

ENCYCLOPEDIA OF COMPUTER TERMS

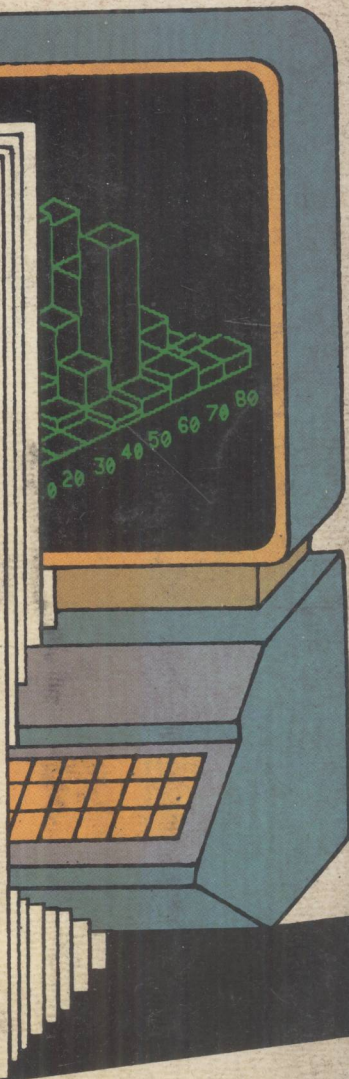
by Douglas Downing



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ENCYCLOPEDIA OF COMPUTER TERMS

Douglas Downing
Yale University



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Barron's Educational Series, Inc.
Woodbury, New York/London/Toronto/Sydney

03a5a200

Printed in 1984

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All inquiries should be addressed to:

Barron's Educational Series, Inc.

113 Crossways Park Drive

Woodbury, New York 11797

Library of Congress Catalog Card No. 82-11350

International Standard Book No. 0-8120-2519-9

Library of Congress Cataloging in Publication Data

Downing, Douglas.

Encyclopedia of computer terms.

1. Computers—Dictionaries. 2. Electronic data processing—Dictionaries. I. Title.

QA76.15.D68 1983

510'.3'21

82-11350

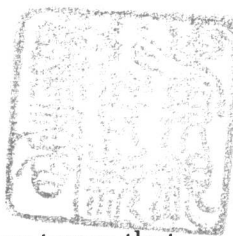
ISBN 0-8120-2519-9

PRINTED IN THE UNITED STATES OF AMERICA

4 5 6 7 510 9 8 7 6 5 4 3 2

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INTRODUCTION



This book contains information about many terms that you will need to know if you want to understand computers. Several topics in computer programming (the act of giving instructions to a computer to get it to do what you want it to do) are discussed. Computers are very literal minded. They will do exactly what you tell them to do, so you have to make sure that your instructions specify exactly what you want the machine to do.

This book includes computer programs written in the languages BASIC, FORTRAN, PL/I, COBOL, APL, ALGOL, and Pascal. In addition, many examples of features of the BASIC language are included. BASIC is a language well suited for use on small computers, so more and more people will have access to BASIC systems as small computers become increasingly popular. The general concept of developing an algorithm to solve a particular problem is the same, though, no matter what programming language you will use to express your program.

You can also find information about the logical structure of computers, the electronic components that make up computers, the history of computers, and personal computers.

Many entries contain background cross references (in **boldface**), indicating where to find the information needed to understand the particular concept. Other entries contain cross references (in *italic*) that suggest where to look for further information or applications of a topic.

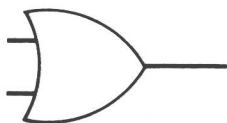
The list of logic and flowchart symbols that follows will help you to identify unfamiliar symbols.

