INSTRUMENTAL ENGLISH

ON LINE

English for Computer Science

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PREFACE

In recent years the interest in computer science and computer-related fields has increased dramatically. This text was written in order to provide the non-native speaker of English with an introduction to the field of computer science. The text is intended to promote success by familiarizing the student with the content, language structures, and vocabulary necessary for further study in the field.

The book is organized so that the types of language problems encountered by high intermediate or advanced English language students are incorporated within an appropriate context. These types of problems include the analysis and mastery of organizational patterns such as general to specific, or comparison and contrast, or grammatical structures such as modals and general tense usage. It is not intended that this be the student's first exposure to these organizational or grammatical points. Rather, the text is designed to provide practice, reinforcement, and further contextual application of these areas.

While the organizational and grammatical points are consistently presented, the specific technique or point chosen reflects the content of the individual chapter; that is, the points naturally reflect the logic of the content area. For example, *Chapter 3,* which treats the applications of computers in society today, lends itself to a progression from a general thesis statement to the presentation of specific and supporting details. Similarly, *Chapter 5,* which deals with the historical development of computers, uses a sequential organizational technique.

ORGANIZATION OF THE TEXT

The division of units is intended to allow the student to follow a natural learning curve from general, introductory considerations to specific, technical information. The first unit, "Computer Technology in Today's World," presents general considerations relevant to the importance of such technology to individuals and society. It contains basic computer literacy as well as areas of interest including careers, applications of computer technology, and current controversial issues. The second unit, "How We Got Where We Are," imparts an historical perspective. The evolution of com-

puter technology, from the first to the fifth generation, is described in an effort to relate the past to the present with an eye to the future. Unit three, "Hardware: Micros to Mainframes," begins the presentation of technical content and vocabulary within a context and learning mode familiar to the English language learner. Concepts regarding computer hardware are presented, with special focus upon the microcomputer or the personal computer. The fourth unit, "Software: Theory to Application," presents detailed explanations of computer codes and introduces the students to computer languages and how they work. The basis for planning programs is presented in the chapter on flowcharts and emphasizes, in particular, the kind of logical thinking that might be required of the English language learner in further university studies. Such a configuration of units is designed to gradually ease the learner into the material without watering down or sacrificing the technical content, since that has proven to be the basis of student success in subsequent computer courses. This configuration also allows the text to be used in a variety of classroom situations: as the core text in an ESP course for computer science at the college or university level; as the primary text in a reading course for English language students who wish to become familiar with technical material; or, by emphasizing the first two units, as a general reader or computer literacy text for the ESL/EFL learner.

ORGANIZATION OF A LESSON

In terms of specific content, the text follows the general paradigm of an introductory course in data processing at the university level. The major content areas have been adapted for the English language learner at the *high-intermediate* or *advanced* level. Accordingly, the chapters present one or more major **structure points** that are inherent to the content. The focal point of each chapter is the **reading passage.** The reading is followed by vocabulary and comprehension exercises. **Vocabulary** is presented and practiced entirely in context. For this reason, vocabulary lists of definitions are not included in the individual chapters. Such a presentation would, naturally, defeat the purpose of vocabulary acquisition through context. Some of the vocabulary items, particularly those of a technical nature, may repeat from chapter to chapter for one or more of the following reasons: the word is used in a slightly different context, it is used in relation to a specific device, or it is repeated as a method of reinforcement. **Word study** and/or **language skill exercises,** which specifically relate to reading comprehension, follow. In the chapter on flowcharting, a technical skill inherent to the material and exclusive to the field of

computer science is included. **Reading comprehension exercises** deal with specific details as well as general concepts. In addition, **enrichment activities** designed to enhance the cognitive as well as communicative capabilities of the language learner have been included.

RATIONALE

All of the exercises have been designed to follow a natural learning progression from recognition to production. In either a classroom or a self-study situation, the teacher or learner may want to review the word study and skill presentations prior to reading the passage. The exercises, however, are intended to be completed after the selection has been read, as they are an outgrowth of the content. The illustrations have been specifically chosen to aid in the comprehension of difficult concepts for both teachers and students.

