Microcomputer Power

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Use the VisiCalc worksheets to

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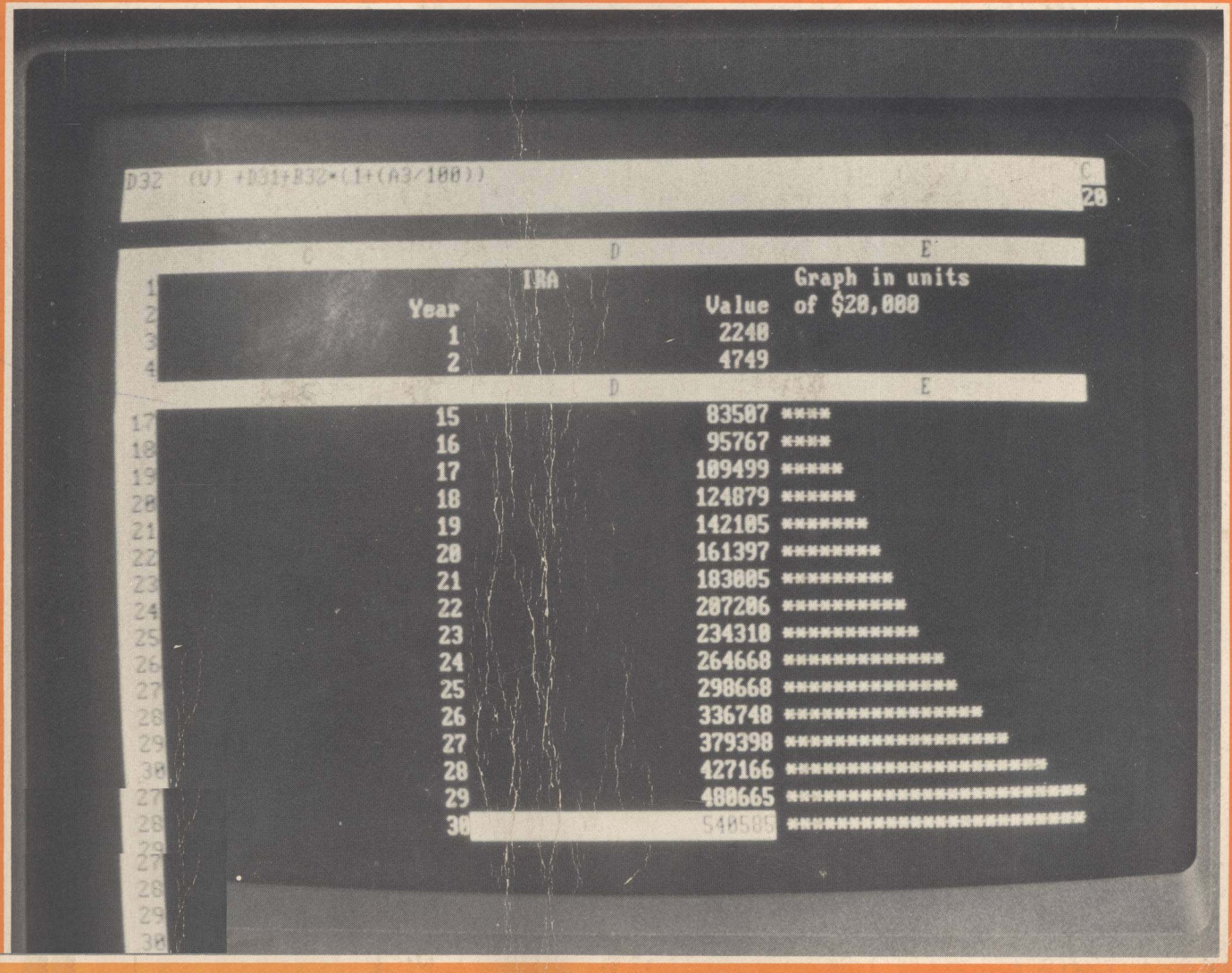
- evaluate your portfolio
- log your expenses
- compute your IRA account
- determine your net worth

Written for the novice and the professional.

