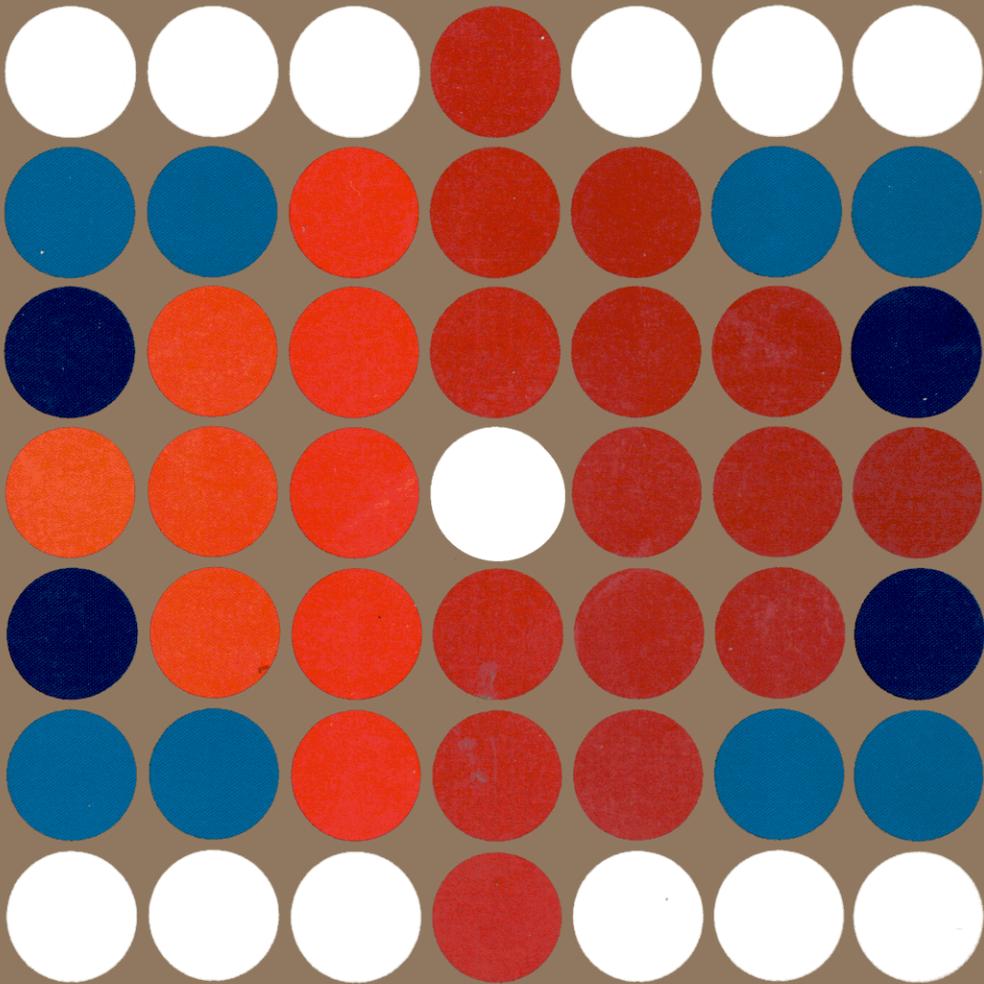


VISICALC

FOR YOUR TRS-80®



Carol Klitzner
Matthew J. Plociak, Jr.

VisiCalc[®] for Your TRS-80[®]

VisiCalc[®] for Your TRS-80[®]

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Section ONE _____

Introduction

1

The Software That Launched 20,000 Computers

- What Is VisiCalc?
- How This Book Will Help You with VisiCalc
- How Much Do You Need to Know about Computers?
- How to Use This Book

WHAT IS VISICALC?

VisiCalc is a phenomenon in the business and computer worlds. It's a software package, a set of instructions for computer hardware, that has sold more copies more rapidly than any other piece of business software ever produced—over 200,000 in its first two years alone. For many businesspeople, the VisiCalc package itself justifies purchasing a microcomputer, and VisiCalc is credited with motivating the sale of thousands of computers. The surest sign of success may be imitation, and VisiCalc has been imitated by a dozen computer hardware and software manufacturers who call their products by such names as SuperCalc, Execuplan, Supercomp-Twenty, T/Maker II, Calcstar, Unicalc, and so on. To a large extent, the information in this book applies to these products as well as to VisiCalc.

VisiCalc allows the creation on the computer screen of an electronic spreadsheet to display numbers for almost any business problem and to show instantly the impact of a change in any number. The ability to try out different numbers, to play “What if?” with many different figures, is a powerful feature that helps corporate managers and small business owners manage their businesses better.

HOW THIS BOOK WILL HELP YOU WITH VISICALC

People encounter two kinds of problems with VisiCalc: learning VisiCalc and designing VisiCalc layouts (the rows and columns of information that appear on the VisiCalc screen). *VisiCalc for Your TRS-80* is designed to solve both problems.

Solving the Problem of Learning VisiCalc

The first difficulty people have with VisiCalc is learning to use the package easily and efficiently. Anyone can quickly learn to handle a software package that only requires answering questions presented by the computer or giving it one or two instructions. VisiCalc does not ask many questions, and it has a rather extensive vocabulary of commands that the user employs to give instructions to the computer. Therefore, it requires the user to learn these commands to use the system effectively.

Once these commands are familiar they become second nature, but how do you learn them? The instructions that come with VisiCalc require you to spend a good deal of time at the computer practicing each command with the instruction book open in front of you. This time-consuming process is not an efficient learning style for many people. The result is that many people use the instructions only long enough to learn a few commands and then continue operating with just that small vocabulary, staying at one skill level, unable to tap the power available to someone who understands and can use all of VisiCalc's commands.

Of course, devoting time and practice to acquiring skill with VisiCalc cannot be avoided, but *VisiCalc for Your TRS-80* is designed to make that process as easy as possible.

Needed information is presented in groups of related concepts so an understanding of the overall structure of the package may be obtained. These sections can be read when you don't have access to the computer or you don't want to use it, for example, while traveling, at your office desk, or at home. Then when you have enough time, you can try these skills with the practice exercises in the book.

Solving the Problem of Designing VisiCalc Tasks

The second problem users have with VisiCalc arises from its flexibility. Because the user is confronted with an empty screen on which to develop a VisiCalc layout to solve a unique financial problem, it's essential for that user to have a certain amount of knowledge of finance and accounting to set up the screen for the task. The more knowledgeable the user is, the more useful

VisiCalc will be. Many small business owners and managers in larger businesses don't have an extensive knowledge of finance, and although they may perceive an area where VisiCalc could be useful, they can't design the necessary VisiCalc screen. As a result, many users stick to just one application of VisiCalc, for example, sales forecasting, and never use it for other tasks, such as analyzing inventory or calculating the rate of return on investments.

VisiCalc for Your TRS-80 provides a set of useful applications in the areas of cash flow analysis, inventory management, analysis of rate of return, financial reports, and other areas, each designed for the VisiCalc screen.

HOW MUCH DO YOU NEED TO KNOW ABOUT COMPUTERS?

There is a fundamental distinction between using a computer to create your own program and using an application package like VisiCalc. Novice users sometimes feel that to use a computer they have to know how to program it and that they'll need to know a programming language (which they imagine as a lot of 0's and 1's) to accomplish this. Actually, when you use an application package like VisiCalc, the programming is already done. Built into the program are various capabilities, tasks the program can do for you. As you use this program, you'll employ various "commands" to tell the computer which capabilities to exercise. These commands are not part of a programming language; rather, they are part of the application program itself. The commands are typical English words or abbreviations for these words and are far easier to learn than a programming language. Therefore, to use VisiCalc you don't need to know programming at all.

However, you should be comfortable with some aspects of the computer before using VisiCalc, but these can be learned the first time the program is used. These are fundamental facts about using a computer, basics like how to turn on the system, hook up and operate the printer, use the keyboard, and load a diskette in the disk drive. If you're not familiar with these basics, become familiar with them before your first VisiCalc session. The best source of such information is the operator's guide for the computer.

HOW TO USE THIS BOOK

VisiCalc for Your TRS-80 is divided into three main sections. Section One, comprising this chapter and Chapter 2, gives an overview of VisiCalc and its use in management. Section Two, *How To Use VisiCalc*, gives instruction on VisiCalc commands. Section Three, *VisiCalc Management Applications*, gives the actual VisiCalc layouts.

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Generally, it is recommended that you should read the various sections of the book depending on your needs, that is, whether you have knowledge of VisiCalc and/or of financial areas. However, all users should read Chapter 2.

Those who don't have a thorough understanding of VisiCalc commands should read Section Two on how to use VisiCalc. When you complete each chapter, you'll practice the skills you've just learned by doing the exercises at the end of the chapter. You'll work on a few practical problems, incorporating the new commands and techniques you are learning. You'll also continue to review earlier skills so they become automatic.

The material is organized from simplest to most sophisticated, with enough information presented in the first chapter to get you working with VisiCalc. If you want to become truly proficient in using VisiCalc, don't quit when you find that you can use commands and accomplish a few tasks; instead, press on and learn the commands to make what you do easier, more efficient, and more valuable to you.

If you don't have an extensive knowledge of finance, read Section Three on VisiCalc management applications and examine the layouts shown in the text.

If you decide that a layout can be useful to you, enter the layout by following the instructions in the book, and try the application. The sections on interpreting each layout will help you analyze your results.

The management applications section will probably be useful even if you have a financial background and ideas on how to use VisiCalc. The techniques used in the various applications may suggest ways of handling some of your own designs or be useful to you as they stand, so it's a good idea to skim this section.

2

VisiCalc[®] in Business: The “What If?” Game

- VisiCalc's Strengths
- Implications for the Future
- What VisiCalc Is Used For
- A Brief History of VisiCalc
- Three Examples Where VisiCalc Helps Managers
- Problems Where VisiCalc Is Not the Solution
- Using VisiCalc in Your Business

VISICALC'S STRENGTHS

Most business software packages are designed to accomplish one or more fairly specific tasks. These tasks may be relatively simple, such as storing a small mailing list of customers and printing mailing labels, or complex, such as keeping a general ledger. The flexibility of VisiCalc allows the person using it to design and carry out a wide variety of tasks. *Any task that involves calculations and that can be placed on a page in rows and columns can be performed with VisiCalc.* Of course, many of these tasks are not always most efficiently accomplished with VisiCalc. This book covers the tasks best suited to VisiCalc's powers and provides actual VisiCalc layouts for accomplishing the most useful tasks.

VisiCalc is essentially an automated worksheet or spreadsheet where the rows and columns are displayed on the computer's monitor screen, and the computer does all calculations. (See Fig. 2-1, the basic VisiCalc sheet.)

The VisiCalc user gives labels to rows or columns and then places numbers or formulas anywhere in these rows and columns. VisiCalc does

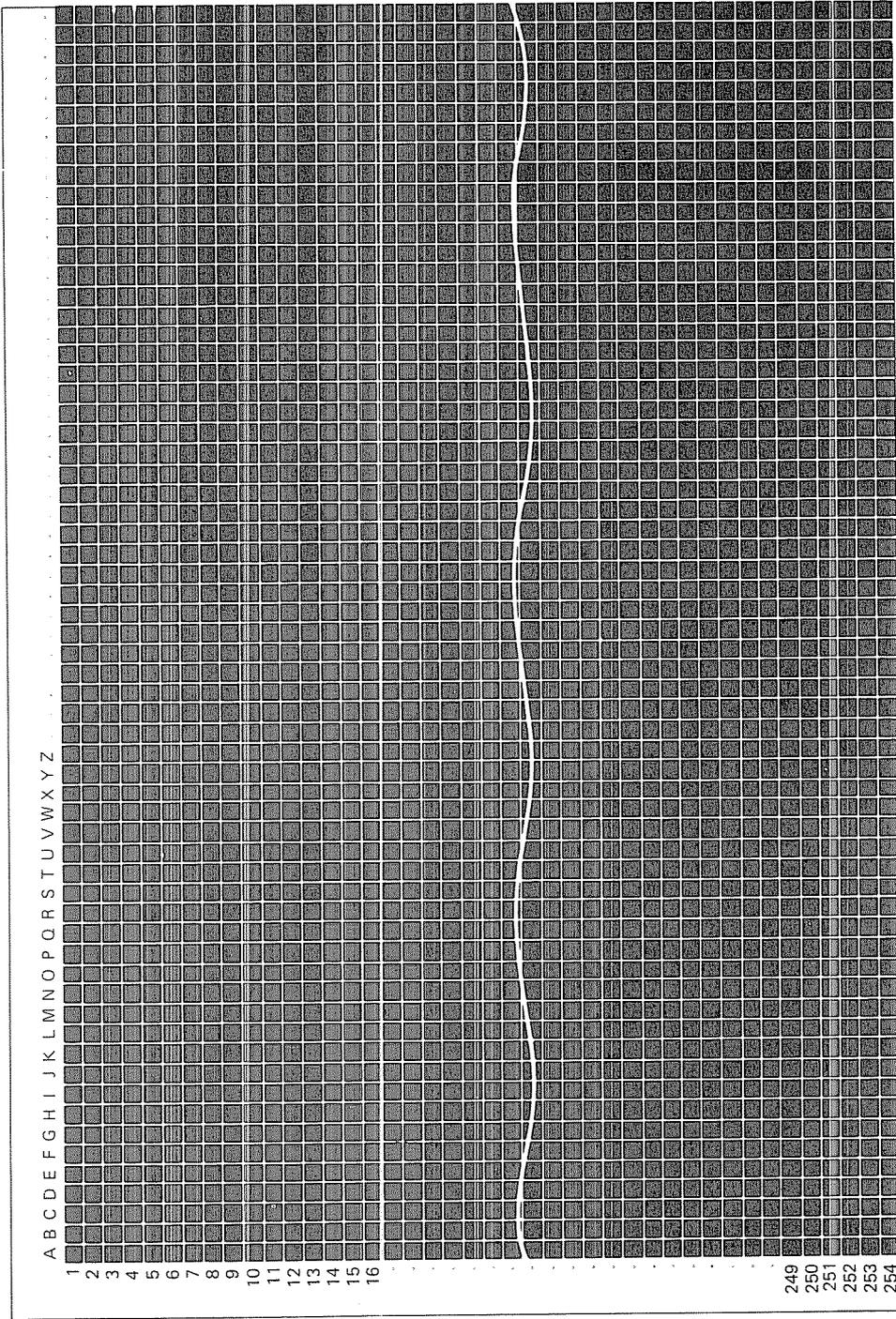


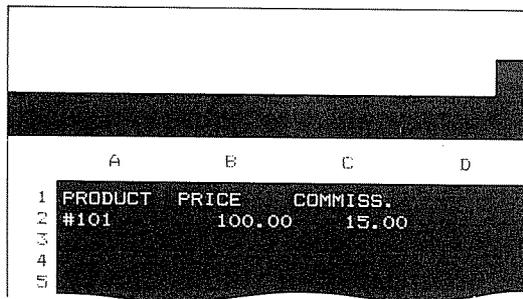
FIGURE 2-1

The basic VisiCalc sheet is divided into rows and columns where numbers or labels can be displayed.

the called-for calculations. When a number or formula is changed, automatic recalculation occurs, and all related numbers change as well.

The Recalculation Feature

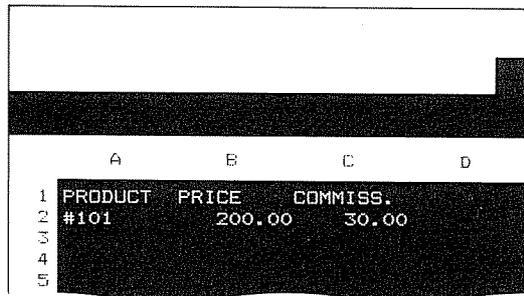
The ability to recalculate is the basis of VisiCalc's usefulness. To see how it works, consider this example. You have placed the price of an item you might sell at \$100 in one location on the VisiCalc sheet and at another you've directed VisiCalc to make the sales commission 15% of that figure. VisiCalc automatically calculates the commission as \$15. If you subsequently change the item's price to \$200, the commission will change to \$30 (15% of the new price). Any other figures related to either price or commission will then change as well (see Fig. 2-2a, b).



	A	B	C	D
1	PRODUCT	PRICE	COMMISS.	
2	#101	100.00	15.00	
3				
4				
5				

FIGURE 2-2a

A product price has been entered and VisiCalc has been instructed to make the commission 15% of that price.



	A	B	C	D
1	PRODUCT	PRICE	COMMISS.	
2	#101	200.00	30.00	
3				
4				
5				

FIGURE 2-2b

When the price is changed to \$200, VisiCalc automatically and instantly changes the commission to 15% of this new price.

The recalculation feature saves managers from performing dozens of repetitive calculations in preparing estimates or comparing the financial

10 INTRODUCTION

impact of a series of options. A manager working on establishing a price for a new product, for example, can explore many more price, commission, and manufacturing quantity options with VisiCalc than when each quantitative change means tedious work with a calculator and pencil.

VisiCalc Increases Productivity

VisiCalc can also make a department much more productive. In one fast-growing company, the purchase of computers and VisiCalc substituted for hiring new clerical help. One clerk handled data on \$15 million worth of merchandise without VisiCalc; with VisiCalc, the same clerk was able to handle data on \$40 million.

Because VisiCalc can be used for almost any financial or mathematical problem, managers have a powerful tool immediately available when a new question arises that requires a quick decision. The manager can design a VisiCalc layout to produce needed information, usually in about an hour. Frequently, reviewing the first data produced by VisiCalc will generate other questions that VisiCalc can also be used to answer. This information can be made available much more quickly than if the data processing department has to be involved or if the manager has to work things out on paper.

IMPLICATIONS FOR THE FUTURE

VisiCalc and word processors now available on microcomputers are the first of a series of products that will put computer power in the hands of every office worker. It does make sense to leave the largest and most complex computing tasks to the traditional data processing department, but simpler, ordinary tasks will be handled at the individual department level where information is needed quickly, on a daily basis.

WHAT VISICALC IS USED FOR

VisiCalc applications are almost as numerous as VisiCalc owners. Because VisiCalc is very flexible, and because good software for microcomputers is in short supply, people have probably used VisiCalc for every imaginable financial problem, and some that one wouldn't imagine as well. VisiCalc has been used for:

- Forecasting of all kinds, from sales forecasts to market growth
- Analyzing breakeven points and rate of return

- Generating accounting reports like balance sheets and income statements
- Keeping accounts payable and receivable journals
- Estimating materials needs
- Keeping checkbook registers
- Calculating mortgage payments
- Projecting cash flow
- Planning workloads
- Budgeting
- Invoicing
- Valuing inventory
- Determining the profitability of a real estate purchase
- Keeping a general ledger
- Preparing price estimates for contractors
- Estimating production and purchasing
- Analyzing profit-and-loss statements
- Estimating agricultural crop returns
- Determining seller's and buyer's closing costs

VisiCalc has even been used to write memos in lieu of a word processor and to perform calculations in place of a calculator.

A BRIEF HISTORY OF VISICALC

Obviously, no one software package can be all things to all people, and VisiCalc is not equally useful for all applications. To understand what applications VisiCalc is best employed for, it's helpful to know a little about the history of VisiCalc.

The idea for VisiCalc came to Dan Bricklin while he was working on his M.B.A. at Harvard Business School and performing the thousands of spreadsheet calculations on the case studies for which the school is famous. He visualized a computer program that would execute all those endless recalculations and display the results immediately. Bricklin and his friend Bob Frankston, of Massachusetts Institute of Technology, formed Software Arts, Inc. to program this package. Basically, the program was designed to allow instant answers to thousands of "What if?" questions. "What if the price were higher?" "What if interest rates go up?" "What if we consolidate production?" and so on. Another Harvard Business School graduate, Dan Fylstra, marketed the product through Personal Software, Inc. (now Visi-Corp), and VisiCalc, for Visible Calculator, was launched.

VisiCalc was thus designed to be primarily suited for problems with a number of "What if's?". It is also appropriate for problems with repetitive calculations within the problem itself and in which a number of different values will be used for many items.

THREE EXAMPLES WHERE VISICALC HELPS MANAGERS

Here are three examples of problems where VisiCalc is a useful tool. First, an income statement on VisiCalc can be a tool for estimating and planning. What effect will the purchase of a related business have on your company's income for the year? Enter an estimated income statement for your current business and the expanded business on VisiCalc and see the effect of adding the new business's income while subtracting the new cost of goods and new operating expenses. Then try different scenarios. In what expense categories can you absorb the new business without increasing costs? How will this affect income? How much will your sales force be able to increase the new company's sales? Which loans of the new business can be consolidated or repaid? How much will those payments be reduced? VisiCalc will instantly show the effects of each change.

Second, VisiCalc is ideal for a budgeting problem where the same calculations are done on the same categories for 12 months of projected expenses. You'll set up the budget for only one month and then automatically repeat the budget for the next 11 months across the electronic sheet. Some items in the budget will be percentages of other items; some lines on the sheet will be totals or subtotals of other groups of figures. You want to compute some expenses by increasing the number from a previous month. You may have a sliding scale for some percentages, like taxes or commissions, so they become larger or smaller depending on the size of another figure. You will want to answer questions like "What if we hire two new employees in the third month? What if we wait to hire the second one until month 5?" All of this is possible, even easy, with VisiCalc.

Third, VisiCalc can help managers make intelligent decisions about when to reorder inventory items and how large the reorder quantity should be by comparing the benefits of the price breaks for different quantities of an item against the holding costs for these quantities over the length of time the item will be in stock.

PROBLEMS WHERE VISICALC IS NOT THE SOLUTION

Despite its frequent use for accounting applications, such as keeping a general ledger or various journals, VisiCalc is not really suitable for most accounting purposes. It is not set up to accommodate accounting procedures easily, to process transactions or transfer information readily from one journal or ledger to another. It can be used for an application like invoicing, for example, but the resulting sales figures will not be automatically recorded in a sales journal.

If you want to do general accounting on a computer, buy an accounting package. However, if you have neither the need for nor the staff to use a full

accounting system, VisiCalc can indeed serve a useful accounting purpose. For example, when a cash disbursements journal is entered on VisiCalc, the computer will do all the tedious adding of columns so your books will balance the first time rather than after hours of re-adding columns to find your errors.

VisiCalc is appropriate for relatively simple formulas, such as those involving percentages, averages, arithmetic operations, simple trigonometric calculations, and so on. VisiCalc also has the power to handle very complex formulas, but entering, correcting, and checking these becomes complex. For example, for complex business analysis using time series data, VisiTrend/VisiPlot is a better package. For complex statistical calculations, use a package with some standard statistical formulas built in so you don't have to construct everything from scratch.

VisiCalc is best suited for calculation with items entered directly on the spreadsheet. It is not well suited for elaborate searches of information or for sorting information. It is possible to do some minor searches within VisiCalc, but essentially you need a database management package for this type of application.

USING VISICALC IN YOUR BUSINESS

By now you probably have thought of one or more areas where VisiCalc could help you. More will certainly occur to you as you read this book and as you work with VisiCalc.

At this point, it's natural to want to plunge ahead and begin using VisiCalc for your business problems. You'll be tempted to do this as soon as you learn your first VisiCalc commands in Chapter 3. Please try to resist the temptation and instead read the rest of Section II and work on the VisiCalc examples given at the end of each chapter. If you follow this plan before you begin using VisiCalc for your own problems, you'll find that you know all the commands, tricks, and shortcuts that will make your layouts easy to set up and effective in your work. The brief investment of time necessary to complete the text will be repaid quickly by your increased proficiency with VisiCalc and by the time VisiCalc saves you in your work.



Section TWO _____

How to Use VisiCalc[®]

3

The VisiCalc® Basics

- The VisiCalc Diskettes
- Getting Started—Moving around the Screen
- Making Entries
- Correcting Errors
- Types of Commands
- Formatting an Entry
- Changing Numbers/Recalculation
- Using the Storage Diskettes

THE VISICALC DISKETTES

This chapter covers the basics of VisiCalc: diskettes, the screen's appearance, moving around the screen, types of commands, entering data on the sheet, and storing or recalling layouts. When you complete the chapter, you will be able to load the VisiCalc diskette and set up and save a simple layout. From time to time a set of review questions will let you test your knowledge. Practice exercises can be found at the end of the chapter.

Use of Diskettes

Two kinds of diskettes are used for VisiCalc: program and storage. As in other application programs, the information and instructions that make up the VisiCalc program are stored on a program diskette. When you place this diskette in the disk drive and load the program, the information on the diskette is copied into the computer's memory where it remains until the computer is turned off. Because the program is now in memory, you remove the program diskette from the drive at this point. You won't need it until the next time you turn the machine on and need to put the program into memory again.

Remove the VisiCalc diskette once the program is loaded.

Once you have used VisiCalc to create a layout to solve a problem, you will want to save this layout, your figures, and the results. To do this, you use the second kind of diskette, the storage diskette. Storage diskettes are blank diskettes for your computer, available in a computer store. You must have some blank diskettes to begin using VisiCalc, as none come with the package. When you save your layout and figures on the storage diskette, you keep a record of all your entries and where they belong on the screen. It is possible to store a number of different layouts on one diskette; very soon you'll probably have a series of diskettes with groups of related layouts on each.

Store layouts on blank storage diskettes.

Each time you use VisiCalc, first load the program diskette, then remove it and put in a storage diskette. Then you can retrieve the layouts and figures you've put together and stored on the diskette before or store new work.

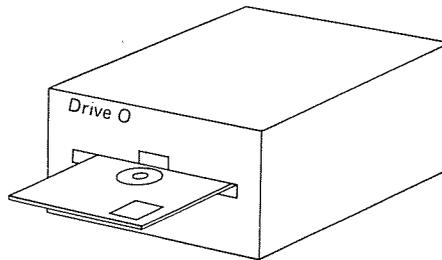
Loading VisiCalc

The best way to get a feeling for the basics of VisiCalc, the way the screen appears, the way you make entries, and so on, is to load the VisiCalc program diskette and spend some time trying things out on the screen. When you've got the basic structure in mind, you will be able to read about other commands and follow the figures on the book much more easily. So, load the VisiCalc program, following the directions that follow. In the next few pages we'll show the basics of VisiCalc and you can try out each of the features discussed.

The method used to load the VisiCalc program diskette is summarized in Procedure 3-1. If you have any difficulty with the procedure, check your computer reference manual and the Visicalc User's Manual.

PROCEDURE 3-1 **Loading VisiCalc**

1. To load VisiCalc, first turn on all peripherals. Then turn on the computer. Drive 0 will go on. Wait for the busy light to go out.
2. Then insert the VisiCalc program disk. Place it label up, with the label toward you in the drive. Close the drive door (see Fig. P3-1).

**FIGURE P3-1**

Insert the diskette label side up and toward you.

3. Now press the RESET key. You'll see the TRS DOS message and the copyright on the screen. At the bottom you'll see: "ENTER DATE (MM/DD/YY)?" You should type today's date using the slashes between month, day, and year. It should look like this: "02/12/84".
4. Next, you'll see the message "ENTER TIME (HH:MM:SS)?" You can enter the time using a 24-hour clock, or just press ENTER to skip this.
5. You'll see the message "TRS DOS Ready". Type "VC" and press ENTER. The program will appear.
6. Remove the VisiCalc disk and put it back in the binder.

Once you have VisiCalc loaded and see the spreadsheet on the screen, put the program diskette back in the binder.

GETTING STARTED—MOVING AROUND THE SCREEN

Use of the Screen

On your monitor screen you should now see what appears in Fig. 3-1. The VisiCalc spreadsheet is divided into rows and columns; a row runs horizontally across the screen, and a column runs vertically down the screen. Six columns and 12 rows are visible on TRS-80.

Because the monitor's size is limited, you are actually looking at only part of the sheet at this time. The spreadsheet is quite large, 63 columns by 254 rows (see Fig. 3-2). The rest of the sheet is there; it's just out of sight for the moment.

Generally, in applications like word processing where only part of the whole page is visible at a time, the concept of a "window" is used to explain what is happening. VisiCalc also uses the window concept. Imagine you are

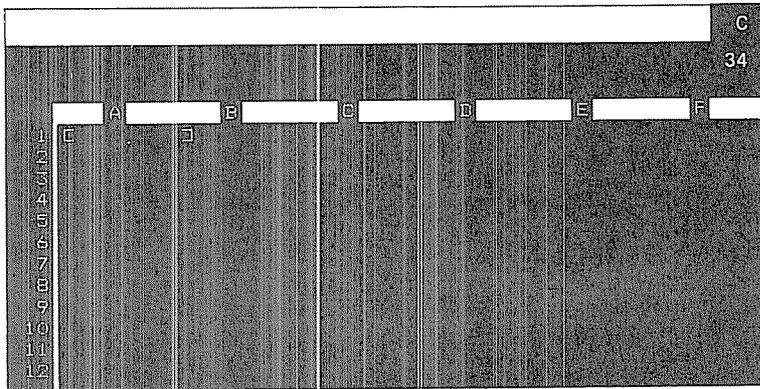


FIGURE 3-1

This is the standard VisiCalc screen on the TRS-80.

viewing the VisiCalc page through a window that cuts off your view of the whole page. You can move the window to the right or left, up or down. If you move to the right one column, you'll lose sight of the leftmost column and bring into view the next column to the right. Similarly, as you move one row down the screen, you'll bring into view a new row and lose the row at the top.

Moving around the Screen

Arrow keys are used to move around the screen; the arrow that points to the right moves you one cell to the right, the left arrow moves you to the left, and so on. If you move to the right edge of the screen and continue to move, the window will move over so you can see the next column. If you move down the screen, the window will move when you reach the bottom so you can see the next row.

Your computer lets you know if you have hit a boundary of the sheet by beeping and freezing the cursor. This will happen if you try to go further left than the first column, further right than the 63rd column, further up than Row 1, or further down than Row 254. But there's no harm in hitting any of these borders. See Procedure 3-2 for information on how to move on the screen and then try out the arrow keys. Move far enough to the right to see new columns appear. Move far enough down the screen to see new rows appear.

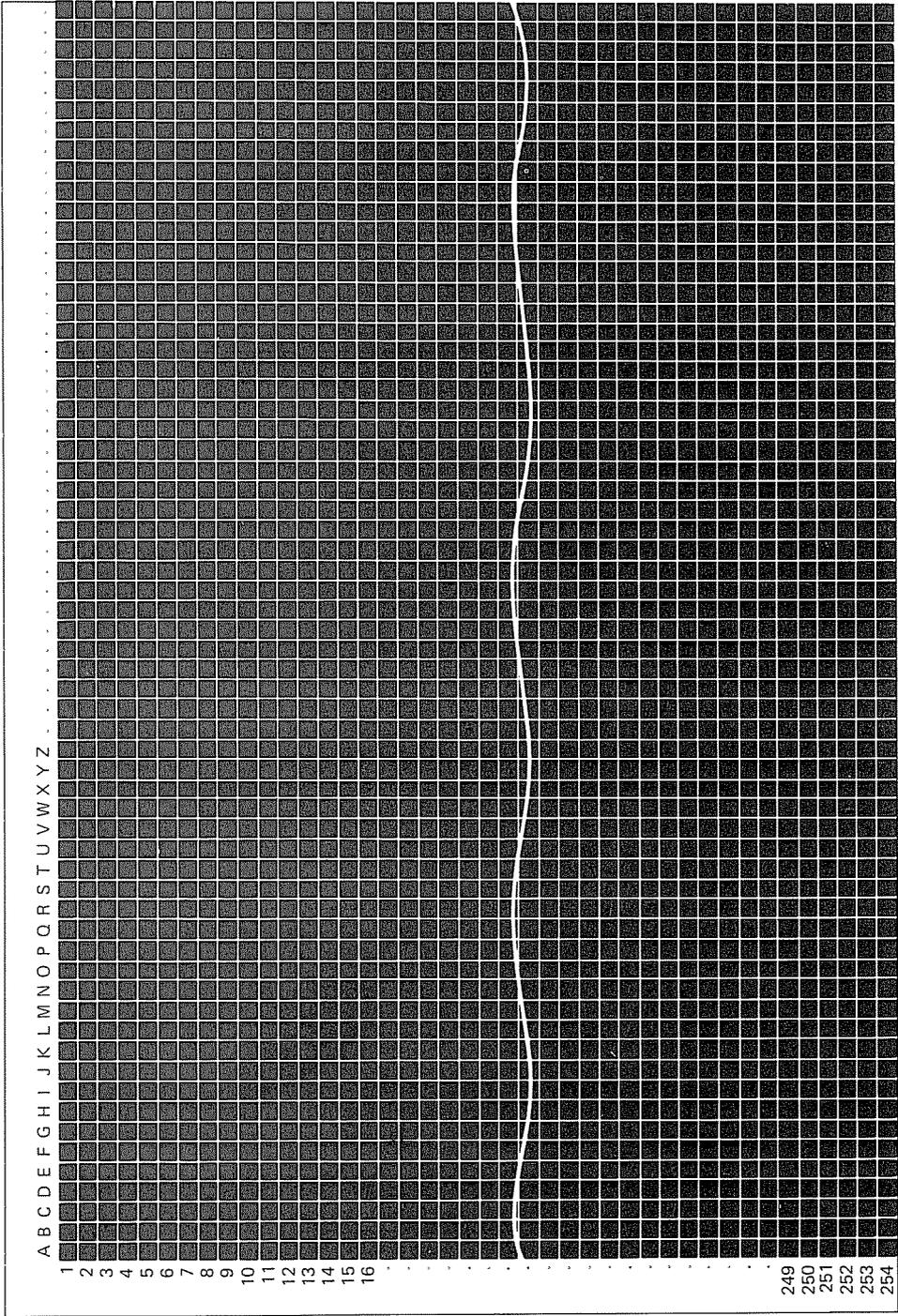


FIGURE 3-2

The whole VisiCalc sheet.

PROCEDURE 3-2 Moving around the Screen

The TRS-80 Model III computer has four cursor control keys:



The left and right arrows are on the right side of the keyboard; the up and down arrows, on the left.

To move around the screen, simply press the arrow for the direction in which you want to move.

Changing the Cursor

As you move around the screen, your position is indicated by the brackets around a cell. The cursor can be either flashing or steady. To change the cursor from flashing to steady or vice versa, type the SHIFT key and the 0 (zero) key at the same time. To change it back, press SHIFT-0 again.

If you want to remove the brackets entirely, press SHIFT and the CLEAR key at the same time. The brackets will not show on the screen. To restore the brackets, press SHIFT-CLEAR again.

Coordinate System

As you've seen, the sheet has references for each location. Across the top the columns are marked A to Z for the first 26 columns, AA to AZ for the next 26, and BA to BK for the remaining 11 columns of the 63. Going down the left side of the screen are the numbers 1 to 254 for the 254 rows. Figure 3-3 shows the screen as it appears when you have moved the window over four columns and down 20. In this book we'll usually show the screen as four columns wide.

You can make entries in any location, called a **cell**, on the screen. Even if that entry disappears as the window is moved to another part of the screen, VisiCalc remembers it is there, uses it in calculations as you call for it, and displays it to you any time the window is moved to that spot.

Each cell on the screen is identified by two coordinates, one referring to the column, one to the row. So, the first cell in Column A is A1; the one to its right is B1, and so on. The letter (the column) is always put first.

The column comes before the row in identifying a cell.

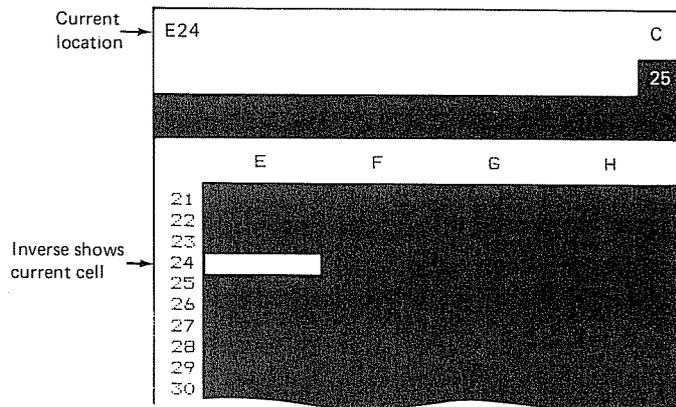


FIGURE 3-3

The window has been moved over 4 and down 20.

The Cursor

You could see exactly what cell you were in as you moved around the screen by looking for the inversed cell or the cell in brackets: []. This cell is called the **cursor**. In Fig. 3-3 the cursor is in Cell E24. (We show the cursor as an inversed cell because this is easy to see on a printed page. On your TRS-80, you'll see the bracketed cell on your screen.)

Information Area

The rectangle above the worksheet area gives a variety of information about VisiCalc. On your screen, notice that the upper-left corner of the rectangle contains the coordinates of your current location on the sheet. As you move around the screen, watch the coordinates in the information area change.

Note on Carriage Return: After each entry and some commands you must tell the computer that the entry is complete. You do this with a carriage return, which is similar to the carriage RETURN on a typewriter that moves you down a line. The carriage return is ENTER on the TRS-80. This book refers to the carriage return as RETURN.

Moving with GO TO

To move more quickly to a cell on the screen, press the ">" key on your computer. The information area at the top of the screen will show what you

see in Fig. 3-4. You'll see the words "GO TO: COORDINATE" on the prompt line. Type the coordinates of the cell you want to move to and press RETURN. In Fig. 3-4, you typed "A1" and RETURN. The cursor will move immediately to the cell you select. In Fig. 3-4, the entry "A1" moves you to the cell in the upper-left corner. Press ">" now and move to a cell.

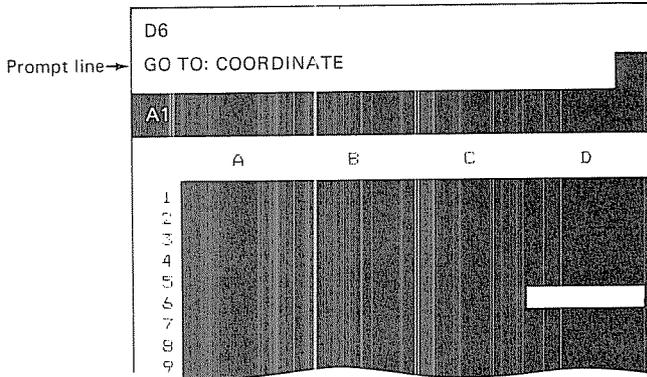


FIGURE 3-4

This shows a "GO TO" prompt and the response "A1".

MAKING ENTRIES

Label Entries

To create a VisiCalc layout, you put information on the screen: this is called making entries. Whatever the layout, you will make only three kinds of entries: labels, numbers, and formulas.

A label entry is a word or abbreviation that helps you understand the numbers on the sheet. In Fig. 3-5 the label at the top tells you this is a cash

	A	B	C	D	E	F
1	CASH DISBURSE.		LAYOUT			
2	DATE	ITEM	NET	RENT	SUPPLIES	UTIL
3	JAN 2	ACME	25.00		25.00	
4	JAN 10	JONES	500.00	500.00		
5	JAN 14	CON ED	40.00			40.00
6	JAN 15	TELEPH.	100.00			100.00
7						
8	TOTALS		665.00	500.00	25.00	140.00
9						
10						
11						

FIGURE 3-5

A sample VisiCalc layout shows labels in Rows 1 and 2 and in Columns A and B.

disbursements layout. The labels across the top of the sheet—"DATE", "ITEM", "NET", "RENT", "SUPPLIES", "UTIL"—tell you what's in those columns. Then the labels in Column A tell you the dates the checks were written; Column B tells you to whom the checks were written.

To make an entry, move to the cell where you wish to make the entry and begin typing. Move now to Cell A1 and type the label "DATE". As you type, you'll see what you type on the edit line, which is just above the sheet. Figure 3-6a shows the edit line containing what is being typed, while the prompt line just above it reads "LABEL" because a label is being typed. (Don't try to correct any errors now.) The label will appear in Cell A1 as well.

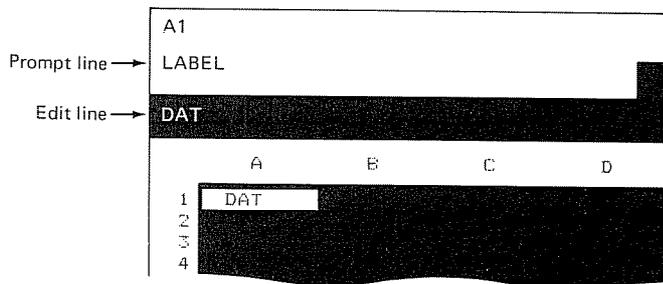


FIGURE 3-6a

As you type a label, this is what you'll see.

When the entry is complete, press RETURN. Your entry will then disappear from the edit line and be stored in the cell in VisiCalc's memory. You'll see it in the entry contents line as shown in Fig. 3-6b.

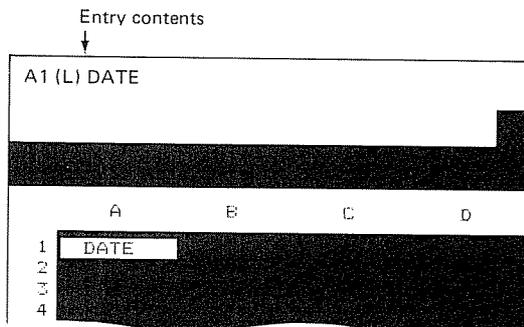


FIGURE 3-6b

This is what you see after you press RETURN. The "(L)" stands for "label."

When you finish your entry, you can simply type a cursor control arrow to move to the next spot. Any cursor control arrow will first enter what you've typed in the cell and then move to the next spot. Try this now. Type a label in B1 and move on to C1 without pressing RETURN. Your label will be stored as if you'd pressed RETURN and then the arrow.

When you enter a label, you can type with either capital or small letters; VisiCalc doesn't care which you type. In case you wondered how VisiCalc knows whether you are typing a label or not so it can put this information on the prompt line, the answer is that as soon as you type a letter, VisiCalc assumes that what follows will be a label. So, to type the average label, simply type your characters and press RETURN or a cursor control arrow.

A label entry starts with a letter.

Because each VisiCalc cell has only nine spaces, you will be able to type only nine characters for a label. Therefore, in many cases you'll have to abbreviate a word to fit it in the cell, or you may have to eliminate spaces between two words (like "net profit") to make them fit.

Number Entries

A **number entry** is a figure that is part of your layout and with which you will do some calculations. Again in Fig. 3-5, the numbers are in Columns C to F, Rows 3 to 6. The numbers are totaled at the bottom.

To enter a number, simply type the number and press RETURN. You can type a decimal point or a minus sign before the number if needed. You can type a plus sign to indicate a positive number, but it is not necessary.

Try this now. Move to Cell B2 and type a number. As you begin to type, you'll see "VALUE" on the prompt line. Your number will appear on the edit line. When you press RETURN, you'll see your number appear in the cell. Don't include commas in your numbers.

Numbers in VisiCalc can't have commas.

It's the number or symbol ("+" or "-") that tells VisiCalc you're typing a number entry.

A value starts with a number or symbol.

If you type a number that has too many digits to be displayed, VisiCalc will display the number in scientific notation. For example, 200,000,000 will appear as "2E8", where "E8" stands for 10 to the eighth power (eight zeros). To translate "2E8", add eight zeros to the 2. "99E9" becomes 99 plus 9 zeros or 99,000,000,000. A decimal like .000000002 becomes "2.E-9". To translate, move the decimal the indicated number of places to the left. "1.3E-8" becomes .000000013. If the number can't be displayed in scientific notation, VisiCalc will fill the cell with ">" symbols. At any time you'll be able to see the entry in standard notation on the top line of the information area in the entry contents spot. Now try entering large numbers to see scientific notation.

Sometimes you want to type a label that begins with a number. For example, you might use check numbers in a journal. Because they will not be used in calculations, they are labels. If you begin an entry with a number, VisiCalc assumes you are typing a number or formula and will put VALUE on the prompt line. You don't want VisiCalc to think your labels are values. To avoid this problem, type a quotation mark before a label entry that begins with a number or with a symbol like -, +, *, =, or /. You can also use a quotation mark if you want to put some spaces in front of your label.

A label can start with “.

Enter some dates, “9-23”, “6-1”, and so on, in Column A under the DATE label. Use quotation marks.

Formula Entries

A **formula entry** tells VisiCalc to perform some operation on the numbers on the sheet. The result of the calculations appears in the cell where you have entered the formula. In Fig. 3-5, the formulas are in Columns C to F in Row 8. The formula in each cell tells VisiCalc to add the numbers entered above it. VisiCalc performs that addition and places the total in Row 8. So, for example, Column C shows the sum of checks written, \$665. The next three columns show the sum of checks written in each of the three categories.

Formulas in VisiCalc generally contain a reference to another cell on the sheet. For example, you might want to add a column of figures that appear in Cells A1 to A5, as in Fig. 3-7. You want the total to appear in Cell A6, just below them. Cell A6 would contain a formula calling for the addition of the numbers. You create the formula in A6 by referring to each of the other cells by its coordinates and putting in “+” signs to indicate that the numbers in these cells should be added. Figure 3-7a shows the edit line as you enter a formula to do this addition: “+A1+A2+A3+A4+A5”.

Try this now. Move to Cell A1 and type 10; then move down Column A, entering each number. Don't worry about what is in the cells now. As you place a new entry in the cell, the old one is erased. Then in Cell A6 enter the formula shown in Fig. 3-7.

Why does the formula start with a plus sign? Because otherwise VisiCalc thinks this is a label starting with the letter A.

+ starts a formula beginning with coordinates.

Press RETURN. VisiCalc will evaluate the formula and place the result in Cell A6. Cell A6 will contain 130. The entry contents line (top line of the information area) will show the formula as in Fig. 3-7b.

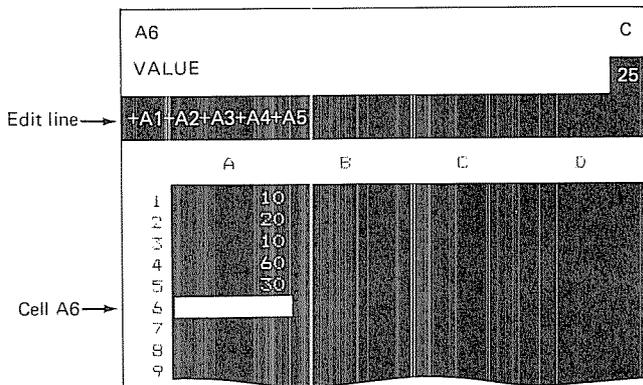


FIGURE 3-7a

Entering a formula.

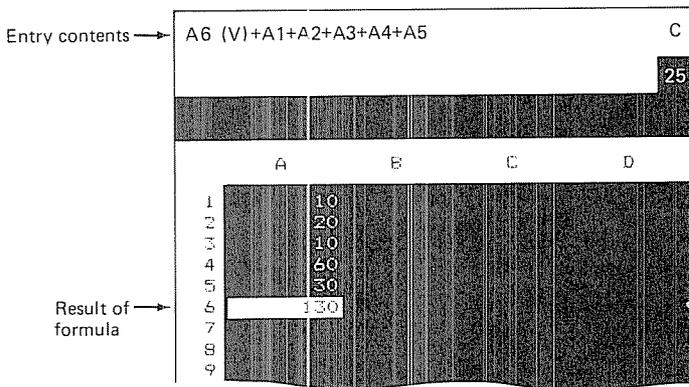


FIGURE 3-7b

After you press RETURN, “(V)” stands for “value,” a formula or number.

A formula tells VisiCalc to do some calculations with a cell’s contents. You need to use some special symbols for the formulas. Procedure 3-3 shows the symbols you need.

PROCEDURE 3-3
Symbols for Arithmetic Operations

- + Addition
 - Subtraction
 - * Multiplication
 - / Division
 - ^ Exponentiation: 3^2 means square 3;
 5^3 means cube 5; 5^10 means the 10th power of 5
- Note:* The ^ is over the @ key. Use the shift key to print it.

HOW FORMULAS ARE EVALUATED

VisiCalc does the arithmetic operations in a formula from left to right.

$12+12/6$ will result in 4.

The order of calculation corresponds to algebraic calculation.

Parentheses change the order of calculation. Operations inside parentheses will be performed first.

$12+(12/6)$ will result in 14.

$4*2^2$ will result in 64 (8 squared).

$4*(2^2)$ will result in 16 (2 squared times 4).

The formula “+D5*B2” tells VisiCalc to take the number stored in Cell D5 and multiply it by the number stored in Cell B2. Suppose you haven’t put a number in these cells yet. VisiCalc will call each one 0, and the result of the calculation will be 0. Suppose you ask for division by a cell whose content is currently 0? You’ll see the result “ERROR” in the cell as division by 0 is not possible.

The result 130 should now be in Cell A6 on your screen. Change the number entered in Cell A1 from 10 to 1010. Each time you make an entry, every formula on the entire sheet is recalculated. So when you make this entry, the formula in A6 is recalculated. This time the computer adds up A1 to A5, using the numbers that are now in those cells, and gets the number 1130. Figure 3–8 shows what you should see now.

	A	B	C	D
1	1010			
2		20		
3			10	
4				60
5				30
6				1130
7				
8				
9				

FIGURE 3–8

This screen shows a change in Cell A1 and its effect on the total in A6.

This is how easy it is to do the recalculation that is VisiCalc's strength for the manager. The formulas on the sheet contain references to locations on the sheet that may contain different numbers at different times. Constant recalculation shows you the results of your formulas with every new number.

