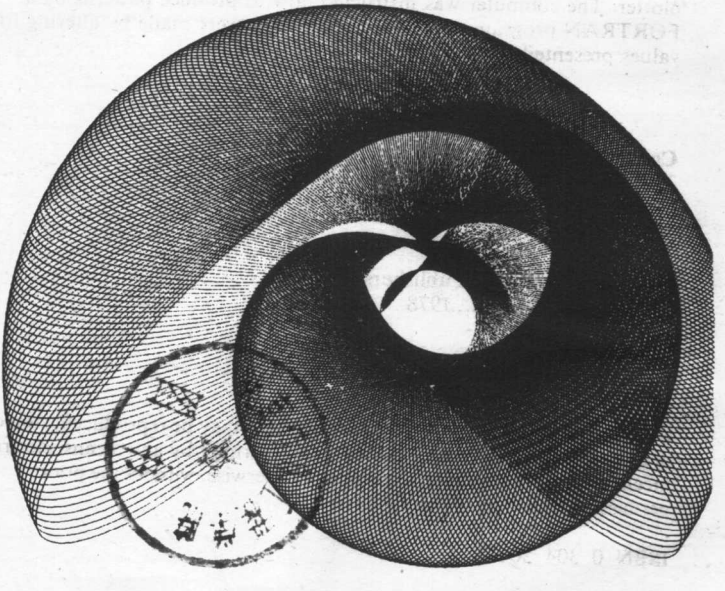
Special English

COMPUTERS

Edward Humby & Philip Bedford Robinson

Edward Humby and Philip Robir

Computers



Grateful acknowledgement for permission to use the photographs reproduced in this book is made to the following (numbers refer to the pages on which the pictures appear):

The British Aircraft Corporation (74); Draper's Record (83); IBM (U.K.) Limited (1, 5, 6, 10, 20, 23, 27, 36, 56, 69, 80, 88); International Computers Limited (6, 13, 24, 25, 32, 34, 37, 38, 41, 53, 58, 66, 71, 74, 78, 87); Midland Bank (viii, 44); Swiss Bank Corporation (65). The pictures on pages 17, 28, 32 and 38 were supplied by The National Giro Centre.

Cover photograph: International Computers Limited.

The pattern on the title page was produced by a computer on a graph plotter. The computer was instructed how to produce patterns by a FORTRAN program, and different patterns were made by altering the values presented to this program.

Cassell Ltd.
35 Red Lion Square, London WC1R 4SG
an affiliate of Macmillan Publishing Co. Inc.,
New York

First published 1971
Reprinted 1972, 1975, 1978, 1979, 1981, 1982

ISBN 0 304 30116 7

Printed and bound in Great Britain at
The Camelot Press Ltd, Southampton

PREFACE

The Special English series introduces titles on a wide range of technical subjects that will be of interest to students of English as a second language. Each volume illustrates the special English of a particular trade or profession in both its spoken and written forms. It is not possible, of course, for books of this size to cover the subject matter exhaustively, so the authors have concentrated on those topics and activities that should have the widest appeal. The conversations which are the basis of each chapter or unit are deliberately written in the colloquial and idiomatic speech used by technicians and specialists as they go about their everyday activities.

It must be emphasized that these books are *not* primarily intended to teach the subject matter itself, although the technical content is accurate in every respect. Nor are they intended to teach the introductory stages of English. It is assumed that the reader is already familiar in his own language with the subject matter of the book, and has a good grounding in the basic grammatical patterns and vocabulary of English. He will use these books to improve his knowledge of English within the framework of a technical vocabulary that is of interest to him either privately or professionally.

The authors in this series each have their individual approach, but all the volumes are organized in the same general way. Typically, each book is based on a series of situational dialogues, followed by narrative passages for reading comprehension. Exercises give the student practice in handling some of the useful and more difficult patterns, as well as lexical items, that occur in each unit. Tape recordings, of the dialogues and selected exercises, may be used either in the language laboratory or for private study. Each volume is provided with a glossary of technical terms, with i.p.a. equivalents as used in the Daniel Jones Pronouncing Dictionary.

