2nd Edition

MICRO COMPUTING

R.G. ANDERSON

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Microcomputing

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SECOND EDITION

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Microcomputing

Preface to the Second Edition

This HANDBOOK has been considerably restructured in the light of developments which have occurred since the first edition. A number of programs have been specifically developed for running on a PET microcomputer and these programs will need to be modified for the needs of other microcomputers by consulting the appropriate manual. Additional programs have been included in the second edition designed to run on other specified machines such as the Tandy TRS-80, the Sharp MZ-80K and the Apple II. Comments are made in respect of these programs indicating which machine the programs will run on and the minor changes necessary to enable them to be run on other specified computers.

Five completely new chapters have been added on demonstration programs, computer literacy, computers in perspective, local area networks and computer graphics. A general description of a number of popular microcomputers is provided to enable the reader to see which microprocessor is used on the various machines, their memory capacity, expansion capabilities and whether they are colour computers with high resolution graphics, etc. The machines outlined include Tandy TRS-80 model III, the Sharp MZ-80K, the Apple II and the PET. All of these machines have been used successfully by the author for development work on the basis of "If you do not attempt to make it do what you want it to do, you will never know if it will do it and whether you are capable of making it do it". One can only teach oneself microcomputing by practising the art of microcomputing; it cannot be learnt simply by reading a book or manual. It is hoped that this book will teach you how to use a microcomputer effectively but it is recommended that you study it, after an initial reading, whilst sitting at the keyboard of one of the computers mentioned in the book.

This HANDBOOK is not a technical treatise on microcomputers and silicon chip technology, neither is it a BASIC programming manual. It is, however, an attempt to fuse together both the practical aspects of microcomputers and the essential aspects of programming them in the BASIC programming language.

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It may be considered as an introductory text which will serve the needs of accountants, office managers, administrators, office staff and students who have no previous experience of operating microcomputers. Some of the programs are business-oriented, but others are of general interest and accordingly the book should appeal to any reader with a general interest in computing. Many of the programs which have been developed for the book are designed to serve as a basis which will enable the reader to develop ambitious programs.

Almost everyone will need to become familiar with microcomputing, whether in the home, the office or the classroom, as micros will be more widely used in the future, both for the achievement of administrative efficiency and as a means of solving mathematical problems more quickly. Many computers are sold for personal, as opposed to business, use and many hours of enjoyment can be gained from their use particularly when running games programs when in pursuit of programming expertise. This usage will be greatly accelerated as hardware prices continue to fall and microcomputers come within the budget of many more people. Mainframe computers can still cost many thousands of pounds but microcomputers for business use cost £3,000 or less, including a printer and disc storage with high resolution graphics in colour. A basic micro costs even less, in fact small personal computers or pocket computers are now available in £60–£100 region.

To assist the reader, a summary is provided of the type of commands or statements available in the BASIC used by the various machines outlined in the HANDBOOK. It is hoped that this facility will provide a speedy means of reference when preparing a program or when comparing the BASIC of one microcomputer with that of another.

For the interpretation of specific terms used in the book, see the author's *Dictionary of Data Processing and Computer Terms* (Macdonald & Evans). This HANDBOOK should therefore be considered as a first book on microcomputers which paves the way for more ambitious projects to be undertaken.

The book should be eminently suitable for students studying for the examinations of the following bodies:

The Institute of Cost and Management Accountants (ICMA).
The Institute of Administrative Management (IAM).
The Institute of Management Services (IMS).

The Association of Certified Accountants (ACA).
The Institute of Chartered Accountants (ICA).
The Society of Company and Commercial Accountants (SCCA).
Association of Accounting Technicians (AAT).
The Institution of Industrial Managers (IIM).
The Institute of Data Processing Management (IDPM).
The City and Guilds of London Institute (Data Processing for Computer Users).

The HANDBOOK would also be suitable for relevant BEC and degree courses as well as managers and owners of small businesses.

