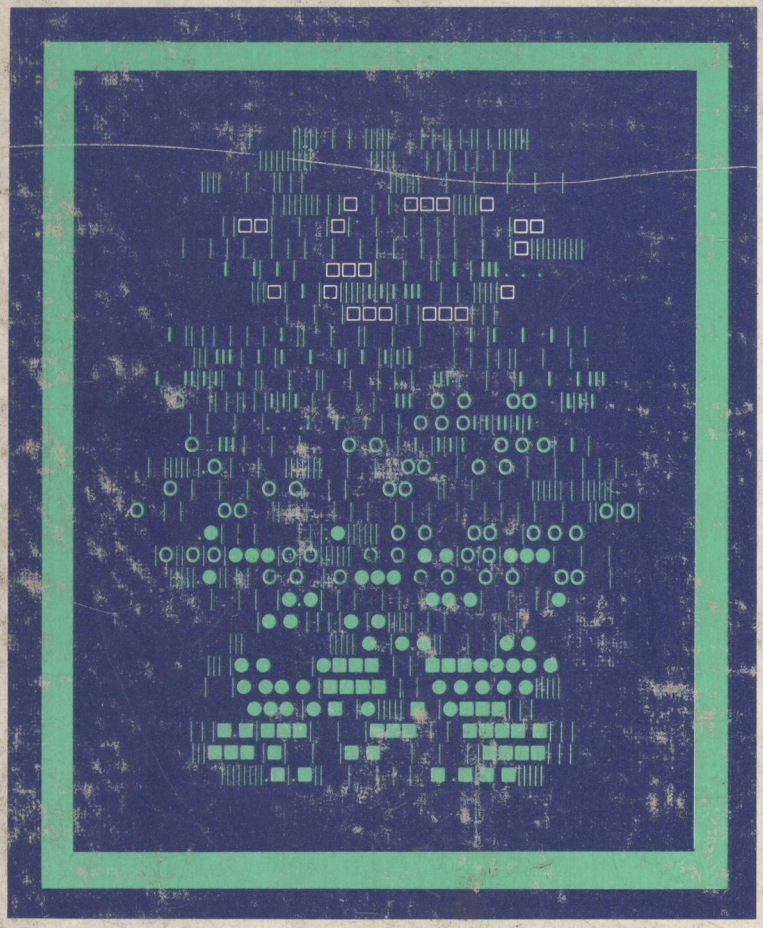

# Data Processing for Business

Gerald A. Silver
Joan B. Silver

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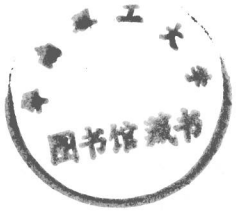
Second Edition



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# PREFACE

Business data processing is an extremely fast changing, dynamic field. New methods, techniques, and devices enter the picture almost daily. Any textbook purporting to teach this discipline must be updated and revised frequently to reflect this phenomenon.

For the second edition of *Data Processing for Business,* we have retained all the features that made the first edition so successful. But we have carefully reviewed and revised textual and illustrative material to reflect current developments. Designed for the first course in data processing, *Data Processing for Business,* Second Edition, presents a contemporary view of computer technology and computer languages. It deals with fundamental concepts, terminology, and theory in logical order, moving from the simple to the complex. Excessive details have been avoided in favor of broad coverage of central topics. The excellent graphics, simple and logical organization, and easy reading style of the first edition have been retained.

Cartoons and anecdotes are used throughout the book to present the ideas, thoughts, and commentary of people who feel strongly about data processing and to remind the student that in data processing, people are as important as machines.

For this edition we have added a chapter on BASIC—one of the major languages now taught to introductory students. We have also added a chapter on the social impact of computers to help the student see the computer in its broader social context. Sections on teleprocessing and information systems have been expanded to reflect their growing importance in the field. All material has been revised, edited, and updated to include discussions of the latest equipment and technology, such as point-of-sale (POS) terminals, electronic funds transfer systems (EFTS), virtual memory systems, and microprocessors.

*Data Processing for Business* is divided into seven parts followed by four appendixes.

Part One, Introduction, discusses the general subject, defines important terms, and surveys data processing methods and trends.

Part Two, Unit Record Processing/Electrical Accounting Machine Processing, introduces the fundamentals of unit record processing and treats the basic techniques involved in manipulation and reporting.

Part Three, Computer Hardware, considers input, processing, storage and output methods. Numbering and coding systems, conversions, and elementary mathematical operations are included here.