PETER STREVENS
General Editor

INTRODUCTION

Special English: Computers is intended for students of English as a second language who wish to become familiar with the vocabulary of computers and computing. The book is intended for classroom work with a teacher, but it will also be found suitable for private study.

Each unit contains a dialogue, in colloquial conversational style, based on activities within the field of computing. The dialogue is followed by a group of exercises which give the student practice with the structures and new vocabulary items that have been introduced. Although these exercises may be written, they are primarily for oral practice, with the emphasis on repetition until the student is entirely fluent and can make the appropriate changes and substitutions quickly and accurately.

The exercises are followed by a reading passage with comprehension questions. Keys to the exercises are provided at the back of the book, together with a glossary of the technical terms connected with computing. These are marked in the text with an asterisk. The International Phonetic Alphabet is used as a guide to pronunciation, and colloquial and idiomatic expressions are footnoted.

The tape recording that accompanies the book may be used by the teacher in the classroom or the language laboratory. For the student working alone, it will provide a model for pronunciation as well as a means of taking dictation for practice in spelling. The exercises have pauses for student response, but there are no pauses in the dialogues. This has been done on purpose to provide the maximum amount of recorded material. Most tape recorders are now equipped with a pause button, which will enable the listener to stop the tape after each sentence and repeat it aloud before proceeding to the next one. If pauses are required for language laboratory work, a copy may be made and the pauses inserted of a length to suit the requirements of the students.

CONTENTS

UNIT 1

WHAT IS A COMPUTER?

Dialogue

John Codewell is discussing a career in computing with the Personnel Officer of a large firm.

John: A computer's a machine that thinks, isn't it?

Personnel Officer: Well, yes. But it has to be told what to think; like any other machine it's only a slave. I'll give you a more exact definition. It's an electronic machine that processes *data under the control of a *stored *program.

John: What's the difference between a computer and a *computer installation?

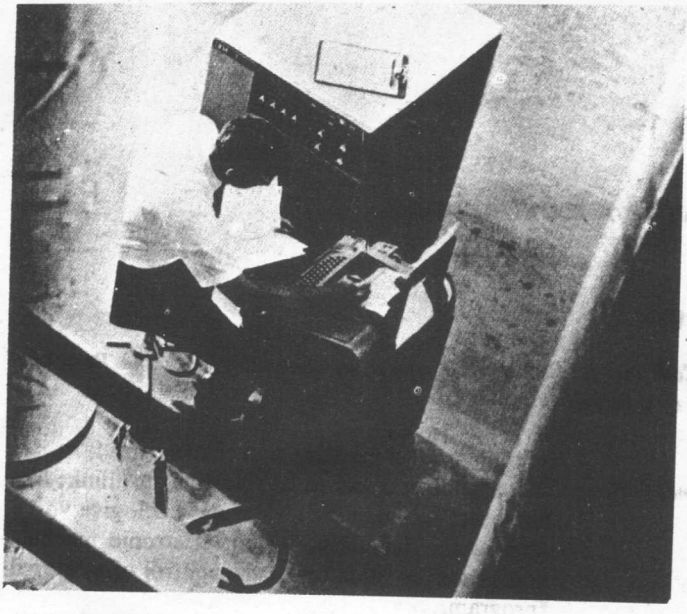
Personnel Officer: A computer installation really consists of three things: the *hardware, or machinery; the *software, computer programs telling the machine what to do; and the staff who work with the installation, sometimes called the *"liveware". Take the hardware first. This comprises a number of separate machines linked together in a system.

John: Isn't the main one the *central processing unit?

Personnel Officer: Yes, and the C.P.U. might be called the computer proper, because it contains all the *memory banks and logic and arithmetic units which actually do the calculations. But by itself it's as useless as a brain without a body. The brain needs sense impressions to work on, and the C.P.U. needs data to process. Data simply means information. It's fed into the machine via *input units, and the C.P.U. processes it and communicates results to the user via *output units.