IMPORTANT SYMBOLS

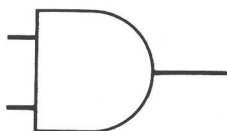
Logic Symbols



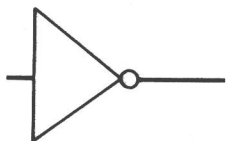
implication



OR gate



AND gate

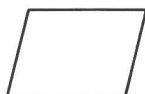


NOT gate

Flowchart Symbols



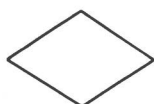
process



input/output



**communication
link**



decision



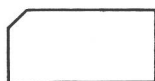
**start, stop,
or interrupt**



display



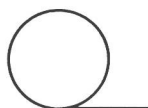
document



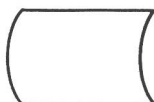
**punched
card**



merge



magnetic tape



online storage



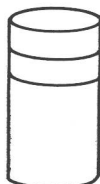
sort



manual input

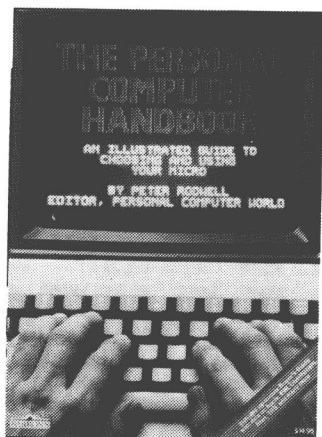


**manual
operation**



**magnetic
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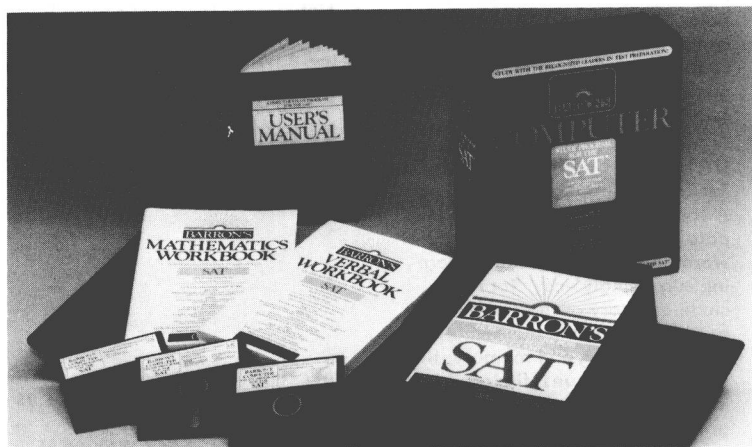
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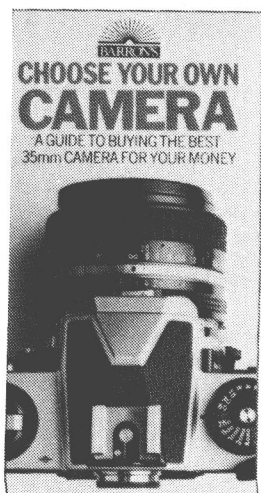
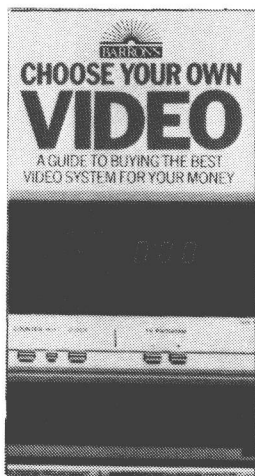
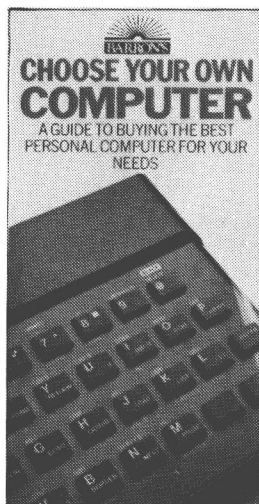
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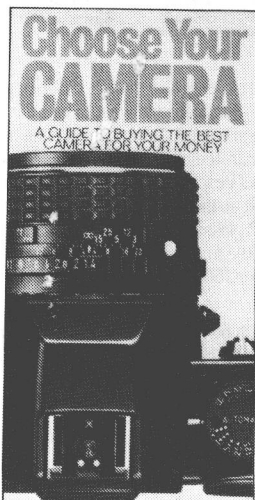
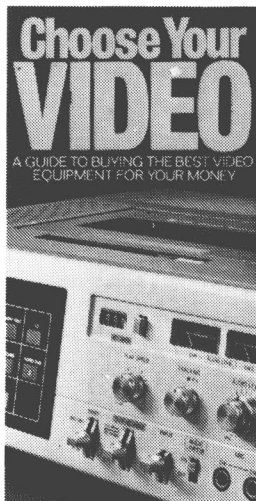
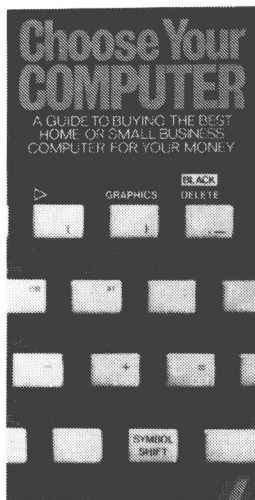


