command Ranges

The /Move, /Worksheet Insert, and /Worksheet Delete commands change the definitions of command ranges in the same way that they change range name definitions:

Moving Cell Entries. You specify the range A1..E15 as the /Data Fill range. Then you issue a command that moves cell E15 to K20. As a result, 1-2-3 modifies its /Data Fill range definition to A1..K20.

Obliterating Cell Entries. You specify the range A1..E15 as the /Data Fill range. Then you issue a command that obliterates cell E15. As a result, 1-2-3 cancels the /Data Fill range definition.

8. Writing Formulas

1-2-3 does much more than recording numbers and labels in a column-row structure. This section examines 1-2-3's single most powerful capability—formula calculation.

Formula writing can be a simple, basic procedure, However, in the hands of an experienced user, 1-2-3 offers an extremely sophisticated tool for complex formula calculation. We suggest that you read this chapter several times, returning to read the more intricate sections as you gain experience with 1-2-3.

In any cell, you can enter a **formula**—an instruction for 1-2-3 to calculate a number.

Let's explore the formula concept with an example. We suggest that you work through this example using 1-2-3 as you read.

Enter some numbers in the worksheet, perhaps to represent quarterly revenue figures (Figure 8-1).

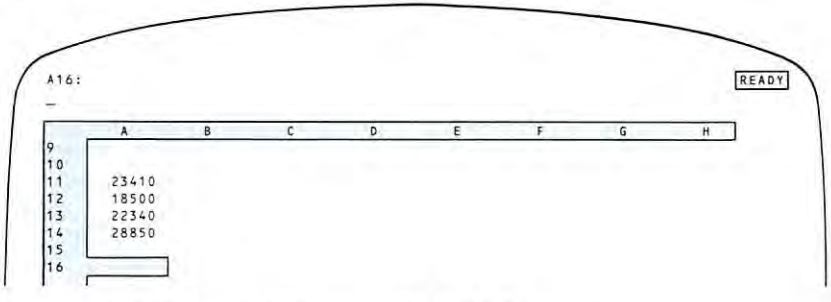


Figure 8-1. A Column of Figures to Be Added

A First Try. To have the worksheet also show the sum of these figures, you can enter a formula in cell A16. An obvious candidate for the formula is:

(1) 23410 + 18500 + 22340 + 28850 [ENTER]

When you press [ENTER], the answer 93100 appears in cell A16.

There are two lessons to be learned from this first attempt at formula writing:

- A formula is like other entries in many ways. As you type the characters, they appear on line 2 of the control panel. And you press [ENTER] to signal 1-2-3 that you're finished.
- Like a number, a formula may not contain any space characters.

We've already entered the revenue figures once, in cells A11 through A14. Why should we have to enter the numbers again in order to get 1-2-3 to add them up?

A Second Try. We don't have to enter them again. Instead of telling 1-2-3 which numbers to add up, we can tell it where to find the numbers:

(2) +A11+A12+A13+A14 [ENTER]

Here's the general rule (Figure 8-2):

> If you include one or more cell addresses in a formula, 1-2-3 automatically uses the numbers stored at those addresses whenever it calculates the formula. Any changes to numbers in the referenced cells are automatically reflected in formula cells

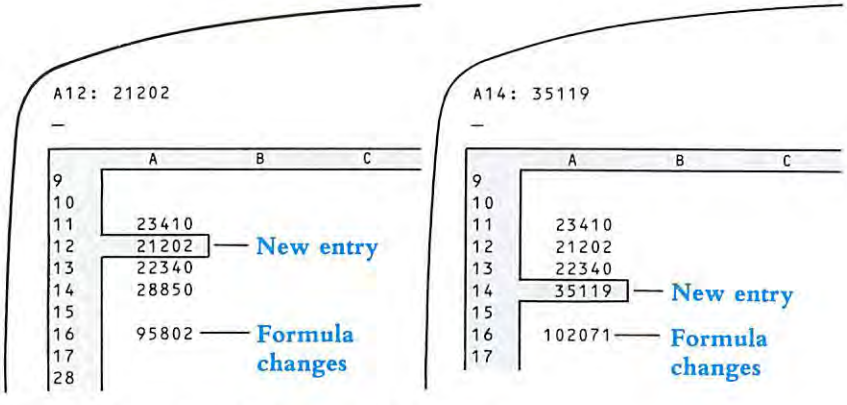


Figure 8-2. "What if" a Number Changes?

Formula (2) illustrates another important point:

- A formula, like a number, must begin with one of these characters:

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

In this case, starting the formula with the letter "A" would have made 1-2-3 think we were typing a label. So 1-2-3 users have found it a good general practice to begin formulas with the "+" character.

Entering Cell Addresses—Typing and Pointing

In both formulas so far, we told 1-2-3 which items to add by typing—typing numbers in the first case and typing cell addresses in the second. Since 1-2-3 is a visually-oriented program, it also allows you to use the cell pointer to indicate the items to be added. We could construct formula (2) by *pointing* (Figure 8-3):

- Instead of typing a cell address (e.g., A13), you can use pointer-movement keys to show 1-2-3 the cell to be used in a calculation. For instance, pressing ↑↑↑ while entering this formula would move the pointer to cell A13.

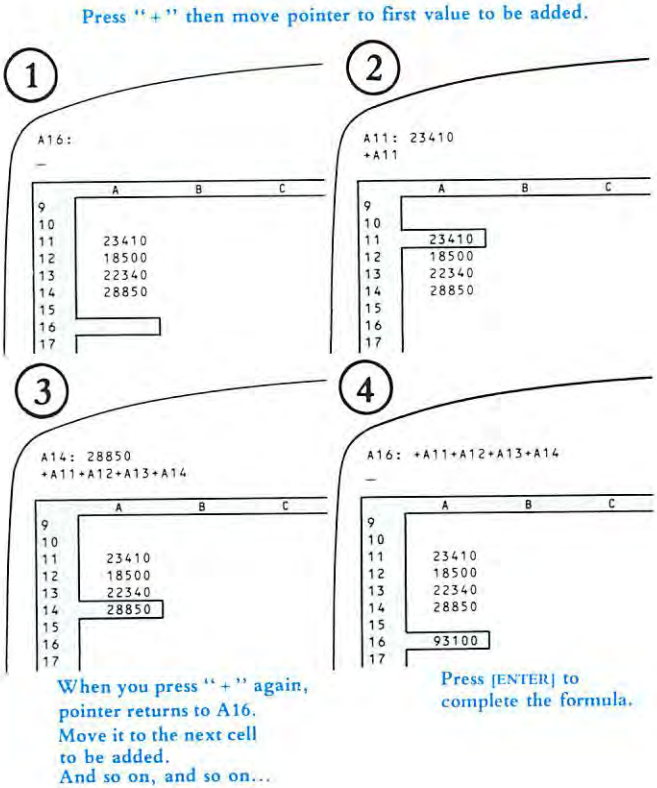


Figure 8-3. Entering a Formula by Pointing

Relative Cell Addresses

The formula constructed in Figure 8-3 by a combination of pointing and typing is equivalent to the one entered by typing alone. The "feeling" is different, though. The process of pointing to cells indicates the positional relationships between the *formula cell* and the *referenced cells*—the cells whose values are used in the formula.

Most people seem to prefer pointing rather than typing cell addresses. There's a very real reason to appreciate the positional relationships among the cells involved in a formula—1-2-3 itself remembers the formula in this way.

For instance, 1-2-3 does not record the formula in cell A16 as:

"The sum of the values in cells A11, A12, A13, and A14"

rather, it records the formula as:

"The sum of: the value five cells above this one,
the value four cells above this one,
the value three cells above this one, and
the value two cells above this one".

You might like to think of the formula as a machine that calculates a number when placed over a cell (Figure 8-4).

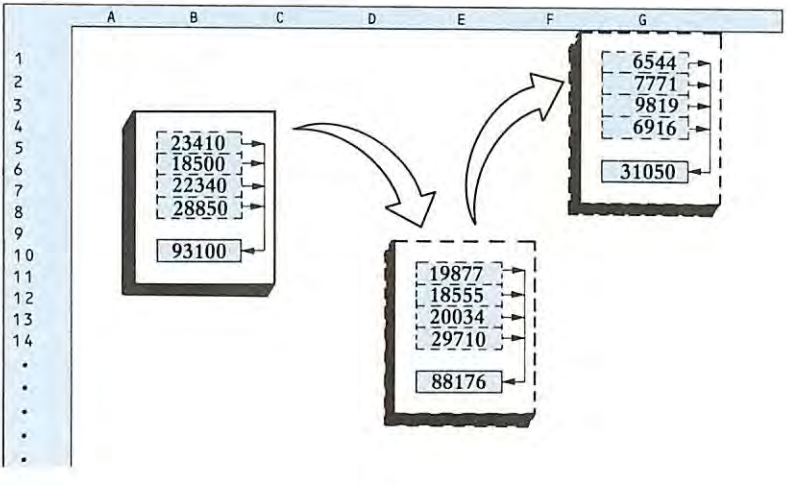


Figure 8-4. A Relative Address Machine

We describe this situation by saying that the formula involves **relative cell addresses**. Instead of remembering a cell address as a letter-number combination, 1-2-3 records the position of each referenced cell *relative* to the formula cell. Including "A11" in cell A16's formula really incorporates the value of "the cell five rows above this one". This is true whether you type "A11" into the formula or you point to it.

This "relative" way of representing formulas has a big payoff. You can use the very same formula at different locations in the worksheet (e.g., to add different columns of numbers). In practice, you enter the formula just once, then use the /Copy command to copy it to other cells (page 12-4). In the example above, we could enter the formula once, in cell A16, then make copies in cells B16 and C16 with a /Copy command (Figure 8-5).

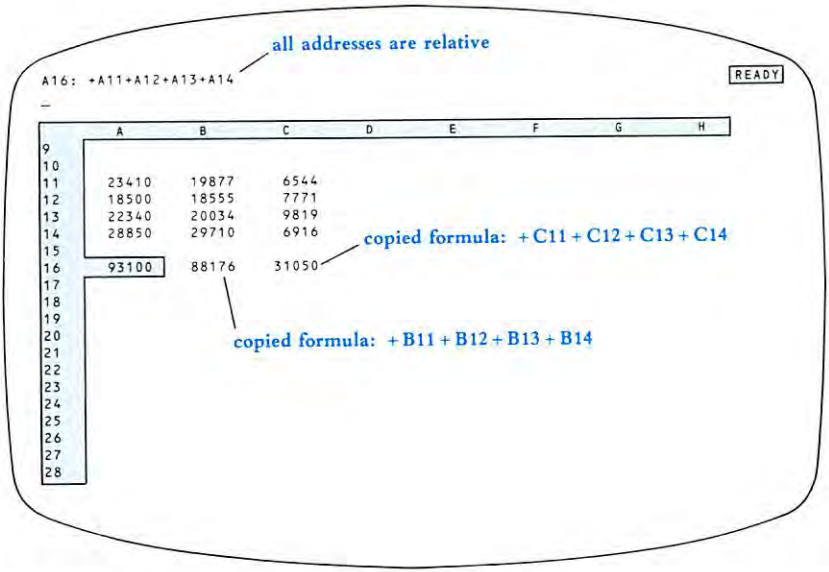


Figure 8-5. Copying a Formula with Relative Addresses

Figure 8-6 illustrates another example in which the very same formula can be used to perform similar calculations in several cells.

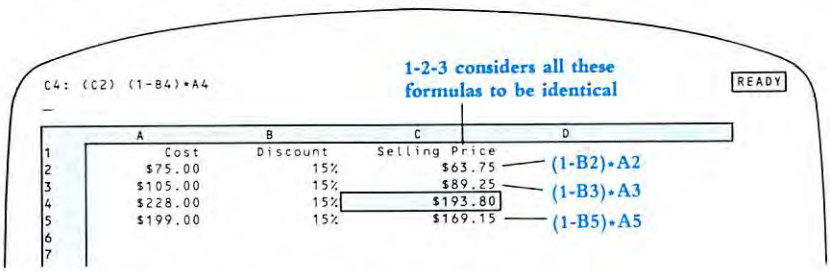


Figure 8-6. More Relative Address Formulas

In this example, the formulas in column C convert the "Cost" values in column A to "Selling Price" values, using the "Discount" factors in column B. All the column C formulas are exactly the same, if we view them as using relative cell addresses:

> "Subtract the value of the cell one column to the left from 100%, then multiply by the value of the cell two columns to the left".

So once again, 1-2-3 allows us to use the very same formula in several different places, to perform several related calculations.

Absolute Cell Addresses

There are situations in which you will need to override 1-2-3's inclination to think of cell addresses as relative. As an example, let's examine part of a loan-analysis worksheet (Figure 8-7). (This situation occurs in the 1-2-3 Electronic Tutorial.)

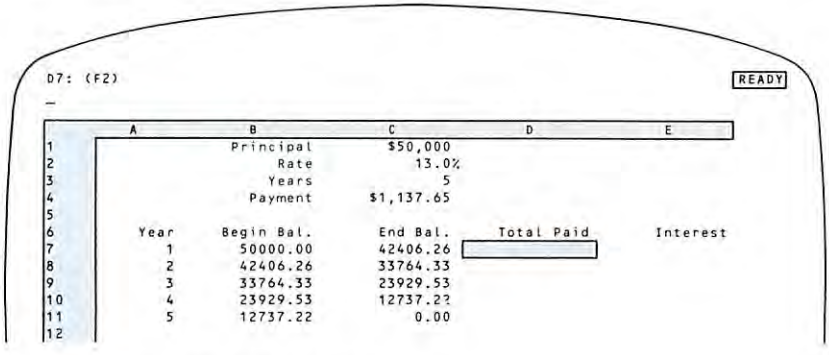


Figure 8-7. Loan Analysis Worksheet

Cell C4 contains the monthly payment due on a loan. We wish to show the yearly total for each of five years, in cells D7, D8, D9, D10, and D11. Since we're in a hurry, we would like to enter a formula just once, in cell D7, then make copies in cells D8 through D11.

The obvious candidate for the formula in cell D7 is +C4*12. (Note again that we start with "+" to distinguish the entry from a label.) But the first part of Figure 8-8 shows what happens if we try to copy this formula to cells D8 through D11.

What we really want for cell D7 is a formula that refers to cell C4 in an *absolute* way rather than a *relative* way. That is, we want a formula in which the "C4" remains "C4", even when we copy the formula to another cell.

1-2-3 uses the "$" character to distinguish absolute cell addresses from relative cell addresses in formulas. In our example:

Relative. If the formula +C4*12 is entered in cell D7, C4 really means "The value one column to the left and three rows up".

Absolute. In any formula, $C$4 means "the value of cell C4", no matter where the formula is copied to.

Why two dollar signs? Because a cell address with a single $—$C4 or C$4—also has a meaning. It indicates a *mixed* cell address—half relative, half absolute.

Example: Formulas That Include Both Relative and Absolute Addresses

Figure 8-9 shows a modification of the "Cost-Discount-Selling Price" example above.

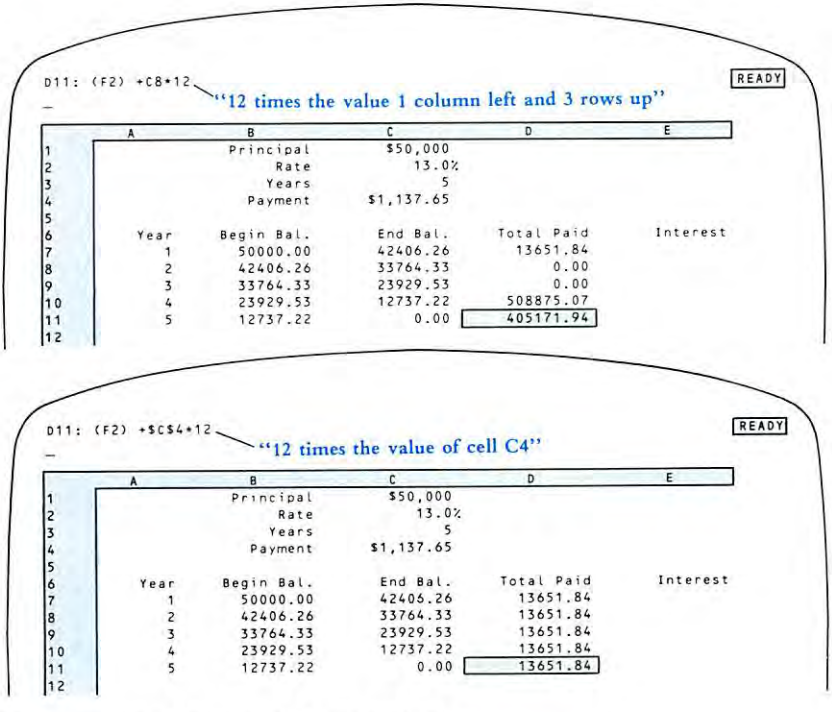


Figure 8-8. An Absolute Address Is Needed

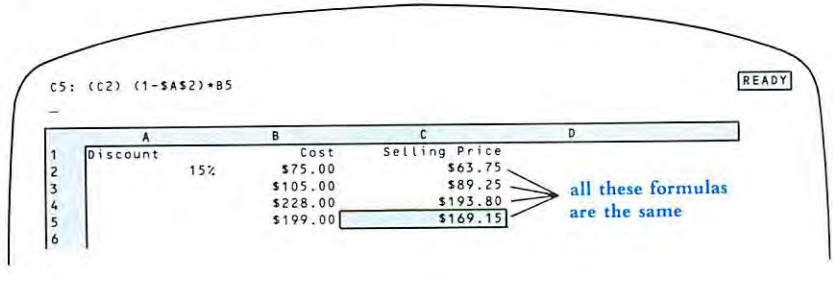


Figure 8-9. A Formula with Both Absolute and Relative Addresses

Since the same discount factor, 15%, is used to convert all the values, why repeat it? Instead we place 15% in a single cell. The same formula can be used in column C to perform all four selling-price conversions:

"Subtract the value in cell A2 from 100%, then multiply by the value one column to the left".

We can type this formula just once, let's say in cell C5:

(1 – $A$2)*B5

Then, we can copy this formula to cells C4, C3, and C2.

Indicating an Absolute Cell Address by Pointing

The dollar signs ($) that turn a relative address into an absolute address are ordinary characters. If you are entering a formula by typing (Value mode or Edit mode), just press the "$" key.

If you are *pointing* a cell address into a formula (Point mode), don't try to type a "$". Instead, use the **[F4/ABS]** key (Figure 8-10). Pressing **[F4/ABS]** several times in a row cycles a cell address through all its forms—relative, absolute, and mixed:

C4 → $C$4 → C$4 → $C4 → C4 → etc.

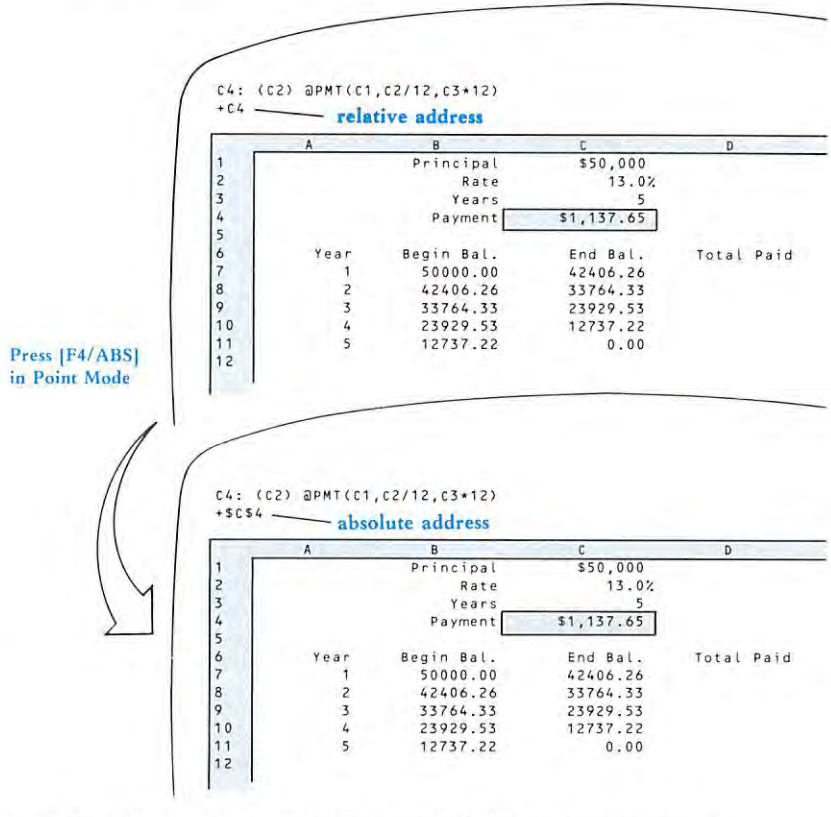


Figure 8-10. Using the [F4/ABS] Key to Make an Address Absolute

We suggest that you postpone using mixed addresses until you're quite comfortable with using relative and absolute addresses. Then read "Mixed Cell Addresses" (page 8-14). For now, just note that you can press **[F4/ABS]** repeatedly to switch between absolute and relative addresses.