Finally, this text is the result of more than three years germination and classroom contact with the type of language learner described above. We would, therefore, like to express our gratitude to all the students who have used these materials and whose comments and feedback have greatly contributed to their development.

It is hoped that this text will bridge the gap between the ESL/EFL classroom and that of the university or workplace. We have had great success with the materials contained herein. We wish you the same.

ACKNOWLEDGMENTS

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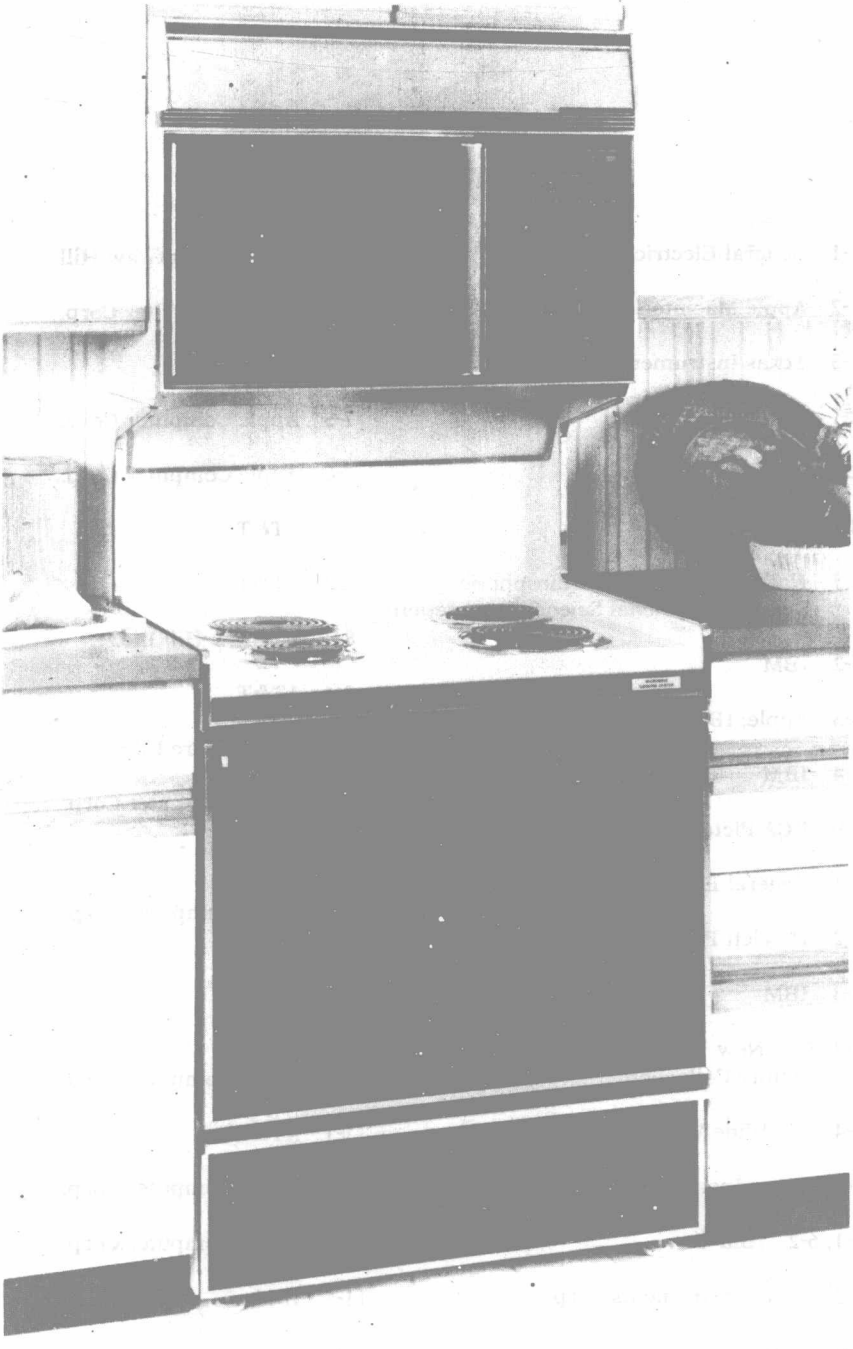