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A

ABS The function ABS(X) in BASIC is the absolute value of X:

$$\text{ABS}(X) = X \text{ if } X \geq 0$$

$$\text{ABS}(X) = -X \text{ if } X < 0$$

access time The access time of a memory device is the amount of time required from the instant that the computer asks for data until those data are transferred to the computer. For example, the access time of a disk memory can be about 20 milliseconds, and the access time of an internal electronic memory can be less than 10^{-8} second.

accumulator The accumulator is the register where a computer stores the results of an arithmetic operation. For example, the assembly language command ADD 7 means to add the contents of memory address 7 to the number in the accumulator, and then store the result in the accumulator. (See **computer design**; **assembly language**.)

acoustic coupler An acoustic coupler is a device used to connect a computer terminal to a telephone receiver, allowing the terminal to communicate with a computer in another location.

acronym An acronym is a word that is formed by joining the first letters (or first few letters) of a series of words. For example, NASA stands for National Aeronautics and Space Administration, and BASIC stands for Beginner's All-Purpose Symbolic Instruction Code.

adaptive system An adaptive system is a system that is able to learn from what has happened in the past.

adder An adder is a device capable of performing the addition of two numbers. (See **half adder**, **full adder**, **binary addition**.)

address Each location in computer memory is identified by an address, which allows the computer to find the location of a specific data item (or instruction).

ALGOL ALGOL is a computer language developed by an international committee in the 1960s. ALGOL stands for Algorithmic Language. Figure 1 shows a program written in ALGOL.

BEGIN

COMMENT PROGRAM TO READ A LIST OF INTEGERS AND TEST
WHETHER THEY ARE PRIME;

INTEGER X, FACTOR, HALF;
REAL QUOTIENT;

NEXT: READ(X);
COMMENT SKIP A LINE AND PRINT THE NUMBER;
WRITE(" "); WRITE(X);

IF X < 1 THEN BEGIN
WRITE("...IS NOT A NATURAL NUMBER.");
GOTO NEXT
END

ELSE BEGIN
QUOTIENT := X/2;
IF QUOTIENT = ENTIER(QUOTIENT)
THEN GOTO NO
END;

IF X = 1 THEN GOTO YES;

HALF := ENTIER(X/2);

```
FOR FACTOR := 3 STEP 2 UNTIL HALF DO
    BEGIN
        QUOTIENT := X/FACTOR;
        IF QUOTIENT = ENTIER(QUOTIENT) THEN GOTO NO
        END;

YES: WRITE("...IS PRIME.");
    GOTO NEXT;

NO:  WRITE("...IS NOT PRIME.");
    GOTO NEXT

END
```

FIGURE 1

algorithm An algorithm is a sequence of instructions that tell how to solve a particular problem. An algorithm must be specified exactly, so there can be no doubt about what to do next, and it must have a finite number of steps. A computer program is an algorithm that is written in a language that a computer can understand, but the same algorithm could be written in several different languages. An algorithm can also be a set of instructions for a person to follow. Figure 2 (p. 4) is an algorithm (expressed as a flowchart) that tells how to calculate your income tax payment or refund, once you know the total amount of tax you owe and the total amount that has been withheld.

A set of instructions is not an algorithm if it does not have a definite stopping place, or if the instructions are too vague to be followed clearly. The stopping place may be at variable points in the general procedure, but something in the procedure must determine precisely where the stopping place is for a particular case.