Specifying Ranges in Formulas

1-2-3 formulas can calculate with entire ranges of values as well as individual values. But ranges of values can't be processed with the ordinary arithmetic operations. For instance, you can't add or subtract two ranges like two individual values. Instead, you process ranges with special @ functions (page 8-22). For example:

@SUM(B10..D30)	Sums the values of all cells in the range B10..D30
@VLOOKUP(B3,F10..H30,1)	Performs a table-lookup using the range F10..H30
@MAX(100,C15,TOTALS)	Finds the maximum of 100, the value in cell C15, and all the values in the range named "TOTALS"

Ranges are specified in formulas just as they are at 1-2-3 command prompts: by typing cell addresses, by pointing, or by typing a range name. (For details, see Chapter 7, "Indicating Cell Ranges".)

Single-Cell vs. Multiple-Cell Ranges

You can't do ordinary arithmetic with multiple-cell ranges. For example, you can't subtract two ranges:

B10..D30 – F10..H30 can't be done.

Likewise, if "EXPENSES" = B10..D30 and "REVENUES" = F10..H30, 1-2-3 won't accept the formula "REVENUES – EXPENSES".

You can do ordinary arithmetic with range names that apply to single cells. If "EXPENSE" is assigned to cell D32 and "REVENUE" to cell H32, you can use the formula "EXPENSE – REVENUE". (The /Range Name Labels command makes it particularly easy to define names for single cells. See page 11-14.)

In general, feel free to use ranges (including range names) in formulas. Just be sure that each range you specify is appropriate to the context.

+B10/12	Legal
+B10..B20/12	Illegal
1stQ*2.5	Legal if "1stQ" names a single cell; illegal if "1stQ" names a multiple cell range
@SUM(1stQ,2ndQ)	Always legal, since the @SUM function accepts any type of argument

Absolute Ranges in Formulas

Just as a cell address in a formula can be relative or absolute, so can a range specification. When pointing to a range, use **[F4/ABS]** to make it absolute. When typing cell addresses, precede each column letter and row number with "$". In either case, the result looks like this:

$D$35..$F$50

As with individual cell addresses, this feature comes into play only when you copy a formula.

A12: @SUM(A1..A10)	A12: @SUM($A$1..$A$10)
Copy to C12: @SUM(C1..C10)	Copy to C12: @SUM($A$1..$A$10)
Copy to D112: @SUM(D101..D110)	Copy to D112: @SUM($A$1..$A$10)

Absolute Range Names. If you use a range name in a formula, 1-2-3 takes it to be a relative specification. To make it absolute, precede the range name with a "$":

If @SUM(EXPENSES) = @SUM(B10..D30),
then @SUM($EXPENSES) = @SUM($B$10..$D$30)

(For a continuation of this discussion on a rather advanced level, see "Mixed Range References" on page 8-16.)

Revising Formulas

A formula is similar to a label or number in that it is an entry, stored in one of the worksheet's cells. As with other types of entries, you can (1) Revise a formula as you're typing it, or (2) Return to a previously entered formula and invoke Edit mode to change it.

1-2-3's entry-correction facilities work with all types of entries, including formulas (page 5-8). You can also *point* cell addresses into a formula.

As you're entering a formula, the mode indicator in the upper right corner of the screen can change between *VALUE*, *EDIT*, and *POINT*:

- You are in Value mode when you begin a formula and whenever you're typing letters, numbers, and symbols.
- You switch to Edit mode if you press **[F2/EDIT]** or if 1-2-3 finds your formula to be incorrect when you press **[ENTER]**.
- You are in Point mode when you're using the pointer-movement keys to show 1-2-3 which cells and ranges to use in the calculation.

Let's take a look at the editing facilities on a mode-by-mode basis.

Value Mode

In Value mode, you can use these editing keys:

Key	Function
[BACKSPACE]	Delete the character preceding the cursor. In most cases, this is the last character you typed.
[ESC]	Cancel the entire entry and return to Ready mode.

Edit Mode

1-2-3 goes to Edit mode if you press [F2/EDIT] while you are entering a formula. It also goes to Edit mode automatically if it finds an error in a formula when you press [ENTER]. In Edit mode, you can use the following editing keys:

Key	Function
[BACKSPACE]	Delete character preceding cursor
[DELETE]	Delete character at the cursor
[ESC]	Delete entire entry, staying in Edit mode
← / →	Move cursor to left/right 1 character
[SHIFT]-[TAB]/[TAB]	Move cursor to left/right 5 characters (see note below)
[HOME]/[END]	Move cursor to the first/last character

Note. Pressing the [TAB] key alone invokes the [TAB] (forward tab) function. Holding down [SHIFT] and pressing [TAB] invokes the [SHIFT]-[TAB] (backward tab) function. [CTRL]-→ is equivalent to [TAB]. [CTRL]-← is equivalent to [SHIFT]-[TAB].

Point Mode

When you are using pointer-movement keys to indicate an individual cell address or cell range in a formula, only two correction keys are available: [ESC] and [BACKSPACE]. Their effect depends on when you use them.

If you are pointing to a single cell:

- Pressing [ESC] erases the cell address from the formula and returns the cell pointer to the formula cell. 1-2-3 returns to Value mode.
- Pressing [BACKSPACE] returns the cell pointer to the formula cell.

If you are expanding the cell pointer to indicate a cell range (Figure 8-11):

- Pressing [ESC] erases the cell address of the *free cell* from the formula, shrinks the expanded cell pointer down to the *anchor cell* only, and removes the anchor. 1-2-3 remains in Point mode.
- Pressing [BACKSPACE] reduces the range specification to the formula cell, unanchored. 1-2-3 remains in Point mode.

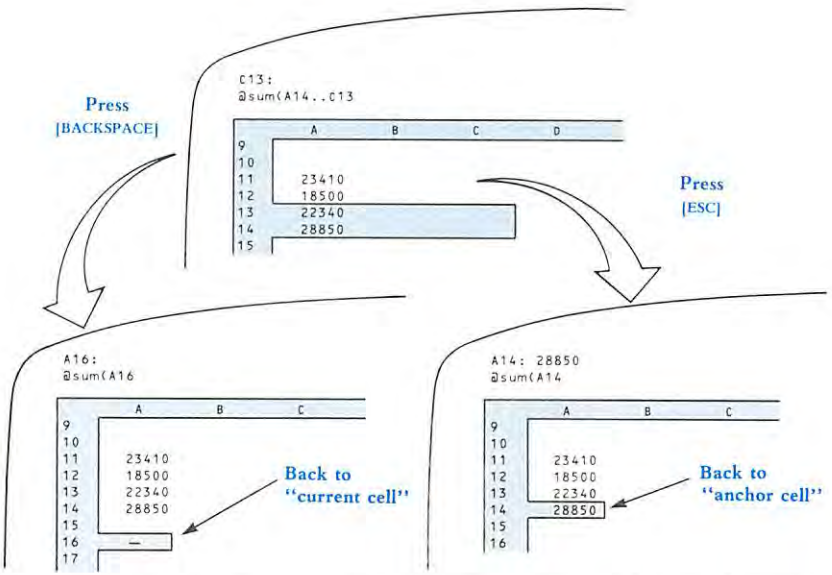


Figure 8-11. [ESC] and [BACKSPACE] Correct Pointing Errors—Expanded Pointer

The [F9/CALC] Key

Pressing **[F9/CALC]** in Ready mode causes 1-2-3 to perform a recalculation pass on all formulas in the worksheet (page 10-5). You can also use **[F9/CALC]** when entering a formula (Value mode) or when editing a formula (Edit mode). **[F9/CALC]** converts the formula into a number—the formula's current value. No other recalculation takes place.

This use of **[F9/CALC]** is handy in a variety of situations:

Quick-Reference and Calculator. To find the current value of a cell that's far away or to perform a quick calculation. For example, to find the value of cell AC106: (1) Type "+AC106"; (2) Press **[F9/CALC]** to see the value; (3) Press **[ESC]** to clean up.

Similarly, you could calculate the value 56.7 × sin 37 without having to store any values in the worksheet.

Saving Calculation Time. Why make 1-2-3 calculate a formula during each recalculation pass if its value never changes? Instead, convert the formula into a number, once and for all. For example, to enter the value "ten times π": (1) Type the formula "10*@PI"; (2) Press **[F9/CALC]** to convert this formula to the number 31.415926536; (3) Press **[ENTER]** to enter the number.

Automatic (Implicit) Changes to Formulas

The previous section explained how you can use 1-2-3's editing features to explicitly change formulas stored in the worksheet. In addition, there are situations in which another action you take changes one or more formulas:

/Worksheet Delete Columns and /Worksheet Delete Rows

Formulas that refer to a deleted cell are rendered invalid: 1-2-3 replaces the deleted cell's address in the formula with *ERR*, causing the entire formula to have the value *ERR*.

Cells beyond the deleted area are implicitly moved by the Delete command. Formulas that refer to these cells are automatically adjusted.

(Similarly, the /Worksheet Delete commands can invalidate and adjust range specifications. See page 10-12.)

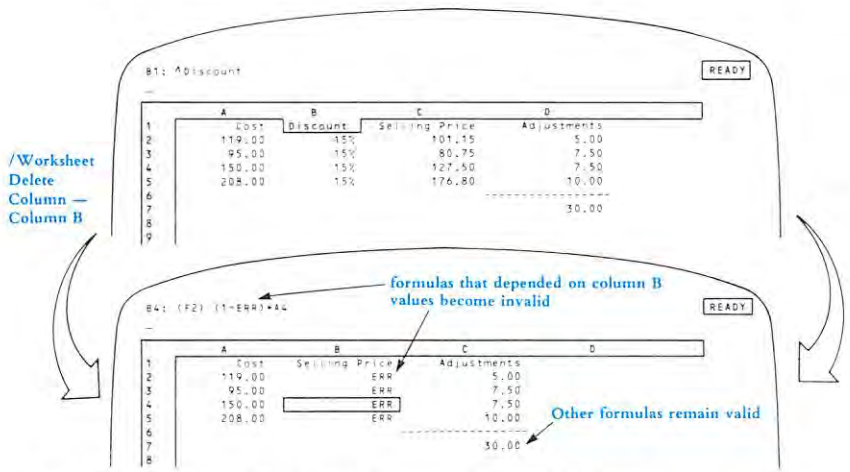


Figure 8-12. Be Careful When Deleting Rows or Columns

/Move

Formulas that refer to a cell that is the destination of a /Move are rendered invalid: 1-2-3 replaces the cell's address in the formula with *ERR*, causing the entire formula to have the value *ERR*.

Formulas that refer to a /Moved cell are automatically adjusted. 1-2-3 substitutes the *TO* cell address for the *FROM* address in each formula.

When you /Move cells, be sure to pick an unused area of the worksheet as the destination for the /Moved cells.

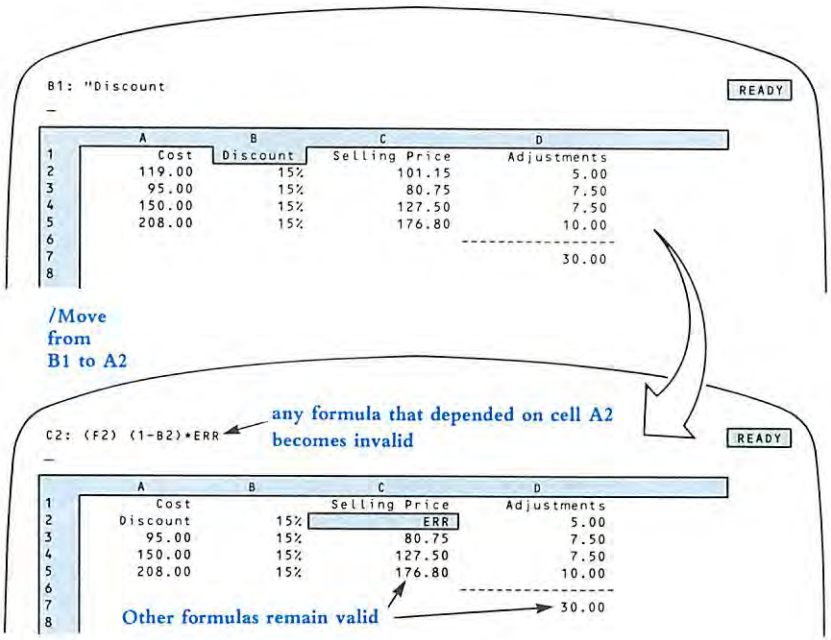


Figure 8-13. Be Careful When Moving Cell Entries

If a formula contains a range name whose definition involves a /Moved cell, the /Move changes the definition of the named range. As a result, the calculation involving the named range is implicitly changed. (See "Command Ranges and Range Names", page 7-14.)

/Range Name Create

A range name occurs in a formula, and you use the /Range Name Create command to alter the range name definition. (This is similar to the /Move situation we just described. In both cases, the named range is redefined.) When you change the definition of the range, 1-2-3 automatically changes the formula accordingly. You'll see the difference (if any) after the next recalculation of the worksheet. (See "Command Ranges and Range Names", page 7-14.)

Advanced Topic: Mixed Cell Addresses

In this section, we describe a sophisticated 1-2-3 facility that can be a tremendous timesaver. **Mixed cell addresses**, combined with the flexibility of the /Copy command, can reduce your formula writing chores significantly.

Mixed cell addresses—half-relative, half-absolute—are a solution to a problem. Suppose we wish to produce a 25-year mortgage payment table, given a variety of principal amounts, and a variety of interest rates (Figure 8-14). Each of the 20 cells inside the table will have an @PMT function as its entry. Here's the challenge: Can we type just one such formula, then /Copy it to the 19 other cells?

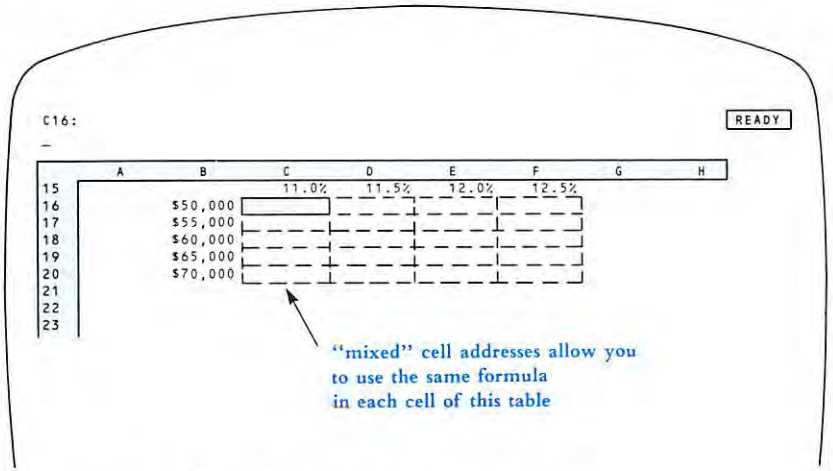


Figure 8-14. Building a Mixed Cell Addresses Table

For each cell, the Principal amount to be used in the formula is "the value in column B of this row". If we try typing a formula in cell C16 using an absolute or relative address, it doesn't quite work:

C16: @PMT(B16,. . .
"the cell to my left"

C16: @PMT($B$16,. . .
"column B, row 16"

What we want is half of each—and 1-2-3 allows us to get exactly what we want:

$B — "column B"
16 — "this row"
$B16 — "the value in column B of this row"

The situation with the interest rate values is a precise mirror image. We want to represent "the value in row 15 of this column" as a cell address. For a formula in cell C16, this translates to:

C — "this column"
$15 — "row 15"
C$15 — "the value in row 15 of this column"

Here's the complete formula, using two different mixed cell addresses:

@PMT($B16,C$15/12,300)

To complete the table, we need only issue a single /Copy command:

/Copy *FROM:* C16 *TO:* C16..F20

Note. The /Data Table command (page 17-16) provides an alternative, and somewhat simpler, method of performing the same calculations. The difference is that /Data Table uses a single formula to calculate 20 values, while we have just created 20 formulas, each calculating a single value. Both strategies have their advantages.

Mixed Range References

Just as you can use a mixed cell address in a formula, you can use a range specification involving one or more mixed addresses. Moreover, the two corners of a range specification need not be the same type of address. All these formulas are legal, and all have the same original meaning:

@SUM(A1..A10)	@SUM($A$1..A10)
@SUM($A1..$A10)	@SUM($A$1..A$10)
@SUM(A$1..A$10)	@SUM($A1..A10)...etc.

The differences between such formulas appear only when you /Copy them to other cells. You can do the investigating—we'll just start you off with the general rule and some examples.

When copying a range specification in a formula, 1-2-3 processes the cell addresses of the two corners independently

Example 1. If cell A12 contains the formula @SUM($A1..$A10):

A copy in B12 would be @SUM($A1..$A10).

A copy in D112 would be @SUM($A101..$A110).

Example 2. The formula @SUM($A$1..A1), entered in cell B1, calculates a running total: It says "Sum the values in the rectangle whose corners are cell A1 and the cell to my left".

A copy of this formula in B12 would be @SUM($A$1..A12).

A copy of this formula in B85 would be @SUM($A$1..A85).

Using Operators in Formulas

We've discussed the fact that you can indicate numbers for 1-2-3 to process in a formula either by typing or by pointing to cells. Now, let's concentrate on the other half of the story—telling 1-2-3 what to do with the numbers.

In the examples above, addition was the only arithmetic we did. As usual, the character "+" indicates addition. 1-2-3 uses the familiar "+" and "–" characters to in-

dicate the arithmetic operations. But it uses "*" instead of " × " for multiplication and "/" (back slash) instead of " ÷ " for division.

Since these characters indicate arithmetic operations, we call them **operators**:

Operator	Meaning
+	addition
–	subtraction
*	multiplication
/	division

Note that slash (/) allows you to indicate division on one line instead of three:

Three-fourths is 3/4, not $\frac{3}{4}$.

Figure 8-15 shows a worksheet that uses some simple formulas. We suggest that you examine and verify each formula.

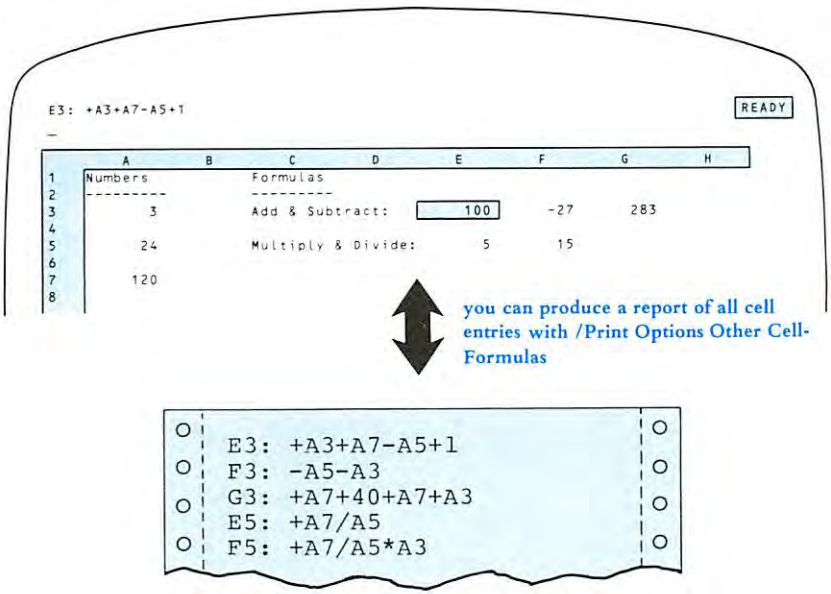


Figure 8-15. Simple Formulas

Parentheses and Precedence (Order of Operations)

In the Figure 8-15 formulas, the operations are performed from left to right. There are two ways to indicate that operations are to be performed in another order: using parentheses and taking advantage of *operator precedence*.

Parentheses. Using parentheses (like those enclosing this phrase) says "Do this section of the formula first":

+D7–(B7–C7)	Take the difference between the values in B7 and C7. Subtract this result from the value in D7.
+F50/(1+A3)	Add 1 to value in cell A3, and divide this result into the value in cell F50.

Feel free to use parentheses within parentheses. This technique is called "nesting" parentheses.

Precedence (Order of Operations). The other way to alter the order in which 1-2-3 performs arithmetic operations is by using precedence. You may recall this idea from high-school algebra:

Multiplication and division are performed before addition and subtraction

Examples:

+G5+A7*100	Multiply the value in A7 by 100. Add the result to the value in G5.
1+1/4	The number "one and a quarter".

There's more to order of operations than this one statement, because there are additional operators in the world of 1-2-3. We will discuss two more arithmetic operators now, and logical operators later in this chapter (page 8-20).

(If the precedence discussion that follows gets to be a little too much, just remember that you can always use parentheses to force calculations to be performed in a particular order.)

Negatives and Exponents

1-2-3 can handle negative numbers—numbers less than zero—just as well as positive numbers. You indicate a negative number in a formula by starting it with a hyphen (–), the same character used to indicate subtraction:

–3	"minus 3"
–50%	"minus 50 percent"

You can also precede a cell address with "–" to indicate its negative:

–F13 has the value –34.7	if cell F13 contains 34.7
–F13 has the value 150	if cell F13 contains –150

1-2-3 can tell the difference between a "–" that indicates subtraction and a "–" that indicates the negative of a value:

+A15–450	"–" means subtraction
–C35*F1	"–" means negative
+X100– –45	First "–" means subtraction; second "–" means negative

1-2-3 also allows you to precede any number or cell address with "+". It doesn't affect the value at all; you may include extra "+" characters if they help you keep things straight:

@IF(C6>75,-D9,+D9) is equivalent to @IF(C6>75,-D9,D9)

As with "-", 1-2-3 can tell the difference between a "+" that indicates addition and a "+" that indicates "not the negative".

