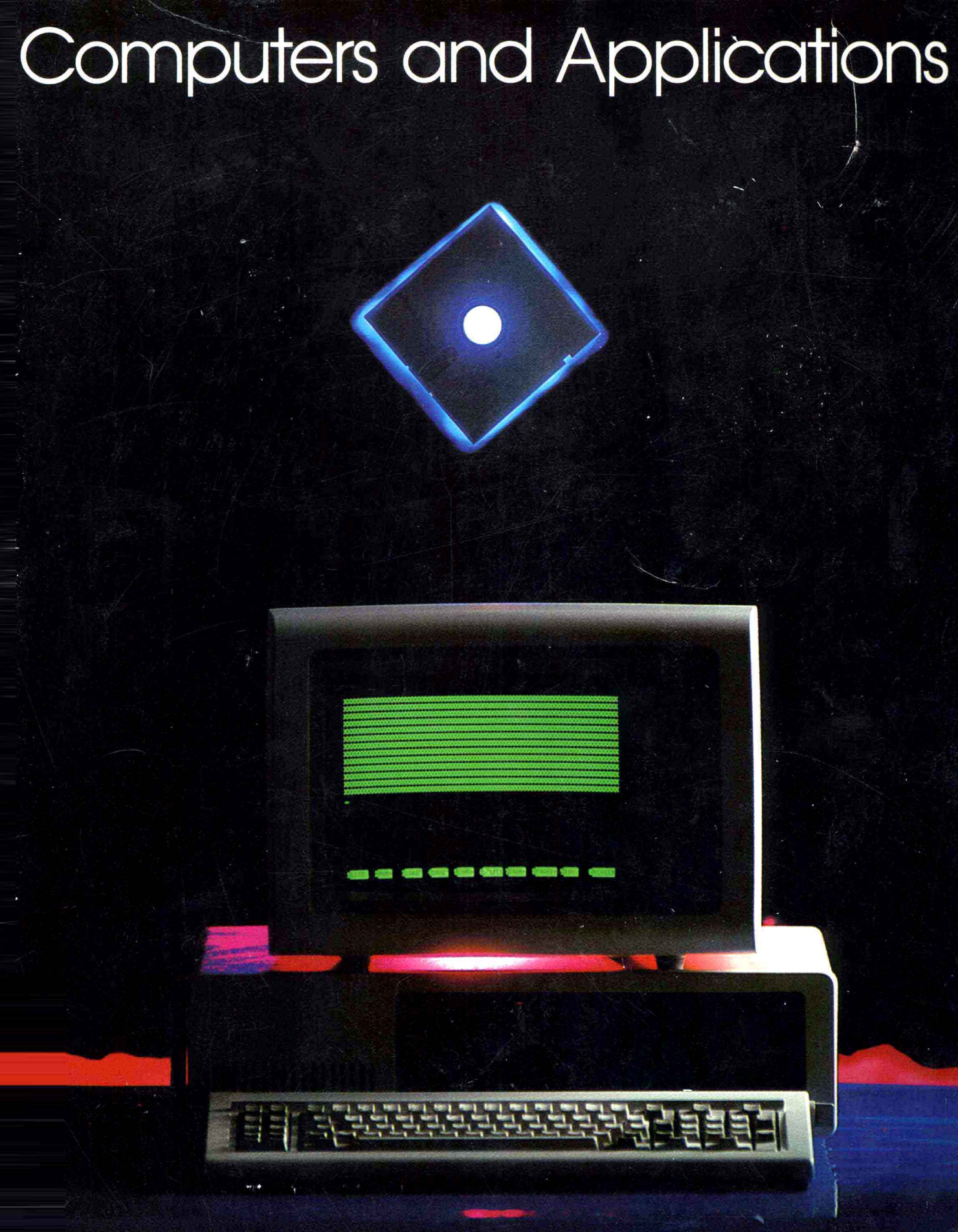
Computers and Applications



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Computers and Applications

AN INTRODUCTION TO DATA PROCESSING

D. C. Heath and Company
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To the memory of Dan Slotnick.

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Preface

Hardly a day goes by that we aren't affected by or don't interact directly with computers in some way. The tremendous recent growth in the introduction to data processing course and all its relatives, such as courses in computer literacy and microcomputer applications, is only one indicator of a society-wide computer revolution. The reader of this text may be fulfilling a requirement, satisfying curiosity about computers, looking for ways to use a newly purchased personal computer, or trying to keep up with a trend. Whatever his or her goal, *our* goals in writing this book were to present enough details about the actual workings of hardware and software to dispel the mystery without overwhelming the reader with more technical detail than is needed for competency. Add to that a touch of humor, imaginative use of graphics, and substantial emphasis on real-world examples and applications, and you have a practical yet entertaining introduction to computers and their applications.

