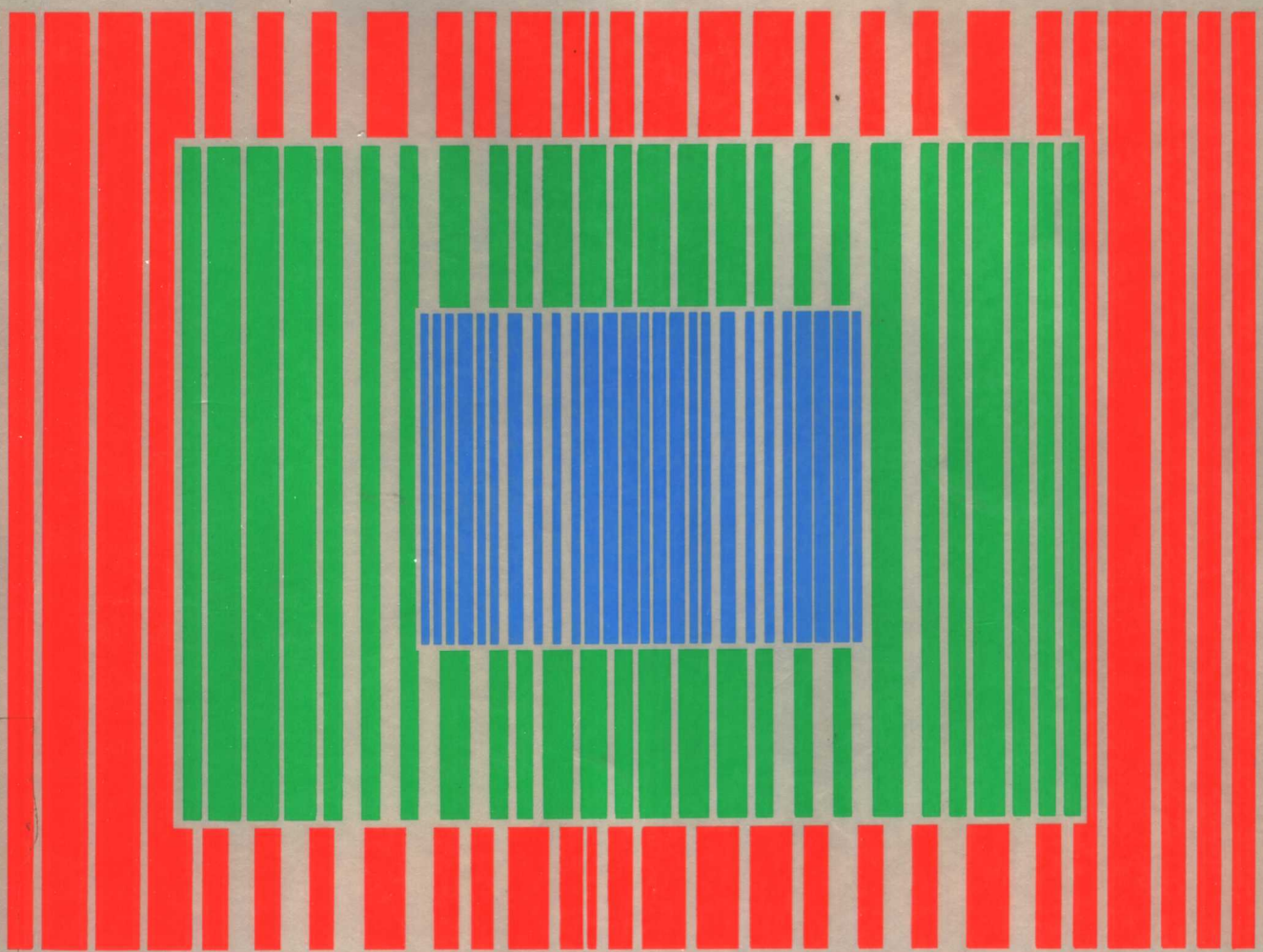
COMPUTERS TODAY

DONALD H. SANDERS

THIRD EDITION



COMPUTERS TODAY

Third Edition

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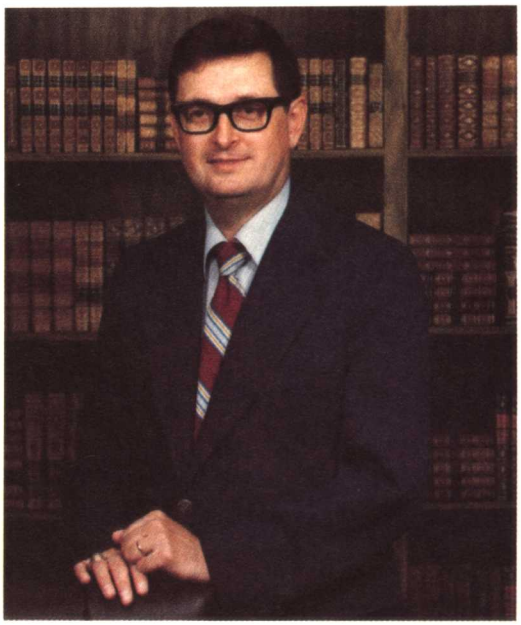
ABOUT THE AUTHOR



Donald H. Sanders is the author of seven books about computers—their uses and their impact—spanning more than 25 years. Over a million copies of his books have been used in college courses and in industry and government training programs.

Dr. Sanders has 20 years of teaching experience. After receiving degrees from Texas A & M University and the University of Arkansas, he was a professor at the University of Texas at Arlington, at Memphis State University, and at Texas Christian University. In addition to his books, Dr. Sanders has contributed articles to journals such as *Data Management*, *Automation*, *Banking*, *Journal of Small Business Management*, *Journal of Retailing*, and *Advanced Management Journal*. He has also encouraged his graduate students to contribute computer-related articles to national periodicals, and over 70 of these articles have been published. Dr. Sanders chairs the "Computers and Data Processing" Subject Examination Committee, CLEP Program, College Entrance Examination Board, Princeton, N.J.

PREFACE

We're at the dawn of a new era. The emphasis has shifted from the physical and mechanical labor required by the Industrial Revolution to the mental labor needed to sustain the new Information Revolution. Just as gears, gas engines, and electric motors extend our physical power, so do today's computers give us the information we need to extend our thinking power. For the first time, our society is keyed to a resource—information—that's renewable and self-generating. Information is now doubling every 5½ years, but in the years ahead, working with increasingly powerful information systems, we probably will double the available knowledge every 2 years. Thus, in addition to mass-producing goods, we're now mass-producing information, and this knowledge is a driving force in our economy.