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Contents

	Preface to the Second Edition	v
	Acknowledgments	viii
	List of Illustrations	xi
	List of Tables	xiv
I	*Computer Literacy* Conceptual appraisal; Conversing with computers: use of dialogue	1
II	*Computers in Perspective* Spectrum of computers; Mainframe computers; Minicomputers; Microcomputers; Typical microcomputers; The Apple II; Sharp MZ-80K; Tandy TRS-80 Model III; Portable micros; ORIC-I: Micro colour computer; Pocket computers; Fourth generation microcomputers	8
III	*Elements of a Microcomputer* The microprocessor; Internal memory: ROM, PROM, EPROM and RAM; Backing storage; Interface and bus; Printer; Keyboards; Display screen; Clock; Character set; Sound generation; Software; Functions of a microcomputer; Guidlines and systematic selection of a microcomputer	29
IV	*Operating a Microcomputer* Getting started with a micro: general considerations; PET microcomputer: general description; Operating procedure	49
V	*Concepts of Programming for Microcomputing* Main stages of preparation; General structure of a program	60
VI	*Programming Microcomputers* Outline of BASIC programming language; BASIC statements; Program errors and diagnostics;	67

Operating system messages; BASIC commands; Performing and terminating loops; Nested FOR-NEXT loops; Branching; Summary of Standard Dartmouth and Extended BASIC statements

VII *Arithmetic by Microcomputer* 94
Arithmetic operators; Arithmetic examples

VIII *Demonstration Programs* 100
Program 1: Hairdressing salon price list; Program 2: Delivery charges; Program 3: Bubble sorting numerical data; Program 4: Remuneration of representatives; Program 5: Menu display

IX *More Advanced Programs of an Accounting Nature* 108
Program 6: Gas bill calculation program; Program 7: Quarterly profit and loss statement; Program development; Program 8: Break-even analysis including sensitivity analysis; Comments relating to various statements; Program 9: Computing Invoice Values; Program 10: Discounting cash flows (present values); Comments relating to program statements

X *Computer Graphics* 144
General principles and concepts; Memory mapping, POKE and PEEK; Display code; ASCII characters; Graphics direct from the keyboard; Introducing high resolution graphics

XI *Local Area Networks and Electronic Desktop Display Systems* 171
Local area networks (LANs); Electronic desktop display systems; Turtle graphics and sprites

Appendixes 182
I Examination technique; II Program exercises; III Solutions to program exercises; IV Manufacturers and distributors of microcomputers; V Bibliography; VI Data representation in the computer; VII Structured programming; VIII Further considerations; IX Recent developments

Index 205

List of Illustrations

1. Comparison of computer characteristics 9
2. Modern medium-scale mainframe computer 11
3. Minicomputer configuration 14
4. The PET microcomputer 16
5. Microcomputer configuration for business applications 17
6. Apple IIe Microcomputer 20
7. Sharp MZ-80K desk top personal computer 21
8. Radio Shack TRS-80 Model III microcomputer 23
9. Microprocessor chip 29
10. Cassette storage 33
11. Floppy disc storage (diskette) 34
12. Program flowchart symbols 63
13. Program listing and computer printout: Quarterly gas accounts 65
14. Statement analysis 70
15. Program listing and computer printout: Summary of values 79
16. Flowchart illustrating FOR-NEXT loop: Summary of loops 80
17. Program listing and computer printout: Sets of values 81
18. Program listing and computer printout: Addition program 82
19. Flowchart illustrating IF-THEN loop: Addition program 83
20. Program listing and computer printout: Square roots 84
21. Flowchart illustrating the incrementing of a counter: Square roots 85
22. Program listing and computer printout: Square roots 86
23. Flowchart illustrating the decrementing of a counter 87
24. Program to print a table of hours and minutes (nested loops) 88
25. Computer printout: Table of hours and minutes 89

