

# **The Concise Encyclopaedia of Computer Terminology**

by Adrian V. Stokes



**Input Two-Nine**



**MCB Publications**

**THE CONCISE ENCYCLOPAEDIA OF  
COMPUTER TERMINOLOGY**

**By Adrian V. Stokes**

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**ISBN 0 905897 32 3 Input Two-Nine Ltd./MCB Publications Limited.**

# INTRODUCTION

At first sight, this book looks like yet another dictionary of computer terminology and one might be tempted to ask, "why buy this one?". There are a number of reasons.

First, the subject of computer science is evolving so rapidly that it is probably worth buying the most up-to-date dictionary possible in order to keep up with the plethora of terms constantly entering the language. In the production of this book, techniques (such as setting directly from the computer generated output) have been used to ensure that it is as up-to-date as possible and the normal delays between writing and appearing on the bookshelves have been reduced from many months (or even years) to a few weeks.

Secondly, many dictionaries do not contain terms which are considered to be slang, even though they are in common use in the industry (e.g. "zap"). This book attempts to include such terms; at the same time, many terms are now obsolescent and have been deliberately omitted in order to be concise. Similarly, it is not meant to be a dictionary of English and so words which retain their usual meanings (e.g. "count") are also omitted.

Thirdly, it is not merely a dictionary of computer terminology. As the title implies, it is an Encyclopaedia rather than a dictionary. A significant number of terms do not have a few-line description but have a short article enabling the reader to use this Encyclopaedia as a convenient reference document. Nevertheless, none of these articles is longer than a page so that, rather than being a weighty tome to be found only on library bookshelves, it is a convenient reference book.

Finally, the book has been designed to be as easy to use as possible. For example, each term is defined as briefly as possible and then, if necessary, a more detailed explanation is given. In order to make each definition self-contained, it is sometimes necessary to duplicate definitions but this has been reduced as far as possible. Where one definition refers to another, if this is not

obvious, the term referenced is enclosed in double-quotes, unless this interferes with the ease of reading. Lastly, the usual order of definitions in a book is not always followed in this one since many terms are spelt in different ways in the literature (especially with regard to spacing). Therefore, unless a term is standardised, it is listed in order ignoring all punctuation and spacing. Thus "I/O" is listed as if it were "IO".

This book is intended to be a useful reference book which, it is hoped, will be of great use to students (and lecturers), to DPMs and to anyone with an interest in computer science.

Adrian V.Stokes  
June 1980

## **A**

**ABACUS:** A mechanical device for performing arithmetic calculations. It operates by sliding beads on parallel wires and the beads are arranged either in groups of ten or five and two. High speeds can be achieved by an expert. The origins of the abacus are in Mesopotamia in about 3000 BC but it is now more often associated with China.

**ABEND:** An acronym for ABnormal END. That is, termination of a job following detection of an error.

**ABL:** An acronym for "Atlas Basic Language", an assembler language (with no operation code mnemonics) on the Atlas computer.

**ABORT:** To terminate prematurely execution of a job (or operation of a system) following an error indication. Often in interactive computer systems, the typing of a single character (frequently control-C) allows the user to abort a job.

**ABSCISSA:** The x-axis (horizontal) of a graph. The y-axis is known as the "ordinate".

**ABSOLUTE ADDRESS:** The actual location in (main) storage of a particular item of data. Also known as "machine address".

**ABSOLUTE ADDRESSING:** A method of addressing locations in (main) storage using absolute addresses.

**ABSOLUTE ASSEMBLER:** An assembler which produces object programs in which all addresses are absolute addresses and which hence cannot be relocated.

**ABSOLUTE CODE:** Programs written using absolute addresses and absolute operation codes so that they may be entered into a computer memory and executed with no further processing required.

**ABSOLUTE CODING:** Programming using "absolute code".

**ABSOLUTE ERROR:** The magnitude of an error taking no account of the sign.

**ABSOLUTE OPERATION CODE:** The numeric value of an operation code. Used in absolute code.

**ABSOLUTE VALUE:** The value of some number without any regard for its sign.

**AC:** An abbreviation for "accumulator".

**ACC:** An abbreviation for "accumulator".

**ACCEPTANCE TEST:** A test (or set of tests) used to check that a system conforms according to agreed specifications.

**ACCESS (vb):** To obtain data from or placing data in storage. The storage may be main or peripheral. The data may, in fact, be an instruction (in which case, it is usually stored in main storage), in which case the word "access" usually implies executing the instruction as well as retrieving it.

**ACCESS METHOD:** Used to indicate the method of accessing data on backing storage, for example, QSAM - Queued Sequential Access Method.

**ACCESS TIME:** The time between the issuing of a read command and the obtaining of the data to which the command related. It usually refers to the time taken to read data from a peripheral device into main memory.

