Simplified Guide To
MICROCOMPUTERS
With Practical Programs and Applications

WILLIAM A. BOCCHINO

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...With Practical Programs and Applications

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Dedication

To the men and women who apply the power of the computer to select the optimum interrelationships of men, materials, machines and money to increase the production of goods and services that satisfy human needs and move us closer to that divine era of peace on earth, good will toward all.

Acknowledgments

The Author

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Dr. Bocchino spent over ten years in operations analysis and management in the electronics and aircraft industries before joining the faculty at Fairleigh Dickinson University, and at about the same time founded AMI, Inc., a computer-oriented management consulting firm.

He conducts management seminars for a variety of companies and organizations in the United States, Europe, Asia and Africa. Dr. Bocchino is the author of numerous articles and his books include *A Simplified Guide to Automatic Data Processing* and *Management Information Systems*, both published by Prentice-Hall, Inc.

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How This Book Will Help You
Use the Microcomputer
to Great Advantage

Over a million people now have direct, "hands-on" access to their own desk-top microcomputers. The purpose of this book is to give you the know-how to make the computer something as simple to use as the telephone. The book assumes no previous experience or background in computers. It starts at ground zero and proceeds, step by step, in simple to understand, down-to-earth language, to explain what a computer is, how it works and how to use it.

Whether your interest in computers is for pleasure or for profit, for business, education, or in the home; the practical, non-technical language, and the cookbook approach will soon make this space age development your own personal tool.

The computer is, whether we like it or not, understand it or not, fear it or love it, a fact of our day to day existence. Already, computers appear in our automobiles, home appliances, office machines and even some wristwatches. Government departments at the local, state and national levels have installed them by the thousands. Banks, hospitals, libraries, schools and companies of every size and description are using them. Elementary school children are being introduced to them as early as the third grade. Computer literacy is already viewed as the 4th "R" to add to "Reading, Riting and Rithmetic."

THE PRICE IS RIGHT

One company announced a computer that hooks up to a TV set for under $300. Another announced a computer that fits into the palm of your hand. The experience we've had with the price of hand-held calculators indicates that the same sort of price performance will probably take place with computers. The increase of production quantities and the technological developments that can be expected will further accelerate the trend to the smaller and less expensive. It makes sense to find out about this new development so that you can make up your own mind as to its place in your own unique situation.

"LOOK MOM, I'M DANCING"

Within one hour after beginning to read this book, it is quite possible for a person of average intelligence to be able to turn on a microcomputer and key in one of the

programs that are listed in Chapter 10 of this book, run the program and use the results. It may be necessary to consult the particular computer's instruction book to locate the on-off switch or to discover the two or three special function keys on the keyboard, but that is necessary if you were to use a new typewriter or wanted to operate a new television set. But aside from the slight unfamiliarity and awkwardness that you would feel when using any machine for the first time, that would be the extent of the difficulty in using the computer. With little effort, little cost and no embarrassment, it is quite possible to be launched into the world of computers. The emphasis throughout the book is on "how to do it."

A THOUSAND DOLLAR BONUS-CHAPTER 10

Ten ready-to-go programs are listed in their entirety in Chapter 10. First there is a concise description of the program and what it does. Then there is the line by line listing of the program so that the reader can key it into a computer and run it. Most of the programs also include sample input data and output results.

Each program was selected to demonstrate a particularly useful aspect of using a computer. The first program consists of just a few lines, and demonstrates the computer's unique versatility and ease of use by allowing the user to generate different dynamic patterns on the video display screen.

The second program expands on the capability of computers by allowing the user to manipulate the graphic power of the machine in the analysis of a business decision situation. The third program moves this capability a bit further along by demonstrating the possibilities of using the computer in the design of a new product.

The fourth program illustrates the awesome computing power of the machine in the typical management problem of choosing between alternative courses of action. The fifth program seems, at first blush, to be simply a method for handicapping horses: that's right, a program to help pick a winner! The text goes on to explain that the same analytical approach used in comparing strengths and weaknesses of the competition in a race can be a very powerful tool in devising competitive decision strategies in the marketplace. But the fact that it has a management application shouldn't get in the way of anyone who wants to use the program in picking a horse for win, place or show. In fact, the explanatory material does just that in an honest-to-goodness race at the Aqueduct Race Track in New York.