You can also enter a number as part of a formula. You might, for example, have a formula that gives you 25% of the number in another cell. The formula would look like this: ".25*D3".

You might also have a formula that simply copies another cell on the screen to repeat its contents. This kind of formula would look like "+E25", if you wanted to repeat the number stored in E25 and have it change every time E25 changed. Try this to repeat the contents of Cell A6 in Cell B6. (Type the formula "+A6".)

But the complexity of formulas in VisiCalc is limited. If the formula is too long or complex, VisiCalc will stop displaying it on the edit line at the point where it becomes too complicated. You may need to divide the formula into two parts and put each part in a different cell. Incidentally, as you may have discovered, if you make an error in entering a formula, for example, ending with a "+" sign, VisiCalc will give a "beep" when you press RETURN and will not enter the formula until you correct it.

CORRECTING ERRORS

You may notice an error while you are typing an entry. To correct as you are typing, see Procedure 3-4, which also shows how to abort an entry as you are doing it if you decide you don't want to make the entry. Now try entering some labels and numbers incorrectly and correcting them.

PROCEDURE 3-4 **Correcting an Entry**

To correct an error as you are typing, press the CLEAR key. Pressing CLEAR once backs you up one character in what you are typing. Press it again for each character you want to erase. It acts like the backspace on a typewriter and erases as you go.

CLEAR = backspace

To abort a command or entry entirely, that is, to erase both the entry and the prompt line and to stop any command from being executed, you can just keep pressing CLEAR. After an entry disappears from the

edit line, the prompt will disappear with the next stroke. You can get out of anything you are doing on the screen by pressing CLEAR enough.

There's a faster way to abort a command. Use the BREAK key to break out of what you're doing and leave the sheet unchanged.

BREAK = aborts a command

Editing

You can edit your entry without retyping it completely. Procedure 3-5 shows how to do it. Note that on older versions of VisiCalc, editing is not available.

PROCEDURE 3-5 **Editing**

The Edit command lets you make changes in an entry without retyping the whole entry. You can use it on an entry you are currently typing or on something you have already placed in a cell. To use it on an entry already in a cell, move to that cell on the sheet.

To begin the Edit command, type the "/" key and then type "E" for "Edit" from the menu presented.

The edit cue tells you what part of the entry you are on. You can insert or delete any character without changing the others in the entry.

You can edit on the TRS-80 by typing "/" and "E" for the EDIT choice or you can type SHIFT and ENTER while you're typing an entry to edit as well.

Use these keys to edit:

- The cursor control keys ← and → will move you to the left or right in the entry. Watch the edit cue to see where you are.
- The ↑ key will move you to the beginning of the entry; the ↓ will move you to the end of it.
- The CLEAR key deletes the character to the left of the cue.
- To insert characters, move to the position where you want them and begin typing. The characters will appear in that position.

REVIEW

At this point test your recall of what you've read by answering these questions. Try to answer each question. Write the answers down before you look at our answers.

1. What three kinds of information can be entered in a cell?
2. Look at Fig. 3-9. What does the top line of the information area, "B2 (V)125000", tell you? Should there be a comma in "125000"?

The screenshot shows a VisiCalc spreadsheet window. At the top, the information area displays "B2 (V)125000". Below this is a grid with columns labeled A, B, C, and D, and rows numbered 1 through 6. The data in the grid is as follows:

	A	B	C	D
1	SALES	150000		
2	-COSTS	125000		
3	MARGIN	25000		
4				
5				
6				

FIGURE 3-9

Look at this layout to answer the review questions.

3. Which entries are labels? How were they entered? How could they be changed?
4. Which entries are numbers? Which are formulas?
5. What is the formula in Cell B3?
6. How do you move directly to Cell H13?

Answers

1. You can enter labels, numbers, and formulas.
2. The information lines tell you that you are in Cell B2, that the entry is a number or formula, and that it is "125000". VisiCalc numbers do not include commas.
3. All entries in Column A are labels. The label "-COSTS" was entered by starting with a quotation mark. The others were entered by moving to the cell and typing the label. To change any label, just move to that cell and type the new entry.
4. Cells B1 and B2 are numbers. Cell B3 is a formula for subtracting one from the other.
5. "+B1-B2". The "+" is necessary to show VisiCalc that this is a formula, not a label, as it starts with a "B".
6. Type ">" and then "H13" when you see "GO TO: COORDINATE" on the prompt line.

TYPES OF COMMANDS

To make entries on the sheet, you'll use three types of commands. The first is **direct entry** of a label, number, or formula. This is what you've been doing by moving to the cell where you want the label, number, or formula and typing it in place. The second type of command is a variation of this direct entry used for some formulas. You'll call for a **function**, such as summing a column, counting, averaging, and so on, from the functions available in VisiCalc. To get these functions, you type the "@" sign and a VisiCalc function name (like "SUM") and then the rest of the formula.

@ = function

The third type of command is one you'll pick from a **menu** of choices available from VisiCalc. A "menu" is a list of options like the items on a restaurant menu. To use these commands, you'll type the "/" mark and see a menu of choices on the screen. Then you'll type the letter that is an abbreviation for the menu choice you want.

/ = menu

You may go through a series of menus once you've entered the "/". You can think of the VisiCalc menus as "layered." As you pick from one menu, you will see another that is lower in the menu hierarchy. On that menu you may pick a choice and then see a third menu. Each time you see a menu, the first word, like "COMMAND" or "FORMAT" or "STORAGE" gives you a cue to what menu layer you're on.

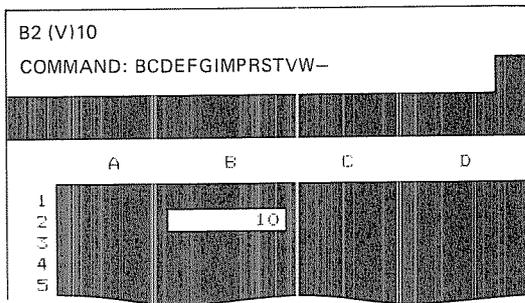
All of these commands will be covered in detail in the following sections, but it is useful to keep in mind the three types so that you can classify each one as you learn it.

The Menu Command for Removing an Entry

At times you will simply want to remove an entry completely leaving a blank cell. To do this, try your first VisiCalc menu command. Move to Cell B2. Type the "/" on the keyboard. The prompt line then shows the menu of commands available. The menu is:

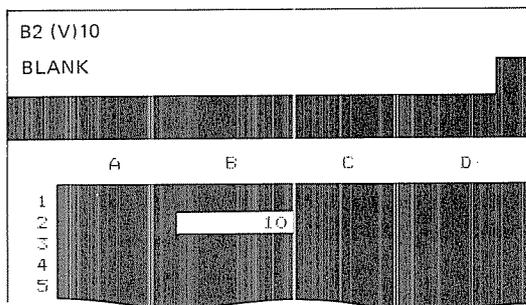
```
COMMAND: BCDEFGIMPRSTVW-
```

Figure 3-10a shows the menu as it appears on your screen. Each letter in this menu is an abbreviation for a different command. (If editing is not available, you won't see choice "E" on the menu.) To pick a command from the menu, just type that letter. Now type "B" for "BLANK." *Don't press RETURN after you pick a choice.*

**FIGURE 3-10a**

The screen after you press “/”.

Figure 3-10b shows what you will see. The menu disappears from the prompt line and the word “BLANK” appears on it. To blank out the cell, just press RETURN. If you don’t want to blank it out, use the abort technique for your computer.

**FIGURE 3-10b**

You pick choice “B”, and pressing RETURN blanks the cell.

Note: From now on we won’t give specific instructions to try out each command as it is presented. Try out any command that isn’t clear to you from the text. But you don’t have to continue sitting at the computer as you proceed through this and subsequent chapters.

FORMATTING AN ENTRY

When you make entries on the sheet or have calculations done, you’ll usually want to clean them up a bit. If you’re working on a financial calculation with dollars and cents, for example, you won’t want to see a number like 10.001. You’ll probably want to see the decimal point and two digits on each entry rather than have a variety of entries like 100, 10.31, 20,

100.5, 200.59. Or, conversely, you may want to round off all the numbers so you never see the cents.

To accomplish this kind of cleanup, you can use another VisiCalc menu command, the Format command. To get it, you type the “/”, see the menu, and pick choice “F” for “FORMAT”. Once you choose “F”, you’ll be presented with this new menu of choices:

FORMAT: D G I L R \$ *

Each choice represents a different kind of format in which your entry will automatically appear when you press RETURN. We review each of these different formats here. Then the practice exercises at the end of the chapter will give you the opportunity to try the formats and see the results.

Once you pick a format type for a given cell, anything you enter in that cell will have that format. If you blank out the entry, the format will remain in the VisiCalc memory so the next time you place an entry in the cell, it will have that format. How do you know what format you have specified? The entry contents line in the information area at the top will show the format specified for that cell. Figure 3–11 shows the format choice “\$” for Cell A1.

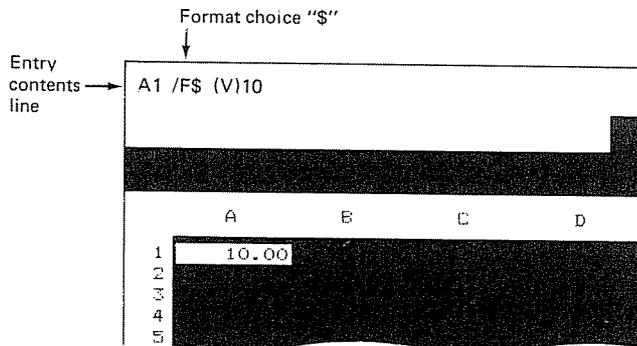


FIGURE 3–11

This screen shows the format choice “\$” on the entry contents line.

Format Choice “\$”

This format choice is obvious. If you choose the option “\$”, a number entry will appear as dollars and cents or a formula will be calculated and displayed as dollars and cents. The “\$” format will round off any decimal fraction after the hundredths place. The number 1.594 will be displayed as 1.59 in the cell; 1.595 will be displayed as 1.60. The entry contents line will, however, show the full entry, and calculations using the entry will use the full value not the rounded-off entry. Figure 3–12 shows Cell B2 where the number

100.995 has been entered; the entry contents line still shows this number, but the cell itself is formatted to round it off to 101.00.

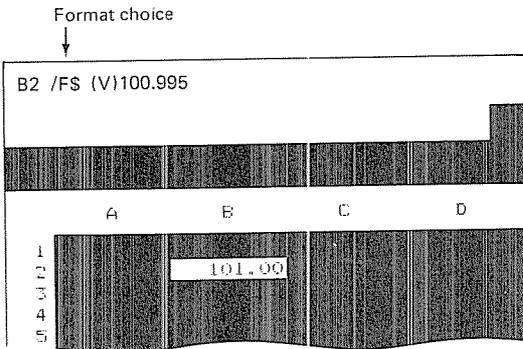


FIGURE 3-12

The “\$” format rounds to two decimal places.

If you enter a label in a cell with the format “\$”, VisiCalc just ignores the format and displays the label.

Format Choice “I”

“I” stands for “INTEGER”. When you pick this choice for a cell, any number or formula will be displayed rounded off to the nearest whole number. The decimal will not be displayed at all. (See Fig. 3-13.) For example, the number 199.9 will appear in the cell as 200. This might be useful, for example, in doing taxes where you might enter a column of figures as dollars and cents but want just a total dollar figure. Again, the entry contents line will show you the full entry.

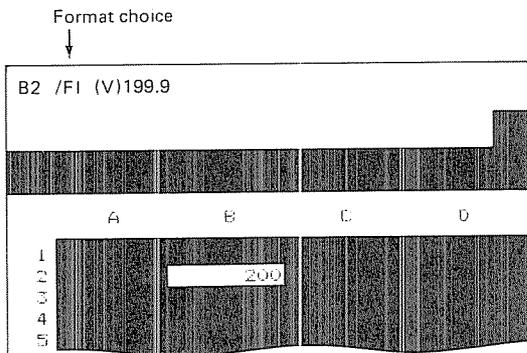


FIGURE 3-13

The “I” format rounds to whole numbers.

Format Choice “R”

“R” stands for “RIGHT”. This format choice is for labels, numbers, or formulas. When you use this format, the entry will be placed on the right margin of the cell. Figures 3–14 shows how this affects a label and a number.

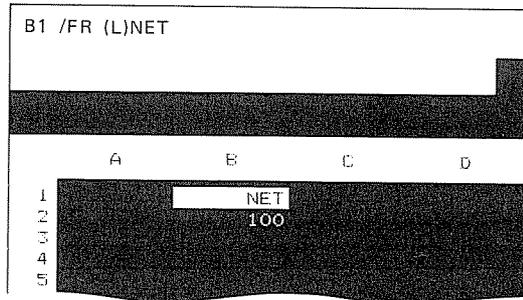


FIGURE 3–14

Both B1 and B2 have the format “R”.

Format Choice “L”

This format choice stands for “LEFT” and starts the entry on the left margin of the cell. Figure 3–15 shows how this appears.

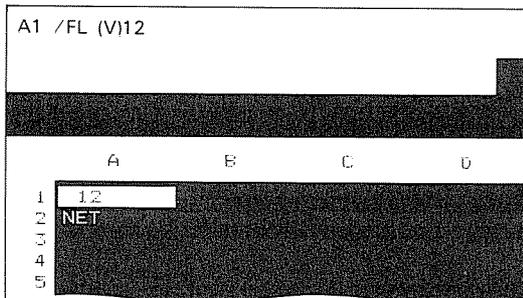


FIGURE 3–15

Both A1 and A2 have the format “L”. VisiCalc puts a blank space before a number.

Format Choice “G”

“G” stands for “GENERAL”. Use it only when you have selected a format for a cell and wish to change it back to the standard, general format. In the General format, all labels start on the left margin, and all numbers are

placed on the right margin with a blank space at the left side of the cell. In numbers, all significant decimals are displayed, meaning that a number like 12.00 is displayed as 12, but 15.09 is displayed as 15.09 because that zero is significant. (Decimal or scientific notation is chosen, depending on which will display the largest number of significant digits.) Figure 3–16 shows the general format.

	A	B	C	D
1	DATE	NET		
2	JAN 1		15	
3	JAN 2		16.07	
4				
5				
6				

FIGURE 3–16

All cells are in General format.

Format Choice “D”

“D” stands for “DEFAULT”. To understand this choice, you have to know that there is a method to format all the cells on the sheet at the same time, using the Global command. This will be covered in Chapter 4. For now, you need to know only that if, for example, you have set the format for the whole sheet to be dollars and cents, format “D” will return a cell to this format. If there is no format for the whole sheet, then the cell will return to the General format. So, if you haven’t set a format for the whole sheet, format “D” will behave just like format “G”.

Format Choice “*”

This format choice is for numbers or formulas. It creates a simple bar graph for the entry. First, VisiCalc drops every number after the decimal point. It doesn’t round the number; it simply uses the integers. Next it places in the cell a number of stars equal to the value in the cell. For the number 1, it gives one star; for 2, two stars, and so on. The leftmost spot remains blank. This means that the graph will show only eight stars. For a number larger than 8, the cell will show only eight stars.

To use this format effectively to compare several quantities, do calculations on each quantity to reduce it to a number from 1 to 8. For example, in

Fig. 3-17, the second column shows sales figures for the week. The third column contains formulas that divide the weekly sales figures by 1000, and each cell in the third column is formatted as “*”. Thus, \$5000 in Week 1 is divided by 1000 and five stars are displayed. Notice that Week 2, with \$2500 in sales, becomes two stars. The figure 2500 is divided by 1000 to become 2.5, but the decimal portion is dropped when the format choice “*” is used.

C2 /F* (V) + B2/1000

	A	B	C	D
1	WEEKS	SALES	GRAPH	
2	WEEK 1	5000.00	*****	
3	WEEK 2	2500.00	**	
4	WEEK 3	3000.00	***	
5	WEEK 4	4000.00	****	
6				
7				
8				

FIGURE 3-17

Column C is formatted with the “*” choice.

REVIEW

Pause now to look at an example that incorporates most of what you’ve done so far. Figure 3-18 was created using the commands and entry techniques you’ve learned. Answer the following questions by looking at the figure.

	A	B	C	D
1	SALES	10000.00		
2	-COST GDS	2000.00		
3	GROSSMAR	8000.00		
4				
5	-EXPENSES	6375.00		
6	NETPROFIT	1625.00		
7	Z PROFIT	16		
8				
9				
10				

FIGURE 3-18

Look at this figure to answer the review questions.

1. First look at the figure and identify the labels. Which cells contain labels? How are they formatted?
2. Which entries are numbers? Which are formulas?

3. What format is used for all the dollar figures?
4. What formulas are used for gross margin and net profit?
5. The percentage of profit in Cell B7 is calculated by dividing the net profit by the total sales. What is the formula for Cell B7? How do you get the result to be a percentage, not a decimal?
6. How do you make the percentage of profit appear as a whole number without a decimal fraction?
7. How would you use this layout to try different values? What entries would you change? What would you expect to see alter as you changed those numbers?

Answers

1. The labels are all in Column A. There is no special format for these cells, because the General format, which puts labels on the left, was acceptable. The label that begins with the “%” sign was typed by starting the label with a quotation mark, as were the two labels that start with the “-” sign. In this case, it was convenient to label the two cost items in the list, cost of goods and expenses, with a “-” as they are subtracted from the figure above them.
Notice that the labels are abbreviated or condensed by leaving out spaces. This is necessary because each cell has only nine spaces. To arrive at these abbreviations, the correction features of the computer were used. First, the entry was typed in full; then, when it obviously wouldn’t fit, the backspace feature was used to erase the label and create one that would fit.
2. The figures in Cells B1, B2, and B5 are numbers for sales, cost of goods, and expenses. Gross margin in Cell B3 is a formula. The figure 8000 is arrived at by subtracting cost from sales. Similarly, net profit (B6) is arrived at by subtracting expenses (B5) from gross margin (B3). Percentage of profit (B7) is a calculation based on other figures as well, so it is a formula.
3. The format choice “\$” is used to display the entries with two decimal places.
4. To calculate gross margin (B3), the formula “+B1-B2” was used. It starts with “+” so it won’t be mistaken for a label. Otherwise, the first character would be “B” and it would be a label.
The formula for net profit is “+B3-B5”.
5. This is a tricky formula. First, divide the two numbers: “+B6/B1”. Next, add to the formula the instruction to multiply by 100. This creates a percentage. “+B6/B1*100” produces 16.25.
6. Use the format choice “I” to create an integer.

- Change only the number entries on the sheet. Try different sales figures, new cost of goods, and new expenses. Perhaps you would keep the expenses and cost of goods the same and see the effect of higher prices (as shown in a higher sales figure) on your profits. Perhaps you would see the effect of a lower cost of goods at the same sales volume. Perhaps you would decide the expense figure was too low and increase it to see the effect on the profit margin.

CHANGING NUMBERS/RECALCULATION

Each time an entry is made, VisiCalc automatically recalculates every formula on the sheet, so it will pick up every reference to that new entry if such a reference exists anywhere. You won't be aware that such a recalculation is taking place, although you will see new numbers pop up where they are needed.

VisiCalc recalculates the sheet by starting at the top of Column A and recalculating every cell in that column; then it proceeds down Columns B, C, D, and so on. When you're entering formulas and when you're using the layouts to try out different numbers and see the results, keep in mind the order in which VisiCalc does the recalculation. If, for example, you have an entry in Column A that refers to values that are calculated in Column B, VisiCalc will do the calculation in A using the old number in Column B. Figure 3-19 should make this clearer.

Figure 3-19 is a simple calculation showing the total of salaries and benefits. Benefits are figured as 25% of salary. This means that the formula for benefits in Cell C2 is ".25*B2", and this is fine. When Cell B2 is changed, Cell C2 will be recalculated with the new value and will show a new figure. The problem is in Cell A2. The formula in A2 is "+B2+C2". Figure 3-19a shows this calculation done correctly when the number 10,000 is entered for salary. The total is 12,500.

	A	B	C	D
1	TOTAL	SALARY	BENEFITS	
2	(V) + B2 + C2	12500	2500	
3				
4				
5				

FIGURE 3-19a

The formula in Cell A2 refers to values that follow it in B2, and C2.

In Fig. 3-19b, the number 50,000 has been entered as salary. Benefits are 12,500, which is correct. But the total is shown as 52,500! Obviously, this is not the total of 50,000 and 12,500. What happened is that VisiCalc entered the new number 50,000 in Cell B2. VisiCalc then began at A1 and recalculated Column A. When it got to A2, it added B2 and C2. B2 was 50,000 but C2 *was still* 2500, as it had been before. C2 had not been recalculated yet. Finally, VisiCalc recalculated Columns B and C, and in C2 it put the number 12,500.

	A	B	C	D
1	TOTAL	SALARY	BENEFITS	
2	52500	50000	12500	
3				
4				
5				

FIGURE 3-19b

There is an error; A2 used the old value in C2 for its recalculation.

If a third number is entered as salary, VisiCalc will pick up the number 12,500 for C2. Unfortunately, by this time C2 will need to be a new number because salary will be a different number.

If you made entries elsewhere on the sheet and caused a recalculation, Column A would be recalculated with the correct numbers. But relying on this kind of chance event is not a good way to work. It would be much better to put the total column to the right of what it is adding.

In a formula, don't refer to cells that follow on the screen.

Recalculation with the "!" Sign

If you suspect you may have made this kind of error, and they are not always this easy to see, press the "!" key. This forces another recalculation. If you see any changes in an entry when you press "!", you'll know you made an error in placing that formula on the sheet.

Symbol for Order of Recalculation

It is possible to change the order of recalculation to make it go across the rows instead of down the columns. (This would not help in our example,

though.) This is covered in Chapter 4. For now, just note that this information is shown in the information area at the top of the screen. In the upper-right corner, the letter “C” means you have the normal recalculation order of columns; the letter “R” means VisiCalc is recalculating across the rows.

USING THE STORAGE DISKETTES

You will want to do several things with the storage diskettes: (1) initialize them so they can receive information, (2) store layouts on them, (3) recall the layouts, and (4) delete layouts from a diskette. Each action begins by typing the “/” key.

To Initialize

Initializing a diskette means erasing whatever is there if the disk has been used before and preparing the surface for storing new information. Because you will erase whatever is on the diskette, don’t initialize unless you are sure you won’t want whatever is on the diskette at a future time.

Initializing erases the diskette.

See Procedure 3–6 to find out how to initialize a storage diskette.

PROCEDURE 3–6 Initializing a Diskette

You should always have at least one initialized storage diskette ready to use when you begin working. It can be a diskette that you have stored other layouts on or a new one. In addition you should always have one extra initialized diskette. You can only initialize a diskette when you don’t have the VisiCalc program diskette loaded, and you don’t want to discover that there is no more space on your storage diskette and no blank initialized diskette after you’ve developed a layout.

To initialize a diskette, use the TRS DOS backup utility. Follow these steps.

1. Load TRSDOS as you do to load VisiCalc. When you see the message, “TRSDOS Ready”, type “BACKUP” and press ENTER.

2. You'll see the message "TRSDOS Model III Backup Utility Version XX. SOURCE Drive Number?" Type 0 and press ENTER. (See Fig. P3-6).

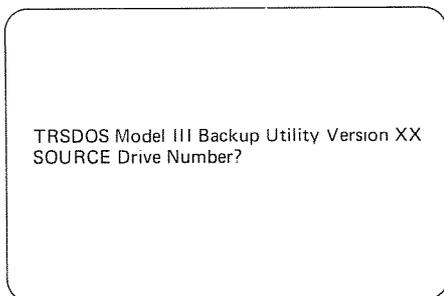


FIGURE P3-6

This is what you'll see when you load the backup utility on the TRS-80.

3. You'll see "DESTINATION Drive Number?" Type 0 for Drive 0 if you have one drive, 1 for Drive 1 if you have two drives.
4. You'll see "SOURCE Disk Master Password?" Type "PASSWORD" and press ENTER.
5. Now the computer will tell you which drive it will use as the source and which it will use as the destination. The VisiCalc program diskette belongs in the source drive. The diskette in the destination drive should be your blank diskette. This diskette will be initialized. Make sure you have the VisiCalc and the blank diskettes in the right drives. If you have only one drive, you'll be told when to place the source and destination diskettes in Drive 0.
6. If you are using an old disk, you'll see "Diskette contains DATA. Use Disk or not?" Type "Y" for Yes or "N" for No and press ENTER. "N" indicates you want to start again with a different disk.
7. If you type "Y", the computer will ask "Do you wish to reformat this diskette?" Type "Y" or "N" and press ENTER. The response "Y" will erase whatever is on the diskette.
8. Initializing takes about two minutes. Don't be concerned if you see a message about "flawed tracks." You'll see the final message "**Backup Complete" and again "TRSDOS Ready". You can then load VisiCalc just as you usually do.

To Store

Here again is the menu you'll see when you type "/":

```
COMMAND: BCDEFGIMPRSTVW-
```

To store a VisiCalc layout, pick "S" for "STORAGE". Here is the menu you'll see when you pick choice "S":

```
STORAGE: L S D Q #
```

If you pick choice "S" for "SAVE", you can record your layout on the diskette and then have it available at a future session. The "S" here means "SAVE"; in the first menu it meant "STORAGE". The same letter is used, but it has a different meaning when a different menu is on the prompt line. What you will actually type to save is "/", then "S" on the first menu, and then "S" again on the Storage menu.

The same letter has different meanings on different menus.

Figure 3-20 shows what you'll see on the prompt line when you type "S" for "SAVE".

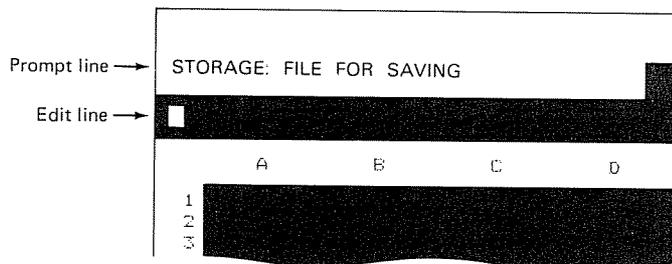


FIGURE 3-20

This is what you'll see when you choose "S" for "SAVE".

You have to pick a name for the layout or file you are saving. Pick a name that will help you remember later what this layout contains.

In choosing a name, refer to Procedure 3-7 to see what filenames will be acceptable to your computer.

PROCEDURE 3-7 **VisiCalc Filenames**

You can use a filename of up to eight characters, with no punctuation, spaces, or other special characters. Don't begin a filename with a

number. Capital and small characters are considered different characters, so a filename with capital letters is different from the same name with small letters.

VisiCalc will automatically place the suffix "/VC" on the end of each VisiCalc filename. You can cause it to place a different suffix if you like by typing your own after a slash when you name the file.

After any suffix you can also indicate a drive number with a colon and the number 0 or 1 for Drive 0 or Drive 1. Adding the drive number will cause VisiCalc to save or load to or from that drive. VisiCalc will automatically use Drive 0 if you don't indicate a drive. Once you have given a drive number, VisiCalc will use that drive until you change the drive number on another Load or Save command. Here are some possible names for files:

```
CASHFLO/VC:1
BALSHEET:0 (VisiCalc will add the /VC)
sales/84:1
Expenses/84 (VisiCalc will use Drive 0)
```

Once you've typed the name and pressed RETURN, the disk drive will go on and the layout will be saved.

For safety you can save a layout as you work on it. Each time you've completed a new segment of work, save it again. Use the same name each time. That way VisiCalc will save the more complete layout on top of the old one, erasing the old one. You can also save the same layout on two different diskettes so that if something happens to one, you'll have a backup copy.

Save your work as you go and make backup copies.

To Load from the Storage Diskette

```
STORAGE: L S D Q #
```

On the same Storage menu, the choice "L" for "LOAD" will let you load a layout you saved before.

Before you load a layout, you should usually perform one other step. When the layout is loaded, it will appear on the screen just as you stored it, but it will not erase anything that is on the screen in any other cell. For example, if you loaded a layout with something in Column A but nothing in Column B, and you had on the screen a new layout that used Column B, you would still see Column B on the screen. You would have two layouts on the

screen at once. This can sometimes be very useful for combining two layouts, but generally you don't want this. To avoid the problem, clear the screen first.

To Clear the Screen

The Main menu command "C" will clear the screen. If you type a "/" and then "C", you'll see the prompt: "CLEAR: Y TO CONFIRM". If you type "Y", the screen will clear. Pressing another key will not clear the screen.

Once the screen is clear, you can proceed to get the Storage menu and type "L" for "LOAD". The screen in Fig. 3-21 shows what you'll see. Type the name of the file you want.

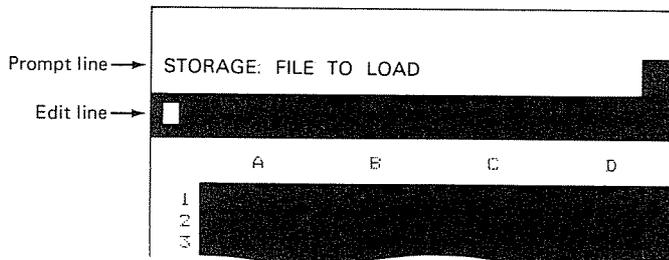


FIGURE 3-21

To load, respond to this prompt.

Suppose you don't remember what you called the layout when you saved it? You can see all the filenames on the diskette by typing the → (right cursor control) key in response to the prompt. Each time you press it, you'll see the name of a new layout. When you see the one you want, press RETURN and that file will load. If you don't pick any file, the prompt line will go blank and nothing will load.

To Delete a Layout from a Diskette

If you don't have any further use for a layout, you can delete it from the diskette to make room for other layouts. Pick choice "D" for "DELETE" from the menu.

First, you need to tell VisiCalc what file to delete. Use the → key again to locate the file to delete from those on the diskette.

Once you name the file, you'll see "TYPE Y TO CONFIRM." Typing "Y" in response will erase just that file from the diskette (see Fig. 3-22).

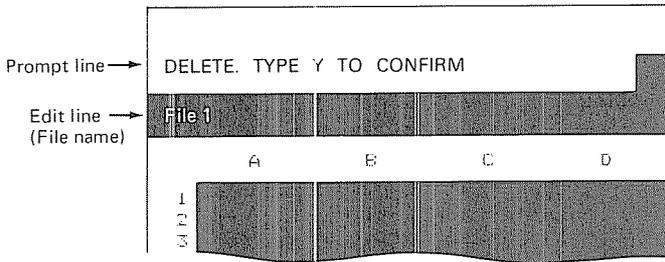


FIGURE 3-22

Once you give the filename to delete, you must type “Y”.

To Quit VisiCalc

Picking choice “Q” will terminate VisiCalc and allow you to run another diskette placed in the drive.

The “#” Choice

This choice allows you to save files in a format that will be discussed in detail in Chapter 6.

REVIEW

1. When you press the “/” command, this is what you see:

COMMAND: BCDEFGIMPRSTVW-

What do you press to save, load, or delete a layout from the diskette?

2. The Storage menu looks like this:

STORAGE: L S D Q #

What do the first four of these letters stand for?

3. When would you initialize?
4. Which cells should not be included in a formula in Cell A10 when the order of recalculation is the standard one of recalculation down columns?

Answers

1. “S” for “Storage”.
2. Load, Save, Delete, Quit.

3. Initialize to prepare a diskette to be a storage diskette. Initialize only if what is on the diskette can be erased.
4. Any cell *except* A1 to A9 should not be included because it will be recalculated *after* Cell A10.

SUMMARY

Chart 3-1 shows all the commands covered so far.

CHART 3-1 Summary

DIRECT ENTRIES

Labels, numbers, and formulas are entered directly on the screen. Use a "+" before coordinates like A1 in a formula; use " before a numeric symbol in a label.

> lets you go to any cell directly.

← → ↑ ↓ move you around the screen.

! recalculates the screen automatically.

FUNCTION COMMANDS

None covered in this chapter.

MENU COMMANDS

The main menu is: COMMAND: BCDEFGIMPRSTVW-

/B blanks out a cell.

/C clears the whole screen; press Y to confirm.

/E lets you edit an entry on some computers.

/F sets the format for a cell. The menu is: DGILR\$*

Choices: D, default; G, general; I, integer;

L, left; R, right; \$, dollars and cents; *, graph.

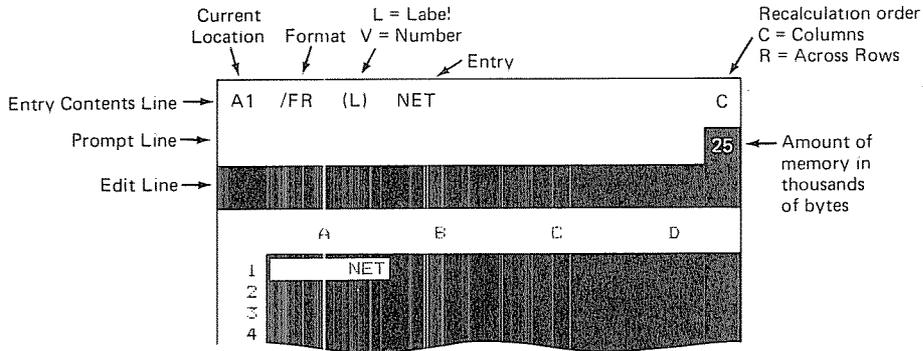
/S is the Storage command. The menu is: LSDQ#

Choices: L, load a file; S, save a file; D, delete a file; Q, quit VisiCalc.

Chart 3-2 shows all the information to be found in the information area thus far covered.

CHART 3-2

This chart shows every item in the information area.



PRACTICE EXERCISES

The following exercises review all the important concepts and commands covered in this chapter so you can put your knowledge to work on the computer and solidify these basics. As you use VisiCalc to do each exercise, refer to Chart 3-1 and/or the text to refresh your memory of each step you need to take.

EXERCISE 1 Load VisiCalc, prepare a storage diskette, use the movement commands, enter labels, numbers, formulas.

1. Get a blank diskette and initialize it.
2. Load the VisiCalc program diskette. Remove the diskette.
3. Make the entries to put Fig. 3-23 on the screen. Correct your entries as you make errors. Try to make the entries first, then read on for tips about how to do it.

Column A1 is all labels. The entry in Cell B1 is a label. The entries in Cells B2 and B3 are numbers. The entry in Cell B4 is a formula. The

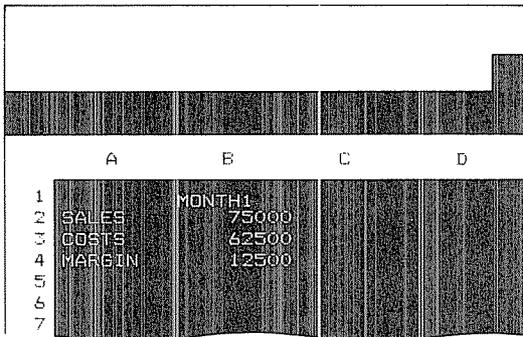


FIGURE 3-23

Set up this layout.

- margin equals sales less costs. The formula should read “+B2-B3”.
4. Working with the same layout, add Columns C to G so that the layout looks like Fig. 3-24. These columns show what happens if sales and costs each increase every month for six months. Each column is a month. Sales increase by 10% each month; in other words, sales in month 2 are 10% greater than in month 1, sales in month 3 are 10% greater than month 2, and so on. Costs increase by 8% per month. Enter all these formulas; then look below to see whether your formulas were correct. For Cell C2, the formula “+B2*1.10” was used. For Cell D2, the formula “+C2*1.10” was used, and so on across the columns.

	A	B	C	D	E	F	G
1		MONTH1					
2	SALES	75000	82500	90750	99825	109807.5	120788.3
3	COSTS	62500	67500	72900	78732	85030.56	91833.00
4	MARGIN	12500					
5							
6							
7							

FIGURE 3-24

Add these columns.

EXERCISE 2 Try formats.

1. Try the Dollar format on each number. You'll see that because of the size of some of the numbers, VisiCalc can't display the number in the cell and gives you the number as >>>>. The Integer format “I” is probably the best format for the numbers. Put that format in each number cell.
2. Try the Right format on the month 1 label. It lines up better. Your screen should look like Fig. 3-25.

	A	B	C	D	E	F	G
1		MONTH1					
2	SALES	75000	82500	90750	99825	109808	120788
3	COSTS	62500	67500	72900	78732	85031	91833
4	MARGIN	12500					
5							
6							
7							

FIGURE 3-25

You should have this layout after Exercise 2.

EXERCISE 3 Add more formulas.

Add the formulas for margin to Row 4, formatting with the Integer format. Add labels for each column as shown in Fig. 3-26.

	A	B	C	D	E	F	G
1		MONTH1	MONTH2	MONTH3	MONTH4	MONTH5	MONTH6
2	SALES	75000	82500	90750	99825	109808	120788
3	COSTS	62500	67500	72900	78732	85031	91833
4	MARGIN	12500	15000	17850	21093	24777	28955
5							
6							
7							

FIGURE 3-26

Add these formula cells and labels.

The formulas for the columns will follow this pattern: For C4, the formula will be "+C2-C3".

EXERCISE 4 Save and load.

1. Now, using your blank diskette, save the screen layout. Give it an appropriate filename, like "SAMPLE1".
2. Once you've saved the layout, load it back again. In case you made an error in saving, don't clear the screen before you load. That way you won't lose your work. Find the file with the → key. You'll see it load back in over the layout on the screen.

	A	B	C	D	E	F	G
1		MONTH1	MONTH2	MONTH3	MONTH4	MONTH5	MONTH6
2	SALES	80000	88000	96800	104480	117128	128841
3	COSTS	62500	67500	72900	78732	85031	91833
4	MARGIN	17500	20500	23900	27748	32097	37008
5							
6							
7							

FIGURE 3-27

The sheet with sales of \$80,000 in month 1.

EXERCISE 5 Change values, add a total column, figure percentages.

- Now change the entry in Cell B2, the first month's sales, to 80,000. Watch all the numbers recalculate. Your screen will look like Fig. 3-27.
- Now, as in Figure 3-28, add a column at the far right that is a total of the rows.
The formulas here look like this: "+ B2+C2+D2+E2+F2+G2".

	A	B	C	D	E	F	G	H
1		MONTH1	MONTH2	MONTH3	MONTH4	MONTH5	MONTH6	TOTAL
2	SALES	80000	88000	96800	106480	117128	128841	617249
3	COSTS	62500	67500	72900	78732	85031	91833	458496
4	MARGIN	17500	20500	23900	27748	32097	37008	158753
5								
6								
7								

FIGURE 3-28

Column H is new.

- Add a percent row so you see what percentage the margin is of the total sales for each month and for the six-month period. Your screen should look like Fig. 3-29.

	A	B	C	D	E	F	G	H
1		MONTH1	MONTH2	MONTH3	MONTH4	MONTH5	MONTH6	TOTAL
2	SALES	80000	88000	96800	106480	117128	128841	617249
3	COSTS	62500	67500	72900	78732	85031	91833	458496
4	MARGIN	17500	20500	23900	27748	32097	37008	158753
5	%	22	23	25	26	27	29	26
6								
7								
8								
9								

FIGURE 3-29

A percentage row is new.

To enter the "%" in Cell A5, use quotation marks. The formulas in Cells B5 to H5 will look like this one for Column B: "+ B4/B2*100" and will be formatted with the Integer format.

EXERCISE 6 Try the "*" format.

In Fig. 3-30 a small graph has been added with the "*" format to show the change in the percentage from month to month. Set up this graph. Divide the percentage by a number to display it as a graph.

	A	B	C	D	E	F	G	H	I
1		MONTH1	MONTH2	MONTH3	MONTH4	MONTH5	MONTH6	TOTAL	
2	SALES	80000	88000	96800	106480	117128	128841	617249	
3	COSTS	43500	47500	52900	58732	65031	71833	458496	
4	MARGIN	37500	40500	43900	47748	52097	57008	158753	
5	%	22	23	25	26	27	29	26	
6								GRAPH	
7								-MTH1	*****
8								-MTH2	*****
9								-MTH3	*****
10								-MTH4	*****
11								-MTH5	*****
12								-MTH6	*****
13									
14									
15									

FIGURE 3-30

This screen shows a layout with the "*" format.

To get a small enough number to display; for example, use the formula "+B5/4" for Cell I7.

Why is the graph in Column I instead of Column A? Because in Column A it will pick up the old values for the calculation each time the numbers change or when it's loaded back from the diskette. The graph has to follow the calculations on the sheet. As you can see, the graph is of limited value. **BE SURE TO SAVE THIS LAYOUT ON DISKETTE.** You'll want to recall it in the next practice session.

You've completed the basics of VisiCalc. Now to find out how to make the screen display more readable and useful, go on to Chapter 4.

4

Changing the Appearance of the Screen

- Spacing and Moving on the Screen
- Global Formatting
- Making the Screen Easier to Read
- Splitting the Screen
- Instant Calculation
- Printing the Sheet
- Printing What's behind the Sheet

Often you will want to make changes on the VisiCalc screen as you are working on it, adding an item you have left out, inserting some space to make things easier to read, or deleting something you decide isn't necessary. The beauty of VisiCalc is that you can see the results of these changes as they occur.

When you add a blank line to divide two classes of items, you see that blank line appear immediately on the sheet and can judge the effect of it. You can change your mind and remove the line too. You can change column widths and see immediately if you made them wide enough or if you made them too wide and change them again. You can also split the screen into two parts and watch the two parts of the screen at once. All this happens immediately.

When you complete this chapter you'll know a series of commands that change the appearance of the screen or allow you to print the sheet so you can see it on paper. You'll know how to insert and delete lines, move lines, change column width, and split the screen. You'll also know how to get VisiCalc to calculate immediately and show results on the screen.

SPACING AND MOVING ON THE SCREEN

Inserting

By skipping a line as you create a layout you can add blank areas to the screen to make it easier to read. However, suppose you don't discover that you want a blank row or column until you've already completed that section of the screen. What do you do then? You simply insert a row or column where you decide you need one.

To insert a blank line, move to the row or column on the screen where you want to insert the blank, type the "/" key, and get the Main menu:

COMMAND: BCDEFGIMPRSTVW-

Select I for "INSERT". The prompt line will read:

INSERT: R C

"R" stands for "ROW," and "C" for "COLUMN". Type one of these choices. (Remember that anytime you change your mind about executing a command, you can get out of the command completely.)

If you pick choice "R", VisiCalc will insert a row at the point where the cursor is located. Everything below that will move down one row. If you insert a column, everything after that column will move one to the right. Figure 4-1 shows how this works.

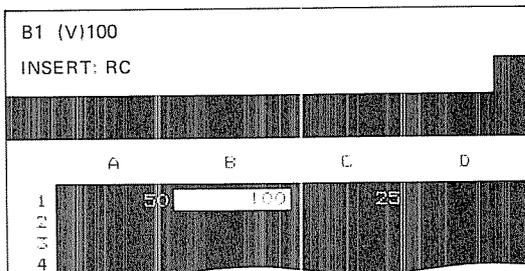


FIGURE 4-1a

Pick choice "C" to insert a column.

After you've inserted the row or column, you needn't be concerned about formulas on the sheet that refer to the entries that have been moved. VisiCalc automatically changes the references to those items and gives their new coordinates. For example, you might insert a blank column at Column B that causes the B entries to move over one column and become Column C entries. A formula "+B2+B3" elsewhere on the sheet automatically becomes "+C2+C3" to accommodate the change.

	A	B	C	D
1	50		100	25
2				
3				
4				

FIGURE 4-1b

A column has been inserted at Column B. The columns have shifted over by one.

You can insert as many rows or columns as you like, and you can then make as many entries as you like in those locations. So, if you leave out a whole row of numbers, you can use the Insert command to add a blank row where it belongs and then make the necessary entries in that row.

The only real limitation on inserting is that you have to insert a whole row or column, not just a few cells where they are needed.

Deleting

If you decide you don't like the appearance of the sheet once you've inserted a row, you can remove it. You can also delete a row or column that has entries in it. If you want to remove just some of the items in a row or column, use the Blank command on just those items. (Remember, "/" and "B" blanks a cell.) If you determine that a whole row or column is unnecessary, you can use the Delete command to eliminate the whole row or column.

To delete, type the "/" command and pick "D" for "DELETE" from the Main menu. The prompt line will show:

```
DELETE: R C
```

Type "R" to delete a row; "C" to delete a column. Figure 4-2 shows how this works.

	A	B	C	D
1	50	75	100	25
2	200	90	125	60
3				
4				
5				

FIGURE 4-2a

Picking choice "R" will delete the top row, as that is where the cursor was positioned when the command is executed.

	B1 (V)90			
	A	B	C	D
1	200	70	125	60
2				
3				
4				

FIGURE 4-2b

Row 1 has been removed. The rows below have moved up one.

As with inserting, formulas will adjust to the new position of items that remain on the sheet. But VisiCalc cannot adjust for items that do not remain on the sheet. Figure 4-3 is a layout that calculates total payments to salespeople. The entries in Row 5 are formulas to add the three items above them.

	A	B	C	D
1		ROBERTS	SMITH	
2	EXPENSES	2000	1500	
3	SALARY	12000	12000	
4	COMMISS.	30000	23400	
5	TOTAL	44000	36900	
6				
7				
8				

FIGURE 4-3

The layout shows totals of three cells in Row 5.

Now suppose you determine that expenses should not be totaled here because they are not direct compensation. You can delete Row 2, expenses, but when you do you will get the screen you see in Fig. 4-4. The totals show up as "ERROR". The formula in Row B, for example, was "+B2+B3+B4", and VisiCalc automatically changed the B3 and B4 to B2 and B3, respectively, as these items moved up the screen. But the original Cell B2, expenses, no longer exists and so VisiCalc cannot simply assign new coordinates to it. Instead, VisiCalc places the word "ERROR" on the screen to tell you it can't make the calculation called for. If you move to the "ERROR" cell and look at the entry contents line, you'll see the formula now reads "@ERROR+B2+B3". The "@ERROR" indicates a calculation that can't be made.

	A	B	C	D
1		ROBERTS	SMITH	
2	SALARY	12000	12000	
3	COMMISS.	30000	23400	
4	TOTAL	ERROR	ERROR	
5				
6				
7				

FIGURE 4-4

Because a row was deleted, the formulas in Row 3 can't work.

Repeating Label

Sometimes, instead of or in addition to a blank row, it's useful to place a line on the VisiCalc layout to divide two sections of the sheet. Figure 4-5 shows such a dashed line.

	A	B	C	D
1		ROBERTS	SMITH	
2	-			
3	EXPENSES	2000	1500	
4	SALARY	12000	12000	
5	COMMISS.	30000	23400	
6	TOTAL	44000	36900	
7				
8				
9				

FIGURE 4-5

Row 2 contains a dashed line created with the “-” option.

To create the line in Fig. 4-5, move to the first cell where you want the line, type “/”, and pick choice “-” from the Main menu. The symbol “-” is used to remind you of the command because “-” is often repeated across the column. The computer will respond “LABEL: REPEATING” on the prompt line. You type whatever it is that you want to repeat. It could be one

or more characters or symbols. When you press RETURN, the cell will fill with that character or characters. Chapter 5 discusses how to repeat one cell across the page. For now, just repeat the “-” command in every cell where you want the line to appear.

Moving a Row or Column

Inserting a blank row or column and typing entries is one way to change the sheet. In some cases, however, you already have material on the screen when you decide it would be better in a different spot. To reposition an entire row or column, use the Move command.

First place the cursor somewhere in the column or row you want to reposition. Then type “/” and select choice “M” for “MOVE” from the menu. When you do, you’ll see on the prompt line (see Fig. 4-6):

MOVE: FROM... TO

	A	B	C	D
1		ROBERTS	SMITH	
2				
3	EXPENSES	2000	1500	
4	SALARY	12000	12000	
5	COMMISS.	30000	23400	
6	TOTAL	44000	36700	
7				
8				
9				

FIGURE 4-6

You need to complete the command with A6 so it reads “A3 . . . A6”.

Notice that the edit line already contains the coordinate A3, which is where the cursor is now positioned; this is the row or column that will be moved. VisiCalc doesn’t yet know whether it will move Column A or Row 3.

The Move command prompt line contains three dots “. . .”, a symbol you’ll encounter in several VisiCalc commands. The “. . .” (ellipsis) indicates a range. In this case, VisiCalc expects you to give the range of movement using the ellipsis. The left side of the ellipsis will be the starting point and the right side the ending point.

When you type the ellipsis, you need type only the first period, and VisiCalc will automatically put all three on the line.

Since the left side of the entry, the current position, is already on the edit line, just type the ellipsis and the coordinate where you want to move. In Fig. 4-6 we want to move expenses down below commissions and above total. To do so, type "A6" and press RETURN. The completed command looks like this:

A3 . . . A6

The result is shown in Fig. 4-7. Notice that "EXPENSES" moved to the spot between "COMMISSION" and "TOTAL" and Row 3 closed up. This is how you move a row; give the coordinate just *below* where you want your row to appear.

	A	B	C	D
1				
2		ROBERTS	SMITH	
3	SALARY	12000	12000	
4	COMMISS.	30000	23400	
5	EXPENSES	2000	1500	
6	TOTAL	44000	36900	
7				
8				
9				
10				

FIGURE 4-7

Compare this layout to Fig. 4-6. Row 3 was moved to the spot indicated, between total and commission. To indicate a move, give the row just below the location you want.

To move a row, give the row below the spot where you want it.

To move a column, give the coordinate of the column just to the right of where you want your column to appear.