Part Four, Solving a Problem with a Computer, explores computer program planning, algorithms, logic, and flowcharting. Batch, interactive, and supplied programs are discussed and compared.

Part Five, Computer Software, opens with an elementary treatment of operating systems, which lays the groundwork for understanding the design and function of compilers and their relationship to the computer. COBOL, BASIC, and FORTRAN are treated in separate chapters. Another chapter describes such languages as PL/I, RPG, and assembler.

Part Six, Information Systems, explores business systems and their evaluation and covers teleprocessing and information systems, two rapidly growing elements of data processing.

Part Seven, The Computer in Society, discusses the influence the computer is having on the broad spectrum of our everyday lives and the implications for the future.

Appendix A explores the organization of the data processing department and related employment opportunities. Appendix B is a conversion table for the decimal, hexadecimal, and binary number systems. New to this edition, Appendix C teaches the student the terminology of the punched card and how to operate the keypunch machine. Appendix D presents nine case studies, which can be used as springboards for discussion or for a review of the concepts covered in the text.

Each chapter is followed by a list of key terms; a glossary appears at the back of the book. Exercises follow each chapter to aid the student in evaluating his or her progress. Some of the exercises broaden the learning experience by requiring that the student go into the field to interview people or to observe computers and businesses.

A textbook is not the product of one or two individuals. We wish to thank the firms and organizations that graciously provided assistance. We also thank William Cornette of Texas Technological University and Oberita Hager of Eastern Kentucky University for their help in the early stages of the revision and C. C. Calhoon of University of Georgia, James Letterer of Elmhurst College, and Robert Panian of Northern Michigan University for their critical reviews of the final draft.

It is our hope that this book will make learning business data processing an enjoyable and fascinating undertaking.

Gerald A. Silver
Joan B. Silver

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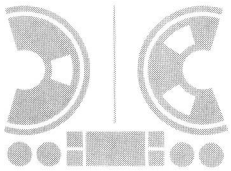

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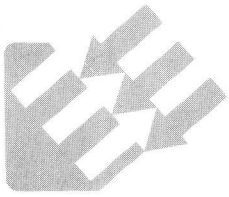

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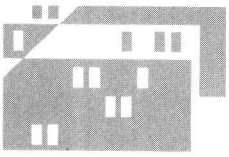

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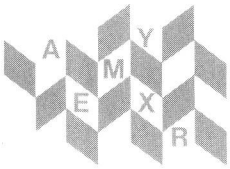


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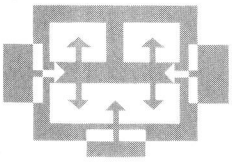

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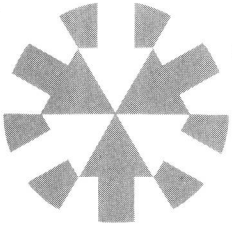

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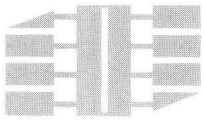

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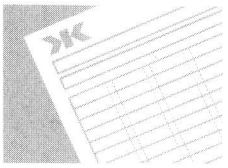

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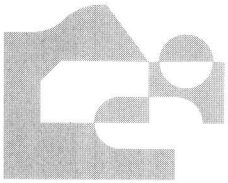

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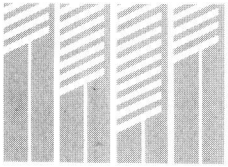

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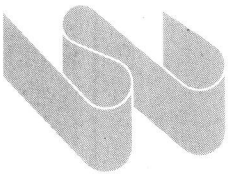

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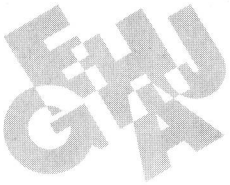

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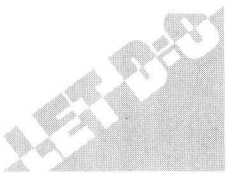

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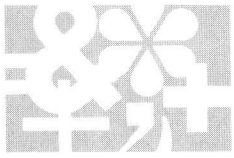

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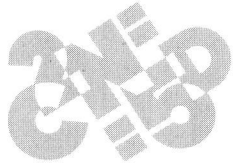

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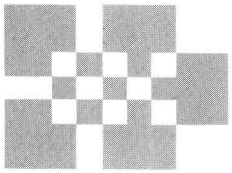

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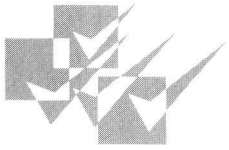