VisiCalc®
for the IBM Personal Computer

Edouard J. Desautels



VisiCalc®

for the IBM Personal Computer

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wcb
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Preface

VisiCalc® makes a computer as easy to use as a calculator, and it gives you far more power than a calculator does. This little book is intended to show you how you can use VisiCalc effectively. This book is designed so you do not have to have any previous experience with computers to use VisiCalc.

The first chapter sketches the kind of situation in which VisiCalc excels. The next chapter shows you how to start using the IBM Personal Computer. Then we start looking at the specifics of using VisiCalc. Although it is easier to keep reading the chapters in the order in which they appear, you can often skip ahead if you wish to look into some feature of special interest to you. A comprehensive index will help you find your way.

Most of the features of VisiCalc are presented while solving a sequence of realistic problems, such as evaluating the accumulation in an IRA (Individual Retirement Account). Some of these problems are solved a second time, so you can better appreciate the contrast between different approaches.

Almost everyone has to come to grips with numbers, lots of them. VisiCalc is such a powerful assistant in helping you manage numeric information that you should seriously consider equipping yourself with this tool. Perhaps this book will help you make such a decision.

Although this book contains detailed instructions on how you can yourself do everything that is shown, an optional diskette may be used to reduce the typing which would otherwise be required. See the appendix for further information. It is assumed that you have already purchased the appropriate version of the VisiCalc software. If not, you may obtain it from your IBM Personal Computer supplier.

Contents

Chapter 1

WHY USE VISICALC?

Electronic computers have been in use for over 30 years. Why is it that VisiCalc is one of the best-selling computer software packages since the beginning of the computer age? The Time magazine article on VisiCalc gives you some idea of its financial success. What makes VisiCalc so attractive?

The Smash Hit of Software

Daniel Bricklin, 29, and Robert Frankston, 31, a team of new-wave composers, have penned a dynamite disc that has grossed an estimated $8 million. It is not a punk-rock smash, but an unmelodic magnetic number called VisiCalc, the bestselling microcomputer program for business uses. The featherweight sliver of plastic is about the size of a greeting card, but when it is placed in a computer, the machine comes alive. A computer without a program, or "software," is like a $3,000 stereo set without any records or tapes.

Three years ago, Bricklin, then a first-year Harvard Business School student, conceived VisiCalc while struggling with financial-planning problems on his calculator. He enlisted the aid of Frankston, a longtime friend and an expert programmer, to develop a new piece of computer software that would make juggling all those figures easier.

The partnership paid off. Since late 1979 nearly 100,000 copies of nine different versions of VisiCalc have been ordered at prices ranging from $100 to $300. It is far ahead of other business programs like Data Factory and General Ledger, and even outsells the programs for Star Cruiser, Dogfight and other arcade-like computer games.

VisiCalc translates simple commands typed on a keyboard into computer language that the machine then uses to solve problems. It enables a businessman, for example, to manipulate labyrinthine equations to calculate financial trends for his company. If he changes one figure, the machine can tell quickly how that affects the other numbers. A firm that gives its workers a 10% pay hike could estimate how that action would alter its costs, sales, profits, or dividends.

The computer program is being put to a wide range of uses. It helps Allerton Cushman Jr., a New York financial analyst, to project insurance-industry profits during the week and tote up his income taxes on the weekend. The Cabot Street Cinema Theatre in Beverly, Mass., bought VisiCalc to figure out which pattern of movie show times draws the best box-office receipts. An accounting firm in Las Vegas plans to use VisiCalc to tell its gambling-house clients how to position slot machines around the floor to ensure the biggest take. VisiCalc is obviously one composition that is in no danger of fading from the charts.

Reprinted from the March 2, 1981 issue with permission of Time, Inc.