To move a column, give the column to the right of where you want it.

You won't get confused about how to indicate a move if you look straight along the row or column you are in and pick up the coordinate that's just beyond the place where you want to move.

GLOBAL FORMATTING

In setting up layouts in the practice exercises, you've had to format each cell on the sheet as you make an entry or return afterward to the cells and change the format. This is time consuming, and you might omit a cell or two and notice only later, probably after it is printed out on paper, that it is in the wrong format. A better way of handling formatting of the sheet is to determine in what format most of the entries will be and set the whole sheet to that format. This can be accomplished with the Global command. "Global" refers to something that is true for the sheet as a whole.

The Global command is executed by typing "/" and picking "G" from the Main menu. When you do this, you'll see another menu. The Global command, like the Storage command, is layered so that each choice you pick will have other menus below it. The first menu is:

```
GLOBAL: C O R F
```

For the moment, ignore the first three choices and select choice "F" for "FORMAT". When you press "F", you'll see a familiar menu:

```
FORMAT: D G I L R $ *
```

This is the menu you saw on the Format command. However, this time these format choices refer to the sheet as a whole, not just to one cell. Let's briefly review the choices:

- Starting from the right, choice "*" formats all numbers as a simple graph of stars.
- Choice "\$" rounds off all numbers to two decimal places and displays two decimal places on each one.
- Choice "R" moves all numbers and labels to the right side of the cell.
- Choice "L" moves all labels to the left side of the cell and all numbers to the left side with one blank space before the number.
- Choice "I" rounds all numbers to integers.
- Choice "G" removes whatever Global format has been picked and returns all cells to the General format of labels on the left of the cell and numbers on the right with the largest number of significant digits possible.
- Choice "D" actually has no global effect. To get a cell to return to the Global format after you have formatted it individually, use the Format command discussed in Chapter 3. Type "/" and "F" and pick choice "D" for "DEFAULT".

You can set a Global format at any time, before you work on the sheet or later, and you can reset the Global format at any time. Before or after using a

Global format, you can use the Format command on individual cells. They will not be affected by the Global command. Set the Global format to whatever the largest number of cells will be and then individually format other cells. Figure 4-8 shows the effect of a Global format of "\$" and an "R" format for some labels.

Set the Global format of the sheet to the format needed for the majority of cells.

C1 /FR (LIAMOUNT)

	A	B	C	D	E	F	G
1	DATE	FAVEE	AMOUNT	RENT	UTIL.	SUPPLIES	XEROX
2							
3	JAN. 1	CASAB. R. E	450.00	450.00			
4	JAN. 5	B. SMITH	25.28			25.28	
5	JAN. 6	COPYCENT.	36.77				
6	JAN. 7	PHONE	100.00		100.00		36.77
7							
8	TOTAL		612.05	450.00	100.00	25.28	36.77
9							
10							
11							

FIGURE 4-8

The Global format is "\$", but some labels have an individual "R" format.

REVIEW

Look at Fig. 4-9 to answer these questions.

	A	B	C	D
1	SIX-MONTH BUDGET			
2	*****			
3				
4	MONTH	PLANNED	ACTUAL	%DIFF.
5				
6	JAN	5500.00	5476.55	3.11
7	FEB	5775.00	5777.55	8.33
8	MAR	6065.75	6068.99	7.97
9	APR	6366.94	7024.55	9.36
10	MAY	6665.28	6722.34	0.85
11	JUNE	7019.55	7399.88	5.14
12	TOTALS	37410.52	39711.86	5.80
13				
14				
15				

FIGURE 4-9

Look at this figure to answer the review questions.

1. To insert a blank line between “June” and “Totals” to make the sheet more readable, in what cell would you start? What command would you use?
2. How was the line in Row 2 done?
3. How would you move the actual expenses into the column before the planned expenses? What cell would you move to before pressing “/” and “M”? How would you respond to the prompt “FROM . . . TO”? What will happen to the top line on the screen?
4. What is the Global format of this sheet? Which cells have an individual format?
5. What would be the effect of typing the Global command, picking choice “F”, and picking the format choice “I”?

Answers

1. You’d move anywhere in Row 12 and type “/” and “I”. Then you’d pick choice “R” for row.
2. The command “/” and “-” were used, and VisiCalc was told to repeat the characters “-*”. This sequence was repeated in each cell across the row.

3. You'd place yourself anywhere in Column C, perhaps on coordinate C4. You'd respond "C4 . . . B4". The top line of text would be moved when the column is moved. It would read "BUDGET SIX-MONTH" because you can't move just a part of a column; you have to move the whole thing.
4. The Global format is "\$" because most cells are dollars and cents. The labels "ACTUAL", "PLANNED", AND "%DIFF." are formatted to be on the right side of the cell.
5. All dollar entries would be rounded off to whole numbers, as would the percentages. This would probably be a much better way to look at the information, as pennies are not important for budget analysis.

MAKING THE SCREEN EASIER TO READ

Changing Column Width

The limited width of the columns (nine characters maximum) has made it necessary to abbreviate a number of labels in the examples used so far. Generally, this is not a real difficulty because a label's meaning is clear even if abbreviated. At times, however, you need more clarity in your labels and need to be able to use a longer one. Look back at the first entry in Fig. 4-8, for example. There the labels should read "CASABLANCA REAL ESTATE" and "BERNARD SMITH", but the labels didn't fit. The solution is to change the column width.

The only difficulty with changing width is that you have to change the width of *all* the columns on the sheet at once. You can't have one wider column on the sheet. If you make the columns wider, you'll be able to see fewer of them in the window at a time, and they'll take up more space when you print them out. These two disadvantages must be weighed against the need for more precision in labels or numbers.

Changing column width changes all columns on the sheet.

Increasing the width is easy. It's part of the Global command menu. You type "/" and "G" and get this menu:

```
GLOBAL: C O R F
```

Choice "C" stands for "COLUMN WIDTH". When you choose "C", the prompt line reads "COLUMN WIDTH", and you type the width desired, up to 40 characters, the width of the screen.

Figure 4-10 shows what happens to the checkbook layout when you change the column width to 15. Longer entries were made in Column B, but now you cannot see the other columns on the screen.

	A	B
1	DATE	PAYEE
2		
3	JAN. 1	CASABLANCA R.I.E.
4	JAN. 5	BERNARD SMITH
5	JAN. 6	COPYCENTER
6	JAN. 7	PHONE
7		
8	TOTAL	
9		
10		
11		

FIGURE 4-10

The columns are 15 characters wide, so only two columns show on the screen.

Keeping Titles in Position

Up to this point you have worked largely with small layouts where most of the layout remains on the screen and in view. This is certainly not always the case, and at times, as rows or columns disappear from view, important information needed to make other entries disappears as well. In Figs. 4-8 or 4-10, as more and more checks are written and recorded, the window will move down the sheet and the top line that labels each column will disappear too. This makes it difficult to place each new check in the appropriate category column on the sheet. The answer to this problem is to “fix” the important titles so they won’t disappear from view.

Figure 4-11 shows the result of fixing the top two rows of the check register. Look at the numbers on the left. You’ll see that Rows 1 and 2 have remained in position at the top while Rows 3 to 12 have disappeared as new rows have appeared at the bottom. What has happened is that the window has moved down the page as usual so that Row 30 is now visible, but Rows 1 and 2 have been superimposed on the screen at the top.

When you try this, you’ll see that you can move up the screen and bring the top rows into view again just as you always do. They’ll “slide” out from under the fixed title.

To fix the titles, type the “/”, then pick “T” for “TITLE”, and the prompt line will show this menu:

```
TITLES: H V B N
```

You can fix any horizontal title, vertical title, both, or choose “N” for “NONE” to remove a fix. Just position the cursor on the row that will be the

A19		
	A	B
1	DATE	PAYEE
2		
13	JAN. 28	JONES OF SUPPLY
14	JAN. 29	GENERAL LEASING
15	JAN. 29	OLSON PAINTERS
16	JAN. 30	EASTERN AIRLINE
17		
18	TOTAL	
19		
20		
21	FEB. 3	CASABLANCA R.E.
22	FEB. 8	PHONE
23	FEB. 12	JENNIFER BROWN
24	FEB. 13	COPYCENTER
25	FEB. 13	POST OFFICE
26	FEB. 15	CENTRAL NAT'L
27	FEB. 18	COPYCENTER
28	FEB. 23	GENERAL LEASING
29	FEB. 28	BERNARD SMITH
30		

FIGURE 4-11

The titles in Rows 1 and 2 have been fixed so they don't move off the screen as we move down.

bottom of the fixed area (Row 2 in Fig. 4-11) and then use the Title command. Or position on the column that will be at the right of the fixed area or on the row and column that will both be fixed. You might, for example, decide to fix both Column A and Rows 1 and 2. To do so, position on Cell A2 and execute the Title command, picking Choice "B".

To fix a title on the screen position, position on the row or column that should remain on the screen.

SPLITTING THE SCREEN

Sometimes fixing titles is not enough to let you view what you want to see on the screen. Perhaps you want to be able to view different columns side by side. You can accomplish this with the Window command.

Figure 4-12a shows plant production at three different plants. You might want to line up each plant next to the average for the month or see how one plant's drop in production has affected the total for the month. What you want is the flexibility to view two different parts of the screen at a time, even if they are not adjacent.

	A	B	C	D	E	F
1		TOTAL	AVERAGE	PLANT 1	PLANT 2	PLANT 3
2						
3	JAN	64000	21333	19000	23000	22000
4	FEB	62999	21000	21000	19899	22100
5	MAR	65179	21726	20999	22090	22090
6	APR	59986	19995	17000	21987	20999
7	MAY	60741	20247	19050	19811	21880
8	JUNE	64495	21498	22987	21008	20500
9						
10						
11						

FIGURE 4-12a

This screen shows all the columns of the layout.

The Window command allows you to split the screen into two different windows at a time. Each window looks at exactly the same sheet, but the windows can be in different places on the sheet. Figure 4-12b shows what the screen looks like when the screen is split at Column C.

	A	B		C	D
1		TOTAL	1	AVERAGE	PLANT 1
2			2		
3	JAN	64000	3	21333	19000
4	FEB	62999	4	21000	21000
5	MAR	65179	5	21726	20999
6	APR	59986	6	19995	17000
7	MAY	60741	7	20247	19050
8	JUNE	64495	8	21498	22987
9			9		
10			10		
11			11		

FIGURE 4-12b

This figure shows the screen with a window at Column C. Notice that the row numbers appear again at the edge of Window 2.

Then in Fig. 4-13 you have moved to the second window and brought Plant 3 in Column F to the edge of the second window. Columns C and D have disappeared. Thus, you have lined up Columns B and F next to each other.

	A	B		E	G
1		TOTAL	1	PLANT 3	
2			2		
3	JAN	64000	3	22000	
4	FEB	62999	4	22100	
5	MAR	65179	5	22090	
6	APR	59986	6	20999	
7	MAY	60741	7	21880	
8	JUNE	64495	8	20500	
9			9		
10			10		
11			11		

FIGURE 4-13

You've scrolled over in Window 2 to bring Column F into view.

The Window command has even more possibilities. You can bring the average column into view in Window 1 and line it up with any of the plants in Window 2, for example.

Remember, each window looks at the same sheet. So don't think you have two different sheets to work with and that you can try different figures at the same time. If you make a change in one window, you will be making the change in that cell no matter which window it appears in.

To use the Window command, select choice "W" from the main menu. You'll see this menu:

```
WINDOW: H V 1 S U
```

- Choice "H" will place a second window horizontally at the cell you are in.
- Choice "V" will place the window vertically at that point.
- Choice "1" will remove the window and return you to one window on the screen. You'll need to use this choice to remove a vertical window before changing to a horizontal one.

The other two choices refer to how the windows scroll or move. If you pick choice "S", the two windows will move in a "synchronized" way, that is, if you move to the right in a horizontal window, the other window will also move to the right. If you move down in a vertical window, the other vertical window will move down as well. You'll also see the same row numbers in both windows. Figure 4-14 shows synchronized scrolling. As you move down in Window 1, Window 2 moves as well.

Window 1		Window 2	
A	B	F	G
8	JUNE	64495	20500
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			

FIGURE 4-14

Using synchronized scrolling, moving in Window 1 caused Window 2 to move as well.

Choice “U” will turn off the synchronized command and make the windows move in an unsynchronized fashion once again.

To move from one window to another, use the “;” key. Pressing it moves you to the other window and places you in the cell you were last in. Pressing it again moves you back to the first window.

The “;” key moves you from one window to the other.

One important point: You can set Global formats separately for each window. Therefore, each window can display the same material in a different format or with a different column width. Just move into the window before you set the Global commands for that window. When you select choice “1” and return to one window, you’ll get the Global formats for the window in which you are located when you execute the command.

REVIEW

1. How do you set column width to show 1 billion?
2. How would you hold the material in Rows 1 and 2 on the screen at all times?

	A	B	C	D
1	PLANT 1 IS IN AKRON, PLANT 2 IS IN			
2	FORT WORTH, PLANT 3 IS IN MANCHESTER,			
3	NEW HAMPSHIRE.			
4				
5	EACH PLANT HAS IDENTICAL MACHINERY.			
6	-----			
7		TOTAL	AVERAGE	PLANT 1
8				
9	JAN	64000	21333	19000
10	FEB	62999	21000	21000
11	MAR	65179	21726	20999
12	APR	59986	19995	17000
13	MAY	60741	20247	19050
14	JUNE	64495	21498	22987
15				
16				
17				

FIGURE 4-15

Look at this layout to answer the review questions.

- How do you split the screen in Fig. 4-15?
- How do you get so much text included across the top of the screen in Fig. 4-15?

Answers

- Type the Global command ("I", "G"), pick choice "C", and set the column width at 11 or more. (There will always be one blank before the numbers.)
- Move to Row 2 and pick choice "T" from the main menu. Then choose "H" for "HORIZONTAL" from the choices given and the two rows will be fixed on the screen.
- Use the Window command on Row 7 and pick a horizontal window.
- In the top window, set the column width at 40 and type the material. Leave the bottom window at a width of 9.

INSTANT CALCULATION

Calculation with "!"

On occasion, you may need to enter a number that must be calculated first. Certainly you could enter the relevant figures at several locations on the VisiCalc sheet and have VisiCalc perform the calculation, but you may not want a permanent record of the numbers on the sheet.

The solution is to use the “!” key. This key, when pressed as you enter a formula, instantly calculates the value of what you’ve entered so far. If, for example, you enter the formula “200/5*2+6” and press the “!” key, the edit line will no longer show the formula but instead will show “86”. You can then continue the formula from that point or press RETURN to enter the result in the cell.

You can also use “!” with references to coordinates. You could have “+B6/5*2+6” on the edit line and press the “!” key. VisiCalc would take the current value of Cell B6 and use it in the calculation. However, since VisiCalc will replace your formula with the calculated value, it won’t “remember” later that B6 was used on this line, and it won’t recalculate the value when B6 changes.

In Fig. 4-16, consider the case in which commission is calculated as 25% of sales. It would be feasible to put the sales figure somewhere on the sheet, but this would be an extra step because the number is used only for the commission calculation. It makes more sense to follow the procedure shown in Fig. 4-16 and enter the sales figure, multiply by .25 on the edit line, and press “!” to see the result appear on the edit line. Pressing RETURN puts the value in Cell B4. Notice that the entry contents line shows the value “30000” not the formula “120000*.25”.

B4
VALUE
120000*.25

	A	B	C	D
1		ROBERTS	SMITH	
2	EXPENSES	2000	1500	
3	SALARY	12000	12000	
4	COMMIS.		23400	
5	TOTAL		34900	
6				
7				
8				
9				

FIGURE 4-16a

Type in the calculation and press the “!” key.

B4 (V) 30000

	A	B	C	D
1		ROBERTS	SMITH	
2	EXPENSES	2000	1500	
3	SALARY	12000	12000	
4	COMMIS.	30000	23400	
5	TOTAL	44000	34900	
6				
7				
8				
9				

FIGURE 4-16b

The result appears on the line and on the entry contents line.

Calculations with “#”

A similar situation may arise when you know that a value already on the sheet is needed in another calculation. Perhaps it is to be part of a formula, but you don't want the number you're picking up to change when a new figure is entered. Perhaps you have designed a layout to do an estimate, have entered low figures, and want to save the total somewhere while you recalculate with higher figures. You want simply to copy the low total and keep it on the sheet.

To copy the value of an entry, type the coordinates of the cell you want to copy and press the “#” key. On the edit line, the coordinates will be replaced by the cell's present value. Then, you can continue typing a formula from that point if you wish.

Figure 4-17 shows one instance where you might want to use the “#”. Suppose you want to be sure that you record the same dollar amount for each check in the amount column and under its proper expense category. As shown in Fig. 4-17, enter the dollar figure in the amount column, move to the proper cell under the category heading, type the coordinates of the amount column, and press “#”. VisiCalc will pack up the dollar amount and place it on the edit line and in the cell when you press RETURN.

	B	C	D	E
1	PAYEE	AMOUNT	RENT	UTIL.
2				
3	APEX	450.00	450.00	
4	SMITH'S	25.28		
5	COPYCENT.	36.77		
6	PHONE	100.00		
7				
8		612.05	450.00	0.00
9				
10				
11				

FIGURE 4-17

Next press the “#” key to see the current value of C6 appear in the cell.

PRINTING THE SHEET

You will operate on the screen as long as you are making changes to the layout and trying out new figures. When you have something final, however, you'll want to print the whole sheet on paper to see more of the sheet and so there is a permanent record of the results.

A printer eliminates the VisiCalc window. If you had a printer wide enough, you could print 63 columns across and 254 rows down—the whole VisiCalc sheet at once. With a typical 80- or 100-character printer, you can print 8 or 11 VisiCalc columns by 254 rows. If your layout is wider than this, you can simply print the sheet in two or more parts and piece the whole sheet together after the parts have printed.

Because something can, according to Murphy's Law, go wrong with the computer and/or diskette (and eventually will), the only safe way to keep a copy of a layout is to print out a copy. You can redo the VisiCalc layout from the printed copy if necessary.

Printing a Rectangle

When you make a printed copy (also called a "hard copy") of a VisiCalc layout, the printer "mirrors" what is on the sheet. It prints all the material on the screen except the row and column indicators. And, since VisiCalc ignores the window, it doesn't print a split screen. If you have a window at Column C and have moved Column F to that spot, VisiCalc will ignore this and will print Columns A to F in order. If you've fixed a title in Row 1 across the top and scrolled up under it to, say, Row 15, VisiCalc will print from Row 1 to Row 15 in order, ignoring what you've done.

VisiCalc does not, however, have to print the whole sheet. It actually prints a rectangle every time; you tell it how large the rectangle should be. You tell VisiCalc the upper-left and lower-right corners of the rectangle. Figure 4-18 shows the VisiCalc sheet and a rectangle from C1 to F10. VisiCalc will print all the shaded area if you give it these coordinates as corners.

Different Printers

There are a wide variety of possible computer-printer combinations because VisiCalc will work with any printer you can attach to your computer. The various computer-printer combinations are set up differently, and it is assumed here that you have a setup that works. (Read your computer and printer manuals for assistance.) Instructions for accessing special printer features and for eliminating or adding lines on the page are given as they are needed for VisiCalc.

Print Command

As printing is not an entry but an operation performed on the sheet, it should come as no surprise that it is a Menu command. To print, move to the

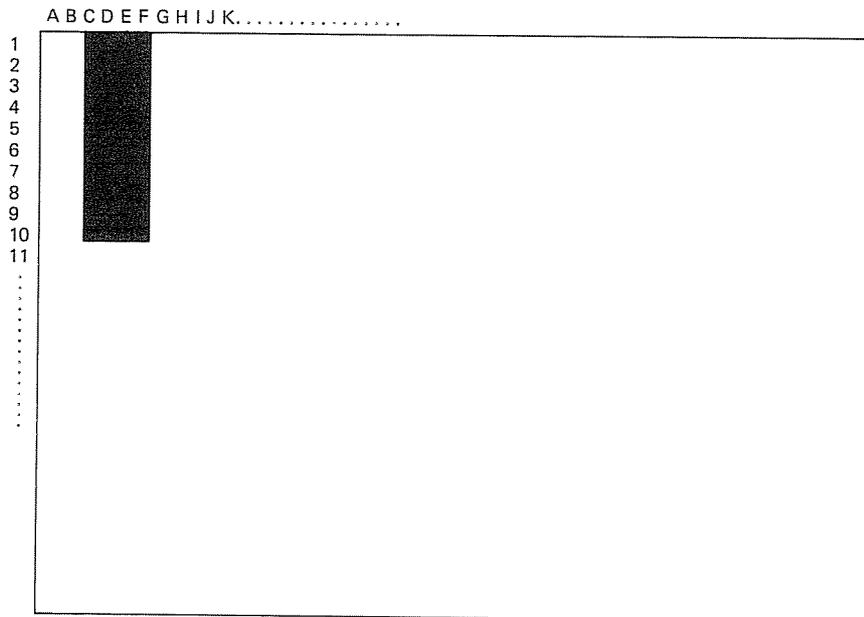


FIGURE 4-18

The corners of the rectangle are C1 and F10.

upper-left corner of the rectangle you want to print, press “/”, and choose choice “P” for “PRINT” from the menu.

The prompt line will show a menu like this:

```
PRINT: FILE, PRINTER, RS-232
```

“PRINTER” sends the sheet to your printer. (See Procedure 4-1 for exceptions.) For now, assume you’ll always type “P” for “PRINTER”. The next menu will look like this:

```
PRINT: LOWER RIGHT, "SETUP, -, &
```

Each choice sends the printer different information about what you are printing. You may not use most of the choices, but you’ll always enter the coordinates of the lower-right cell of the rectangle. You can do this in one of two ways. You can simply type coordinates like “E8”, or you can move the cursor to the lower-right cell and press RETURN. VisiCalc will know the cell is the lower-right one and will proceed to print that rectangle. Figure 4-19 shows how this works.

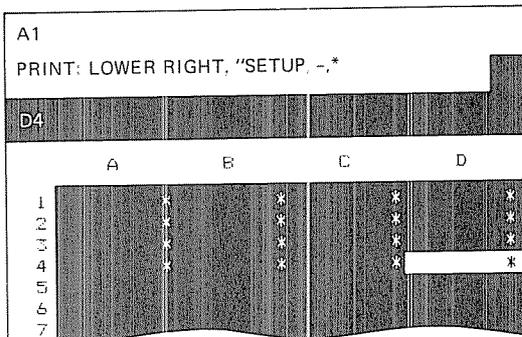


FIGURE 4-19

The Print command was started in A1, which becomes the upper-left corner. To show the lower-right corner, you have the option of just moving to the cell and pressing RETURN. Here you have moved to D4. This appears on the edit line as if you had typed it. (The “*’s” here show just the rectangle to be printed.)

If Your Layout Is Too Wide

If your layout is too wide for your computer to print, you will have to print it in sections. For example, if you have an 80-character printer, you’ll find that you can print only eight columns across the page. So you can print Columns A to H and print from Cell A1 all the way to the bottom of your layout in Column H. If your layout is wider than this, you would then print a second rectangle, starting with Cell I1 in the upper-left and going as far as Column P. You could print a third section, and so on, if necessary. Then you can tape the sections together if you want to see the whole layout.

The Other Print Options

Most of the time you won’t have to be concerned with the second menu options. You will get the printout you want without using them. If you are not getting the printout you want, then you may need the options to add or delete blank lines or to change spacing or typefaces.

The “SETUP” choice on the menu allows you to send special setup strings that may be needed by your printer. Procedure 4-1 shows some uses of “SETUP”. To use it, type just the quotation mark and then the characters you want in your setup string. Procedure 4-1 also covers the other options on the menu. The best reference for using these options is a combination of your printer manual and the VisiCalc manual for your computer.

PROCEDURE 4-1 Special Print Commands

To Eliminate an Extra Blank Line

If the printer is double spacing, then VisiCalc is sending a "line feed" to the printer. To turn it off, just press the "-" key when you see the second menu. You need only press it once until you load VisiCalc again.

To Add a Line Feed

The "&" option restores the line feed eliminated with the "-".

The "FILE" and "RS-232" Options

On the first Print menu you will see the choices "FILE, PRINTER, RS-232". With Radio Shack line printers you will pick option "P" for "PRINTER." For a serial printer with RS-232 interface, type "R" for "RS-232".

The "FILE" option let's you save data to a diskette file in standard ASCII form. Type the filename when prompted. VisiCalc will append the suffix "/PRF".

OTHER SPECIAL COMMANDS

You can use the setup string to send other special commands to your printer to change margins, type size, spacing, and so on. Follow this list to send the special characters you may need:

^C sends a control character. The next character in the string becomes a control character. ^^CP" is Control-P.

^E sends an escape character. The next character is an escape character.

^Hnn sends the single ASCII character defined by the hexadecimal nn.

^R is a RETURN in the setup string.

^L is a line feed in the string.

^^ is the ^ character.

Note: The ^ key is typed by pressing SHIFT and typing "@".

For example, to send Control-R to the printer, type " for the setup string followed by the characters: ^CR

THE EPSON PRINTER

Here are some setup strings for the popular Epson printer:

- “^CO132” to get compressed print and 132 characters across.
- “^CR” to turn off compressed print.
- “^CI80N” for 80 characters across.
- “^EG” for double strike.
- “^EH” to turn off double strike.
- “^EE” to turn on emphasized mode.
- “^EF” to turn off emphasized mode.

PRINTING WHAT’S BEHIND THE SHEET

Looking at the VisiCalc layout once it’s been printed may not give you all the information you need. You won’t be able to see the formulas used to arrive at the different results on the sheet. To keep a complete record of what you did and to have all the information on the sheet available, you need a method of printing the entries on the sheet that includes the formulas. To do this, you use not the Print command, but the Storage command. You send the contents of the sheet, all the information needed to construct it, to the printer instead of a diskette.

The Storage command let’s you print what’s behind the sheet.

To save the sheet to the printer, type the “/” and pick “S” for “STORAGE” from the Main menu. Next, pick choice “S” for “SAVE”. Then instead of giving VisiCalc a filename when it prompts you with “FILE NAME FOR SAVING”, give it a name that tells it to go to the printer. Procedure 4–2 tells you what name to use.

PROCEDURE 4–2 Printing What’s behind VisiCalc

Type “/” and “S” to get the Storage menu. Then type “S” for “SAVE.”
Instead of a filename, type “:P”.

Once you’ve printed what’s behind the sheet, Fig. 4–20 gives an example of what you’ll see.

The first item on each line is the cell number. You’ll see the cell numbers only where you have entered something. This starts at the bottom

```

>C12:@SUM(C6...C11
>B12:@SUM(B6...B11
>A12:"TOTALS
>D11:+C11-B11/C11*100
>C11:7399.88
>B11:7019.55
>A11:"JUNE
>D10:+C10-B10/C10*100
>C10:6722.34
>B10:6685.28
>A10:"MAY
>D9:+C9-B9/C9*100
>C9:7024.55
>B9:6366.94
>A9:"APR
>D8:+C8-B8/C8*100
>C8:6588.99
>B8:6063.75
>A8:"MAR
>D7:+C7-B7/C7*100
>C7:6299.55
>B7:5775
>A7:"FEB
>D6:+C6-B6/C6*100
>C6:5676.55
>B6:5500
>A6:"JAN
>D4:"%DIFF
>C4:"ACTUAL
>B4:"PLANNED
>A4:"MONTH
>D2:/--*
>C2:/--*
>B2:/--*
>A2:/--*
>C1:" BUDGET
>B1:"SIX-MONTH
/W1
/GOC
/GRA
/GF$
/GC9
/X>A1:>A1:

```

FIGURE 4-20

A listing obtained with the Storage and Save commands and sent to the printer instead of a disk.

of the sheet and continues up, row by row. Following the cell is its contents. If there's a format, that comes first, just as it does in the entry contents line. At the end of the list is a status report showing the window status, "W1" for one window, the calculation order to be used, whether recalculation is automatic or not (these two items are discussed later), any Global format you've set, and the column width.

To Reconstruct a Layout

If you have the printout of a layout, you can reconstruct the layout by reentering all the cells on the sheet. It's not very likely you would want to do

this, but you may want to do so when you work with the layouts given in this book. In the third section of this book, you'll be given layouts to solve various problems. If you don't have the optional diskettes, you will want to enter at least some of the layouts on your computer and save them on diskette. The listings of formulas cell by cell were done with the VisiCalc Storage command, saving the contents to the printer.

REVIEW

1. What coordinates would you enter to print the layout shown in Fig. 4-21?
2. What command would you use to list all the labels, numbers, and formulas on the printer?

	A	B	C	D
1		SIX-MONTH BUDGET		
2	*-*-*	*-*-*	*-*-*	*-*-*
3				
4	MONTH	PLANNED	ACTUAL	%DIFF.
5				
6	JAN	5500.00	5476.55	3.11
7	FEB	5775.00	6299.55	8.33
8	MAR	6063.75	6588.99	7.97
9	APR	6346.94	7024.55	9.36
10	MAY	6685.28	6722.34	0.55
11	JUNE	7019.55	7399.88	5.14
12	TOTALS	37410.52	39711.86	
13				
14				
15				

FIGURE 4-21

Look at this layout to answer the review questions.

Answers

1. Enter Cells A1 and D12. Even though there is no entry in Cell A1 or D12, you want to get the rest of the Rows 1 and 12, so you have to print these cells. If you printed Cells A2 to D12, you would lose all of Row 1 and wouldn't print "Six-Month Budget".
2. Type "/", "S" for "STORAGE", "S" for "SAVE", and then:P.

SUMMARY

Chart 4-1 shows all the commands covered so far, with those covered in this chapter highlighted so you can see how they fit into the total VisiCalc structure.

CHART 4-1

Summary

Highlighted comments were introduced in this chapter.

DIRECT ENTRIES

Labels, numbers, and formulas are entered directly on the screen. Use a "+" before coordinates like A1 in a formula; use " before a numeric symbol in a label.

> lets you go to any cell directly.

← → ↑ ↓ move you around the screen.

! recalculates the screen automatically.

! when used in a formula, performs calculations to that point.

when used in a formula, picks up the cell's value and places it in the formula.

FUNCTION COMMANDS

None covered in this chapter.

MENU COMMANDS

The main menu is: COMMAND: BCDEFGIMPRSTVW-

/B blanks out a cell.

/C clears the whole screen; press Y to confirm.

/D deletes a column or row.

/E lets you edit an entry on some computers.

/F sets the format for a cell. The menu is: DGILR\$*

Choices: D, default; G, general; I, integer, L, left; R, right; \$, dollars and cents; *, graph.

/G is the Global command. The menu is: CORF

Choice C sets the column width between 3 and 40.

Choice F on the menu sets the format globally for every cell on the screen that does not have its own format set with the /F command. The options are the same as for /F.

/I inserts a blank row or column.

/M moves a row or column to a new location.

/P prints a rectangle described by its upper-right and lower-left corners.

/S is the Storage command. The menu is: LSDQ#

Choices: L, load a file; S, save a file; D, delete a file; Q, quit VisiCalc.

Choice S allows you to print the formulas behind the VisiCalc sheet by giving a filename that refers to the printer: ":P".

/T fixes titles either horizontally, vertically, or both.

/W splits the screen into two windows, horizontally or vertically.

/- is the repeating label. It allows you to pick a character or characters that will repeat across the cell.

PRACTICE EXERCISES

EXERCISE 1 Load VisiCalc, load a layout, delete and insert rows, use the repeating label.

1. Load VisiCalc.
2. Load the layout you stored at the end of Chapter 3, shown in Fig. 3-30.
3. Delete the rows with the graph on them. (Remember, use the "I" and "D" commands and pick choice "R" for "ROW".)
4. Now insert a row below Row 1. (Remember, "I" and "I".)
5. Put in a dashed line as shown in Fig. 4-22. Use the "-" choice from the main menu to do it in each column. Your screen should look like Fig. 4-22.

	A	B	C	D
1		MONTH1	MONTH2	MONTH3
2				
3	SALES	80000	88000	96800
4	COSTS	62500	67500	72900
5	MARGIN	17500	20500	23900
6	%	22	23	25
7				
8				
9				

FIGURE 4-22

Your layout should look like this for Exercise 1.

6. Save what you have done under a new filename.

EXERCISE 2 Set up a layout, insert a column, use the Move command.

1. Clear the screen using "I" and "C".
2. Set up the layout shown in Fig. 4-23.

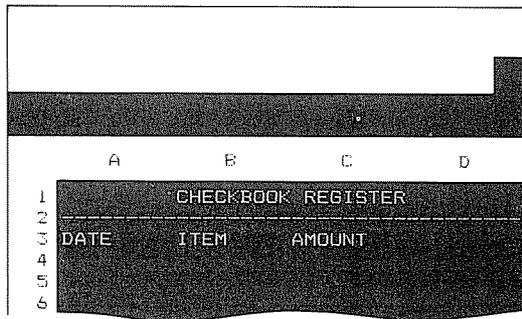


FIGURE 4-23
Begin this new layout.

3. Now insert a column between “ITEM” and “AMOUNT” and call it “NUMBER”.
4. Your layout should look like Fig. 4-24.

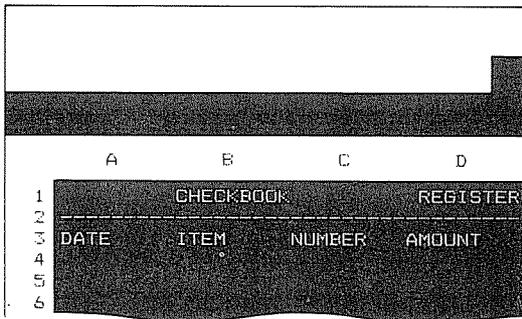


FIGURE 4-24
Insert the number column.

Make it look like Fig. 4-25 by using the Move command on Column C. To accomplish the move, place the cursor in Column C, type “/” and “M”, then type a coordinate in Column B as the destination.

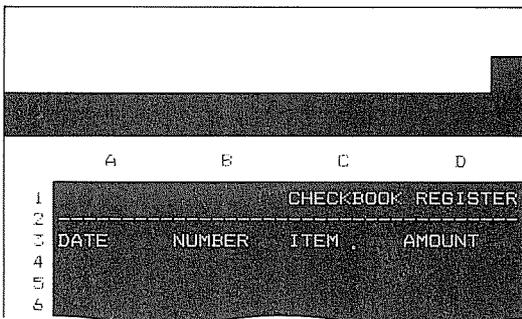


FIGURE 4-25
Move the number column to Column B.

EXERCISE 3 Add to the layout, use the Global format, change the column width.

1. Add several items of the kind shown in Fig. 4-26.

	A	B	C	D
1			CHECKBOOK REGISTER	
2				
3	DATE	NUMBER	ITEM	AMOUNT
4				
5	JUNE 5	101	AVIS	195.34
6	JUNE 5	102	COPY CENT	25.66
7	JUNE 8	103	CLEANING	55
8				
9				
10				

FIGURE 4-26

Add items of this kind.

2. Use the Global command to pick the “\$” format for the whole sheet. Remember, pick the Global choice, then the Format choice, and then the “\$”. If you entered your check numbers as labels, the results will be like Fig. 4-27.

	A	B	C	D
1			CHECKBOOK REGISTER	
2				
3	DATE	NUMBER	ITEM	AMOUNT
4				
5	JUNE 5	101	AVIS	195.34
6	JUNE 5	102	COPY CENT	25.66
7	JUNE 8	103	CLEANING	55.00
8				
9				
10				

FIGURE 4-27

Format with choice “\$”.

3. Try changing the column width. Make the column width 13. Again, use the Global command. The results should look like Fig. 4-28.

	A	B	C
1			
2			
3	DATE	NUMBER	
4			
5	JUNE 5	101	
6	JUNE 5	102	
7	JUNE 8	103	
8			
9			
10			

FIGURE 4-28

Change the column width to 13.

4. Change the width back to 9.

EXERCISE 4 Calculations with # and !.

1. Add category columns as in Fig. 4-29.

	A	B	C	D	E	F	G
1	CHECKBOOK REGISTER						
2							
3	DATE	NUMBER	ITEM	AMOUNT	TRAVEL	OFFICE	UTILITIES
4							
5	JUNE 5	101	AVIS	195.34			
6	JUNE 5	102	COPY CENT	25.66			
7	JUNE 8	103	CLEANING	55.00			
8							
9							
10							

FIGURE 4-29

Add the columns shown here.

- Place each amount in the correct category column. Use the “#” symbol to copy the exact value in the amount column.
- Add a few checks and try the “!” symbol to do immediate calculation. For example, enter an amount for one check as “100+25” on the edit line, press the “!” and RETURN, and see “125.00” appear in the cell.

EXERCISE 5 Use windows.

1. Add the total cells shown in Fig. 4-30. The category total is the total of cells E9 to G9.

	A	B	C	D	E	F	G	H
1	CHECKBOOK REGISTER							
2								
3	DATE	NUMBER	ITEM	AMOUNT	TRAVEL	OFFICE	UTILITIES	
4	JUNE 5	101	AVIS	195.34	195.34			
5	JUNE 5	102	COPY CENT	25.66		25.66		
6	JUNE 8	103	CLEANING	55.00		55.00		
7								
8								
9	TOTALS			276.00	195.34	80.66	0.00	
10								CATEGORY
11								TOTAL
12								276.00
13								
14								
15								

FIGURE 4-30

Add the total cells.

2. Make your screen look like Fig. 4-31. Place a vertical window in Column H.

	C	D	H	I
1	CHECKBOOK REGISTER			
2				
3	ITEM	AMOUNT		
4				
5	AVIS	195.34		
6	COPY CENT	25.66		
7	CLEANING	55.00		
8				
9		276.00		
10			CATEGORY	
11			TOTAL	
12			276.00	
13				
14				
15				

FIGURE 4-31

Add the vertical window in Column H. Use “;” to move back and forth between windows.

3. Try synchronized and unsynchronized scrolling: Choices “S” and “U” on the Window command menu.
4. Save your work.

EXERCISE 6 Print the sheet.

1. This exercise may take a while because you’ll be experimenting with the printer. Begin by making sure your printer is hooked up correctly and is turned on.
2. Load the layout shown in Fig. 4–22 that was saved in Exercise 1.
3. Print the layout using just the Print command without setup strings, and so on. The rectangle you specify will start at A1. Remember, you can move the cursor to the lower-right corner and press RETURN to indicate the corner.
4. Now look at what you’ve printed. If it doesn’t look just like Fig. 4–32, decide what the problem is (are you getting extra lines, is the printer not giving you the 80 characters it could, and so on). Use the information in this chapter (particularly Procedure 4–1) plus the VisiCalc manual and the printer manual to solve any problem.

	MONTH1	MONTH2	MONTH3	MONTH4	MONTH5	MONTH6	TOTAL
SALES	80000	88000	96800	106480	117128	128841	617249
COSTS	62500	67500	72900	78732	85031	91833	458496
MARGIN	17500	20500	23900	27748	32097	37008	158753
%	22	23	25	26	27	29	26

FIGURE 4–32

This is what your printout should look like.

If the problem is that your printer can’t handle the full eight columns, proceed to Step 5.

5. If your printer couldn’t print the full eight columns, you will need to split the sheet into two rectangles as you print. Even if you did get the full eight columns, try to print two rectangles. Make the first one four columns wide. Then start the second one at Cell E1. If you want to put a few blank lines between the two rectangles, just press the line feed on your printer before you begin to print the second rectangle.

At this point you’ve got a good grasp of VisiCalc fundamentals. In the next chapter, you’ll learn how to improve the speed and ease with which you set up and manipulate VisiCalc layouts.

5

Working More Efficiently

- Pointing the Cursor
- The Function Commands
- How to Enter Functions
- Replicating

This chapter presents VisiCalc commands that will greatly increase the speed and efficiency with which you use VisiCalc. When you're using these commands, you'll probably feel as though you've really tapped the power of the computer and of VisiCalc. Each command and technique covered in this chapter duplicates more efficiently things you could do by hand. You won't learn new concepts, but you'll learn "automated" ways to handle the concepts you already know. These time-saving techniques were not presented before because it's essential that you understand and can use the concepts before you learn to automate them.

When you complete this chapter, you'll know how to point the cursor, use the automatic function commands, and replicate.

POINTING THE CURSOR

You've certainly noticed that it's frequently a challenge to insert a coordinate reference into a formula. Either the cell you're referring to is not visible at the moment or you can't determine what row it's in without drawing your finger across the screen.

In printing the sheet you moved to the lower-right corner of the rectangle and pressed RETURN to instruct VisiCalc that this is the corner. This is called "pointing" with the cursor, and it's a technique that you can use *almost anywhere* you need to coordinate reference.

Pointing the cursor saves time.

You can move the cursor in the middle of the formula to the cell you want to reference in the formula. Suppose you want to repeat Cell B2 in Cell C2. The formula is "+B2". Move to Cell C2, type the "+" and then, instead of typing "B2", move the cursor to Cell B2. Then press RETURN. The cursor pops back to Cell C2, the formula "+B2" appears on the edit line, and the result of the formula appears in the cell. Figure 5-1 shows the process.

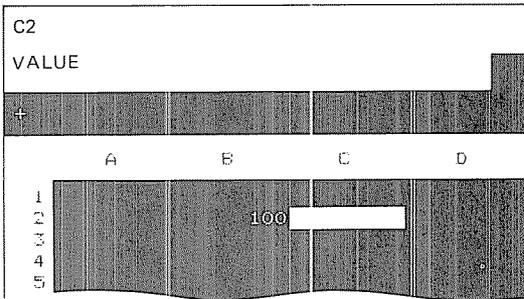


FIGURE 5-1a

To type the formula "+B2", begin with the "+".

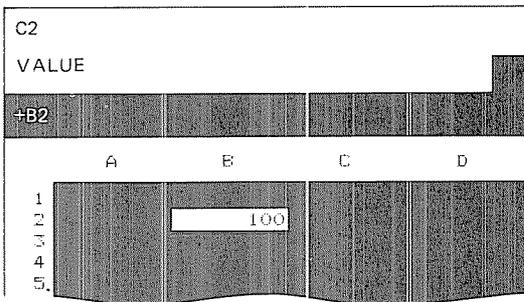


FIGURE 5-1b

Move to the cell you want to reference. "B2" appears on the edit line.

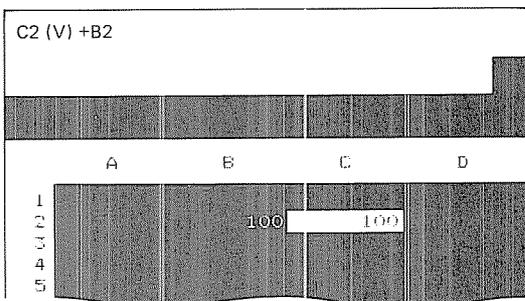


FIGURE 5-1c

Press RETURN. The formula is complete.

Notice that as the cursor was moved in Fig. 5-1b the coordinates showed up on the edit line. If you continued moving instead of pressing RETURN, the coordinates would change for each cell until RETURN was pressed.

How VisiCalc Knows the Cursor Is Being Pointed

The arrow keys can be used instead of RETURN. How does VisiCalc know whether you are pointing the cursor in a formula or terminating? If you are in the middle of a formula, VisiCalc assumes you're pointing the cursor. So if the edit line shows an arithmetic sign at the end of the formula (–, +, /, *), VisiCalc will expect you to be pointing to a cell. If you have just entered coordinates and the edit line shows a completed formula, like "C2–D4", VisiCalc assumes you've completed the entry when you press an arrow.

This is important because you may want to point the cursor several times in one formula. To point repeatedly, type an arithmetic sign at the end of the formula before you point the cursor. For example, to type "+C2–D4", type the "+", point to Cell C2, then type the "–", point to Cell D4 and press RETURN. In other words, don't press RETURN until you have finished the formula. Up until then, keep an arithmetic symbol at the end of the formula.

When pointing the cursor type an arithmetic symbol first.

In Fig. 5-2 the cursor is pointed twice in one formula. In the commands that follow, remember you can point the cursor instead of typing coordinates.

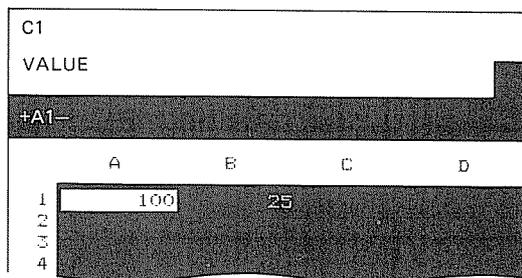


FIGURE 5-2a

You have entered the start of a formula—"+"—and pointed to A1. Then you have typed a "–" to keep an arithmetic symbol on the edit line.

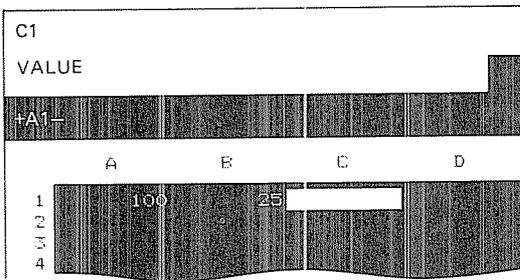


FIGURE 5-2b

As soon as the “-” is typed, the cursor pops back to where it started, Cell C1. Now you can point to B1.

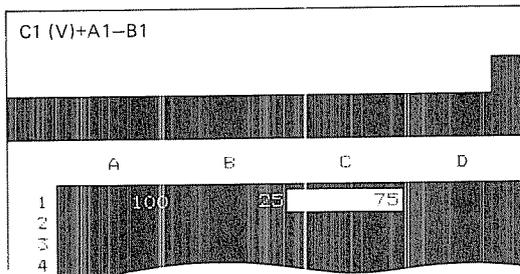


FIGURE 5-2c

You pressed RETURN after pointing to B1.

THE FUNCTION COMMANDS

Chapter 3 differentiated the three types of VisiCalc commands: direct entry, functions, and menu commands. You’ve dealt primarily with the first and third types so far; now you’ll learn some of the function commands.

All function commands require that you first type the “at” sign, “@”. After this you type a key word that tells VisiCalc which built-in function you want to use. These functions are formulas to perform the common calculations needed for setting up layouts.

@SUM Command

Perhaps the simplest formula to understand is the Sum function. The command “@SUM” adds the entries in a column or row. In Fig. 5-3 you might want to add the column of entries and place the result in Cell A6. The formula on the edit line shows how we’ve been doing this up to now.

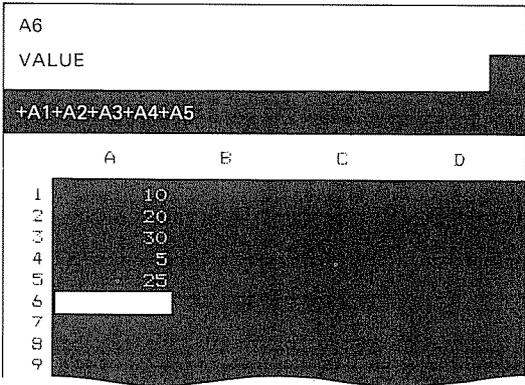


FIGURE 5-3

This shows a typical formula for addition.

Instead, you could use the formula:

```
@SUM(A1 . . . A5)
```

The “@” calls a function; the “SUM” tells VisiCalc to add; the “(A1 . . . A5)” tells it what to add. The result is placed in the cell with the Sum function. Figure 5-4 shows this.

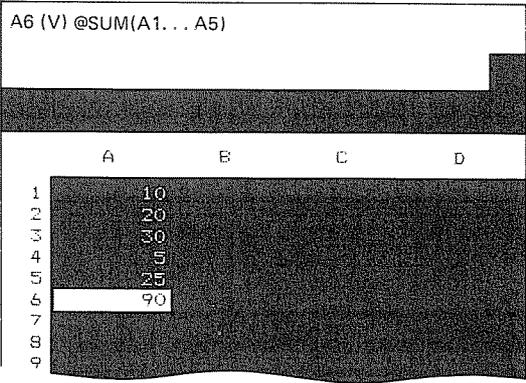


FIGURE 5-4

The formula in Cell A6 sums the column.

The Range of a Function

Recall that the Move command used two sets of coordinates connected by an ellipsis to indicate a *range* on which VisiCalc will act. In the Function

commands, the *range* tells VisiCalc on which entries to perform the function. The range must fall within either a row or column. In other words, VisiCalc can add up a row or add up a column on a sheet; however, it can't add up a diagonal or a rectangle with the @SUM command.

A range must be in a row or column.

Here are several Sum commands that will work and several that won't. These work:

1. @SUM(A1 . . . D1) adds in the top row.
2. @SUM(B1 . . . B33) adds in Column B.
3. @SUM(A1 . . . C1, B2 . . . B6) adds part of Row 1 to part of Row 2.
4. @SUM(G1 . . . J1, A2*100, B2 . . . B9) .

You can have several ranges in your list of items to sum, or you can have a range and one or more single items. Just separate the items in the list by commas. These don't work:

1. @SUM(A1 . . . B3) adds neither a row nor a column.
2. @SUM(H5, H7) *works* because it adds H5 and H7, but *it won't add the items between them*. You need the formula "H5 . . . H7" to add the range.

@COUNT Command

The Count command simply counts the total number of items in a range. In Fig. 5-5 the "@COUNT" function was used in Cell B12 to count the number of entries in Column B from 2 to 10. This counts the number of cells with an entry and tells you how many different categories of merchandise were sold. Cell B11 is the sum of all items sold, "@SUM(B2 . . . B10)". Notice that the Count command did not count the empty cell, B6. If you put a "0" in B6, however, the Count command will tell you there is something in the cell.