THE PURPOSE OF THIS EDITION

The third edition of *Computers Today* acquaints students with the four related areas of computer knowledge they'll need if they're to understand the driving force behind our information society. An understanding of the first two areas is required for computer literacy; additional competence is gained by mastery of the last two areas. These areas are:

1. ***Knowing computer capabilities and limitations.*** A general understanding of the organization, capabilities, and limitations of the various machines, or **hardware,** that comprise a modern computer system is developed, but unnecessary technical concepts are omitted.
2. ***Knowing how to use computers.*** **Software** is a term that refers to the written instructions or programs that control the operations of a computer. Common uses or *applications* of computer software are spelled out in this edition, and a strong emphasis is placed on prewritten programs or software packages that allow users to produce the applications results they desire. For example, a wealth of information about word processing, desktop publishing, spreadsheet, data base management, data communications, graphics, data analysis, project management, memory-resident, and other common prewritten applications programs are outlined and then discussed in detail.
3. ***Knowing how computer software is acquired.*** In addition to showing readers how to acquire the general-purpose applications software packages they'll need now and in the future, this edition also outlines how individuals and organizations analyze unique problems and then design custom-made programs and information systems to solve those problems.
4. ***Understanding the computer's impact.*** Computers don't operate in a vacuum; their use has an impact on people and organizations everywhere. This impact is outlined early in the text, and the topic is then integrated throughout the book.