It is rarely the case that financial success is also accompanied by formal recognition of excellence by one's academic peers. The impact of VisiCalc is such that the ACM, the Association for Computing Machinery, the foremost professional society of computer scientists, awarded its 1981 Grace Murray Hopper award to Daniel S. Bricklin, the chairman of the board of Software Arts, Inc., which originated VisiCalc. He received this award for the excellence and elegance represented by the development of VisiCalc. It is worth noting that this is the

first time that any activity involving microcomputers or personal computers has merited the ACM's attention. It is almost as if very small computers were previously regarded as toys. This is definitely no longer the case.

What is it about VisiCalc that sets it apart from ordinary computer programming languages? There can be no doubt that any solution that VisiCalc can produce can also be produced by writing a computer program to generate that solution. For any problem you might wish to solve using VisiCalc, a computer program to solve that problem could be written, using some computer programming language such as BASIC, FORTRAN, COBOL, PASCAL, etc.

That is exactly the reason for using VisiCalc. You **don't** have to write a program to solve your problem when you use VisiCalc. You key in the relevant data (there is no way to avoid this completely, no matter what you are using). You then specify how the data items are related, and what answers you want calculated. At this point, the computer expert might object: "This is the same as writing a program." Theoretically that may be true; in practice, it makes all the difference in the world. Writing computer programs can be very tricky and time-consuming, and that is after you have invested your time and effort in learning the programming language.

When you solve a new problem using a computer, you usually have to write a program to solve that problem, using one of the programming languages we mentioned earlier. That usually means you also have to use some kind of editing program just to prepare the program you need. Then you may have to prepare a data file, with the help of the editing program.

The data file is considered input to the program you wrote, and the results produced by your program are called its output. We often depict the input as flowing into the program which has been placed into the computer's memory, and show the results produced by your program as flowing out from it, as we see in figure 1.1.

Figure 1.1 Input, program and output relationships

After you examine the output from your program, you may come to one of several conclusions:

(1) great- let's stop computing.
(2) oops!- there must be a "bug" in the program; try to find it and fix it.
(3) it's ok, but what if ...?

Case 3 might involve wondering what would happen if some data

item had a slightly larger value, or what would happen if the formula in the program was just a little different.

With VisiCalc, you are more likely to get the first conclusion first. Number two is much less probable, simply because VisiCalc won't let you request many ridiculous computations. VisiCalc really shines in the third situation. You simply change the desired number or formula, and you immediately see the consequences. You don't have to fool with an editing program, or even request that your program be rerun.

With the conventional approach, the input data is laid out for the convenience of the computer program (or whoever wrote the program). The actual layout of the input data has little if any spatial relationship to the results. With VisiCalc, you begin by putting the numbers where they should be at all times. And you decide where the results should appear, in relationship to the other input. If you should change your mind, it is a simple matter to move things around painlessly. If you then decide to change a number, you simply locate its old value where you expect to find it (not at some strange location chosen for a program's convenience). As soon as you change that number, all the other outputs which depend on that number immediately change.

A Brief Example

The following simple example will give you a better idea of the difference between solving a problem using VisiCalc, versus solving a problem using the conventional computer approach.

Suppose you were a budding author, and had just had your manuscript accepted by a publisher. The publisher might have proposed that you be paid royalties based upon the following sliding schedule:

Earn 5% of selling price, for the first 3,000 copies.
Earn 7% " " next 4,000 "
Earn 8% " " next 5,000 "
Earn 10% " " , for all additional copies.

With VisiCalc, you would lay out the essential data in the form of a table, as we see here in table 1.1.

Rate	Copies
5	3,000
7	4,000
8	5,000
10	?

Table 1.1 Raw data

You would then make an educated guess as to what number to use for the ? in table 1.1. You might like to project your potential income (before taxes) if the book sold say 50,000 copies, assuming

that it sells for $1 per copy. So the ? is replaced by 50,000-(3,000+4,000+5,000), giving us 38,000. You then ask VisiCalc to work out the product (Rate multiplied by Copies) for each line, which results in table 1.2, since our rate figures are actually percentages.