**ACCUMULATOR:** Part of the arithmetic unit of a computer in which (partial) results are formed (or accumulated). It is nearly always a register and is often referred to implicitly in instructions although, in computers

with more than one register, one is often designated the accumulator by convention.

ACCURACY: A measure of the exactness of an approximation to the real value. It is often confused with "precision".

ACE: An acronym for "Automatic Computing Engine", one of the earliest computers. Its successor was "DEUCE".

ACK: Acknowledgment. A control character widely used to acknowledge correct receipt of a message. In ASCII, its value is binary 0000110 (control-F).

ACM: An acronym for "Association for Computing Machinery", an American professional association which has a large number of SIGs (Special Interest Groups), active in many areas of computer science.

ACOUSTIC COUPLER: A device for converting digital signals into acoustic signals enabling data to be transmitted over the PSTN with no electrical connection between the terminal and the line. It is usually not possible to use an acoustic coupler for bandwidths greater than 300 bits/second.

ACOUSTIC DELAY LINE: A delay line which stores data using the propagation of sound waves in a suitable medium (often mercury). Now obsolete.

ACOUSTIC MEMORY: A storage medium using acoustic delay lines.

ACRONYM: In theory, a group of letters formed from the first (or, sometimes, other than the first) letters of a name. However, in practice, the "acronym" is often first decided then suitable words selected to fit this. An example of this is BASIC which has now acquired the status of an acronym meaning "Beginners' All Purpose Symbolic Instruction Code". A list of acronyms in common usage is given in Appendix A.

ACTIVITY RATIO: The ratio of the number of records being updated to the total number of records within that file.



ACTP: An acronym for "Advanced Computer Technology Project", a project funded by the UK Government for research and development by industry into advanced techniques.

ACU: An acronym for "automatic call unit".

ADA: In 1975, the US Department of Defense started a program called the "High Order Language Commonality Program" to establish a single high-level language for DoD applications. A set of requirements were defined, known as "Steelman" and various companies submitted language specifications to fulfil these requirements. The final language, which was called "Ada" after Ada Lady Lovelace who was the daughter of Lord Byron and programmed Charles Babbage's first computers, was designed by CII-Honeywell Bull. A preliminary Ada reference manual was published in 1979.

ADAPTIVE CONTROL SYSTEM: A control system which adapts its own behaviour to suit the environment in accordance with data from that environment which it obtains by continuous monitoring.

ADAPTIVE ROUTING: A technique of routing in a distributed computer network which adapts to changing conditions by adjusting its parameters in accordance with data obtained by continuous monitoring. ARPANET uses an adaptive routing system.

ADC: An acronym for "analogue to digital converter".

ADCCP: An acronym for "Advanced Data Communication Control Procedure", a "bit-oriented" line-level protocol.

ADDEND: One of the operands in an addition. The addend is added to the augend to produce the sum. In most computer systems, the addend remains unchanged throughout this operation while the augend is replaced by the sum.

ADDER: The hardware device in a computer which performs addition. It takes three inputs, the addend, augend and carry and produces two outputs, the sum and a carry.

**ADDITION:** The operation of combining an augend and an addend to form a sum according to the usual rules of arithmetic.

**ADDITION WITHOUT CARRY:** A synonym for "exclusive-or".

**ADDRESS:** This word, used either as a verb (meaning to give an address) or a noun, means a reference, usually a number, indicating the location of a specified item, usually in main memory or on backing storage. Thus, "the address of variable A is 8000". An address may be given in any one of a large number of ways and these various methods are given under the name of the method (e.g. "absolute addressing") and under the heading "addressing". Instructions are also referred to as "n-address instructions" where "n" denotes the number of items addressed by the instruction.

**ADDRESS BUS:** A physical connection between a processor and memory. The processor places an address on the bus and the memory responds by placing the contents of that address back on the bus.

**ADDRESS FORMAT:** The format of the address part of an instruction.

**ADDRESS MODIFICATION:** The altering of an address within an instruction. This can be achieved in two ways, either by the actual changing of the instruction as stored in memory or by the effect of, for example, an "index register" when the "effective address" is formed by modifying the address by the contents of the index register.

**ADDRESS REGISTER:** A register which contains the address of the current instruction.

**ADDRESSING:** The technique of referring to an item by means of an address. There are a large number of methods by which these can be done and they are described individually under the appropriate heading. The ones described herein are as follows:

- \* Immediate
- \* Direct (or Absolute)
- \* Indirect
- \* Register
- \* Indexed

- \* Base/Displacement
- \* Stack
- \* Relative

ADP: An acronym for "automatic data processing".

AFIPS: An acronym for "American Federation of Information Processing Societies".