The sixth program demonstrates the ability of the computer to act as your own personal memory bank. It indexes books and magazine articles for ease of location and retrieval. But it could just as easily be used for filing and retrieving records, tapes, recipes or any other storage and retrieval application.

The seventh program is strictly for the fun of it as you watch "Squot" go through a sequence of adventures in its "Universe." It doesn't require anything from you but the capacity to enjoy it. As noted in the text, computer games are often the best way to get a recalcitrant user started on the computer.

The eighth program can help minimize your taxes by comparing alternative methods

of handling assets. It dramatizes the effectivenesses of having a computer to help you do battle with the government's computers. The ninth program demonstrates an effective forecasting method to help everybody reduce the area of uncertainty when trying to predict the future. Since all decisions require forecasting, this program is an example of the wide array of forecasting techniques that are accessible if you have a computer.

The tenth and final program is a massive and powerful "Sales Analysis" program that exemplifies the kind of packaged programs that are available from programming houses, computer companies and computer retail stores. This particular program can be purchased for $24.95 from *Instant Software, Inc.*, Peterborough, NH, 03458 but it would cost thousands of dollars if it were contracted to be written for you by a professional programmer. It is included in its entirety as a dramatic finish to the array of programs included in this book. Write to the author at AMI, Inc., 109 Yesler Way, Hillsdale, NJ 07642 for information on obtaining the other programs on cassette or disk, or for sources of information on other programs and computer applications.

OPEN THE DOOR TO A TREASURE TROVE OF
MANAGEMENT TOOLS

The ten complete programs are included to dramatize one of the great truths in the field of computers. That is, that once you gain a basic understanding of computers and a threshold ability to work with computers, you have instant access to a world of pre-written programs. Programs that apply a tremendous variety of sophisticated techniques to help you solve your business and personal problems. These programs are prepared by experts who understand the underlying mathematical and statistical techniques involved. Programming them makes these complex and powerful tools available at nominal cost to millions of others. The only requirement is that you have access to a computer and can follow the few simple steps to load and run the program. You then use the results for your own purposes. It's almost at easy as saying "open sesame," and the power and flexibility of the Computer Age is suddenly yours.

DOING YOUR OWN THING

Anyone interested in developing their own ability to design and program computer applications for their own special situations can use the simple, but very powerful, computer programming language called *BASIC* which is explained in this book. The chapters on *BASIC* are designed for self-teaching, and will carry the reader from ground zero right through the key commands in the *BASIC* language. In addition, the systems analysis tool called Flow Charting is explained in the same style, so that everyone who needs this tool can learn to use it to produce effective and efficient computer applications. The combination of your personal computer, Flow Charting and *BASIC*, will provide you with the necessary tools to do your own thing. The only limitation is your own imagination.

PERSONAL SURVIVAL AND GROWTH IN THE
COMPUTER AGE

It really comes down to a question of survival in an environment unprecedented in any previous age. Learning what a computer is, how it works, and how to use it is a critical requirement for effective functioning as a citizen in this Computer Age. A case in point is the need to be able to assess the impact of the increasing use of computers by government on personal privacy, and the impact such use will have on personal freedom. Then there is the ever increasing need to interact with computers in the everyday activity of computer-generated bills, bank statements and form letters, as well as the necessity to conform to the requirements of computer input on tax forms, car registrations and what have you. Almost unnoticed, the Computer Age is all around us. We can either use it or continue to be baffled by it. Since learning to use it is neither difficult nor uninteresting, and the dividends are enormous, it makes sense to learn about this powerful tool and be prepared for a personal launch into the Computer Age.

William A. Bocchino

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1 _____ THE VAST POTENTIAL OF THE MICROCOMPUTER

THE MICROCOMPUTER REVOLUTION

In the last few decades, managing a business has not only grown more complex, but things have begun to happen faster. This combination of complexity and faster action-reaction has generated a need for new management tools, for quickly converting the flood of business data into meaningful information to be used in management decision-making.