Rate	Copies	Income
5	3,000	150
7	4,000	280
8	5,000	400
10	38,000	3,800

Table 1.2 Projected income

Of course, what you really want is a running total, so you ask VisiCalc to produce another column, headed "Total", which is to show, for each row, the sum of the current and all preceding income figures. That being done, you now see the results in table 1.3.

Rate	Copies	Income	Total
5	3,000	150	150
7	4,000	280	430
8	5,000	400	830
10	38,000	3,800	4,630

Table 1.3 Projected total income

This may seem like much ado about nothing, at this point. You could have done the same thing with a calculator, or merely with paper and pencil. True--but having gone this far, you can now begin the "What If ..." phase. As the budding author, you might want to negotiate a better royalty schedule.

So you begin thinking "What if my first book is not a terrific success? I should ask for a higher percentage for the first few thousand sold, just to be safe." Suppose you settled on 6, 8 and 9%, in place of the 5, 7 and 8 that was offered; you don't want to be greedy. You can now proceed to replace the 5, 7, and 8 by the 6, 8, and 9 and, lo and behold, you immediately see the consequences, as shown in table 1.4.

Rate	Copies	Income	Total
6	3,000	180	180
8	4,000	320	500
9	5,000	450	950
10	38,000	3,800	4,750

Table 1.4 Projected total using new rates

You might think about these totals for a while, and because you are now convinced you have a best seller on your hands, perhaps it would be better to focus on negotiating a better top rate than the 10% that was offered. After all, the other rates will make very little difference if you sell 100,000 copies. So you change the

10% to 20% (dreamer) and you decide to increase the 38,000 by 50,000. The results are shown in table 1.5.

Rate	Copies	Income	Total
6	3,000	180	180
8	4,000	320	500
9	5,000	450	950
20	88,000	17,600	18,550

Table 1.5 New projected totals

If you were in the publisher's shoes, you would also like to be able to do the same juggling of figures. As the budding author, you have much less experience with the consequences of manipulating either the rates, the sales thresholds, or the number of steps in the schedule. The publishers can probably do it in their heads; you could use a little help.

You could of course have written a computer program to perform these calculations. The data file for this program could very well look like the following list (using the first set of rates and copies):

```
5,3000,7,4000,8,5000,10,38000
```

which is awkward to read and change. It might have looked like:

```
05 3000      or      05070810
07 4000              03000 04000 05000 38000
08 5000
1038000
```

where you find yourself putting in leading zeroes or leading blanks with the data, because the exact spacing between these numbers may be critical, depending upon the programming language that was used in writing the program. You could easily provide data which looks correct to the naked eye, but which the program takes to be ten times larger (or ten times smaller) than what you had in mind.

The data file

```
5                3000
7               4000
8                5000
10              38000
```

seems to have the right numbers,even though the alignment for the 4000 and the 10 is a little sloppy. Some computer programs would interpret this 4000 as if you had written 40,000 because the actual position of the number on the line was critical. This is much less of a problem with VisiCalc. You immediately see what VisiCalc thinks you just typed. If it is not what you intended, you can change it right away.

What About Big Problems?

Suppose you had a really big problem to solve? Could VisiCalc handle it? Suppose you were going to be a real-estate tycoon, and were working out a ten-year projected statement of cash flow. Such a statement is a table with at least ten columns of numeric data, and some 33 rows, depending upon how much detail you want to include in projecting your cash disbursements. Then we also need some labels to keep track of things. If each column is to hold numbers as large as eight digits, and we leave a little space between columns for ease of reading, the cash flow table will be about 120 characters wide. Since most computer video display terminals (VDTs) can only display 24 or 25 rows of 80 characters at one time, you would be hard pressed to squeeze all of the cash flow table onto the VDT screen at one time.