Count doesn't count empty cells.

In the Count command, as in the other commands to follow, you can have several ranges separated by commas: "@COUNT(A1 . . . A5, G1 . . . G1)" gives the total of entries in A plus any entry in G1. Use a range, not a single cell, in the Count command to count a single cell.

B12 (V) @COUNT(B2...B10)				
	A	B	C	D
1	ITEM#	SOLD		
2	101	1		
3	102	2		
4	103	7		
5	104	5		
6	105			
7	106	6		
8	107	4		
9	108	3		
10	109	2		
11	TOTAL	32		
12	CAT'GRS.		8	
13				
14				
15				

FIGURE 5-5

The formula in Cell B12 counts the number of items between B2 and B10.

@AVERAGE Command

This command gives the average of a range. It actually combines summing a range and dividing it by the count of all cells with an entry. In Fig. 5-5, it could have been used to find the average number of items sold from B2 to B10. The command would be: “@AVERAGE(B2 . . . B10)”. The result would be the sum 32 divided by the count 8, or 4. To get an average of all nine categories, you’d have to put a “0” in the empty cell to get VisiCalc to count it and get a count of 9. Then your average would be 32/9, or 3.56.

@MAX and @MIN Commands

These two commands are similar. One chooses the largest, the other the smallest item in a range. In Fig. 5-6, Cell B13 gives the highest number of the nine items; Cell B14 gives the lowest number. The formulas in these cells are “@MAX(B2 . . . B10)” and “@MIN(B2 . . . B10)”.

When VisiCalc counts a range, it doesn’t count empty cells. What does it do with the Minimum and Maximum commands when you have an empty cell? Look at Fig. 5-6 to see.

B14 (V) @MIN(B2... B10)			
	A	B	C
1	ITEM#	SOLD	
2	101	1	
3	102	2	
4	103	4	
5	104	5	
6	105	1	
7	106	6	
8	107	4	
9	108	3	
10	109	2	
11	TOTAL	32	
12	CAT. GRS.	8	
13	HIGH VOL.	9	
14	LOW VOL.		0
15			
16			
17			

FIGURE 5-6

Cells B13 and B14 contain functions for finding the largest and smallest items in a range.

The minimum command gave “0” as the lowest volume even though “0” is not in the list. It took the empty cell in the list as zero.

@MAX and @MIN count empty cells as zero.

Functions without Ranges

Some function commands don't require a range. For instance, “@INT” gives you the integer value of one number. The command looks like this:

@INT(B6)

If B6 is 101.93, the Integer function will give you 101. The Integer function does not round off the number before it lops the decimal—the Integer Format command does that.

Other functions include:

- @ABS for absolute value (no “+” or “-” signs).
- @SQRT for square root.
- @LOG10 for logarithm.
- @SIN for sine in radians.
- @COS for cosine in radians.

- @TAN for tangent in radians.
- @ASIN, @ACOS, @ATAN for arc sine, arc cosine, arc tangent in radians.
- @PI gives you the value of pi (π) to 10 decimal places in your formula: e.g., "+B15*@PI".

You can use these functions with coordinates or numbers, "@ABS(B6)" or "@LOG10(100)". You can also use several functions in a formula, as in this example:

```
+B6*@SQRT(2)+@SUM(C1...C9)
```

Nested Functions

Functions can be part of the list for other functions. They can be in the list separated by commas. "@SUM(A1...A6,@AVERAGE(B2...B9))" gives you the sum of the A range plus the average of the B range. Be sure to close the parentheses on each function. Examples of this use of the functions include:

1. @SUM(@AVE(A1...A3), @AVE(B1...B3)) sums two averages.
2. @SUM(@SQRT(2), @SQRT(3), @SQRT(A13)) sums three square roots.

The total of left parentheses in a formula should equal the total of right parentheses.

Figure 5-7 shows a function that gives the average of a group of sums.

C6 (V) @AVERAGE(@SUM(A1...A4),@SUM(B1...B4))				
	A	B	C	D
1	6	4		
2	8	9		
3	10	3		
4	12	2		
5				
6	AVERAGE NUMBER			27
7				
8				
9				

FIGURE 5-7

This layout gives the average of numbers in two columns.

@NPV Command

This command gives the Net Present Value function. It allows you to determine the present value of money to be received in the future, discounted by a percentage. You need two types of items in the parentheses: (1) the discount or interest rate as a decimal, and (2) the range over which to calculate. The range should be from the cell with the cash flow at the end of the first period to the cell with the cash flow at the end of the last period. Set up your sheet with these cash flows lined up in a row or column. In Fig. 5-8 the cash flows for four years are in Cells A2 to D2.

	A	B	C	D
1	Y1	Y2	Y3	Y4
2	1000	2000	1500	3000
3				
4				
5				

FIGURE 5-8

The cash flows are in a row.

In Fig. 5-9, Cell B4 contains the formula “@NPV(.10,A2 . . . D2)”. This represents a discount rate of 10% to be applied to the cash flows in the range A2 to D2. (See Fig. 5-9 for the result.) Cell B4 now shows “5738”, which is calculated by discounting the entry for the first year once, the second year twice, and so on, and adding the results.

B4 / F1 (V) @NPV(.10,A2 . . . D2)				
	A	B	C	D
1	Y1	Y2	Y3	Y4
2	1000	2000	1500	3000
3				
4	NPV=	5738		
5				
6				
7				

FIGURE 5-9

Cell B4 gives the net present value of the cash flows in Row 2.

HOW TO ENTER FUNCTIONS

When you type the Function command, you need type only enough of the word to distinguish it from other functions—SUM from SIN, for example. VisiCalc will complete the word if you type the “(”.

Pointing the Cursor

You can always point the cursor in entering a function. This is especially useful when entering a function like sum. Type “@SUM(” and move to the first cell of the range. Type just the first dot of the ellipsis and VisiCalc puts that cell in the formula and pops back to the cell where you began. Then move to the second cell of the range, type “)”, and press RETURN. VisiCalc will do the sum and show the completed formula.

Inserting in Ranges

Once you’ve set up a range, you don’t have to change it every time you insert a new row or column. If you insert your new row or column inside the range, VisiCalc will include it in the calculation. So, if you have the sum of “(A1 . . . A10)” and add a new row at 8, VisiCalc will adjust the formula to “(A1 . . . A11)”. If you insert outside the range, (at A12 for example), VisiCalc will not include the new row or column in the range.

Insert a new row or column inside a range and it will become part of the range.

REVIEW

	A	B	C	D
1		MTH1	MTH2	MTH3
2				
3	WK1*	13000	25834	15888
4	WK2	25333	17999	12455
5	WK3	12555	23444	12777
6	WK4*	17888	12965	15687
7				
8	TOTAL			
9	AVER. WK.			
10			TOTAL QRT	
11			HIGHESTWK	
12	*EXT. DAYS			
13	INCLUDED			
14				
15				
16				

FIGURE 5-10

Look at this layout to answer the review questions.

1. How do you enter the formula “A1 + A2” without typing the coordinates?
2. What function command gives the total number of items in Row 1 from A to H? Will it count the empty cells?

3. Will this command work?

@SUM(A1...G6)

4. In Fig. 5-10, what command should be entered in B8? In B9 for an average week for month 1?
5. What command in D10 will total all three months? In D11 what will pick the best week?

Answers

1. Type the "+", move to A1, type another "+", move to A2, press RETURN.
2. "@COUNT (A1 . . . H1)". It won't count the empty cells.
3. No, because the range is neither a row nor a column.
4. @SUM(B3 . . . B6) and @AVERAGE(B3 . . . B6).
5. After all the totals are placed in the layout, @SUM(B8 . . . D8) and @MAX(B3 . . . B6,C3 . . . C6, D3 . . . D6).

REPLICATING

Until now you've had to do tedious repetition of formulas to set up a sheet like the "SALES-COSTS-MARGIN" sheet you've been working on. Figure 5-11, the sheet you've been working on, has a number of cells in which the formulas differ only slightly from the adjoining cell. For example, Cell C3 contains the formula "+B3*1.10", and D3 is "+C3*1.10". The margin formulas are identical except for the cells they refer to. The cells are in the same relative position in each column as well, sales in Row 3, costs in Row 4. All the cells in Row 2 have exactly the same content, "-----".

	A	B	C	D
1				
2		MONTH1	MONTH2	MONTH3
3	SALES	80000	88000	96800
4	COSTS	62500	67500	72900
5	MARGIN	17500	20500	23900
6	%	22	23	25
7				
8				
9				

FIGURE 5-11

The cells in Columns C and D are very similar to those in Column B.

A shortcut allows you to enter a formula into a cell just once and then to copy it exactly or with minor changes. As long as the formula you want to copy refers to cells that are in the same relative position in other rows or columns, you can copy it. Proper use of this shortcut will save a huge amount of worktime on a typical layout.

The command to copy is the Replicate command, choice “R” on the Main menu. It allows you to copy (or replicate) an entry across a range.

Three Ways to Copy

The Replicate command can be rather confusing, and because it’s so powerful, it can run away with you like the broom of the sorcerer’s apprentice if you don’t use it properly. The fundamental thing to understand is that you can copy entries three different ways. Each requires slightly different specifications for the range of the command.

First, you may want to copy one entry into a number of different locations. For example, you might copy the “-----” from Cell A2 in Fig. 5–11 across all the cells in Row 2.

Second, you might want to copy a whole section of a row or column to another row or column. For example, once you set up Column C, you might have copied it into Column D.

Third, you might want to make a number of copies of a row or column. In Fig. 5–11, instead of copying Column C to D, you might copy the Column C material into Columns D to G. Then you’d have almost the whole sheet done.

Ranges in Replicating

VisiCalc wants a range in two places in the Replicate command. First, one for the source—what you’re copying, and a second one for the target—where you’re placing the material. In each command you may enter a real range like “A1 . . . A13” or one like “A1 . . . A1” that shows just one cell.

Replicate ranges may be just one cell: A1 . . . A1 is one cell.

The clue to whether you enter a real range or just one cell is whether you want one copy or more than one copy. If you want just one copy, you’ll enter just one cell. If you want more than one copy, give VisiCalc the first cell of each new location where you want the copy to appear. For example, if you want copies of a column of information to start in Cells A5 to A10, give the range “A5 . . . A10”. Keep this in mind as you read the following specifics on how to replicate.

Target ranges: Use one cell for one copy, a range for several copies.

Replicating One Cell

In Fig. 5-12, the task is to replicate the dashed line across the screen. To begin the Replicate command, type "/" and pick choice "R" for "REPLICATE" from the main menu. Figure 5-12 shows what you'll see when you type this. VisiCalc will ask you for the source range with

REPLICATE: SOURCE RANGE OR RETURN

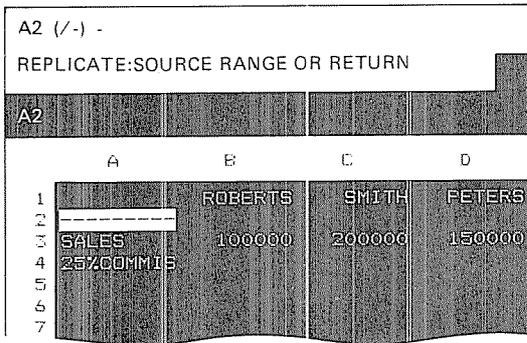


FIGURE 5-12

Here you will replicate the dashed line across the row. This is the first thing you will see.

VisiCalc shows the current cell on the edit line. This is the first entry in the range. You can type either a real range, like "A2 . . . A4" or just one cell. Either way, VisiCalc will show the range on the edit line.

To copy just one cell, press RETURN. Note that Fig. 5-13 now shows the edit line completed with the range A2 . . . A2. This happened when you pressed RETURN.

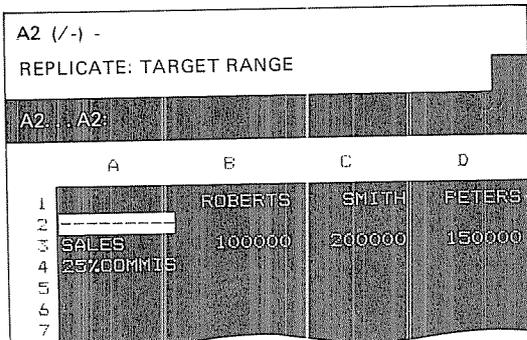


FIGURE 5-13

The source range is completed. VisiCalc needs the target range.

Figure 5-13 also shows VisiCalc asking for the target range with the prompt

REPLICATE: TARGET RANGE

In Fig. 5-13 you want to copy Cell A2 into Cells B2 to D2. So the target range becomes "B2 . . . D2". You can either type these coordinates or simply point to each one by positioning on B2 and typing ". . .", moving to D2, and pressing RETURN. Either way, the target range will be as shown in Fig. 5-14.

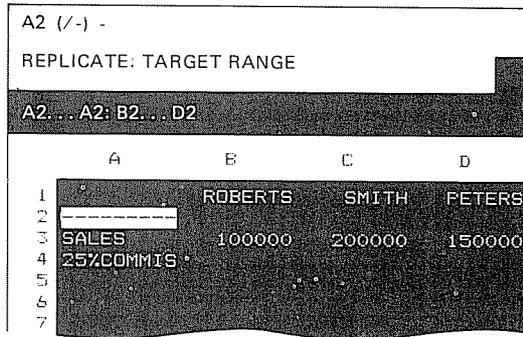


FIGURE 5-14

The target range is completed.

Figure 5-15 shows the cell replicated across the screen when the target range is complete.

In these examples, you have been copying a label. In Fig. 5-15 you have begun copying a formula that contains some coordinates. Remember, VisiCalc will replicate a formula if you want it copied exactly or if the formula refers to items in the same relative position in each row or column. In Fig. 5-15, you want to copy the formula in Cell B4 for computing commission, "+B3*.25". The edit line in Fig. 5-15 shows the completed source range and target range.

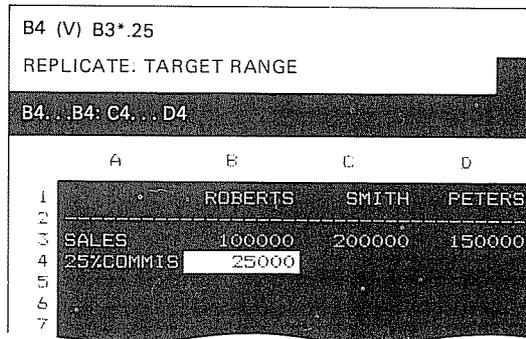


FIGURE 5-15

Replication of Cell A2 is complete. Now we want to replicate B4 across Row 4. The source and target ranges have been entered.

How will VisiCalc know whether to copy exactly what is in cell B3, as it did with the "-----" label, or to adjust the coordinates in each column? The prompt line will be:

REPLICATE: N=NO CHANGE, R=RELATIVE

The edit line shows each cell in the formula in turn; answer “R” if the cell coordinates are to be different in each column, but refer to the same relative positions or “N” to make an exact copy of the coordinates. Figure 5–16 shows the prompt for the “B3” in the formula “+B3*.25”.

B4 (V) B3*.25				
REPLICATE: NO = NO CHANGE, R = RELATIVE				
B4: .B4: C4: .D4: +B3				
	A	B	C	D
1		ROBERTS	SMITH	PETERS
2				
3	SALES	100000	200000	150000
4	25%COMMIT	25000		
5				
6				
7				

FIGURE 5–16

The Replicate command will step through each reference in a formula, asking whether it should be copied with no change (“N”) or relative to the column (“R”).

The answer to the prompt question is clearly “R” for “RELATIVE” in Fig. 5–16. *This is because in each column you want the formula to refer to the sales figure in that column, not to the sales figure in B3.* The formula in Cell C4 should read “+C3*.25”; in D4 it should read “+D3*.25”.

Figure 5–17 shows the completed replication after you have typed “R” for “RELATIVE”. The formulas in Cells C4 and D4 are clearly relative to those columns.

D4 (V) D3*.25				
REPLICATE: NO = NO CHANGE, R = RELATIVE				
D4: .D4: C4: .D4: +D3				
	A	B	C	D
1		ROBERTS	SMITH	PETERS
2				
3	SALES	100000	200000	150000
4	25%COMMIT	25000	50000	37500
5				
6				
7				

FIGURE 5–17

Replication of B4 is complete.

Replicating a Group of Cells

Figure 5–18 shows a case where you want to replicate a group of cells in one column and make just one copy. You want to copy the formula for totaling the year’s sales and for averaging the quarters. Figure 5–18 shows the

source and target ranges completed. Remember, even though you are copying a range, you want just *one* copy, so the target range contains just the first cell of the new location. This prompt will start one copy at D10.

D5 (V) @SUM(A3...D3)
 REPLICATE: TARGET RANGE
 D5...D6: D10...D10

	A	B	C	D
1	SALES BY QUARTER (K)			
2	Q1	Q2	Q3	Q4
3	250	300	182	275
4				
5			TOTAL	1007
6			AVERAGE	251.75
7				
8	300	320	200	310
9				
10			TOTAL	
11			AVERAGE	
12				
13				
14				

FIGURE 5-18

The source and target ranges show the two cells being copied once.

This time you have to tell VisiCalc about more than one cell in more than one formula. The formula in Cell D5 is “@SUM(A3 . . . D3)” and in Cell D6 it’s “@AVERAGE(A3 . . . D3)”. Again, you want to copy both with the cells changed to refer to the relative positions in the new row. VisiCalc will step through and highlight each reference in turn. You’ll type “N” or “R” for each cell in each formula. Figure 5-19 shows the completion of the process.

D6 (V) @AVERAGE(A3...D3)
 REPLICATE: N = NO CHANGE, R = RELATIVE
 D6: D11...D11: @AVERAGE(A3...D3)

	A	B	C	D
1	SALES BY QUARTER (K)			
2	Q1	Q2	Q3	Q4
3	250	300	182	275
4				
5			TOTAL	1007
6			AVERAGE	251.75
7				
8	300	320	200	310
9				
10			TOTAL	
11			AVERAGE	
12				
13				
14				

FIGURE 5-19

Here you must tell VisiCalc that D3 is a relative position.

You've already told VisiCalc that Cells A3 and D3 are relative values in the sum; now VisiCalc wants to know about Cell D3 in the *average*. It's relative too.

VisiCalc shows each item in each formula and you answer "R" or "N" for each.

Figure 5-20 shows the results of the replication.

D11 (V) @ AVERAGE(A8..D8)

	A	B	C	D
1	SALES BY QUARTER (K)			
2	Q1	Q2	Q3	Q4
3	250	300	182	275
4				
5			TOTAL	1007
6			AVERAGE	251.75
7				
8	300	320	200	310
9				
10			TOTAL	1130
11			AVERAGE	282.5
12				
13				
14				

FIGURE 5-20

Replication is complete.

Replicating a Group of Cells Several Times

Figure 5-21 shows a case where we want to replicate part of a column several times. You want the familiar formulas for increasing sales by 10% and costs by 8%, as well as the calculation for margin and percentage, copied from month 2 across six months. (You can't copy them from month 1 because the formulas for increase aren't set up until Column C—month 2.)

C3

REPLICATE: TARGET RANGE

C3..G6: D3..G3

	A	B	C	D	E	F	G	H
1		MONTH1	MONTH2	MONTH3	MONTH4	MONTH5	MONTH6	TOTAL
2								
3	SALES	80000	88000					
4	COSTS	62500	67500					
5	MARGIN	17500	20500					
6	%	22	23					
7								
8								
9								

FIGURE 5-21

The source and target ranges show four cells copied four times.

Figure 5–21 shows the completed source and target ranges. Note that both source and target are real ranges. The source range is the section we want to copy and the target range indicates the place where each copy should start for multiple copies. The source range thus is vertical, down Column C. The target range is horizontal, across Row 3 because each copy starts in Row 3.

The target range is the location of the start of each copy.

Each cell in the formula is again relative. Look back at Fig. 5–11 to see what the result would be.

Replicating a Format

Often you want a Global format for most of the sheet but have a second format in other areas. It's time consuming to type the Format command in each cell. You can cut that time by replicating the format across the cells where you want it. For example, in a case like Fig. 5–21, you could set up the Integer format in Column C as you're entering it. The format will be replicated along with the formula when you replicate the column.

What about the case where you don't want to replicate the format and the formula together, but you do want each cell to have the same format? In this case you replicate the empty cell with the correct format. In Fig. 5–21 the Global format for the page could be the Integer format, but the labels across the top should be in the Right format. To do this, start in Cell B1 when it's empty and type the Format command: "/", "F", and "R". The entry contents line will show just the Right format for the cell. Next, replicate Cell B1 to the range C1 and across to the last cell you expect to use for a label. If you move to each of these cells, you will find just the format on the entry contents line. Last, actually type in each month in each cell. It will be displayed in the correct format when you press RETURN.

REVIEW

1. Look at Fig. 5-22. How would you copy the "-----" label across to Column D? What ranges would you type?

	A	B	C	D
1	MULTIPLICATION TABLES			
2				
3		X1	X2	X3
4	1			
5	2			
6	3			
7	4			
8	5			
9	6			
10	7			
11	8			
12	9			
13	10			
14	11			
15	12			

FIGURE 5-22

Look at this layout to answer the review questions.

2. How could you create Column A with the Replicate command?
3. The 1-times table in Column B will obviously be a copy of Column A. What ranges would you type?

	A	B	C	D
1	MULTIPLICATION TABLES			
2				
3		X1	X2	X3
4	1	1	2	3
5	2	2	4	6
6	3	3	6	9
7	4	4	8	12
8	5	5	10	15
9	6	6	12	18
10	7	7	14	21
11	8	8	16	24
12	9	9	18	27
13	10	10	20	30
14	11	11	22	33
15	12	12	24	36

FIGURE 5-23

Look at this layout to answer question 4.

4. The multiplication tables are calculated with a formula. In Fig. 5–23, Row 4 contains a series of formulas like “1*A4”, “2*A4”, and so on. How would you replicate these for all the tables? What ranges would you type? Would the coordinates in the formulas be “RELATIVE” or “NO CHANGE”?

Answers

1. Move to Cell A2, type “/” and “R”, and press RETURN for the source range. The target range would be “B2 . . . D2”. (Complete range: “A2 . . . A2:B2 . . . D2”.)
2. In Cell A4 type “1”. In Cell A5 type the formula “+A4+1” and replicate this down the column. Ranges: “A5 . . . A5:A6 . . . A15”. When you make the formula relative, each cell will contain a formula to add 1 to the cell above it.
3. The ranges would be: “A4 . . . A15:B4 . . . B4.” You want just one copy of the column.
4. The ranges would be: “B4 . . . D4:B5 . . . B15”. The coordinates would be relative.

SUMMARY

Chart 5–1 summarizes the VisiCalc commands covered so far, with those covered in this chapter highlighted.

CHART 5–1

Summary

DIRECT ENTRIES

Labels, numbers, and formulas are entered directly on the screen. Use a “+” before coordinates like A1 in a formula; use “” before a numeric symbol in a label.

> lets you go to any cell directly.

← → ↑ ↓ move you around the screen.

! recalculates the screen automatically.

! when used in a formula, performs calculations to that point.

when used in a formula, picks up the cell’s value and places it in the formula.

FUNCTION COMMANDS

@SUM(A1 . . . A16) adds this range of cells; you can have several ranges separated by commas.

@COUNT(A1 . . . A16) counts the number of entries in the range.

@AVERAGE(A1 . . . A16) averages the entries in the range.

@MAX(A1 . . . A16) chooses the largest in a range.

@MIN(A1 . . . A16) chooses the smallest in a range.

@INT(A1) gives the integer value of the entry.

@NPV(.10,A1 . . . A16) gives the net present value of the cash flows in the range and discounts the value by the percentage given in parentheses.

MENU COMMANDS

The main menu is: COMMAND: BCDEFGIMPRSTVW-

/B blanks out a cell.

/C clears the whole screen; press Y to confirm.

/D deletes a column or row.

/E lets you edit an entry on some computers.

/F sets the format for a cell. The menu is: DGILR\$*

Choices: D, default; G, general; I, integer; L, left; R, right; \$, dollars and cents; *, graph

/G is the Global command. The menu is: CORF

Choice C sets the column width between 3 and 40.

Choice F on the menu sets the format globally for every cell on the screen that does not have its own format set with the /F command. The options are the same as for /F.

/I inserts a blank row or column.

/M moves a row or column to a new location.

/P prints a rectangle described by its upper-right and lower-left corners.

/R replicates one entry or a row or column to one or more other locations. Give a source and target range when prompted.

/S is the Storage command. the menu is: LSDQ#

Choices: L, load a file; S, save a file; D, delete a file; Q, quit VisiCalc.

Choice S allows you to print the formulas behind the VisiCalc sheet by giving a filename that refers to the printer: ":P" for TRS-80.

/T fixes titles either horizontally, vertically, or both.

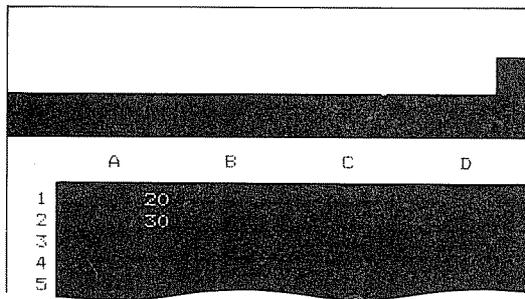
/W splits the screen into two windows, horizontally or vertically.

/- is the repeating label. It allows you to pick a character or characters that will repeat across the cell.

PRACTICE EXERCISES

EXERCISE 1 Load VisiCalc and point the cursor in entering formulas.

1. Load VisiCalc.
2. Experiment with pointing the cursor. Enter the sheet shown in Fig. 5-24. Put the formula "+A1+A2" in Cell A3. Do it by typing the "+", moving the cursor to Cell A1, typing the "+", and then moving to A2 and pressing RETURN.



	A	B	C	D
1	20			
2	30			
3				
4				
5				

FIGURE 5-24

Enter this layout.

3. Make other entries and formulas on the sheet, pointing the cursor each time.

EXERCISE 2 Load a layout, delete a row, use the Sum function command.

1. Clear the sheet with "C" and load the checkbook register you stored at the end of Chapter 4 (Fig. 4-30).
2. You're going to redo the formulas for the totals of each column. First, delete the totals in Row 9 and the formula for the category total in Cell H12.
3. Next, type the formula for the sum of Column D in Cell D9. Use the Sum command. Remember, type "@SUM" and the range to be added.

4. Then type the Sum command for Columns E to G. Type each one separately; don't use the Replicate command now. Try pointing the cursor instead of typing in the coordinates. The formulas should look like this: "@SUM(E5 . . . E7)".
 5. Finally, type the Sum command for the category total in Cell H12. This is the sum of all the individual categories. Your sheet should look like Fig. 5-25.
- Note that the formula for the category total is: "@SUM(E9 . . . G9)".

	A	B	C	D	E	F	G	H
1	CHECKBOOK REGISTER							
2								
3	DATE	NUMBER	ITEM	AMOUNT	TRAVEL	OFFICE	UTILITIES	
4								
5	JUNE 5	101	AVIS	195.34	195.34			
6	JUNE 5	102	COPY CENT	25.66		25.66		
7	JUNE 8	103	CLEANING	55.00		55.00		
8								
9	TOTALS			276.00	195.34	80.66	0.00	
10								CATEGORY
11								TOTAL
12								276.00
13								
14								
15								

FIGURE 5-25

You should recreate this layout.

EXERCISE 3 Use the Count and Average commands.

1. Add a check count and an average check size to Fig. 5-25. The result should look like Fig. 5-26.

	A	B	C	D
1	CHECKBOOK REGISTER			
2				
3	DATE	NUMBER	ITEM	AMOUNT
4				
5	JUNE 5	101	AVIS	195.34
6	JUNE 5	102	COPY CENT	25.66
7	JUNE 8	103	CLEANING	55.00
8				
9	TOTALS			276.00
10			NO. CHECKS	3
11			AVE. CHECK	92.00
12				
13				
14				

FIGURE 5-26

A check count and average have been added in Cells C10 and C11.

Note: The formulas in Cells D10 and D11 are “@COUNT(D5 . . . D7)” and “@AVERAGE(D5 . . . D7)”, respectively, with a “\$” format.

2. Save your work.

EXERCISE 4 Use the “-” Command and the Replicate command.

1. You’re going to do the SALES–COSTS–MARGIN layout again from scratch and see how much easier it is with the Replicate command. Clear the screen and load the layout again. You last saved it in Chapter 4.
2. Now delete everything but the labels and the top line. Your layout should look like Fig. 5–27. Insert months 7 to 12 before the total column.

	A	B	C	D
1		MONTH1	MONTH2	MONTH3
2				
3	SALES			
4	COSTS			
5	MARGIN			
6	%			
7				
8				
9				

FIGURE 5–27

Layout continues to month 12.

3. Now add the repeating label “-” in Cell A2.
4. Replicate the label across all 12 months and for the totals. Point with the cursor instead of typing in the target range.
Note: The range will be “A2 . . . A2:B2 . . . N2”. Move to Cell B2, type “-”, and then move to Cell N2 and press RETURN.
5. Now add the figures and formulas in Fig. 5–28. Remember that the sales and costs figures in Column C are 10% and 8% greater than B, respectively.

	A	B	C	D
1		MONTH1	MONTH2	MONTH3
2				
3	SALES	80000	88000	
4	COSTS	62500	67500	
5	MARGIN	17500	20500	
6	%	22	23	
7				
8				
9				

FIGURE 5–28

Sales and costs have been added in month 2.

6. Now extend the formulas across 12 months. Use the Replicate command to copy the column.
The range for replicating should be "C3 . . . C6:D3 . . . M3". You want the copies to start in Cells D3 to M3. All entries should be relative.
7. Add the first two items in the total column, Column N. The entries for sales and costs will be totals of all the items in that row. Your first entry, in Cell N3, will be a Sum command. Then replicate it in Cell N4.
Note: The range will be "N3 . . . N3:N4 . . . N4".
8. For the total margin and percentage, you can replicate the formulas from month 12. Your layout should look like Fig. 5-29.

If you have had any problems with the Replicate command, reread that section of the chapter.

In Chapter 6, you'll cover some ways to design formulas more powerful than those you've worked on in this chapter. It's likely, though, that the majority of the layouts you design will depend on the functions and timesavers you just learned.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	MONTH1	MONTH2	MONTH3	MONTH4	MONTH5	MONTH6	MONTH7	MONTH8	MONTH9	MONTH10	MONTH11	MONTH12	TOTAL	
1	SALES	80000	80000	96800	106480	117128	128841	141725	155897	171487	188636	207499	228249	1710743
2	CDSTS	62500	67500	72900	78732	85031	91833	99180	107114	115483	124938	134933	145727	1186070
3	MARGIN	17500	20500	23900	27748	32097	37008	42245	48783	55804	63698	72567	82522	524672
4	%	22	23	25	26	27	29	30	31	33	34	35	36	31
5														
6														
7														
8														
9														
10														

FIGURE 5--29

The completed layout.

6

Greater Sophistication with VisiCalc[®]

- Recalculation Order
- Automatic Calculation
- Errors and Information That Is Not Available
- Saving Part of the Screen
- Looking up Information in a Table
- Choosing from a List
- Evaluation with VisiCalc: Boolean Algebra

Beyond the commands you have learned is another level of more complex commands within VisiCalc. These commands allow the development of layouts to solve problems that involve a complex logical structure or require handling a good deal of data.

When you finish this chapter, you will be able to change the order of recalculation to fit the layout you've designed, save and recall part of the screen to allow combining old and new information, use lookup tables that pick up information from elsewhere on the screen and use it in a formula, and use a series of commands to evaluate data.

RECALCULATION ORDER

A constant concern with VisiCalc is placing information so when VisiCalc recalculates the formulas it picks up the correct values. A formula in Column A can't refer to a formula in Column B because Column A will be recalculated before the formula in Column B is evaluated. The recalculation order so far has always been down each column from Column A on across the screen.

In Fig. 6-1, the row labeled "QUAR. TOT." is a row of totals, each of which sums the months above it. The "YEAR TOT." is the sum of the

quarters. If the sales figure in any month in Column C is changed, VisiCalc will recalculate the year total in Column A before it recalculates the quarter total in Row C. Therefore, the year total will be incorrect.

B5 (V) @SUM(B4..E4)				C
				25
	A	B	C	D
1	MONTH1	12000	13457	11983
2	MONTH2	13500	15000	14999
3	MONTH3	11999	13999	17888
4	QUAR. TOT.	37499	42458	44870
5	YEAR TOT.	174438		
6				
7				
8				

FIGURE 6-1

The yearly total is placed where it won't pick up new quarterly totals from Columns C to E.

It is possible, though, to alter the recalculation order to make VisiCalc proceed across Row 1, then across Row 2, and so on. In Fig. 6-1, this would cause the yearly total in Row 5 to calculate after the quarterly totals in Row 4. As a result, changes in the monthly figure would not cause the yearly total to become incorrect.

To change the recalculation order use the Global command. The Global menu looks like this:

GLOBAL: C O R F

Recall that "C" refers to column width and "F" to Global format. Choice "O" is the "ORDER" of recalculation or reevaluation. When you type the "I" and "G" and pick choice "O", you'll see:

REEVAL ORDER: R C

You can pick which reevaluation order you want, either "R" for across rows or "C" for down the columns. The standard order is "C" for "COLUMNS", so unless you specify an order, that's what you'll get. In Fig. 6-2, notice the upper-right corner of the information lines. Where you have always had a "C", there is now an "R". The "R" means reevaluation by rows. It has appeared in Fig. 6-2 because you used the Global command to change the reevaluation order. This order of reevaluation will now be stored with the layout when you save it.

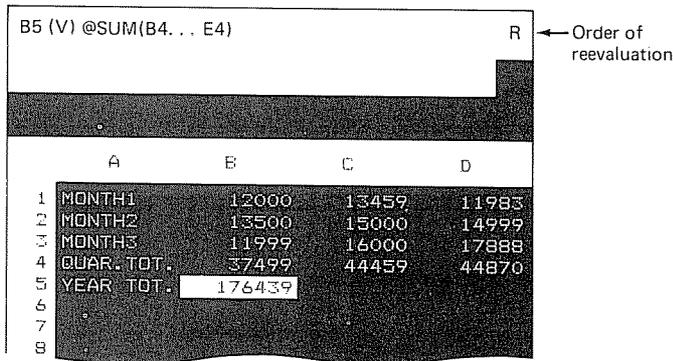


FIGURE 6-2

The reevaluation order has been changed and a new figure in C3 shows in the yearly total.

Cautions on Reevaluation

Changing the reevaluation order is not a cure-all. You can't change the order because one section of the sheet requires reevaluation by rows when the rest of the sheet requires reevaluation by column. For some layouts, neither order solves the problem, and you have to rearrange the sheet.

Figure 6-3, which you saw in Chapter 3, is a case where a formula references a cell further along on the sheet. The item in Cell A2 is a total of the two items that follow, and benefits in Column C is a formula that takes 25% of Column B. As you saw in Chapter 3 (Fig. 3-19), the total in Column A uses an old figure in its calculation each time it is calculated.

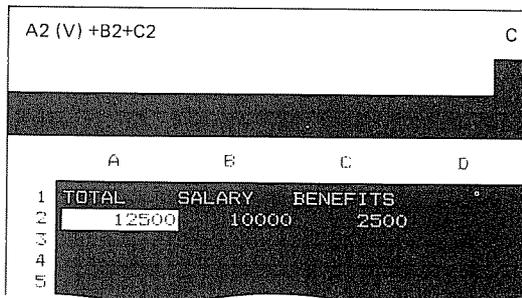


FIGURE 6-3

The formula in Cell A2 references values that appear later on the sheets.

The calculation order in Fig. 6-3 is down the columns. However, even changing the calculation order to "R", across rows, won't help. The first item in Row 2 (total) will still be reevaluated before the third item (benefits). The

only solution in such a case is to move formulas so they come after the items they refer to. In this case, the obvious solution is shown in Fig. 6-4. Simply put the total after the items it is totaling. Then the order of reevaluation can be either by row or column.

	A	B	C	D
1	SALARY	BENEFITS	TOTAL	
2	10000	2500	<input type="text" value="=A2+B2"/>	
3	10000	2500	12500	
4	10000	2500	12500	
5	10000	2500	12500	

FIGURE 6-4

The formula is placed after the items to which it refers. This is correct.

AUTOMATIC CALCULATION

The last choice on the Global command menu also refers to calculation. The choice "R", which you might mistake for "recalculation order" actually refers to another aspect of recalculation:

GLOBAL: C O R F

When you pick choice "R" you see this menu:

RECALC: A M

Choice "A" means "AUTOMATIC" recalculation. This is normally in effect. It means that each time you enter something new on the sheet, every item on the sheet will be recalculated. If you pick choice "M", for "MANUAL", then recalculation will occur only when you press the "!" key. Use the manual recalculation while you're setting up a section of the sheet or changing values and don't want any interrelationships on the screen to affect your numbers until you've finished your entries.

ERRORS AND INFORMATION THAT IS NOT AVAILABLE

Perhaps in setting up some of the layouts you've seen "ERROR" appear in a cell. You might have deleted a cell that is needed by a formula, so VisiCalc shows you an error in the formula's cell. Or, you might have loaded in a sheet from memory with errors in the placement of formulas so they

reference information appearing in a column to the right on the sheet. (Pressing “!” takes care of that error, but the sheet should be rearranged or the calculation order changed.)

Another way to get an “ERROR” is to attempt to divide by zero. This frequently occurs when you call for a calculation that divides by a cell in which you have not yet placed a number. VisiCalc will assume that cell is a 0, and will give you an “ERROR”. Figure 6–5a shows this kind of error. The formula in Cell B4 calls for dividing the cost by number of months, but number of months is blank.

	A	B	C	D
1				
2		AMORTIZATION CALCULATION		
3		TOT. COST	50000	
4		#MONTHS		
5		AMOUNT	ERROR	
6				
7				

FIGURE 6–5a

A division by zero error.

	A	B	C	D
1				
2		AMORTIZATION CALCULATION		
3		TOT. COST	50000	
4		#MONTHS	NA	
5		AMOUNT	NA	
6				
7				

FIGURE 6–5b

The “@NA” function is in Cell B3.

To avoid this problem, you can use another VisiCalc function. This function is “@NA”. “NA” stands for “NOT AVAILABLE”. If you place the function “@NA” in a cell where you don’t yet have the value, VisiCalc will place “NA” in every other cell referring to that cell. So, in Fig. 6–5b, you see “NA” in two places on the sheet because the formula in Cell B4 refers to B3.

	A	B	C	D
1				
2		AMORTIZATION CALCULATION		
3		TOT. COST	50000.00	
4		#MONTHS	24	
5		AMOUNT	2083.33	
6				
7				

FIGURE 6–5c

The “NA’s” disappear when you enter a number of months.

In part c of the same figure you see that as soon as you enter a number for the number of months, all calculations are completed. Use “@NA” while you’re setting up the sheet and have some blanks where figures aren’t

immediately available. You could simply let VisCalc give you an “ERROR”, which will disappear when you put the figure in place, but then you won’t be able to distinguish this kind of error from a true error.

SAVING PART OF THE SCREEN

Often you have a series of VisiCalc layouts containing related information. Perhaps you have the budget for one division on one layout and the budget for a second division on a second layout. Usually this is perfectly acceptable, but at times it’s useful to see both sets of information at once. You can do this by putting two printouts side by side, but VisiCalc has a way to let you pick up all or part of one screen and place it wherever you want on a second screen.

To save part of the screen you use the Data Interchange format, “DIF” for short. This format also allows you to transfer VisiCalc data to other programs, which is covered in detail later.

Using “DIF” to save part of the screen is relatively simple. It’s analogous to the Print command in that you save a rectangle from the screen, indicating the rectangle’s size by positioning the cursor on the cell that will be the upper-left corner and then typing the coordinates of the lower-right corner or pointing the cursor to that cell.

Figure 6–6 shows production at one plant for 12 months. Suppose you want to save the units and value columns of this layout so they can be placed on a second layout later.

	A	B	C	D
1		PLANT 1		
2	MONTH	UNITS	VALUE	
3		1	15000	161250
4		2	15188	163246
5		3	15377	165306
6		4	15570	167373
7		5	15764	169445
8		6	15941	171563
9		7	16141	173723
10		8	16343	175900
11		9	16547	178098
12		10	16774	180325
13		11	16984	182579
14		12	17196	184861
15				
16	TOTAL	192905	2073733	
17				
18				
19				

FIGURE 6–6

This shows production at one plant.

To begin the “DIF” process, type the “/” and pick “S” for “STORAGE”. This is the Storage menu:

```
STORAGE:  L S D Q #
```

You’ve learned all of these options before except “#”. The “#” option gives “DIF”. When you pick it, you’ll see these two options:

```
DATA:  SAVE LOAD
```

(Remember, you should be in the upper-left corner of the rectangle you want to save when you begin this command.) Figure 6–7 shows the process to this point.

B1 (L)PLANT1		C	
DATA: SAVE LOAD		25	
	A	B	C
1		PLANT 1	
2	MONTH	UNITS	VALUE
3		1	15000
4		2	15188
5		3	15377
6		4	15570
7		5	15764
8		6	15961
9		7	16161
10		8	16363
11		9	16567
12		10	16774
13		11	16984
14		12	17196
15			
16	TOTAL	192905	2073733
17			
18			
19			

FIGURE 6–7

The cursor is placed on B1 before the Storage command is executed and “#” selected from the menu.

Because you want to save this screen, you pick “SAVE” from the menu. Typing “S” is sufficient to indicate this choice. The prompt line next shows:

```
DATA SAVE: FILE FOR SAVING
```

Figure 6–8 shows this prompt and the filename response “PLANT1”.

B1 (L) PLANT 1				C
DATA SAVE: FILE FOR SAVING				25
PLANT 1				
	A	B	C	D
1		PLANT 1		
2	MONTH	UNITS	VALUE	
3	1	15000	161250	
4	2	15188	163264	
5	3	15377	165306	
6	4	15570	167373	
7	5	15764	169463	
8	6	15961	171583	
9	7	16161	173728	
10	8	16363	175900	
11	9	16567	178098	
12	10	16774	180325	
13	11	16984	182579	
14	12	17196	184861	
15				
16	TOTAL	192905	2073733	
17				
18				
19				

FIGURE 6-8

The filename has been typed.

Next, the prompt line shows "DATA SAVE: LOWER RIGHT". Move to the lower-right corner of the rectangle or type the coordinates. In the example, the cell is C16.

The last prompt you see is this:

DATA SAVE: R,C, OR RETURN

This tells VisiCalc whether you want to save the data by row or by column. For this purpose, choose the "R" option.

Peculiarities of the "DIF" Save

Once you have completed this sequence, VisiCalc will save the rectangle on the disk. You can then load it back in by selecting the "LOAD" option from the "#" menu. You should know at this point that when VisiCalc saves data using "DIF", it saves exactly what is on the screen. It does not save formulas, but only the labels and numbers showing on the screen. In the example in Fig. 6-8, the total entry in Cell B16 is a formula that sums all the entries above it. The "DIF" command will save the number in the cell instead of the formula.

Using "DIF" will also save every value at full precision. In Fig. 6-8 an Integer format rounded off all the figures to whole numbers. "DIF" will save these figures with the decimal.

“DIF” saves values at full precision.

Later you’ll see the effects of the “DIF” precision when you load the “DIF” file back in.

Loading a “DIF” File

Figure 6–9 shows another VisiCalc layout; this one showing production at plant 2. Suppose that after this is done you want to compare plant 2 to plant 1. Since the plant 1 figures are saved as a “DIF” file, you can load them onto this screen.

	A	B	C	D
1		PLANT2		
2	MONTH	UNITS	VALUE	
3		1	20999	225739
4		2	21261	228561
5		3	21527	231418
6		4	21796	234311
7		5	22069	237240
8		6	22345	240205
9		7	22624	243208
10		8	22907	246248
11		9	23193	249326
12		10	23483	252442
13		11	23777	255598
14		12	24074	258793
15				
16	TOTAL	270055	2903088	
17				
18				
19				

FIGURE 6–9

A related sheet.

“DIF” files can be loaded not only at their original position, but at any spot on the screen. Simply position the cursor in the upper-left corner of the rectangle where you want the information to appear. For example, in Fig. 6–9 you could place the plant 1 information in the rectangle starting at D1 or below plant 2 starting in Cell B17. However, it probably makes most sense to put plant 1 to the left of plant 2. Figure 6–10 shows the layout after inserting two columns to allow room for the plant 1 information.

You can load a “DIF” file at any location.

To recall the plant 1 layout, position the cursor in Cell B1 and type the “/”, “S”, and “#” commands. Then, from the choice “DATA: SAVE LOAD”, type “L” for “LOAD”. This prompt appears:

DATA LOAD: FILE TO LOAD

B1

DATA LOAD: FILE TO LOAD

PLANT1					
	A	B	C	D	E
1				PLANT2	
2	MONTH			UNITS	VALUE
3		1		20999	225739
4		2		21261	228561
5		3		21527	231418
6		4		21796	234311
7		5		22069	237240
8		6		22345	240205
9		7		22624	243208
10		8		22907	246248
11		9		23193	249326
12		10		23483	252442
13		11		23777	255598
14		12		24074	258793
15					
16	TOTAL			270055	2903088
17					
18					
19					

FIGURE 6-10

Two columns are inserted at B and C. Then the "DIF" file can be placed at B1.

B1 (L) PLANT 1

PLANT 1						
	A	B	C	D	E	
1		PLANT 1		PLANT2		
2	MONTH	UNITS	VALUE	UNITS	VALUE	
3		1	15000	161250	20999	225739
4		2	15187.5	163265.6	21261	228561
5		3	15377.34	165306.4	21527	231418
6		4	15569.56	167372.8	21796	234311
7		5	15764.18	169464.9	22069	237240
8		6	15961.23	171583.2	22345	240205
9		7	16160.75	173728.0	22624	243208
10		8	16362.76	175899.6	22907	246248
11		9	16567.29	178098.4	23193	249326
12		10	16774.38	180324.6	23483	252442
13		11	16984.06	182578.7	23777	255598
14		12	17196.36	184860.9	24074	258793
15						
16	TOTAL		192905.4	2073733.	270055	2903088
17						
18						
19						

FIGURE 6-11

The "DIF" file is loaded into the layout.

The response here is "PLANT1", as shown in Fig. 6-10. Next you see this prompt:

DATA LOAD: R,C, OR RETURN

Notice that the save and load prompts are almost identical. This time type "R" because that is how the data were saved. (Typing C would transform the data from loading across rows to loading down columns. This might sometimes be useful if you wanted to display the data in a different order on the screen.)

The data now load back on to the screen. Figure 6-11 shows the result. Notice that the plant 1 data are not in the Integer format. As explained before, "DIF" saves numbers with full precision.

You can now compare plant 1 and plant 2 on the same layout. Using the Global command, change the format to integer. Figure 6-12 shows the result of the Integer format.

	A	B	C	D	E
1		PLANT 1			
2	MONTH	UNITS	VALUE	PLANT2	VALUE
3	1	15000	161250	20999	225739
4	2	15188	163264	21261	228561
5	3	15377	165306	21527	231418
6	4	15570	167373	21796	234311
7	5	15764	169465	22069	237240
8	6	15961	171583	22345	240205
9	7	16161	173728	22624	243208
10	8	16363	175900	22907	246248
11	9	16567	178098	23193	249326
12	10	16774	180325	23483	252442
13	11	16984	182579	23777	255598
14	12	17196	184861	24074	258793
15					
16	TOTAL	192905	2073733	270055	2903088
17					
18					
19					

FIGURE 6-12

After that, the Global Integer format is used.

"DIF" saves the numbers in the cells and not the formulas that created them. This means that if you alter a figure in the section recalled from a "DIF" file, no other figure on the screen will change! In Fig. 6-13, you have changed the plant 1, month 1 units total to 16,000. The total for 12 months did not change. Notice that the cursor is on the total cell and that the entry contents line shows a number, not the formula "@SUM(B3...B14)" that was

originally placed in that cell. "DIF" is thus useful only to accumulate data on one sheet but not for playing "What if?" or changing data once you've got it all in one place.

"DIF" saves numbers, not formulas.

B16 (V) 192905					
	A	B	C	D	E
1		PLANT 1		PLANT2	
2	MONTH	UNITS	VALUE	UNITS	VALUE
3		1	16000	20999	225739
4		2	15188	21261	228561
5		3	15377	21527	231418
6		4	15570	21796	234311
7		5	15764	22069	237240
8		6	15961	22345	240205
9		7	16161	22624	243208
10		8	16363	22907	246248
11		9	16567	23193	249326
12		10	16774	23483	252442
13		11	16984	23777	255598
14		12	17196	24074	258793
15					
16	TOTAL	192905	2073733	270055	2903088
17					
18					
19					

FIGURE 6-13

The total does not change when the first item in Column B changes because the "DIF" file contains a number, not a formula.

REVIEW

1. In Fig. 6-14, what should the recalculation order be?
2. If the calculation order in Fig. 6-14 is "C", how would you change it to "R" for "ROW"?

	A	B	C	D	E
1		JANUARY SALES			
2		WEEK1	WEEK2	WEEK3	WEEK4
3	SALES	10000	15000	16799	13444
4	AVER. SALE	13810.75			
5					
6					
7					

FIGURE 6-14

Look at this layout to answer review questions 1 and 2.