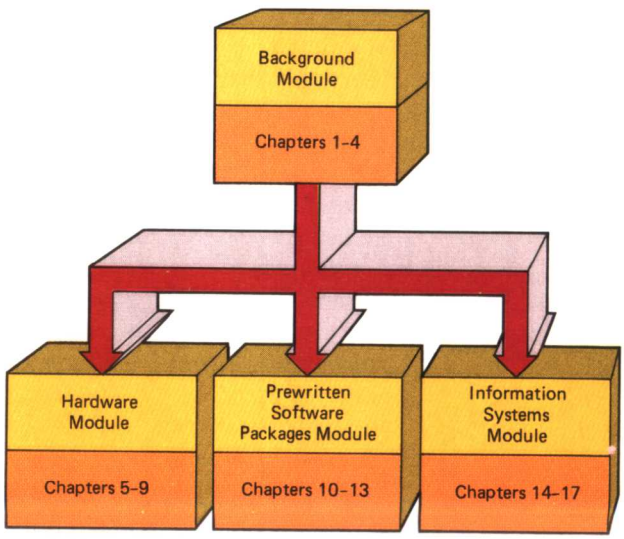
THE REMAKING OF *COMPUTERS TODAY*

Retaining Flexible Organization and Integrated Examples

Computers Today pioneered two popular features that are retained in this edition. The *first* of these is the *modular organization* that permits the book to meet the needs of courses with different subject emphases and with different presentation sequences. This flexibility is possible because *Computers Today* is organized into four modules. An overview of the four areas of knowledge mentioned above is presented in the four chapters of the first Background Module. Readers should tackle these chapters (1 through 4) in sequence, but once they have completed them, they can turn *immediately to any of the remaining modules* to meet whatever sequence and depth requirements are needed in a particular course (see the chart below). For example, after completing Chapter 4 they can then go directly to the entirely new Prewritten Software Packages Module (Chapters 10 through 13). Of course, it's also logical to consider computing equipment in more detail (Chapters 5 through 9) and then move to the Prewritten Software Packages and Information Systems Modules.

So *Computers Today* continues to give you the flexibility to choose the sequence that's best for your needs. It also permits you to vary the depth of the material covered in a one-term course. Although you may be unable to cover all 17 chapters in a single term, you'll have the freedom to select those topics that are most appropriate for your needs.

A *second* and unique feature of *Computers Today* is the use of *integrated applications and programming examples*. This innovative approach (1) allows readers to see how prewritten applications packages can be put to work to solve realistic problems, and (2) introduces readers to the methodology and techniques needed to analyze problems and then develop custom-made computer programs and systems to solve those problems. Student interest and motivation is enhanced in this text with the introduction, in Chapter 2, of the computer-using Plum Natural Company (PNC)—a small distributor of carbonated fruit juice drinks. Some of the realistic and interrelated information needs of this start-up company



are outlined in a number of applications examples in Chapter 2. Many of these examples are processed with the help of outlining, word processing, communications, spreadsheet, graphics, data base management, project management, memory-resident, and other prewritten software packages. But other Plum Natural problems use custom programs written specifically for the task at hand.

What the owners of PNC do with computers is an integrating theme that's carried first from Chapter 2 to Chapter 3 and then to the chapters in the Prewritten Software Packages and Information Systems Modules. In Module 3, readers learn more about how specific prewritten software packages serve PNC needs, and how these packages may be acquired; they see how customized PNC information system solutions may be developed in Module 4.

Creating a realistic start-up business that students can identify with, discussing the popular prewritten applications packages that may be used to solve many of the common problems faced by this business, and then following the program/system development steps required to produce customized solutions to other problems the business must deal with is a unifying approach unique to *Computers Today*.