TABLE OF CONTENTS

CHAPTER

1

INTRODUCTION TO COMPUTERS AND ELECTRONIC DATA PROCESSING

COMPUTERS AND SOCIETY

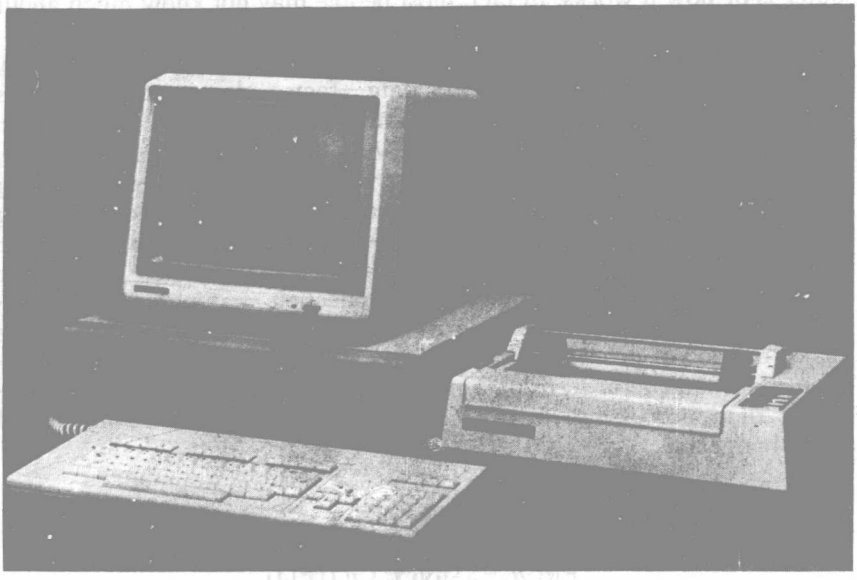
Computers have had a great effect on modern society and have caused a great many changes in a short time. It is sometimes difficult to believe that computers first came into existence during the late 1930s, and that during this time, they were used mainly for scientific research in government and in universities. Computer technology has developed very quickly and has greatly influenced modern life. In fact, by the 1970s computers were used for applications that were previously unthinkable. By the 1970s, computers were common not only in businesses, which found them very helpful for all kinds of office tasks, but also in many other places, including retail stores, supermarkets, schools, and libraries. By the beginning of the 1980s computers could be found everywhere—in gas stations, in cars, or in household appliances such as dishwashers or microwave ovens, just to name a few examples (see illustration 1.1). In fact, by this time, microcomputers, or personal computers, relatively small and inexpensive computers (see illustration 1.2), were becoming even more common in both business and the home. Since the interest in computers is increasing every day, and because tremendous advances are being made so quickly in computer technology, it is often difficult to envision the impact that computers will have in the future. 1

1-1 Computers are now commonly found in household appliances such as dishwashers or microwave ovens.

1-2 Microcomputers, or personal computers, are popular in both business and the home.

