STUDENT WORKBOOK
TO ACCOMPANY
FIRST COURSE IN DATA PROCESSING
WITH BASIC, COBOL, FORTRAN, AND RPG
THIRD EDITION
AND
FIRST COURSE IN DATA PROCESSING
WITH BASIC
SECOND EDITION

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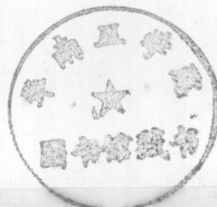
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Commissioned and developed for John Wiley & Sons, Inc.
by P.S. Associates, Inc.; Brookline, Massachusetts

PREFACE

This workbook is designed to accompany FIRST COURSE IN DATA PROCESSING WITH BASIC, COBOL, FORTRAN, AND RPG, Third Edition, and FIRST COURSE IN DATA PROCESSING WITH BASIC, Second Edition, by J. Daniel Couger and Fred R. McFadden.* It contains five types of exercises that will serve to reinforce your understanding of each chapter of the textbook:

1. Identification of Important Terms, in which you are asked to match key terms introduced in the text with their correct definitions.

2. True/False Questions. A 20-item practice quiz.

3. Multiple-Choice Questions. Another 20-item quiz, this time in a multiple-choice format.

4. Questions on Key Textbook Illustrations, in which you are asked to answer questions based on figures, tables, and other important illustrations used in the text.

5. Problems and Projects, in which you are asked to solve quantitative exercises and prepare programs in data processing.

In addition to these exercises, a Chapter Integrator, a list of Chapter Objectives, and a skeletal Chapter Outline are provided at the beginning of each chapter. The objectives highlight the most important topics covered in the text chapter, which you are expected to know after studying the chapter. The outline serves as a brief review of the chapter's organization. Answers to all chapter exercises and problems are given at the end of the workbook.

Your instructor may ask you to turn in portions of the workbook for grading. If not, it will still be to your advantage to answer the workbook questions as practice for class quizzes and examinations. Our students have found the workbook very useful in this regard.

*Those students who are using this workbook with the shorter version of the text (FIRST COURSE IN DATA PROCESSING WITH BASIC, Second Edition), should omit workbook Chapters 13-15. Chapter 12 of the workbook, Introduction to BASIC, should be completed along with the introduction to BASIC that appears as an appendix to the shorter text.

CONTENTS

Chapter 1
COMPUTERS AND SOCIETY

CHAPTER INTEGRATOR

"Computer literacy" is an increasingly important prerequisite for survival and progress in today's computer-oriented world. In order to become computer-literate, the student must develop an understanding of the "whys" and "hows" of the computer. This chapter concentrates on the "whys" of computers and explains how the application of computer technology has revolutionized our social and economic environment. The remainder of the book focuses on the more technical aspects of computer use.

CHAPTER OBJECTIVES

After you have mastered the material in this chapter, you will be able to:

1. Discuss the importance of and requirements for computer literacy.

2. Describe the three possible responses to accelerating computer technology and explain the desirability of adopting the contributor mode of response.

3. Define the terms <u>hardware</u>, <u>software</u>, <u>applications</u>, and <u>systems</u>.

4. Illustrate how the computer can be used to help solve problems in science, engineering, business, education, sports, and government.

5. Cite the objectives of this course as explained in your text.

CHAPTER OUTLINE

Overview

Dramatic Growth in Computer Use

Dealing with Computers as Laypersons

Acquiring a Computer Literacy

Contributing to Society Through Computer Knowledge

    Computer Impact on Laypersons

    Communicating with the Computer

Difference Between Hardware and Software

What Are Computer Applications?

    Scientific versus Business Applications

Computers in Education

    Counseling

    Instruction

Computers in Government

    Local Government

    The Courts

Computers in Sports

    Football

    Baseball

    Track

Computers in Engineering

Computers in Business

    Transportation

    Insurance

    Office Operations

Objectives in Designing This Course

    Objective 1: The First Course for an Effective Computer User

    Objective 2: The First Course for an Information Analyst

    Objective 3: The First Course for a Computer Professional

IDENTIFICATION OF IMPORTANT TERMS

Match each term with its definition by inserting the appropriate letter in the space provided.

a.	computer literacy	j.	computer application
b.	future shock	k.	computer system
c.	capitulation	l.	computer hardware
d.	coping	m.	computer software
e.	contributing	n.	word processing
f.	cashless-checkless society	o.	computer simulation
g.	information analyst	p.	systems analyst
h.	computer professional	q.	computer programmer
i.	system	r.	Universal Product Code