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26. Flowchart illustrating nested loops to print a table of hours and minutes 90
27. Program 1: Hairdressing salon price list 100–1
28. Program 2: Delivery charges 102
29. Program 3: Bubble sorting numerical data 103
30. Program 4: Remuneration of representatives 105
31. Program 5: Menu display 106–7
32. Program 6: Gas bill calculation 109
33. Program 7: Quarterly profit and loss statement 112–15
34. Business model: Identifying the nature of the problem 117
35. Business model: Variables 118
36. Program 8: Break-even analysis 126–8
37. Program 9: Invoice calculations 131–2
38. Flowchart illustrating invoice calculations 133–5
39. Program 10: Discounting cash flows 138
40. Flowchart illustrating discounting cash flows 139–41
41. Program for displaying Sharp MZ-80K display code 146
42. MZ-80K display code table. The code is based on the decimal system 147
43. Program for displaying CBM-PET display code 148
44. Program for displaying Apple II display code 149
45. Program for displaying Tandy TRS-80 Model III display code 149
46. Program for displaying moving characters and character codes 149–50
47. Program for displaying character code and moving character 150
48. Program for displaying characters in same location on screen 150
49. Program for spacing character displays 151
50. Program for displaying characters using print @ statement 151
51. Example 1: Graphical display 152
52. Content of rows and columns for producing a graphical display 153
53. Memory mapping 153
54. Example 2: Program modification for moving graphical display 154
55. Construction of graphical image (spaceship) 155
56. Moving graphical display (spaceship) 155
57. Example 3(a): Display using print statements 156
58. Example 3(b): Display using TAB statements 156

59. Example 4: Graphics direct from the keyboard 157
60. Random moving graphical display 157
61. Example 5: Graphical display—memory mapping 158
62. Memory mapping 159
63. Example 6: Graphical display using INKEY$ or GET 159
64. Example 7: Two-dimension array 160
65. Example 8: Graphical presentation of data 161
66. Example 9: Graphical presentation of data—alternative technique 162–3
67. Example 10: Graphical presentation of data using a sub-routine 163
68. Example 11: Graphical presentation of data using SET 164–5
69. Graphical display depicting movement using SET and RESET (diagrams) (a) Sharp MZ-80K display; (b) Tandy TRS-80 Model III 165
70. Example 12: Graphical display depicting movement using SET and RESET (program) 166
71. Example 13: Display of single graphic symbol 166
72. Example 14: Plotting a line on the screen 167
73. Example 15: Plotting an oblique line on the screen 168
74. Example 16: Alternative plotting of a line 168
75. Example 17: Alternative plotting of a line 169
76. Example 18: Alternative plotting of a line 169
77. Example 19: Plotting a line between two points 169
78. Example 20: Plotting parallel lines 169–70
79. Corvus omninet local area network 171
80. Screen display: Xerox 8000 Ethernet Network System 175–6
81. Xerox 8000 Ethernet Network System: Star information system 177
82. Examples of icons 178
83. Electronic desktop display indicating the nature of icons 179
84. Electronic desktop display showing selection of icon 179
85. The "mouse"—hand-held cursor control device 179
86. The ACT Apricot computer 200

List of Tables

I	Screen display: Profit and loss program	116
II	Key to variables and assignments	118
III	Key to variables and assignments	124
IV	Additional variables and assignments	124
V	Screen display: Break-even program	125
VI	Key to variables: Invoice values	131
VII	Assignments: Invoice values	132
VIII	Screen display: Invoice program	136
IX	Key to variables: DCF	142
X	Decimal number system	191
XI	Binary number system	192
XII	Examples of code combinations	193
XIII	Hexadecimal code and equivalent EBCDIC coding	194
XIV	Hexadecimal position values	194

CHAPTER I

Computer Literacy

CONCEPTUAL APPRAISAL

1. Underlying philosophy. Almost everyone will need to become familiar with microcomputing to a greater or lesser extent whether in the home, office, school, college, etcetera. The reason for this is that the microcomputer is becoming accepted as a very efficient means of performing many types of operation such as displaying information from a Prestel database, for speedy computations of varying types including professional, scientific, engineering and accounting calculations as well as mathematical calculations for the classroom; and word processing. In business the computer is recognised as a means of increasing administrative efficiency in payroll processing, sales invoicing, order processing, stock control and production planning. Insurance renewal notices and gas and electricity bills for example are all now printed by computer. This means that almost everyone will need to become what may be classed as "literate" in the computer context. It is very interesting to obtain an understanding of how a computer functions and how the user can make it do what he wants it to do. It's a challenge to mental ability and imagination when determining the nature of the problem and writing the program to solve it. Computer literacy requires familiarisation with computer terminology and students are advised to consult a reference work such as the author's *Dictionary of Data Processing and Computer Terms*, published by Macdonald & Evans Ltd. In addition, it is beneficial to become familiar with and understand the nature of computer hardware, i.e. the machines and devices, as they are called which, when combined, make up a computer system. Then, of course, understanding the nature of software, i.e. the programs, is of extreme importance because programs are the lifeblood of a computer; without programs a computer is inanimate. The hardware may be highly sophisticated and capable of many and varied functions but without commensurate software it is nothing. It is an element of computer literacy to appreciate how hardware and software complement each other.