AFNOR: An acronym for "Association Francaise de Normalisation", a French standards body which is a member of ISO.

AGRIS: An abbreviation for "agricultural information system".

ALGOL: An acronym for ALGO<sup>r</sup>ithmic Language. The first such language, Algol 58, was developed for use by mathematicians to represent algorithms. In 1960, the "Report on the Algorithmic Language ALGOL 60" was published by IFIP. The report is of considerable interest in that it uses a metalanguage to define the actual language. In 1963, discussions started on a successor language, called ALGOL-X, by Working Group 2.1 of IFIP and the definition of this language, renamed ALGOL 68, was published as the "Report on the Algorithmic Language ALGOL 68". Although it bears considerable similarities to its predecessor, it is very much more powerful.

ALGORITHM: A formal description of the method of solving a specified problem. One method of doing this is by means of an algorithmic language, such as Algol.

ALGORITHMIC: Pertaining to the use of algorithms.

ALLOCATE: To assign system resources for the processing of a "job".

ALLOCATION: The process of assigning system resources for the processing of a "job".

ALOHA: An experimental packet-switched computer network at the University of Hawaii which uses satellite communication links in a broadcast mode. Much work has been done in this network to investigate optimal use of these links and these are described under "broadcast satellite techniques".

ALPHA: Often used as an abbreviation for "alphabetic" (or sometimes, confusingly, for "alphanumeric").

ALPHABETIC: An adjective describing characters in the set 'A' to 'Z' or 'a' to 'z'.

ALPHAMERIC: A synonym for "alphanumeric".

ALPHANUMERIC: An adjective describing characters which are either numeric or alphabetic.

ALTERNATE ROUTING: A routine technique used in some computer networks when, in the event of failure of a primary route, an alternate route is provided.

ALT-MODE: A name sometimes given to the character (or key) known more often as "escape".

ALU: An abbreviation for "arithmetic/logical unit".

AM: An acronym for "amplitude modulation".

AMENDMENT FILE: A file which contains the changes required to be made to a "master file", performed in a batch environment. It consists of a set of "amendment records".

AMENDMENT RECORD: One record which is a part of an "amendment file", specifying the change(s) to be made to a record in the "master file".

AMENDMENT TAPE: A tape (magnetic or paper) containing an "amendment file".

ANALOG(UE): The representation of values by means of a physical variable, often a voltage level but could be, for example, a length (as in a slide rule). A number of early computers (and some current, special purpose, computers) are based on analog principles. One based on a combination of analog and digital principles is known as a "hybrid" computer.

ANALOG CHANNEL: A transmission channel on which the data being transmitted is represented as an analogue signal (for example, a telephone line).

**ANALOG/DIGITAL CONVERTER:** A device which converts between analog and digital signals.

**ANALOG NETWORK:** An electrical (electronic) circuit which is set up in order to solve a problem by analog methods.

**ANALYSER:** Something which performs analysis, for example, a syntax analyser (part of a compiler) which performs analysis of the "source code" according to pre-defined "syntax rules".

**ANALYSIS:** The process of breaking down a problem into its constituent parts.

**ANALYST:** Usually used as an abbreviation for "systems analyst".

**ANALYTICAL ENGINE:** A device invented in 1833 by Charles Babbage which is the forerunner of the modern computer.

**AND (1):** A Boolean operation which produces a value of TRUE only if both inputs are TRUE.

**AND (2):** A logical operation which gives the result 1 only if both operands are 1. It conforms to the following table:

&		0		1
-----				
0		0		0
-----				
1		0		1

**ANISOCRONOUS TRANSMISSION:** Transmission of data where the transitions occur at irregular (unclocked) intervals.

**ANNOTATION:** Explanatory text added to a flowchart or program.

**ANSI:** The American National Standards Institute (formerly the American Standards Association). This is the USA member body of the International Standards Organization.

ANSWERBACK: The response of a device (usually a terminal) to a specific enquiry (usually the WRU character) in order to verify the identity of the device.

ANSWERBACK DRUM: A component of a terminal (e.g. a Teletype) which automatically sends the terminal identification in response to an enquiry. Since this is a physical component, it provides some degree of security.

ANTIOPE: The French "videotex" system.

APL: An acronym for "A Programming Language", a very high-level language developed by Iverson of IBM.

APPLE: A "home computer" made by Apple Computers Inc. A UK version is marketed as the ITT 2020.

APPLICATION: The problem for which computing is required.

APPLICATIONS PROGRAMS: Programs to solve problems. These should be contrasted with "systems programs" which are programs written to enable operation of computer systems.

ARCHITECTURE: The set of facilities and functional components visible to a programmer using the language of the machine and some of the principles used to realise this language.