Rebuilding the Modules

The modules and the chapters they contain have been dismantled, reworked, and reassembled in this edition to meet changing conditions. Eight chapters are totally or mostly new, and fresh material accounts for much of the content of the remaining chapters. Included among the changes created by the module rebuilding effort are:

- All chapter titles in the Background Module are new to reflect the extensive reworking that has occurred. The material presented in Chapter 1 has been tightened to make room for updated information on computer system advances, and the Closer Look reading on computing history has been enlarged. Readers are introduced to the new Plum Natural Company in Chapter 2 and become familiar with its processing needs. Much of the focus in Chapter 2 is then on PNC's use of many of the prewritten applications packages that are further developed in Module 3. However, custom-made software examples are also featured, and these examples are later reconsidered in Module 4. Chapter 2 is essentially a new chapter. The first half of Chapter 3 that deals with software categories and outlines how people can obtain prewritten software packages and then communicate with those packages is also new. And another new chapter—Chapter 4—completes the Background Module. Chapter 4 is a strong chapter that shows the impact that computer usage is having on people and organizations. Important topics such as the development of expert systems and natural language programs in the field of artificial intelligence, and many of the positive and negative effects that computer usage may have on individuals and organizations are retained from the Social Impact Module in the second edition. Other important social considerations are integrated throughout many of the remaining chapters in the book. For example, a lengthy discussion of the social issues raised by the use of Management Information Systems is presented in Chapter 17. Thus, a wealth of relevant social impact material has been retained, but a separate social impact module has not been included in this edition. (My *Computer Concepts and Applications*, McGraw-Hill Book Company, 1987, does contain such a module and includes

contributions made by several experts in the fields of Government and Law, Health Care, Education, the Humanities, and Science and Engineering.)

- The five chapters in the Hardware Module cover the topics found in six chapters of the second edition. Some hardware items have been dropped and other concepts have been repositioned. For example, details of arithmetic-logic and control section operations in the central processor are now optional and have been moved to the Closer Look reading following Chapter 5. Dozens of new concepts are introduced. For example, discussions of future primary storage components, customized chips, and silicon compilers are found in Chapter 5. New sections on data entry methods, user-friendly hardware interfaces, magnetic and optical disk storage developments, and laser printing and liquid crystal display topics are located in Chapters 6 and 7. And new discussions on personal computers and the steps that may be followed to buy such systems, along with updated material on minis, mainframes, and supercomputers are found in Chapter 8. Chapter 9—"Data Communications: Systems and Networks"—has been added to this Module, and new material has been included on modems, fiber optics, bypass networks, local-area networks, and micro-to-mainframe linkages.

- An entirely new Prewritten Software Packages Module with four new chapters has been added. These new chapters are: "Text-Manipulating Software: Outlining, Word Processing, Desktop Publishing, and Data Communications Packages" (Chapter 10), "Data Analysis Software: Spreadsheets, Other Analysis Programs, and Graphics Packages" (Chapter 11), "Storage and Retrieval Software: Data Base Management, Project Management, and Memory-Resident Packages" (Chapter 12), and "Integrated Packages, Package Selection, and Operating Systems" (Chapter 13). The titles indicate the scope of these new chapters, and a quick glance through the pages of this new module will show you why it has been acclaimed by reviewers.

- A new Information Systems Module has been formed. Chapter 14—"Information Systems Analysis and Design"—and Chapter 15—"Preparing Programs: Practices and Languages"—emphasize the analysis, design, and program preparation techniques that people follow to acquire the custom-made programs and information systems they need to solve unique problems. "Management Information Systems: Concepts" (Chapter 15), and "Management Information Systems: Issues" (Chapter 16) replace the single MIS chapter in the second edition. Included among the many topics that have been added or updated in this Information Systems Module are prototyping, data flow diagrams, fourth-generation languages, the C programming language, and decision support systems.

- All flowcharting and coding examples in the three Programming Module chapters have been reworked to reflect the needs of the new Plum Natural Company. All programs have been coded in Microsoft BASIC and will run on IBM-PC and compatible systems.

- A new DOS tutorial appendix discusses the Disk Operating System of today's personal computer. The student is given hands-on guidance with specific details of DOS commands.