+A15+450	First "+" means not-the-negative; second "+" indicates addition
999++G23	First "+" indicates addition; second "+" means not-the-negative

The examples which involve two "-" signs or two "+" signs in a row may be a bit confusing, but they illustrate precedence: 1-2-3 performs the "take the negative" and "not the negative" operations before the "subtract" and "add" operations. Here are the precedence rules for the operators we've met so far:

Unless parentheses are used to override:

- "Take the negative" and "not the negative" take precedence over "multiply" and "divide".
- "Multiply" and "divide" take precedence over "add" and "subtract".

Powers. But there's more. The operation "raise to the power", also called *exponentiation*, is performed before any other arithmetic operation. The caret (^) character (on the "6" key) indicates this operation:

+B35^5	The value in cell B35 raised to the fifth power.
18*B35^5	Raise the value in cell B35 to the fifth power, then multiply by 18 (multiplication has lower precedence than exponentiation).

Precedence Numbers

So far we've examined more than a half dozen operators. And logical operators are described in the next section. It's pretty clear that we need some concise way to indicate which operations have priority over which. We'll adopt the traditional mathematical method of assigning precedence numbers:

Operations with larger precedence numbers are performed first, unless overridden by parentheses. Operations of equal precedence are performed left to right.

The operations we've examined so far have the precedence numbers listed below. The actual numbers don't have a specific meaning. What's important is that "negative" has a larger number than "division", "multiplication" has a larger number than "addition", etc.

Operator	Meaning	Precedence
^	Exponentiation	7
+	Positive (not negative)	6
–	Negative	6
*	Multiplication	5
/	Division	5
+	Addition	4
–	Subtraction	4

Examples:

+A4+100*A1	Multiply the value in A1 by 100. Then add the value in A4.
A1/12+C7/12	Add 1/12th the value in A1 to 1/12th the value in C7.
B25*C1^3	Raise the value in C1 to the third power. Then multiply by the value in B25.

Note. We've left some room at the bottom for operators with lower precedence. All logical operators have lower precedence than the arithmetic operators. A complete table of operator precedence numbers appears at the end of this chapter (page 8-26).

Logical Operators and Formulas

The formulas we've examined so far do arithmetic. They combine numbers using arithmetic operators, and produce numerical answers. You can also use another type of formula, in which numbers are combined into a statement that is either *TRUE* or *FALSE*. Such formulas are called logical formulas or conditions; the operators that combine the numbers are called **logical operators**.

Here are some examples of formulas that are *TRUE/FALSE* statements:

+SALES=45	The value in the cell named "SALES" is 45.
+BALANCE>=16.3	The value in the cell named "BALANCE" is greater than or equal to 16.3.
+Yr2<>Yr1	Yr2's value does not equal Yr1's value.

Each of these statements has a *TRUE/FALSE* value. But what exactly does 1-2-3 mean by *TRUE* and *FALSE*?

- If 1-2-3 calculates a statement to be *TRUE*, it assigns the statement the value 1. Conversely, any nonzero number is equivalent to *TRUE*.
- If 1-2-3 calculates a statement to be *FALSE*, it assigns the statement the value 0. Conversely, the number 0 is equivalent to *FALSE*.

In many situations, you won't need to recall this—it will be sufficient to think in terms of *TRUE* and *FALSE* only. But don't forget that these logical values are really numbers.

As these examples imply, logical formulas can be used as record-selection criteria for use in /Data Query operations (page 17-6). Another major application is using a condition to control a cell's value. For example, you might use an @ function (see page 8-22) to "raise a red flag" if a projected expenses figure exceeds a projected revenue figure:

@IF(EXPNS>REV,6,0)

(Set the display format of the cell to + / − . If the condition is true, six plus signs will appear in the cell. If it's false, a single dot will be displayed.)

1-2-3 recognizes the following operators for making simple logical statements:

Operator	Meaning	Precedence
=	equal	3
<	less than	3
<=	less than or equal	3
>	greater than	3
>=	greater than or equal	3
<>	not equal	3

More Logical Operators—Compound Statements

In some situations, several conditions may apply at once:

- Select records whose credit code is either 3 or 7.
- Select records whose balances are greater than $500 and are more than 60 days overdue.

You can build up compound conditions using several additional logical operators.

Operator	Meaning	Precedence
#NOT#	logical not	2
#AND#	logical and	1
#OR#	logical or	1

Note. These operators have lower precedence than the simple logical operators listed above. Each of them begins and ends with the "#" character.

#NOT#(code = 4)	The credit code stored in the cell named "code" is not 4.
+ code = 3#OR#code = 7	The credit code stored in the cell named "code" has the value 3 or the value 7. (The formula + code = 3#OR#7 does not have this meaning, since the operation #OR# is performed after the operation = .)
+ E12>500#AND#G12>60	The value in cell E12 exceeds 500 and the value in cell G12 exceeds 60.

@ Functions

You can specify a number in a 1-2-3 formula directly, by typing its digits (e.g., 14.57). Or you can specify a number indirectly, using a cell address (e.g., H37) or range name (e.g., TOTAL). When you use a cell address or range name, you're telling 1-2-3:

> "Go off to another cell (e.g., H37), get the number stored there, and plug it into the formula here".

There's yet another way to specify a number in a formula—using an @ function. A function tells 1-2-3:

> *"Here are some numbers. Do some figuring. Then take the answer you get and use it in the formula here".*

In a sense, a function is a formula within a formula. This makes 1-2-3 a very powerful tool, but as always, greater sophistication means a greater possibility of confusion. So let's take it slowly, proceeding in a question and answer fashion.

What does a function look like? 1-2-3 needs to know what particular figuring to do, and what particular numbers to use. Here are some examples:

@SUM(1,2,3,4,5)
@AVG(A1,A2,A3,A4,A5)
@MAX(A1..A5)
@COUNT(DATA_VALUES)

These examples illustrate several important facts about functions:

- Each function begins with a name, starting with a "@"character. Uppercase and lowercase letters are equivalent in function names.

- Following the function name, you indicate the numbers for 1-2-3 to combine to produce the function's result or value. These numbers are called the **arguments** to the function. The entire set of arguments is enclosed in parentheses; individual arguments are separated by commas.

- Some functions allow you to specify a cell range as an argument. 1-2-3 then uses all the numbers stored in the range to calculate the function's value. Each function has its own rules about processing a range of values, and what it does with the values.

Where can I use a function? Anywhere that you can use a number in a cell entry, either alone or as part of a formula. For example, if the sum of the numbers in cells A12..A25 is 176.99, then:

Alone: @SUM(A12..A25) is equivalent to the number 176.99

In a formula: 3*@SUM(A12..A25) is equivalent to the formula 3*176.99

What 1-2-3 functions can I use? A complete list of 1-2-3 functions appears in Chapter 19, "1-2-3 Function Reference". For convenience, a short listing of the functions, grouped according to the type of calculation they perform, appears at the beginning of that chapter. A function listing also appears in the *1-2-3 Quick Reference.*

Functions Inside Functions

Consider these two facts:

1. You can use a function instead of a number anywhere in a cell entry.

2. Many of the arguments to be specified in a function are numbers.

Taken together, these facts imply that you can use one function inside another function. It can get very complex:

@IF(F13>20,100,55)

Substitute the function @MAX(A1..A5) for 20

Substitute the function @HLOOKUP(B1,B5..B10,1) for 55

@IF(F13>@MAX(A1..A5),100,@HLOOKUP(B1,B5..B10,1))

Substitute the function @ABS(A17) for B1

@IF(F13>@MAX(A1..A5),100,@HLOOKUP(@ABS(A17),B5..B10,1))

It is possible to create a formula that is so complex that 1-2-3 can't understand it. In this case, 1-2-3 displays the error message "Formula too long". Break the formula into two or more parts, entering them in two or more cells.

Advanced Topic: Calendar Arithmetic

We'd like you to note especially a group of @ functions that allow you to do calendar arithmetic. With calendar arithmetic, you don't type dates as label entries, (e.g., 5-8-85). Instead, you use *serial numbers* to represent dates:

Serial Number	Date
1	January 1, 1900
2	January 2, 1900
.	.
367	January 1, 1901
.	.
36526	January 1, 2000
.	.
72685	January 1, 2099
73049	December 31, 2099

This strategy makes it easy for you to use 1-2-3's calculation ability in carrying out many date-related analyses:

- Tickler files.
- Weekly schedules.
- Gantt charts.
- Day-by-day and month-by-month planning.

Of course, you're free to ignore 1-2-3's date-calculation capability. For some purposes, the label "5-8-85" is a perfectly adequate indicator of the date May 8, 1985. But entering dates as numbers rather than labels has several advantages:

Consistency and Flexibility. 1-2-3 has three different numeric display formats that make date serial numbers really look like dates:

08-May-85 08-May May-85

1-2-3 takes care of making entire sets of dates look consistent. ("Is it supposed to be 5-8-85 or 5/8/85 or 08/05/85 or . . .") And you can switch back and forth among these display formats without having to reenter the dates.

Calculations. There is no way for 1-2-3 to know that there are 481 days between 5-8-84 and 9-1-85. But if these dates are represented by numbers (30810 and 31291), then the answer is a simple subtraction: 31291 – 30810 = 481. You can quickly construct a complete calendar, using a few simple formulas.

In the /Data Query command, you can search for a particular date whether it is represented as a number or a label. But you can specify conditions such as "before today" and "all Tuesdays from March to September of next year" only if you use calendar arithmetic.

Let's take a look at 1-2-3 facilities for performing calendar arithmetic. There are two sets of tools: @ functions and *numeric display formats*.

The Date Functions

Two of the @ functions answer the question:

What is the serial number for a particular date?

Function	Description
@DATE(year,month,day)	Calculates the number (1-73049) corresponding to a particular day between January 1, 1900 and December 31, 2099.
@TODAY	Calculates the number corresponding to the date entered when you started your computer. Always enter the correct date and time when you start your computer (unless you're lucky enough to have a non-stop "clock" included in your system).

Several other @ functions perform an opposite operation: They allow you to reconstruct a date from its particular serial number:

Function	Description
@YEAR(serial#)	Calculates the number of years since 1900 (0-199) for the date with the given serial number.
@MONTH(serial#)	Calculates the month (1-12) for the date with the given serial number.
@DAY(serial#)	Calculates the day-of-month (1-31) for the date with the given serial number.

Numeric Display Formats

The /Worksheet Global Format and /Range Format commands offer a variety of numeric display formats—ways in which 1-2-3 can display numeric values. Three of these formats are gathered under the format choice Date:

Format	Appearance of the number
D1	08-May-85
D2	08-May
D3	May-85

In order to have 1-2-3 display a date, you must do three things:

1. Enter the date's serial number. For instance, @DATE(85,11,4) calculates the serial number of November 4, 1985.

2. Assign one of the Date display formats to the cell in which the serial number is stored.

3. Be sure the column-width of the cell is adequate for the display format you select.

You need not perform these tasks in a particular order, since numeric formats and column-widths are independent of cell contents. For instance, if you intend to enter dates in column F of the worksheet, we suggest that you assign a Date format to the cells in column F before making any entries therein.

If you don't assign a Date format to the cell, you'll see the date's serial number in whatever numeric format applies to the cell (e.g., 31355, $31355.00, or 3.1355E4).

Performing Calendar Arithmetic Calculations

Here are some tips for performing calculations with date serial numbers.

- Calculate the number of days between two dates by subtracting serial numbers: later date – earlier date.
- To generate a calendar, use such formulas as:

  +A15+1 to generate the next day's date
  +A15+7 to generate the date of the same day next week

Do not use "plus 31" or "plus 365" formulas to go from month-to-month and from year-to-year. Months and years are not all the same length.

- Given the number of days between two dates, calculate the number of weeks by dividing by 7. Use the @INT or @ROUND function to convert the result to a whole number.

- When the exact number of days in an interval is critical, decide whether the interval should include both the starting and ending dates, just one of those dates, or neither. A straightforward subtraction includes one of the end dates.

- Bankers often simplify things by assuming that months have 30 days and years 360 days. To calculate in this manner, don't compute an interval in days. Instead, use the @YEAR and @MONTH functions to calculate the interval in years and months. Then multiply by the 360 and 30 factors to obtain the days-equivalent.

- You can also use dates in logical expressions. For example, the expression @TODAY<@DATE(85,4,15) is *TRUE* (i.e., has the value 1) before April 15, 1985. After that, it is *FALSE* (i.e., has the value 0).

Operator Precedence Numbers

Operator	Meaning	Precedence
^	Exponentiation	7
–	Negative	6
+	Positive	6
*	Multiplication	5
/	Division	5
+	Addition	4
–	Subtraction	4
=	Equal	3
<	Less than	3
<=	Less than or equal	3
>	Greater than	3
>=	Greater than or equal	3
<>	Not equal	3
#NOT#	Logical Not	2
#AND#	Logical And	1
#OR#	Logical Or	1

9. Using Keyboard Macros—the Typing Alternative

1-2-3 has a facility that allows you to store sequences of keystrokes for future use—during the same session or during a later one. The keystrokes might invoke one or more formatting commands, type entries, or create a graph.

A stored sequence of keystrokes is often called a **keyboard macro** (also called **macro**). Since this facility allows you to save keystrokes, some people also call it the **Typing Alternative** or *macro facility*.

You "attach" each macro to one of the letter keys: A, B, C, . . .Z. When you hold down [ALT] and type the letter, 1-2-3 automatically types all the keystrokes stored in the sequence, just as if you had typed them again yourself.

There are many situations in which you'll find the Typing Alternative useful:

- You need to type the same label many times in a worksheet. For instance, "Revenues", "1st Quarter", or your company's name.
- You need to perform a certain procedure involving several commands and/or entries in a particular order. For instance, a macro might produce a printed report consisting of several sections of the worksheet, each with its own margins, character size, line spacing, etc.
- You wish to use some of 1-2-3's more sophisticated functions in a worksheet that you are developing for use by non-technical personnel—but you can't afford the time to train the personnel in the program's advanced features.

Let's take a closer look at one of these situations. We strongly suggest that you use 1-2-3 to work through the example in the next section.

A Simple Example

Suppose that one of your 1-2-3 worksheets provides the data for several types of reports. For each report, you wish to adjust the widths of columns A and B, in order to produce the best visual effect.

Before printing the report, you must issue the appropriate 1-2-3 commands to set column-widths. You can have a keyboard macro handle this task.

• **Do it yourself.** Perform the procedure once manually, noting all the keys you press:

Keystrokes	Result
[F5/GOTO]A1 [ENTER]	Move the pointer to cell A1.
/WCS25 [ENTER]	Use the /Worksheet Column-Width Set command to set the width of column A to 25 characters.
→	Move the pointer one cell to the right, to cell B1.
/WCS12 [ENTER]	Use the /Worksheet Column-Width Set command to set the width of column B to 12 characters.

• **Enter the macro.** Go to a cell that is out of the way (e.g., cell X1) and record all the keystrokes as a label entry:

'{goto}A1~/WCS25~{right}/WCS12~[ENTER]

• **Attach the keystroke sequence to a letter key:**

/Range Name Create
Enter name: \C [ENTER]
Enter range: X1 [ENTER]

This attaches the keystroke sequence stored in cell X1 to the C key.

• **Use the macro.** First, reset the column-widths of columns A and B. Do this by going to cell A1 and issuing the command /Worksheet Column-Width Reset and then going to cell B1 and issuing the same command.

Now, hold down the [ALT] key and press C. 1-2-3 instantly types the stored keystrokes, changing the column-widths back to 25 and 12.

Having worked through an example, let's examine the macro facility more closely.

Creating and Naming a Macro

We suggest that you always go through a "dry run" before using the Typing Alternative. Type the entries and/or commands, noting exactly which keys you press. Don't forget to note [ENTER] and [SPACE]. When you're satisfied that you know precisely which keystrokes are to be saved, find some out-of-the-way cells, in an empty part of the worksheet. Then:

1. Enter the macro as one or more labels (e.g., preceded by a label-prefix).

2. Assign a special macro range name to the cell in which the keystroke sequence begins.

We'll examine both these steps in detail, then proceed to a discussion of using (*invoking*) macros.

1. Enter the macro as one or more labels.

Even if the keystrokes will perform commands or enter numbers/formulas, you must define the sequence in label form. In practice, this means that you'll need to begin many macro entries with a label-prefix character (page 5-6). Figure 9-1 shows three labels that can act as keystroke sequences.

(1) +{up}+{up}{up}+{up}{up}{up}~

(2) /wcs10~{right}/wcs10~{right}/wcs10~{left}{left}

(3) Lotus Development Corporation~

Figure 9-1. Three Simple Macros

Macro 1 in Figure 9-1 enters a formula that sums the three cells above the current cell. To enter this macro as a label, you must begin it with an apostrophe (') or another label-prefix:

You type: '+{up}+{up}{up}+{up}{up}{up}~ [ENTER]

What appears in cell: +{up}+{up}{up}+{up}{up}{up}~

The general rule is:

What you see in the worksheet is what 1-2-3 uses to do Alternative Typing.

Macro 2 issues the /Worksheet Column-Width Set command several times. This macro sets the display width of three consecutive columns to 10 and returns the pointer to its original position. As above, to enter this macro as a label, you must begin it with an apostrophe or any other label-prefix.

Macro 3 enters a label in the current cell.

These examples illustrate how you indicate the keyboard's special keys in a macro:

- Keys are indicated by enclosing the name of their function in braces, e.g., {Home}, {Esc}.

- The arrow pointer-movement keys are similarly indicated by name, e.g., {left}, {RIGHT}, {Up}, {DOWn}.

(As these examples indicate, 1-2-3 accepts either uppercase or lowercase letters in these key names.)

- Because you will be using [ENTER] a great deal, it has been assigned a single-character name—tilde (~).

Figure 9-2 is a complete listing of the special keystroke indicators you can use in macros. These standard designations for 1-2-3 macros differ from the actual key name on your keyboard. 1-2-3 always interprets the characters "{" and "~" as having their special meanings in a macro. Do not use these characters with the Typing Alternative for any other purpose.

Type this:	To get this key:	Type this:	To get this key:
~	[ENTER]	{Up}	↑
{Down}	↓	{Left}	←
{Right}	→	{Home}	[HOME]
{End}	[END]	{PgUp}	[PG UP]
{PgDn}	[PG DN]	{Esc}	[ESC]
{Del}	[DELETE]	{Bs}	[BACKSPACE]
{Edit}	[F2/EDIT]	{Name}	[F3/NAME]
{Abs}	[F4/ABS]	{GoTo}	[F5/GOTO]
{Window}	[F6/WINDOW]	{Query}	[F7/QUERY]
{Table}	[F8/TABLE]	{Calc}	[F9/CALC]
{Graph}	[F10/GRAPH]	{?}	Pauses for manual input until you press [ENTER]

Figure 9-2. Indicating Key Functions in Macros

Multiple-Cell Macros. We said above that you can use one or more labels to store keystrokes. Here's how. For readability, you can split up a long keystroke sequence into a column of labels. 1-2-3 doesn't care exactly which keystrokes are stored in which cells. It simply continues to read downward until it reaches a non-label cell (empty, number, or formula). (You can modify this strictly downward procedure using the special commands /XG, /XC, and /XM. See page 9-9.)

We suggest that you take advantage of this flexibility to divide long macros into modest-sized pieces. Use the cells to the right of the macro sequence to remind yourself what each piece accomplishes. Programmers call this process *commenting*. When you do this, be certain that your comments are not in the same cell as the macro. Figure 9-3 contains two versions of the same macro, illustrating both the use of explanatory text and the fact that it doesn't matter exactly which keystrokes are stored in which cells.

Caution. 1-2-3 pays attention to all characters in a macro. This includes "invisible" ones, such as spaces, that lie beyond the last visible character in an entry.

2. Assign a special macro range name to the cell in which the keystroke sequence begins.

Using the /Range Name command, assign a name consisting of a backslash (\) and then a letter to the starting cell of the keystroke sequence:

\A \B \C . . . \Z

This makes the cell into a named range. For many purposes, you can use this range name like any other (with [F5/GOTO], with /Range Erase, etc.). But in addition, 1-2-3 attaches the macro beginning in that cell to the corresponding letter key.

Version one	
Jan-Jun{right}	First label
Jul-Dec{left}	Second label
{down}	Down a row
0{right}0~	Enter zeros
/rfc2~{left}~	Format: Currency,2
{left}{up}	Back to beginning cell
Version two	
Jan-Jun{right}Jul-Dec{left}	Labels
{down}0{right}0~	Numbers
/rfc2~{left}~	Format: C2
{left}{up}	Return

Figure 9-3. Multiple-Cell Macros

Auto-Execute Macro. You can assign one additional macro name with the /Range Name command: \0 (zero). This is a special name, indicating an *auto-execute* macro.

If a worksheet you've created includes a macro named \0, 1-2-3 automatically invokes the macro whenever you load the worksheet (/File Retrieve command). This 1-2-3 feature is particularly useful in combination with the auto-loading worksheets (page 21-3).