If you study the game of tic-tac-toe long enough, you will be able to develop an algorithm that tells you how to play an unbeatable game. However, some problems are so complicated that there is no algorithm to solve them. (See **heuristic**.)

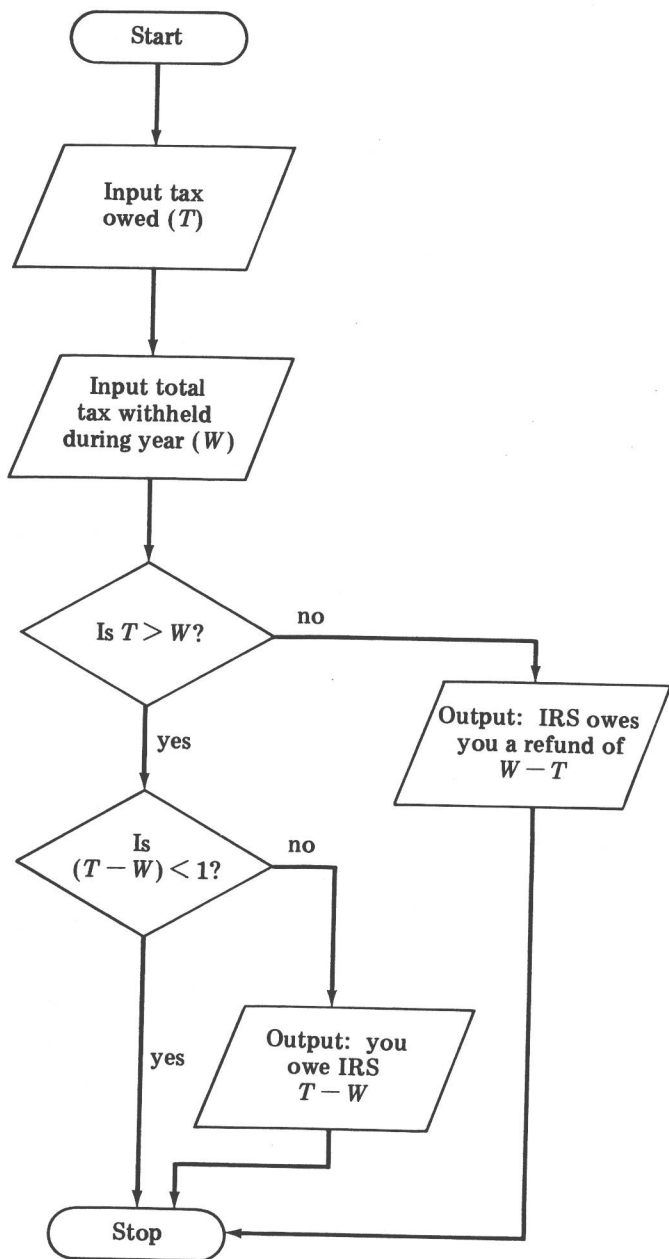


FIGURE 2

alphanumeric The 26 letters, the 10 numerical digits, and certain other special characters, such as \$, that are readable by a particular machine are called alphanumeric characters.

ampere An ampere (or amp, for short) is the unit for measuring electric current. A current of 1 ampere means that 6.25×10^{18} electrons are flowing by a point each second. A group of 6.25×10^{18} electrons has a charge of 1 coulomb, so 1 ampere = 1 coulomb per second.

analog computer An analog computer is a computer in which information is stored in a form that can be varied continuously. A slide rule is an example of an analog computer, because a number is represented by a distance along a scale.

The most common types of electronic computers are digital, rather than analog, computers.

analog to digital converter An analog to digital converter is a device that changes data from analog form to digital form, making it possible to feed the data into a computer. For example, a mercury thermometer measures temperature in analog form (by the height of the mercury). If this temperature information is to be read into a computer, an analog to digital converter is needed.

AND gate An AND gate (see Figure 3, p. 6) is a logic gate that produces an output of 1 only if both inputs are 1. The operation of an AND gate is completely described by the following table:

Input 1	Input 2	Output
0	0	0
0	1	0
1	0	0
1	1	1