John: What a lot of jargon![1] What are the input and output units called?

[1] jargon: words used in a specialized, often technical sense



A one-man computer

Personnel Officer: They're called "peripherals". There are slow peripherals—*card readers, *paper tape readers and *console typewriters for inputting data; and printers, card punches and paper tape punches for outputting results.

John: Why do you call them "slow"?

Personnel Officer: Because they're mechanical devices.

John: So I suppose magnetic devices—tape decks and so on—are called "fast" peripherals?

Personnel Officer: That's right. Tape decks work in much the same way as ordinary tape recorders, but there are even faster magnetic peripherals—*drums and *discs, for instance. All these can be used both for input and output. Then there are *visual display units.

John: Yes, I see. I think I've got the idea of the hardware. But what about the software? What exactly is a "computer program"?

Personnel Officer: It's a set of instructions telling the computer how to solve a problem, whether the problem is calculating a square root or working out Mr. Jones' pay for the week.

John: Surely the machine isn't big enough to hold programs to solve every possible problem?

Personnel Officer: No, not all at once. And here you've hit on one of the most important features of the modern computer. A program can be stored in its memory just as long as it's needed, and then removed, or, as we say, "deleted from store". When it's not needed it's held in a library, usually on one of the magnetic devices.

John: So the software tells the hardware what to do and computer personnel write the software?

Personnel Officer: That's what computer *programmers do, but there are many other categories of computer personnel. There are *operators to run the machines, electronic engineers to service them, *systems analysts to define the problems, not to mention[s] the data preparation staff who punch up the cards and paper tape, and the people in administration, like myself.

[s] not to mention: also, as well as

EXERCISE 1: STRUCTURAL PRACTICE

Notice this structure from the conversation:

What about the software?

Use this structure to respond to the following statements:

Example: This is the hardware.
Prompt: *software*
Response: What about the software?

Now, you do it.

1. This is the hardware.	*software*
2. These are the fast peripherals.	*slow peripherals*
3. These are the input units.	*output units*
4. This is the programmer.	*operator*
5. These are the mechanical devices.	*magnetic devices*
6. This is the card reader.	*card punch*
7. This is the paper tape reader.	*paper tape punch*
8. These are the drums.	*discs*

EXERCISE 2: PROGRESSIVE SUBSTITUTION DRILL

Statement: A computer installation consists of three things.
Prompt: *The*
Response: *The* computer installation consists of three things.

Now, you do it.

Statement: A computer installation consists of three things.
Prompts:
1. The
2. different
3. various
4. Any
5. parts
6. is made up
7. C.P.U.
8. contains

EXERCISE 3: FURTHER STRUCTURAL PRACTICE

Notice this structure:

I suppose magnetic devices *are called* "fast" peripherals?

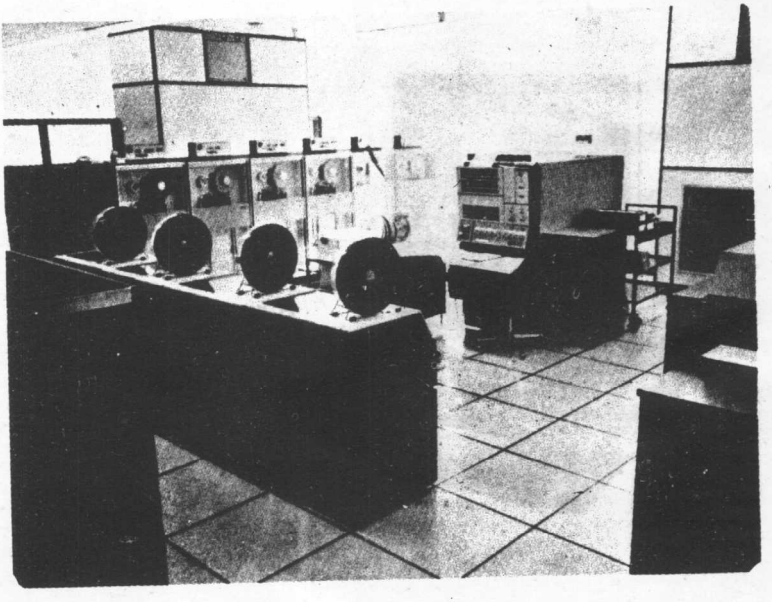
Use this structure to make complete sentences:

1. mechanical devices / "slow" peripherals
2. the whole thing / a computer installation
3. card readers / input units
4. programs / the software
5. the C.P.U. / the computer proper
6. the peripherals / input/output devices
7. circuits such as those / arithmetic units
8. drums and discs / magnetic devices

Reading and Comprehension

A computer is an electronic calculating machine, but by itself it is of no more use than a car engine without a chassis, or a control panel without machines to monitor and control. It needs data to process and input units to feed it this data. It also needs output units to which it can send its results. Thus it is more meaningful to talk about a computer installation, consisting of a Central Processor, which is the computer proper, and a number of input/output units, or peripherals. And just as there are people of widely different skills and knowledge in a ship's crew—engineers, deckhands, navigators, stewards, pursers and radio operators, for example—so too the personnel in a computer installation are specialists in many different fields. There will be systems analysts to analyse and define the problems the computer has to solve; programmers to write the instructions the machine must obey to solve the problems; data preparation staff to *punch the programs on to cards or paper tape, and operators to run the machine and monitor its progress. There will also be a messenger service and a magnetic library staff, together with a superstructure of managers and supervisors. All are necessary for the smooth functioning of a computer installation.

A computer room



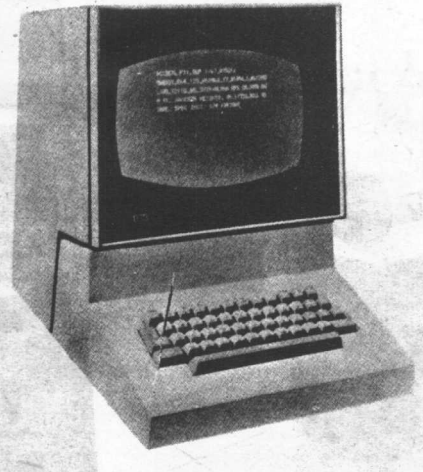
EXERCISE 4: COMPREHENSION QUESTIONS

1. What does a computer process?
2. What is another name for input/output units?
3. What are the people called who analyse and define problems for the computer to solve?
4. Who writes the instructions the machine is to obey?
5. What do data preparation staff do?
6. What do operators do?
7. Name two other categories of computer personnel.
8. Which part of a computer installation is the computer proper?

EXERCISE 5

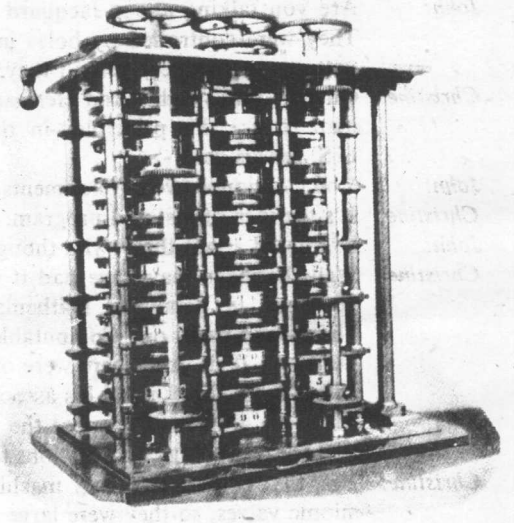
Use the following words and phrases in sentences of your own to show that you understand their meaning and use:

1. data
2. input units
3. useless
4. slow peripherals
5. software
6. deleted from store
7. define
8. magnetic



A visual display unit

Babbage's differential engine



UNIT 2

THE HISTORY OF THE COMPUTER

Dialogue

John is looking round a science museum with his cousin Christine, who is taking a university computer course.