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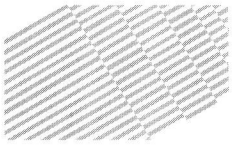

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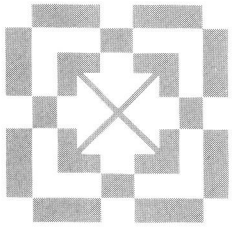

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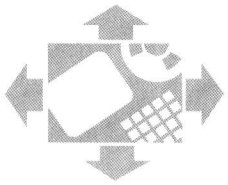

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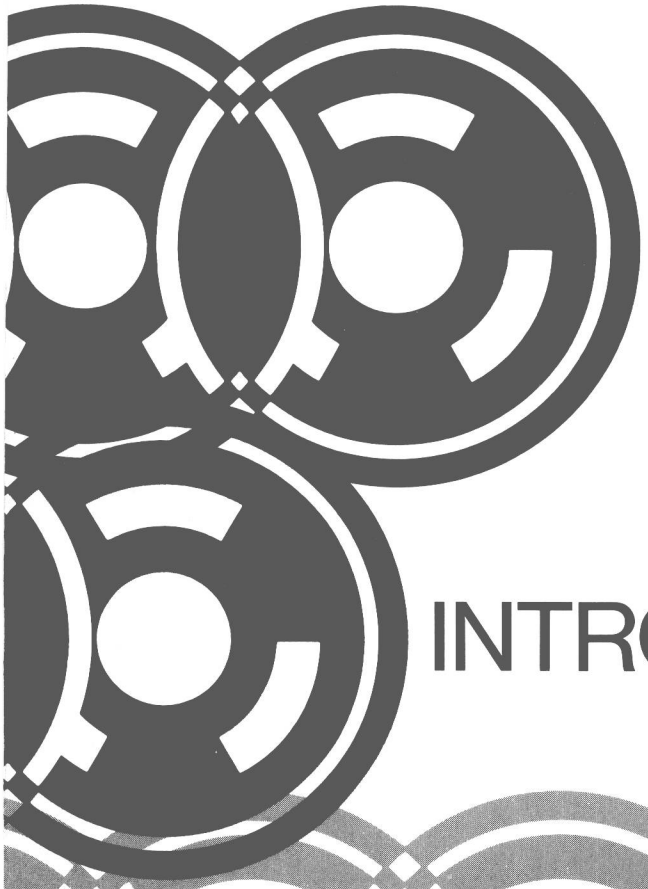
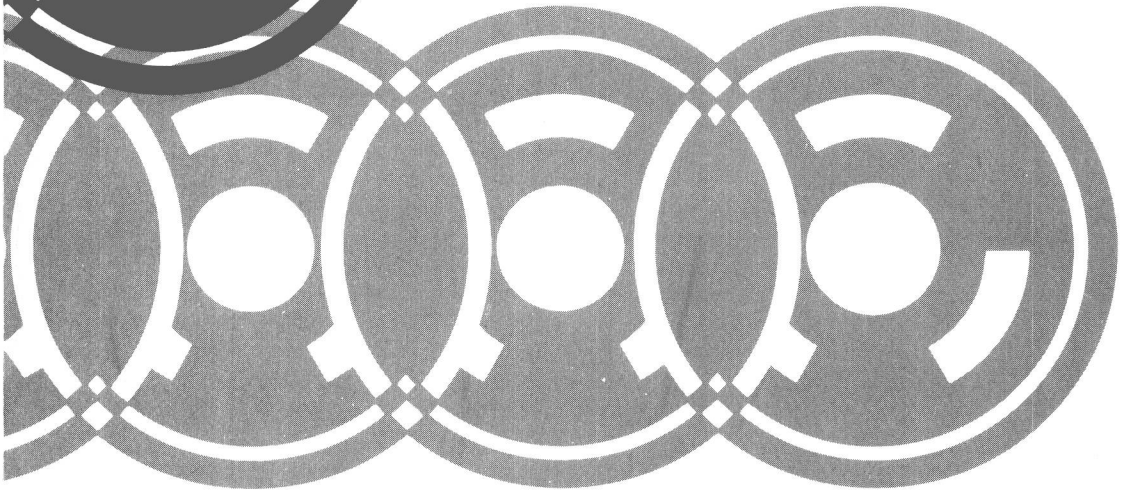
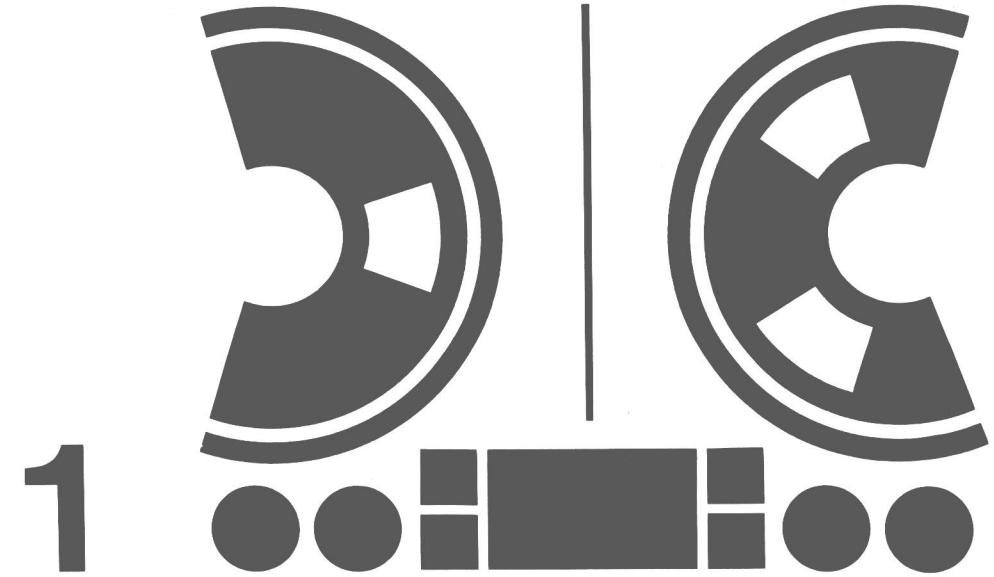