With VisiCalc, you can construct and display tables with as many as 63 columns and 254 rows and you can "browse" over parts of the table very easily. If the whole table won't fit on your screen, VisiCalc treats your VDT screen as if it were a "window." Your screen window lets you see any part of the table you wish to see, getting as much of it as will fit on your screen at one time. Trying to do this with a conventional computer program would be far more difficult. Figure 1.2 illustrates the idea of a window.

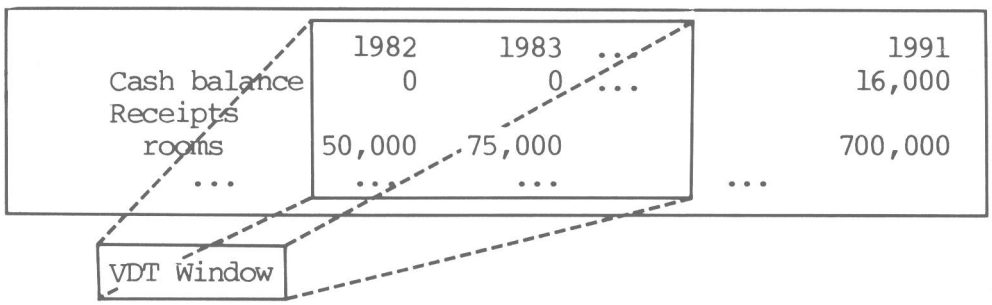


Figure 1.2 VDT Window into a large table

Coming Up

Specifics on using VisiCalc: how do you tell VisiCalc to do something? What if you made a mistake? What if you were in the middle of filling out a worksheet and had to leave suddenly: how can you save worksheets, and recall them later? These and many other features of VisiCalc will be described, discussed and illustrated as we proceed. It goes without saying that you will learn more, faster and better, if you can be using VisiCalc and trying the things we are discussing. We hope however to provide sufficiently detailed examples so that you can follow what is going on even if you don't have immediate access to a computer equipped with VisiCalc.

SUMMARY

VisiCalc is data-oriented, very much like a calculator. You begin with your own raw data, lay it out on what amounts to an electronic worksheet, using your VDT's screen as an easily erasable worksheet. Then you begin specifying the relationships between your data and the desired results. You build up to the desired end-product in a step-by-step fashion, seeing the results at every step. You always see your input data in the natural spatial relationship it is intended to have with respect to any computed results.

Problem solving with computers, using the conventional approach, is program-oriented rather than data-oriented. Most people who are not computer experts feel more at ease with the data they know well than with the use of unfamiliar computer programming languages. Most people are familiar with the everyday use of a simple worksheet. VisiCalc combines the ease of using a calculator and the familiarity of a worksheet with the power of a computer. It follows that most people will find that VisiCalc provides a very natural, user-friendly way to make the computer work for you.