John: So this is where it all started—with Babbage's Differential Engine?

Christine: Yes, he showed that a machine could do calculations by itself, using levers and gear wheels, provided you supplied it with a list of operations to follow.

John: It was a mechanical device, then? It must have been very slow compared with today's electronic machines!

Christine: Well, he never actually completed it. It isn't only the development of electronics that has made modern computers possible, though: at least two other things had to be thought

up first. One of them was the representation of data as holes punched in cards. I think that was discovered in France before Babbage's machine.

John: Are you talking about Jacquard and his weaving looms? They were controlled by holes in cards telling them what patterns to produce, weren't they?

Christine: Oh, yes, that's right. And Hermann Hollerith was the first man to use this principle—in the 1890's, to process the U.S. census data.

John: You mentioned two developments. What was the other one?

Christine: It's the idea of a stored program.

John: I've heard about that—who thought it up?

Christine: Well, Babbage may have had it in mind, but it was only described in detail by mathematicians in this century. There was a paper on "Computable Numbers" by Dr. A. M. Turing in 1936. And there were other important papers by John von Neumann and his associates in the 1940's.

John: As usual, though, I suppose the ideas of theorists had to wait for technological inventions to put them into practice?

Christine: Yes, that's right. The early machines were based on *thermionic valves, so they were large and clumsy and got very hot. It was only when *transistors and *printed circuits and *magnetic cores were invented that computers became really useful.

John: By the way, what's the difference between *analogue and *digital computers?

Christine: Digital computers depend on electronic devices which at any moment are in one of two states: on or off. So they can only answer "yes" or "no" to a question. But the analogue machine gives answers in degrees, according to the strength of an electric current. As the name suggests, they're *simulators. The *abacus is a digital-type device, and a slide-rule is an analogue.

John: It sounds as if analogue machines are closer to the way our brain works than digital machines.

Christine: Yes, I suppose so. But in practice they're only used by scientists and engineers. Almost all commercial machines are digital computers.

John: Well, thanks very much. You certainly know your stuff; you could always get a job as a guide here, if you're ever out of work!

EXERCISE 1: STRUCTURAL PRACTICE

Notice this structure from the conversation:

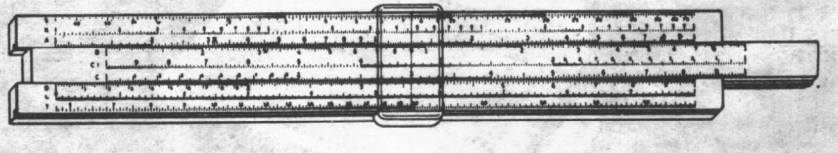
> *What's the difference between* analogue computers *and* digital computers?

Use this structure to respond to the following statements:

Example: These are analogue computers, and those are digital computers.
Response: What's the difference between analogue computers and digital computers?

Now, you do it.

1. These are analogue computers and those are digital computers.
2. This is an abacus and that's a slide rule.
3. This is the paper on "Computable Numbers" and those are von Neumann's papers.
4. This is Babbage's machine and these are other early machines.
5. This is the "on" state and this is the "off" state.
6. These are input units and those are output units.
7. This is the C.P.U. and these are the peripherals.
8. These are thermionic valves and those are transistors.