COMPUTER TERMINOLOGY

Computers have brought about many changes in language, both in the 2
United States and in other countries. With the invention and use of the computer, an entire new vocabulary has developed—words which describe the computer and its functions, or relate to computer technology in some way. Such words include "software," the term used to refer to computer "programs." Programs are the instructions that tell the computer what to do. Software is generally contrasted with "hardware," the actual physical parts of the computer system (see illustration 1.3). "Debug" is another term that came into existence with computers. It means to locate and remove all mistakes in a computer program. Other computer-related words are not really new, but take on a special meaning in terms of computers. For example, "up" and "down," used in reference to computers, do not signify spatial relationships. Instead the term "up" means that the computer is "up" and working, while the term "down" means the opposite, that the computer is not functioning and cannot be used. Another example of a word which takes a special meaning in reference to computers is the word "boot." When used to refer to computers, "boot" is not used to mean a kind of shoe. Rather, "boot" is generally used as a verb. "To boot" a computer means to start it up.



1-5 "Hardware" refers to the actual physical parts of the computer system.

Other influences in language brought about by computer technology 3
involve words which have become almost exclusively associated with computers, although they retain their original meanings. One such word is "user." While user really signifies "one who uses something," today it very often refers to a person using a computer. Associated with the word "user" is the term "user friendly." This is currently a very popular expression meaning that the computer can be easily understood and operated by non-technical, "non-computer" people.

Finally, many terms associated with computers are *acronyms.* An 4
acronym is a word formed by the first letter or letters of all or some of the parts of a particular expression. Acronyms are very often used instead of the complete expression. Many languages used to program computers are acronyms. For example, the computer language BASIC is the acronym for *B*eginner's *A*ll-purpose *S*ymbolic *I*nstruction *C*ode. Another example of an acronym is PC, which stands for *p*ersonal *c*omputer.

WHAT IS DATA PROCESSING?

In spite of the tremendous impact computers have made and will continue 5
to make on society, many people do not really understand what a com-

puter is or how it works. In fact, most people may not know much about computers except that using them usually makes their lives easier.

In very simple terms, a computer, regardless of its size, appearance, 6
or cost, is a machine that processes data—facts—electronically. (Data is the plural of datum; however, in common usage, the word data is often used in the singular.) Processing data with a computer is relatively new; however, the idea of processing data is not. In general, data processing (DP) can be defined as a series of three steps: 1) the collection or gathering of data; 2) the manipulation or handling of data, and 3) the distribution or sending out of data or information for a particular purpose. Electronic data processing (EDP), therefore, is the collection, manipulation, and distribution of facts by electronic means—by computer. EDP has become the major method of processing data in modern society. In fact, it is so common that the general term data processing and the specific idea of electronic data processing have become synonymous and are now used interchangeably.

THE DATA PROCESSING CYCLE: INPUT, PROCESSING, OUTPUT

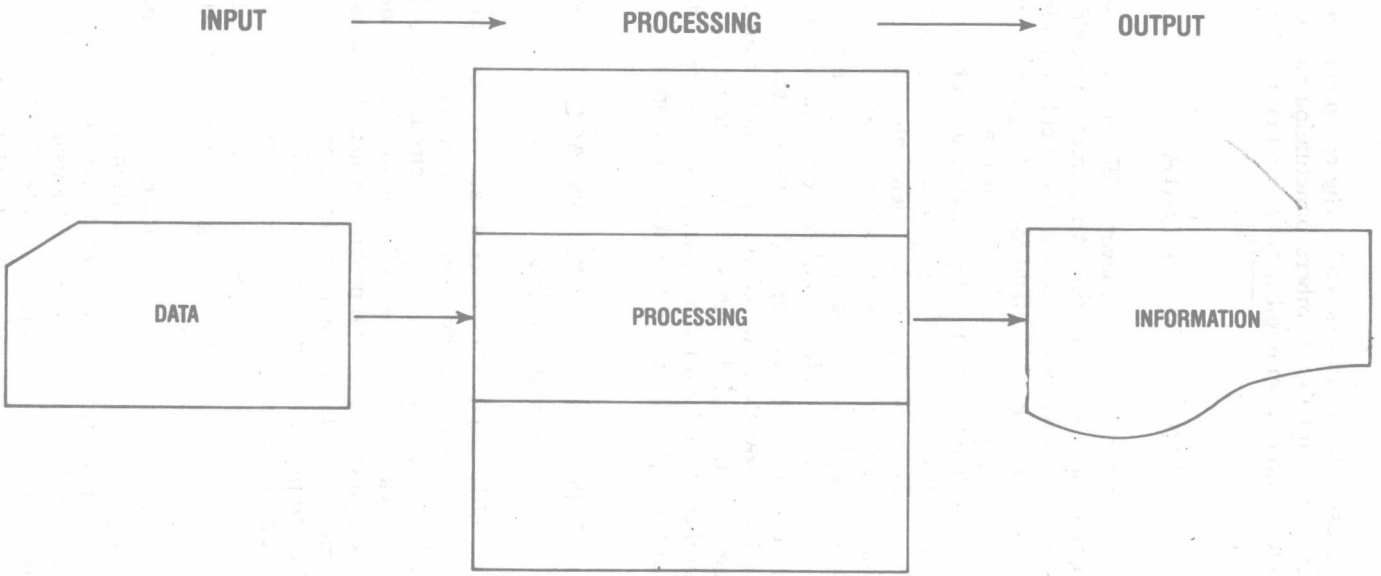
The data processing cycle takes place in three steps. First, data are put 7
into a computer in a form the computer can understand. Second, the data are processed according to the instructions the computer receives through programs. Third, the data, now in a form understandable and meaningful to people, come out (see illustration 1.4).