What began as an attempt to provide management with new decision tools actually resulted in a breakthrough for everyone. Computers were applied first to one area of business and then to another. As experience was gained, their use spread. However, a rather peculiar phenomenon accompanied the use of the computers. Until very recently, they were the domain of the systems analyst, the programmer and the technical specialist. Managers keep out! What applied to the manager applied even more to the ordinary citizen. Computers were too costly and complex for personal ownership and use.

The development that is rapidly changing this scenario is the advent of the microcomputer. A computer in every sense of the word, but one that adapted the technology of microminiaturization to the production of a very powerful data processing device, at very low cost. Coupled with this development is the emphasis on simplicity of use. Power, low cost, and simplicity: an unbeatable combination for putting this most powerful decision tool into the hands of the person who needs it most—the manager.

A computer is a computer is a computer. The prefix micro simply implies very small component parts. But even the biggest computers make use of these same parts, only more of them. In this book, the term computer and microcomputer are used inter-

changeably. The distinction is simply one of physical scale and has no other meaning. What you will learn about "microcomputers" is applicable to all electronic computers. A very useful and simplifying generality in this increasingly complex world.

THE MANAGER'S PERSONAL MANAGEMENT TOOL

Management information processing using computers has suffered from rapid, almost uncontrolled growth and attendant misunderstanding. The stories of computer goofs are legion. What must be kept in mind is that the computer began as a tool, is a tool, and will always be a tool. The effectiveness of this tool rests on one thing alone—*the ability of the user.*

Inherently, the computer has no more creative ability than an ordinary screwdriver. The fundamental power of computers is in their ability to absorb a great deal of data, manipulate it exactly as directed, and then regurgitate it quickly and accurately in a summarized, meaningful form.

With this kind of power, the computer can unquestionably be the most powerful management tool ever developed—it already is for the few managers who have learned how to use it. Understanding how a computer works, what it can or cannot do, and how to use it to help you manage better are the keys to making it your personal and powerful decision tool.

The examples in this chapter use a business scenario, but their lessons and guidelines are universally applicable to both the business and personal use of the computer.

Do's and Don'ts
of Microcomputer Applications

There have been some extraordinary misconceptions about computers generated by a combination of ignorance, overenthusiasm, and unbridled commercialism. This flood of misinformation obscured their real meaning for management. An apt example is provided by the treatment of computers in the media of mass communication.

Ever since the television networks and magazines "discovered" computers, the world of the manager hasn't been the same. All have been bombarded with television presentations and magazine articles on "the electronic brain," "thinking machines," "the information revolution," "management automation," etc. A whole series of catch phrases and slogans were generated that resulted in the creation of an image of computer capabilities that was far out of proportion with anything that these machines could deliver.

Management, on the one hand, was justifiably apprehensive about the impact this equipment might have on delicately balanced, carefully nurtured systems and procedures. On the other hand, management could not help but be influenced and sometimes swept away by the idea that "salvation" was finally at hand: "salvation" in the sense of eliminating uncertainty, once and for all, in decision-making. Alas, this was not to be.

Managers always have had to make decisions with information that was inadequate, often inaccurate, and never available as early as it was needed. This is a result of the fact that the transactions in any organization are processed, generally, in batches: either daily, weekly, or monthly. Managers have learned to live with the fact that day-to-day decisions have to be made based on information gathered from last month's transactions, collected and summarized last week, and being analyzed today.

Television programs and articles promised a new tomorrow. In almost science-fiction terms, one program outdid another in forecasting an automated world of tomorrow.

Most sensational of all, and almost as a proof of these allegations, a president's election was accurately predicted by the devices long before the nation's voters had finished voting!

Swept along by this wave of mass-media-generated enthusiasm, many companies and organizations plunged into the significant investment represented by a computer installation. Remember, there were no microcomputers then. But, to the chagrin of these organizations, they soon discovered that the cost and effort of installing the equipment was just the tip of the iceberg. The major effort and expense was in preparing their organizations to work with the computerized data processing system. They found, to their horror, that their "routine" systems and procedures were not so routine after all. In fact, they had been made operable by the day-to-day creativity and judgment of human beings. They could not successfully convert these multi-dimensional, delicately tuned, highly interrelated systems and procedures to the "judgment" of a high-speed machine without a massive, time-consuming, and expensive systemization effort.