Invoking a Macro

After you've attached a keystroke sequence to a letter key, you can have 1-2-3 type it automatically at any time* by pressing

[ALT]-letter

That is, holding down the [ALT] key and press the letter key. We call this process *invoking* a macro. The simplest use is having 1-2-3 automatically type one or more complete entries and/or issue one or more complete commands in Ready mode. For example, refer to Figure 9-1:

- Assign the cell containing Macro 1 the range name \X. Then, pressing [ALT]-X in Ready mode enters the formula in the current cell.

- Assign the cell containing Macro 3 the range name \Y. Then, pressing [ALT]-Y in Ready mode enters the label "Lotus Development Corporation" in the current cell.

However, you are not restricted to using the Typing Alternative in Ready mode. The macro \Y could be invoked at a command prompt to enter the same sequence of characters (e.g., at the /Graph Options Titles First prompt or at the /Print Options Footer prompt).

*Exception: Pressing [ALT]-letter when a macro is active and pausing for keyboard input has no effect. See "Interactive Macros", page 9-8, and the /XM command description, page 9-12.

It is even possible to: (1) start an entry or command manually, (2) use the Typing Alternative to continue, and (3) finish the label manually. Note the difference between these two macros:

\P: Revenues ~ \Q: Revenues

Pressing [ALT]-P types the word "Revenues" and finishes the entry. (Remember, "~" means [ENTER].) But pressing [ALT]-Q doesn't type [ENTER]. That means you can press [ALT]-Q to insert the word "Revenues" in the middle of a label, a graph legend, a page footer, etc.

A Two-Macro Procedure. Similarly, you might begin a procedure with a macro, continue it manually, then finish it with a macro. The two macros in Figure 9-4 start and end a procedure that prints a form letter using information from a data record. The 1-2-3 user follows this procedure:

1. Moves the cell pointer to a particular data record.
2. Invokes macro "A" by pressing [ALT]-A.
3. Types a "# of days" entry.
4. Invokes macro "B" to finish the job.

Auto-Execute Macro. After the worksheet is loaded, you cannot invoke the auto-execute macro, \0, by typing "[ALT]-0". To be able to use an auto-execute macro while you're working, assign it a second macro name (e.g., \H), in addition to \0.

The CMD Indicator

In many cases, you will want 1-2-3 to run through the entire macro more or less instantaneously. But in other cases, you may want a pause in the middle (e.g., to specify a range to be printed). You can indicate pauses for keyboard input in a macro using the {?} facility (page 9-8) and the /XM command (page 9-12).

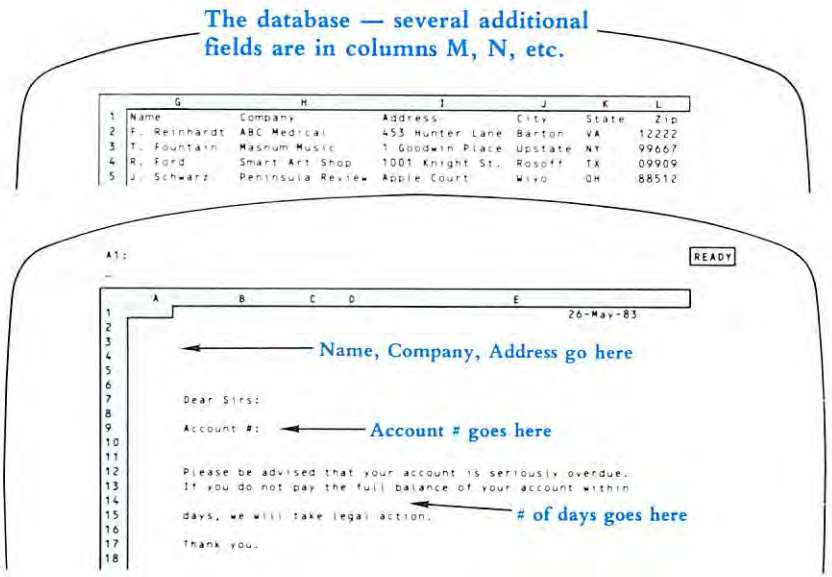
Whenever it pauses during a macro, 1-2-3 displays a *CMD* indicator next to the mode indicator in the upper right corner of the screen.

For a more technical discussion of what happens when you press [ALT]-letter, see page 9-14.

Single-Step Execution

During the design and testing phase of writing macros, you'll sometimes find that 1-2-3 is too fast. To help you diagnose problems in your procedures, 1-2-3 has a *single-step mode*, in which 1-2-3 pauses after each keystroke of a macro instead of typing the entire sequence at once.

At any time, you may hold down the [ALT] key and press [F1/HELP]. This causes a *STEP* indicator to appear in the lower right corner of the screen. Then press any key to proceed one step at a time in the execution of the macro. Pressing [ALT]-[F1/HELP] turns off the *STEP* indicator, but does not resume macro execution.



Macro \A

/c ~ b2 ~ {right}	Copy "Name"
/c ~ b3 ~ {right}	Copy "Company"
/c ~ b4 ~ {right}	Copy "Address"
/c{right}{right} ~ b5 ~	Copy "City-State-Zip"
{right}{right}{right}	Move to "Account #"
/c ~ c9 ~	Copy "Account #"
{home}{goto}b14 ~ '	Move to "# of days"

Macro \B

{up}{up}	Move to top of paragraph
/rjb12..e15 ~	Justify paragraph
/pprb1.e17 ~ gq	Print it

Figure 9-4. A Two-Macro Procedure

Whenever a macro is executing while the *STEP* indicator is on, processing occurs one step at a time: a single keystroke or a single /X command (page 9-9). Between keystrokes, 1-2-3 pauses for you to press any key. At such times, *SST* is displayed in the upper right corner of the screen instead of *CMD*.

The key you press to advance a single step is not interpreted by 1-2-3—it simply resumes macro execution.

Exception: Pressing **[ALT]-[F1/HELP]** during a pause turns off the *STEP* indicator, but does not resume macro execution.

Interrupting Macro Execution

You can interrupt the execution of a keyboard macro and return immediately to Ready mode. While a macro is reading keystrokes, interrupt by pressing [BREAK]. Control returns immediately to Ready mode.

Similarly, you can press [BREAK] to interrupt a macro during a pause for keyboard input. 1-2-3 displays a *CMD* or *SST* indicator in the upper right corner during such pauses.

Advanced Topic: Interactive Macros

The two-macro procedure above illustrates one way to implement a partly automatic, partly manual procedure. But 1-2-3 offers an even better way to get the job done. The Typing Alternative facility can be interactive—1-2-3 can pause one or more times for manual input while it is processing a macro.

Whenever 1-2-3 encounters {?} in executing a macro, it pauses for keyboard input. The user may type any number of keys. 1-2-3 will interpret them in the current context. When the user presses [ENTER], 1-2-3 resumes the macro just after the {?}.

The [ENTER] pressed by the user only causes the macro to resume execution. The [ENTER] is not acted upon by 1-2-3 as part of the keystroke sequence. This means that you'll often find it necessary to include this sequence in a macro:

{?}~

The {?} accepts keyboard input, and the ~ finishes off the entry with [ENTER].

Other sequences are equally useful:

{?}{Right}	1-2-3 accepts keyboard input, then automatically presses the → key.
{?}{PgDn}	1-2-3 accepts keyboard input, then automatically presses [PG DN].

Example. Figure 9-5 shows how to combine the pair of form-printing macros illustrated in Figure 9-4 above.

/c~b2~{right}	Copy "Name"
/c~b3~{right}	Copy "Company"
/c~b4~{right}	Copy "Address"
/c{right}{right}~b5~	Copy "City-State-Zip"
{right}{right}{right}	Move to "Account #"
/c~c9~	Copy "Account #"
{home}{goto}b14~	Move to "# of days"
'{?}~	Start entry, pause, then finish entry
{up}{up}	Move to top of paragraph
/rjb12..e15~	Justify paragraph
/pprb1.e17~gq	Print it

Figure 9-5. An Interactive Macro

In addition to the {?} facility, 1-2-3 offers several other tools for constructing interactive macros. See the descriptions of the "Pause-for-Keyboard-Input" commands on page 9-12.

Advanced Topic: Programming Capabilities

1-2-3's Typing Alternative facility incorporates an additional feature that opens an entirely new range of possibilities. Instead of merely typing keystrokes that you have previously stored, 1-2-3 can make decisions regarding what to do next. These decisions can be based on values in the worksheet or on actions taken by the user during macro execution.

For instance, you can have a macro:

- [F5/GOTO] different locations in the worksheet, depending on the value of a certain cell.
- Print mailing labels using the information in a database, stopping automatically when it gets to the last record.
- Display a menu that you define in the control panel, allowing the user to select one of the menu choices. The macro then takes an action based on the user's choice.

This facility gives the 1-2-3 user true programming capability. But the same caution goes for 1-2-3 programming as for all other kinds of computer programming:

> *Allowing the computer to make decisions means there is a possibility it will make a decision you didn't anticipate.*

The /X Commands

Now that we have issued the appropriate warnings, let's take a look at how to use the extra power. It's localized in an extra set of 1-2-3 commands, the /X commands. /X is "invisible"—1-2-3 won't recognize it if you try to type it. You can use the /X commands only in a macro.

The /X commands differ from other 1-2-3 commands in a fundamental way: Most commands affect the worksheet's entries; the /X commands affect the way in which 1-2-3 "reads" the keystrokes of a keyboard macro.

Here's a summary listing of the /X commands:

Programming

Command	Function
/XI*condition* ~ . . .	If-Then
/XG*location* ~	GoTo
/XC*location* ~	Call subroutine (GoTo, then return)
/XR	Return from subroutine
/XQ	Quit macro execution

Pause for Keyboard Input

Command	Function
/XM*location* ~	Process a user-defined menu
/XL*message* ~ *location* ~	
/XN*message* ~ *location* ~	Display a message in the control panel, accept a label entry (/XL) or number entry (/XN) from the keyboard, and place this entry in a cell.

/X Programming Commands

The /X programming commands supply the basic tools of a programming language: an "If" statement, both "GoTo" and "Subroutine Call-and-Return" facilities, and a "Quit" (END) statement.

For variables, you have the worksheet's cells. We strongly suggest that you use the range name facility, which allows you to have variables with meaningful names. (Figure 9-6 illustrates a macro that uses the variables NUMBER and COUNTER.)

/XI*condition* ~ . . . If-Then

If the condition is *TRUE* (i.e., has a non-zero value), continue reading keystrokes in the same cell. If the condition is *FALSE* (i.e., zero), continue reading keystrokes in the cell below. Be sure to follow the *condition* in the /XI command with a " ~ ".

/XGlocation ~ GoTo

Continue reading keystrokes at *location*. You may specify a cell address, a range, or a range name as the location. 1-2-3 immediately abandons the current cell and continues reading keystrokes at the specified cell (or the upper left corner of the specified range).

Caution. Don't get this programming "GoTo" confused with the [F5/GOTO] key. The /XG command only determines where 1-2-3 will look next for macro keystrokes. This is unrelated to the worksheet's current cell and [F5/GOTO].

/X*Clocation* ~ Call Subroutine
/XR *Return from Subroutine*

Similar to /XG (GoTo). Continue reading keystrokes at *location*. When an /XR command is encountered, return to reading keystrokes at the point just beyond the /X*Clocation* ~ command.

An error occurs if an /XR command is encountered, but no /XC command has been issued. Subroutines may be nested up to 16 levels.

/XQ *Quit*

1-2-3 erases the *CMD* indicator from the upper right corner of the screen and returns you to Ready mode.

Example. Figure 9-6 shows a macro that converts a column of formulas into their current values. For each cell, this takes just two keystrokes: [F2/EDIT], then [F9/CALC]. This is followed by ↓ (move to the next entry to be converted) and [F9/CALC] (increment COUNTER).

You can use the /XG command to jump a few cells upward in the same column. The effect is to make 1-2-3 process the same cells—type the same keystrokes over and over again, going cell-by-cell down the column. This could go on forever—an "infinite loop". But the /XI command breaks out of the loop when all the formulas have been converted.

```
/wgrm                                          Set Recalc to Manual
/rncNUMBER~b1~                                 Create "NUMBER" variable
/rncCOUNTER~b2~                                Create "COUNTER" variable
/rncCOLUMN~{bs}.{end}{down}~                   Name the formulas COLUMN
{goto}NUMBER~                                  Initialize NUMBER
@count(COLUMN){calc}~
{down}+COUNTER+1~                              Initialize COUNTER
{goto}COLUMN~                                  Move to top of COLUMN
{edit}{calc}{down}{calc}                       Convert and increment
/xiCOUNTER<=NUMBER~/xgLOOP~                    Branch on condition
/wgra                                          Endgame: Automatic Recalc
{home}{goto}COUNTER~Done!~                     Done message
{goto}COLUMN~                                  Return to starting point
/xq                                            End macro
```

Assign range name "LOOP" to this cell

Figure 9-6. A "Looping" Macro

Pause-for-Keyboard-Input Commands

/XL*message* ~ location ~ Get label entry from keyboard

1-2-3 displays the *message* string (which may be up to 39 characters long) on line 2 of the control panel, and then pauses. The user can type any string of characters (up to 240). When the user presses [ENTER], 1-2-3 stores the string of characters as a label in the specified *location*. If a range is specified as the location, only its upper left corner cell gets the entry. Each label is assigned the apostrophe (left-align) label-prefix.

/XN*message* ~ location ~ *Get number entry from keyboard*

1-2-3 displays the *message* string (which may be up to 39 characters long) on line 2 of the control panel, and then pauses. The user can type any number or formula—even range names and @ functions are allowed. When the user presses [ENTER], 1-2-3 finds the numeric value of the entry and stores it in the specified location. If a range is specified as the location, only its upper left corner cell gets the entry.

If the user types an entry that 1-2-3 cannot interpret as a numeric value, 1-2-3 displays an error message and allows the user to try again. (The error condition must be cleared first, with [ENTER] or [ESC].)

Note. 1-2-3 does not recalculate the worksheet after it performs an /XL or /XN command. You may wish to include {CALC} steps in your macro when using these commands.

/XM*location* ~ Process a Menu

1-2-3 allows the user to make a menu choice, and branches according to the user's choice. 1-2-3 constructs the menu from the menu range whose upper left corner is *location*. As above, location may be a cell address, range, or range name.

A menu range can be up to eight columns wide and is two rows deep (Figure 9-7):

1st Row. A consecutive set of entries, with any text you wish.

During execution of the /XM command, the entries in this row are displayed as a set of menu choices on line 2 of the control panel. Be sure to follow these guidelines in creating these entries:

- Do not place more than eight consecutive entries across this row.
- The cell to the right of the final menu item must be empty.
- No empty cells are allowed between menu items.
- Keep the total number of characters small, to prevent overflowing the screen.
- Avoid creating menu entries that begin with the same character. This will limit the user's ability to select choices by typing a character. 1-2-3 automatically converts a lowercase letter to uppercase at the beginning of a menu entry. Thus, don't try to use case to distinguish choices.

2nd Row. Each entry in this row is the long prompt for the menu choice above it. /XM-type menus work the same way as standard 1-2-3 menus. Whenever the user highlights a particular menu choice, line 3 of the control panel displays the choice's explanatory phrase.

Here is an outline of /XM command execution:

1. 1-2-3 pauses in reading macro keystrokes (similar to the {?} facility).

2. In the control panel, 1-2-3 displays a moving-pointer menu that looks just like 1-2-3's command menus. The menu choices themselves are drawn from the first row of the menu range. The corresponding explanatory phrases come from the second row of the menu range.

3. The user makes a menu choice in the same way as with a 1-2-3 command menu:

- Moving the menu pointer with →, ←, [HOME], and/or [END], then pressing [ENTER]; or
- Typing the first character of the menu choice. (If two menu choices begin with the same character, the one on the left is selected.)

4. 1-2-3 continues reading keystrokes just below the menu range, in the column of the selected menu choice. That is, the macro continues two cells below the choice selected by the user (Figure 9-7).

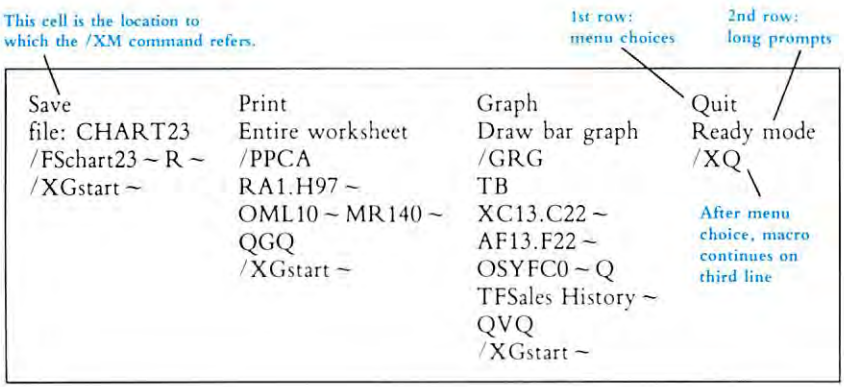


Figure 9-7. A User-Defined Menu

Note these differences between /XM menus and 1-2-3 command menus:

- /XM menu choices need not start with different characters. If the user presses a character to make a choice, 1-2-3 selects the first menu item, reading left-to-right, that begins with that character.
- Pressing [ESC] at an /XM menu doesn't "Back up one step"—1-2-3 just continues reading keystrokes in the cell containing the /XM command.

Advanced Topic: Macro Implementation Details

After you have done some simple work in using the Typing Alternative, you'll probably want to reread this section thoroughly. We present some additional detail here regarding the way macros work. A greater understanding will help you in revising macros and in using macros to type aligned labels (right-aligned, centered, etc.).

When you invoke a macro (e.g., [ALT]-E), here is what happens:

1. 1-2-3 looks up \E in its range name table. If there is no range with this name, 1-2-3 *beeps*.

2. The first cell is either the single cell assigned the name \E, or the upper left corner of the range to which \E is assigned.

3. 1-2-3 types the keystrokes stored in this first cell, then goes to the cell below it, looking for more keystrokes to type.

4. 1-2-3 continues downward in this manner until one of the following happens:

- It arrives at a non-label cell, or reads an /XQ command. In these cases, macro execution terminates.

- It reads an /XG, /XC, or /XR command, which instructs it to continue reading keystrokes elsewhere in the worksheet.

Ignoring the Label-Prefix. With each entry it types, 1-2-3 ignores the label-prefix character, paying attention only to the subsequent characters. Think of it this way:

What you see of a label in the worksheet is what 1-2-3 uses to do Alternative Typing.

Here are some examples to illustrate this point:

Cell Entry as Displayed in the Control Panel	Effect in a Macro
'Revenues	Revenues
'/WGRM	/Worksheet Global Recalculation Manual
'+A4/100 ~	+A4/100[ENTER] (a formula)

What does all this detail mean? There are important implications for two aspects of using the Typing Alternative: revising an existing macro and entering labels with macros.

Revising an Existing Macro

To do automatic typing, 1-2-3 doesn't remember keystrokes directly. Rather, it remembers the cell range in which the keystrokes are stored. If you change the contents of the range named \E, you've effectively revised the macro invoked by [ALT]-E.

Thus:

To revise a keystroke sequence, don't use the /Range Name command. Just revise the entries in the named range itself.

Using Macros to Enter Labels

When 1-2-3 interprets a label as a keystroke sequence, it ignores the label-prefix character. Thus, if the purpose of the sequence is to type a label, you may need to include a second label-prefix character. We admit this is a bit complex. But just remember the rule mentioned above:

What you see of a label in the worksheet is what 1-2-3 uses to do Alternative Typing.

For example:

' "Expenses ~ [ENTER]	actual cell entry
"Expenses ~	how cell appears in worksheet

What you see in the worksheet—and what 1-2-3 gets when you invoke the macro—is a word preceded by a double quote ("). Thus, the result is a right-aligned label.

Let's look at another case:

'Expenses ~ [ENTER]	actual cell entry
Expenses ~	how cell appears in worksheet

When you invoke the macro, 1-2-3 views this entry as a label that begins with "E". It automatically adds the global label-prefix character, as set with the /Worksheet Global Label-Prefix command.

Command Skills

Contents

10. Worksheet Commands

The /Worksheet commands control overall aspects of 1-2-3 use. The commands fall into several categories:

Starting Out. When you install 1-2-3 on your computer, you can use /Worksheet commands to tell 1-2-3 about your system's hardware. From time to time, you'll need to inform 1-2-3 of any changes you make in the system hardware.

At the Beginning of a Session. Certain /Worksheet commands are useful at the beginning of a 1-2-3 session. Some of them determine the overall appearance of the worksheet—column widths and overall display formats. Others determine the way in which 1-2-3 calculates the formulas you enter into the worksheet.

During a Session. Still other /Worksheet commands are most useful in the middle of a session. They can make large-scale changes to the worksheet's contents, such as erasing the entire worksheet or inserting empty rows and columns. And they can change the way 1-2-3 uses the display screen, allowing you to view two widely separated parts of the worksheet at the same time.

How 1-2-3 Displays Cell Entries

Using /Worksheet Global commands, you can control these overall aspects of worksheet appearance:

- Display format for numbers and formulas.
- Prefix-character for labels (determines label alignment).
- Column widths.