Chapter 2

GETTING ACQUAINTED WITH THE IBM PERSONAL COMPUTER

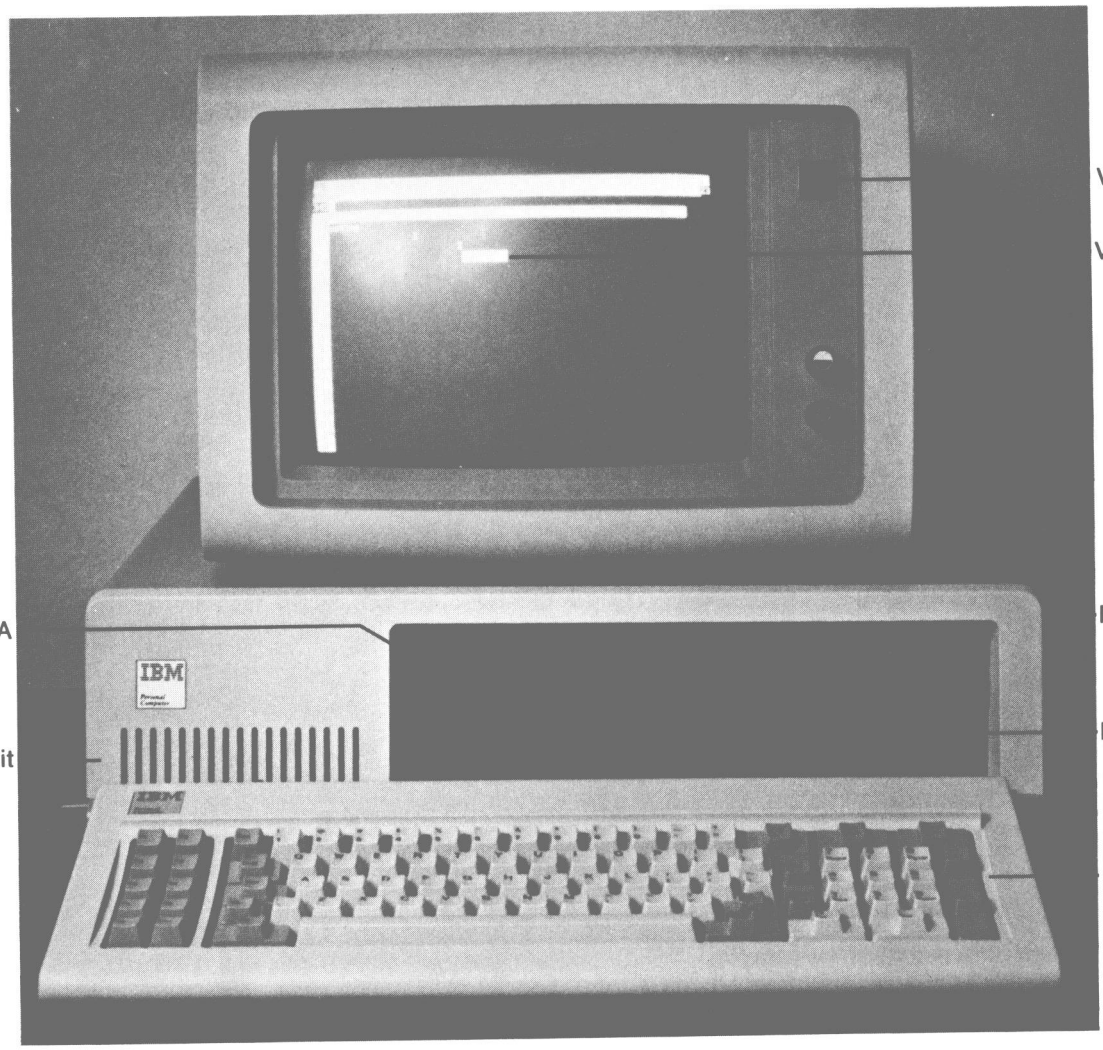
This chapter deals with the operation of the IBM Personal Computer. No previous experience with computers is required to use VisiCalc with the IBM Personal Computer. Here the rudiments of turning the computer on and setting it up so you can use VisiCalc effectively will be described. If you are already familiar with this computer, you might want to merely skim most of this chapter and proceed to the next (you should read the section on preparing a VisiCalc diskette to make it self-loading).

Physical Components of an IBM Personal Computer

Every IBM Personal Computer has a system unit, a display console, and a keyboard. In order to use VisiCalc, a diskette drive is also required. The computer can have optional devices, such as a printer, as well as a second diskette drive (which is also called a floppy disk drive, or simply a disk drive, dropping the "ette").