Our approach to this text and package has been one of learning and application. In order to succeed with that approach, we have brought a unique variety of perspectives to this project. In much the same way that the introduction to data processing course is aimed at an increasingly diverse audience, this book was conceived by authors from diverse, yet related, academic and professional backgrounds. Two of us have been active teachers of the introductory course, one of us brings a writer's skills to his work, three of us have worked at

different levels in the computer industry, and our senior author (see About the Authors) brings considerable technical and management expertise to the project. Our publisher, D. C. Heath and Company, brought in additional insight from the experts—those on staff who know how to publish successful textbooks, those who teach the introductory course, and those who currently work in the computer industry. D. C. Heath surveyed over 2000 course instructors, personally interviewed over a dozen others, and had the text manuscript reviewed by twenty-five teachers. The result, we feel, is a perfect fit of teaching package with classroom reality.

The *Computers and Applications* package is a four-part instructional system featuring the following components:

1. *Text content.* Exceptionally well-explained and accurate coverage of all key computer and data processing concepts.
2. *Text learning aids.* Extensive pedagogical features integrated throughout the text.
3. *Student supplements.* A variety of study aids designed for flexibility within any course structure.
4. *Instructor's supplements.* A complete teaching package fully coordinated with the text, for both full- and part-time instructors.

TEXT CONTENT

This text has been carefully designed for use in any first course in computer data processing or for any individual who is learning more about computers. It meets or exceeds the requirements for CIS-1, Introduction to Computer-Based Systems, the first course proposed by the Data Processing Management Association (DPMA); serves as an introduction to management information systems as recommended by the American Assembly of Collegiate Schools of Business (AACSB); conforms with the curriculum units recommended by the Association for Computing Machinery (ACM) for data entry operations, computer operations, entry-level programming, and Courses 2 and 3 in the ACM's program for small colleges; meets the requirements of ISI, the ACM's first recommended course in information systems; and can be used for Modules 2.1 and 2.2 proposed recently by UNESCO-IFIP. It is intended to prepare students in two-year colleges who plan to transfer to curricula in four-year institutions, as well as for those taking courses offered at four-year schools.

As you can see, the table of contents lends itself to a wide range of course types—from those that deal only lightly with programming to the programming-intensive, from hands-on applications courses to more traditional surveys, from the business-oriented to the technical.

Above all, the content of this book has been organized for maximum flexibility. Its 23 chapters are divided into 7 modules which can, with some exceptions, be taught in any order. We recommend covering Part 1 (Chapters 1 and 2) first. After that, Part 2, Hardware (Chapters 3 through 7); Part 3, Software (Chapters 8 through 11); Part 4, Systems (Chapters 12 through 14); Part 5, The Miraculous Micro (Chapters 15 and 16); Part 6, Applications (Chapters 17 through 21); and Part 7, Implications (Chapters 22 and 23) can be read in any order.

We also recommend, however, that the software module's introductory material on programming style and languages (Chapters 8 and 9 in Part 3) be covered before the BASIC Appendix. Note, too, that the programming materials in the text require neither a computer nor mathematical skills beyond high school algebra. However, the BASIC Appendix becomes progressively more complex, giving the instructor a variety of choices—from teaching only the programming material in Part 3 to devoting nearly half the course to programming. Similarly, a computer may not be used at all, used only occasionally, or used frequently, depending on the availability of computer facilities and on course objectives.