For example, Figure 10-1 shows how the same entries might result in quite different appearances, depending on the /Worksheet Global settings.

You do not need to issue /Worksheet Global commands when you start filling in a new worksheet. When 1-2-3 begins execution and whenever you issue a /Worksheet Erase command, the initial global settings listed in the table below are automatically established. Any changes you make thereafter are stored along with the cell entries in the worksheet files you create with /File Save and /File Xtract.

Global Setting	Initial Value	Other Possible Values
Numeric Display Format	General	Fixed, Currency, Comma, Percent, Scientific, Date, +/-, Text
Label Alignment	Left-Aligned	Right-Aligned, Centered
Column-Width	9 characters	1..72 characters

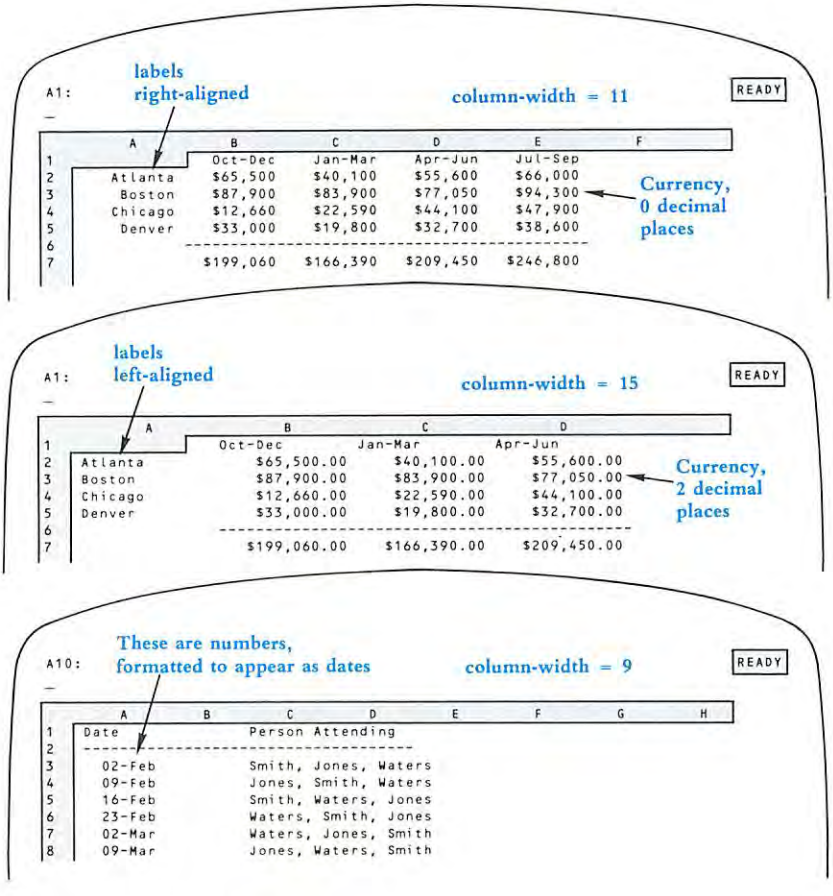


Figure 10-1. Global Settings

Standards and Overrides

The /Worksheet Global commands establish overall (*global*) standards. Unless you issue an override for a particular cell or range, 1-2-3 displays it according to the /Worksheet Global settings. This global-setting-and-override system allows you the flexibility both to establish the rules and to specify the exceptions to them:

- The global numeric display format can be overridden for particular cells with /Range Format commands (page 11-9).
- The global label alignment can be overridden for particular cells by typing label-prefix characters and issuing /Range Label-Prefix commands (page 11-10).

• The global column-width setting can be overridden for particular columns with /Worksheet Column-Width commands (page 10-19).

For example, you might override the global settings in certain parts of the worksheet in Figure 10-1 above to produce the different illustrations in Figure 10-2.

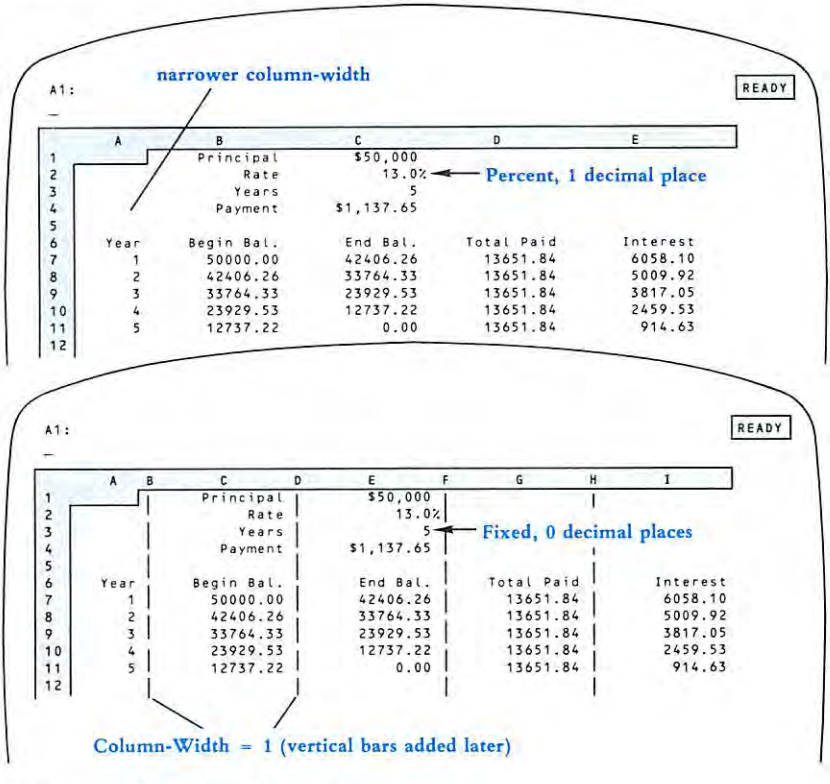


Figure 10-2. Overriding Global Settings

A few additional points are important to an understanding of how these /Worksheet Global commands work:

Numeric Display vs. Label Display. The ways in which 1-2-3 displays numbers and labels are independent. Setting the numeric format of a cell has no effect on the way 1-2-3 displays a label—whether it's already there or you enter it later. Accordingly, two different /Worksheet Global commands handle these two independent formats:

Numeric Formats: /Worksheet Global Format
Label Formats: /Worksheet Global Label-Prefix

Numeric and label formats, along with numerous examples, are described in the command summaries later in this chapter.

Numbers—Appearances, not Values. The /Worksheet commands determine only the way in which 1-2-3 shows numbers on the display screen. These commands do not change the values stored in the cells.

Example: 1-2-3 calculates an amount to be 518.628.

1. You set the display format to dollars-and-cents (1-2-3 calls this format *Currency, 2 decimal places*). The cell now appears as $518.63. 1-2-3 seems to have rounded off the number to the nearest penny, but it still knows the true value.

2. You then set the format to *Currency, 4 decimal places*, causing the cell to appear as $518.6280.

No matter how many decimal places of a number are displayed, 1-2-3 always remembers the number at maximum precision, about 15 decimal places. You can have 1-2-3 do true rounding, using the @ROUND function (Chapter 19, "1-2-3 Function Reference").

Labels—Appearances and Values. The situation with labels is different from that with numbers. 1-2-3 stores the formatting information concerning labels (left-aligned, right-aligned, centered, or repeating) as part of the label itself, in the label-prefix character.

Using a /Worksheet Global Label-Prefix command establishes a standard prefix-character—1-2-3 automatically places this character in front of any label that you enter without a prefix. Subsequently changing the standard prefix does not change these existing labels. Use a /Range Label-Prefix command to change their prefix-characters and, hence, their alignment (page 11-10). Or use Edit mode to change the label-prefixes of individual cells (page 5-8).

More Standards—/Worksheet Global Default Commands

The /Worksheet Global Default commands control the way in which 1-2-3 is configured to use printers and disks. These commands are similar to the other /Worksheet Global commands.

You'll want 1-2-3 to handle many aspects of printing automatically most of the time. But there will be some situations in which you will want to temporarily override the standard procedures and give special instructions.

1-2-3 allows you this flexibility with its system of default settings. The term **default** commonly describes what occurs when you don't do anything to change the situation. For instance, when you don't pay back a loan, you are "in default".

With 1-2-3, default settings determine what happens when you don't issue an overriding command. But you can substitute your own default settings with /Worksheet Global Default commands.

Moreover, you can save the default settings you make with these commands. Then each time 1-2-3 starts, it adopts your settings rather than those which were "factory-installed". We've separated the /Worksheet Global Default commands from the other /Worksheet Global settings, because only the default settings can be saved.

(For details concerning usage of the /Worksheet Global Default commands, see Appendix A, "Configuring 1-2-3".)

Processing of Entries and Formulas

In this section, we discuss what happens when you make a change to a cell in the worksheet. This involves a discussion of how 1-2-3 handles the formulas that make cell values depend on one another. And it involves an explanation of the cell protection facility that prevents you (or somebody else) from making changes to the wrong cells.

Formula Processing—/Worksheet Recalculation

One of 1-2-3's main jobs is to recalculate all of the worksheet's formulas from time to time. Changes you've made ripple through the worksheet to show precisely how some values depend on others.

When 1-2-3 begins execution, and whenever you issue a /Worksheet Erase command, the following settings are established:

Automatic Recalculation. 1-2-3 will recalculate all formulas automatically whenever you enter a new value or edit an existing value. Entering values with a /Copy, /Move, or /File command also causes a recalculation.

Natural Recalculation Order. In performing formula recalculation, 1-2-3 respects the relationships among all cells. It does not recalculate a formula until it has already processed all other formulas it depends on.

For instance, if cell H15 depends on the values of formulas in cells A5, C25, and J100, 1-2-3 evaluates the three cells' formulas before recalculating the formula in H15. If A5, C25, or J100 are in turn dependent on other formulas, then the other formulas are recalculated first.

The formulas in a worksheet thus have a "natural" order. 1-2-3's standard practice is to observe this order.

Circular References

Although 1-2-3 is very clever about keeping track of the relationships among cell formulas, it can't prevent you from devising some paradoxical situations. For instance, Figure 10-3 shows three formulas whose values depend on each other.

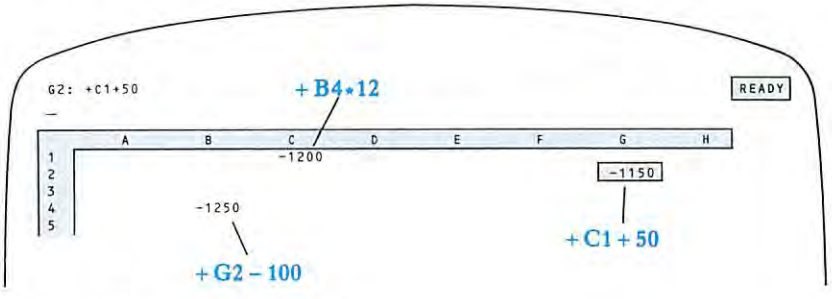


Figure 10-3. Circular References

This situation is called a **circular reference**. The value of cell B4 depends indirectly on itself. Independence is not usually a desirable trait in worksheets. (You can use a self-dependent cell as a counter of the number of times 1-2-3 performs a recalculation. See the example in Chapter 9, " Using Keyboard Macros".)

Whenever 1-2-3 detects a circular reference in a worksheet using Natural order, it displays a *CIRC* indicator at the lower right corner of the screen. If this comes as a surprise, print out all the formulas (/Print Printer Options Other Cell-Formulas command, page 15-16) and analyze the worksheet.

Changing the Recalculation Procedure

There are a number of situations in which you might want to alter the recalculation procedure from Natural and Automatic:

- You need to change several input values at once. It isn't necessary for 1-2-3 to recalculate formulas until you've entered all the values.
- The relationships among the cells include circular references, so that more than one recalculation pass is required to allow calculated values to converge to the desired result.

The /Worksheet Recalculation commands afford you the necessary flexibility in the recalculation process:

- Set the order in which 1-2-3 processes formulas to Natural, Columnwise, or Rowwise. Both of the alternatives to Natural process formulas in order of their position in the worksheet, starting with cell A1.

- Set the frequency with which 1-2-3 performs recalculations to Automatic (every time a value changes) or Manual. (When in Ready mode, recalculation occurs whenever you press [F9/CALC].)
- Set the Iteration count—the number of times 1-2-3 cycles through the entire set of formulas when it performs a recalculation.

If recalculation is Manual, 1-2-3 displays a *CALC* indicator at the bottom of the screen whenever a cell value has changed since the last recalculation. This indicator is a reminder to press [F9/CALC] before trusting the worksheet's values.

Cell Protection

The "standard" way to use a 1-2-3 worksheet is to type labels and numbers into some cells (*input*), and let 1-2-3 show calculated values in other cells (*output*). When you create a small worksheet for yourself, you probably won't need any help to keep things straight.

But when you start building more sophisticated worksheets, and especially when you create worksheets for others to use, you'll quickly discover the need to prevent accidental modification of certain cells.

1-2-3 has the answer in the concept of a "protected" cell, a cell whose contents may not be replaced or edited. You can organize a worksheet so that it consists of:

1. Unprotected cells (input cells) in which the user types labels and/or numbers.
2. Protected cells (output cells) in which 1-2-3 shows the results of its calculations.

You'll also want to protect other entries that should not change—instructions, horizontal and vertical lines, labels, formulas that perform intermediate calculations, etc.

It may help you to think of the protection facility as a set of electric fences around individual cells. However, unless the "power" is turned on, these fences don't work, and changes may be made to any cell (Figure 10-4).

The /Worksheet Global Protection command turns the protection power "on" (*Enable*) and "off" (*Disable*). If you never Enable protection, it's as if the protection facility didn't exist.

The /Range Unprotect and /Range Protect commands dismantle and re-erect these fences, respectively, allowing you to make certain cell contents changeable (input cells), even when protection is Enabled.

You will probably want to implement cell protection only after you have finished creating a worksheet. During the creation process, almost everything is subject to change as you create output cells, rearrange the worksheet, etc. A general procedure for using the protection facility is presented on page 11-7.

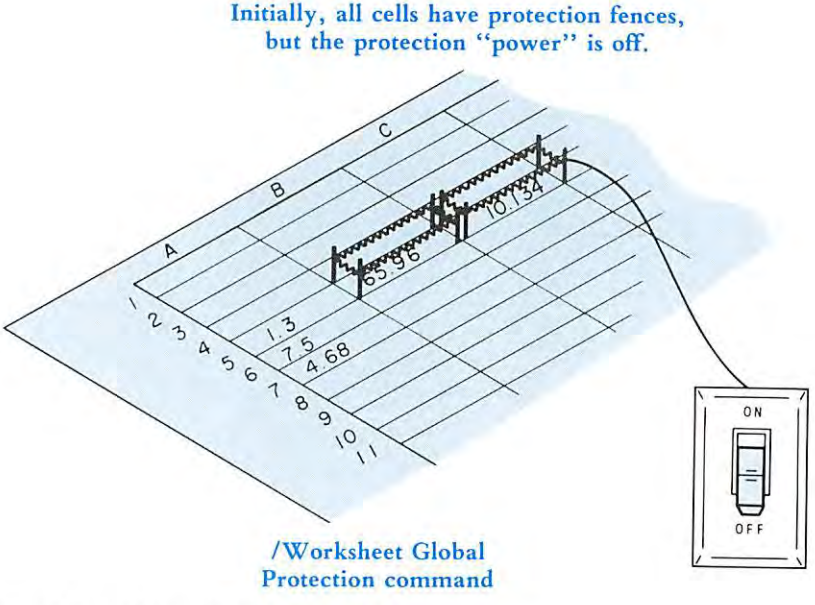


Figure 10-4. Protection Fences

The protection facility prevents changes to cells, but it doesn't prevent you from moving the cell pointer to protected areas of the worksheet. To impose this even greater restriction, use the /Range Input command (page 11-17).

Status of Global and Default Settings

Five overall aspects of the worksheet are controlled with /Worksheet Global commands:

- Global numeric display format.
- Global label-prefix.
- Global column-width.
- Recalculation procedure.
- Cell protection

To help you keep track of these settings, the /Worksheet Status command reports the current settings. It also shows you how much of the computer's main memory is available to allow expansion of the worksheet (Figure 10-5).

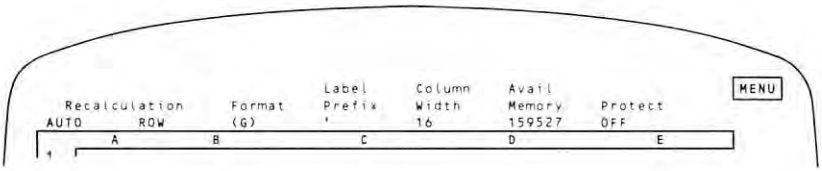


Figure 10-5. Worksheet Status Display

Altering the "Window" into the Worksheet

The entire 1-2-3 worksheet is far too large to be shown in its entirety. Therefore, at any one time you can see just part of the worksheet.

The standard window shows a portion of the worksheet that is 20 rows high and one or more columns wide, depending on the display widths you've set for the columns.

However, sometimes the limitation imposed by the size of the display screen can be inconvenient:

- You wish to see how a result in cell D55 changes when different values are entered in cell B12. Since these cells are separated by more than 40 rows, you can't see them both at once.
- When you move the cell pointer to the right to see sales projections for October in column L, the labels in column A disappear off the left edge of the screen.

1-2-3 handles these problems and similar ones by offering two additional methods for using the display screen as a window into the worksheet: *Titles* and *Split Screen*. These additional methods may be used separately or together.

Titles

In a standard worksheet, the column letters A, B, C, etc. and the row numbers form a border around the top and left edges of the worksheet. The border is "frozen" in place—you can't move the cell pointer there. The Titles facility allows you to expand this border to include several rows and/or several columns of the worksheet.

Thus, the border can include column headings a bit more meaningful than A or B, and row headings more informative than 14 or 75 (Figure 10-6).

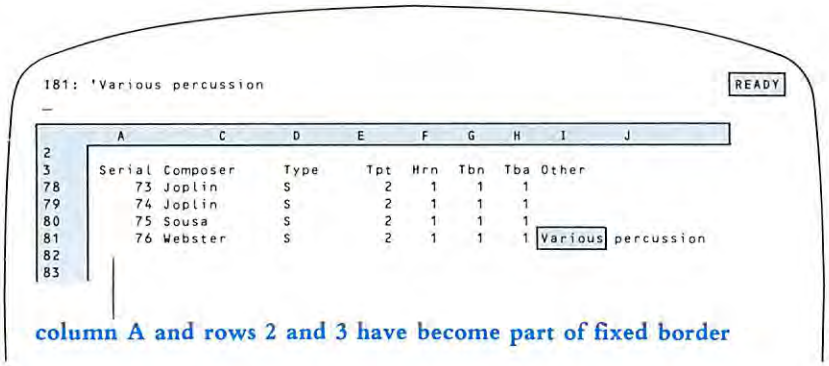


Figure 10-6. Worksheet Titles

Split Screen

1-2-3 allows you to split the screen either horizontally or vertically. Instead of showing a single block of 20 rows, the screen can display one block of 10 rows and another block of 9 rows (one row goes to column letters). Or a block of 15 rows and a block of 4 rows. In fact, you can split the screen anywhere you wish, to produce blocks of varying sizes.

Similarly, you can split the screen vertically, so that some columns appear in the left-hand window and others appear in the right-hand window. Figure 10-7 shows the results of Horizontal and Vertical splits.

It's important to keep in mind that there still is just one worksheet. There's only one cell B3, there's only one row 45, etc. The two worksheet windows simply allow you to view two different parts of this single worksheet at the same time. (You can also view the same part of the worksheet in the two windows. There are some situations in which this is useful.)

The worksheet windows are somewhat independent. Within each, you can move the cell pointer to any part of the worksheet. Each window can have its own global display formats and global/individual column widths. It might be helpful to think of two different TV cameras, each focusing on part of the worksheet. Since each camera has its own lenses, each produces its own version of a portion of the worksheet.

When you first split the screen, the two parts are *synchronized*. If you cause one of the windows to move (e.g., GoTo a distant cell), the other window automatically moves comparably, keeping the same rows or columns in view.

Should you desire complete independence of the two windows, you can prevent this automatic synchronization, using /Worksheet Window Unsync. The /Worksheet Window Sync command reactivates this facility.

To move the cell pointer between worksheet windows, use the [F6/WINDOW] key in Ready mode or Point mode.