2. Changing nature of jobs. The nature of clerical work is changing as jobs are restructured to take advantage of new technology. Many clerks are being provided with work stations which puts them on-line to a computer for dealing with customer account enquiries and for entering order details into the computer, etc. The checking of credit facilities and the availability of stocks is also achieved by means of on-line terminal type devices such as work stations. These activities not only provide increased efficiency in business operations, but also add to job enrichment as clerks are involved with the new technology. Clerks do not need to become involved with the programming of computers as they use package programs or programs which have been developed by expert programmers within the business.

3. Use of hardware. For people directly involved with using microcomputers, it is necessary to become familiar with the method of switching on the power and the controls. These aspects are dealt with in the relevant sections of this book. It is also necessary to become familiar with the commands for using discs, cassettes and printers to obtain the best results from the overall system. The use of discs and a printer can be dispensed with, to some extent, when the computer is used for personal amusement and home use, but these devices are essential for business use as they enable records to be stored on magnetic media, cassettes or discs, for updating and retrieval when required. Printers are essential in the business environment for printing out programs and documents.

4. Computing concepts. It is also advisable to obtain an appreciation of computing concepts, such as how characters are stored in a computer and how they are represented in binary code. This is more for interest than an operational necessity but the knowledge does allow a micro to be used in a more enlightened way. It is also important to understand the difference between a pocket calculator and a pocket computer. The stored program concept is fundamental to understanding the functions of a computer.

5. Operation and programming of a computer. It must be appreciated that the operation and programming of a computer is no longer the sole province of the "professionals" as was the case with mainframe computers. The big computers were, for many years, surrounded with self-generated mystique and one had to be specially trained to operate and program them. Even now they

are more formidable to understand than their smaller offshoots—the microcomputers. It would seem that since the advent of the silicon chip the skill to use a computer has become more widespread: it seems that the reduction in size of the computer has had an inverse effect upon the ease with which knowledge can be gained on how to use them, i.e. the smaller size has generated a greater simplicity in understanding the nature of computers. Micros are now within the financial reach of many more people willing to tackle this new breed of technology. Let's face it, children of five years of age are now using them in school so many of us must look to our laurels.

Accountants, amongst others, should become capable of writing the less complex type of program such as those outlined in this book relating to discounted cash flow, break-even analysis, invoice computations and projected profit and loss accounts, etc. The author, as an accountant, has proved that this is not too formidable a task as the demonstration programs show which were specially prepared for this book by the author "with a little help from my friends".

The user of a personal micro should attempt to become reasonably proficient at writing programs both for personal satisfaction and for their usefulness, or the enjoyment they provide if they are game-type programs. It is extremely gratifying when one's own program runs after the command RUN has been keyed in. It is equally frustrating when it fails to work due to some logical or syntax error. Be philosophical in such cases as this is the difficult part of the learning process; it is a case of learning from mistakes in order to become proficient. The only way to understand the nature of some instructions is to vary their construction and sequence and observe the results on the screen.

It is essential to refer to the manual provided with the micro to interpret the results being obtained, the type of syntax error signalled on the screen, and for general guidance on the meaning of statements and commands. More complex programs can be developed progressively as the level of programming literacy increases.

It is not essential for the user of a micro to become an expert touch typist but it certainly helps as it enables the user to observe what is happening on the screen when keys are "hit" rather than concentrating on whether the correct keys are being depressed. Familiarity with the keyboard is also essential for the effective use of the function keys such as BREAK, RESET, CONT,

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