_____   1. A solid foundation in computing concepts

_____   2. Equipment, personnel, and procedures organized to complete a set of tasks in order to meet an objective

_____   3. Results from inability to adjust to accelerating pace of social and technological change

_____   4. A set of hardware and software through which an application is processed

_____   5. Will exist when money and checks are eliminated from business transactions

_____ 6. A means of imprinting on a product information that can be read by a computer in order to implement an integrated sales, inventory, and record-keeping system

_____ 7. A computer professional who converts information specifications to system designs

_____ 8. Not letting a computer system error frustrate you

_____ 9. The set of computer programs or instructions that causes the computer to produce the desired results

_____ 10. Software designed to accomplish a specific function

_____ 11. A computerized model capable of answering "what if" questions by projecting results of changes introduced into an assumed environment

_____ 12. Determines the information needs of managers and helps translate these needs into specifications for a computer system

_____ 13. The use of computers to prepare letters, memoranda, reports, and articles

_____ 14. "Giving in" and "giving up" when confronted with computer system error

_____ 15. An individual trained in the skills necessary to one or more career areas in the field of computer technology

_____ 16. An individual who creates a specific set of computer instructions required to meet a given system design and codes those instructions into a language the computer can understand

_____ 17. The physical equipment, or components, that comprise a computer

_____ 18. The capacity to apply computer-literacy skills to help solve problems

TRUE/FALSE QUESTIONS

Circle T if the statement is true and F if the statement is false.

T   F   1. In order to be truly computer-literate, a person should learn to use a computer.

T   F   2. Many problems between computer experts and computer users arise because of a failure of the two parties to communicate effectively.

T   F   3. The goal of computer literacy is to allow people to cope with their changing environment.

T   F   4. Despite enthusiastic support, the cashless-checkless society is not likely to emerge for at least another 15 to 20 years.

T   F   5. The terms systems and applications are synonymous.

T   F   6. Theoretically, it is possible (if not always feasible) to computerize any system whose processing rules can be defined.

T   F   7. In education, computers are primarily utilized for counseling.

T   F   8.   The computer's ability to enter, store, manipulate, and retrieve data on demand makes it an ideal vehicle for improving the efficiency of judicial information systems.

T   F   9.   Use of the CADAM system generates productivity increases of at least 8 percent compared with the drawing board.

T   F   10. Users of distributed processors must learn to program.

T   F   11. A systems analyst/designer is responsible for converting system specifications into a viable computer program.

MULTIPLE-CHOICE QUESTIONS

Place the letter of the most appropriate answer in the space provided.

_____   1.   After completing a basic computer course, Jane Wilson volunteered to serve on a PTA committee formed to help her town's educators learn to use computers as a teaching aid. Jane is using her new computer literacy to:
a. educate.
b. capitulate.
c. contribute.
d. cope.

_____   2.   Equipment, personnel, and procedures organized to complete a set of tasks required to meet a specified objective are most properly called a(n):
a. system.
b. application.
c. hardware set.
d. software set.

_____   3.   The ability of the computer to produce the desired results is primarily dependent on its:
a. applications.
b. hardware.
c. electronics.
d. software.

_____   4.   The computerization of a system results in the creation of a(n):
a. computer application.
b. hardware set.
c. electronic program.
d. automated decision system.

_____   5.   Planning alternatives may be tested prior to implementation through the use of a(n):
a. application test.
b. computer simulation.
c. system test.
d. software check.

_____   6.   Engineers utilize which of the following to create and analyze the strengths and weaknesses of a design?
a. METRO-APEX
b. DISCOVER
c. CADAM
d. VISICALC

7. The use of computers in preparing letters, memoranda, reports, and articles is called:
   a. data processing.
   b. office system design.
   c. office automation.
   d. word processing.

8. The person who serves as a link between the using department and the computer department is called a(n):
   a. information analyst.
   b. programmer.
   c. systems analyst/designer.
   d. operator.

QUESTIONS ON KEY TEXTBOOK ILLUSTRATIONS

Complete each exercise as indicated.

1. List the three possible responses to accelerating computer technology as given in Table 1-1.

   a. _____

   b. _____

   c. _____

2. According to Figure 1-1, the three categories of portable computers are _____, _____, and _____.

3. The incidents reported in Figure 1-2 illustrate that those people who possess the highest degree of _____ can best deal with an increasingly computer-oriented world.