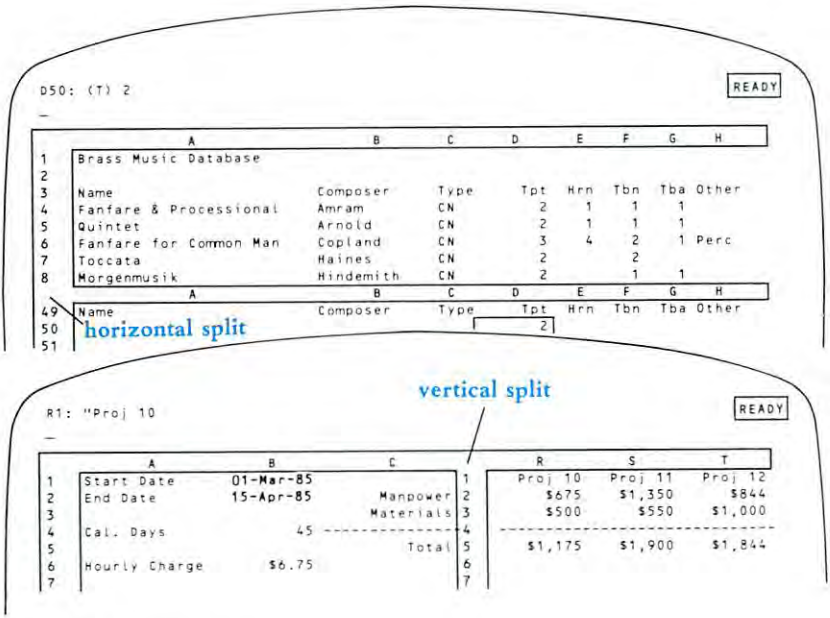


Figure 10-7. Split Screen

Large-Scale Editing

Several additional /Worksheet commands make major changes to the worksheet:

/Worksheet Erase. This command allows you to start afresh. It's almost like shutting off the computer, then turning it back on and starting 1-2-3 again. Any information currently in the worksheet is lost, so make sure you have first issued a /File Save command to store it. All cell formats are lost, and all /Worksheet Global settings return to their startup values. However, /Worksheet Global Default settings are not affected by this command.

If you mess up a worksheet, just clean the slate with this command. If you have an earlier version of the worksheet stored in a worksheet file, you can "fall back" to it using /File Retrieve (page 14-7) and try again.

(By the way, this is a relatively safe panic button. When you issue a /Worksheet Erase command, 1-2-3 requires you to confirm it before wiping the slate clean.)

/Worksheet Insert Rows and /Worksheet Insert Columns. These commands create one or more new rows or columns in the worksheet. The newly created cells are unformatted—numeric entries will be displayed in the global format.

All rows or columns beyond the insert location are moved toward the end of the worksheet, so that no information is lost.

These commands are helpful, particularly in conjunction with /Copy and /Move, should you decide to redesign the layout of a worksheet (Figure 10-8).

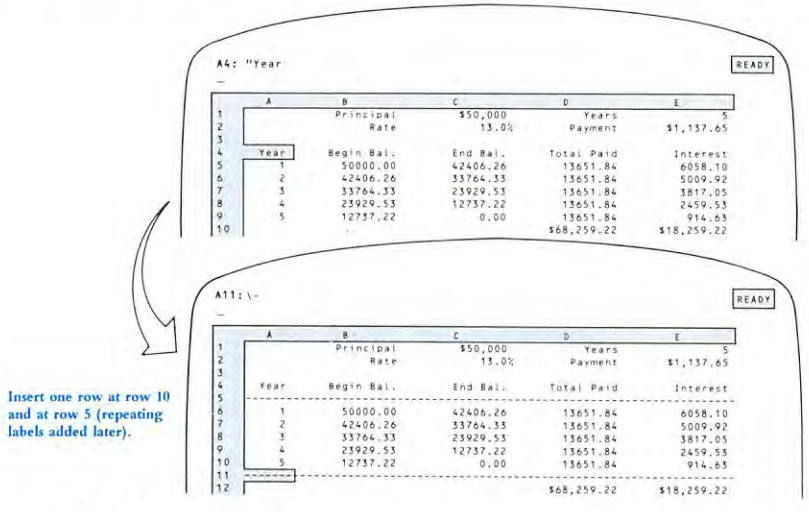


Figure 10-8. Inserting Rows

/Worksheet Delete Rows and /Worksheet Delete Columns. These commands remove one or more complete rows or columns from the worksheet. All entries following the deleted entries are moved toward the beginning to fill in the space.

Note. These commands can be quite dangerous. Any cell remaining in the worksheet whose formula depends on a deleted cell will be rendered invalid (Figure 10-9).

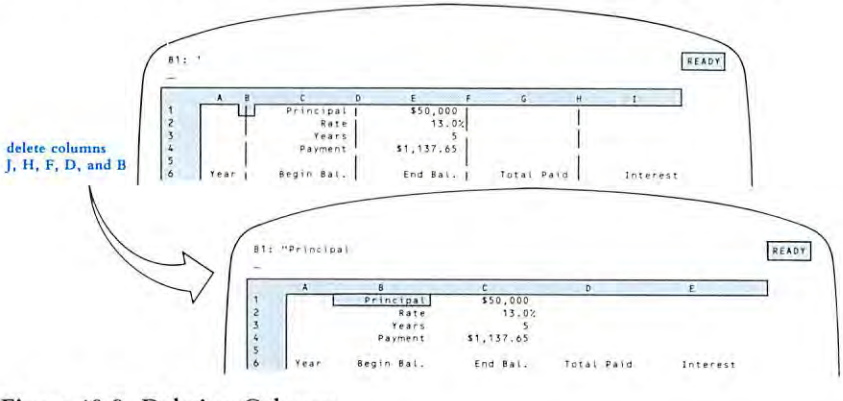


Figure 10-9. Deleting Columns

/Worksheet Global Format /WGF

Set the standard numeric display format for numbers and formula values.

Procedure

Choose a format: Fixed, Scientific, Currency, *,(comma)*, General (the initial format), + / –, Percent, Date, or Text.

Fixed, Scientific, Currency, *,(comma)*, and Percent formats:

Specify the number of decimal places to be displayed. Press **[ENTER]** alone to accept the default value, 2. Otherwise, enter any number between 0 and 15.

- Date formats:

  Choose D1 (Day-Month-Year), D2 (Day-Month), or D3 (Month-Year).

Results

- All cells not specifically formatted with the /Range Format command (page 11-9) are redisplayed in the new global format.

- If a value's display does not fit within its cell's column-width, the cell on the screen is filled with asterisks. But 1-2-3 remembers its value to full precision (about 15 decimal digits).

Format	Description	Examples
General	Trailing zeros suppressed after decimal point. This is the initial display format. Very large and very small numbers are displayed in scientific (exponent) format.	12.427 –4.25 1.00E+12
Fixed	Fixed number of decimal places (0-15).	12 –125.00
Scientific	Exponent notation to the base 10. Fixed number of decimal places (0-15) in the mantissa, followed by a two-digit exponent of 10 (–99 to +99).	–4.3E+00 1.246E+22 –6.24E–04
Currency	Value is preceded by "$"; commas separate three-digit groups; negative values enclosed in parentheses. Fixed number of decimal places (0-15).	$12.43 ($4.200) $8,999
, *(comma)*	Currency format without dollar signs.	12.43 (4.200) 8,999

+ / –	Horizontal bar graph. The number of symbols is the integer part of the value. "+" for positive values; "–" for negative values; "." for zero.	+ + + – – –
Percent	Value is followed by "%". Fixed number of decimal places (0-15). 1-2-3 automatically moves the decimal point so that the displayed value accurately represents the actual value.	1242.7% –425.00%
Text	Formulas are shown as they were typed; range names are used instead of cell addresses, where applicable; numbers are displayed in General format.	+C22/4 +PRINC*RATE 12.427
Date	D1: Day-Month-Year	15-Jan-85 05-Mar-2015
	D2: Day-Month	15-Jan 05-Mar
	D3: Month-Year	Jan-85 Mar-2015

In these formats, a positive number (rounded off to an integer) is considered to be the serial number of a particular date (from 1 = 01-Jan-1900 to 73049 = 31-Dec-2099). You can generate these serial numbers with the functions @DATE and @TODAY (page 19-3).

Notes

1. You can check the current global format with /Worksheet Status.

2. With *Split Screen*, you can set the global format separately for each window. This allows you to view the same part of a worksheet two different ways at the same time (e.g., formula values in one window, formula texts in the other).

/Worksheet Global Label-Prefix /WGL

Set the standard alignment of label entries in their cells.

Procedure

Choose a label alignment: Left (the initial alignment), Right, or Center.

Alignment	Prefix	Effect on Label
Left	'	Left-aligned
Right	"	Right-aligned
Center	^	Centered

Result

Later in the session, whenever you type a label without a prefix, 1-2-3 will assign it the global label-prefix you've specified with this command. Changing the global label-prefix only affects labels you type after the change. Existing labels are not changed.

Notes

1. /Worksheet Status displays the current global label-prefix.

2. A prefix is part of the label. 1-2-3 displays it in the control panel when the cell pointer is on a label cell, but the prefix does not appear in the cell itself.

3. In addition to the three alignments shown above, individual labels may be entered with a backslash (\) prefix, which repeats the label across the entire column. This is useful for creating lines and borders.

\Repeating → RepeatingRepeatingRepeatingRep

4. There are two ways to change the alignment of an existing label:

- Edit the label to change the label-prefix.
- Use /Range Label-Prefix (page 11-10). Unlike /Worksheet Global Label-Prefix, this command changes the appearance of labels *already* in the worksheet.

5. If your label begins with a number or another character that would make 1-2-3 think it's a numeric value, then you must explicitly type a prefix, to let 1-2-3 know it's a label. Likewise, use a label-prefix when you begin a label with a slash (/), so that 1-2-3 doesn't think that you want to issue a command. This situation often occurs when you're creating a keyboard macro.

6. If a label is as long as or longer than its cell's column-width, called a **long label**, 1-2-3 always displays it left-aligned. If possible, the label overflows into empty cells to the right. Nevertheless, the global label-prefix is assigned to such long labels. If you increase the column-width so that the label fits within the cell, the label-prefix will determine the alignment.

/Worksheet Global Column-Width /WGC

Set the standard column-width (1-72 characters).

Procedure

1-2-3 displays the current global column-width setting. Use ← and → to increase and decrease the width. The screen will show the effect of each change. When the column-width is as you want it, press [ENTER]. Alternatively, type a number then press [ENTER].

Result

All columns whose widths have not been individually set (/Worksheet Column-Width Set) or that have been reinitialized (/Worksheet Column-Width Reset) now have the new global column-width.

Notes

1. You can check the current global column-width with /Worksheet Status.

2. If you use *Split Screen*, each window can have its own global column-width. This command affects only the window in which the cell pointer is currently located.

/Worksheet Global Recalculation /WGR

Control when, in what order, and how many times formulas are processed during a recalculation pass.

Procedure

Choose one of the following:

Recalculation Method. Automatic or Manual.

Recalculation Order. Natural, Columnwise, or Rowwise.

Iteration. 1-2-3 prompts you to enter the number of calculation cycles per recalculation pass. Enter a number between 1 and 50.

Results

Automatic. 1-2-3 recalculates all the formulas in the worksheet every time you change the contents of any cell.

Manual. You must press [F9/CALC] to make 1-2-3 recalculate all formulas. The *CALC* indicator will appear in the lower right corner of the screen if any cell entries have changed since the last recalculation.

Each recalculation is performed in the currently selected *order*:

Natural. Before recalculating a particular formula, 1-2-3 always recalculates all other formulas on whose values it depends.

Columnwise. 1-2-3 starts at the top of column A and works to the bottom. Then, it processes column B, then column C, etc.

Rowwise. 1-2-3 starts at the beginning of row 1 and works to the right. Then, it processes row 2, then row 3, etc.

Iteration. Determines the number of calculation cycles performed during each recalculation pass. (If the order is Natural and there are no circular references in formulas, then only one cycle is performed.)

Notes

1. For most purposes, the default recalculation order, Natural, is best. Change to Columnwise or Rowwise with a worksheet in which you explicitly control the recalculation order.

2. With the initial settings (Automatic, Natural), the worksheet is continuously updated. Therefore, these settings are usually best for worksheets that will be used by others. If recalculation takes a noticeable length of time because the worksheet is large or complex, a change from Automatic to Manual will alleviate this problem.

3. The Manual setting is best if you wish to change more than one value before reviewing the calculated results. Press the [F9/CALC] key when you wish to recalculate formulas.

4. /Worksheet Status displays the current recalculation settings.

5. Recalculation settings are stored in the worksheet files created with /File Save and /File Xtract.

/Worksheet Global Protection /WGP

Allow/Disallow changes to cells that have been protected.

Procedure

Before issuing this command, unprotect (/Range Unprotect, page 11-12) those cells in which you want users to be able to enter or edit entries.

Choose Enable to turn on protection, or Disable to turn it off.

Results

- While protection is enabled, you can only change the contents of cells that have had their protection removed with /Range Unprotect. You may use /Range Unprotect and /Range Protect while protection is enabled.

- When protection is enabled, you cannot delete columns or rows (/Worksheet Delete) that include protected cells.

Notes

1. You can check the current setting of protection with /Worksheet Status.

2. You can erase the entire worksheet (/Worksheet Erase) while protection is enabled.

3. Do not use the /Range Justify command while cell protection is enabled. You may get protected cell errors when this command rearranges the cell entries (implicit /Move command).

/Worksheet Global Default /WGD

Define default printing and data-storage procedures.

A complete description of /Worksheet Global Default appears in Appendix A, "Configuring 1-2-3".

/Worksheet Insert /WI

Insert empty rows or columns into the worksheet.

Procedure

1. Choose Column to insert one or more consecutive columns, or Row to insert one or more consecutive rows.

2. To insert one row or column at the current location, press [ENTER]. Otherwise, expand the cell pointer or specify a range.

Results

- Empty rows or columns are inserted in the worksheet. These columns use the global column-width and numeric display format. Their cells all have protection flags set. If you are inserting columns, the number of columns inserted is equal to the width of the range you specified. If you are inserting rows, the number of rows inserted is equal to the height of this range.
- All the contents of the worksheet are preserved, but are moved to the right or downward to make room for the new rows or columns.
- All formulas are changed so that they continue to refer to the same cells as before.
- If you insert rows or columns into a range that is used in a formula, specified as a command range, or assigned a range name, the size of the remembered range is increased (page 7-14).

Notes

1. If the insertion would shift data off the edge of the worksheet, 1-2-3 displays a "Worksheet Full" error message and leaves the worksheet unchanged.

2. If a formula depends on a cell in the last columns or rows, an insertion may invalidate the formula (*ERR*).

/Worksheet Delete /WD

Delete rows or columns from the worksheet.

Procedure

1. Choose Column to delete one or more consecutive columns, or Row to delete one or more consecutive rows.

2. To delete one row or column at the current location, press [ENTER]. Otherwise, expand the cell pointer or specify a range.

Results

The contents of the deleted rows or columns are lost. Entire rows or columns are deleted, not just the cells in the specified range.

Cell entries to the right of the deleted columns (or below the deleted rows) are shifted to fill in the empty space.

Formulas that referred to deleted cells, or to ranges with deleted endpoints, will have the value *ERR* (pages 5-4, 7-16).

- Formulas, command ranges, and range name definitions are changed so that they continue to indicate the same entries as before (page 7-16).
- Deletions inside ranges, not including any endpoint, merely shorten the range.

Notes

1. A potential problem with deletions is that they remove entire rows/columns, including cells that are not on the screen. When working with an extensive worksheet, it is usually better to use /Move to rearrange sections of the worksheet.

2. Deleting columns or rows from the worksheet recovers some of the computer's memory used by the deleted cells. You can recover additional memory by saving the worksheet (/File Save), then retrieving it (/File Retrieve).

/Worksheet Column-Width /WC

Change the display width of the current column.

Use this command to make the appearance of the worksheet fit your application. You can adjust column-widths to accommodate values that are too wide to fit in their column. 1-2-3 shows such values as asterisks.

Procedure

Before issuing this command, be sure to place the cell pointer in the target column.

1. Choose Set to specify a new column-width, or Reset to return the column to the current global column-width.

2. *Set only:* Indicate the new column-width by pointing with ← and → or by typing the new value. End by pressing [ENTER]. (Pointing is usually more convenient, because you can view the changes to the worksheet as you point.)

Results

Reset. The column assumes the current global column-width (/Worksheet Global Column-Width, initially 9 characters). The screen readjusts to show as many columns as possible.

Set. The column is redisplayed at the new column-width. The screen readjusts to show as many columns as possible.

With *Split Screen*, changing the column-width affects only the window containing the cell pointer.

Notes

1. It is often helpful to place blank columns between blocks of data. This enhances the visual presentation and lets you use the [END] key (page 4-6) to move around the worksheet efficiently. These columns can be made as narrow as necessary, to allow the display or printing of more data at one time.

2. Since long labels can extend to the right beyond their columns, 1-2-3 is ideal for writing outlines. Just create a number of narrow columns on the left side of the sheet, and represent sublevels by indenting labels one or more columns.

/Worksheet Erase /WE

Erase the entire worksheet and reinitialize worksheet settings.

Procedure

Choose Yes to erase the worksheet, or No to cancel the command.

Results

All data in the worksheet are lost, unless they have previously been saved (/File Save). All main memory space occupied by the worksheet is freed for reuse.

- The recalculation settings return to Natural, Automatic. The global numeric display format returns to General. The global label-prefix returns to apostrophe ('): left-align. The global column-width returns to 9.
- All remembered ranges, including range names, are cancelled.
- The default printer and disk settings (/Worksheet Global Default) do not return to their startup values.

Note

To switch worksheets during a session, it is not necessary to erase the current worksheet. /File Retrieve automatically erases the current worksheet before reading in a worksheet stored in a disk file.

/Worksheet Titles /WT

"Freeze" rows or columns along the top or left edge of the screen.

Procedure

Before issuing this command, position the cell pointer as indicated below. (*Split Screen*): Titles are allowed in either or both windows. Be sure the pointer is in the proper window.

Horizontal: Place the pointer in the row below the row(s) to be frozen onscreen.

Vertical: Place the pointer in the column to the right of the column(s) to be frozen onscreen.

Both: Do both of the above. Think of this as placing the pointer in the cell that will be the upper left corner of the reduced window (the area that will continue to scroll while Titles are in effect).

Set Titles by choosing Horizontal, Vertical, or Both. Or choose Clear to remove all existing Titles in the current window.

Results

Horizontal. The rows on the screen above the cell pointer are "frozen". When you subsequently move the cell pointer so that the row scrolls vertically, these rows stay in place, serving as column titles. The titles do scroll horizontally, along with the columns below.

Vertical. The columns on the screen to the left of the cell pointer are "frozen". When you subsequently scroll horizontally, these columns stay in place, serving as row titles. The titles do scroll vertically, along with the rows to the right.

Both. The rows above and columns to the left of the cell pointer are "frozen". The column titles scroll up and down, along with the rows to the right. The row titles scroll side-to-side, along with the columns below.

Clear. Title columns and rows are "unfrozen". The entire window scrolls as a unit.

Notes

1. With *Split Screen*, you can set different Titles in each window.

2. You usually cannot move the cell pointer into the Titles area using the pointer-movement keys. However, you can move into the Titles area when you're in Point mode: specifying a cell or range by pointing. In this case, 1-2-3 may display two copies of some of the Titles rows or columns.

3. Titles are used most often for long rows and/or columns of similar data, where you want to retain the row and/or column headings while scrolling through the entire data area. When you just want to be able to see two distant parts of the worksheet at the same time, *Split Screen* (/Worksheet Window) may be more appropriate.

/Worksheet Window /WW

Control Split Screen—the division of the screen into two horizontal or vertical windows.

Procedure (when there is a single window)

Before issuing this command, move the cell pointer to the column or row where the split is to be made.

Choose Horizontal or Vertical split screen.

Results

- Two windows appear, each with its own row and column designations along its top and left borders. The column or row location of the cell pointer when you issued the command becomes the first column or row of the second window.
- The cell pointer remains in the first window, in the column or row next to the split.
- Both windows start with the same individual column-widths and global settings. Thereafter, you can control these settings independently for each window.

Procedure (when Split Screen is in effect)

Choose Clear to return to one window, or choose Synchronize or Unsynchronize to control how the two windows scroll.

Results

Clear. The second window disappears. The first window, with its column-widths, display formats, etc., expands to fill the screen.

Synchronized (initial setting). When one window scrolls in the direction of the split, so does the other. The effect is to keep the same columns or rows onscreen in both windows.

Unsynchronized. Scrolling in one window does not affect the other window. The columns (horizontal split) or rows (vertical split) can "slip past" each other.

Notes

1. To move the pointer between windows, use the [F6/WINDOW] key.

2. Windows can be most useful when you want to see the effects of changing some entries on other entries that are far away. Put a window around the result cells and then use the other window to scroll around the rest of the sheet, changing the entries of interest.

3. With synchronized windows, you can scroll so that the same cells can be shown in the two windows, perhaps to view them using different numeric display formats (e.g., Text format vs. Currency format).

/Worksheet Status /WS

Display available memory and current global settings in the control panel.

Procedure

After viewing the information, clear the control panel and return to Ready mode by pressing any key. Pressing that key has no other effect.

Result

Here is a typical /Worksheet Status display:

			Label	Column	Avail		MENU
Recalculation		Format	Prefix	Width	Memory	Protect	
AUTO	NATURAL	(G)	'	9	223149	OFF	
A	B	C	D	E	F	G	H

Notes

1. The amount of memory used is affected both by the contents of cells and by the number of rows and columns you use. To conserve memory, keep all entries in a rectangle whose lower right corner is as close to cell A1 as possible.

2. If you rearrange a worksheet into a more compact rectangle, you must save it (/File Save) and then retrieve it (/File Retrieve) to regain the freed memory. If you erase cells (/Range Erase), be sure to cancel the cells' numeric display formats (/Range Format Reset) and restore their protection (/Range Protect).