3. In Fig. 6-15, the layout shows total units sold and total dollar volume for a three-month period and the average price of a unit sold. At this point the layout is just being set up and the formulas entered and replicated. Next the data will be entered. To avoid seeing "ERROR" appear in any cell, where would you place the "@NA" functions?

	A	B	C	D
1				
2		MONTHS		
3				
4	UNITS SOLD	1	2	3
5	TOTAL \$			
6	AVE. PRICE			
7				
8				
9				

FIGURE 6-15

Look at this layout to answer question 3.

4. Figure 6-16 shows a simplified budget for one division of a company. The budgeted figures and the actual expenses for January are shown. The same figures are kept for each division of the company. Finance, human resources, and production each have a layout like this for January with their own figures. The task is to merge all the material on one report for January that will have the appearance of Fig. 6-17. How would you transfer the marketing figures to this new layout? What steps would you follow? What commands would you enter?

	A	B	C	D
1	MONTHLY			
2	BUDGET			
3	MARKETING			
4	*****			
5		BUDGET	ACT. (JAN)	
6	SUPPLIES	1000	750	
7	SALARIES	20500	20500	
8	TRAVEL	3000	1400	
9	OVERHEAD	2500	2500	
10	TOTAL	27000	25150	
11				
12				
13				

FIGURE 6-16

Look at this layout to answer question 4.

	A	B	C	D	E
1	ACTUAL				
2	MONTHLY				
3	EXPENSES		JANUARY		
4	*****				
5		MARKETING	HUMAN.R.	PRODUCT.	FINANCE
6	SUPPLIES	750	750	1000	1000
7	SALARIES	20500	18000	30000	28000
8	TRAVEL	1400	500	1000	0
9	OVERHEAD	2500	2500	2500	2500
10	TOTAL	25150	21750	34500	31500
11					
12					
13					

FIGURE 6-17

Look at this layout to answer question 5.

5. Once you've combined all the budget figures from all the departments in Fig. 6-17, can you make any corrections to the individual budget figures? What will be the effect if you make a change?

Answers

- The order should be across the rows because the average in Column A refers to items in columns to its right.
- Type "/" and "G" for "GLOBAL", pick "O" from the Global menu (for "ORDER"), and choose "R" for "ROW".
- "@NA" would go in each units sold cell. You'd place it in one and replicate across the screen. Otherwise, because total sales are divided by units to give the average price per unit, all averages will be divided by zero.
- You would save part of the marketing budget screen and load it onto the combined layout screen. The steps to follow would be to position the cursor on Cell C6 in Fig. 6-16, type the "/" and "S" commands, and pick choice "#" from the Storage menu. Pick choice "S" to save a "DIF" file and give the file a name like "MARKETING". The lower-right corner is Cell C10.
Then put together a combined department layout with a blank Column B and position the cursor in Cell B6. This time go through the same steps as before, but pick choice "L" to load the file. Give the same filename as before. The figures will load into Column B on the new layout.
- You can alter the items; however, the total won't change because it is not a formula, but a number. You could reenter a formula for the total; of course, the recalculations would then take place.

LOOKING UP INFORMATION IN A TABLE

In office work, much important information for calculations is found in tables, such as price sheets, quantity discount rates, and the like. In working with VisiCalc for tasks like making projections of sales, you need to use the same kinds of information. Of course, you can enter a price or discount rate directly in a formula, but this can be a nuisance when you need the same figure in several formulas on the sheet and want to experiment with different values for the price or discount. VisiCalc instead allows you to place a table on the VisiCalc sheet and to cause other formulas on the sheet to “look up” the appropriate value in the table just as you would do yourself in a hand calculation.

To cause a table lookup, you use the function command “@LOOKUP”.

To begin the Lookup function, place a table of information on the sheet outside the area you’re using for calculations. Use either a row or column arrangement for the table. Figure 6–18 shows a table of commissions to be paid to salespeople based on their total sales volume for the year. In Column C are the sales figures; next to these, in Column D, are the commissions for those figures. For example, the commission on \$100,000 is 2%.

	A	B	C	D
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12			COMMISSION TABLE	
13			*****	
14			SALES	COMM.
15			100000	.02
16			125000	.05
17			150000	.07
18			175000	.1
19			200000	.12
20			225000	.15
21			250000	.17
22			275000	.2
23			300000	.23
24				

FIGURE 6–18

The lookup table is placed below the area to be used for calculations.

When you set up a table in columns, place the values to be looked up in one column and the values to be found to the right of them. In setting up an arrangement by rows, put the values to be looked up in one row and the values to be found below, as in Fig. 6-19. If you are unsure which value should be looked up and which should be the value found in the table, simply imagine the calculation as a manual one and decide which figure you'd be looking for in the table yourself. VisiCalc will look for the same figure.

	A	B	C	D	E	F	G
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14	SALES	100000	125000	150000	175000	200000	225000
15	COMM.	.02	.05	.07	.1	.12	.15
16							
17							
18							

FIGURE 6-19

The table is arranged across the screen.

In Lookup tables place the values to be looked up above or to the left of the values to be found.

Now you're ready to begin using the information. Figure 6-20 shows the entry of four salespeople and their sales figures. These are the figures you need to calculate the commission, but thus far you haven't performed that calculation.

Now, in Column C you need to get the commission rate. The formula for the first salesperson will be replicated for the other three. In Cell C2 you need a formula to find the proper percentage. The proper percentage will result from the Lookup command. This is what the formula will look like:

`@LOOKUP(B2,C15...C23)`

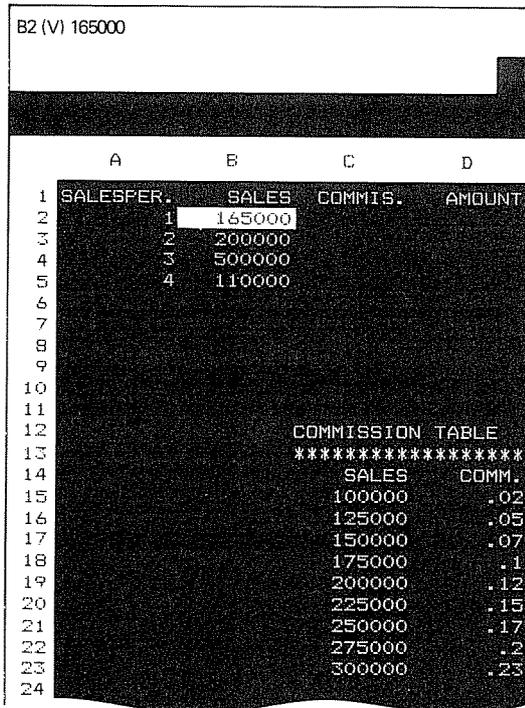


FIGURE 6-20

The layout shows four salespeople and their sales.

The Lookup command has two separate items in parentheses, separated by a comma. The first item is the number to be looked up in the table, in this case, the value stored in Cell B2 as the sales. Next is the range in which the Lookup table will be found. Notice that the range given is that of the number to look up, not of the value to be found. Column C, not D.

The formula is replicated for the other three salespeople. The formulas follow this form:

@LOOKUP(B3, C15...C23)

Figure 6-21 shows the results of the lookup calculations. How does VisiCalc perform the lookup? It looks down the table until it reaches a number equal to the one it is looking up. If no number is equal, it finds the largest number that is not greater than the number it's looking up. The corresponding value in the next column is the one it picks. For salesperson 1, for example, VisiCalc looked up \$165,000 in the table. It went down the table until it found 150,000. That number is not greater than 165,000, but the next number in the table, 200,000, is greater. So 150,000 is the match and the corresponding value in the next column is .07. This is the number VisiCalc printed in Cell C2.

C2 (V) @LOOKUP(B2.C15...C23)			
	A	B	C
1	SALESREP	SALES	COMMISS.
2	1	150000	.07
3	2	200000	.12
4	3	500000	.23
5	4	110000	.03
6			
7			
8			
9			
10			
11			
12		COMMISSION TABLE	
13		*****	
14		SALES	COMM.
15		100000	.02
16		125000	.05
17		150000	.07
18		175000	.1
19		200000	.12
20		225000	.15
21		250000	.17
22		275000	.2
23		300000	.23
24			

FIGURE 6-21

This shows the results of lookup.

To take another example, salesperson 2 had sales of exactly 200,000. So VisiCalc found the number 200,000 in the table. It was equal to the lookup value, but not greater than it. So the result was the corresponding figure of .12.

Now you need to fill in the amount column to determine the exact commission. This is done in Cell D2 with the formula “+C2*B2”, multiplying the commission times the sales. The Integer format can be used to round off. This formula is replicated for the other salespeople. The results are shown in Fig. 6-22.

You should be aware of a few other things about the Lookup function. Because VisiCalc looks for a number that is not *greater* than the lookup value when it goes through the table, if the first number in the table is greater than the number you are entering, it can't find a match. It places “NA”, for “NOT AVAILABLE” in the cell instead. Look at Fig. 6-23. Salesperson 5 had sales of \$75,000. VisiCalc couldn't find a number smaller than or equal to 75,000 in the table, and so it printed “NA”.

D2 /F1 (V) +C2*B2

	A	B	C	D
1	SALESPER.	SALES	COMMIS.	AMOUNT
2	1	165000	.07	11550
3	2	200000	.12	24000
4	3	500000	.23	115000
5	4	110000	.02	2200
6				
7				
8				
9				
10				
11				
12			COMMISSION TABLE	
13			*****	
14			SALES	COMM.
15			100000	.02
16			125000	.05
17			150000	.07
18			175000	.1
19			200000	.12
20			225000	.15
21			250000	.17
22			275000	.2
23			300000	.23
24				

FIGURE 6-22

This layout shows all the commissions.

C6 (V) @LOOKUP(B6,C15..C23)

	A	B	C	D
1	SALESPER.	SALES	COMMIS.	AMOUNT
2	1	165000	.07	11550
3	2	200000	.12	24000
4	3	500000	.23	115000
5	4	110000	.02	2200
6	5	75000	NA	NA
7				
8				
9				
10				
11				
12			COMMISSION TABLE	
13			*****	
14			SALES	COMM.
15			100000	.02
16			125000	.05
17			150000	.07
18			175000	.1
19			200000	.12
20			225000	.15
21			250000	.17
22			275000	.2
23			300000	.23
24				

FIGURE 6-23

There is no value corresponding to \$75,000 in the lookup table.

An easy solution to this problem is to place a small enough value in the table so that VisiCalc can always find a number equal to or less than the lookup value. For example, in Fig. 6-24, a line is added to the commission table. Now any sales figure greater than 0 but less than 100,000 will have the corresponding commission of 0%. (So the commission will also be \$0, which is what is intended by this commission arrangement.)

Put a 0 in every lookup table.

C6 (V) @LOOKUP(B6,C15..C24) C

	A	B	C	D
1	SALESPER.	SALES	COMMISS.	AMOUNT
2		165000	.07	11550
3		200000	.12	24000
4		500000	.23	115000
5		110000	.02	2200
6		75000	0	0
7				
8				
9				
10				
11				
12			COMMISSION TABLE	
13			*****	
14			SALES	COMM.
15			0	0
16			100000	.02
17			125000	.05
18			150000	.07
19			175000	.1
20			200000	.12
21			225000	.15
22			250000	.17
23			275000	.2
24			300000	.23

FIGURE 6-24

The table shows a new line for sales of \$0. Notice that the lookup function range had to be changed to accommodate the larger table.

If a value is greater than any in the table, VisiCalc will give the last corresponding figure. This is why salesperson 3, with sales of \$500,000, got the commission rate for \$300,000 and above.

Using @LOOKUP in Formulas

Like other functions, the Lookup function can be used in formulas. In Fig. 6-24, for example, it is not necessary to use the Lookup function to find the commission rate in one cell and then do the calculation of commission

amount in a different cell. Instead, the commission formula can contain the Lookup function and multiply the result by sales. In Fig. 6-25 both lookup and calculating are completed in Column C. The formulas in Column C follow this form:

`@LOOKUP(B2, C15...C24)*B2`

C2 /FI (V) @LOOKUP(B2,C15...C24)*B2

	A	B	C	D
1	SALESPER.	SALES	COMMISS.	
2	1	165000	11550	
3	2	200000	24000	
4	3	500000	115000	
5	4	110000	2200	
6	5	75000	0	
7				
8				
9				
10				
11				
12			COMMISSION TABLE	
13			*****	
14			SALES	COMM.
15			0	0
16			100000	.02
17			125000	.05
18			150000	.07
19			175000	.1
20			200000	.12
21			225000	.15
22			250000	.17
23			275000	.2
24			300000	.23

FIGURE 6-25

Lookup and calculating are combined in one formula.

VisiCalc proceeds to look up the value of Cell B2 in the table and to find the commission rate. The rest of the formula tells VisiCalc to multiply that commission rate times the sales figure in Cell B2. The result shows in Cell C2.

CHOOSING FROM A LIST

A related function allows you to include a table in the formula itself rather than placing it elsewhere on the sheet. The function is “@CHOOSE”, and it is available in some versions of VisiCalc. Check the manual and reference card that come with your copy of VisiCalc to determine whether @CHOOSE is available. If it is not, skip to the review questions.

Figure 6-26 shows the Choose function in a calculation of employee bonuses. There are four different levels of bonuses possible, and these are shown by number (1-4) in Column C.

D2 (V) @ CHOOSE(C2,.10,.12,.15,.18)*B2				
	A	B	C	D
1	EMPLOYEE	SALARY	BONUS#	BONUS
2	ANDERSON	19500	1	1950
3	JONES	32000	4	5760
4				
5				
6				

FIGURE 6-26

The Choose function picks the first item in the list because C2 is 1.

The Choose function is then used in Column D to choose the correct bonus figure from a table and multiply it by the salary. This is what the formula in Cell D2 looks like:

```
@CHOOSE(C2, .10, .12, .15, .18)*B2
```

The Choose function contains two kinds of information inside the parentheses. The first is a cell; following it, separated by commas, is a list of values. To do the calculation, VisiCalc looks first at the cell to find the number there. It then uses this number as a counter and counts through the list of values. If the number in the cell is 1, for example, it counts to the first of the values and picks that one. If it is 8, it counts to the eighth one and chooses that (provided there are eight elements in the list; otherwise it gives "NA").

In the example in Fig. 6-26, VisiCalc looks at Cell C2 and finds the number 1. It counts to the first item in the list and chooses .10. It then multiplies this by the salary in Cell B2, \$19,500, and gives the result \$1950 as the bonus. In Cell D3, the function chooses the fourth item, .18, and multiplies that times the salary.

The Choose function will work only when you have a fairly small integer to use as a counter. Then it saves you the trouble of setting up a lookup table. But the Choose function is awkward to use for large numbers or a large number of items because the list becomes so long. Use Lookup instead.

REVIEW

- 1. How would you write a command to look up the value in Cell G6 in a table located between A2 and A16?
- 2. How would you look up 500 in the same table?
- 3. What two ways could you implement this table with VisiCalc? What command would you use to find the value corresponding to 1 in the table?

1	.35
2	.45
3	.50
4	.65

- 4. Figure 6-27 shows the beginning of a quantity price list for a series of products. In the cells under the various quantities, you want to place the price for that quantity, taking into account the quantity discount rate below on the sheet. The formula will be fairly complex. To start, for 100 of item 1, what Lookup function would be used?

	A	B	C	D	E	F	G
1		PRICE SCHEDULE					
2	ITEM #	UNIT PRICE	QUANTITY PRICES				
3			100	250	500	750	1000
4							
5	1	11.75					
6	2	28.90					
7	3	31.05					
8	4	9.90					
9							
10		DISCOUNT					
11		0	0				
12		250	.05				
13		500	.07				
14		750	.075				
15		1000	.1				
16							
17							
18							

FIGURE 6-27

Look at the layout to answer the review questions.

- 5. How will this Lookup function be embedded in a formula in Cell C5 to determine the price for 100 of item 1?
- 6. What will be the formula in Cell E8?

7. This layout also has a Choose function. Instead of simply entering the price in Column B, you have a formula in each cell in Column B that picks the proper manufacturing cost for the item and multiplies it times a markup of 500%. The four cost figures are \$2.35, \$5.78, \$6.21, and \$1.98. What is the formula in Cell B5? How are the other prices added to the layout? What is the advantage of this method?

Answers

1. "@LOOKUP(G6,A2...A16)".
2. "@LOOKUP(500,A2...A16)".
3. You could set up the table in, for example, Cells B15 to B18. Then you could write Lookup functions like "@LOOKUP(1,B15...B18)". Or you could use the Choose function without a table on the screen. The function would be written "@CHOOSE(1,.35,.45,.50,.65)".
4. "@LOOKUP(C3,B11...B15)" or "@LOOKUP(100,B11...B15)".
5. The formula will be "+B5-(@LOOKUP(C3,B11...B15)*B5)*C3". This formula takes the price in Cell B5, subtracts an amount equal to the discount rate times the price, and multiplies the whole times the quantity in Cell C3.
6. "+B8-(@LOOKUP(E3,B11...B15)*B8)*E3".
7. "@CHOOSE(A5,2.35,5.78,6.21,1.98)*5". This formula is replicated down the column. The advantage is that prices are calculated for you based on manufacturing costs, but the costs and markup are kept confidential.

EVALUATION WITH VISICALC: BOOLEAN ALGEBRA

This section covers a series of functions that cause VisiCalc to take actions based on the results of calculations. These functions are the "Boolean functions" and are available in newer VisiCalc versions. To determine whether you have the Boolean functions, check the manual or reference card for your VisiCalc, looking for the functions "@AND", "@IF", "@NOT", "@OR".

The Boolean functions come from Boolean algebra, which is concerned with values that evaluate as either true or false. In VisiCalc, the Boolean functions evaluate a statement like "The number in Cell B2 is less than the number in Cell C12" and determine whether that statement is true or false. The power of the functions comes not just from knowing whether such a statement is true or false, but from the fact that you can instruct VisiCalc to take one action if the statement is true and another if it is false.

The @AND Function

This function gives you either “TRUE” or “FALSE” in the cell on the screen. The first Boolean function looks at a series of values and gives the result “TRUE” only if all the values are true. You could read an And function like this: “If Cell B1 is greater than Cell G5 AND if Cell B1 is less than Cell H2, then the result is true; otherwise it is false.” You would write this function for VisiCalc as follows:

```
@AND(B1>G5, B1<H2)
```

The material inside the parentheses tells VisiCalc what to evaluate. The symbols “>” and “<” mean “greater than” and “less than.” The other symbols used in these evaluations are shown in Procedure 6–1.

PROCEDURE 6–1 Symbols for Comparison

The comparisons for Boolean functions are done with the following symbols:

<i>Symbol</i>	<i>Meaning</i>	<i>Example</i>
<	less than	B1<C4 means the number in B1 is less than the number in C4. So if B1 is 2 and C4 is 3, the result is true; if B1 is 3 or 4 or more, the result is false.
>	greater than	B1>C4 means the number in B1 is larger than the number in C4. So if B1 is 3 and C4 is 2, the result is true. (<i>Note:</i> The larger side of the symbol is toward the larger number.)
=	equal to	B1=C4 means B1 is equal to C4.
<>	is not equal to	B1<>C4 means B1 is not equal to C4. If B1 is 6 and C4 is 7, the result is true; if they are both 6, the result is false.
<=	either less than or equal to	B1<=C4 means B1 is either less than or the same as C4. So if B1 is 1 or 2 and C4 is 2, the result is true. If B1 is 3, the result is false.
>=	either greater than or equal to	B1>=C4 means B1 is larger than or equal to C4. So if B1 is 3, 4, or more and C4 is 3, the result is true. If B1 is 2, the result is false.

Figure 6–28 shows the And function in Cell A2. The function reads: “@AND(A1>B1, B1>C1, C1>D1)”. All these comparisons must be true for

the result to be true. In Fig. 6-28 each comparison is true: 10 is greater than 5; 5 is greater than 2; 2 is greater than 1. Therefore the result in Cell A2 is true.

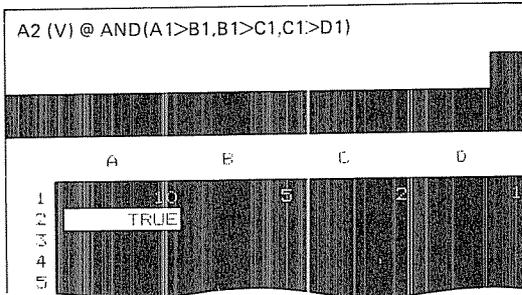


FIGURE 6-28

The And function is in Cell A2.

In Fig. 6-29 one number on the screen is changed. What will the result be now that Cell D1 is 10? The first two comparisons are still true, but "C1>D1" is now false. In the And function, all the comparisons must be true for the result to be true. Otherwise it is false. Therefore, in Fig. 6-29, the result in Cell A2 is false.

In the And function all the comparisons must be true for the result "TRUE".

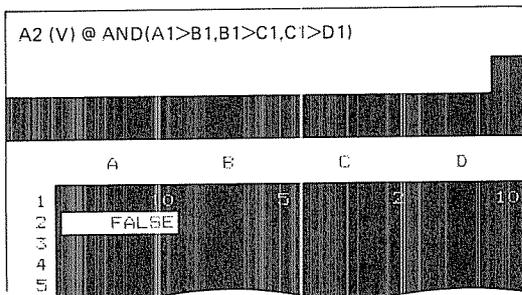


FIGURE 6-29

All of the comparisons are not true, so the result is "FALSE".

The @OR Function

This function looks at a series of values and gives the result true if at least one comparison is true. You could read an Or function like this: "If Cell B1 is greater than Cell C4 OR Cell G4 is less than Cell A3, then the result is true; but if neither is true, the result is false. This is written as follows:

@OR(B1>C4,G4<A3)

Figure 6-30 shows the Or function “@OR(A1>B1,B1>C1,C1>D1)” in Cell A2. This time it doesn’t matter that one of the three comparisons is not true. Since one of them *is* true, the result is true. The result would be false only if the other comparisons were false as well.

Only one comparison needs to be true for a “TRUE” result with the Or function.

A2 (V) @ OR(A1>B1,B1>C1,C1>D1)				
	A	B	C	D
1	10	5	2	10
2	TRUE			
3				
4				
5				

FIGURE 6-30

One comparison is not true, but the Or function looks for only one true result to put “TRUE” in the cell.

The @ISNA Function

This function looks at just one cell or one comparison. If that cell or that comparison will result in “NA” for “NOT AVAILABLE”, then the result is true; if anything else is in that cell, then the result is false.

In Fig. 6-31 the ISNA function is in Cell A2. It reads:

@ISNA(C1)

A2 (V) @ ISNA(C1)				
	A	B	C	D
1	10	5	NA	10
2	TRUE			
3				
4				
5				

FIGURE 6-31

The result is true because “NA” is in Cell C1.

Because Cell C1 contains NA, the result is true. If anything else was in Cell C1, the result would be false.

The @ISERROR Function

This function works like ISNA. It looks at just one cell to determine if that cell is an error. If it is, the result is true; otherwise, it is false.

In Fig. 6-32, Cell A2 contains the function “@ISERROR(C1/C2)”. As Cell C2 contains nothing, dividing C1 by C2 will result in a division by zero error, so Cell A2 is “TRUE”.

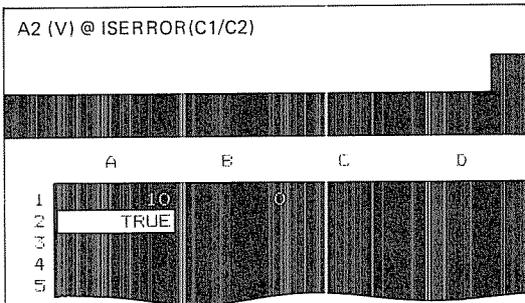


FIGURE 6-32

The calculation will result in an error, so the result of the function is true.

The @NOT Function

The Not function can be confusing; it’s similar to a double negative. You can read a Not function like this: “If it’s NOT the case that Cell A1 is greater than Cell B1, then the result is true.” The function is written like this:

@NOT(A1>B1)

Figure 6-33 shows how this function works in a layout. In the figure, Cell A2 contains the preceding formula. To result in true, the comparison would have to be a false one. However, A1 is indeed greater than B1; therefore, the Not function results in false. If A1 was *not* greater than B1, the result would be true.

The Not function gives the opposite result from the And function.

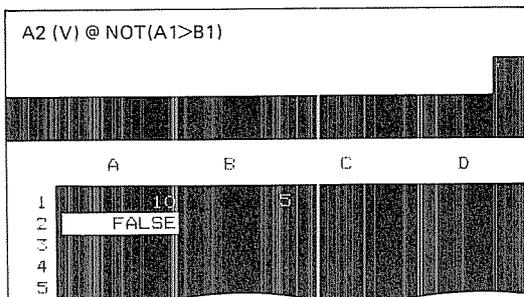


FIGURE 6-33

The result is false because A1 is greater than B1.

The Power of the Boolean Functions: The @IF Function

Now, you are ready to look at a function that does something besides print “TRUE” or “FALSE” on the screen. This is the “@IF” function. The If command gives VisiCalc two different actions to take, one if the result is true, and one if it is false. Instead of printing “TRUE” or “FALSE” on the screen, VisiCalc takes one of these two actions. The actions are always a value to be placed in the cell. Sometimes the value is that in a cell (G5, for example); sometimes it is a number or formula.

This is how you could read an If function: “If A1 is greater than B1, then print A1; otherwise print B1.” That function would appear on the screen as follows:

```
@IF(A1>B1,A1,B1)
```

The material within the parentheses has three parts. The first is the comparison, followed by the value to use if the comparison is true, then the value to use if it is false. In Fig. 6–34 this formula is in Cell A2.

	A	B	C	D
1	10	5		
2	10			
3				
4				
5				

FIGURE 6–34

The “@IF” formula in Cell A2 selects A1 if the comparison is true.

When the comparison (A1>B1) was made, the result was true, so VisiCalc took the first action called for and simply placed the value of A1 in the cell.

In Fig. 6–35 Cells A1 and B1 are changed so that A1 is not greater than B1. Now the function in A2 makes the comparison and moves to the second value, the one for the false result, and places B1 in the cell. This use of the If function causes VisiCalc to pick the larger of two numbers and put that in the cell.

	A	B	C	D
1	10	20		
2	20			
3				
4				
5				

FIGURE 6–35

Now the comparison is false and the second value (B1) is selected.

Now look at a more complex example using the If function. In Fig. 6-36, we want to do a sales projection assuming a steady growth of 10% per month. However, we know that capacity at this plant will limit the amount that can actually be sold in a month to \$200,000. Therefore, we don't want to show any numbers greater than 200 on the layout. Notice that in Fig. 6-36 sales do level out in month 3, and only 200 appears after that.

D2 /FI (V)@IF(C2*1.1>=200,200,C2*1.1)							
	A	B	C	D	E	F	G
1		MONTH 1	MONTH 2	MONTH 3	MONTH 4	MONTH 5	MONTH 6
2	SALES	175	193	200	200	200	200
3	COSTS	125	137	143	143	143	143
4	MARGIN	50	55	57	57	57	57
5							
6							
7							

FIGURE 6-36

From Cell D2 on across the row the result of the calculation is greater than 200, so VisiCalc puts 200 in the cell.

The result in Fig. 6-36 is accomplished with the If function. After month 1, each month's sales figure contains a formula that will increase sales only if they will not exceed 200. That formula is:

```
@IF(B2*1.1>=200,200,B2*1.1)
```

In the first part of the function, VisiCalc does the calculation on the previous month's sales, multiplying it by 1.1 and compares to see if that number is greater than or equal to 200. In month 2, the result is false, so VisiCalc picks the second action, does the multiplication, and places the product in the cell. However, in month 3, when the result is true because the number will be greater than 200, VisiCalc takes the first action and places 200 in the cell.

This kind of comparison is very useful when you want to set a limit on commissions or costs or want to figure a tax only up to a maximum base.

The If function can set a limit on the result of calculations.

Embedded Functions

Now that you have seen how the If function works, you can understand how to use the functions covered earlier, those that give just a true or false. You place these functions as the first item in the parentheses of an If function,

and the If function will take an action based on whether the function results in a true or false. The “TRUE” or “FALSE” won’t appear on the screen—VisiCalc will simply use it to make a decision.

Figure 6–37 shows how the And function can be embedded in the If function. In Cell A2 is the function

$$\text{@IF}(\text{@AND}(\text{A1}>\text{B1}, \text{B1}>\text{C1}), 100, 0)$$

	A	B	C	D
1	10	6	5	
2	@IF(@AND(A1>B1,B1>C1),100,0)			
3				
4				
5				

FIGURE 6–37

This layout shows an embedded function.

VisiCalc checks to see if the And function results in true, meaning both conditions have to be true. Because the result is true, VisiCalc takes the first action and places 100 in a cell.

Figure 6–38 shows a case where it would be useful to embed the ISERROR function in the If function. The formulas are set up for the whole layout, but since this is an actual, not a projected sheet, not all the figures are yet in place. In Cell D7, the formula for percentage is “D6/D4”. The result is an error because no figure is yet in D4.

	A	B	C	D
1				
2				
3				
4	SALES	175	190	
5	COSTS	125	136	
6	MARGIN	50	54	
7	PERCENT	29	29	
8				
9				
10				

FIGURE 6–38

The result in Cell D7 is a division by zero error.

Rather than have the word "ERROR" appear on the sheet for every blank month, use the function shown in Fig. 6-39. This function causes VisiCalc to see if the division will result in an error, and if this is true, print a 0 in the cell instead. If the division won't be an error, VisiCalc will print the result of the division. This means that when figures are entered in Cells D6 and D4, the percentage will appear.

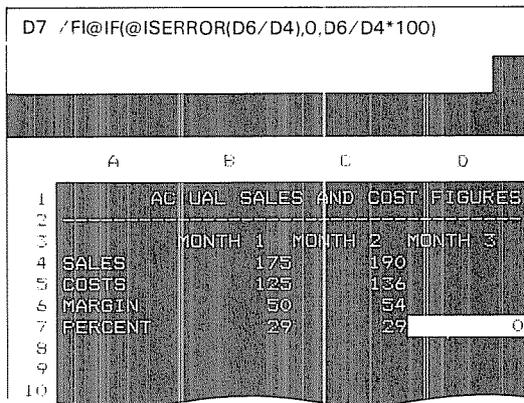


FIGURE 6-39

The function eliminates the error message.

REVIEW

1. How would you write a function to give you "TRUE" when C1 is greater than C2 and D1 is greater than D2? How would you write a function to give you "TRUE" when C1 was at least as large as C2 and D1 was the same size or smaller than D2?
2. How would you write a function to evaluate as true when either C1 was equal to C2 or D1 was not equal to D2?
3. What would appear in Cell C4 of Fig. 6-40 if the function was "@AND(C3>=C2)". Would the function work at all?

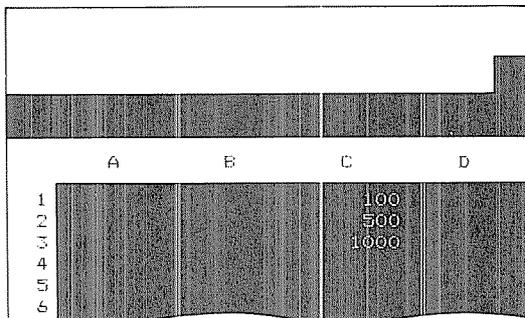


FIGURE 6-40

Look at this layout to answer the review questions.

4. In Fig. 6-40, what would appear in C4 as the result of the function “@ISERROR(C3/C2)”?
5. In Fig. 6-40, what would be the result of the function “@NOT-(C2>C3)”?
6. What function would you put into C4 to pick the smaller number between C3 and C2 and print it?
7. What function would you put into C4 to print 1000 if either C1, C2, or C3 are 1000, and to print 0 if none of them are 1000?

Answers

1. “@AND(C1>C2,D1>D2)” is the first function.
“@AND(C1>=C2,D1<=D2)” is the second function.
2. “@OR(C1=C2,D1<>D2)” is the function.
3. The Or and And functions work with any number of items in the list, so it will work. The result will be true.
4. False.
5. True.
6. “@IF(C3<C2,C3,C2)”.
7. “@IF(@OR(C1=1000,C2=1000,C3=1000),1000,0)”.

SUMMARY

Chart 6-1 summarizes all the VisiCalc commands covered so far, with those covered in Chapter 6 highlighted.

CHART 6-1 Summary

DIRECT ENTRIES

Labels, numbers, and formulas are entered directly on the screen: Use a “+” before coordinates like A1 in a formula; use “” before a numeric symbol in a label.

> lets you go to any cell directly.

← → ↑ ↓ move you around the screen.

! recalculates the screen automatically.

! when used in a formula, performs calculations to that point.

when used in a formula, picks up the cell's value and places it in the formula.

FUNCTION COMMANDS

@SUM(A1...A16) adds this range of cells; it can have several ranges separated by commas.

@COUNT(A1...A16) counts the number of entries in the range.

@AVERAGE(A1...A16) averages the entries in the range.

@MAX(A1...A16) chooses the largest in a range.

@MIN(A1...A16) chooses the smallest in a range.

@INT(A1) gives the integer value of the entry.

@NPV(.10,A1...A16) gives the net present value of the cash flows in the range. Discounts the value by the percentage given in the parentheses.

@NA is placed where information is not yet available. All related formulas show "NA".

@LOOKUP(A1,B15...B23) looks up a value (first item in parentheses) in the table indicated by the range.

@CHOOSE(A1, 1,2,3,4,5,6) takes the value in the first item in the list and uses that as a count to choose one of the remaining items in the list.

@AND(A1>B1,B1<C1) results in TRUE if all comparisons are true, FALSE if any is false.

@IF(A1<B1,A1,B1) does the first comparison and takes the first value if TRUE and the second if FALSE.

@ISERROR(A1) returns TRUE if the item in parentheses is an error.

@ISNA(A1) returns TRUE if the item in parentheses is not available.

@NOT(A1>A2) returns TRUE if this is Not true and FALSE if it is true.

@OR(A1>A2,B1<B3) returns TRUE if any one of the comparisons in parentheses is true, otherwise it indicates FALSE.

MENU COMMANDS

The main menu is: COMMAND: BCDEFGIMPRSTVW-

/B blanks out a cell.

/C clears the whole screen; press Y to confirm.

/D deletes a column or row.

/E lets you edit an entry on some computers.

/F sets the format for a cell. The menu is: DGILR\$*

Choices: D, default; G, general; I, integer; L, left; R, right; \$, dollars and cents; *, graph.

/G is the Global command. The menu is: CORF

Choice C sets the column width between 3 and 40

Choice F sets the format globally for every cell on the screen that does not have its own format set with the /F command. The options are the same as for /F.

Choice R selects either manual or automatic recalculation.

Choice O sets the order of recalculation either R, for across rows, or C for the normal mode of down the columns.

/I inserts a blank row or column.

/M moves a row or column to a new location.

/P prints a rectangle described by its upper-right and lower-left corners.

/R replicates one entry or a row or column to one or more other locations. Give a source and target range when prompted.

/S is the Storage command. The menu is: LSDQ#

Choices: L, load a file; S, save a file; D, delete a file; Q, quit VisiCalc.

Choice S allows you to print the formulas behind the VisiCalc sheet by giving a filename that refers to the printer: ":P" for TRS-80.

Choice # saves a "DIF" file for retrieval to another screen or other VisiCorp program.

/T fixes titles either horizontally, vertically, or both.

/V gives you the copyright notice and version number.*

/W splits the screen into two windows, horizontally or vertically.

/- is the repeating label. It allows you to pick a character or characters that will repeat across the cell.

*Not covered in this book.

PRACTICE EXERCISES

EXERCISE 1 Load VisiCalc, enter figures, use the repeating label, replicate, change the recalculation order, use the Move command, use @NA.

1. Load VisiCalc. Enter the layout shown in Fig. 6-41. The formulas in Rows 6 and 7 compute each store's percentage of the total for the quarter.

	A	B	C	D	E
1	QUARTERLY SALES				
2		Q1	Q2	Q3	Q4
3					
4	STORE1	100			
5	STORE2	265			
6	STORE1 %	27			
7	STORE2 %	73			
8					
9					
10					

FIGURE 6-41

Enter this layout.

2. Replicate the formulas for percentage across the four quarters. The formulas should be in this form: "+ B4/(B4+B5*100)".
3. Now save the work you've done so far. You will need it in Exercise 5.
4. You will now have errors showing in Columns C to E because you're dividing by 0. Place "@NA" where it is needed to have the calculations on Rows 6 and 7 show "NA" instead of "ERROR". Your layout should look like Fig. 6-42. (Don't use @Ierror yet.)
 "@NA" should be placed in the cells in Rows 4 and 5 where store sales will be inserted later.

	A	B	C	D	E
1	QUARTERLY SALES				
2		Q1	Q2	Q3	Q4
3					
4	STORE1	100	NA	NA	NA
5	STORE2	265	NA	NA	NA
6	STORE1 %	27	NA	NA	NA
7	STORE2 %	73	NA	NA	NA
8					
9					
10					

FIGURE 6-42

Your layout should look like this.

5. Now fill in the quarterly totals shown in Row 4 of Fig. 6-43. (A row must be inserted first.) Will this work? What must be done?
6. The totals come before the things they total. This is a poor design. Instead, move the totals to below the store figures and above the percentages. Use the Move command to reposition the totals.

	A	B	C	D	E
1	QUARTERLY		SALES		
2	-----				
3		Q1	Q2	Q3	Q4
4	TOT. SALES	365	NA	NA	NA
5	STORE1	100	NA	NA	NA
6	STORE2	265	NA	NA	NA
7	STORE1 %	27	NA	NA	NA
8	STORE2 %	73	NA	NA	NA
9					
10					
11					

FIGURE 6-43

Enter the totals in Row 4.

7. Now add quarterly figures similar to those shown in Fig. 6-44. Add the yearly total in Cell B9. This should be the total of all the quarterly totals.
8. Change one sales figure. Does it show up in the total? What can be done? Change the recalculation order to across rows.
Remember, this is a Global command, choice "O" on the Global menu.
9. Save the layout if you wish, but save it under a different name from the one you used earlier in this exercise.

	A	B	C	D	E
1	QUARTERLY		SALES		
2	-----				
3		Q1	Q2	Q3	Q4
4	STORE1	100	120	150	110
5	STORE2	265	275	280	230
6	TOT. SALES	365	395	430	340
7	STORE1 %	27	30	35	32
8	STORE2 %	73	70	65	68
9	YR. TOTAL	1530			
10					
11					
12					

FIGURE 6-44

Add numbers like these quarterly figures.

EXERCISE 2 Save part of the screen, load it on another layout.

1. Clear the sheet. Enter the layout shown in Fig. 6-45.

	A	B	C	D
1	MARKETING			
2	*****	*****		
3		JANUARY		
4	SUPPLIES	750		
5	SALARIES	20500		
6	TRAVEL	1400		
7	OVERHEAD	2500		
8	TOTAL	25150		
9				
10				
11				

FIGURE 6-45

Enter this layout.

2. Move the figures from this budget to a sheet with other figures on it. To do this, first save the figures in Column B from Row 4 to Row 8 by using the "DIF" system.
Pick choice "#" on the Storage menu to begin this. Then choose to save a file.
3. Now clear the sheet and enter the layout shown in Fig. 6-46.

	A	B	C	D
1	EXPENSES JANUARY			
2	*****	*****	*****	
3		FINANCE	PRODUC.	MARKETING
4	SUPPLIES	1000	1000	
5	SALARIES	25000	30000	
6	TRAVEL	1000	1000	
7	OVERHEAD	2500	2500	
8	TOTAL	29500	34500	
9				
10				
11				

FIGURE 6-46

Enter this layout.

	A	B	C	D
1	EXPENSES JANUARY			
2	*****	*****	*****	*****
3		FINANCE	PRODUC.	MARKETING
4	SUPPLIES	1000	1000	750
5	SALARIES	25000	30000	20500
6	TRAVEL	1000	1000	1400
7	OVERHEAD	2500	2500	2500
8	TOTAL	29500	34500	25150
9				
10				
11				

FIGURE 6-47

Recall the marketing "DIF" file.

4. Now recall the marketing figures and place them in Column D. Your layout should look like Fig. 6-47.
To accomplish this, again choose the "#" option on the Storage menu, but this time load in the file you saved before.

EXERCISE 3 Set up a lookup table, use the Lookup function, replicate.

1. Clear the sheet. Then enter the lookup table shown at the bottom of Fig. 6-48.
2. Now enter the salespeople and their sales figures, as shown in Fig. 6-48.

	A	B	C	D
1	SALESPER.	SALES	COMMISS.	
2	1	165000	11550	
3	2	200000	24000	
4	3	500000	115000	
5	4	110000	2200	
6	5	75000	0	
7				
8				
9				
10				
11				
12			COMMISSION TABLE	
13			*****	
14			SALES	COMM.
15			0	0
16			100000	.02
17			125000	.05
18			150000	.07
19			175000	.1
20			200000	.12
21			225000	.15
22			250000	.17
23			275000	.2
24			300000	.23

FIGURE 6-48
Enter the lookup table.

3. Now in Cell C2 put the calculation to determine the commission to be paid for salesperson 1. Use the Lookup function.
To accomplish this, get the commission with a Lookup function and then multiply it times the sales figure in Cell B2. The formula will be: "`@LOOKUP(B2,C15...C24)*B2`".
4. Now replicate this formula for the other salespeople. Carefully determine which items in the formula are relative and which have no change. Your final layout should look like the completed Fig. 6-48. (The table coordinates don't change from formula to formula.)

EXERCISE 4 Boolean functions and replicating.

1. Clear the sheet. Now experiment with the Boolean functions. Enter the layout shown in Fig. 6-49. Then try various Boolean functions to see "TRUE" or "FALSE" appear in Cell A2. Try "`@AND`", "`@OR`", "`@NOT`", "`@ISNA`" in turn.

	A	B	C	D
1	10	5	2	1
2				
3				
4				

FIGURE 6-49

Enter this layout. Then try various comparisons in Cell A2.

- In the same layout, use the If function in Cell A2 to compare A1 to B1; place A1 in the cell if A1 is larger and B1 in the cell if it is not. The formula will look like this: “@IF(A1>B1,A1,B1)”. Review the discussion on Boolean functions and try out all the examples shown if you had trouble with Step 1 or Step 2 in this exercise.
- Now enter Columns A and B of the layout shown in Fig. 6-50. In this layout, the salesperson is paid a 25% commission on sales in excess of \$100,000; no commission is paid on the first \$100,000 of sales. Column C shows the commission figures correctly, with an If function. Enter the function to perform the calculation.
- To check your work, replicate the formula to Cell C3. Does the commission figure show “0” as it does in Fig. 6-50?
- The function in Column C should be: “@IF(B2>100000,B2-100000*.25,0)”.

	A	B	C	D
1	SALESPER.	SALES	COMMIS.	
2	1	175000	18750	
3	2	75000	0	
4				
5				
6				

FIGURE 6-50

Enter Columns A and B and the formulas to create Column C.

EXERCISE 5 Embedded Boolean functions.

- Now load the layout you saved in the first part of Exercise 1. It will have errors in it because of division by zero. Eliminate those errors and place a 0 in Rows 6 and 7 where no store figures are yet available. Place functions

first in Cells C6 and C7 to result in “0” if the calculation is an error. To accomplish this, use the ISERROR function as part of an If function. Your formulas should look like this: “@IF(@ISERROR(C4/(C4+C5)),0,C4/(C4+C5))” and “@IF(@ISERROR(C5/(C4+C5)),0,C5/(C4+C5))”. Then replicate the formula in Columns D and E.

You’ve now learned all the VisiCalc commands and used them in sample exercises. Chapter 7 contains VisiCalc layouts of practical value in your business. These layouts should be of use to you and should give you ideas on layouts you can design yourself.



Section THREE _____

VisiCalc[®] Management Applications



7

Getting Down to Business

- Entering Layouts from the Book
- Forecasting
- Cash Flow
- Financial Statements
- Financial Ratios
- Economic Order Quantity
- Breakeven Analysis
- Designing Your Own VisiCalc Layouts
- Entering a VisiCalc Layout
- A Final Word

This chapter contains VisiCalc layouts you can use in your business. Each layout is shown once blank and once with sample data with an explanation of the layout, its use(s), how to enter figures, and how to interpret the results. When you complete the chapter you'll know how to use these layouts and how to design and enter your own.

ENTERING LAYOUTS FROM THE BOOK

Use the layouts in the book to set up labels, spacing, and so on. Then refer to the listing in Appendix B to see what formulas to enter. As you'll recall from Chapter 4, the listing shows each cell's content as well as its format and gives the Global format and column width settings. Use the listing for only the formulas.

FORECASTING

The Forecasting Model was designed for both large and small firms. The individual categories used are the most common ones encountered. Space has been allocated to insert specific accounts not listed here.

Forecasting is an important function for any organization. Usually, preparing a forecast entails a number of iterations. For instance, a company may want to know what effect changing sales figures or expenses will have on its projected profit.

What Do You Need to Know?

To make this forecasting model an effective tool, you must first understand how your company's operations are related financially. For example, what is the ratio of salaries to sales? What is the expected growth rate for sales? How will purchases and ending inventory change throughout the forecasting period? What is the effective tax rate likely to be for the period? The ability to estimate correctly answers to such questions will determine how effective a forecasting model will be for your company.

Data Entry

The model provided in Fig. 7-1 and on the diskette is a blank layout except for the summation and percentage formulas. Your data can be entered in two ways: (1) enter the actual numbers in each cell, or (2) build formulas into the model. For example, in Fig. 7-2 sales are projected to grow at 10% each period. In many cases this just does not happen. Therefore, you must decide on a realistic formula and growth rate. Once that is done for the second month, the formula can be replicated for the remaining months. A variable formula could also be used with different growth rates throughout the year. This is also true for the other categories. Inventory, salaries, and other expenses can be entered using static data, numbers, or as a percentage of sales or any other item you feel accurately approximates projected numbers.

COMPANY NAME
 FORECASTING MODEL
 YEAR ENDING

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPT	OCTOBER	NOVEMBER	DECEMBER	TOTAL	% OF SAL
SALES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BEG. INV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PURCHASES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
END. INV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COGS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR.PROFIT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OPERATING EXPENSES:														
SALARIES & WAGES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EMPLOYEE BENEFITS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FED.UNEMP. INS.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ST.UNEMP. INS.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEPRECIATION	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ADVERTISING	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PROMOTION	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OFFICE SUPPLIES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OFFICE EXPENSE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAINTENANCE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TELEPHONE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ELECTRICITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HEAT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FREIGHT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBSCRIPTIONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STATIONARY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POSTAGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
INSURANCE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MISCELLANEOUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTHER:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL EXPENSES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NET PROFIT BEFORE TAXES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FEDERAL TAXES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STATE TAXES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NET PROFIT	0	0	0	0	0	0	0	0	0	0	0	0	0	0

FIGURE 7-1

Model of a blank template.

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COMPANY NAME
FORECASTING MODEL
YEAR ENDING

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPT	OCTOBER	NOVEMBER	DECEMBER	TOTAL	% OF SAL
SALES	1500000	1650000	1815000	1996500	2196150	2415745	2657342	2923076	3215383	3536922	3890614	4279675	32076426	100
REC. INV.	200000	210000	220500	231525	243101	255256	268019	281420	295491	310266	325779	342068	3183425	10
PURCHASES	800000	840000	882000	926100	972405	1021025	1072077	1125680	1181964	1241043	1303116	1368271	12733701	40
END. INV.	175000	183750	192938	202584	212714	223349	234517	246243	258555	271482	285057	299309	2785497	9
COGS	825000	866250	909563	955041	1002793	1052932	1105579	1160858	1218901	1279846	1343838	1411030	13131629	41
GR. PROFIT	675000	783750	905438	1041459	1193357	1362833	1551763	1762218	1996482	2257076	2546776	2868645	18944796	59
OPERATING EXPENSES:														
SALARIES & WAGES	250000	270000	291600	314928	340122	367332	396719	428456	462733	499751	539731	582910	4744282	15
EMPLOYEE BENEFITS	25000	27000	29160	31493	34012	36733	39672	42846	46273	49975	53973	58291	474428	1
FICA	16750	18090	19537	21100	22788	24611	26580	28707	31003	33483	36162	39055	317867	1
FED. UNEMP. INS.	2500	2700	2916	3149	3401	3673	3967	4285	4627	4998	5397	5829	47443	0
ST. UNEMP. INS.	1000	1080	1166	1260	1360	1469	1587	1714	1851	1999	2159	2332	18977	0
RENT	5000	5400	5832	6299	6802	7347	7934	8569	9255	9995	10795	11658	94886	0
DEPRECIATION	5500	5940	6415	6928	7483	8081	8728	9426	10180	10995	11874	12824	104374	0
ADVERTISING	100000	108000	116640	125971	136049	146933	158687	171382	185093	199900	215892	233164	1897713	6
PROMOTION	15000	16200	17496	18896	20407	22040	23803	25707	27764	29985	32384	34975	284657	1
OFFICE SUPPLIES	1500	1620	1750	1890	2041	2204	2380	2571	2776	2999	3238	3497	28466	0
OFFICE EXPENSE	3500	3780	4082	4409	4762	5143	5554	5998	6478	6997	7556	8161	66420	0
MAINTENANCE	1000	1080	1166	1260	1360	1469	1587	1714	1851	1999	2159	2332	18977	0
TELEPHONE	3700	3996	4316	4661	5034	5437	5871	6341	6848	7396	7988	8627	70215	0
ELECTRICITY	2600	2808	3033	3275	3537	3820	4126	4456	4812	5197	5613	6062	49341	0
HEAT	1000	1080	1166	1260	1360	1469	1587	1714	1851	1999	2159	2332	18977	0
FREIGHT	12500	13500	14580	15746	17066	18367	19836	21423	23137	24988	26987	29145	237214	1
SUBSCRIPTIONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STATIONARY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POSTAGE	20000	21600	23328	25194	27210	29387	31737	34276	37019	39980	43178	46633	379543	1
INSURANCE	3400	3672	3966	4283	4626	4996	5395	5827	6293	6797	7340	7926	64522	0
MISCELLANEOUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTHER:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL EXPENSES	469950	507546	548150	592002	639362	690511	745752	805412	869845	939432	1014587	1095754	8918301	27
NET PROFIT BEFORE TAXES	205050	276204	357288	449456	553996	672322	806011	956806	1126638	1317644	1532189	1772891	10026496	31
FEDERAL TAXES	102525	138102	178644	224722	276998	336161	403006	478093	563319	658822	766094	886446	5013248	16
STATE TAXES	20505	27620	35729	44944	55400	67232	80601	95681	112644	131764	153219	177289	1002650	3
NET PROFIT	82020	110482	142915	179783	221598	268929	322404	382722	450655	527057	612876	709157	4010598	13

FIGURE 7-2

Forecasting model with projected sales growth of 10%.