ARGUMENT: Most commonly used to indicate values passed to a function or routine. For example, in the call:

$$y=\sin(x)$$

"x" is the argument of the function call.

ARITHMETIC EXPRESSION: An expression consisting of a number of values (or equivalent), joined by various "arithmetic operators".

ARITHMETIC/LOGICAL UNIT: Part of a central processor unit which performs the arithmetic and logical operations on data.

ARITHMETIC MEAN: The result of adding together the items in a set of values and dividing by the number of items.

ARITHMETIC OPERATION: An operation on data using an "arithmetic operator".

ARITHMETIC OPERATOR: One of the set of operators used to perform arithmetic operations, such as "+", "-", "\*", and "/".

ARITHMETIC SHIFT: To shift the bits in a word, treating the value as a signed integer. A left shift of "n" places is equivalent to multiplication by  $2^{**n}$ . Conversely, a right shift of "n" places is equivalent to division by  $2^{**n}$ . It should be contrasted with other shifts such as a "logical shift" or a "circular shift".

ARITHMETIC STATEMENT: A statement in a programming language to perform arithmetic operations.

ARITHMETIC UNIT: Part of the "central processor unit" which performs arithmetic functions. Usually this is combined with logical functions into the "ALU" (arithmetic and logical unit).

ARPA: The Advanced Research Projects Agency of the United States Department of Defense.

ARPANET: A packet-switched computer network, set up in 1969 by ARPA and now consisting of over 100 "Host" computers, mainly in the continental USA, with links to Hawaii, Norway and England.

Following the publication of a series of papers by Paul Baran of the Rand Corporation in 1964 and early experiments by Marill and Roberts (1966) in the USA, ARPA decided to fund the setting up of a "packet-switched" network, connecting together various sites in the continental USA which were in receipt of ARPA grants. Various criteria were proposed for the network, such as that the end-to-end delay should be less than half a second, that there should be at least two physically separate paths between any two network nodes, that the communications cost should be less than 25% of the total network cost and that software costs should be minimised at each site. In early 1969,

the contract for the network was awarded to a company in Cambridge, Massachusetts called Bolt, Beranek and Newman. The design of the network was that each computer to be connected ("Host") should be connected to a dedicated mini-computer which formed part of the communications sub-network. These node computers were called "IMPs" and were based on Honeywell-516 computers (later 316s). They were later superseded by "TIPs" - Terminal IMPs - which had facilities for terminal handling.

The first, four-node, experimental network was operational in early 1970 and expanded rapidly, including the provision of satellite links to Hawaii and London (1973). The network has provided a testbed for much research into computer networks and protocols but now is considered an operational (rather than research) network and is operated by the Defense Communications Agency.

Although ARPANET mainly provides a communications medium between various computers and terminals, there have been experiments in the concept of distributed operating systems, perhaps the best known of which is "RSEXEC".

1. Baran, P. et al., "On Distributed Communications", Rand Corporation, 1964.
2. Marill, T. and Roberts, L.G., "Toward a Co-operative Network of Time-shared Computers", Proc. AFIPS FJCC, 29, 425-431, 1966.
3. Roberts, L.G. and Wessler, B.D., "Computer Network Development to Achieve Resource Sharing", Proc. AFIPS SJCC, 36, 543-549, 1970.

ARQ: An abbreviation for "automatic request for repetition", an error detection and correction technique.

ARRAY: A linearly ordered set of data items, often used synonymously with "matrix".



ARTIFICIAL INTELLIGENCE: A branch of computer science concerned with the design of computer systems so that they have attributes associated with intelligence such as game playing.

ASA: An acronym for the "American Standards Association", now known as ANSI.

ASCC: An acronym for "Automatic Sequence Controlled Calculator", an early computer (constructed around 1937 by Howard Aiken at Harvard University). It was also known as the "Mark I".

ASCENDER: The part of a character which projects above the body of the character.

ASCII: An acronym for "American Standard Code for Information Interchange" - a seven-bit plus parity) character code established by the American Standards Institute (ANSI).

ASLIB: An acronym for the "Association of Special Libraries and Information Bureaux".

ASR: An acronym for "automatic send/receive". A Teletype which has a keyboard/printer, together with a paper tape reader/punch which allows the automatic transmission of data.

ASSASSIN: An acronym for "A System for Storage and Subsequent Selection of Information".

ASSEMBLE: To translate from a "source program" written in "assembly language" into "object code" by means of an "assembler".

ASSEMBLER: The program which translates a "source program" written in "assembly language" into "object code". Assemblers vary from extremely simple ones which perform little more than resolving label references and translating mnemonic operation codes, to extremely complex ones which allow "conditional assembly" and "macros".

ASSEMBLY: The process of translating a "source program" written in "assembly language" into "object code" by means of an "assembler".