Additional Revision Features

The remaking of *Computers Today* didn't stop with the rebuilding of the modules. Other revision features and learning aids found in this edition are:

- Hundreds of new full-color photographs, drawings, and illustrations have been substituted for earlier photos and art. Every chapter benefits from this extensive revision of graphic learning aids.
- Most of the following aids to learning are either all new or substantially revised: (1) The vignettes used to open a chapter and highlight some aspect of its contents; (2) the boxed inserts included in each chapter to provide applications, cases, and items of interest to support chapter material and stimulate discussions; (3) the Closer Look readings following each chapter that provide additional information on selected topics.
- Many new Projects/Issues to Consider have been added at the end of selected chapters to suggest student research topics that are based on material presented in the chapters. Some projects may be completed at a library, while others require visits to computer stores and/or computer-using organizations.
- Learning aids carried over from the second edition have received the necessary updating. These aids include Chapter Outlines, Looking Ahead learning objectives, Feedback and Review sections with answers, Looking Back chapter summaries, listings of Key Terms and Concepts, Topics for Review and Discussion, and a Glossary.

SUPPLEMENTS FOR THIS EDITION

Numerous supplements have been prepared to make the *Computers Today* package a complete teaching/learning tool. They include:

- ***Inside Computers Today.*** This student study guide, by Robert Condon of Westchester Community College, is designed to provide extensive self-tests for each corresponding chapter in *Computers Today*. Each study guide chapter contains learning objectives; a chapter overview and summary; and varied self-test sections including key term matching, multiple choice, true or false, and completion exercises. Answers for all exercises are included in the study guide. *Inside Computers Today* is an instrument planned to reinforce and integrate text concepts. It's designed for success—no "tricky" questions have been included intentionally. Successfully completing the study guide exercises should increase the confidence of all levels of students. It's a straightforward, no-frills, self-testing implement written for students, not for teachers.
- ***Instructor's Resource Kit.*** The components of this kit provide instructors with extensive support materials for teaching a course with *Computers Today*. The following supplements are included:

1. ***Instructor's Manual.*** For each chapter of the text, the Instructors' Manual contains a chapter overview, teaching objectives, a detailed teaching outline, answers and suggestions for the Topics for Review and Discussion, and comments and suggestions for the Projects/Issues to Consider. The author, Marilyn Moore, Indiana University Northwest, also provides sample course outlines and guidance for preparing a syllabus.

2. ***Overhead Transparencies.*** A comprehensive set of color transparencies serves as a visual classroom aid that can be used to further explain text concepts.

3. ***Test Bank.*** Some 3,000 questions test all the important ideas and definitions in *Computers Today*. These questions were created and class-tested by Hal

Sackman, California State University, Los Angeles. A computerized version of the test bank on MicroExaminer allows you to generate tests using your microcomputer. Questions can be scrambled into two versions, allowing you to create alternative exams for multiple sections of the same course. You also have the option of adding your own questions to the test bank. The Examiner System for mainframes contains a magnetic tape which can be installed in your computer center, and offers the same features as MicroExaminer.

4. ***Slide Package.*** A package of 80 slides, many of them not found in the text, is available to adopters. This package includes separate 20-slide presentations on history, computer graphics, a tour of a computer center, and computer applications. A descriptive narrative script is provided for each of the four slide presentations.

5. ***BASICard and DOScard.*** These convenient pocket-sized cards enable students to have important BASIC and DOS commands and codes always at their fingertips. These aids for student programming are available in quantity to the instructor upon adoption.

- ***Microcomputer Applications.*** Various software and manuals are offered to round out students' computer knowledge with hands-on experience with microcomputers.

1. ***USING Wordstar 3.3, VP PLANNER, and dBASE III PLUS.*** This easy to use manual by Intentional Educations lets you instantly begin working with these productivity tools. The manual assumes no previous knowledge of the software packages or microcomputers. Written so that you learn by doing, the manual is developed as a series of one-hour lab sessions. Each software product is discussed in an independent module, allowing you to select the software package you want to learn.

2. ***Software.*** Limited educational versions of WordStar, VP PLANNER, and dBASE III PLUS software are available free to adopters.

3. ***Framework Manual and Software.*** Also available is a special, limited version of Framework, the popular integrated software package which includes word processing, spreadsheeting, data base management, and graphics. The instruction manual, by Wayne Zage of Purdue University, guides students in Framework's use and provides exercises keyed to the text.

ACKNOWLEDGMENTS

It's customary for authors to conclude a preface by acknowledging the contributions and suggestions received from numerous sources. This is particularly appropriate in the case of *Computers Today* because a colorful package of this scope just doesn't happen without the input of many people.