In Fig. 7-2 the sales figures for February through December were generated by multiplying the January sales amount by 1.1 to get the February sales amount. Then, to generate the remaining months the Replicate function was used. This gives the projection of sales a compounded rate of 10% per period. Likewise, the section that calculates cost of goods sold was projected at 5% increase per period. Operating expenses were projected at an 8% compounded rate. Federal taxes were estimated to be 50% of income before taxes. State taxes were calculated at 10%.

Interpreting the Model

The projected sales show what the next 12 months of sales are projected to be. Then the associated costs are deducted from the gross profit as in any income statement. Use the model to generate a number of scenarios to look at instead of just one static one. With a number of models you have a better picture of how the company's performance looks under different sales and expense levels.

Change the data, and Visicalc automatically recalculates the model using the new data. Ask questions like: What if sales fall or rise to X ? What is the effect on the company's profits? What if the firm's tax rate changes from X to Y ? How does that affect our profitability? If our sales grow at 10% for the year, how will it affect our inventory picture? These and hundreds of other questions can be asked and answered using this model with Visicalc.

The last column of the model shows the percentage of sales. Each number in the percent of sales column shows the percentage that particular item is of the sales amount in Column O. Beginning inventory is 10% of sales, salaries and wages are 15% of sales, and so on.

This number can show the historical relationship between sales and various costs. For instance, if cost of goods averaged 41% last year, use this number as a starting point in forecasting this year.

CASH FLOW

Cash flow models are used to estimate the flow of cash into and out of the company, that is, how much cash a firm will generate in the normal course of its business in the coming period as well as what cash expenditures it will incur. Data entry for a cash flow model is similar to data entry in forecasting in that the data are estimated. It is also similar to forecasting data because it can be entered either as individual data per cell or can be derived by formula.

The model shown in Fig. 7-3 is a bit different from most cash flow models in that it breaks the cost of goods sold section into its components. It

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COMPANY NAME												
CASH FLOW MODEL												
YEAR ENDING												
	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPT	OCTOBER	NOVEMBER	DECEMBER
BEG. CASH	0	0	0	0	0	0	0	0	0	0	0	0
SALES	0	0	0	0	0	0	0	0	0	0	0	0
PLUS:												
BEG. RECEIVABLES	0	0	0	0	0	0	0	0	0	0	0	0
END. INVENTORY	0	0	0	0	0	0	0	0	0	0	0	0
END. ACCT PAY.	0	0	0	0	0	0	0	0	0	0	0	0
LESS:												
BEG. INVENTORY	0	0	0	0	0	0	0	0	0	0	0	0
PURCHASES	0	0	0	0	0	0	0	0	0	0	0	0
END. RECEIVABLES	0	0	0	0	0	0	0	0	0	0	0	0
BEG. ACCT PAY.	0	0	0	0	0	0	0	0	0	0	0	0
NET CHANGE	0	0	0	0	0	0	0	0	0	0	0	0
LESS:												
OPERATING EXPENSES:												
SALARIES & WAGES	0	0	0	0	0	0	0	0	0	0	0	0
EMPLOYEE BENEFITS	0	0	0	0	0	0	0	0	0	0	0	0
FICA	0	0	0	0	0	0	0	0	0	0	0	0
FED. UNEMP. INS.	0	0	0	0	0	0	0	0	0	0	0	0
ST. UNEMP. INS.	0	0	0	0	0	0	0	0	0	0	0	0
RENT	0	0	0	0	0	0	0	0	0	0	0	0
ADVERTISING	0	0	0	0	0	0	0	0	0	0	0	0
PROMOTION	0	0	0	0	0	0	0	0	0	0	0	0
DEPREC. & AMORT.	0	0	0	0	0	0	0	0	0	0	0	0
OFFICE SUPPLIES	0	0	0	0	0	0	0	0	0	0	0	0
OFFICE EXPENSE	0	0	0	0	0	0	0	0	0	0	0	0
MAINTENANCE	0	0	0	0	0	0	0	0	0	0	0	0
TELEPHONE	0	0	0	0	0	0	0	0	0	0	0	0
ELECTRICITY	0	0	0	0	0	0	0	0	0	0	0	0
HEAT	0	0	0	0	0	0	0	0	0	0	0	0
FREIGHT	0	0	0	0	0	0	0	0	0	0	0	0
SUBSCRIPTIONS	0	0	0	0	0	0	0	0	0	0	0	0
STATIONARY	0	0	0	0	0	0	0	0	0	0	0	0
POSTAGE	0	0	0	0	0	0	0	0	0	0	0	0
INSURANCE	0	0	0	0	0	0	0	0	0	0	0	0
MISCELLANEOUS	0	0	0	0	0	0	0	0	0	0	0	0
OTHER:	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL EXPENSES	0	0	0	0	0	0	0	0	0	0	0	0
NON-CASH ITEMS:												
PLUS:												
DEPRECIATION	0	0	0	0	0	0	0	0	0	0	0	0
ACCRUED EXPENSES	0	0	0	0	0	0	0	0	0	0	0	0
LESS:												
END. PREPAID EXP.	0	0	0	0	0	0	0	0	0	0	0	0
NET CASH AVAILABLE FROM OPERATIONS	0	0	0	0	0	0	0	0	0	0	0	0
CASH FROM SALE OF SECURITIES	0	0	0	0	0	0	0	0	0	0	0	0
CASH FROM LOANS	0	0	0	0	0	0	0	0	0	0	0	0
FEDERAL TAXES	0	0	0	0	0	0	0	0	0	0	0	0
STATE TAXES	0	0	0	0	0	0	0	0	0	0	0	0
NET CASH AVAILABLE	0	0	0	0	0	0	0	0	0	0	0	0

FIGURE 7-3

Cost of goods sold broken into components in a cash flow model.

is intended to give a clear picture of how the various components of cost of goods sold affect your cash flow. The model in Fig. 7-4 has been included to show a typical example and give you a better understanding of what a cash flow model is designed to accomplish.

COMPANY NAME CASH FLOW MODEL YEAR ENDING												
	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPT	OCTOBER	NOVEMBER	DECEMBER
BEG. CASH	200000	-79450	-38941	-13870	-17879	-47424	-111904	2281200	2123161	1903819	1611368	1232114
SALES	1500000	1450000	1915000	1996500	2196150	2415765	2657342	2923073	3215383	3536922	3890614	4279675
PLUS:												
BEG. RECEIVABLES	500000	750000	906250	866719	931723	1001602	1076722	1157474	1244287	1337608	1437929	1545774
END. INVENTORY	125000	128125	131328	134611	137977	141426	144962	148584	152300	156168	160111	164011
END. ACCT. PAY.	300000	309000	318270	327819	337452	347182	356214	364962	373001	381432	403175	415270
LESS:												
BEG. INVENTORY	350000	125000	120125	131328	136611	137977	141426	144962	148584	152300	156108	160011
PURCHASES	1200000	1344000	1505200	1685914	1886222	2114810	2368527	2652816	2971154	3327455	3727615	4174260
END. RECEIVABLES	500000	306250	866719	931723	1001602	1076722	1157474	1244287	1337608	1437929	1545774	1661707
BEG. ACCT. PAY.	200000	300000	309000	318270	327818	337652	347782	358214	368962	380031	391432	403175
NET CHANGE	125000	182425	222782	241544	333369	191990	116045	2479018	2288850	2027934	1892734	1237692
LESS:												
OPERATING EXPENSES:												
SALARIES & WAGES	100000	108000	116640	125971	136049	146932	158657	171382	185092	199900	215892	233164
EMPLOYEE BENEFITS	25000	27000	29160	31493	34012	36733	39672	42846	46273	49975	53973	58291
RENT	14750	16090	17527	21106	22785	24611	26580	28707	31002	33483	36162	39051
ST. UNEMP. INS.	2500	2700	2916	3149	3401	3673	3967	4285	4627	4999	5397	5829
ST. UNEMP. INS.	1000	1080	1166	1260	1360	1469	1587	1714	1851	1999	2159	2332
RENT	5000	5400	5832	6299	6802	7347	7934	8569	9255	9995	10795	11658
ADVERTISING	25000	27000	29160	31493	34012	36733	39672	42846	46273	49975	53973	58291
PROMOTION	15000	16200	17494	18894	20407	22040	23803	25707	27764	29985	32384	34975
DEPRE. & AMORT.	12000	12960	13997	15117	16324	17632	19042	20566	22211	23968	25807	27980
OFFICE SUPPLIES	1000	1080	1166	1260	1360	1469	1587	1714	1851	1999	2159	2332
OFFICE EXPENSE	2000	2160	2332	2519	2721	2939	3174	3426	3702	3999	4318	4663
MAINTENANCE	0	0	0	0	0	0	0	0	0	0	0	0
TELEPHONE	2500	2700	2916	3149	3401	3673	3967	4285	4627	4999	5397	5829
ELECTRICITY	2000	2160	2332	2519	2721	2939	3174	3426	3702	3999	4318	4663
HEAT	2000	2160	2332	2519	2721	2939	3174	3426	3702	3999	4318	4663
FREIGHT	3100	3348	3614	3905	4219	4555	4919	5313	5738	6197	6693	7228
SUBSCRIPTIONS	0	0	0	0	0	0	0	0	0	0	0	0
STATIONARY	0	0	0	0	0	0	0	0	0	0	0	0
POSTAGE	0	0	0	0	0	0	0	0	0	0	0	0
INSURANCE	4100	4428	4782	5155	5553	6024	6508	7027	7589	8196	8852	9560
MISCELLANEOUS	0	0	0	0	0	0	0	0	0	0	0	0
OTHER:	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL EXPENSES	219950	236466	255282	275314	297879	321739	347444	375242	405241	437682	472697	510512
NON-CASH ITEMS:												
PLUS:												
DEPRECIATION	12000	12960	13997	15117	16324	17632	19042	20566	22211	23968	25807	27980
ACCRUED EXPENSES	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
LESS:												
END. PREPAID EXP.	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500
NET CASH AVAILABLE FROM OPERATIONS	-79450	-38941	-16870	-17879	-47424	-111904	-248800	2123161	1903819	1611368	1232114	750204
CASH FROM SALE OF SECURITIES							2500000					
CASH FROM LOANS												
FEDERAL TAXES	0	0	0	0	0	0	0	0	0	0	0	0
STATE TAXES	0	0	0	0	0	0	0	0	0	0	0	0
NET CASH AVAILABLE	-79450	-38941	-16870	-17879	-47424	-111904	2281200	2123161	1903819	1611368	1232114	750204

FIGURE 7-4

A typical example of a cash flow model.

The area of the model called net change is found just below sales and before the net change figure. This is where the components of *cost of goods sold* are included. Notice that while ending inventory is an addition to cash available, beginning inventory and purchases are reductions in available cash. This is not a common perception of the effect of inventory and purchases on cash flow. But if you look at what comprises cost of goods sold you will see that it makes sense. Cost of goods sold is calculated by:

$$\begin{array}{r}
 \text{Beginning inventory} \\
 + \text{ purchases} \\
 \hline
 \text{goods available for sale} \\
 - \text{ ending inventory} \\
 \hline
 \text{cost of goods sold}
 \end{array}$$

Therefore, the larger the beginning inventory, the higher the cost of goods. The cost of goods sold is then subtracted from sales to get the gross profit from operations, which determines the cash available from sales of product for the company. This also gives the net change in inventory.

The remaining items in the net change section of the model give the net change in receivables and accounts payable. Notice that the ending receivables in one month become the beginning receivables of the next month. As receivables increase, less cash is available, and as payables increase more cash is available to the firm since less is sent to suppliers. The net change number then reflects the net change in available cash to the business before any expenses are taken into consideration. It shows the effect of the sales and purchasing cycle on available cash for the business.

Operating expenses is the next section in the model. It contains the normal operating expenses of most businesses, including total outlays for the designated categories. For example, the first line, salaries and wages, is simply the cash outlay for salaries and wages for the time period under study.

Non-cash items are categories that affect a company's net income, but do not require any cash expenditure by the company. Depreciation is the allocation of the cost of a company's assets over a specified time period. Typically, the cash for the asset was spent when the asset was actually acquired. Accrued expenses are costs allocated to the period under study, but for which cash has not been expended, for example, taxes that are owed on June 30, but not due until July 15. Prepaid expenses have been paid in previous periods but are allocated to the current period. For example, for insurance paid on January 1 for the entire year, only half of this expense is applicable to the period ending June 30. No cash has changed hands for these expenses in this period. This section of the model can be looked at as

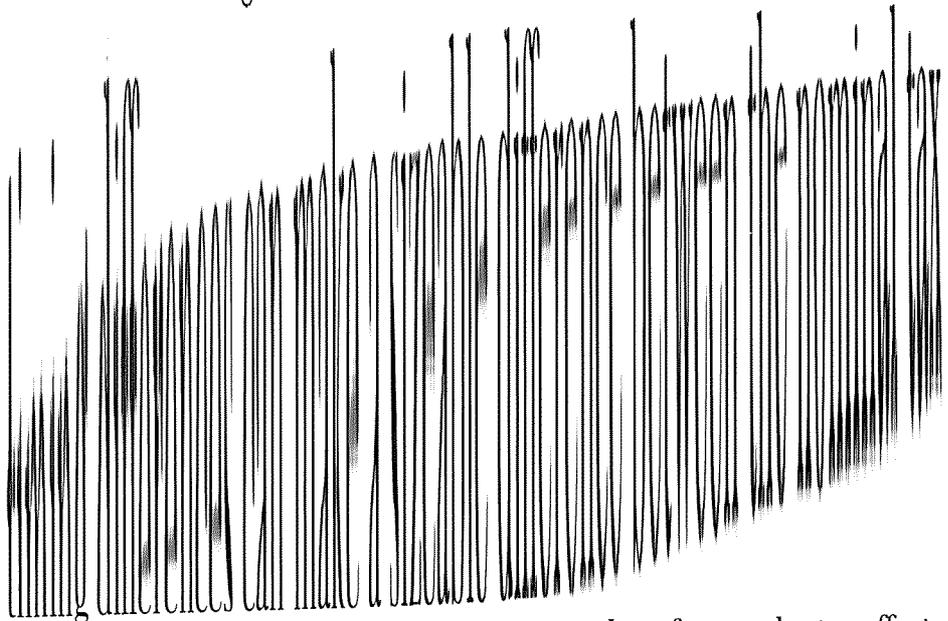
times for which the timing of the cash expenditures is different from allocating the expense. Please note that these are not all the possible categories, but are the most common.

Net cash available from operations is the result of the company's normal course of business. This tells how much cash can be expected to be generated by the business's normal operations.

Cash from outside sources shows the cash obtained by the company from other than the firm's operations. The types of items included are shown in the model. Sale of securities is the sale of stock or bonds. This is usually done when it is clear that the firm is in need of cash for expansion or general operations. As shown in Fig. 7-4, the company was having cash flow deficits and needed to raise additional funds. This is shown by the sale of stock in July. Even with the additional \$2,500,000, the company finished the year with only a \$750,000 cash surplus. It would definitely have sustained a sizeable cash flow deficit had it not raised the additional funds.

Cash from loans is cash obtained from traditional long or short-term loans. Sale of assets provides cash for the firm by selling assets the firm wants to dispose of. If cash requirements are critical and there is no alternative, this may also entail selling valuable assets to get badly needed cash.

The taxes in Fig. 7-4 are shown at zero because the various tax rates and



rate and the actual tax rate. Therefore, to avoid confusion, the tax effects were left at zero. Consult your accountant to get an accurate picture of the cash flow consequences of your tax situation.

Net cash available is the total cash available to the business. Each figure in this section is the cash available to the business at the end of that particular month. Likewise, it is also the beginning of the cash available for the next month. The final amount of \$750,204 is the cash available at the end of the year. A total column is not used because this is a flow of cash through the year; totaling the individual months would not give a meaningful figure.

Remember that any figures obtained using cash flow analysis are only estimates. The process of arriving at the projected cash flow is just as valuable as the information shown in the model. Its main benefit is to illustrate potential problem areas and allow you to try different scenarios

task of adding the statement numbers and finding that they do not add properly is taken care of with the automatic calculation feature of VisiCalc. The data is entered into the appropriate statement and VisiCalc calculates the results immediately.

YOUR COMPANY NAME	
BALANCE SHEET	
PERIOD ENDING	
ASSETS	
CURRENT ASSETS	
CASH	\$
SHORT TERM INVESTMENTS, AT COST	
ACCOUNTS RECEIVABLE	
LESS: RESERVE FOR BAD DEBT	
INVENTORIES, AT LOWER OF COST OR MARKET	
PREPAID EXPENSES	
OTHER	

TOTAL CURRENT ASSETS	0

FIXED ASSETS	
PLANT AND EQUIPMENT	
FURNITURE AND FIXTURES	
LEASEHOLD IMPROVEMENTS	
LESS: ACCUMULATED DEPRECIATION	
GOODWILL	

TOTAL FIXED ASSETS	0

TOTAL ASSETS	0
=====	

FIGURE 7-5

A blank balance sheet.

Balance Sheet

A blank balance sheet is shown in Fig. 7-5. Figure 7-6 shows a sample balance sheet. The balance sheet is the statement of the company's assets and liabilities at a particular point in time. Typically, both the assets and liabilities are broken down further to (1) current and (2) fixed (for assets) or

FIGURE 7-5 (continued)

LIABILITIES AND SHAREHOLDERS EQUITY	
CURRENT LIABILITIES	
ACCOUNTS PAYABLE	
TAXES PAYABLE	
CURRENT PORTION OF LONG TERM DEBT	
INTEREST PAYABLE	
OTHER	

TOTAL CURRENT LIABILITIES	0

OTHER LIABILITIES	
LONG TERM DEBT	
DEFERRED TAXES	
OTHER	

TOTAL OTHER LIABILITIES	0

STOCKHOLDERS EQUITY	
CAPITAL STOCK:	
COMMON STOCK	
PREFERRED STOCK	
CAPITAL SURPLUS	
RETAINED EARNINGS	

TOTAL SHAREHOLDERS EQUITY	0

TOTAL LIABILITIES AND SHAREHOLDERS EQUITY	\$ 0
=====	

long-term (for liabilities). It also shows the company's net worth in the stockholders' equity section. The model is designed to be a simple example for a company's balance sheet. Enter data next to the appropriate category and the built-in formulas automatically calculate the totals. It may be good to have your accountant assist you in this example if you have not had much accounting experience. Once the data have been entered, the model can be saved and then printed for use as the first part of your financial statements. If

YOUR COMPANY NAME	
BALANCE SHEET	
PERIOD ENDING	
ASSETS	
CURRENT ASSETS	
CASH	\$ 10000
SHORT TERM INVESTMENTS, AT COST	50000
ACCOUNTS RECEIVABLE	75000
LESS: RESERVE FOR BAD DEBT	-7500
INVENTORIES AT LOWER OF COST OR MARKET	200000
PREPAID EXPENSES	12500
OTHER	

TOTAL CURRENT ASSETS	340000

FIXED ASSETS	
PLANT AND EQUIPMENT	175000
FURNITURE AND FIXTURES	25000
LEASEHOLD IMPROVEMENTS	50000
LESS: ACCUMULATED DEPRECIATION	-25000
GOODWILL	100000

TOTAL FIXED ASSETS	325000

TOTAL ASSETS	665000

FIGURE 7-6

A sample balance sheet.

an error is found in the balance sheet, it can easily be changed and a new statement printed.

Current assets are usually considered assets that can or will become cash within the next year. Cash is an obvious item. Short-term investments are items like government securities, stocks and bonds, certificates of deposits, money market funds, and so on, that are being held as a means of investing surplus cash until needed. The rest of the current assets are made up of the usual items of accounts receivable, inventory, and prepaid expenses. Fixed assets are those the firm does not plan to convert to cash in the next fiscal period under the normal operation of the business. This comprises such items as: plant and equipment, leasehold improvements, furniture and fixtures, and so on.

FIGURE 7-6 (continued)

LIABILITIES AND SHAREHOLDERS EQUITY

CURRENT LIABILITIES

ACCOUNTS PAYABLE	225000
TAXES PAYABLE	18000
CURRENT PORTION OF LONG TERM DEBT	15000
INTEREST PAYABLE	5500
OTHER	

TOTAL CURRENT LIABILITIES	263500
---------------------------	--------

OTHER LIABILITIES

LONG TERM DEBT	200000
DEFERRED TAXES	26500
OTHER	

TOTAL OTHER LIABILITIES	226500
-------------------------	--------

STOCKHOLDERS EQUITY

CAPITAL STOCK:

COMMON STOCK	10000
PREFERRED STOCK	20000
CAPITAL SURPLUS	100000
RETAINED EARNINGS	45000

TOTAL SHAREHOLDERS EQUITY	175000
---------------------------	--------

TOTAL LIABILITIES AND SHAREHOLDERS EQUITY	\$ 665000
---	-----------

Current liabilities are similar to current assets. They are liabilities that must be paid in the coming 12 months. This would include all taxes and current portions of notes or other long-term debts. Other liabilities are primarily long-term debt and deferred taxes.

Stockholders' equity shows common and preferred stock as well as any additional paid-in capital. This is the amount of additional funds paid to the firm above the par value of the stock. Retained earnings is usually the final number shown in the equity section.

YOUR COMPANY NAME
 INCOME STATEMENT
 PERIOD ENDING

GROSS SALES		\$	0
LESS:SALES RETURNS & ALLOW.	\$	0	
SALES DISCOUNTS		0	0

NET SALES			0
COST OF GOODS SOLD:			
BEGINNING INVENTORY			0
PLUS:PURCHASES			0

GOODS AVAILABLE FOR SALE			0
LESS:ENDING INVENTORY			0

GROSS PROFIT ON SALES			0
OPERATING EXPENSES:			
SALARIES & WAGES	\$		0
COMMISSIONS			0
ADVERTISING			0
SALES PROMOTION			0
BAD DEBTS			0
DEPRECIATION			0
OFFICE SUPPLIES			0
OFFICE EXPENSE			0
INSURANCE			0
MAINTENANCE & REPAIRS			0
TAXES			0
MISCELLANEOUS EXPENSES			0
OTHER			0

TOTAL OPERATING EXPENSE			0

NET OPERATING INCOME	\$		0

FIGURE 7-7

A blank income statement

FIGURE 7-7 (continued)

OTHER REVENUE AND EXPENSES:

INTEREST INCOME	\$	0	
DIVIDEND INCOME		0	
ROYALTY INCOME		0	

TOTAL OTHER INCOME	\$	0	
INTEREST EXPENSE		0	0

NET INCOME BEFORE TAXES			0
INCOME TAXES			0

NET INCOME			0
			=====

Income Statement

The income statement is the most sought after of the financial statements. It is the one that most executives, analysts, and investors want to see to gauge the company's performance. The VisiCalc income statement is shown in Figs. 7-7 and 7-8.

Net sales are derived by subtracting sales returns and allowances and any discounts from gross sales. The net sales figure is the number most often used when a company reports its sales.

Gross profit on sales is determined by subtracting the cost of goods sold from net sales. The cost of goods sold is the cost to the company of the products sold in the net sales figure. The cost of goods sold could be calculated by keeping track of the cost of each individual product sold, but it is generally easier to compute this number by the method shown in the model. Beginning inventory (the value of goods in inventory) is added to the purchases of goods during the period. This results in the amount of goods available for sale during the period. Then the ending inventory for the period is subtracted from the goods available for sale. The remainder must be the cost of the goods sold. Subtracting this from net sales results in gross profit on sales.

Operating expenses are all the costs associated with running the business during the period. As shown in Fig. 7-8 it includes everything from salaries and wages to the cost of paper clips. Subtracting total operating expenses from gross profit on sales yields net operating income. This is the net profit from the company's normal course of business.

YOUR COMPANY NAME
 INCOME STATEMENT
 PERIOD ENDING

GROSS SALES		\$	2500000	
LESS:SALES RETURNS & ALLOW.	\$	20000		
SALES DISCOUNTS		15000	35000	

NET SALES				2465000
COST OF GOODS SOLD:				
BEGINNING INVENTORY			375000	
PLUS:PURCHASES			1250000	

GOODS AVAILABLE FOR SALE			1625000	
LESS:ENDING INVENTORY			350000	1275000
			-----	-----
GROSS PROFIT ON SALES				1190000
OPERATING EXPENSES:				
SALARIES & WAGES	\$	250000		
COMMISSIONS		25000		
ADVERTISING		50000		
SALES PROMOTION		12500		
BAD DEBTS		0		
DEPRECIATION		10000		
OFFICE SUPPLIES		12500		
OFFICE EXPENSE		10000		
INSURANCE		7500		
MAINTENANCE & REPAIRS		5000		
TAXES		15700		
MISCELLANEOUS EXPENSES		4500		
OTHER		0		

TOTAL OPERATING EXPENSE				402700

NET OPERATING INCOME				\$ 787300

FIGURE 7-8

A sample income sheet.

FIGURE 7-8 (continued)

OTHER REVENUE AND EXPENSES:

INTEREST INCOME	\$	0	20000
DIVIDEND INCOME		0	
ROYALTY INCOME		0	50000

TOTAL OTHER INCOME	\$	70000	
INTEREST EXPENSE		25000	45000
		-----	-----
NET INCOME BEFORE TAXES			742300
INCOME TAXES			345000

NET INCOME			397300
			=====

Other revenue and expenses are items that affect the firm's profit picture but are not encountered in the company's day-to-day activities. These items include: interest income, dividend income, royalty income, and interest expense. Subtracting this from net operating profit results in net income before taxes.

To arrive at net income, only income taxes must be subtracted. Net income is the most common number given when a company reports its earnings for a given period.

Source and Application of Funds

As shown in Figs. 7-9, and 7-10, this statement usually includes data from more than one year to show the flow of cash into and out of the various accounts. The first section, source of funds, illustrates where the firm has obtained the cash for its operations. Typically, income before taxes provides the most cash. This number is taken from the same line on the income statement. Depreciation is added back to source of funds since it does not take any of the company's cash for the period, but is only an allocation of costs for an asset over a period of time. Deferred taxes also do not affect a company's cash position as these are taxes allocated to the current period and will not be paid until a subsequent period. Investment tax credit is actual cash available to the company through a credit against the firm's tax liability. Total cash from operations is an important figure because it shows how much cash the company was able to generate from current operations. If the funds are not sufficient to carry the company without additional monies, it may indicate a serious problem in the future.

YOUR COMPANY NAME
 SOURCE AND APPLICATION OF FUNDS
 PERIOD ENDING

SOURCE OF FUNDS:	1982	1981	1980	1979	1978

FROM OPERATIONS:					
INCOME BEFORE TAXES					
DEPRECIATION					
DEFERRED TAXES					
INVESTMENT TAX CREDIT					
OTHER					

TOTAL FROM OPERATIONS	0	0	0	0	0

SALE OF COMMON STOCK					
SALE OF NOTES					
LOANS FROM BANKS					
DECREASE/INCREASE IN RECEIVABLES					
DECREASE/INCREASE IN OTHER					
CURRENT ASSETS					
DECREASE/INCREASE IN INVESTMENTS					

TOTAL FUNDS PROVIDED	0	0	0	0	0

FUNDS USED FOR:					
PURCHASE PLANT & EQUIPMENT					
LESS: DISPOSAL OF PLANT & EQUIPMENT					
DIVIDENDS DECLARED ON STOCK					
RETIREMENT OF DEBT					
OTHER TRANSACTIONS					

TOTAL FUNDS USED	0	0	0	0	0

WORKING CAPITAL INCREASE OR DECREASE	0	0	0	0	0
=====					

FIGURE 7-9

A blank source and application of funds statement.

YOUR COMPANY NAME
 SOURCE AND APPLICATION OF FUNDS
 PERIOD ENDING

SOURCE OF FUNDS:	1982	1981	1980	1979	1978

FROM OPERATIONS:					
INCOME BEFORE TAXES	742300				
DEPRECIATION	10000				
DEFERRED TAXES	0				
INVESTMENT TAX CREDIT	20000				
OTHER	0				

TOTAL FROM OPERATIONS	772300	0	0	0	0

SALE OF COMMON STOCK	500000				
SALE OF NOTES					
LOANS FROM BANKS	257000				
DECREASE/INCREASE IN RECEIVABLES	25000				
DECREASE/INCREASE IN OTHER					
CURRENT ASSETS	-45000				
DECREASE/INCREASE IN INVESTMENTS	0				
TOTAL FUNDS PROVIDED	1509300	0	0	0	0

FUNDS USED FOR:					
PURCHASE PLANT & EQUIPMENT	175000				
LESS: DISPOSAL OF PLANT & EQUIPMENT	0				
DIVIDENDS DECLARED ON STOCK	250000				
RETIREMENT OF DEBT	500000				
OTHER TRANSACTIONS	0				

TOTAL FUNDS USED	925000	0	0	0	0

WORKING CAPITAL INCREASE OR DECREASE	584300	0	0	0	0
=====					

FIGURE 7-10

A sample source and application of funds statement.

The next category is funds provided from other than operations. Sales of stock or notes are ways for publicly owned companies to raise needed funds. Loans from banks is also a common source of needed funds. Decrease/increase in receivables is the net change in accounts receivable from the prior period to the current period. The timeframe shown by the model in Fig. 7-9 is one year. Decrease/increase in other current assets would include items like: prepaid expenses, marketable securities and cash equivalents, and inventory. Decrease/increase in investments is the net change of long-term investments of one firm in another firms' securities. For instance, if your firm held the stock of another company and sold it during the timeframe covered by this statement, the funds received would go into this category. Interest and dividends is the amount the firm receives as interest or dividends during the period. Adding this section and the total from operations yields the total funds provided. This total is the amount of funds available to the company during the year.

The allocation of available funds is illustrated in the next section, funds used for. Notice it does not contain any expense items. These have already been taken into consideration in arriving at net income before taxes. By looking at the income statement you can see what those expenses entailed. Purchase of plant and equipment is the amount of funds used for the acquisition of fixed assets during the year. From this the disposal of fixed assets is subtracted. Dividends paid on stock can be for either common or preferred stock a company has outstanding. Any retirement of debt reduces the available funds to the firm. Taxes paid will, likewise, reduce the company's funds. Other transactions can cover such items as repurchase of the company's stock or unusual changes in retained earnings due to other than normal operations. This gives the total funds used.

The difference between total funds provided and total funds used is working capital increase or decrease. This is the net change in the working capital for the company. One of the major benefits of using VisiCalc for a source and application of funds is the ability to see how each component of the statement affects the company's working capital. Positive amounts indicate an increase in working capital that can be used for growth. Negative amounts indicate that the company is not able to generate the required funds to operate the company. Obviously, this situation cannot be allowed to continue for any extended period or the firm will not be able to maintain operations.

FINANCIAL RATIOS

The ratios shown in Fig. 7-11 are used primarily to analyze a company's financial strength. They are most helpful when comparing one period's results with another period's results to reveal trends in the ratios and give a more complete picture of the firm's financial status.

* FINANCIAL RATIOS

INPUT DATA:

SALES	0
DEPRECIATION & AMORTIZATION	0
NET INCOME BEFORE INTEREST & PREFERRED DIVIDENDS (AFTER TAX)	0
INTEREST & PREFERRED DIVIDENDS	0
NET INCOME	0
DIVIDENDS FOR COMMON STOCK	0
TOTAL CAPITAL (BOOK VALUE)	0
COMMON STOCK EQUITY (BOOK VALUE)	0
COMMON STOCK AT MARKET VALUE	0
NUMBER OF SHARES OF COMMON STOCK	0
CURRENT ASSETS	0
CURRENT LIABILITIES	0

PROFITABILITY RATIOS:

		FORMULAS WITH VISICALC LOCAT
RETURN PER DOLLAR OF TOTAL CAPITAL BEFORE DEPRECIATION & AMORTIZATION	0	(F9+F12)/F20
RETURN PER DOLLAR OF TOTAL CAPITAL AFTER DEPRECIATION & AMORTIZATION	0	F12/F20
SALES PER DOLLAR OF TOTAL CAPITAL	0	F7/F20
EARNINGS MARGIN	0	F12/F7
RETURN PER DOLLAR OF COMMON STOCK	0	F16/F22

FIGURE 7-11

Financial ratios.

*Formulas derived from Graham, Dodd, Cottle, and Tathan. *Security Analysis: Principles and Technique*, McGraw-Hill, New York, 1962.

FIGURE 7-11 (continued)

PAYOUT RATIO:

PERCENT OF EARNINGS PAID ON COMMON STOCK	0	F18/F16
--	---	---------

CREDIT:

CURRENT RATIO	0	F28/F20
---------------	---	---------

COMMON STOCK AS PERCENT OF TOTAL CAPITAL	0	F22/F20
--	---	---------

COVERAGE OF INTEREST & PREFERRED DIVIDENDS(AFTER TAX)	0	F12/F14
---	---	---------

PER SHARE FIGURES:

SALES	0	F7/F24
-------	---	--------

INCOME	0	F16/F24
--------	---	---------

DIVIDENDS	0	F18/F24
-----------	---	---------

BOOK VALUE	0	F22/F24
------------	---	---------

MARKET PRICE RATIOS:

SALES PER \$ OF COMMON STOCK AT MARKET	0	F7/F24
--	---	--------

PERCENT EARNED PER \$ OF COMMON STOCK AT MARKET	0%	(F16/F24)*100
---	----	---------------

DIVIDEND YIELD	0%	(F18/F24)*100
----------------	----	---------------

NET ASSETS PER \$ OF COMMON STOCK AT MARKET	0	(F22/F24)*100
---	---	---------------

What You Need to Know

The data used to calculate the ratios are shown in Fig. 7-11 in the section called input data. Most of the data is obtained from the company's financial statements. The items listed need to be calculated:

1. Net income before interest and preferred dividends (after tax) is determined by adding the net income, interest, and preferred dividends.
2. Dividends for common stock may have to be calculated by taking the dividends declared for common stocks and multiplying it by the number of outstanding shares of common stock. It may, however, be available from a firm's annual report.
3. Common stock at market value is calculated by multiplying the number of common shares outstanding by the price per share.

The following items are taken directly from either the company's balance sheet or income statement.

1. Sales: the net sales from the income statement.
2. Depreciation and amortization: taken directly from the balance sheet.
3. Interest and preferred dividends: interest is that from loans and notes, preferred dividends are dividends on preferred stock (if any) from the income statement.
4. Net income: the net income shown on the income statement.
5. Total capital (book value): the amount of stockholders' equity taken from the balance sheet.
6. Common stock equity (book value): the book value of the common stock listed on the balance sheet.
7. Number of shares of common stock: taken directly from the stockholders' section of the balance sheet, it shows the number of outstanding shares.
8. Current assets: the total for current assets taken from the balance sheet.
9. Current liabilities: the total for current liabilities taken from the balance sheet.

Five types of financial ratios are derived using the preceding data:

- Profitability ratios
- Payout ratios
- Credit ratios
- Per share ratios
- Market price ratios

FINANCIAL RATIOS

INPUT DATA:

SALES	1550
DEPRECIATION & AMORTIZATION	130
NET INCOME BEFORE INTEREST & PREFERRED DIVIDENDS (AFTER TAX)	175
INTEREST & PREFERRED DIVIDENDS	17
NET INCOME	165
DIVIDENDS FOR COMMON STOCK	110
TOTAL CAPITAL (BOOK VALUE)	1425
COMMON STOCK EQUITY (BOOK VALUE)	965
COMMON STOCK AT MARKET VALUE	3900
NUMBER OF SHARES OF COMMON STOCK	28.5
CURRENT ASSETS	690
CURRENT LIABILITIES	248.5

FIGURE 7-12

Sample financial ratios for an example company.

Profitability Ratios

Return per dollar of total capital before depreciation and amortization shows the amount of cash generated per sales dollar without subtracting depreciation and amortization. This highlights the actual return to the company by not having the tax effect of depreciation affect the results. It tells you that for every dollar of capital invested in the company illustrated in Fig. 7-12, \$0.21 dollars are generated by the business. Since this is per dollar, it can also be viewed as a 21% return on invested capital. This is calculated by adding depreciation and amortization (f9) (the number refers to the cell F9 where this figure is found) to net income before interest and preferred dividends (f12), then dividing that sum by total capital (f20).

Return per dollar of total capital after depreciation and amortization is similar to the preceding, but does take into account the effect of depreciation and amortization. Using this ratio, the return on invested capital drops to 12%. This is calculated by dividing net income before interest and preferred dividends (f12) by total capital (f20).

FIGURE 7-12 (continued)

PROFITABILITY RATIOS:

RETURN PER DOLLAR OF TOTAL CAPITAL BEFORE DEPRECIATION & AMORTIZATION	0.21
RETURN PER DOLLAR OF TOTAL CAPITAL AFTER DEPRECIATION & AMORTIZATION	0.12

SALES PER DOLLAR OF TOTAL CAPITAL	1.09
EARNINGS MARGIN	0.11
RETURN PER DOLLAR OF COMMON STOCK	0.17

PAYOUT RATIO:

PERCENT OF EARNINGS PAID ON COMMON STOCK	0.67
---	------

CREDIT:

CURRENT RATIO	2.78
COMMON STOCK AS PERCENT OF TOTAL CAPITAL	0.68
COVERAGE OF INTEREST & PREFERRED DIVIDENDS(AFTER TAX)	10.29

PER SHARE FIGURES:

SALES	54.39
INCOME	5.79
DIVIDENDS	3.86
BOOK VALUE	33.86

MARKET PRICE RATIOS:

SALES PER \$ OF COMMON STOCK AT MARKET	0.40
PERCENT EARNED PER \$ OF COMMON STOCK AT MARKET	4.23%
DIVIDEND YIELD	2.82%
NET ASSETS PER \$ OF COMMON STOCK AT MARKET	0.25

Sales per dollar of total capital is the amount of sales generated by each dollar of invested capital. In the example in Fig. 7-12 it is \$1.09 dollars of sales for each dollar the company has invested in the business. This tells you that each dollar you add to the business today will generate \$1.09 worth of sales. The trend of this ratio is important to watch. If, for example, it takes more capital to generate the same volume of sales, it is possible that the business is becoming more competitive. This is calculated by dividing sales (f7) by total capital (f20).

The earnings margin is the return on sales. Every dollar of sales generated contributes \$.11 to the company's profit. To take this a step farther, since it takes \$1.00 to generate \$1.09 in sales, then it takes \$1.00 of capital to generate \$.12 in margin or gross profit. This is calculated by dividing net income before interest and preferred dividends (f12) by sales (f7).

Return per dollar of common stock is the amount of net income generated for each dollar in common stock value. This is a useful number in comparison to the common stock's market value. It indicates the relative value of the common stock to the amount of profit generated by each dollar of the stock. This is calculated by dividing net income (f16) by common stock equity (f22).

Payout Ratio

Percentage of earnings paid on common stock is the amount of net income paid as a dividend on the company's common stock. It is the ratio of dividends to earnings, thus the name payout ratio. This is calculated by dividing the dividends for common stock (f18) by net income (f16). This ratio shows how many times the dividend is covered by the company's net income. In general, the smaller payout ratio number the more likely it is the dividend amount will not be decreased.

Credit Ratios

Current ratio is the ratio of current assets to current liabilities. It is used to show a company's solvency. The higher the number, the better the short-term financial shape of the firm. It measures the number of times the current assets cover the current liabilities without affecting the firm's fixed assets. This is calculated by dividing the current assets (f28) by current liabilities (f30).

Common stock as a percentage of total capital is the percentage that the common stock represents of the firm's total capital. Preferred Stock is the

other item that most often makes up capital.* If common stock is the only type of stock, then the percentage would be 100. This is calculated by dividing common stock equity (f22) by total capital (f20).

Coverage of interest and preferred dividends is the number of times net income covers interest and preferred dividends. For example, in Fig. 7-12 Net Income would have to go down to one-tenth of what it currently is before the payment of interest and dividends on preferred stock would be in peril. For investors in a company's bonds or preferred stock this is obviously useful information. This is calculated by dividing net income before interest and preferred dividends (f12) by interest and preferred dividends (f14).

Per Share Ratios

Sales is the ratio of sales to the number of shares of common stock outstanding. It is useful to compare the market price of common stock to the dollar amount of sales per share of common stock. It is calculated by dividing the sales (f7) by the number of shares of common stock outstanding (f26).

Income is net income per share of common stock, normally known as earnings per share. Many stock analyses are performed using this number. It is calculated by dividing net income (f16) by number of common stock shares outstanding (f26).

Dividends is the ratio of dividends to number of shares of common stock outstanding. It is calculated by dividing dividends (f18) by the number of shares of common stock (f26).

Book value shows the ratio of the net worth of the company per share of common stock. It is very useful to compare the market value per share of stock to the book value to see the difference between book value and the value the stock market perceives of the stock. It is calculated by dividing the book value of the common stock (f22) by the number of shares outstanding (f26).

Market Price Ratios

Sales per dollar of common stock at market shows the amount of sales generated in relation to \$1.00 of value of the company's stock. In Fig. 7-12 it is just \$.40. This means that for every dollar of value of common stock the company has generated \$.40 in sales. This is calculated by dividing sales (f7) by market value of common stock (f24).

*A firm's capital is the difference between its assets and liabilities. It is the net amount invested in the company. Besides stock, the other major component is retained earnings.

Percent earned per dollar of common at market is the percentage that net income is to the market value of the company's common stock. This can give an investor a good idea of what the firm can earn in net income in relation to the value the market perceives of the company. An increasing trend in this ratio could mean two things: (1) net income may be rising faster than the market's perceived value of the stock, and the market may correct this by pushing the price of the stock up; or (2) net income may be decreasing relative to the market's perceived value, and the stock may decrease in price once the market becomes aware of this development. This is calculated by dividing net income (f16) by the market value of the company's stock (f24).

Dividend yield is the rate of return an investor will receive in the form of dividends based on the current price of the stock. As the yield increases, it provides more protection from loss by giving a steady stream of cash to the investor. It is calculated by dividing dividends (f18) by the market value (f24). It is also determined by simply dividing the dividend per share by the current price per share.

Net assets per dollar of common stock at market shows the net value of the company per share. It is a good comparison to the market price of the stock because theoretically it is the minimum value of the stock. However, many companies sell at prices far below their book value. Many analysts consider this an indication to check the stock more closely to see if the company is sound and if it is a good opportunity to buy the stock.

The financial ratios provided in Fig. 7-11 will be of assistance to management, investors, and analysts who want to measure a company's financial strength and its relative strength to other stocks in the stock market.

ECONOMIC ORDER QUANTITY

Economic order quantity is a useful tool for controlling the costs of ordering, carrying, and shortage of inventory. As with most planning tools, some basic data are required.

The following information must be obtained before proceeding:

What You Need to Know

1. Order cost (OC): the actual cost to place an order. This is usually the least significant cost encountered.
2. Carrying cost (CC): the cost for holding the goods from the time they are received until they are sold. It includes all interest, handling, and storage costs and is typically the greatest cost of inventory.

3. Shortage cost (SC): the opportunity cost of not making a sale when the product is out of stock. This is the amount the company would have made had this product been in stock.
4. Demand: the number of units of the product projected for sale in the period under study, an estimate of how many units are to be sold.

Data Entry

Figure 7-13 is the model for entering the data to determine the economic order quantity. The example at the top shows how figures are calculated for one product. Below you can enter up to 10 different products. Enter data in Column D in the cells adjacent to the product data.

Interpreting the Model

The results from the model are relatively easy to understand and interpret. Each product has two items calculated for it: (1) the reorder quantity, also known as the economic order quantity; and (2) the reorder point.

ECONOMIC ORDER QUANTITY (EOQ)

THE MODEL PRESENTED HERE IS A RELATIVELY SIMPLE MODEL. HOWEVER,
IT CAN HELP IMPROVE INVENTORY MANAGEMENT.

BASIC ASSUMPTIONS:

1. DEMAND IS STEADY THROUGHOUT A PERIOD.
2. NEW ORDERS HAVE A PREDETERMINED ARRIVAL TIME.
3. INVENTORY COSTS ARE KNOWN.
4. STORAGE CONSTRAINTS ARE NOT A FACTOR.

R = REORDER POINT

Q = REORDER QUANTITY

OC = ORDER COST (THIS IS USUALLY THE SMALLEST COST OF THE THREE.)

CC = CARRYING COST (INCLUDES INTEREST EXPENSE AND THE COST OF STORING THE INVENTORY)

SC = SHORTAGE COST (THIS IS THE OPPORTUNITY COST OF NOT MAKING THE SALE)

D = DEMAND WITHIN THE PERIOD

TOTAL COST = ORDERING COSTS + CARRYING COSTS + SHORTAGE COSTS

FIGURE 7-13

Model for entering data to determine economic order quantity.

FIGURE 7-13 (continued)

THE REORDER QTY IS DETERMINED AS FOLLOWS:

$$Q = \text{SQUARE ROOT OF } (2 \times OC \times D / CC) \times \text{SQUARE ROOT } ((C + SC / OC))$$

INPUT:

OC = 0
 CC = 0
 SC = 0
 D = 0

REORDER QUANTITY = 0

THE REORDER POINT IS DETERMINED AS FOLLOWS:

$$R = \text{SQUARE ROOT OF } (2 \times OC \times D / SC) \times \text{SQUARE ROOT } (CC / CC + SC)$$

REORDER POINT = 0

PRODUCT1:	REORDER INPUT:	REORDER QUANTITY	REORDER POINT
ORDER COST:	0		
CARRYING COST:	0		
SHORTAGE COST:	0		
DEMAND:	0	0	0

PRODUCT2:			
ORDER COST:	0		
CARRYING COST:	0		
SHORTAGE COST:	0		
DEMAND:	0	0	0

PRODUCT3:			
ORDER COST:	0		
CARRYING COST:	0		
SHORTAGE COST:	0		
DEMAND:	0	0	0

FIGURE 7-13 (continued)

PRODUCT4:			

ORDER COST:	0		
CARRYING COST:	0		
SHORTAGE COST:	0		
DEMAND:	0	0	0

PRODUCT5:			

ORDER COST:	0		
CARRYING COST:	0		
SHORTAGE COST:	0		
DEMAND:	0	0	0

PRODUCT6:			

ORDER COST:	0		
CARRYING COST:	0		
SHORTAGE COST:	0		
DEMAND:	0	0	0

PRODUCT7:			

ORDER COST:	0		
CARRYING COST:	0		
SHORTAGE COST:	0		
DEMAND:	0	0	0

PRODUCT8:			

ORDER COST:	0		
CARRYING COST:	0		
SHORTAGE COST:	0		
DEMAND:	0	0	0

PRODUCT9:			

ORDER COST:	0		
CARRYING COST:	0		
SHORTAGE COST:	0		
DEMAND:	0	0	0

PRODUCT10:			

ORDER COST:	0		
CARRYING COST:	0		
SHORTAGE COST:	0		
DEMAND:	0	0	0

The reorder quantity is the most economical quantity in which a product should be ordered, taking into consideration ordering costs, inventory carrying costs, and the cost of being out of stock. With all other factors being equal, for example, the availability of cash, the reorder quantity should be the number of units ordered for a particular product. The reorder point is the inventory level at which it is time to reorder.

In the example in Fig. 7-14 the reorder quantity is 78. This indicates that every time an order is placed, the lowest cost is achieved by ordering 78 units of this item. The reorder point shown is a -7. This indicates that orders should be placed when a backlog of seven units is reached. The formula has determined that it is most economically advantageous to wait until you are seven units short on this product before reordering. When you do reorder, 78 units should be the order quantity.

Other considerations may come into play when determining reorder policies. Cash availability may be a factor. If so, you may not be able to order the recommended quantities. Your firm may not want to be out of stock on a critical item or component. In that case, it would not be wise to wait until you were seven units short of a product to reorder. The idea of safety stock has not been addressed. This can be included in the calculations by adding the number of units desired in safety stock to the demand for the period. Remember that these formulas and results are only guidelines, not absolutes.