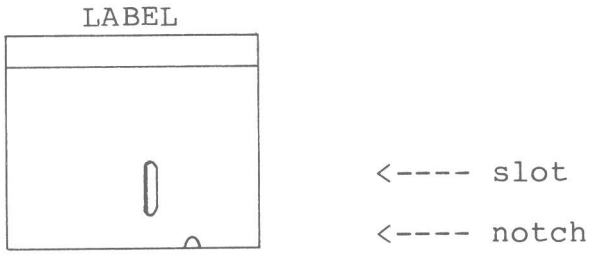
Figure 2.1 on the next page shows the display console above the system unit, and the keyboard, and it identifies important items. The system unit contains one or two floppy disk drives. Each drive can hold one five-inch diskette. Each diskette can record approximately 160,000 characters of information. Some of these characters may be used to represent computer programs such as VisiCalc and some of them are used to represent your data. The word "byte" is often used in place of the word "character"; for our purposes, these words are equivalent.

If you have two disk drives on an IBM Personal Computer, you can have immediate access to almost one-third of a million characters of information. If your computer only has one disk drive, it is located in the middle part of the system unit, and it is called drive A. A second drive can be placed in the system unit, to the right of drive A, and it is referred to as drive B.


VDT Display
VisiCalc Cursor
Drive A
Power Switch
Drive B
System Unit
Keyboard

Using Diskettes

Diskettes are normally stored in protective jackets or sleeves and they should be kept in an upright position. When you are about to use a diskette you should remove its protective jacket. This will reveal a rigid black square protective envelope. Diskettes have an oval slot in the square envelope which protects the flexible (floppy) disk magnetic recording media, as shown below:



If you see a small notch on the edge, near the bottom right of the label, the information on that diskette can be changed and new information added. In such a case, we say that this diskette is "write-enabled." If on the other hand you see a piece of foil in the same position covering the notch, then the computer will refrain from changing any information on that diskette; the diskette is said to be "write-protected."

If you are inserting your one and only VisiCalc diskette into the diskette drive, make sure its write-protect notch is covered. That will prevent accidental overwriting of your master copy. Your VisiCalc diskette is identified as being "copy protected." That means you cannot duplicate it, so handle it with care.

When you insert the diskette into the diskette drive, the label side should be facing up and the edge furthest from the label must be inserted into the drive first. Gently push the diskette through the drive door slot. Push the drive door shut.

Each disk drive has an indicator light just below the disk drive slot. The indicator light will glow whenever the disk drive is being used by the computer. You should not attempt to insert or extract a disk when this light is glowing. Doing so could destroy the diskette and damage the disk drive. If it seems that the indicator light won't ever stop glowing, it would be better to turn off the computer to perform this operation.

Some Preliminaries

VisiCalc is very easy to start up and use, but we are in a situation similar to the one faced by the purchaser of unpainted furniture--we have some one-time setup work to do (e.g., sanding, priming, and painting) before we can use the furniture. Before we can proceed with this work, which we only need to do

once, we have to learn to use another tool, namely the IBM Disk Operating System DOS. The DOS reference manual has over 160 pages. Don't be alarmed! We can discuss what we need to know about DOS in just a few pages.

The computer program which manages all of the computing resources used on or by the IBM Personal Computer is called the Disk Operating System (DOS). We will use it to condition the VisiCalc diskette; this is an operation that will only be done once. We will also use DOS to initialize blank diskettes so they can be used to store and recall VisiCalc worksheets; this operation is called formatting. We will also discuss a few more DOS facilities that will make our use of VisiCalc more productive.

Operation of the IBM Personal Computer

We will walk through the steps required to start computing, and we will discuss the purpose of these steps, in case you are wondering about what is going on.

1. Place the diskette labeled DOS in drive A (remember that drive A is the one on the left).

2. Turn the computer on, by pushing the system unit's recessed on/off switch up. It is located on the right side of the system unit towards the rear.

3. The computer will then begin reading information from the diskette. Whenever the computer is actively using a disk drive, the corresponding indicator light will glow; never remove a diskette while that light is glowing.

4. After a few dozen seconds, your display screen should greet you with a request to enter the date:

    Enter today's date (m-d-y) :

You should respond by typing one or two digits for the current month (e.g. 9 for September), a dash, then one or two digits for the day of the month (e.g., 29), another dash, then the two digits for the current year (e.g., 82).