Not only is the text coverage comprehensive, but it also emphasizes topics of growing interest to those teaching and taking the introductory course. Part 5 includes substantial

material on the personal computer—from hardware and software basics to a special section after Chapter 15 on selecting a personal computer plus a full chapter on embedded microprocessors. Microcomputers are also discussed as applicable throughout the text. Because applications have become such a significant part of the introductory course, we devote the five chapters in Part 6 to them, as well as a full chapter (10) to application packages. Further, detailed walkthroughs of such popular microcomputer applications software as Lotus 1-2-3 and word processing are provided in Chapters 10 and 17. Look, too, for state-of-the-art coverage of topics like artificial intelligence and the fifth generation, voice input, flat-panel screens, micro-mainframe links, the electronic office, decision support systems, ergonomics and stress, robotics, "Star Wars" defense computers, and the ethical concerns that go with all these developments.

TEXT LEARNING AIDS

Computers and Applications includes an outstanding array of pedagogical features designed to make familiarization with what amounts to a "foreign language" as painless as possible. Combined with a relaxed writing style, they facilitate understanding and encourage reader enthusiasm.

Chapter Preview and Review Materials

Since we believe that repetition of preview and review materials helps a student to skim a chapter and later to study for exams more effectively, we have structured each chapter around such materials. Each chapter opens with *In This Chapter,* a preview outline of the chapter's headings annotated with easily remembered study phrases. These study phrases are then repeated for guided study in the text margins. Finally, the chapter summary is structured for review around the same outline of chapter headings.

Chapter Opening Situations

Each chapter opens with a Focus on a real-world situation closely related to the chapter content. These selections have been chosen from popular computer magazines and from such nonfiction views of the computer world as *Soul of a New Machine* and *Hackers* to give readers a taste of the real, somewhat eccentric, world of the computer literate. More than just frilly adjuncts to each chapter, each Focus also has followup questions (A Sharper Focus) at the end of the chapter, which challenge readers to apply what they have just read to the Focus.

Boxed Features

Every chapter includes an Issues in Technology question boxed within the running text to encourage students to pause, reflect, and take a stand on an ethical question related to the chapter content. Technology Closeups provide a more in-depth look at such topics as supercomputers and systems design.

Careers Guidance

Because many readers will be looking for job opportunities in the computer industry, most chapters include Careers in Technology, a thumbnail sketch of a career area related to the chapter topic, which provides a job description, qualifications, job outlook, and suggested career paths.

Application Perspectives

At the end of each of the first six text modules, an Application Perspective provides concrete, colorful examples of everyday computer use which combine schematics, text, and photographs.

Readability

To ensure accessibility for students, the reading level has been carefully monitored by the editors and course instructors.

Design and Illustrations

Introduction to data processing students of the 1980s are part of a visually oriented society and need a textbook that will hold their interest. To that end, we have a colorful, yet accurate, design that reflects the excitement and dynamism of the computer field.

Chapter-End Materials

A carefully graded set of chapter review materials is provided at the end of each chapter. First, the Computer Concepts exercise reviews vocabulary, providing page references to the chapter's boldfaced glossary terms. From fifteen to twenty Review Questions follow, providing a rote review of the chapter's major topics and paralleling the chapter outline. Two or three Sharper Focus questions challenge students to apply what they have learned to the chapter opening Focus. Finally, three to ten special Projects encourage students to stretch their learning beyond the chapter content.

SUPPLEMENTS

Throughout the development of the text and its supplements, we have aimed to create a total package that would be interesting, easy to use, and well integrated. Each supplement has been prepared by an experienced teacher of the introduction to data processing course.

Student Supplements

Available for students are a study guide and software.

Study Guide. Prepared by Fred L. Head of Cypress College, the Study Guide has been designed as a thorough review and self-test of text mastery. Included for each chapter are

- Learning objectives written especially for the guide.
- Making the Chapter Work, learning and study tips for making the most of the chapter.
- Chapter Review, a summary of the chapter organized by text headings and written in entirely new terms.
- A true-false pretest to assess mastery.

- Applying Your Knowledge, an assortment of different exercises, both objective and subjective.
- A multiple-choice posttest to assess learning.

All answers are supplied at the end of the Study Guide.

Software. Prepared by Technology Training Associates, *Introduction to Microcomputer Applications* is a software package for Apple® and IBM-PC® microcomputers, designed to familiarize students with word processing, spreadsheet, and data base applications software. Hands-on computer experience and cases are provided as part of the software.*

Instructor's Supplements

The supplements designed for instructors include an instructor's guide, a test item file, and transparencies.