# INTRODUCTION





# 1 DATA PROCESSING

The Machine works on . . . a giant mass of wires and circuits in control of the entire world. It never fails, never tires. It knows all, sees all. It is all. The Machine plans, thinks, and watches. It commands every aspect of our daily lives. It monitors every home, office, classroom, airplane, and ship at sea. All radio and television broadcasts, all telephone conversations are monitored, timed, switched, and processed by the Machine. It is the intellectual center of society. It metes out sentences for law violations, processes our payrolls, writes our plays and books, guides our work and play, educates us, and, of course, it thinks for us. . . .

Huddleston and Bradford, a banking firm in London, England, has issued a list of rules for its office staff:

> Godliness, cleanliness and punctuality are the necessities of a good business. Daily prayers will be held each morning in the main office; the clerical staff will be present. A stove is provided for the benefit of the staff; each member of the clerical staff must bring four pounds of coal each day during cold weather. No member of the staff may leave the room without the permission of Mr. Roberts. No talking is allowed during business hours. The craving of tobacco, wines or spirits is a human weakness, and as such, is forbidden to the clerical staff. Members of the staff will provide their own pens. Clothing will be of a sober nature.*

*"Rules for Clerks," 1854, as quoted in *Creative Computer,* No. V, December 1975, p. 33.

Of course, the two examples above represent extremes. The rapid proliferation of data processing and computers in the last few decades has had a phenomenal impact on our society, but the real world of computer technology lies somewhere in between the land of science fiction and the era of the quill pen.

In 1950 there were only a dozen or so large-scale computers in the United States. By 1970 the number had grown to 80,000. The late 1960s saw the advent of the minicomputer. Minicomputers are hardly larger than an electric typewriter and are at least as fast as their giant ancestors. It is anticipated that by 1983 American business firms will be using over 407,000 of these small-scale computers. (See Figure 1.1.) The early 1970s saw the development of the microprocessor. Microprocessors are computers built on a small silicon chip, a fraction of an inch in size. When incorporated in a complete system, they are capable of performing the data processing tasks of many small and medium-sized business firms at a price such firms can afford. By 1978, more than 700,000 microprocessors alone will be in use. (See Figure 1.2.)