Figure 2.2 shows you the keyboard we will be working with. It is very much like a typewriter keyboard, plus a few extra keys that will prove to be very useful as we go on.

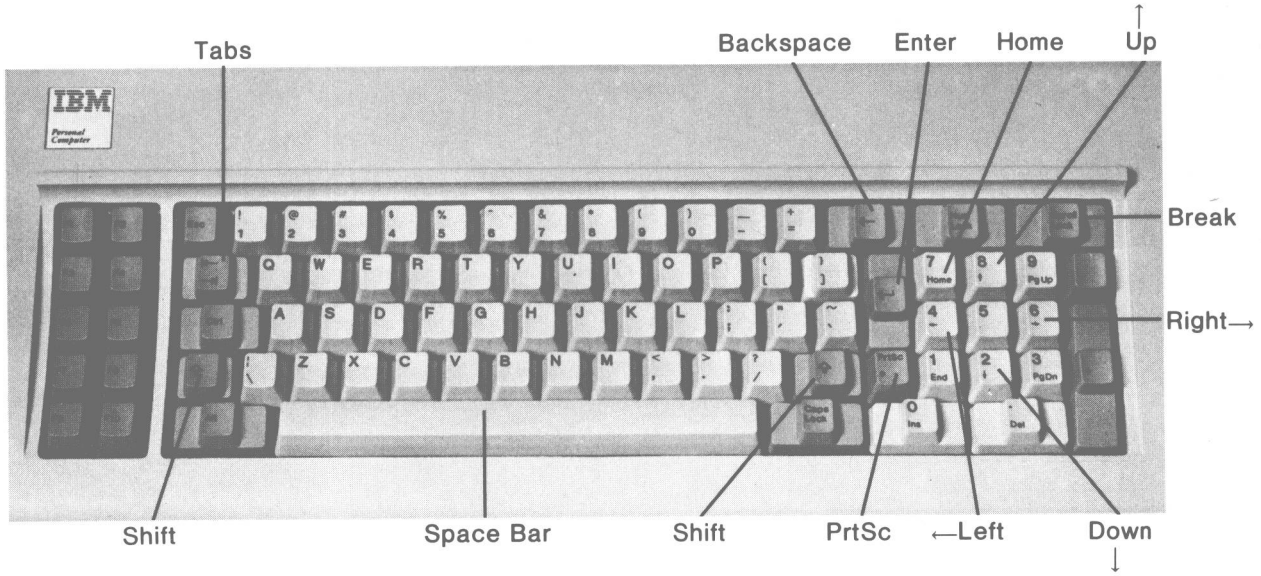


Figure 2.2 IBM Personal Computer Keyboard

You can correct an error while typing a response by pushing the big left-arrow key located in the top row of the keyboard, immediately to the right of the key with the + and = markings. Do not confuse this big left-arrow key which we will call the backspace key with the small left-arrow key under the "4" on the right part of the keyboard. If you push the backspace key it will erase the last character you typed. You can then type the correct information. When the date appears to be correct, push the ENTER key (the large key beneath the backspace key has what appears to be a left-arrow with a bend in it--that is what we will call the ENTER key). So a typical keyin would leave the screen showing

```
Enter today's date (m-d-y) :   9/29/82
```

You have to push the ENTER key to cause DOS to examine your response, but as a general rule no special character will be displayed at the point you pushed the ENTER key. Note: whenever you see the word ENTER included among other items to be typed, simply push the ENTER key --do not type the 5 letters E, N, T, E, and R.)

If your response is accepted, you will next be shown two lines of text which identify the version of the computer software you have just loaded in from the disk and a third line which is called the DOS prompt. The greeting should be similar to the one which appears here:

```
The IBM Personal Computer DOS
Version 1.00 (C)Copyright IBM Corp 1981

A>
```