Instructor's Guide. Prepared by Marilyn Meyers of Fresno City College, the Instructor's Guide includes a wealth of materials for busy instructors. For each chapter we provide learning objectives, chapter overviews, annotated lecture outlines, answers to text questions, and additional classroom and lecture materials.

Test Item File. Prepared by Carole Colaneri of Mid-Florida Technical Institute, the Test Item File includes close to 2000 possible test questions: 40% true-false, 50% multiple choice, and 10% fill-in. *Archive*, a computerized test generator for Apple IIe and IBM-PC microcomputers, is also available.

Transparencies. The transparency pack includes 50 color transparency acetates.

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The number of individuals contributing to a textbook like this is, of course, countless. We do want to give special thanks to C. Brian Honess of the University of South Carolina for his significant contributions to the end-of-chapter projects and to Gayle M. Ross of Copiah-Lincoln Junior College for her ideas for BASIC exercises. Brian Prorok of Bell Laboratories and Dan Mitchell of the University of Illinois, Urbana-Champaign, also provided valuable insights as the book developed.

Our special gratitude and appreciation to Sue Gleason and Pam Kirshen at D. C. Heath. And, last but not least, the following people at D. C. Heath helped make this book possible: Marret McCorkle, Mark Fowler, Martha Shethar, and Ruth Thompson.

D. L. S. D. J. K.
E. M. B. J. K. S.
E. S. C.

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ABOUT THE AUTHORS

Daniel L. Slotnick

Dr. Slotnick has had a business background that includes a decade of active technical management for such firms as IBM and Westinghouse. For the past twenty years—while a Professor of Computer Science at the University of Illinois—he has also been a consultant to domestic and foreign computer corporations and United States government agencies, including NASA, the Department of Defense, Standard Oil of Indiana, Atlantic Refining Company, Intel, and Burroughs.

Most recently Professor of Computer Science at the University of Illinois at Urbana-Champaign, Dr. Slotnick earned his M.S. at Columbia University and his Ph.D. at New York University's Institute of Mathematical Sciences. Dr. Slotnick's early academic experience includes participation in the development of the IAS machine, the earliest general-purpose computer, from 1952 to 1954. From 1965 to 1974 Dr. Slotnick was Director of the ILLIAC IV Computer Project, which produced what was the world's fastest computer from its completion in 1972 until it was removed from service in 1982. He has also served as a corporate director of seven companies.

Dr. Slotnick is the author of more than forty reviewed publications. Among his awards are the McDowell Award, the major award of the nation's principal computer professional organization; the AFIPS Prize of the American Federation of Information Processing Societies; the annual Mellon Award of Carnegie-Mellon University; and selection by graduate and undergraduate students every semester as an outstanding teacher.

Evan M. Butterfield

A professional writer and editor, Evan Butterfield brings to *Computers and Applications* a strong background in both writing and teaching. He received his undergraduate and master's degrees at the University of Illinois and studied at the University of Sussex, Brighton, England. Currently teaching writing at The American University, Mr. Butterfield has also taught courses in writing at the University of Illinois, including classes specifically designed for engineering students.

Ernest S. Colantonio

Ernest Colantonio brings combined teaching, technical, and writing skills to this textbook. Currently a research associate and programmer at the University of Illinois' Human Attention Research Laboratory, he received his undergraduate degree in psychology and completed graduate work in computer science at the University of Illinois. Mr. Colantonio has also taught introduction to computer science courses for nontechnical majors at the University of Illinois.

Daniel J. Kopetzky

Author of the BASIC Appendix to *Computers and Applications,* Daniel Kopetzky has an especially strong computer science background. Principal computer scientist for Compion Corporation, a systems design firm in Urbana, Illinois, he received his undergraduate and M.S. degrees in electrical engineering from the University of Notre Dame and his doctorate from the University of Illinois.

Joan K. Slotnick

Joan Slotnick, an experienced textbook author and project coordinator of this text, received her undergraduate degree in mathematics from Columbia University and her master's degree in agricultural economics from the University of Illinois.

Brief Contents

Contents