DATA VERSUS INFORMATION

We have already mentioned that the facts which are put into the computer 8
are called data. Data are raw facts or figures which are arranged in such a way that the computer can accept and process them. When data are put into, or "input" into, the computer, they may not be meaningful by themselves. Once the data have been handled or processed by the computer, they are changed into useful information. This useful information then comes out from, or is "output" by, the computer so that people can use it. This is the purpose of the computer, and of data processing—to process data so that they become useful information.

THE FORM OF DATA

In order for data to be processed by a computer, they must be "machine- 9
readable," that is, expressed in a form the computer understands. Computers cannot deal with emotions, opinions, or feelings. All computer



1-4 The data processing cycle takes place in three distinct steps.

information is expressed by a numeric code. The computer transforms everything—letters of the alphabet, numbers, punctuation marks, sounds, special symbols, etc.—into its own number system so that the data can be processed.

ORGANIZATION OF DATA

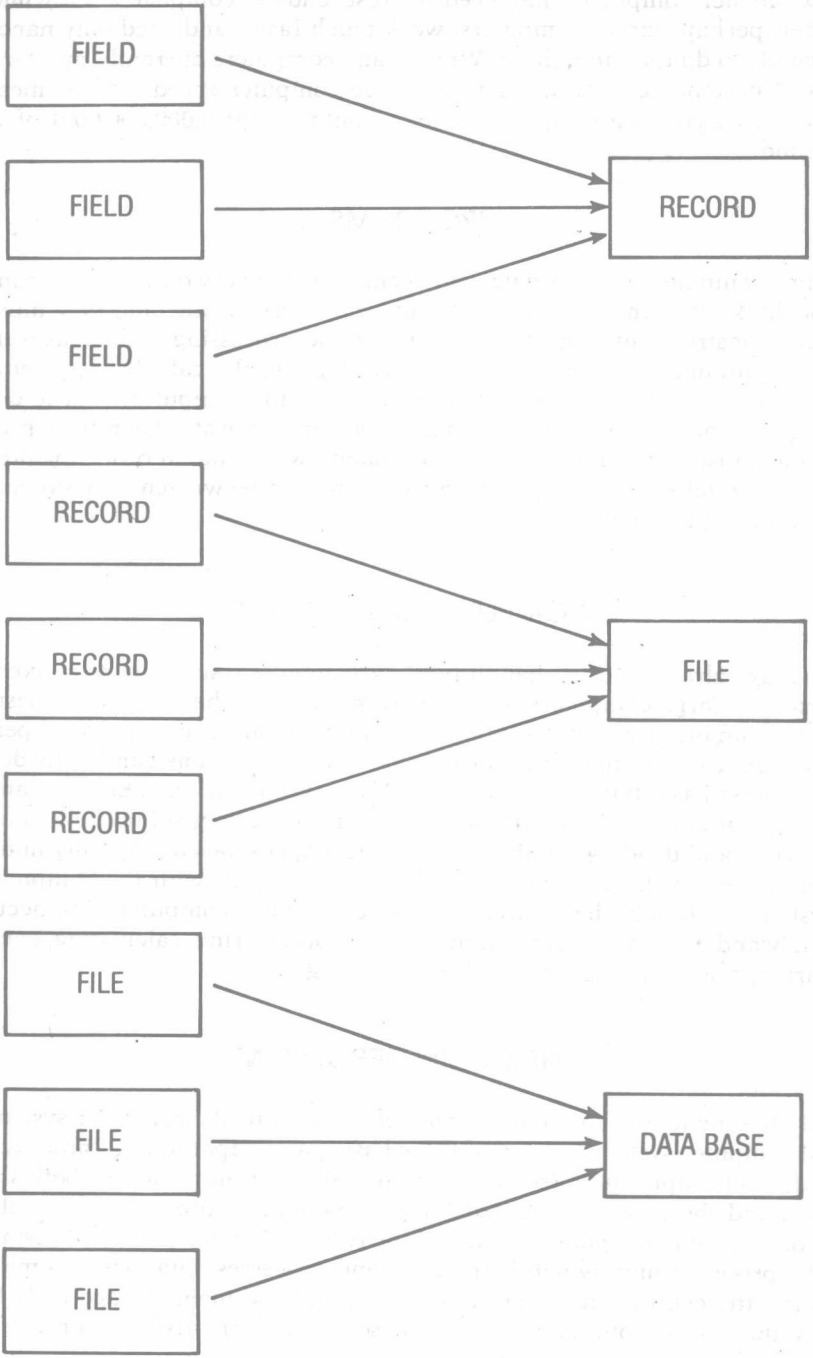
Data for a computer can be organized in several different ways (see illustration 1.5). One unit of data is called a *field.* An example of a field may be a person's name. Several individual fields, such as a field for an individual's name, a field for nationality, and a field for the language a particular student speaks, can be combined together to form a *record.* A record, therefore, is a group of fields related to a particular unit of information. Records, like fields, can be combined together into a related group. A group of related records is called a *file.* A student information file may consist of individual records, each containing a name, nationality, and language field. Data can also be organized into very large collections called *data bases.