3. There is no simple relationship between the amount of main memory a worksheet occupies (as reflected in the /Worksheet Status Available Memory statistic) and the size of its worksheet file.

11. Range Commands

Using 1-2-3, you often need to indicate a **range** of cells to be processed. Some examples: You can print a range or store it in a disk file; the information management facility involves ranges that store data records and ranges that contain selection criteria. 1-2-3 has many functions that process all the values in a range (e.g., @SUM, @COUNT). When you are using 1-2-3 as a text processor, a column range of labels acts as a paragraph.

Since 1-2-3 is range-oriented, it has a group of /Range commands that process cell ranges. Some of these commands treat an entire range of cells as a single unit. For example:

- Assigning a range name to a cell range.
- Processing a range as a fill-in-the-blanks form.
- Readjusting the labels in a column range to a new paragraph width.

Other /Range commands do the same thing to each individual cell in a range. For example:

- Setting the numeric or label display format.
- Erasing cell contents.
- Preventing or allowing cell contents to be changed.

As always, 1-2-3 allows you to indicate the range to be processed in several ways:

1. Expanding the cell pointer to cover the range.
2. Typing the cell addresses of two opposite corners.
3. Typing a range name, or selecting one from a menu 1-2-3 displays.

(For details, see Chapter 7, "Indicating Cell Ranges".)

Cleaning Up: /Range Erase

This command erases the entries from a range of cells. It erases only each cell's entry, not the "flags" and "fences" that indicate its numeric display format and protection status (see pages 11-2 and 11-6). Unlike the /Worksheet Insert and /Worksheet Delete commands, /Range Erase does not move any of the remaining information in the worksheet or cause any adjustment in existing formulas or remembered range definitions.

Numeric Formatting

The /Worksheet Global Format command establishes the standard format in which 1-2-3 displays numbers in the worksheet. All cells display numeric values according to the current global format setting, except those cells for which you provide an override with a /Range Format command. (Numeric display formats are explained, along with numerous examples, in the /Worksheet and /Range command summaries.)

Think of these /Range Format commands as hoisting particular flags above the cells in a range. These flags tell 1-2-3 how to display the cell's contents (if the contents are numeric). If 1-2-3 finds no flag flying above a cell, it displays the cell's contents using the standard setting, as established with /Worksheet Global Format.

In some cases, you may format a cell range with /Range Format, then decide that these cells should use the standard format after all. For this purpose, use the command /Range Format Reset. Imagine that this command lowers the numeric format flags in all of the range's cells, leaving empty flagpoles.

Label Alignment

Just as the global numeric format does not affect the display of labels, the flag work performed by /Range Format commands does not affect any labels currently in the range, or ones that you subsequently enter.

In fact, there is no independent flag that controls label alignment. Instead, a label's format—left-aligned, right-aligned, centered, or repeating—is determined by the label-prefix character that begins the label itself. If you do not type a label-prefix, 1-2-3 automatically uses the global label-prefix. (See the /Worksheet Global Label-Prefix command summary.)

Once a label has been entered, you can realign it by editing its label-prefix character (page 5-6). To realign all the labels in a range, use a /Range Label-Prefix command (Figure 11-1).

Note. This command affects previously entered labels only. Labels that you subsequently enter are not affected by /Range Label-Prefix commands you issued in the past.

Range Names

1-2-3 maintains a list of *range names* as part of each worksheet. Each name, up to 15 characters long, can identify a range of any size. For example:

INT_RATE	might identify a single cell, F46
ALL_PRINT	might identify the entire active area of the worksheet, A1..X200

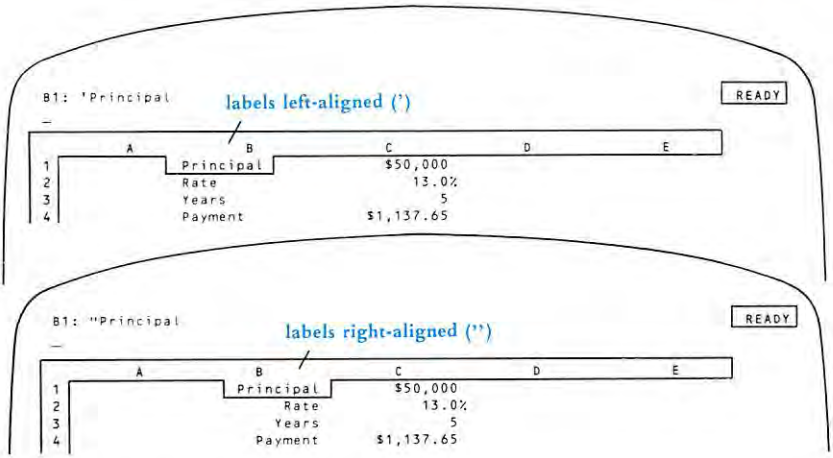


Figure 11-1. Changing Label Alignment

Note. Although it's permissible, we suggest that you don't leave a blank space or use the characters + − * / ^ in a range name. This will avoid confusion with formulas, commands, and other types of entries. Also, don't use range names that look like cell addresses (e.g., R12).

Range names are included in the worksheet files created by the /File Save and /File Xtract commands (Chapter 14, "File Commands"). When you retrieve a worksheet from disk storage with the /File Retrieve command, the names are activated too.

(The /File Combine command does not retrieve range names. This prevents a conflict between range names in the two worksheets—the one you're currently using and the one you specify to combine.)

The following commands allow you to maintain a list of range names for the worksheet currently in use:

/Range Name Create. Assigns a range name to a range of cells, or revises the definition (the addresses of the range's endpoints) of a name already in use.

/Range Name Delete. Deletes an individual range name.

/Range Name Reset. Deletes all range names.

There's one more /Range Name command, /Range Name Labels, included in 1-2-3 as a convenience feature. One of the most common uses of labels in a worksheet is to identify the contents of neighboring cells (Figure 11-2).

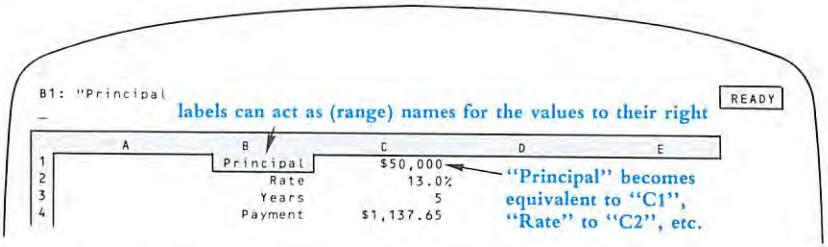


Figure 11-2. Using Label Entries As Range Names

It would make sense to have each of these labels be a range name for the single cell next to it. This would allow you to use the names in formulas, instead of the cell addresses (Chapter 8, "Writing Formulas").

@PMT(Principal,Rate/12,Years*12)

1-2-3 has a command that allows you to do just that, and saves you the trouble of typing the same thing twice—once as a label and once as a range name.

/Range Name Labels. Makes each of a range's labels into a range name for a single cell: the cell immediately to its right, to its left, above it, or below it.

Using Range Names

You can use a range name in any situation that calls for a cell range to be indicated or to name a single-cell range in any situation that calls for a cell address to be indicated. This allows you to think in words, rather than in terms of columns and rows. Here are some examples:

A range name as a response to a command prompt:

Enter Print Range: ALLRECORDS
Enter Fill Range: INPUTNUMBERS

A range name in a cell formula:

@SUM(RECEIVABLES)
@AVG(CASHFLOWS)
@IF(PRINCIPAL/PAYMENT<CUTOFF,@ERR,0)

(For more details concerning the use of range names in formulas, see Chapter 8, "Writing Formulas".)

Using Range Names to Respond to 1-2-3's Prompts—Range Name Menus

In many situations, 1-2-3 prompts you to indicate a range to be processed. Whenever this occurs, pressing **[F3/NAME]** displays a menu of existing range names in the control panel. If you've created more than five names, this menu will extend to several lines, which appear one at a time (page 6-9).

To select one of these range names, point to it or type the range name, ending with [ENTER].

Label Justification

1-2-3 allows you to enter labels up to 240 characters long. If a label is too long to be displayed in a cell, 1-2-3 displays as much of the label as it can, borrowing space from blank cells to the right.

These *long labels* are useful as lines of instructional text, as overall titles, etc. A column of consecutive long labels looks like a paragraph (Figure 11-3).

The /Range Justify command treats an unbroken column of labels as a paragraph, rearranging the words to fit any width you specify. (A paragraph ends when the column of consecutive labels is interrupted by a non-label cell.)

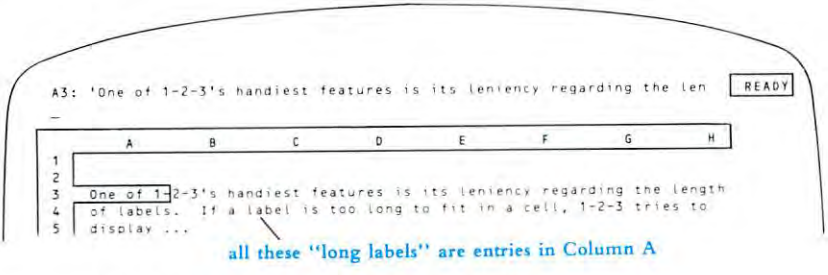


Figure 11-3. A Column of Labels Is a Paragraph

For instance, a single command can convert the paragraph illustrated above into either of the layouts shown in Figure 11-4.

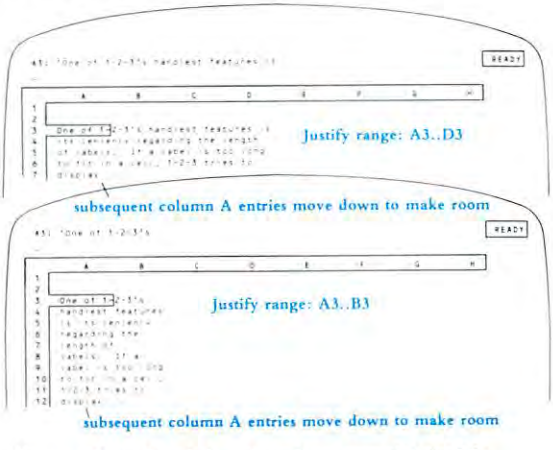


Figure 11-4. /Range Justify: Adjusting Paragraph Width

These illustrations show that when a paragraph is rejustified, the number of rows it occupies may change. In such cases, 1-2-3 automatically moves the cell entries located below the paragraph, either downward or upward. This feature both preserves the spacing between paragraphs and ensures that no information will be overwritten by a Justify operation.

However, there may be situations in which you wish to prevent 1-2-3 from moving the contents of cells below the paragraph. For instance, entries below may be part of a table. Accordingly, 1-2-3 allows you to limit the range of entries that may be reformatted and shifted during a Justify operation (Figure 11-5).

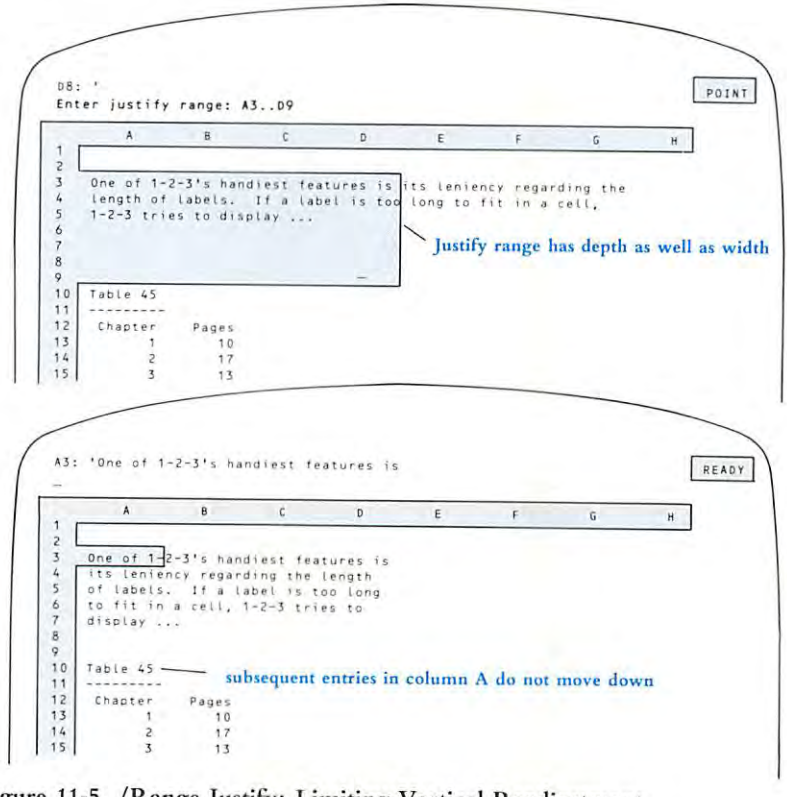


Figure 11-5. /Range Justify: Limiting Vertical Readjustment

Cell Protection

Like cell display formats, the 1-2-3 *cell protection* facility involves both /Worksheet and /Range commands. If you're not familiar with the general concept of cell protection, consult the explanation in Chapter 10, "Worksheet Commands".

In a new worksheet, every cell is surrounded by an electronic protection fence. However, since you need to make cell entries to construct a worksheet, 1-2-3 starts with the power to these fences turned "off". To remove a range's fences entirely, permitting changes even when the protection power is "on", use the /Range Unprotect command.

Here is the general procedure for using the protection facility:

1. Make sure the power to the protection fences is turned "off" (/Worksheet Global Protection Disable). You can check the current protection status using the /Worksheet Status command.

2. Create or modify the worksheet—type entries, use /Copy and /Move, retrieve entries from disk storage, etc.

3. Use the /Range Unprotect command to remove the protection fence from cells in which entries will be made later or changed by the worksheet user.

4. Turn on the power to the protection fences (/Worksheet Global Protection Enable). You can protect and unprotect cells, even when the power is "on".

5. Save the worksheet in a disk file using /File Save or /File Xtract.

Each cell's protection status is saved in the worksheet files created by /File Save or /File Xtract. Thus, if a cell is (un)protected when you store a worksheet, it will be (un)protected when you retrieve the worksheet with /File Retrieve.

Changing Your Mind. If you decide that a range of cells you've /Range Unprotected should be protected after all, you can re-erect the protection fences for a range of cells with the /Range Protect command. Cells may be unprotected and reprotected as many times as desired.

Creating Data Entry Forms

The /Range Input command extends the cell protection facility concept a step further. Not only can you prevent worksheet users from changing cell entries, you can even prevent them from moving the pointer to the protected cells.

This feature allows you to create data-entry forms (fill-in-the-blanks) with 1-2-3. Typically, large computer database management systems are organized around series of such forms. Forms are easy to use, because: (1) they make the display screen look like a traditional paper form, and (2) the data-entry operator is prevented from entering data in the wrong places.

A 1-2-3 data-entry form is illustrated in Figure 11-6. We've indicated in color the cells that the operator is restricted to filling in.

Restricting the user to the "proper" cells is accomplished through a combination of the cell protection facility and the /Range Input command:

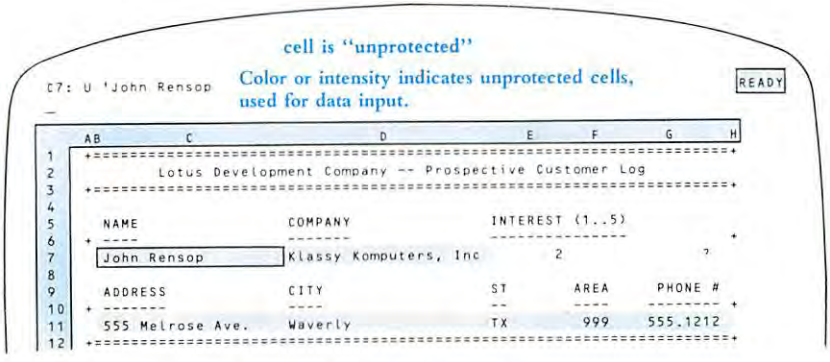


Figure 11-6. /Range Input: A Data Entry Form

During the execution of a /Range Input command, you can make one or more entries or changes to appropriate cells. But 1-2-3 lets you move the cell pointer only to the cells in the specified range whose protection "fences" have been removed with /Range Unprotect.

Here is the general procedure for implementing forms entry:

1. Install cell protection in the worksheet, as outlined in the previous section.

2. Use a /Range Input command to enter or update a series of cell entries.

3. Use 1-2-3's Typing Alternative (keyboard macro) facility to store the filled-in cells as a **record** in a **database**, located elsewhere in the worksheet.

Similarly, you can use a data-entry form as the means to perform other database functions: finding a record, deleting a record, etc. (Chapter 17, "Data Commands", explains the concept of a database and how to use it.)

/Range Format /RF

Set the numeric display format for a cell range.

Procedure

1. Choose a format: Fixed, Scientific, Currency, , *(comma)*, General (the initial format), + / –, Percent, Date, or Text.

- Fixed, Scientific, Currency, , *(comma)*, and Percent formats:

Specify the number of decimal places to be displayed. Press [ENTER] alone to accept the default value, 2. Otherwise, enter any number between 0 and 15.

- Date formats:

Choose D1 (Day-Month-Year), D2 (Day-Month), or D3 (Month-Year).

2. Specify a range.

Results

- Numbers and formula values already or subsequently entered in the specified range will be displayed in the format you have chosen.

- If a value's display will not fit within its column's width, the cell on the screen is filled with asterisks. However, 1-2-3 stores its value.

Format	Description	Examples
General	Trailing zeros suppressed after decimal point. This is the initial display format. Very large and very small numbers are displayed in scientific (exponent) format.	12.427 –4.25 1.00E+12
Fixed	Fixed number of decimal places (0-15).	12 –125.00
Scientific	Exponent notation to the base 10. Fixed number of decimal places (0-15) in the mantissa, followed by a two-digit exponent of 10	–4.3E+00 1.246E+22 –6.24E–04
Currency	Value is preceded by "$"; commas separate three-digit groups; negative values enclosed in parentheses. Fixed number of decimal places (0-15).	$12.43 ($4.200) $8,999
, *(comma)*	Currency format without dollar signs.	12.43 (4.200) 8,999
+ / –	Horizontal bar graph. The number of symbols is the integer part of the value. "+" for positive values; "–" for negative values; "." for zero.	+ + + – – –

Percent	Value is followed by "%". Fixed number of decimal places (0-15). 1-2-3 automatically moves the decimal point so that the displayed value accurately represents the actual value.	1242.7% -425.00%
Text	Formulas are shown as they were typed; range names are used instead of cell addresses, where applicable; numbers are displayed in General format.	+C22/4 +PRINC*RATE 12.427
Date	D1: Day-Month-Year	15-Jan-85 05-Mar-2015
	D2: Day-Month	15-Jan 05-Mar
	D3: Month-Year	Jan-85 Mar-2015

In these formats, a positive number (rounded off to an integer) is considered to be the serial number of a particular date (from 1 = 01-Jan-1900 to 73049 = 31-Dec-2099). You can generate these serial numbers with the functions @DATE and @TODAY (page 19-3).

Notes

1. /Range Format commands can be used to change the appearance of numbers and formula values in a range, to change the number of decimal places displayed in numbers and formula values, or to display numbers that do not fit in a column under the current format, and are therefore shown as asterisks (see the /Worksheet Column-Width and /Worksheet Global Column-Width command summaries).

2. 1-2-3 remembers values with their full precision (about 15 decimal places) no matter what the format is.

3. Ranges that have been formatted with /Range Format are not affected by changes in the global numeric format (/Worksheet Global Format).

4. The formats provided with /Range Format are retained by the cells even if the contents are /Range Erased. If you wish to contract the worksheet before issuing /File Save, be sure to use both /Range Erase and /Range Format Reset on the cells.

5. If the range is /Moved, the formats stay with the moved range; the area from which the range was moved returns to global format.

6. When you /Copy formatted cells, the copies take on the format of the original.

/Range Label-Prefix /RL

Change the alignment of all labels in a cell range.

Procedure

1. Choose Left, Right, or Center alignment.

Alignment	Prefix	Effect on Label
Left	'	Left-aligned (initial global label-prefix)
Right	"	Right-aligned
Center	^	Centered

2. Specify a range.

Results

- Labels in the specified range are assigned the corresponding label-prefix. The screen is redrawn to show the new label alignments, but no recalculation pass takes place. Non-label cells in the range are not affected.
- Labels subsequently entered in the range are not affected by this command. If you do not enter a prefix yourself, 1-2-3 assigns them the global label-prefix (/Worksheet Global Label-Prefix).

Notes

1. A label-prefix is part of the label. It is displayed in the control panel when the cell pointer is on a label, and it may be edited. But it does not appear on the worksheet display.

2. In addition to the three alignments shown above, individual labels may be entered with a backslash (\) prefix, which repeats the label across the entire column. This is useful for creating lines and borders:

\Repeating → RepeatingRepeatingRepeatingRep

3. To change the alignment of a single label, you can also edit the label to change the prefix.

4. If a label is as long as or longer than its cell's column-width (long label), 1-2-3 always displays it left-aligned. If possible, the label overflows into empty cells to the right. Nevertheless, the global label-prefix is assigned to such long labels. If you increase the column-width so that the label fits within the cell, the label-prefix will determine the alignment.