A computer could indeed process data millions of times faster than human beings, but the preparation for the application of this equipment required a long-range, carefully planned, and meticulously implemented program. The alternative is best reflected in the phrase, "Garbage In-Garbage Out."

Nothwithstanding these harsh facts, many organizations attempted to superimpose these high-speed machines on their vaguely proceduralized, loosely disciplined, inaccurately specified, internal information systems. Systems and procedures in use for half a century were suddenly stripped of the many adjustments and modifications that human beings made to accommodate them to the ever-changing realities of the day-to-day business. These "fluid" procedures were suddenly transmitted into the clinically disciplined processing of computers, and something had to give. It did; chaos and confusion reigned. Some examples may prove enlightening.

An Insurance Company

A large insurance company, whose president was beguiled by the concept of replacing battalions of clerks and statisticians with one large computer, brought in the equipment by his personal edict. Since the cost savings could be tremendous, a very short time schedule was set up for putting "simple, routine" work on the computer.

His publicized statement, given wide coverage in the business press, was to the effect that this work had been done for many years and was quite routine, and therefore would prove no problem in being put on the computer in a short space of time.

Four years later, a much wiser and sadder president, speaking at a mangement convention, said that he did not really learn his business, its intricacies and complexities, until he attempted to put the "simple and routine" clerical and statistical work on the computer.

Wholesaler

An automotive parts wholesaler had the perennial problem of all wholesalers, that is, inventory control. He had been intrigued by the idea of using punched cards as withdrawal and receipt tickets. Then, by combining these transactions with his beginning balances (as he had read in the equipment manufacturer's advertising), he would have his inventory status at his fingertips. He hired a bright, knowledgeable young man from one of the manufacturers of data-processing equipment, and invested in punched card equipment and a computer to process the data.

The problem was that his organization was not completely staffed by bright young men from data-processing equipment manufacturers' organizations. In other words, his organization was exactly as it had been before: staffed by people who had been trained in the flexible, indulgent, manual procedures; people who had no idea of the absolute need to follow the computer data-processing procedure to the letter, with no room for deviations, exceptions, or errors, because the machines cannot think. In addition, and to further compound the problem, the bright young man with the data-processing background knew nothing about the auto-parts wholesaling business.

This typical combination of circumstances resulted in an agonizing ordeal for all concerned. Three bright young men later, plus a great deal of expense and a significant disruption in the organization and in customer service, the inventory system was finally in operation.

A Textile Firm

Executives of a medium-sized textile firm were convinced that computer data processing was finally going to provide the kind of sales analysis information that they felt was essential for survival and growth. This data, because of its mass of detail, had been considered too expensive to handle manually. But, with the company's financial statements looking pretty good, the management decided to go ahead with a proposal for a computer installation made by a salesman of a large computer firm.

The salesman was sincere. He was convincing. He assured the management of the textile company that his company would make available all the support talent necessary for a successful application. The problem was, however, that he was but a recent graduate from college with no prior business experience. His computer application experience consisted solely of a six-week course in the equipment manufacturer's school, and his only contact with the textile industry was in the clothing he wore.

The sad fact was that he was representative of a significant part of the "talent" that his company could make available. Since the managers of the textile company had no knowledge of computers, it was a situation of the blind leading the blind.

In this case, as in all so-called "simple" applications, the sales-analysis situation was further aggravated by the welter of discount agreements and special "deals" that the executives of the textile firm made with their customers. A "simple" business information application had subtle and complex interrelationships.

The long and the short of the matter was that, after excruciating, time consuming, all-out effort, the conclusion was reached by all concerned that it was no go. The computer was pulled out, and both sides retired to lick their wounds.