* Each data base is a collection of related items which is organized so that it can be used for different purposes. For example, a data base containing information about an individual student's name, nationality, and language, like the one described above, could be used both to determine the number of students from a particular country and to classify students according to the language each individual speaks. 10

CHARACTERISTICS OF COMPUTERS: ACCURACY AND SPEED

Computers not only process data; they process data very accurately. Data are processed by the computer by being transmitted electronically through the computer's circuits. Since electronic circuits rarely fail, the computer is almost always 100% correct. When a mistake is made it may not really be the computer's fault. The problem is usually due to human error, either to a mistake in the computer program or to a mistake in the data input into the computer. In fact, there is a special term, an acronym, to indicate that if badly organized or incorrect data are input into the computer, the information that is output will be meaningless. This term, GIGO, stands for *g*arbage *i*n, *g*arbage *o*ut and emphasizes the importance of using accurate data when dealing with computers. 11

Besides accuracy, speed is another characteristic of a computer. All computer functions are carried out in very small units of time which are almost impossible for people to imagine. Two of these units are *microseconds* and *nanoseconds.* A microsecond is one-thousandth (1/1,000) of a second, while a nanosecond is one-billionth (1/1,000,000,000) of a second. The speed of a computer is measured in these units and is calculated by the time it takes to complete a particular job, such as adding numbers. A 12

DATA ORGANIZATION



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