/Range Erase /RE

Erase all cell entries in a range.

Procedure

Specify a range.

Results


Be sure that you no longer need the data that is to be erased. To be safe, you may want to save it before erasing it (/File Save).

- The cells in the indicated range become empty but they retain their numeric display formats and their protection status.
- For calculation purposes, each erased cell now has a zero value.
- If cell protection is enabled (/Worksheet Global Protection) and any cell in the range is protected, an error occurs and the command is terminated.

Note

If you /Range Erase, /Range Format Reset, and /Range Protect cells at the bottom or right edge of the worksheet, you don't regain full use of the memory allocated to that area until you save the worksheet (/File Save) and then retrieve it (/File Retrieve).

/Range Protect and /Range Unprotect /RP and /RU

Remove or restore the protection status of a cell range.

Procedure

Specify a range whose cells are to be unprotected or protected.

Results

- When the cell pointer is on an unprotected cell, a "U" appears on the first line of the control panel to indicate that it is unprotected.
- Protected cells are displayed at normal intensity or with blue characters. Unprotected cells are displayed at bright intensity or with green characters.
- When the /Range Input command is in effect, the cell pointer can be moved only to unprotected cells in the specified range.

Notes

1. Use these commands after you have created a worksheet, to control data-entry locations and prevent cells from being accidentally modified.

2. Initially, all cells are protected, but cell protection is disabled. The /Worksheet Global Protection command turns the cell protection facility on and off.

3. Unprotected cells may be reprotected with /Range Protect.

4. Whether or not a cell is protected doesn't matter unless: (1) Cell protection is enabled or (2) The cells are in a /Range Input range.

/Range Name Create /RNC

Assign a name to a range, or change the range assigned to a name.

Procedure

To create a new name:

1. Enter a new name (1-15 characters). Uppercase and lowercase letters are equivalent—1-2-3 always displays the name with uppercase letters.

2. Specify a range.

To check or modify the definition of an existing range name:

1. Choose a range name from the menu on line 3, or type the name. 1-2-3 automatically highlights the range currently assigned to the name, displaying its upper left and lower right corner addresses in the control panel. (You can cancel this definition by pressing [BACKSPACE], which returns the pointer to the current cell.)

2a. Modify the range specification with pointer-movement keys, or specify an entirely new range.

or

2b. Press [ENTER] alone to accept the current definition.

Result

When you modify a range name definition, formulas that referred to that range, either by name or by cell addresses, are updated to reflect the change.

Notes

1. Use a range name to identify a frequently used range, to view or change the definition of a range name, or to name a cell so it can be used as the start of a keyboard macro (Chapter 9).

2. The /Range Name Create command is particularly useful for documenting formulas. Each cell referenced in a formula can be appropriately labeled and named. The formulas will then appear with names rather than cell addresses. These more readable formulas appear on the first line of the control panel when the cell pointer is on their cells. They can be displayed in the worksheet using the Text numeric display format. They can also be printed using the Cell-Formulas option of the /Print command.

3. Once created, you can use a range name wherever a range may be specified. In commands, you can do this by pressing the [F3/NAME] key and selecting the range name from the menu 1-2-3 displays in the control panel.

4. 1-2-3 allows single-cell ranges. If you refer to a cell frequently, give it a range name. If the cell has an appropriate label next to it, consider using /Range Name Labels to name it.

5. Keyboard macros use range names that start with a backslash (\) followed by a letter (A...Z, 0). 1-2-3 uses the range name only to find the location of the first instruction(s). (See Chapter 9, "Using Keyboard Macros".)

6. Don't use range names that look like cell addresses (e.g., P12, AM40, B03). 1-2-3 always treats such ambiguous names as cell addresses.

7. There are few other restrictions on range names; they may contain spaces and symbols. However, range names are used in formulas. To avoid confusion it is a good idea to use only A...Z, 0...9 and the underscore in range names.

8. Two or more different names may be assigned to the same range. When you modify the definition of one name, the other's is automatically modified. Deleting one range name does not delete the other name.

/Range Name Delete /RND

Deletes a range name definition.

Procedure

Choose the range name to be deleted, either by using the menu pointer or by typing the name.

Results

- The deleted name no longer appears on the range name menu, and the range can no longer be referred to by that name. The contents of cells in the range are unaffected.
- Formulas that referred to the range by name still refer to the same cells. The corner cell addresses appear in these formulas now, rather than the range name.

Note

To cancel all range names, use /Range Name Reset.

/Range Name Labels /RNL

Create single-cell named ranges, using labels in adjacent cells as range names.

Procedure

1. Choose a direction: Right, Down, Left, or Up.
2. Specify the range that includes the labels to be used as range names.

Results

- Each label in the specified range becomes the range name for the adjacent cell in the indicated direction. Only the first 15 characters of the label are used for the name.

- Non-label cells in the specified range are ignored.


If a label duplicates an existing range name, the existing range name is first deleted, then reassigned to the cell next to the label. No warning is given of this change. Formulas that referred to the old named range continue to refer to the same range, but by range endpoint cell addresses, not by name.

- The range names created in this fashion exist until you change the range they refer to (Create or Labels) or delete them (Delete or Reset). Subsequently erasing or editing the label has no effect on the range name definition.

Notes

1. Be sure the labels are uniformly above, below, to the left, or to the right of the cells to be named.

2. There is no way to undo in one step the assignment of a group of labels as range names. You can delete names individually (/Range Name Delete) or you can cancel all range names at once (/Range Name Reset).

3. The /Range Name Labels command is particularly useful for documenting formulas. Each cell referenced in a formula can be appropriately labeled and named. The formulas will then appear with names rather than cell addresses. These more readable formulas appear on the first line of the control panel when the cell pointer is on their cells. They can be displayed in the worksheet using the Text numeric display format. They can also be printed using the Cell-Formulas option of the /Print command.

4. /Range Name Labels is usually used with labels in a single column or row, but this is not necessary. As long as the appropriate labels are adjacent to cells in the same direction, the label range can be of any size. Only cells next to labels will be given names.

/Range Name Reset /RNR

Cancel all range names.

Procedure

The cancellation takes effect as soon as you select /Range Name Reset. There is no confirmation step.

Results

- All range names in the current worksheet are cancelled.
- The contents of cells in the formerly-named ranges are unaffected.
- Formulas that referred to named ranges now refer to the same ranges, but by the addresses of the upper left and lower right corner cells, not by name.

Notes

1. To cancel range names individually, use /Range Name Delete.

2. Keyboard macros cannot be used until they are again given \A . . . \Z,\0 names with /Range Name Create or /Range Name Labels.

/Range Justify /RJ

Rearrange words in a single paragraph of consecutive labels to a specified width.

Procedure

When issuing this command manually (i.e., not in a macro), first place the cell pointer at the upper left corner of the paragraph to be justified.

Specify a range one or more columns wide and one or more rows deep. The total width of the range may not exceed 240 characters.

Results

The following terms help describe the effect of /Range Justify:

Justify Range: The cell range you specify in this command. If you indicate a range that is one row deep, 1-2-3 considers the justify range to extend down to the bottom of the worksheet, row 2048.

Paragraph: A consecutive set of label entries in the first column of the justify range, starting at the upper left corner cell. The paragraph ends with: (1) an empty cell, (2) a cell with a non-label entry, or (3) the bottom of the justify range, whichever comes first.

Paragraph Width: The width of the justify range you specify (maximum: 240 characters).

To justify a paragraph, 1-2-3 rearranges the words to make each label as close to the new paragraph width as possible. All the labels are assigned the apostrophe (') label-prefix, making them left-aligned.

- Justification affects the contents of cells in the first column only of the specified range, not subsequent columns.

- Cell entries above the paragraph are unaffected. Cell entries below the paragraph in the same column may or may not be moved.

Movement of Subsequent Entries. Cell entries within the justify range below the paragraph are candidates for being moved.

If a justified paragraph requires the same number of rows as before, no other entries are affected.

If a justified paragraph requires more (or fewer) rows than before, 1-2-3 shifts down (or up) the cell entries below the paragraph that are within the justify range. The effect is to preserve inter-paragraph spacing. No entries outside the range are affected.

If the shifting-down operation would push an entry below the bottom of the justify range, an error occurs.

Notes

1. Use this command to reformat a paragraph in which you've inserted or deleted words in a line (i.e., in a label).

2. Use this command to keep long labels from overflowing into cells to their right.

3. /Range Justify cannot justify or combine the labels in different columns.

4. Text from 1-2-3 can be stored in a print file for export to a word processing program. A word processing document may be loaded into the worksheet with /File Import.

5. As explained above, when a justified paragraph changes size, other cell entries may shift up or down—an implicit /Move command. One side-effect of the shift is that range names for cells within the justify range may be invalidated.

6. Do not use the /Range Justify command while cell protection is enabled. You may get protected cell errors when this command rearranges the cell entries (implicit /Move commmands).

/Range Input /RI

Limit the movement of the cell pointer to the unprotected cells in a range.

Procedure

Before issuing this command, use /Range Unprotect to identify the cells in which data will be entered. It is not necessary to turn cell protection on or off for execution of /Range Input.

Specify a range.

Results

- The upper left corner of the specified range is placed at the upper left corner of the window. The cell pointer is placed at the top-left unproteeted cell in the range.

- The ←, →, ↑, ↓, [HOME], and [END] keys move the cell pointer among the unprotected cells in the range.

- While /Range Input is in effect, you can make and edit as many cell entries as you like. Of the function keys, only [F1/HELP], [F2/EDIT], and [F9/CALC] are active. You can't issue 1-2-3 commands. Formula recalculation takes place according to the current /Worksheet Global Recalculation settings.

- The /Range Input command ends when you press [ESC] or [ENTER] when the entry line—line 2 of the control panel—is empty. (That is, pressing one of these keys an extra time ends the command.) The window and cell pointer are returned to the position they occupied when the command was issued.
- If the /Range Input command is part of a keyboard macro, control returns to the macro when /Range Input ends.
- If there are no Unprotected cells in the specified range, 1-2-3 *beeps* and displays an error message.

Note

/Range Input allows the implementation of form-oriented data entry, for use by people not familiar with 1-2-3. It is particularly powerful when used along with the keyboard macro facility (page 9-1).

12. Copy Command

The /Copy command creates new cell entries that are copies of existing entries. This can save you a great deal in time and keystrokes. But more importantly, /Copy provides the key to one of 1-2-3's greatest strengths: the ability to project and extrapolate. This capability is what makes 1-2-3 an important tool for rapid and confident decision making. Here are some examples:

- After you enter formulas to calculate a 1984 sales projection, you can use /Copy to produce projections for 1985, 1986, etc.
- After you enter formulas to analyze equipment orders for Region A, you can use /Copy to produce the same analysis for Region B, Region C, Region D, etc. Copying formulas is the most sophisticated use of the /Copy command.

Using the /Copy Command

Follow this procedure to /Copy one or more cell entries:

1. Select the /Copy command.
2. Indicate a *FROM* cell or range—the cells whose entries you wish to copy.
3. Indicate a *TO* cell or range.

Some examples should make this clear. We'll start with the simple and proceed to the sophisticated in Figures 12-1 through 12-3.

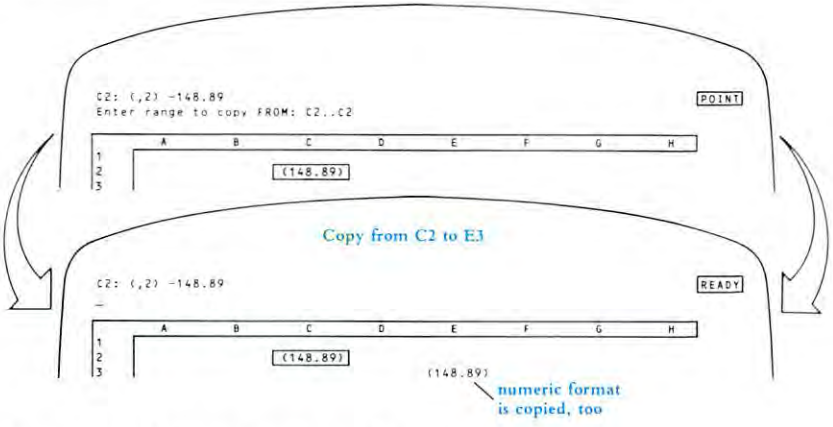


Figure 12-1. Making One Copy of an Entry

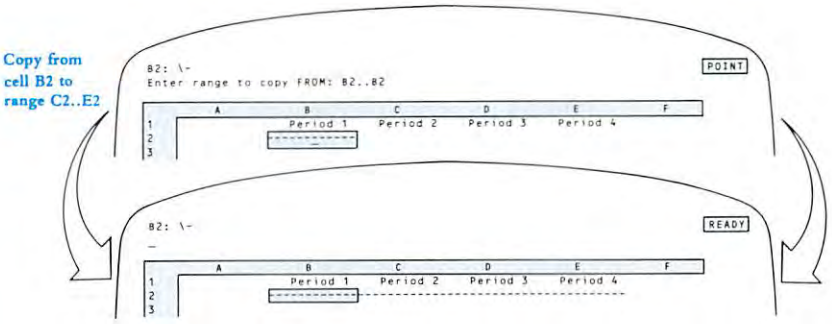


Figure 12-2. Copying an Entry TO a Range

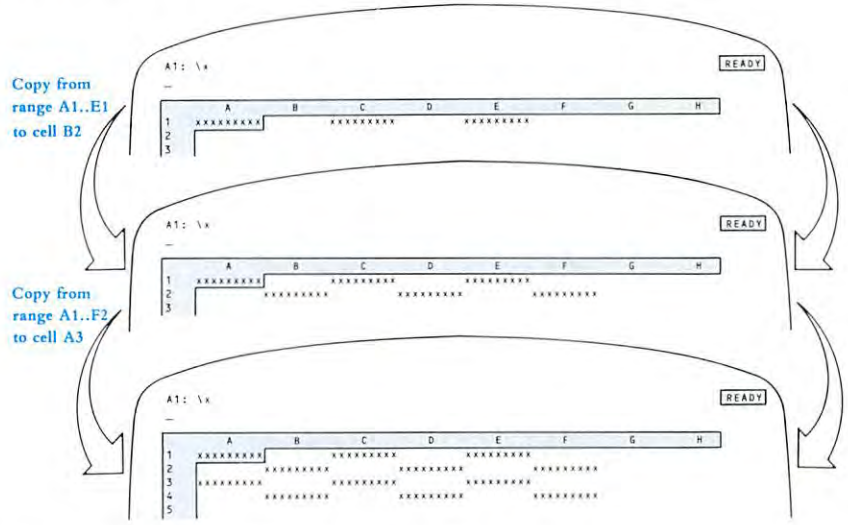


Figure 12-3. Copying FROM a Range of Entries

We haven't exhausted all the possibilities, but these examples should convey the general rule:

> Starting at each cell of the *TO* range, 1-2-3 attempts to place a copy of the entire *FROM* range. Both cell contents and cell formats are copied.

1-2-3 keeps copies of the *FROM* range from overlapping one another when copied (but see Caution #2 below). If you indicate a *TO* range that would cause overlapping, 1-2-3 reduces the range so that no overlapping occurs. You can take advantage of this procedure when copying to a *named range* (Chapter 11, "Range Commands"). No matter what the shape of the named range, 1-2-3 makes sure no two copies of the *FROM* range overlap.

Some Cautions

1. /Copy overwrites the previous contents of cells. There is no way to recover the contents. Formulas that refer to these cells are still valid (this is not the case with /Move), but the formulas' values may change.

2. Don't indicate a *TO* range that itself overlaps the *FROM* range. The result can be surprising (Figure 12-4):

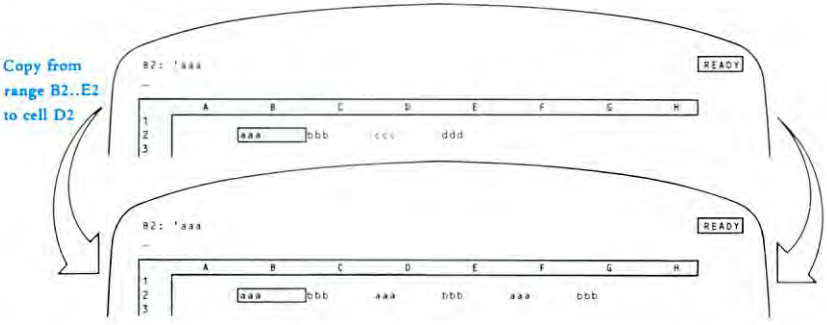


Figure 12-4. Overlapping FROM and TO Ranges

Actually, this restriction is a bit too severe. You won't run into problems if the *FROM* and *TO* ranges share the same upper left corner cell. For instance, /Copying from A5..D5 to A5..A10 won't cause any problems.

3. If a copied entry falls outside the worksheet (e.g., below row 2048), a "Worksheet Full" error occurs.

Copying Formulas

So far, we've shown examples of 1-2-3 making exact copies of each cell's contents—a number or label. When dealing with formulas, though, you rarely want 1-2-3 to perform exactly the same calculation at several different places in the worksheet. It's much more likely that you'll want 1-2-3 to help you enter a set of similar, but not identical, calculations.

1-2-3 makes only exact copies of formulas. However, a copied formula can perform a calculation that is similar, but not identical, to the original calculation.

Did that sound like a contradiction? It's not. Many formulas that seem to be merely similar are, in fact, precisely the same. The key is for you to adjust your viewpoint on formulas a bit, to conform to 1-2-3's point of view. We'll state here 1-2-3's procedure in performing a /Copy, assuming that you are familiar with the concepts of *relative* and *absolute cell addresses*. (For a complete discussion, see Chapter 8, "Writing Formulas".)

When 1-2-3 copies a formula:

- An absolute cell address is exactly the same in the copied formula as in the original formula.
- A relative cell address is different in the copied formula from the original formula (unless you /Copy a cell to itself).
- In copying a range specification, 1-2-3 adjusts each of the two cell addresses independently.
- If a formula to be copied includes a range name (e.g., RECEIPTS), 1-2-3 acts as if you specified the range with relative cell addresses. But if you precede the range name with "$" (e.g., $RECEIPTS), 1-2-3 uses absolute cell addresses instead. However, to see if a range name in a formula is absolute, relative, or mixed (i.e., to see the "$" symbol), you must **[F2/EDIT]** the formula.

Example 1. If cell F20 contains the formula +$B$5*@SUM(E10..F18), then copying *FROM* cell F20 would produce the following formulas in these *TO* cells:

H20: +$B$5*@SUM(G10..H18)
F120: +$B$5*@SUM(E110..F118)
J40: +$B$5*@SUM(I30..J38)

In each case, 1-2-3 interprets the formula as saying "Calculate the sum of the values in the range that starts one column left/ten rows up, and ends this column/two rows up. Then multiply by the value in cell B5".

Be careful in selecting the *TO* range. It's possible that at a given destination, a relative cell address such as "10 rows up/1 column left" won't have a sensible meaning. See what happens if this formula is copied to cell A1:

A1: +$B$5*@SUM(IV2039..A2047)

Example 2. (Figure 12-5)

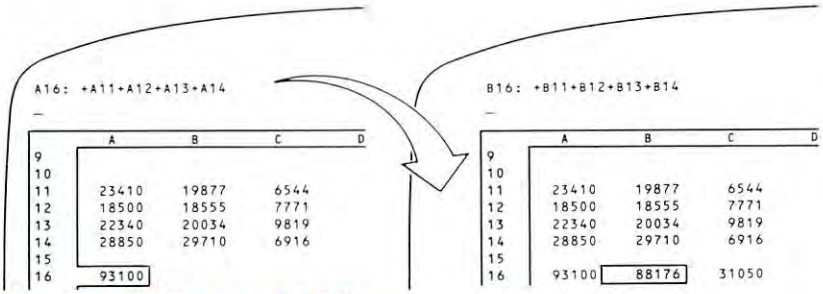


Figure 12-5. Example 2: Copying a Formula—Relative Cell Addresses

1. Formula typed in cell A16: +A11+A12+A13+A14
2. /Copy command specs:

   FROM range: A16
   TO range: B16..C16
3. Resulting formulas in *TO* range:

   B16: +B11+B12+B13+B14
   C16: +C11+C12+C13+C14

Example 3. (Figure 12-6)

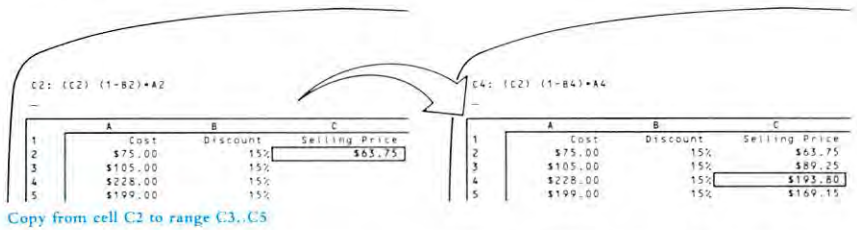


Figure 12-6. Example 3: Copying a Formula—Relative Cell Addresses

1. Formula typed in cell C2: (1 – B2)*A2
2. /Copy command specs:

   FROM range: C2
   TO range: C3..C5