The slide rule—an analogue-type device

EXERCISE 2: PROGRESSIVE SUBSTITUTION DRILL

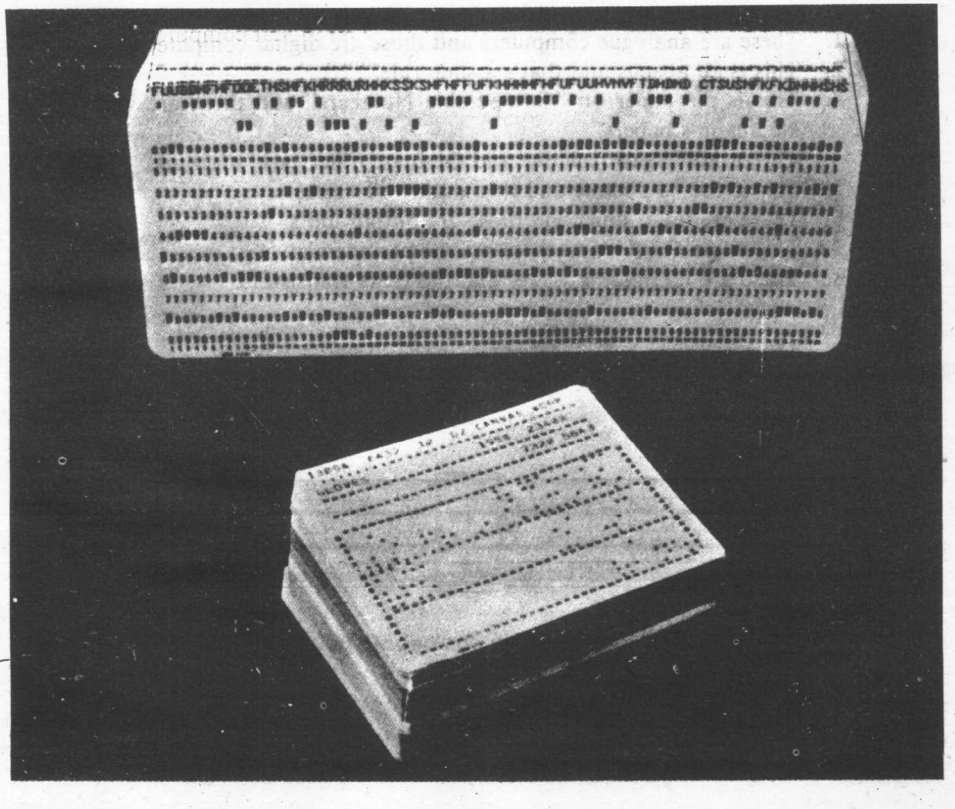
Statement: In practice they're only used by scientists.
Prompt: *engineers*
Response: In practice they're only used by *engineers*.

Now, you do it.

Statement: In practice they're only used by scientists.
Prompts:

1. engineers
2. theory
3. useful to
4. Theoretically
5. operated by
6. it should only be
7. must always
8. serviced

Punched cards



EXERCISE 3: FURTHER STRUCTURAL PRACTICE

Notice this structure:

It isn't only the development of electronics *that has made* modern computers *possible.*

Use this structure to make complete sentences:

1. analogue machines / scientific advances
2. transistors / fast circuits
3. stored programs / automatic processing
4. this invention / computing
5. thermionic valves / arithmetic circuits
6. punched cards / data processing
7. electronic devices / this development
8. magnetic tapes / bulk storage

Reading and Comprehension

Major inventions are usually the result of technology catching up with the ideas of theorists. Charles Babbage (1792–1871) showed that it was possible to make a machine perform arithmetical calculations according to a predetermined series of instructions. But this discovery was of little value until thermionic valves and, later, *bistable electronic circuits had been invented. At the same time, with the growth of industry and commerce in the nineteenth century, it became necessary to find a way of storing vast quantities of data in a form in which they could be easily retrieved and processed. Hermann Hollerith (1860–1929) used data stored in the form of holes punched in cards, an invention of the French weaver Joseph Marie Jacquard (1752–1834).

Theorists evolved the idea of the stored program; in the 1940's these three lines of research came together and the earliest true computers, such as ENIAC and EDSAC, were built. Since then things have developed so fast that we now talk about "third-" and "fourth-generation" computers. Technology has caught up with theory and every year there are new discoveries and inventions; *integrated circuits, *thin film, *tunnel diodes and super-cooled memory banks are some of the latest.