Don't be concerned if you are unable to get accurate costs for determining the reorder quantity and reorder point. The economic order quantity model is quite insensitive to errors and is therefore, a better tool for determining inventory policies than simply "gut feeling" or guesswork.

BREAKEVEN ANALYSIS

Breakeven analysis is used in a variety of ways. The most common is for new project or product evaluation. It is also used for setting pricing for products.

What You Need to Know

Before using this model you need to obtain some facts. The following data must be known:

- Price of the product
- Number of units produced (can be an estimate)
- Fixed costs
- Unit variable cost

ECONOMIC ORDER QUANTITY (EOQ)

THE MODEL PRESENTED HERE IS A RELATIVELY SIMPLE MODEL. HOWEVER,
IT CAN HELP IMPROVE INVENTORY MANAGEMENT.

BASIC ASSUMPTIONS:

1. DEMAND IS STEADY THROUGHOUT A PERIOD.
2. NEW ORDERS HAVE A PREDETERMINED ARRIVAL TIME.
3. INVENTORY COSTS ARE KNOWN.
4. STORAGE CONSTRAINTS ARE NOT A FACTOR.

R = REORDER POINT

Q = REORDER QUANTITY

OC = ORDER COST (THIS IS USUALLY THE SMALLEST COST OF THE THREE.)

CC = CARRYING COST (INCLUDES INTEREST EXPENSE AND THE COST OF STORING THE INVENTO

SC = SHORTAGE COST (THIS IS THE OPPORTUNITY COST OF NOT MAKING THE SALE)

D = DEMAND WITHIN THE PERIOD

TOTAL COST = ORDERING COSTS + CARRYING COSTS + SHORTAGE COSTS

THE REORDER QTY IS DETERMINED AS FOLLOWS:

$Q = \text{SQURE ROOT OF } (2 \times OC \times D / CC) \times \text{SQURE ROOT } ((C + SC / CO))$

INFUT:

DC = 8

CC = 10

SC = 100

D = 3422.5

REORDER QUANTITY = 78

THE REORDER POINT IS DETERMINED AS FOLLOWS:

$R = \text{SQURE ROOT OF } (2 \times OC \times D / SC) \times \text{SQURE ROOT } (CC / CC + SC)$

REORDER POINT = -7

FIGURE 7-14

Determining reorder quantity using the economic order quantity formula.

The price of the product can be estimated or can be for information purposes to see the effect of such a price on total profit or the number of units to break even. Number of units per year can be an estimate or can be the number of units produced for the last year of the product. Fixed costs are not as easy to obtain as the first two items. This encompasses a large variety of costs, but essentially it is all costs that the company would incur for this product even if no product were produced. These are items such as:

- Management salaries
- Rent
- Depreciation
- Taxes

Dozens of other items could be included, depending on how flexible various expenses are. These expenses do not have to exist only when production is at zero; they can also be the fixed costs of producing a product, for example, machine set-up time, any fixed contracts to buy a minimum amount of raw materials for the product, and so on. If the expense could be deferred until production started on the product, it would fit in the next category under variable cost. If the cost cannot be postponed and must be incurred even when production is stopped, then it must be treated as a fixed cost.

Variable costs are costs that vary depending on the number of units produced. This usually covers the following types of items:

- Raw materials to produce the product
- Labor costs to produce the product
- Any additional costs that can vary as production varies, e.g., number of supervisors or foremen, electricity, etc.

The main point with the preceding is to be consistent with each product year after year in determining which costs are fixed and which are variable. This will make comparison between products and analysis of products over time easier.

Data Entry

The data for this model is entered in the cells as shown in Fig. 7-15. Typically, the data would be entered as numbers; however, it is possible to generate the fixed and variable costs from the price or have the price dependent on the costs. The data can be changed to see the effects various prices and costs have on the breakeven point and the profit level. The data for price and variable cost are for each item produced. The data for fixed

BREAK-EVEN ANALYSIS

TO USE BREAK-EVEN ANALYSIS IT IS ESSENTIAL TO KNOW A FEW ITEMS ABOUT YOUR COMPANY'S COSTS AND PRICES. THE FOLLOWING DATA MUST BE KNOWN:

1. PRICE OF PRODUCT (PR)
2. NUMBER OF UNITS PER YEAR (N)
3. FIXED COSTS (FC)
4. UNIT VARIABLE COST (VC)

DEFINITIONS:

1. (PR) - PRICE WHICH PRODUCT IS SELLING
2. (N) - ESTIMATED NUMBER OF UNITS COMPANY WILL PRODUCE IN THE COMING YEAR (OR TWELVE MONTHS)
3. (FC) - TOTAL COSTS WHICH COMPANY WOULD INCUR IF NO PRODUCTS WERE PRODUCED. THIS TYPICALLY COVERS THINGS AS DEPRECIATION, MANAGEMENT SALARIES, RENT, ETC. THIS IS THE TOTAL FIXED COSTS PER PERIOD.
4. (VC) - COST TO PRODUCE ONE UNIT OF THE PRODUCT.
NOTE: THIS COST CAN VARY AT DIFFERENT PRODUCTION LEVELS.

THE FORMULA FOR BREAK-EVEN ANALYSIS IS DERIVED FROM THE FOLLOWING FORMULA TO COMPUTE TOTAL REVENUE FOR A PRODUCT.

$$\text{PROFIT} = \text{PR} \times \text{N} - \text{FC} - \text{VC} \times \text{N}$$

I. VARIABLE PROFIT CONTRIBUTION (VPC)

EQUALS PR - VC

INPUT:

PR	=	0
VC	=	0

OUTPUT:

VPC	=	0
-----	---	---

II. BREAK-EVEN POINT (BP) THIS IS THE POINT WHERE PRODUCTION OR SALES IS AT A ZERO PROFIT OR BREAK-EVEN LEVEL. THE COMPANY WILL NEITHER MAKE MONEY OR LOSE MONEY ON THIS PRODUCT.

EQUALS FC / VPC

INPUT:

FC	=	0
VPC	=	0

OUTPUT:

BP	=	0
----	---	---

FIGURE 7-15

A model for breakeven analysis.

FIGURE 7-15 (continued)

III. PROFIT LEVEL (PL). THIS IS THE LEVEL OF PRODUCTION OR SALES THAT WILL GIVE THE DESIRED PROFIT LEVEL.

$$PL = (FC + \text{DESIRED}) / \text{MPC} \\ \text{PROFIT}$$

INPUT:

FC = 0
 DP = 0
 MPC = 0

OUTPUT:

PL = 0

	VARIABLE PROFIT CONTRIBUTION	BREAK-EVEN POINT	PROFIT LEVEL
PRODUCT1:			
PRICE:	0		
VARIABLE COST:	0		
FIXED COST:	0		
DESIRED PROFIT:	0	0	0
PRODUCT2:			
PRICE:	0		
VARIABLE COST:	0		
FIXED COST:	0		
DESIRED PROFIT:	0	0	0
PRODUCT3:			
PRICE:	0		
VARIABLE COST:	0		
FIXED COST:	0		
DESIRED PROFIT:	0	0	0
PRODUCT4:			
PRICE:	0		
VARIABLE COST:	0		
FIXED COST:	0		
DESIRED PROFIT:	0	0	0
PRODUCT5:			
PRICE:	0		
VARIABLE COST:	0		
FIXED COST:	0		
DESIRED PROFIT:	0	0	0

costs and desired profit are for the entire production run or timeframe in question. For example, in Fig. 7-16 the data for price and variable cost is per item produced, while the fixed cost and desired profit are for an entire month.

Interpreting the Model

Several products can be analyzed at the same time. The results for each product are in the columns marked variable profit contribution, breakeven point, and profit level. The variable profit contribution is shown primarily as an interim result to be able to determine the breakeven point and profit level. But it also shows the amount of profit each item contributes to the total profit for that product. The breakeven point is the number of units that must

BREAKEVEN ANALYSIS

TO USE BREAKEVEN ANALYSIS IT IS ESSENTIAL TO KNOW A FEW ITEMS ABOUT YOUR COMPANY'S COSTS AND PRICES. THE FOLLOWING DATA MUST BE KNOWN:

1. PRICE OF PRODUCT (PR)
2. NUMBER OF UNITS PER YEAR (N)
3. FIXED COSTS (FC)
4. UNIT VARIABLE COST (VC)

DEFINITIONS:

1. (PR) - PRICE WHICH PRODUCT IS SELLING
2. (N) - ESTIMATED NUMBER OF UNITS COMPANY WILL PRODUCE IN THE COMING YEAR (OR TWELVE MONTHS)
3. (FC) - TOTAL COSTS WHICH COMPANY WOULD INCUR IF NO PRODUCTS WERE PRODUCED. THIS TYPICALLY COVERS THINGS AS DEPRECIATION, MANAGEMENT SALARIES, RENT, ETC. THIS IS
4. (VC) - COST TO PRODUCE ONE UNIT OF THE PRODUCT.
NOTE: THIS COST CAN VARY AT DIFFERENT PRODUCTION LEVELS.

THE FORMULA FOR BREAKEVEN ANALYSIS IS DERIVED FROM THE FOLLOWING FORMULA TO COMPUTE TOTAL REVENUE FOR A PRODUCT,

$$\text{PROFIT} = \text{PR} \times \text{N} - \text{FC} - \text{VC} \times \text{N}$$

FIGURE 7-16

A breakeven analysis.

FIGURE 7-16 (continued)

I. VARIABLE PROFIT CONTRIBUTION (VFC)

EQUALS PR - VC

INPUT:

PR = 45
VC = 36

OUTPUT:

VFC = 9

II. BREAKEVEN POINT (BP) THIS IS THE POINT WHERE PRODUCTION OR SALES IS ZERO PROFIT OR BREAKEVEN LEVEL. THE COMPANY W MAKE MONEY OR LOSE MONEY ON THIS PRODUCT.

EQUALS FC / VFC

INPUT:

FC = 135000
VFC = 9

OUTPUT:

BP = 15000

III. PROFIT LEVEL (PL). THIS IS THE LEVEL OF PRODUCTION OR SALES THAT WILL GIVE THE DESIRED PROFIT LEVEL.

$$PL = (FC + \text{DESIRED}) / \text{VFC PROFIT}$$

INPUT:

FC = 135000
DP = 200000
VFC = 9

OUTPUT:

PL = 37222

be sold so that money is neither made nor lost. This is very useful, especially for new products or projects, because you can determine what is the minimum quantity needed to be sold to cover all your costs and not lose any money. Also, by using various prices and costs in the model, you can determine how the breakeven point changes as these items change.

The profit level shows you how many units need to be produced to achieve the desired profit indicated for the product. For example, in Fig. 7-16 the desired profit is shown as \$200,000 and, 37,222 units are needed to

achieve that profit level. The model will also allow you to see the effects of changes in fixed costs, variable costs, and prices on the level of sales needed to produce the desired profit.

DESIGNING YOUR OWN VISICALC LAYOUTS

Now that you have examined a number of sample layouts and actually tried them with your own figures, you have probably thought of several situations where VisiCalc could assist in making decisions. You'll want to use your knowledge of how the VisiCalc commands work along with ideas you've picked up from the sample layouts for your own special problem areas. Rather than sitting down at the keyboard and composing your VisiCalc layout directly on the screen, start by asking yourself some questions about how you want the final screen and printout to appear.

Generally, sketching on paper what you want to see when you are done is helpful. (This incidentally, is a good idea when you are setting up any business problem on the computer, whether for a computer program or for an application package.) Outlining the layout on paper will do several things. First, you'll have a guide as to what to put on the screen when you start VisiCalc and will have fewer corrections to make as you work. Second, you'll see immediately whether what you have in mind will give the information you need.

Suppose, for example, you own a small printshop and occasionally get requests for a special job involving unusual ink, paper, cutouts, or folding. You could draw a rough layout like the one in Fig. 7-17 to help set quantity discounts for such an item.

	ORDER QUANTITY			
	50	100	500	1000
COST OF MATERIALS				
LABOR				
TOTAL COST PER ITEM				
MARKUP (as %)				
PRICE TO CUSTOMER				

FIGURE 7-17

A first attempt at laying out the information you want.

Looking at this layout, you realize you won't be able to use it unless you break down labor costs further because set-up time is constant, but work time varies with the amount of work to be done. You also realize that you won't get enough information from the few quantities you listed, but that

you need to try out many more order quantities to see where you will realize some savings to pass along to the customer as a price break. Figure 7-18 shows a revised paper layout for the problem.

	ORDER QUANTITY			
	50	100	150	200 . . . to 1000
COST OF MATERIALS				
LABOR				
SET-UP				
MANUFACTURING				
TOTAL COST PER				
ITEM				
MARKUP (as %)				
PRICE TO CUSTOMER				

FIGURE 7-18

A revised paper layout with more information.

Once you have on paper a rough layout of the results you want and are confident they will give you the needed information, you may want to make some notes on how the calculations will be done; for example, note formulas to be used, lookup tables needed, comparisons to be made, and so on. Then you are ready to begin using VisiCalc.

ENTERING A VISICALC LAYOUT

First, determine from your rough layout whether the standard recalculation order (vertically down the columns) will work or whether you'll need to change this to recalculate horizontally across the rows. Set up any other global features, such as a Dollar format.

Next, enter the layout title and the labels for the columns (months of the year or whatever).

Enter any lookup tables.

Then begin to fill in the first column with labels and the next column with the relevant figures or formulas. Many applications repeat the calculations in one column (or row) across several columns on the page. If that is the case, do just one column and then replicate. If you have columns that differ, fill in all the different formulas.

As you work, insert rows or columns as needed. One advantage of VisiCalc is that it is interactive, allowing you to make a change and see its effect on the appearance of your layout immediately.

Check your work by entering a sample figure or two where you can calculate the expected results in your head. This may show up a number of errors. You may have forgotten to replicate a formula into a slot. You may have a formula that references a number that is recalculated after the formula. (Changing recalculation order may help this.) Or you may simply have made an error in entering a formula or number.

Finally, enter the actual figures.

A FINAL WORD

With the sample models provided in this chapter, you have a good start on using VisiCalc layouts for your own business. Don't use just the layouts in this chapter, but design your own layouts for your unique situation.

Appendix A

Transferring VisiCalc[®] Data

“DIF”

“DIF” stands for Data Interchange format. Its primary function is to allow exchanging data among a number of programs. A “DIF” file is created by using the following command:

```
/S#S
```

The screen will prompt you for the lower-right cell of the matrix. It will also ask whether to store by rows (“R”) or columns (“C”). These rows are called tuples and the columns are called vectors. It is simply easier to think of the rows as rows and the columns as columns. Figure A-1 illustrates a Visicalc model that will be saved under “DIF”.

	A	B	C	D
1				
2	PRODUCT	PRICE	COSTS	MARGIN
3				
4	BOOK	10.00	5.00	5.00
5				
6	MAGAZINE	3.00	1.50	1.50
7				
8	NEWSPAPER	1.00	.75	.25
9				
10				
11				

FIGURE A-1

A VisiCalc layout table saved with “DIF.”

Now suppose you want to save the preceding data for a BASIC program or a VisiFile program to perform various selections and sorts on this model. To do this, the VisiCalc model must be stored by "DIF". You have to tell VisiCalc during the save routine whether to store data as rows or columns. For "DIF", simply reverse the usual meaning of row and column in your mind. If the data are going to be grouped in rows, store by columns. If the data will be thought of as columns, then store by rows. This is important because if the data are to be manipulated in the manner intended, then you must first store appropriately. No matter which way the data are stored, by row or column, each record is called a tuple in either your BASIC program file or VisiFile file. (This is why it is easier not to think of tuples as rows.)

The model in Fig. A-1 helps explain this. If the data are saved in "DIF" by rows (the question prompted by VisiCalc during the Save routine), the record created will consist of the following elements: 10.00, 3.00, and 1.00, all the prices for each product (a column of data). The second record in this format would be the cost for each product: 5.00, 1.50, .75, and so forth. If the data are saved by "DIF" by columns, the result will be a record with fields consisting of data for each product, the first being book—10.00, 5.00, 5.00. The second record would have data for magazine—3.00, 1.50, 1.50, and so forth.

The power of the "DIF" file can be seen in Fig. A-2 and A-3. Figure A-2 illustrates an accounts payable listing done on VisiCalc. It is a numerical listing of the checks written by a company. To get a listing with totals by vendor would be most difficult using VisiCalc. Using "DIF", the VisiCalc file can be transferred to VisiFile. There it can be sorted and vendor totals calculated, as shown in Fig. A-3. The VisiCalc file must be saved by column to achieve the desired results of having each row become a record in the VisiFile file.

Many other programs also use the "DIF" file format. Following are the more common programs available:

- VisiFile
- VisiTrend/Plot
- VisiPlot
- VisiSchedule
- Desktop/Plan
- DB Master

ACCOUNTS PAYABLE
AS OF 10/21/81

VENDOR	TYPE GDS	AMT	DATE	CURRENT	RF 11/1	SUB 11/1	PAST DUE	TERMS
APP	APP31/F	135.00	10/14	135.00	135.00			NET 15
HERE	CDNS	100.00	10/7	100.00	100.00			
KARF	OFF FURN	806.00	"	806.00	806.00			NET 30
"	OFF SUPP	32.21	"	32.21	32.21			"
"	"	27.32	10/2	27.32		27.32		"
"	"	16.99	10/12	16.99		16.99		"
"	"	524.29	9/23	524.29	524.29			"
HAM/AV	DEMO	4777.16	9/23	4777.16		4777.16		NET 45
"	"	2127.78	9/23	2127.78		2127.78		"
"	"	3494.57	9/23	3494.57		3494.57		"
"	"	222.85	9/23	222.85		222.85		"
STAM WIND	MISC	5.18	10/10	5.18	5.18			
UPS	SHIPPING	2.50	10/3	2.50	2.50			
HUDS PPR	BAGS	84.25	10/1	84.25		84.25		NET 30
DAMN INS	INS	287.00	9/29	287.00	287.00			"
"	WIPN COMP	932.00	9/29	932.00	932.00			"
SRA	RENT	1327.10	10/1	1327.10			1327.10	
APPLE	INVEN	1331.54	10/7	1331.54	1331.54			NET 15
"	DEMO	3805.47	"	3805.47	3805.47			"
WAHL WST	ADV TELPH	51.60	10/1	51.60		51.60		NET 30
APPLE	INV/DEMO	487.86	10/9	487.86	487.86			NET 15
SONITROL	ALARM	700.00	9/4	700.00		700.00		NET 60
CTY CARTG	TRASH	77.63	9/15	77.63	77.63			
SOURCE	PROMO	23.00	9/30	23.00	23.00			NET 30
UARCO	INVEN	43.05	9/28	43.05	43.05			"
"	"	49.51	10/5	49.51		49.51		"
"	"	186.21	9/24	186.21	186.21			"
KARF	OFF FURN	466.55	9/23	466.55	466.55			"
"	OFF SUPP	13.32	9/30	13.32		13.32		"
TELPH	TELPH	1587.13	10/13	1582.06	405.07		405.07	NET 30
UPS	SHIPPING	6.53	10/10	6.53	6.53			
HAM/AV	DEMO	61.86	10/12	61.86		61.86		NET 45
DUEL/HOLL	LEGAL	3114.32	10/20	3114.32		3114.32		
		-----		-----		-----		
		26907.78		25175.61	10984.19	14740.53	1732.17	27456.89

FIGURE A-2

A VisiCalc accounts payable layout.

ACCOUNTS PAYABLE

AS OF 10/21/81

VENDOR	TYPE GDS	AMT	DATE	CURRENT	BF 11/1	SUB 11/1	PAST DUE	TERMS
APP	APP31/F	135.00	10/14	135.00	135.00			NET 15
APPLE	INV/DEMO	487.86	10/9	487.86	487.86			NET 15
APPLE	INVEN	1331.54	10/7	1331.54	1331.54			NET 15
"	DEMO	3805.47	"	3805.47	3805.47			"
		5759.87						
CTY CARTG TRASH		77.63	9/15	77.63	77.63			
		77.63						
DAMM INS	INS	287.00	9/29	287.00	287.00			"
"	WKMN COMP	932.00	9/29	932.00	932.00			"
		1219.00						
DUEL/HOLL	LEGAL	3114.32	10/20	3114.32		3114.32		
		3114.32						
HAM/AV	DEMO	4777.16	9/23	4777.16		4777.16		NET 45
HAM/AV	DEMO	61.86	10/12	61.86		61.86		NET 45
"	"	2127.78	9/23	2127.78		2127.78		"
"	"	3494.57	9/23	3494.57		3493.57		"
"	"	222.85	9/23	222.85		222.85		"
		10684.22						
HERE	COKE	100.00	10/7	100.00	100.00			
		100.00						
HUDS PAPER	BAGS	84.25	10/1	84.25		84.25		NET 30
		84.25						
KARP	OFF FURN	806.00	"	806.00	806.00			NET 30
KARP	OFF FURN	466.55	9/23	466.55	466.55			"
"	OFF SUPP	13.32	9/30	13.32		13.32		"
"	"	524.29	9/23	524.29	524.29			"
"	OFF SUPP	32.21	"	32.21		32.21		"
"	"	27.32	10/2	27.32		27.32		"
"	"	16.99	10/12	16.99		16.99		"
		1886.63						
SONITROL	ALARM	700.00	9/4	700.00		700.00		NET 60
		700.00						

FIGURE A-3

When the information in Fig. A-2 is saved by "DIF", it is transferred to VisiFile and sorted by vendor.

FIGURE A-3 (continued)

SOURCE	PROMO	23.00	9/30	23.00	23.00		NET 30

		23.00					
SRA	RENT	1327.10	10/1		1327.10	1327.10	

		1327.10					
STAM WIND	MISC	5.18	10/10	5.18	5.18		

		5.18					
TELPH	TELPH	1587.13	10/15	1182.06	405.07	405.07	NET 30

		1587.13					
UARCO	INVEN	43.05	9/28	43.05	43.05		"
"	"	49.51	10/5	49.51		49.51	"
"	"	186.21	9/24	186.21	186.21		"

		278.77					
UPS	SHIPPING	2.50	10/3	2.50	2.50		
UPS	SHIPPING	6.53	10/10	6.53	6.53		

		9.03					
WAHL WST ADV TELPH		51.60	10/1	51.60		51.60	NET 30

		51.60					

		26907.78		25175.61	10984.19	14740.53	1732.17 27456.89



Listings for VisiCalc® Layouts in Chapter 7

>Q55:"==	>A54:"NET PROFIT
>P55:"=====	>Q53:"--
>O55:"=====	>P53:"-----
>N55:"=====	>O52:"-----
>M55:"=====	>N53:"-----
>L55:"=====	>M53:"-----
>K55:"=====	>L53:"-----
>J55:"=====	>K53:"-----
>I55:"=====	>J53:"-----
>H55:"=====	>I53:"-----
>G55:"=====	>H53:"-----
>F55:"=====	>G53:"-----
>E55:"=====	>F53:"-----
>D55:"=====	>E53:"-----
>C55:"=====	>D53:"-----
>B55:"=====	>C53:"-----
>A55:"=====	>B53:"-----
>P54:@IF(@ISERROR(O54/O9*100),0,O54/O9*100)	>A52:"-----
>O54:+O49-O51-O52	>P52:@IF(@ISERROR(O52/O9*100),0,O52/O9*100)
>N54:+N49-N51-N52	>O52:@SUM(C52...N52)
>M54:+M49-M51-M52	>M52:+M49*.1
>L54:+L49-L51-L52	>M52:+M49*.1
>K54:+K49-K51-K52	>L52:+L49*.1
>J54:+J49-J51-J52	>K52:+K49*.1
>I54:+I49-I51-I52	>J52:+J49*.1
>H54:+H49-H51-H52	>I52:+I49*.1
>G54:+G49-G51-G52	>H52:+H49*.1
>F54:+F49-F51-F52	>G52:+G49*.1
>E54:+E49-E51-E52	>F52:+F49*.1
>D54:+D49-D51-D52	>E52:+E49*.1
>C54:+C49-C51-C52	>D52:+D49*.1
>B54:"T	>C52:+C49*.1

FIGURE 7-2

Forecasting model with projected sales growth of 10%.

FIGURE 7-2 (continued)

>B52:"ES	>C50:"-----
>A52:"STATE TAX	>B50:"-----
>P51:@IF(@ISERROR(D51/D9*100),0,D51/D9*100)	>A50:"-----
>D51:@SUM(C51...N51)	>P49:@IF(@ISERROR(D49/D9*100),0,D49/D9*100)
>N51:+N49*.5	>O49:@SUM(C49...N49)
>M51:+M49*.5	>N49:+N16-N46
>L51:+L49*.5	>M49:+M16-M46
>K51:+K49*.5	>L49:+L16-L46
>J51:+J49*.5	>K49:+K16-K46
>I51:+I49*.5	>J49:+J16-J46
>H51:+H49*.5	>I49:+I16-I46
>G51:+G49*.5	>H49:+H16-H46
>F51:+F49*.5	>G49:+G16-G46
>E51:+E49*.5	>F49:+F16-F46
>D51:+D49*.5	>E49:+E16-E46
>C51:+C49*.5	>D49:+D16-D46
>B51:"AXES	>C49:+C16-C46
>A51:"FEDERAL T	>B49:"XES
>Q50:"--	>A49:"BEFORE TA
>P50:"-----	>B48:"T
>O50:"-----	>A48:"NET PROFI
>N50:"-----	>Q47:"--
>M50:"-----	>P47:"-----
>L50:"-----	>O47:"-----
>K50:"-----	>N47:"-----
>J50:"-----	>M47:"-----
>I50:"-----	>L47:"-----
>H50:"-----	>K47:"-----
>G50:"-----	>J47:"-----
>F50:"-----	>I47:"-----
>E50:"-----	>H47:"-----
>D50:"-----	>G47:"-----

FIGURE 7-2 (continued)

>F47:"-----	>G45:"-----
>E47:"-----	>F45:"-----
>D47:"-----	>E45:"-----
>C47:"-----	>D45:"-----
>B47:"-----	>C45:"-----
>A47:"-----	>B45:"-----
>P46:@SUM(P20...P41)	>A45:"-----
>O46:@SUM(O46...N46)	>P41:@IF(@ISERROR(O41/O9*100),0,O41/O9*100)
>N46:@SUM(N20...N44)	>O41:@SUM(O41...N41)
>M46:@SUM(M20...M44)	>N41:0
>L46:@SUM(L20...L44)	>M41:0
>K46:@SUM(K20...K44)	>L41:0
>J46:@SUM(J20...J44)	>K41:0
>I46:@SUM(I20...I44)	>J41:0
>H46:@SUM(H20...H44)	>I41:0
>G46:@SUM(G20...G44)	>H41:0
>F46:@SUM(F20...F44)	>G41:0
>E46:@SUM(E20...E44)	>F41:0
>D46:@SUM(D20...D44)	>E41:0
>C46:@SUM(C20...C44)	>D41:=+C41*1.08
>B46:"ENSES	>C41:0
>A46:"TOTAL EXP	>A41:"OTHER:
>O45:"--	>P40:@IF(@ISERROR(O40/O9*100),0,O40/O9*100)
>P45:"-----	>O40:@SUM(O40...N40)
>O45:"-----	>N40:0
>N45:"-----	>M40:0
>M45:"-----	>L40:0
>L45:"-----	>K40:0
>K45:"-----	>J40:0
>J45:"-----	>I40:0
>I45:"-----	>H40:0
>H45:"-----	>G40:0

FIGURE 7-2 (continued)

```

>F40:=0
>E40:=0
>D40:=+C40*1.08
>C40:=0
>B40:"EDUS
>A40:"MISCELLAN
>P39:@IF(@ISERROR(D39/D9*100),0,D39/D9*100)
>O39:=SUM(C39...N39)
>N39:=+M39*1.08
>M39:=+L39*1.08
>L39:=+K39*1.08
>K39:=+J39*1.08
>J39:=+I39*1.08
>I39:=+H39*1.08
>H39:=+G39*1.08
>G39:=+F39*1.08
>F39:=+E39*1.08
>E39:=+D39*1.08
>D39:=+C39*1.08
>C39:=3400
>A39:"INSURANCE
>P38:@IF(@ISERROR(O38/O9*100),0,O38/O9*100)
>O38:=SUM(C38...N38)
>N38:=+M38*1.08
>M38:=+L38*1.08
>L38:=+K38*1.08
>K38:=+J38*1.08
>J38:=+I38*1.08
>I38:=+H38*1.08
>H38:=+G38*1.08
>G38:=+F38*1.08
>F38:=+E38*1.08
>E38:=+D38*1.08
>D38:=+C38*1.08
>C38:=20000
>A38:"POSTAGE
>P37:@IF(@ISERROR(O37/O9*100),0,O37/O9*100)
>O37:=SUM(C37...N37)
>N37:=0
>M37:=0
>L37:=0
>K37:=0
>J37:=0
>I37:=0
>H37:=0
>G37:=0
>F37:=0
>E37:=0
>D37:=+C37*1.08
>C37:=0
>B37:"Y
>A37:"STATIONARY
>P36:@IF(@ISERROR(O36/O9*100),0,O36/O9*100)
>O36:=SUM(C36...N36)
>N36:=0
>M36:=0
>L36:=0
>K36:=0
>J36:=0
>I36:=0
>H36:=0
>G36:=0
>F36:=0
>E36:=0

```

FIGURE 7-2 (continued)

```

>D36:=+C36*1.08
>C36:=0
>B36:"IONS
>A36:"SUBSCRIPT
>P35:=@IF(@ISERROR(D35/D9*100),0,D35/D9*100)
>D35:=@SUM(C35...N35)
>N35:=+M35*1.08
>M35:=+L35*1.08
>L35:=+K35*1.08
>K35:=+J35*1.08
>J35:=+I35*1.08
>I35:=+H35*1.08
>H35:=+G35*1.08
>G35:=+F35*1.08
>F35:=+E35*1.08
>E35:=+D35*1.08
>D35:=+C35*1.08
>C35:=12500
>A35:"FREIGHT
>P34:=@IF(@ISERROR(D34/D9*100),0,D34/D9*100)
>D34:=@SUM(C34...N34)
>N34:=+M34*1.08
>M34:=+L34*1.08
>L34:=+K34*1.08
>K34:=+J34*1.08
>J34:=+I34*1.08
>I34:=+H34*1.08
>H34:=+G34*1.08
>G34:=+F34*1.08
>F34:=+E34*1.08
>E34:=+D34*1.08
>D34:=+C34*1.08
>C34:=1000
>A34:"HEAT
>P33:=@IF(@ISERROR(D33/D9*100),0,D33/D9*100)
>D33:=@SUM(C33...N33)
>N33:=+M33*1.08
>M33:=+L33*1.08
>L33:=+K33*1.08
>K33:=+J33*1.08
>J33:=+I33*1.08
>I33:=+H33*1.08
>H33:=+G33*1.08
>G33:=+F33*1.08
>F33:=+E33*1.08
>E33:=+D33*1.08
>D33:=+C33*1.08
>C33:=2600
>B33:"TY
>A33:"ELECTRICI
>P32:=@IF(@ISERROR(D32/D9*100),0,D32/D9*100)
>D32:=@SUM(C32...N32)
>N32:=+M32*1.08
>M32:=+L32*1.08
>L32:=+K32*1.08
>K32:=+J32*1.08
>J32:=+I32*1.08
>I32:=+H32*1.08
>H32:=+G32*1.08
>G32:=+F32*1.08
>F32:=+E32*1.08
>E32:=+D32*1.08
>D32:=+C32*1.08
>C32:=3700

```

FIGURE 7-2 (continued)

```

>A32:"TELEPHONE
>P31:@IF(@ISERROR(031/09*100),0,031/09*100)
>O31:@SUM(C31...N31)
>N31:+M31*1.08
>M31:+L31*1.08
>L31:+K31*1.08
>K31:+J31*1.08
>J31:+I31*1.08
>I31:+H31*1.08
>H31:+G31*1.08
>G31:+F31*1.08
>F31:+E31*1.08
>E31:+D31*1.08
>D31:+C31*1.08
>C31:1000
>B31:"CE
>A31:"MAINTENANCE
>P30:@IF(@ISERROR(030/09*100),0,030/09*100)
>O30:@SUM(C30...N30)
>N30:+M30*1.08
>M30:+L30*1.08
>L30:+K30*1.08
>K30:+J30*1.08
>J30:+I30*1.08
>I30:+H30*1.08
>H30:+G30*1.08
>G30:+F30*1.08
>F30:+E30*1.08
>E30:+D30*1.08
>D30:+C30*1.08
>C30:3500
>B30:"PENSE
>A30:"OFFICE EX
>P29:@IF(@ISERROR(029/09*100),0,029/09*100)
>O29:@SUM(C29...N29)
>N29:+M29*1.08
>M29:+L29*1.08
>L29:+K29*1.08
>K29:+J29*1.08
>J29:+I29*1.08
>I29:+H29*1.08
>H29:+G29*1.08
>G29:+F29*1.08
>F29:+E29*1.08
>E29:+D29*1.08
>D29:+C29*1.08
>C29:1500
>B29:"PPLIES
>A29:"OFFICE SU
>P28:@IF(@ISERROR(028/09*100),0,028/09*100)
>O28:@SUM(C28...N28)
>N28:+M28*1.08
>M28:+L28*1.08
>L28:+K28*1.08
>K28:+J28*1.08
>J28:+I28*1.08
>I28:+H28*1.08
>H28:+G28*1.08
>G28:+F28*1.08
>F28:+E28*1.08
>E28:+D28*1.08
>D28:+C28*1.08
>C28:15000
>A28:"PROMOTION

```

FIGURE 7-2 (continued)

```

>P27:@IF(@ISERROR(D27/D9*100),0,D27/D9*100)
>D27:@SUM(C27...N27)
>N27:=+M27*1.08
>M27:=+L27*1.08
>L27:=+K27*1.08
>K27:=+J27*1.08
>J27:=+I27*1.08
>I27:=+H27*1.08
>H27:=+G27*1.08
>G27:=+F27*1.08
>F27:=+E27*1.08
>E27:=+D27*1.08
>D27:=+C27*1.08
>C27:=100000
>B27:"MG
>A27:"ADVERTISI
>P26:@IF(@ISERROR(D26/D10*100),0,D26/D10*100)
>D26:@SUM(C26...N26)
>N26:=+M26*1.08
>M26:=+L26*1.08
>L26:=+K26*1.08
>K26:=+J26*1.08
>J26:=+I26*1.08
>I26:=+H26*1.08
>H26:=+G26*1.08
>G26:=+F26*1.08
>F26:=+E26*1.08
>E26:=+D26*1.08
>D26:=+C26*1.08
>C26:=5500
>B26:"ION
>A26:"DEPRECIAT
>P25:@IF(@ISERROR(D25/D9*100),0,D25/D9*100)
>D25:@SUM(C25...N25)
>N25:=+M25*1.08
>M25:=+L25*1.08
>L25:=+K25*1.08
>K25:=+J25*1.08
>J25:=+I25*1.08
>I25:=+H25*1.08
>H25:=+G25*1.08
>G25:=+F25*1.08
>F25:=+E25*1.08
>E25:=+D25*1.08
>D25:=+C25*1.08
>C25:=5000
>A25:"RENT
>P24:@IF(@ISERROR(D24/D9*100),0,D24/D9*100)
>D24:@SUM(C24...N24)
>N24:=+M24*1.08
>M24:=+L24*1.08
>L24:=+K24*1.08
>K24:=+J24*1.08
>J24:=+I24*1.08
>I24:=+H24*1.08
>H24:=+G24*1.08
>G24:=+F24*1.08
>F24:=+E24*1.08
>E24:=+D24*1.08
>D24:=+C24*1.08
>C24:=1000
>B24:"INS.
>A24:"ST.UNEMF.
>P23:@IF(@ISERROR(D23/D9*100),0,D23/D9*100)

```

FIGURE 7-2 (continued)

```

>O23:=@SUM(C23...N23)
>N23:=+M23*1.08
>M23:=+L23*1.08
>L23:=+K23*1.08
>K23:=+J23*1.08
>J23:=+I23*1.08
>I23:=+H23*1.08
>H23:=+G23*1.08
>G23:=+F23*1.08
>F23:=+E23*1.08
>E23:=+D23*1.08
>D23:=+C23*1.08
>C23:=2500
>B23:" INS.
>A23:"FED.UNEMP
>P22:=@IF(@ISERROR(O22/O9*100),0,O22/O9*100)
>O22:=@SUM(C22...N22)
>N22:=+M22*1.08
>M22:=+L22*1.08
>L22:=+K22*1.08
>K22:=+J22*1.08
>J22:=+I22*1.08
>I22:=+H22*1.08
>H22:=+G22*1.08
>G22:=+F22*1.08
>F22:=+E22*1.08
>E22:=+D22*1.08
>D22:=+C22*1.08
>C22:=+C20*.067
>A22:"FICA
>P21:=@IF(@ISERROR(O21/O9*100),0,O21/O9*100)
>O21:=@SUM(C21...N21)
>N21:=+M21*1.08
>M21:=+L21*1.08
>L21:=+K21*1.08
>K21:=+J21*1.08
>J21:=+I21*1.08
>I21:=+H21*1.08
>H21:=+G21*1.08
>G21:=+F21*1.08
>F21:=+E21*1.08
>E21:=+D21*1.08
>D21:=+C21*1.08
>C21:=25000
>B21:" BENEFITS
>A21:" EMPLOYEE
>P20:=@IF(@ISERROR(O20/O9*100),0,O20/O9*100)
>O20:=@SUM(C20...N20)
>N20:=+M20*1.08
>M20:=+L20*1.08
>L20:=+K20*1.08
>K20:=+J20*1.08
>J20:=+I20*1.08
>I20:=+H20*1.08
>H20:=+G20*1.08
>G20:=+F20*1.08
>F20:=+E20*1.08
>E20:=+D20*1.08
>D20:=+C20*1.08
>C20:=250000
>B20:" & WAGES
>A20:" SALARIES
>Q19:"--
>P19:"-----

```

FIGURE 7-2 (continued)

>O19:"-----	>C17:"-----
>N19:"-----	>B17:"-----
>M19:"-----	>A17:"-----
>L19:"-----	>P16:=@IF(@ISERROR(O16/O9*100),0,O16/O9*100)
>K19:"-----	>O16:=@SUM(C16...N16)
>J19:"-----	>N16:=+N9-N14
>I19:"-----	>M16:=+M9-M14
>H19:"-----	>L16:=+L9-L14
>G19:"-----	>K16:=+K9-K14
>F19:"-----	>J16:=+J9-J14
>E19:"-----	>I16:=+I9-I14
>D19:"-----	>H16:=+H9-H14
>C19:"-----	>G16:=+G9-G14
>B19:"-----	>F16:=+F9-F14
>A19:"-----	>E16:=+E9-E14
>C18:" :	>D16:=+D9-D14
>B18:" EXPENSES	>C16:=+C9-C14
>A18:" OPERATING	>A16:" GR. PROFIT
>Q17:" --	>Q15:" --
>P17:" -----	>P15:" -----
>O17:" -----	>O15:" -----
>N17:" -----	>N15:" -----
>M17:" -----	>M15:" -----
>L17:" -----	>L15:" -----
>K17:" -----	>K15:" -----
>J17:" -----	>J15:" -----
>I17:" -----	>I15:" -----
>H17:" -----	>H15:" -----
>G17:" -----	>G15:" -----
>F17:" -----	>F15:" -----
>E17:" -----	>E15:" -----
>D17:" -----	>D15:" -----

FIGURE 7-2 (continued)

```

>C15:"-----
>B15:"-----
>A15:"-----
>P14:@IF(@ISERROR(D14/09*100),0,D14/09*100)
>O14:@SUM(C14...N14)
>M14:+M11+M12-M13
>M14:+M11+M12-M13
>L14:+L11+L12-L13
>K14:+K11+K12-K13
>J14:+J11+J12-J13
>I14:+I11+I12-I13
>H14:+H11+H12-H13
>G14:+G11+G12-G13
>F14:+F11+F12-F13
>E14:+E11+E12-E13
>D14:+D11+D12-D13
>C14:+C11+C12-C13
>A14:"COGS
>P13:@IF(@ISERROR(O13/09*100),0,O13/09*100)
>O13:@SUM(C13...N13)
>N13:+M13*1.05
>M13:+L13*1.05
>L13:+K13*1.05
>K13:+J13*1.05
>J13:+I13*1.05
>I13:+H13*1.05
>H13:+G13*1.05
>G13:+F13*1.05
>F13:+E13*1.05
>E13:+D13*1.05
>D13:+C13*1.05
>C13:175000

>A13:"END. INV.
>P12:@IF(@ISERROR(O12/09*100),0,O12/09*100)
>O12:@SUM(C12...N12)
>N12:+M12*1.05
>M12:+L12*1.05
>L12:+K12*1.05
>K12:+J12*1.05
>J12:+I12*1.05
>I12:+H12*1.05
>H12:+G12*1.05
>G12:+F12*1.05
>F12:+E12*1.05
>E12:+D12*1.05
>D12:+C12*1.05
>C12:800000
>A12:"PURCHASES
>P11:@IF(@ISERROR(O11/09*100),0,O11/09*100)
>O11:@SUM(C11...N11)
>N11:+M11*1.05
>M11:+L11*1.05
>L11:+K11*1.05
>K11:+J11*1.05
>J11:+I11*1.05
>I11:+H11*1.05
>H11:+G11*1.05
>G11:+F11*1.05
>F11:+E11*1.05
>E11:+D11*1.05
>D11:+C11*1.05
>C11:200000
>A11:"BEG. INV.
>B10:"--

```

FIGURE 7-2 (continued)

>P10:"-----	>PB:"-----	>G4:"YEAR ENDIN
>Q10:"-----	>Q8:"-----	>H3:"G MODEL
>N10:"-----	>N8:"-----	>G3:"FORCASTIN
>M10:"-----	>M8:"-----	>H2:"NAME
>L10:"-----	>L8:"-----	>G2:"COMPANY
>K10:"-----	>K8:"-----	/W1
>J10:"-----	>J8:"-----	/GOC
>I10:"-----	>I8:"-----	/GRM
>H10:"-----	>H8:"-----	/GFI
>G10:"-----	>G8:"-----	/GC9
>F10:"-----	>F8:"-----	/X-/X)A1:>A1:
>E10:"-----	>E8:"-----	
>D10:"-----	>D8:"-----	
>C10:"-----	>C8:"-----	
>B10:"-----	>B8:"-----	
>A10:"-----	>A8:"-----	
>P9:@IF(@ISERROR(D9/D9*100),0,D9/D9*100)	>Q7:"ES	
>O9:@SUM(C9...N9)	>P7:" % OF SAL	
>M9:+M9*1.1	>O7:/FR"TOTAL	
>M9:+L9*1.1	>N7:/FR"DECEMBER	
>L9:+K9*1.1	>M7:/FR"NOVEMBER	
>K9:+J9*1.1	>L7:/FR" OCTOBER	
>J9:+I9*1.1	>K7:/FR"SEPT	
>I9:+H9*1.1	>J7:/FR"AUGUST	
>H9:+G9*1.1	>I7:/FR"JULY	
>G9:+F9*1.1	>H7:/FR"JUNE	
>F9:+E9*1.1	>G7:/FR"MAY	
>E9:+D9*1.1	>F7:/FR"APRIL	
>D9:+C9*1.1	>E7:/FR"MARCH	
>C9:1500000	>D7:/FR"FEBRUARY	
>A9:"SALES	>C7:/FR"JANUARY	
>Q8:"--	>H4:"NG	

>N75:"=====	>G74:+G64+G67+G69-G71-G72	>C72:0
>M75:"=====	>F74:+F64+F67+F69-F71-F72	>B72:"ES
>L75:"=====	>E74:+E64+E67+E69-E71-E72	>A72:"STATE TAX
>K75:"=====	>D74:+D64+D67+D69-D71-D72	>N71:0
>J75:"=====	>C74:+C64+C67+C69-C71-C72	>M71:0
>I75:"=====	>B74:"AVAILABLE	>L71:0
>H75:"=====	>A74:"NET CASH	>K71:0
>G75:"=====	>N73:"-----	>J71:0
>F75:"=====	>M73:"-----	>I71:0
>E75:"=====	>L73:"-----	>H71:0
>D75:"=====	>K73:"-----	>G71:0
>C75:"=====	>J73:"-----	>F71:0
>B75:"=====	>I73:"-----	>E71:0
>A75:"=====	>H73:"-----	>D71:0
>N74:+N64+N67+N69-N71-N72	>G73:"-----	>C71:0
>M74:+M64+M67+M69-M71-M72	>F73:"-----	>E71:"AXES
>L74:+L64+L67+L69-L71-L72	>E73:"-----	>A71:"FEDERAL T
>K74:+K64+K67+K69-K71-K72	>D73:"-----	>N70:"-----
>J74:+J64+J67+J69-J71-J72	>C73:"-----	>M70:"-----
>I74:+I64+I67+I69-I71-I72	>B73:"-----	>L70:"-----
>H74:+H64+H67+H69-H71-H72	>A73:"-----	>K70:"-----
	>N72:0	>J70:"-----
	>M72:0	>I70:"-----
	>L72:0	>H70:"-----
	>K72:0	>G70:"-----
	>J72:0	>F70:"-----
	>I72:0	>E70:"-----
	>H72:0	>D70:"-----
	>G72:0	>C70:"-----
	>F72:0	>B70:"-----
	>E72:0	>A70:"-----
	>D72:0	>B69:" LOANS

FIGURE 7-4

A typical example of a cash flow model.