4. Figure 1-3 documents the fact that computers have had their greatest impact in the

   areas of _____/_____ and _____.
   The least productive area for computer applications to date has been in the

   _____.

5. In the computer-assisted instruction system depicted in Figure 1-4, students use a

   _____ to indicate answers to problems posed by the computer.

6. The most comprehensive application for METRO-APEX listed in Table 1-2 would be in

   the development of _____.

7. According to Figure 1-5, the METRO-APEX system can be used to predict changes that

   would result from decisions made in a _____ environment.

8. Figure 1-6 indicates that the _____ office is generally responsible for information control in judicial information systems.

9.   Figure 1-7 illustrates how Dr. Gideon Ariel utilizes computers to help improve the performance of _____.

10. Figure 1-8 illustrates the type of computer system that is capable of increasing the productivity of an engineer by a ratio of _____ to _____.

11. Figures 1-9 and 1-10 demonstrate how computer systems can be used to analyze and improve _____ systems.

12. Figure 1-12 illustrates how O. M. Scott and Sons utilized a _____
_____ to integrate the work of several distributed work locations.

13. The computerized store management system depicted in Figure 1-13 is triggered when the checkout system reads the _____ imprinted on each product.

PROBLEMS AND PROJECTS

Complete each exercise as indicated.

1.   Many educational institutions administer faculty evaluations in each course that an instructor teaches. The evaluations may have an influence on salary, promotion, and tenure decisions at some institutions. Recently at one institution, the evaluation process resulted in a somewhat poor score for an instructor. Further investigation showed that an optical mark sense reader (a computer input device that reads forms which are marked with a number-two pencil) had been reading forms incorrectly in some cases. Forms that had been returned with no pencil marks had been read as the number five, which was the lowest score on the evaluation form.

     a. List the effects that this error might have on the instructor's career.

b. Briefly explain the actions that the instructor should have taken.

2. Fill in the table below with characteristic items illustrating the system components, as shown in the first example. Be as specific as possible with examples you feel could be computer-facilitated.

	INPUT	PROCESS	OUTPUT
Education			
Advising	Transcript of previous college work	Match with graduation requirements	Graduation check report
Text evaluations			
Examination formulation			
Examination evaluation			
Government			
Elections	Registered voter data	Sequencing and selecting	Alphabetic list of registered voters of each political party and of each voting precinct

	INPUT	PROCESS	OUTPUT
Equal employment opportunity			
Police and Fire Protection			
Sports			
"Fun" runs	Registration data of participants, event results entered as they occur	Compilation and computation of times, places of finish, previous individual results, etc.	Handicap listings and immediate run results for participants
Pari-mutuels (betting)			
Stock car racing			
Engineering			
Bridge design	Type of design, load specs, length of span	Structural computations of compression and tension loads of individual bridge members	Diagram of alternative bridge possibilities with size and type of all construction components
Traffic control			
Business			
Production scheduling	Demand requirements, resource availability	Mathematical model of logistics of product production flow	Times of machine setups and duration of runs of specific products
Laborpower planning			
Quality assurance			

Chapter 2

INTRODUCTION TO COMPUTERS

CHAPTER INTEGRATOR

Chapter 2 builds on the foundation laid in the first chapter to discuss the basic computer functions and operations that must be understood by anyone who desires to communicate effectively with data processing specialists. After briefly discussing early computing devices, the chapter focuses on the operation of the electronic digital computer whose accuracy, speed, and large internal storage capacity are ideally suited to business applications.

All digital computers, regardless of their size or cost, perform the same basic functions--data input, storage, control, processing, and output. A set of instructions, called a program, directs the computer through the automatic execution of these functions. The program, which is created by a programmer or other computer user to accomplish a specific purpose, is stored for use in computer memory. A thorough understanding of this material is essential in order to understand the discussion of computing concepts and hardware that follows.

CHAPTER OBJECTIVES

After you have mastered the material in this chapter, you will be able to:

1. Describe the major types of computers, how they work, and how they are used.

2. Outline the historical development of computers.

3. Explain the significance of the development of microelectronic technology to the computer industry.

4. Classify computers into basic types based on their characteristics.

5. Specify and describe the basic functional units of a digital computer.

CHAPTER OUTLINE

Early Computing Devices

Types of Computers

    Analog Computers

    Digital Computers

Generations of Computers
   The Microelectric Revolution
          Semiconductors
          How IC Chips Are Made
Computer Functions and Organization
   Central Processing Unit
          Control Unit
          Arithmetic/Logical Unit (ALU)
          Microprocessors
   Main Memory
   Microcomputers
Computers Used in Business
   Microcomputers
   Small Business Computers
   Minicomputers
   Medium-scale Computers
   Large-scale Computers
   Supercomputers