A Very Small Business

A neighborhood laundry was introduced by its part-time accountant to a computer service bureau with the idea of having the service bureau prepare monthly statements (bills) which could then be mailed to the laundry's customers. (A service bureau is an organization that does data processing for companies without computer equipment of their own. These companies have their work done at the service bureau for a fee.) The monthly statements were currently being done manually. What could be simpler!

Well, first of all, there were different types of services provided by this laundry. Each had to be identified on the statement. Not difficult, but a source of coding error. Second, there were customers with the same name, and in some cases, they lived at the same address. Just a few, but it meant setting up a more complicated identification system. Third, the transactions were posted in ledgers which were kept at the laundry. The entries in these ledgers were not always completely legible and would generate errors when transcribed to punched cards. Fourth, cash, error corrections, and credit for damages were all to be included on the statement. These were not difficult to provide for, but they necessitated extra steps and increased the possibility of error. Fifth, sixth, seventh, etc., other qualifications, modifications and exceptions were also explained to the sales representative of the service bureau.

He airily minimized any difficulties, quoted a reasonable price for the processing, and assured the owner of the laundry that the statements would be ready 72 hours after the ledgers were picked up at the close of the last working day of that month. The owner and his accountant were overjoyed. The manual preparation of statements was halted, and the miracle was awaited.

Two hundred and forty hours (ten days) after the last working day of the month, the statements finally were prepared successfully by the service bureau. The owner of the laundry was close to nervous prostration and the accountant close to losing a client.

This was an extreme case of "simplicity," and yet the results could have been predicted. Over the ensuing months, the procedure was straightened out, systemized and simplified, and monthly statements were prepared 72 hours after the last working day. But all the worry and aggravation could have been avoided and a "clean" application could have resulted much sooner at a much lower start-up cost.

THREE GUIDELINES FOR SUCCESSFUL COMPUTER USE

There are two aspects to the unhappy incidents described above. The first has to do with the fact that large computers, at significant cost and concomitant complexity of application, were involved and secondly, there was absolutely no intent in any of these applications for managers or users to have "hands-on" access to the computer. The availability of microcomputers could change the scenario in each of the applications. Rather than using one large computer, as in the Insurance Company case, each clerk and statistician could have his own microcomputer, which would be simple to use and independent of any malfunction or errors caused by anyone else. The initial cost would be lower, the technical support cost would be non-existant, the computer output could be utilized in larger computers if desired, and the employees would be upgraded and happier.

The wholesaler could have used a microcomputer located at the shipping and receiving desks which would provide perpetual inventory control at much lower cost, without the horror of punched cards full of grime and grease because they are used as withdrawal and receipt tickets.

The textile firm's sales manager could have the microcomputer in his office, with sales statistics entered daily and his analyses activated by simple instructions that he himself could prepare easily and modify as he desires.

In the case of the laundry, the microcomputer could act as a point-of-sale device in capturing the data as the customer was issued a reciept. At the end of the month, a simple procedure would generate the bills right there in the laundry and be mailed out immediately, all under the control of the laundry itself—a very comforting aspect of having your own computer.

What can be learned from experiences like those described above and the many comparable fiascoes? Is there a pattern evident in each? Are there guidelines that a manager can learn in order to avoid the common pitfalls? The answer is a resounding *yes*!

The most important of these guidelines is that *the user must be the planner and the implementer* of the computer application. Rather than ask an outside "expert" to match your needs to the computer's capabilities, it is much more effective for you, the user, to be the matchmaker. Only you really understand the subtle interrelationships and the nuances in the data you have been using for x number of years. As will be demonstrated in the following chapters, the computer and computer programming involve relatively simple, easily grasped concepts, applicable by you in cookbook fashion to fit your unique circumstances. Understanding the intricacies of your decision-making activities is much more difficult for the "computer expert" than learning for yourself what you need to know about computers and programming to make the microcomputer your own personal tool.

Those "subtle interrelationships" and "nuances" mentioned above were the pitfalls that snared the computer "expert" and doomed each of the applications described. Yet, before the advent of the microcomputer, the physical size and cost of a computer installation made it impossible for a manager to think about dedicating a computer exclusively to his/her functional area. It is worth repeating once again. You, the manager, know your functional area more intimately than any technical computer person could