The authorities who responded to research questions and helped reshape the content and organization of *Computers Today,* and the professionals who reviewed the manuscript and made many helpful suggestions are acknowledged separately following this Preface.

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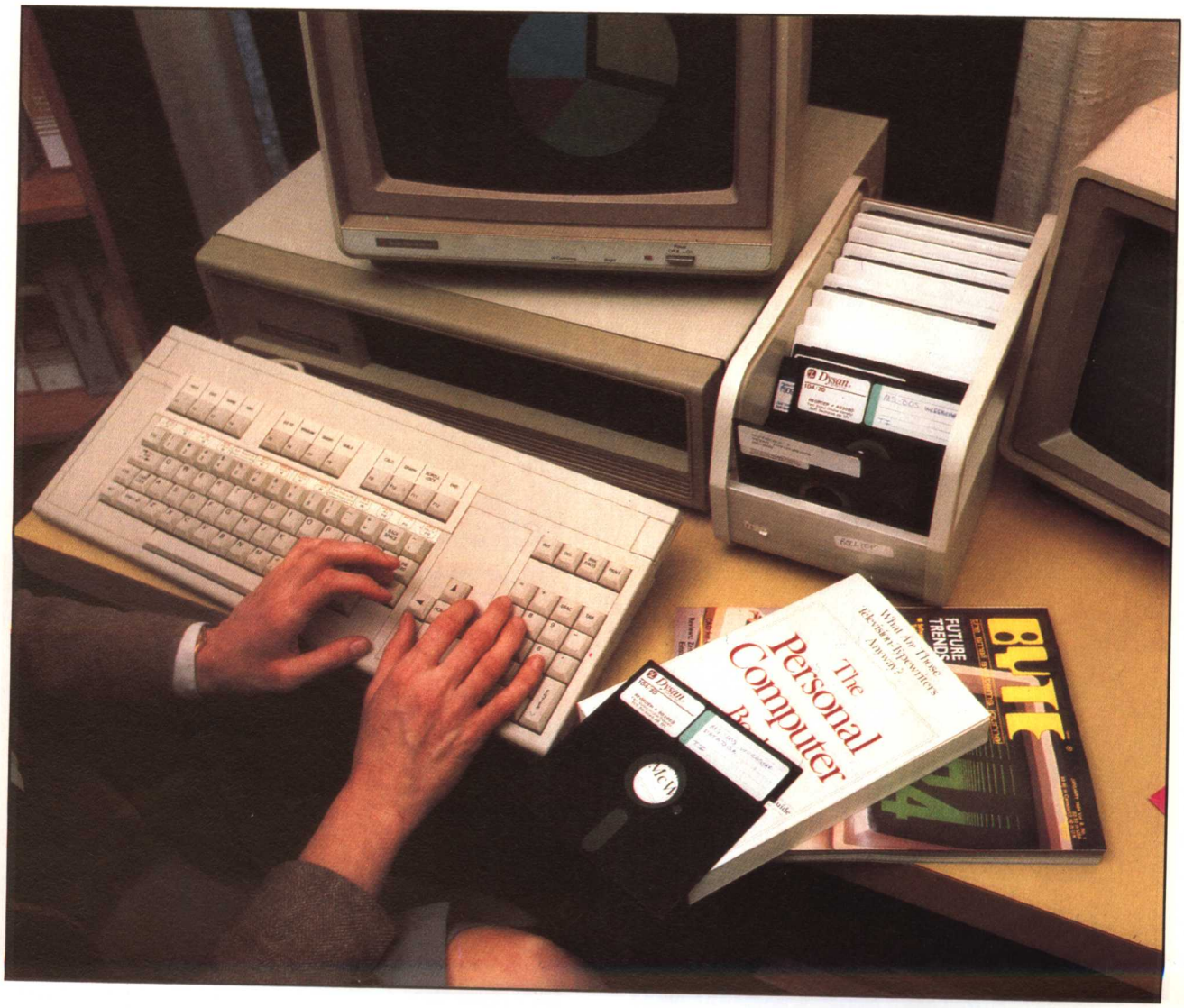
MODULE 1



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