IDENTIFICATION OF IMPORTANT TERMS

Match each term with its definition by inserting the appropriate letter in the space
provided.

a. digital computer
b. analog computer
c. control unit
d. microcomputer
e. main memory
f. mass storage devices
g. logical operation
h. first generation
i. second generation
j. third generation
k. central processing unit
l. arithmetic/logical unit
m. small business computer

n. large-scale computer
o. program
p. location
q. address
r. branch
s. microprocessor
t. computare
u. fourth generation
v. fifth generation
w. milliseconds
x. microseconds
y. nanoseconds
z. picoseconds

_____   1. An explicit set of coded steps that directs the computer

_____   2. A computer that operates on numerical data

_____   3. Featured the introduction of very large-scale integration with several
                thousand components per chip

_____   4. Magnetic tapes, diskettes, and magnetic drums that can be used to supple-
                ment primary storage

_____   5. A major component of the CPU which directs the computer's activities

_____   6. Access times expressed in trillionths of a second

_____   7. A storage area that is an integral part of the CPU

_____   8. Examination of data to determine relationships

_____   9. A computer that processes measurable information

_____ 10. A computer that will contain chips whose circuit densities will be 100 times more dense than those of current computers

_____ 11. A label identifying a location where data are stored

_____ 12. A tiny processing unit contained on a single semiconductor chip

_____ 13. Memory access times expressed in thousandths of a second

_____ 14. A period of time when computers used vacuum tubes as the principal electronic components

_____ 15. A computing system that provides very large storage capacity and can accommodate communications terminals

_____ 16. Memory access times expressed in billionths of a second

_____ 17. A period of time when computers used solid-state devices, such as transistors, as the principal electronic components

_____ 18. An area in memory where a unit of data may be stored or retrieved

_____ 19. A computing system comprised of a minicomputer central processing unit that has limited storage facilities

_____ 20. The controlling center of a computer, comprised of the control unit, arithmetic/logical unit, and memory

_____ 21. Memory access times expressed in millionths of a second

_____ 22. The major component of the CPU where calculations are performed

_____ 23. An operation in which the computer selects one of two paths

_____ 24. A period of time when computers used integrated circuits (magnetic core and semiconductors) as the principal electronic components

_____ 25. Also known as a "personal computer"

_____ 26. The Latin word meaning "to compute"

TRUE/FALSE QUESTIONS

Circle T if the statement is _true_ and F if the statement is _false_.

T   F   1. The abacus, which was invented in India, was one of the earliest computing devices.

T   F   2. The Latin word computare is translated literally as "to compute."

T   F   3. IBM can trace its origins, at least partially, to the Tabulating Machine Company founded by Herman Hollerith.

T   F   4. Because of its ability to perform precise measurements, the analog computer is better suited to business applications than is the digital computer.

T   F   5. Technically, the term computer refers to a computing device that has the capability of storing information internally.

T   F   6. Analog computers are never used by business firms.

T   F   7. First-generation computers, which relied on vacuum tubes, were capable of operating in nanoseconds.

T   F   8. Transistors were introduced in the third generation of computers.

T   F   9. Magnetic disk storage became popular in third-generation computers.

T   F   10. Fifth-generation computers will be capable of operating in picoseconds, or trillionths of a second.

T   F   11. Integrated circuits, or microcircuits, must be designed by a computer.

T   F   12. The control unit interprets program instructions and supervises their execution by the computer.

T   F   13. A computer has the ability to "branch" to one of several paths according to the results of a test or a comparison of two numbers.

T   F   14. A microprocessor is actually a central processing unit contained on a single tiny semiconductor chip.

T   F   15. It is impossible to combine logic and memory circuits on a single microprocessor chip.

T   F   16. A microprocessor is a miniature computer in which the CPU and some memory are contained on a single semiconductor chip.

T   F   17. Minicomputers are general-purpose computers whose central processing units are contained on a single logic board or, at most, a few boards.

T   F   18. Microcomputers are generally larger and more powerful than minicomputers.

T   F   19. Large-scale computers are as fast as supercomputers, but they do not provide so much storage.

T   F   20. Comparatively few organizations require the speed or capacity offered by supercomputers.

MULTIPLE-CHOICE QUESTIONS

Place the letter of the most appropriate answer in the space provided.

_____   1. Which of the following predecessors of the modern computer was distinguished by its ability to perform comparisons and print results without human intervention?
            a. the abacus