There is no doubt that computers have become an essential and integral part of the American business scene. They are used to control the marketing, manufacture, and financing of a vast amount of goods and services. Computer installations employ thousands of programmers, engineers,

FIGURE 1.1 ESTIMATED NUMBER OF SMALL COMPUTERS INSTALLED (IN THOUSANDS)

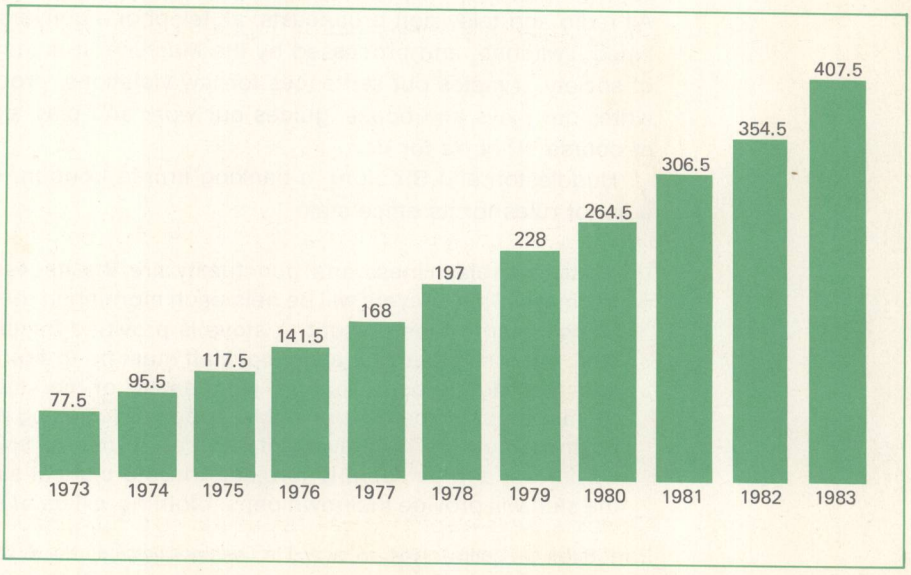
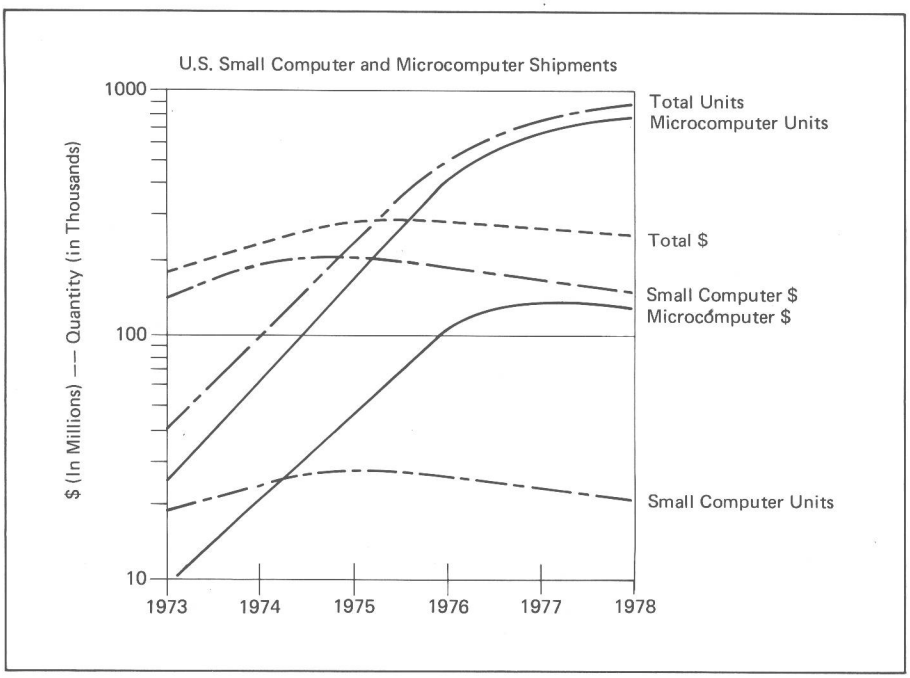


FIGURE 1.2 COMPUTERS IN USE




analysts, computer operators, installers, and other people in related and supporting disciplines.

This book will explore the many elements—people, machines, activities, services—involved in the vital, dynamic new industry of electronic data processing.

## WHAT ARE COMPUTERS?

Broadly defined, a computer is any device that computes, calculates, or reckons. Thus the abacus, adding machine, and slide rule are all forms of computers.

The definition of a computer has become more limited in contemporary usage. A computer is now defined as an electronic device that processes data, is capable of receiving input and output, and possesses such characteristics as high speed, accuracy, and the ability to store a set of instructions for solving a problem.

### What They Are

Computers are electronic devices composed of switches, wires, motors, transistors, and integrated circuits, assembled on frames. The frames form

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