FIGURE 7-4 (continued)

>A69:"CASH FROM	>C62:"-----	>N58:+M58*1.05
>I67:2500000	>B62:"-----	>M58:+L58*1.05
>A67:"SECURITIES	>A62:"-----	>L58:+K58*1.05
>B66:" SALE OF	>N61:2500	>K58:+J58*1.05
>A66:"CASH FROM	>M61:2500	>J58:+I58*1.05
>N64:+N23-N54+N58+N59-N61	>L61:2500	>I58:+H58*1.05
>M64:+M23-M54+M58+M59-M61	>K61:2500	>H58:+G58*1.05
>L64:+L23-L54+L58+L59-L61	>J61:2500	>G58:+F58*1.05
>K64:+K23-K54+K58+K59-K61	>I61:2500	>F58:+E58*1.05
>J64:+J23-J54+J58+J59-J61	>H61:2500	>E58:+D58*1.05
>I64:+I23-I54+I58+I59-I61	>G61:2500	>D58:+C58*1.05
>H64:+H23-H54+H58+H59-H61	>F61:2500	>C58:12000
>G64:+G23-G54+G58+G59-G61	>E61:2500	>B58:"ION
>F64:+F23-F54+F58+F59-F61	>D61:2500	>A58:"DEPRECIAT
>E64:+E23-E54+E58+E59-E61	>C61:2500	>A57:"PLUS:
>D64:+D23-D54+D58+D59-D61	>B61:"ID EXP.	>B56:"ITEMS:
>C64:+C23-C54+C58+C59-C61	>A61:"END,PREPA	>A56:"NON-CASH
>B64:"ATIONS	>A60:"LESS:	>N55:"-----
>A64:"FROM OPER	>N59:5000	>M55:"-----
>B63:"AVAILABLE	>M59:5000	>L55:"-----
>A63:"NET CASH	>L59:5000	>K55:"-----
>N62:"-----	>K59:5000	>J55:"-----
>M62:"-----	>J59:5000	>I55:"-----
>L62:"-----	>I59:5000	>H55:"-----
>K62:"-----	>H59:5000	>G55:"-----
>J62:"-----	>G59:5000	>F55:"-----
>I62:"-----	>F59:5000	>E55:"-----
>H62:"-----	>E59:5000	>D55:"-----
>G62:"-----	>D59:5000	>C55:"-----
>F62:"-----	>C59:5000	>B55:"-----
>E62:"-----	>B59:"EXPENSES	>A55:"-----
>D62:"-----	>A59:"ACCRUED	>N54:@SUM(N28,...N52)

FIGURE 7-4 (continued)

>M54:=@SUM(M28...M52)	>I49:=0	>D47:=+C47*1.08
>L54:=@SUM(L28...L52)	>H49:=0	>C47:=4100
>K54:=@SUM(K28...K52)	>G49:=0	>A47:="INSURANCE
>J54:=@SUM(J28...J52)	>F49:=0	>N46:=0
>I54:=@SUM(I28...I52)	>E49:=0	>M46:=0
>H54:=@SUM(H28...H52)	>D49:=+D49*1.08	>L46:=0
>G54:=@SUM(G28...G52)	>C49:=0	>K46:=0
>F54:=@SUM(F28...F52)	>A49:="OTHER:"	>J46:=0
>E54:=@SUM(E28...E52)	>N48:=0	>I46:=0
>D54:=@SUM(D28...D52)	>M48:=0	>H46:=0
>C54:=@SUM(C28...C52)	>L48:=0	>G46:=0
>B54:="ENSES	>K48:=0	>F46:=0
>A54:="TOTAL EXP	>J48:=0	>E46:=0
>M53:="-----	>I48:=0	>D46:=+C46*1.08
>H53:="-----	>H48:=0	>C46:=0
>L53:="-----	>G48:=0	>A46:="FOSTAGE
>K53:="-----	>F48:=0	>N45:=0
>J53:="-----	>E48:=0	>M45:=0
>I53:="-----	>D48:=+C48*1.08	>L45:=0
>H53:="-----	>C48:=0	>K45:=0
>G53:="-----	>B48:="EODS	>J45:=0
>F53:="-----	>A48:="MISCELLAN	>I45:=0
>E53:="-----	>N47:=+M47*1.08	>H45:=0
>D53:="-----	>M47:=+L47*1.08	>G45:=0
>C53:="-----	>L47:=+K47*1.08	>F45:=0
>B53:="-----	>K47:=+J47*1.08	>E45:=0
>A53:="-----	>J47:=+I47*1.08	>D45:=+C45*1.08
>N49:=0	>I47:=+H47*1.08	>C45:=0
>M49:=0	>H47:=+G47*1.08	>B45:="Y
>L49:=0	>G47:=+F47*1.08	>A45:="STATIONARY
>K49:=0	>F47:=+E47*1.08	>N44:=0
>J49:=0	>E47:=+D47*1.08	>M44:=0

FIGURE 7-4 (continued)

>L44:0	>G42:+F42*1.08	>A40:"TELEPHONE
>K44:0	>F42:+E42*1.08	>N39:0
>J44:0	>E42:+D42*1.08	>M39:0
>I44:0	>D42:+C42*1.08	>L39:0
>H44:0	>C42:2000	>K39:0
>G44:0	>A42:"HEAT	>J39:0
>F44:0	>N41:+M41*1.08	>I39:0
>E44:0	>M41:+L41*1.08	>H39:0
>D44:+C44*1.08	>L41:+K41*1.08	>G39:0
>C44:0	>K41:+J41*1.08	>F39:0
>B44:"IONS	>J41:+I41*1.08	>E39:0
>A44:"SUBSCRIPT	>I41:+H41*1.08	>D39:+C39*1.08
>N43:+M43*1.08	>H41:+G41*1.08	>C39:0
>M43:+L43*1.08	>G41:+F41*1.08	>B39:"CE
>L43:+K43*1.08	>F41:+E41*1.08	>A39:"MAINTENANCE
>K43:+J43*1.08	>E41:+D41*1.08	>N38:+M38*1.08
>J43:+I43*1.08	>D41:+C41*1.08	>M38:+L38*1.08
>I43:+H43*1.08	>C41:2000	>L38:+K38*1.08
>H43:+G43*1.08	>B41:"TY	>K38:+J38*1.08
>G43:+F43*1.08	>A41:"ELECTRICI	>J38:+I38*1.08
>F43:+E43*1.08	>N40:+M40*1.08	>I38:+H38*1.08
>E43:+D43*1.08	>M40:+L40*1.08	>H38:+G38*1.08
>D43:+C43*1.08	>L40:+K40*1.08	>G38:+F38*1.08
>C43:3100	>K40:+J40*1.08	>F38:+E38*1.08
>A43:"FREIGHT	>J40:+I40*1.08	>E38:+D38*1.08
>N42:+M42*1.08	>I40:+H40*1.08	>D38:+C38*1.08
>M42:+L42*1.08	>H40:+G40*1.08	>C38:2000
>L42:+K42*1.08	>G40:+F40*1.08	>B38:"PENSE
>K42:+J42*1.08	>F40:+E40*1.08	>A38:"OFFICE EX
>J42:+I42*1.08	>E40:+D40*1.08	>N37:+M37*1.08
>I42:+H42*1.08	>D40:+C40*1.08	>M37:+L37*1.08
>H42:+G42*1.08	>C40:2500	>L37:+K37*1.08

FIGURE 7-4 (continued)

>K37:+J37*1.08	>G35:+F35*1.08	>A33:"RENT
>J37:+I37*1.08	>F35:+E35*1.08	>N32:+M32*1.08
>I37:+H37*1.08	>E35:+D35*1.08	>M32:+L32*1.08
>H37:+G37*1.08	>D35:+C35*1.08	>L32:+K32*1.08
>G37:+F37*1.08	>C35:15000	>K32:+J32*1.08
>F37:+E37*1.08	>A35:"PROMOTION	>J32:+I32*1.08
>E37:+D37*1.08	>N34:+M34*1.08	>I32:+H32*1.08
>D37:+C37*1.08	>M34:+L34*1.08	>H32:+G32*1.08
>C37:1000	>L34:+K34*1.08	>G32:+F32*1.08
>B37:"PPLIES	>K34:+J34*1.08	>F32:+E32*1.08
>A37:"OFFICE SU	>J34:+I34*1.08	>E32:+D32*1.08
>N36:+M36*1.08	>I34:+H34*1.08	>D32:+C32*1.08
>M36:+L36*1.08	>H34:+G34*1.08	>C32:1000
>L36:+K36*1.08	>G34:+F34*1.08	>B32:" INS.
>K36:+J36*1.08	>F34:+E34*1.08	>A32:"ST.UNEMP,
>J36:+I36*1.08	>E34:+D34*1.08	>N31:+M31*1.08
>I36:+H36*1.08	>D34:+C34*1.08	>M31:+L31*1.08
>H36:+G36*1.08	>C34:25000	>L31:+K31*1.08
>G36:+F36*1.08	>B34:"NG	>K31:+J31*1.08
>F36:+E36*1.08	>A34:"ADVERTISI	>J31:+I31*1.08
>E36:+D36*1.08	>N33:+M33*1.08	>I31:+H31*1.08
>D36:+C36*1.08	>M33:+L33*1.08	>H31:+G31*1.08
>C36:12000	>L33:+K33*1.08	>G31:+F31*1.08
>B36:"AMORT.	>K33:+J33*1.08	>F31:+E31*1.08
>A36:"DEPREC.&	>J33:+I33*1.08	>E31:+D31*1.08
>N35:+M35*1.08	>I33:+H33*1.08	>D31:+C31*1.08
>M35:+L35*1.08	>H33:+G33*1.08	>C31:2500
>L35:+K35*1.08	>G33:+F33*1.08	>B31:" INS.
>K35:+J35*1.08	>F33:+E33*1.08	>A31:"FED.UNEMP
>J35:+I35*1.08	>E33:+D33*1.08	>N30:+M30*1.08
>I35:+H35*1.08	>D33:+C33*1.08	>M30:+L30*1.08
>H35:+G35*1.08	>C33:5000	>L30:+K30*1.08

FIGURE 7-4 (continued)

>K30:+J30*1.08	>F28:+E28*1.08	>F24:"-----
>J30:+I30*1.08	>E28:+D28*1.08	>E24:"-----
>I30:+H30*1.08	>D28:+C28*1.08	>D24:"-----
>H30:+G30*1.08	>C28:100000	>C24:"-----
>G30:+F30*1.08	>B28:"& WAGES	>B24:"-----
>F30:+E30*1.08	>A28:"SALARIES	>A24:"-----
>E30:+D30*1.08	>N27:"-----	>N23:+N9+N11+N14+N15+N16-N18-N19-N20-N21
>D30:+C30*1.08	>M27:"-----	>M23:+M9+M11+M14+M15+M16-M18-M19-M20-M21
>C30:16750	>L27:"-----	>L23:+L9+L11+L14+L15+L16-L18-L19-L20-L21
>A30:"FICA	>K27:"-----	>K23:+K9+K11+K14+K15+K16-K18-K19-K20-K21
>N29:+M29*1.08	>J27:"-----	>J23:+J9+J11+J14+J15+J16-J18-J19-J20-J21
>M29:+L29*1.08	>I27:"-----	>I23:+I9+I11+I14+I15+I16-I18-I19-I20-I21
>L29:+K29*1.08	>H27:"-----	>H23:+H9+H11+H14+H15+H16-H18-H19-H20-H21
>K29:+J29*1.08	>G27:"-----	>G23:+G9+G11+G14+G15+G16-G18-G19-G20-G21
>J29:+I29*1.08	>F27:"-----	>F23:+F9+F11+F14+F15+F16-F18-F19-F20-F21
>I29:+H29*1.08	>E27:"-----	>E23:+E9+E11+E14+E15+E16-E18-E19-E20-E21
>H29:+G29*1.08	>D27:"-----	>D23:+D9+D11+D14+D15+D16-D18-D19-D20-D21
>G29:+F29*1.08	>C27:"-----	>C23:+C9+C11+C14+C15+C16-C18-C19-C20-C21
>F29:+E29*1.08	>B27:"-----	>B23:"E
>E29:+D29*1.08	>A27:"-----	>A23:"NET CHANG
>D29:+C29*1.08	>C26:"	>N22:"-----
>C29:25000	>B26:" EXPENSES	>M22:"-----
>B29:"BENEFITS	>A26:"OPERATING	>L22:"-----
>A29:"EMPLOYEE	>A25:"LESS:	>K22:"-----
>N28:+M28*1.08	>N24:"-----	>J22:"-----
>M28:+L28*1.08	>M24:"-----	>I22:"-----
>L28:+K28*1.08	>L24:"-----	>H22:"-----
>K28:+J28*1.08	>K24:"-----	>G22:"-----
>J28:+I28*1.08	>J24:"-----	>F22:"-----
>I28:+H28*1.08	>I24:"-----	>E22:"-----
>H28:+G28*1.08	>H24:"-----	>D22:"-----
>G28:+F28*1.08	>G24:"-----	>C22:"-----

FIGURE 7-4 (continued)

>B22:"-----	>L19:+K19*1.12	>H16:+G16*1.03
>A22:"-----	>K19:+J19*1.12	>G16:+F16*1.03
>N21:+M16	>J19:+I19*1.12	>F16:+E16*1.03
>M21:+L16	>I19:+H19*1.12	>E16:+D16*1.03
>L21:+K16	>H19:+G19*1.12	>D16:+C16*1.03
>K21:+J16	>G19:+F19*1.12	>C16:300000
>J21:+I16	>F19:+E19*1.12	>E16:" PAY.
>I21:+H16	>E19:+D19*1.12	>A16:"END. ACCT
>H21:+G16	>D19:+C19*1.12	>N15:+M15*1.025
>G21:+F16	>C19:1200000	>M15:+L15*1.025
>F21:+E16	>A19:"PURCHASES	>L15:+K15*1.025
>E21:+D16	>N18:+M15	>K15:+J15*1.025
>D21:+C16	>M18:+L15	>J15:+I15*1.025
>C21:200000	>L18:+K15	>I15:+H15*1.025
>B21:" PAY.	>K18:+J15	>H15:+G15*1.025
>A21:"BEG. ACCT	>J18:+I15	>G15:+F15*1.025
>N20:+M20*1.075	>I18:+H15	>F15:+E15*1.025
>M20:+L20*1.075	>H18:+G15	>E15:+D15*1.025
>L20:+K20*1.075	>G18:+F15	>D15:+C15*1.025
>K20:+J20*1.075	>F18:+E15	>C15:125000
>J20:+I20*1.075	>E18:+D15	>B15:"NTORY
>I20:+H20*1.075	>D18:+C15	>A15:"END. INVE
>H20:+G20*1.075	>C18:350000	>N14:+M20
>G20:+F20*1.075	>B18:"TORY	>M14:+L20
>F20:+E20*1.075	>A18:"EEG. INVEN	>L14:+K20
>E20:+D20*1.075	>A17:"LESS:	>K14:+J20
>D20:+C20*1.075	>N16:+M16*1.03	>J14:+I20
>C20:750000	>M16:+L16*1.03	>I14:+H20
>B20:"IVABLES	>L16:+K16*1.03	>H14:+G20
>A20:"END. RECE	>K16:+J16*1.03	>G14:+F20
>N19:+M19*1.12	>J16:+I16*1.03	>F14:+E20
>M19:+L19*1.12	>I16:+H16*1.03	>E14:+D20

FIGURE 7-4 (continued)

>D14:+C20	>M10:"-----	>I0:"-----
>C14:500000	>M10:"-----	>H0:"-----
>E14:"IVABLES	>L10:"-----	>G0:"-----
>A14:"BEG. RECE	>K10:"-----	>F0:"-----
>A13:"PLUS:	>J10:"-----	>E0:"-----
>M12:"-----	>I10:"-----	>D0:"-----
>M12:"-----	>H10:"-----	>C0:"-----
>L12:"-----	>G10:"-----	>B0:"-----
>K12:"-----	>F10:"-----	>A0:"-----
>J12:"-----	>E10:"-----	>N7:/FR"DECEMBER
>I12:"-----	>D10:"-----	>M7:/FR"NOVEMBER
>H12:"-----	>C10:"-----	>L7:/FR"OCTOBER
>G12:"-----	>B10:"-----	>K7:/FR"SEPT
>F12:"-----	>A10:"-----	>J7:/FR"AUGUST
>E12:"-----	>M9:+M74	>I7:/FR"JULY
>D12:"-----	>M9:+L74	>H7:/FR"JUNE
>C12:"-----	>L9:+K74	>G7:/FR"MAY
>B12:"-----	>K9:+J74	>F7:/FR"APRIL
>A12:"-----	>J9:+I74	>E7:/FR"MARCH
>M11:+M11*1.1	>I9:+H74	>D7:/FR"FEBRUARY
>M11:+L11*1.1	>H9:+G74	>C7:/FR"JANUARY
>L11:+K11*1.1	>G9:+F74	>H4:"NG
>K11:+J11*1.1	>F9:+E74	>G4:"YEAR ENDIN
>J11:+I11*1.1	>E9:+D74	>H3:"MODEL
>I11:+H11*1.1	>D9:+C74	>G3:"CASH FLOW
>H11:+G11*1.1	>C9:200000	>H2:"NAME
>G11:+F11*1.1	>A9:"BEG.CASH	>G2:"COMPANY
>F11:+E11*1.1	>N8:"-----	/W1
>E11:+D11*1.1	>M8:"-----	/GDC
>D11:+C11*1.1	>L8:"-----	/GRM
>C11:1500000	>K8:"-----	/GFI
>A11:"SALES	>J8:"-----	/GC9
		/X-/X>A1:>A1:

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>H71:"=====	>D69:"AND SHARE	>B60:" COMMON	>B48:"OTHER LIA
>G71:"=====	>C69:"BILITIES	>C58:"STOCK:	>H47:"-----
>F71:"=====	>B69:"TOTAL LIA	>B58:"CAPITAL	>G47:"-----
>E71:"=====	>H67:"-----	>D56:"Y	>F47:"-----
>D71:"=====	>G67:"-----	>C56:"ERS EQUIT	>E47:"-----
>C71:"=====	>F67:"-----	>B56:"STOCKHOLD	>D47:"-----
>E71:"=====	>E67:"-----	>H55:"-----	>C47:"-----
>H69:+H46+H54+H66	>D67:"-----	>G55:"-----	>B47:"-----
>G69:/FR"\$	>C67:"-----	>F55:"-----	>H46:@SUM(H40...H44)
>F69:"QUITY	>B67:"-----	>E55:"-----	>E46:"ILITIES
>E69:"HOLDERS E	>H66:@SUM(H60...H64)	>D55:"-----	>D46:"RENT LIAB
	>E66:" EQUITY	>C55:"-----	>C46:"TOTAL CUR
	>D66:"AREHOLDERS	>B55:"-----	>H45:"-----
	>C66:"TOTAL SHA	>H54:@SUM(H50...H52)	>G45:"-----
	>H65:"-----	>E54:"ITIES	>F45:"-----
	>G65:"-----	>D54:"ER LIABIL	>E45:"-----
	>F65:"-----	>C54:"TOTAL OTH	>D45:"-----
	>E65:"-----	>H53:"-----	>C45:"-----
	>D65:"-----	>G53:"-----	>B45:"-----
	>C65:"-----	>F53:"-----	>B44:"OTHER
	>B65:"-----	>E53:"-----	>H43:5500
	>H64:45000	>D53:"-----	>C43:"PAYABLE
	>C64:"EARNINGS	>C53:"-----	>B43:"INTEREST
	>B64:"RETAINED	>B53:"-----	>H42:15000
	>H63:100000	>B52:"OTHER	>E42:"M DEBT
	>C63:"SURPLUS	>H51:26500	>D42:" LONG TER
	>B63:"CAPITAL	>C51:"TAXES	>C42:"ORTION OF
	>H61:20000	>B51:"DEFERRED	>B42:"CURRENT P
	>C61:"RED STOCK	>H50:200000	>H41:18000
	>B61:" PREFER	>C50:" DEBT	>C41:"ABLE
	>H60:10000	>B50:"LONG TERM	>B41:"TAXES PAY
	>C60:" STOCK	>C48:"ILITIES	>H40:225000

FIGURE 7-6

A sample balance sheet.

FIGURE 7-6 (continued)

>C40:"PAYABLE	>E27:"-----	>H18:@SUM(H10...H16)	>D11:"EMTS,AT CO
>E40:"ACCOUNTS	>D27:"-----	>E18:"TS	>C11:"M INVESTM
>D38:"S	>C27:"-----	>D18:"RENT ASSET	>B11:"SHORT TER
>C38:"IABILITIE	>B27:"-----	>C18:"TOTAL CUR	>H10:10000
>E38:"CURRENT L	>H26:100000	>H17:"-----	>G10:"FR"\$
>E36:" EQUITY	>B26:"GOODWILL	>G17:"-----	>B10:"CASH
>D36:"AREHOLDERS	>H25:-25000	>F17:"-----	>C8:"ASSETS
>C36:"ES AND SH	>E25:"ON	>E17:"-----	>B8:"CURRENT
>B36:"LIABILITI	>D25:"EPRECIATI	>D17:"-----	>B5:"ASSETS
>H33:"-----	>C25:"MULATED D	>C17:"-----	>F4:"DING
>G33:"-----	>B25:"LESS:ACCU	>B17:"-----	>E4:"PERIOD EN
>F33:"-----	>H24:50000	>B16:"OTHER	>F3:"SHEET
>E32:"-----	>D24:"ENTS	>H15:12500	>E3:"BALANCE
>D32:"-----	>C24:" IMPROVEM	>C15:"XPENSES	>F2:"ANY NAME
>C32:"-----	>B24:"LEASEHOLD	>B15:"PREPAID E	>E2:"YOUR COMP
>B32:"-----	>H23:25000	>H14:200000	/W1
>H31:+H18+H28	>D23:"URES	>F14:"ET	/GOC
>C31:"ETS	>C23:" AND FIXT	>E14:"T OR MARK	/GRA
>B31:"TOTAL ASS	>B23:"FURNITURE	>D14:"ER OF COS	/XV30
>H29:"-----	>H22:175000	>C14:"ES,AT LOW	/GC9
>G29:"-----	>D22:"T	>B14:"INVENTORI	/X-/X>A1:>A1:;/GC7
>F29:"-----	>C22:" EQUIPMEN	>H13:-7500	/X-/X>H1:>H1:;/WS
>E29:"-----	>B22:"PLANT AND	>E13:"BT	
>D29:"-----	>C20:"ETS	>D13:"OR BAD DE	
>C29:"-----	>B20:"FIXED ASS	>C13:"RESERVE F	
>B29:"-----	>H19:"-----	>B13:" LESS:	
>H28:@SUM(H22...H26)	>G19:"-----	>H12:75000	
>D28:"ED ASSETS	>F19:"-----	>D12:"E	
>C28:"TOTAL FIX	>E19:"-----	>C12:"RECEIVABL	
>H27:"-----	>D19:"-----	>B12:"ACCOUNTS	
>G27:"-----	>C19:"-----	>H11:50000	
>F27:"-----	>B19:"-----	>E11:"OST	

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>H40:"=====  
>H59:+H56-H57  
>C59:"E  
>B59:"NET INCOM  
>H58:"-----  
>H57:345000  
>C57:"YES  
>B57:"INCOME TA  
>H56:+H43-H54  
  
>D56:"TAXES  
>C56:"E BEFORE  
>B56:"NET INCOM  
>H55:"-----  
>G55:"-----  
>H54:+G52-G54  
>G54:25000  
>C54:"T EXPENSE  
>B54:" INTERES  
>G52:+@SUM(H48...H50)  
>F52:/FR"$  
>C52:"ER INCOME  
>B52:"TOTAL OTH  
>F51:"-----  
>H50:50000  
>F50:0  
>C50:" INCOME  
>B50:" ROYALTY  
>F49:0  
>C49:"D INCOME  
>B49:" DIVIDEN  
>H48:20000  
>F48:0  
>E48:/FR"$  
>C48:"T INCOME  
  
>B48:" INTERES  
>D46:"EXPENSES:  
>C46:"EMUE AND  
>B46:"OTHER REV  
>H43:+H19-H41  
>G43:/FR"$  
>D43:"ME  
>C43:"TING INCO  
>B43:"NET OPERA  
>H42:"-----  
>H41:@SUM(F23...F39)  
>D41:"PENSE  
>C41:"RATING EX  
>B41:"TOTAL OPE  
>F40:"-----  
>F35:0  
>B35:" OTHER  
>F34:4500  
>D34:"PENSES  
>C34:"ANEODUS EX  
>B34:" MISCELL  
>F33:15700  
>B33:" TAXES  
>F32:5000  
>D32:"PAIRS  
>C32:"ANCE & RE  
>B32:" MAINTEN  
>F31:7500  
>C31:"CE  
>B31:" INSURAN  
>F30:10000  
>C30:"EXPENSE  
>B30:" OFFICE  
>F29:12500  
  
>C29:"SUPPLIES  
>B29:" OFFICE  
>F28:10000  
>C28:"ATION  
>B28:" DEPRECI  
>F27:0  
>C27:"TS  
>B27:" BAD DEB  
>F26:12500  
>C26:"ROMOTION  
>B26:" SALES P  
>F25:50000  
>C25:"SING  
>B25:" ADVERTI  
>F24:25000  
>C24:"IONS  
>B24:" COMMISS  
>F23:250000  
>E23:/FR"$  
>C23:"S & WAGES  
>B23:" SALARIE  
>D22:"  
>C22:" EXPENSES  
>B22:"OPERATING  
>H19:+H10-H17  
>D19:"LES  
>C19:"FIT ON SA  
>B19:"GROSS PRO  
>H18:"-----  
>G18:"-----  
>H17:+G16-G17  
>G17:350000  
>D17:"NTORY  
>C17:"DING INVE

```

FIGURE 7-8

A sample income sheet.

FIGURE 7-8 (continued)

>B17:" LESS:EN	>C6:"ES
>G16:+G13+G14	>B6:"GROSS SAL
>D16:"FOR SALE	>G4:"NDING
>C16:"AVAILABLE	>F4:"PERIOD EN
>B16:" GOODS A	
>G15:" -----	>G3:"TATEMENT
>G14:1250000	>F3:"INCOME ST
>C14:"RCHASES	>G2:"ANY NAME
>B14:" PLUS:PU	>F2:"YOUR COMP
>G13:375000	/W1
>D13:"DRY	/GOC
>C13:"NG INVENT	/GRA
>B13:" BEGINNI	/XV21
>D12:"	/GC9
>C12:"OODS SOLD	/X-/X>B1:>B1:;/GC8
>B12:"COST OF G	/X!/X>F1:>G1:;/WS
>H10:+G6-G8	
>C10:"NET SALES	
>G9:" -----	
>F9:" -----	
>G8:+F7+F8	
>F8:15000	
>C8:"COUNTS	
>B8:"SALES DIS	
>F7:20000	
>E7:/FR"\$	
>D7:" & ALLOW.	
>C7:"S RETURNS	
>B7:"LESS:SALE	
>G6:2500000	
>F6:/FR"\$	

>I43:"=====	>H37:"-----	>H28:"-----
>H43:"=====	>G37:"-----	>G28:"-----
>G43:"=====		>F28:"-----
>F43:"=====	>F37:"-----	>E28:"-----
>E43:"=====	>E37:"-----	>D28:"-----
>D43:"=====	>D37:"-----	>C28:"-----
	>C37:"-----	>B28:"-----
>C43:"=====	>B37:"-----	>A28:"-----
>B43:"=====	>A37:"-----	>I27:@SUM(I18...I25)+I15
>A43:"=====	>E36:0	>H27:@SUM(H18...H25)+H15
>I42:+I27-I38	>C36:"ONS	>G27:@SUM(G18...G25)+G15
>H42:+H27-H38	>B36:"TRANSACTI	>F27:@SUM(F18...F25)+F15
>G42:+G27-G38	>A36:" OTHER	>E27:@SUM(E18...E25)+E15
>F42:+F27-F38	>E35:500000	>D27:"DS PROVIDED
>E42:+E27-E38	>C35:"EBT	>C27:"TOTAL FUN
>B42:"SE	>B35:"MENT OF D	>I26:"-----
>A42:"OR DECREA	>A35:" RETIRE	>H26:"-----
>C41:"CREASE	>E34:250000	>G26:"-----
>B41:"APITAL IN	>D34:"OCK	>F26:"-----
>A41:"WORKING C	>C34:"RED ON ST	>E26:"-----
>I39:"-----	>B34:"NDS DECLA	>D26:"-----
>H39:"-----	>A34:" DIVIDE	>C26:"-----
>G39:"-----	>E33:0	>B26:"-----
>F39:"-----	>D33:"QUIPMENT	>A26:"-----
>E39:"-----	>C33:"F PLANT&E	>E24:0
>D39:"-----	>B33:"ISPOSAL O	>D24:"ESTMENTS
>C39:"-----	>A33:" LESS:DR	>C24:"SE IN INV
>B39:"-----	>E32:175000	>B24:"SE/INCREAS
>A39:"-----	>D32:"NT	>A24:" DECREA
>I38:@SUM(I31...I36)	>C32:"& EQUIPME	>E23:-45000
>H38:@SUM(H31...H36)	>B32:"SE PLANT	>D23:"T ASSETS
>G38:@SUM(G31...G36)	>A32:" PURCHA	>A23:" CURREN
>F38:@SUM(F31...F36)	>B30:"D FOR:	
>E38:@SUM(E31...E36)	>A30:"FUNDS USE	
>D38:"DS USED	>I28:"-----	
>C38:"TOTAL FUN		
>I37:"-----		

FIGURE 7-10

A sample source and application of funds statement.

FIGURE 7-10 (continued)

>D22:"ER	>E15:@SUM(E9...E13)	>I7:"-----
>C22:"SE IN OTH	>C15:"ATIONS	>H7:"-----
>B22:"SE/INCREAS	>B15:"FROM OPER	>G7:"-----
>A22:" DECREA	>A15:" TOTAL	>F7:"-----
>E21:25000	>I14:"-----	>E7:"-----
>D21:"EIVABLES	>H14:"-----	>D7:"-----
>C21:"SE IN REC	>G14:"-----	>C7:"-----
>B21:"SE/INCREA	>F14:"-----	>B7:"-----
>A21:" DECREA	>E14:"-----	>A7:"-----
>E20:257000	>D14:"-----	>I6:+H6-1
>C20:"S	>C14:"-----	>H6:+G6-1
>E20:"FROM BANK	>B14:"-----	>G6:+F6-1
>A20:" LOANS	>A14:"-----	>F6:+E6-1
>B19:"F NOTES	>E13:0	>E6:1982
>A19:" SALE 0	>B13:"OTHER	>B6:" FUNDS:
>E18:500000	>E12:20000	>A6:"SOURCE OF
>C18:"STOCK	>D12:"DIT	>F4:"NDING
>B18:"F COMMON	>C12:"T TAX CRE	>E4:"PERIOD EN
>A18:" SALE 0	>B12:"INVESTMEN	>H3:"F FUNDS
>I16:"-----	>E11:0	>G3:"CATION OF F
>H16:"-----	>C11:"TAXES	>F3:"ND APPLICA
>G16:"-----	>B11:"DEFERRED	>E3:"SOURCE AN
>F16:"-----	>E10:10000	>F2:"ANY NAME
>E16:"-----	>C10:"ION	>E2:"YOUR COMP
>D16:"-----	>B10:"DEPRECIAT	/W1
>C16:"-----	>E9:742300	/GDC
>B16:"-----	>D9:"S	/GRA
>A16:"-----	>C9:"FORE TAXE	/XV21
>I15:@SUM(I9...I13)	>B9:"INCOME BE	/GC9
>H15:@SUM(H9...H13)	>C8:"	/X!/X)A1:>A1:/GC8
>G15:@SUM(G9...G13)	>B8:"PERATIONS	/X!/X)E1:>F4:/WS
>F15:@SUM(F9...F13)	>A8:" FROM 0	

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>F98: +F22/F24	>F80: +F18/F26	>D56: "S PAID ON
>C98: "MARKET	>B80: "DIVIDENDS	>C56: "F EARNING
>B98: "STOCK AT	>F78: +F16/F26	>B56: "PERCENT O
>D97: "F COMMON	>B78: "INCOME	>C54: "----
>C97: "S PER \$ O	>F76: +F7/F26	>B54: /--
>B97: "NET ASSET	>B76: "SALES	>C53: "TIO:
>G95: "%	>C74: /--	>B53: "PAYOUT RA
>F95: +(F18/F24)*100	>B74: /--	>F49: +F16/F22
>C95: "YIELD	>C73: " FIGURES:	>E49: " STOCK
>B95: "DIVIDEND	>B73: "PER SHARE	>D49: "OF COMMON
>F93: +(F16/F24)*100	>F69: +F12/F14	>C49: "R DOLLAR
>D93: "RKET	>D69: "X)	>B49: "RETURN PE
>C93: "OCK AT MA	>C69: "(AFTER TA	>F47: +F12/F7
>B93: "COMMON ST	>B69: "DIVIDENDS	>C47: "MARGIN
>C92: "%	>E68: "ERRED	>B47: "EARNINGS
>D92: " \$ OF	>D68: "ST & PREF	>F45: +F7/F20
>C92: "ARNED PER	>C68: "OF INTERE	>E45: "APITAL
>B92: "PERCENT E	>E68: "COVERAGE	>D45: "F TOTAL C
>F90: +F7/F24	>F66: +F22/F20	>C45: " DOLLAR O
>B90: "AT MARKET	>B66: "CAPITAL	>B45: "SALES PER
>D89: "MON STOCK	>E65: "TOTAL	>F43: +F12/F20
>C89: " \$ OF COM	>D65: "RCENT OF	>E43: "ATION
>B89: "SALES PER	>C65: "OCK AS PE	>D43: " & AMORTIZ
>D87: "--	>B65: "COMMON ST	>C43: "RECIATON
>C87: /--	>F63: +F28/F30	>B43: "AFTER DEF
>B87: /--	>C63: "ATIO	>E42: "CAPITAL
>D86: "S:	>B63: "CURRENT R	>D42: "OF TOTAL
>C86: "ICE RATIO	>B61: /--	>C42: "R DOLLAR
>B86: "MARKET PR	>B60: "CREDIT:	>B42: "RETURN PE
>F82: +F22/F26	>F57: +F18/F16	>F40: +(F9+F12)/F20
>C82: "E	>B57: "STOCK	>E40: "IZATION
>B82: "BOOK VALU	>E56: " COMMON	>D40: "N & AMORT

FIGURE 7-12

A sample financial ratios statement for an example company.

FIGURE 7-12 (continued)

>C40:"PRECIATIO	>F23:/FR	>F11:/FR
>B40:"BEFORE DE	>F22:/FR955.5	>E11:"&
>E39:"CAPITAL	>E22:"ALUE)	>D11:"INTEREST
>D39:"OF TOTAL	>D22:"Y (BOOK V	>C11:"E BEFORE
>C39:"R DOLLAR	>C22:"OCK EQUIT	>B11:"NET INCOM
>B39:"RETURN PE	>B22:"COMMON ST	>F10:/FR
>D37:"---	>F21:/FR	>F9:/FR129.3
>C37:/--	>F20:/FR1421.1	>D9:"RTIZATION
>B37:/--	>D20:"K VALUE)	>C9:"ION & AMO
>D36:"OS:	>C20:"ITAL (BOO	>B9:"DEPRECIAT
>C36:"LITY RATI	>B20:"TOTAL CAP	>F7:/FR1548.2
>B36:"PROFITABI	>F19:/FR	>B7:"SALES
>F30:/FR245.9	>F18:/FR108.4	>C5:"A:
>D30:"S	>D18:"ON STOCK	>B5:"INPUT DAT
>C30:"IABILITIE	>C18:" FOR COMM	>E2:" RATIOS
>B30:"CURRENT L	>B18:"DIVIDENDS	>D2:"FINANCIAL
>F29:/FR	>F17:/FR	/W1
>F28:/FR688.4	>F16:/FR158	/GOC
>C28:"SSETS	>C16:"E	/GRA
>B28:"CURRENT A	>B16:"NET INCOM	/XV30
>F27:/FR	>F15:/FR	/GC9
>F26:/FR30.1	>F14:/FR16.6	/X!/X)A1:)>A1:;/GF\$
>E26:"STOCK	>E14:"NDS	/GC7
>D26:"F COMMON	>D14:"ED DIVIDE	/X!/X)F1:)>F103:;/WS
>C26:" SHARES O	>C14:"& PREFERR	
>B26:"NUMBER OF	>B14:"INTEREST	
>F25:/FR	>F13:/FR	
>F24:/FR3838	>F12:/FR174.6	
>E24:"E	>E12:"TAX)	
>D24:"RKET VALU	>D12:"S (AFTER	
>C24:"OCK AT MARK	>C12:" DIVIDEND	
>B24:"COMMON ST	>B12:"PREFERRED	

```

)D48:=PI*IF(ABSERROR(-(((2*C34*C37)/C36)^.5)*((C35/(C34+C36))^.5)),0,-(((2*C34*C37)/C36)^.5*((C35/(C34+C36))^.5))
)C48:"POINT =
)B48:"REORDER
)I45:"C
)H45:" / CC + S
)G45:" ROOT (CC
)F45:" X SQUARE
)E45:"X D / SC)
)D45:" (2 X OC
)C45:"E ROOT OF
)B45:"R = SQUARE
)F43:"OLLOWS:
)E43:"INED AS F
)D43:"IS DETERM
)C43:"ER POINT
)B43:"THE REORD

)D40:=PI*IF(ABSERROR(((2*C34*C37)/C35)^.5)*((C35+C36)/C36)^.5),0,+((2*C34*C37)/C35)^.5*((C35+C36)/C36)^.5))
)C40:"UANTITY =
)B40:"REORDER Q
)C37:3422.5
)B37:" D =
)C36:100
)B36:"SC =
)C35:10
)B35:"CC =
)C34:8
)B34:"CC =
)B32:"INFUT:
)I29:"O))
)H29:" + SC / C
)G29:" ROOT ((CC
)F29:" X SQUARE
)E29:"X D / CC)
)D29:" (2 X OC
)C29:"E ROOT OF
)B29:"Q = SQUAR
)F27:"OLLOWS:
)E27:"INED AS F
)D27:"IS DETERMI
)C27:"ER QTY
)B27:"THE REORD
)H24:"E COSTS
)G24:"+ SHORTAG
)F24:"NG COSTS
)E24:" + CARRYI
)D24:"ING COSTS
)C24:"T = ORDER
)B24:"TOTAL COS

```

FIGURE 7-14

Determining reorder quantity using the economic order quantity formula.

FIGURE 7-14 (continued)

>E21:"D	>A18:/FR"O	>B6:"IT CAN BE
>D21:"THE PERIOD	>D17:"TY	>H4:" HOWEVER,
>C21:"D WITHIN	>C17:"ER QUANTI	>G4:"LE MODEL,
>B21:"D = DEMAN	>B17:"O = REORDE	>F4:"VELY SIMF
>I20:"HE SALE)	>C16:"ER POINT	>E4:" A RELATI
>H20:" MAKING TH	>B16:"R = REORD	>D4:"D HERE IS
>G20:"ST OF HOT	>F13:"CTOR,	>C4:" PRESENTED
>F20:"TUNITY COS	>E13:" NOT A FA	>B4:"THE MODEL
>E20:"THE OPPOR	>D13:"INTS ARE	>G2:"O)
>D20:"(THIS IS	>C13:"E CONSTRA	>F2:"NTITY (BOR)
>C20:"AGE COST	>B13:"4. STORAG	>E2:"ORDER QUA
>B20:"C = SHORT	>E12:"N,	>D2:"ECONOMIC
>A20:/FR"S	>D12:" ARE KNOW	/W1
>X19:"RY)	>C12:"ORY COSTS	/GOC
>J19:"E INVENTO	>B12:"3. INVENT	/GRA
>I19:"TORING TH	>G11:"ME,	/GC9
>H19:"COST OF S	>F11:"RRIVAL TIM	/X1/X)A1:)>A1:
>G19:"AND THE	>E11:"ERMINED A	
>F19:" EXPENSE	>D11:" A PREDETE	
>E19:" INTEREST	>C11:"DERS HAVE	
>D19:"(INCLUDES	>B11:"2. NEW OR	
>C19:"ING COST	>F10:"IOD,	
>B19:"C = CARRY	>E10:"OUT A PER	
>A19:/FR"C	>D10:"Y THROUGH	
>I18:")	>C10:" IS STEAD	
>H18:"HE THREE.	>B10:"1. DEMAND	
>G18:"COST OF TH	>C9:"UMPTIONS:	
>F18:"SMALLEST	>B9:"BASIC ASS	
>E18:"ALLY THE	>F6:"MENT,	
>D18:"IS IS USU	>E6:"RY MANAGE	
>C18:" COST (THIS	>D6:"E INVENTO	
>B18:"C = ORDER	>C6:"LF IMPROV	

```

>I129:" -----
>G129:" -----
>E129:" -----
>I128:@IF(@ISERROR((D127+D128)/E128),0,((D127+D128)/E128))
>G128:@IF(@ISERROR(D127/E128),0,(D127/E128))
>E128:+D125-D126
>D128:0
>C128:"ROFIT
>B128:"DESIRED P
>D127:0
>C127:"T:
>B127:"FIXED COS
>D126:0
>C126:"COST:
>B126:"VARIABLE
>D125:0
>B125:"PRICE:
>E124:" -----
>B123:"PRODUCT5:
>I122:" -----
>G122:" -----
>E122:" -----
>I121:@IF(@ISERROR((D120+D121)/E121),0,((D120+D121)/E121))
>G121:@IF(@ISERROR(D120/E121),0,(D120/E121))
>E121:+D118-D119
>D121:0
>C121:"ROFIT
>B121:"DESIRED P
>D120:0
>C120:"T:
>B120:"FIXED COS

```

FIGURE 7-16

A breakeven analysis where the data for price and variable cost is product per item, while fixed cost and desired profit are calculated over a one-month period.

FIGURE 7-16 (continued)

```

>D119:0
>C119:"COST:
>B119:"VARIABLE
>D118:0
>E118:"PRICE:
>B117:"-----
>B116:"PRODUCT4:
>I115:" -----
>G115:" -----
>E115:" -----
>I114:@IF(@ISERROR((D113+D114)/E114),0,((D113+D114)/E114))
>G114:@IF(@ISERROR(D113/E114),0,(D113/E114))
>E114:+D111-D112
>D114:0
>C114:"ROFIT
>B114:"DESIRED P
>D113:0
>C113:"T:
>B113:"FIXED COS
>D112:0
>C112:"CUST:
>B112:"VARIABLE
>D111:0
>B111:"PRICE:
>B110:"-----
>B109:"PRODUCT3:
>I108:" -----
>G108:" -----
>E108:" -----
>I107:@IF(@ISERROR((D106+D107)/E107),0,((D106+D107)/E107))
>G107:@IF(@ISERROR(D106/E107),0,(D106/E107))
>E107:+D104-D105
>D107:0

```

FIGURE 7-16 (continued)

```

>C107:"ROFIT
>B107:"DESIRED P
>D106:0
>C106:"T:
>B106:"FIXED COS
>D105:0
>C105:"COST:
>B105:"VARIABLE
>D104:0
>B104:"PRICE:
>B103:"-----
>B102:"PRODUCT2:
>I101:" -----
>G101:" -----
>E101:" -----
>I100:@IF(@ISERROR((D99+D100)/E100),0,((D99+D100)/E100))
>G100:@IF(@ISERROR(D99/E100),0,(D99/E100))
>E100:+D97-D98
>D100:0
>C100:"ROFIT:
>B100:"DESIRED P
>D99:0
>C99:"T:
>B99:"FIXED COS
>D98:0
>C98:"COST:
>B98:"VARIABLE
>D97:0
>B97:"PRICE:
>B96:"-----
>I95:/FR"-----
>G95:"-----

```

FIGURE 7-16 (continued)

```

>F95:"---
>E95:"-----
>B95:"PRODUCT1:
>I94:/FR"LEVEL
>G94:/FL"POINT
>F94:"ION
>E94:"CONTRIBUT
>I93:/FR"PROFIT
>G93:"BREAKEVEN
>E93:"PROFIT
>E92:"VARIABLE
>E87:/FI@IF(@ISERROR((E81+E82)/E83),0,((E81+E82)/E83)
>D87:"PL =
>D86:"-----
>D85:"OUTPUT:
>E83:0
>D83:"VFC =
>E82:0
>D82:"DF =
>E81:0
>D81:"FC =
>D80:"-----
>D79:"INPUT:
>E76:" PROFIT
>F75:") / VFC
>E75:"+ DESIRED
>D75:"PL = (FC
>J72:"VEL.
>I72:"PROFIT LE
>H72:" DESIRED
>G72:" GIVE THE
>F72:"THAT WILL

```

FIGURE 7-16 (continued)

>J71:"SALES	>K54:"S AT A	>D33:"R A PRODU
>I71:"CTION OR	>J54:"R SALES I	>C33:"EVENUE FO
>H71:" OF PRODUC	>I54:"DUCTION O	>B33:"E TOTAL R
>G71:"THE LEVEL	>H54:"WHERE PRO	>A33:"TO COMPUT
>F71:"THIS IS	>G54:"HE POINT	>I32:"
>E71:"(PL).	>F54:"THIS IS T	>H32:"G FORMULA
>D71:"IT LEVEL	>E54:"T (BP)	>G32:" FOLLOWIN
>C71:"III. PROF	>D54:"EVEN POIN	>F32:" FROM THE
>E67:/FI@IF(@ISERR@R(E62/E63),0,E62/E63	>C54:"II. BREAK	>E32:"S DERIVED
>D67:"BP =	>E50:+E45-E46	>D32:"NALYSIS I
>D66:"-----	>D50:"VFC =	>C32:"EAKEVEN A
>D65:"OUTPUT:	>D49:"-----	>B32:"LA FOR BR
>E63:0	>D48:"OUTPUT	>A32:"THE FORMU
>D63:"VFC =	>E46:0	>H29:"S.
>E62:0	>D46:"VC =	>G29:"IGN LEVEL
>D62:"FC =	>E45:0	>F29:"T PRODUCT
>D61:"-----	>D45:"PR =	>E29:" DIFFEREN
>D60:"INPUT:	>D44:"-----	>D29:"N VARY AT
>E58:" / VFC	>D43:"INPUT:	>C29:"S COST CA
>D58:"EQUALS FC	>E41:" - VC	>B29:"NOTE: THIE
>J56:"DUCT.	>D41:"EQUALS PR	>F28:"DUCT.
>I56:"M THIS PR	>G39:")	>E28:"F THE PROD
>H56:"E MONEY O	>F39:"TION (VFC	>D28:"NE UNIT O
>G56:"EY OR LOS	>E39:" CONTRIBU	>C28:"PRODUCE O
>F56:"MAKE MON	>D39:"LE PROFIT	>B28:"COST TO
>L55:"ER	>C39:"I. VARIAB	>A28:"4.(VC) -
>K55:"ILL NEITH	>F36:" N	>M26:"ERIOD.
>J55:"COMPANY WI	>E36:"FC - VC X	>M26:"STS PER F
>I55:"VEL. THE	>D36:"PR X N -	>L26:" FIXED COS
>H55:"AKEVEN LEV	>C36:"=	>K26:"THE TOTAL
>G55:"IT OR BRE	>B36:"PROFIT =	>J26:" THIS IS
>F55:"ZERO PROF	>E33:"CT.	>I26:"ENT, ETC.

FIGURE 7-16 (continued)

>H26:"LARIES, R	>B20:"PRICE WHI	>BB:"1.PRICE
>G26:"GEMENT SA	>A20:"1.(PR) -	>F6:"KNOWN:
>F26:"ION, MANA	>B18:"NS:	>E6:" MUST BE
>E26:"DEPRECIAT	>A18:"DEFINITIO	>D6:"WING DATA
>D26:"HINGS AS	>D14:"ST (VC)	>C6:"THE FOLL_
>C26:" COVERS T	>C14:"RIABLE CO	>B6:" PRICES.
>B26:"TYPICALLY	>B14:"4.UNIT VA	>A6:"COSTS A^T
>J25:"S	>C12:"OSTS (FC)	>J5:"S
>I25:"UCED. THIS	>B12:"3.FIXED C	>I5:"ROCOMPANY
>H25:"WERE PRODU	>E10:"(N)	>H5:"ABOUT YOU
>G25:"PRODUCTS	>D10:"PER YEAR	>G5:"W ITEMS .
>F25:"R IF NO	>C10:"OF UNITS	>F5:"KNOW A FE
>E25:"OULD INCUR	>B10:"2.NUMBER	>E5:"NTIAL TO
>D25:"COMPANY W	>D8:"T (PR)	>D5:"T IS ESCIMPO
>C25:"TS WHICH	>C8:"OF PRODUC	>C5:"NILY[IS I
>B25:"TOTAL COS		>B5:"EIKM^EN A
>A25:"3.(FC) -		>A5:"TO USE BR
>G23:")		>E2:" ANALYSIS
>F23:"E MONTHS		>D2:"BREAKEVEN
>E23:"(OR TWELVE		>B1:"16
>D23:"ING YEAR		>A1:"FIGURE 7-
>C23:"N THE COM		/W1
>B23:"PRODUCE I		/G0C
>F22:"LL		/GRA
>E22:"OMPANY WI		/G09
>D22:"F UNITS C		/X!/X>A1:>A1:
>C22:" NUMBER O		
>B22:"ESTIMATED		
>A22:"2.(N) -		
>E20:"ING		
>D20:"T IS SELL		
>C20:"CH PRODUCT		



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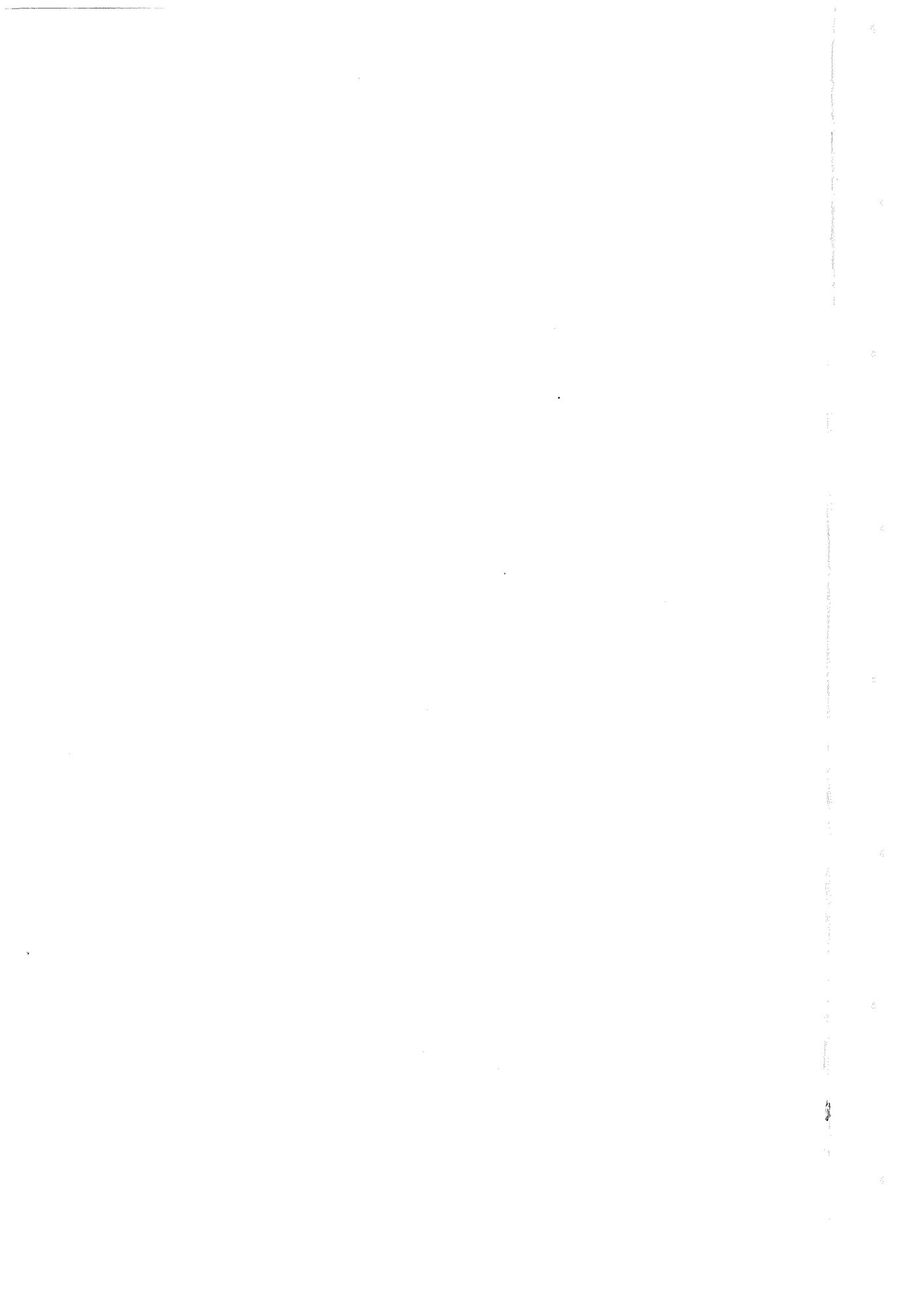
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