# dictionary of COMPUTING AND NEW INFORMATION TECHNOLOGY

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## Introduction to First Edition

Information technology, as a general term, was introduced only recently, but forms of information technology – for example, the telephone – have been familiar for years. What distinguishes new information technology from the older types is the way it combines a variety of communication channels with the information-handling capabilities of computers. New (mainly electronic) methods for dealing with the generation, transmission and reception of information are proliferating rapidly. At the same time, methods of communication which have traditionally progressed separately (for example, telephone and television) are now being drawn together. The rate of development is such that even active participants in the communication system find it hard to keep up with progress outside their own particular sphere. Members of the general public are often, quite naturally, totally confused by what is happening. By way of introduction to this dictionary, it is therefore worthwhile describing briefly some of the techniques that are involved in new information technology. This should also serve to give some indication of the dictionary's intended scope. (Italicized words indicate that the term is discussed, usually at some length, in the body of the dictionary.)

We can start with *computers*, since these represent one of the basic elements of the new technology. Reasonably powerful computers have been decreasing rapidly both in size and cost over the past decade. With the advent of the *microprocessor*, computers have been developed which can sit on a desk top, where they can be used for generating and transmitting information. A typical example of this use is in handling the vast quantities of text generated in the modern world. Specialized computers (called *word processors*) that can automatically produce a range of letters and documents are beginning to revolutionize office work. They are spreading into every field – for example, publishing – that involves the generation and handling of text. The *output* from such computers can be produced as traditional print-on-paper; but, since the computer holds the material in electronic form, it can be transmitted with equal ease through other communication channels, eg a telephone *network*, to a distant receiver. A letter can thus by-pass the traditional mail system, to be delivered by *electronic mail*.

This is just one example of information handling with the new technology. Methods both for the *input* of information to, and the output of information from a system are diversifying at a bewildering speed. Most information is still converted to electronic form via a *keyboard*, as with a typewriter. But it is already possible to talk to a computer, and for some speech to be accepted directly (*voice input*). It is confidently expected that current limitations, eg in the computer's vocabulary, will at least partly disappear during the 1980s.

At the output stage, computerized systems can deal with so much information that new methods must be found for storing it all. The development of the *videodisc* may make it possible to store a small library on a few discs, each the size of a gramophone record, within the next few years. Videodiscs will be viewable via ordinary television screens, and TV may provide the normal basis for finding and using information in the

home. It is already possible to track down factual information via a television set using *videotex*. The next step is to employ the system in various other types of transaction. For example, mail order catalogues can be put on television, goods ordered and the money paid from a bank account, all while the viewer is sitting at home.

Just as methods of handling information are becoming more diverse, so, too, are the methods of transmitting it. One of the most spectacular advances in communications during the past two decades has been the growth in the transmission of messages via Earth satellites. *Satellite communication* is now about to make a major impact on the transmission of television programmes, and so on the home viewer. But it is equally significant for the part it can play in the world-wide transmission of very large quantities of *data* of any kind.

Some of the more complex developments in electronic communication still require large (mainframe) computers. For example, translation from one language to another (computer translation) is still only moderately advanced, even with powerful machines. Computers that try to duplicate the problem-solving capabilities of human beings (*expert systems*) are likewise at an early (but already useful) stage.

This short account of new information technology is far from comprehensive, but should serve to illustrate its diversity. Almost inevitably, the rapid changes within the field lead to a rapidly changing vocabulary. Confusion results: not only because the new terms may not be easy for all participants to understand, but also because the same term may be used in more than one way. A major purpose of this dictionary is to help dispel such confusion by bringing together and codifying the most important specialized terms currently in use in the various parts of this diverse field.

The diffuseness of the subject matter has made decisions on which items to include and which to exclude particularly difficult. Basic computer technology has been limited to the minimum required for an understanding of most information technology. Terms with a restricted application (such as most manufacturers' brand names) have generally been excluded. Since the emphasis is on information, techniques which are mainly used for entertainment receive less emphasis. For example, 'videotape' is treated for the purposes of this dictionary as less important than 'videodisc'. The main criterion has been that the term should be likely to have a reasonably wide usage for a reasonable period of time.

So far as our intended audience is concerned, it would be true to say that this dictionary is intended for the non-specialist, but it would not be very helpful. Few people would consider the whole of new information technology as their specialism. Rather there are computer specialists whose acquaintance with information terminology may be limited, librarians who may be uncertain of the meanings of some computer-related terms, publishers who may need to learn the jargon of new methods of information handling, and so on. Hence, the contents of this dictionary not only are aimed at non-specialists (that is, at readers with an interest in the

field, but with no expertise in any of its branches); they are also designed to aid the various specialist groups whose concerns overlap in the field of new information technology.

Our selection of the words included in this dictionary stems mainly from our own acquisition and vending of periodicals and advertising literature in the field. We hope that, if nothing more, it will help the unfortunate reader through some of the flood of jargon these contain. To give some coherence to the field, a few topics are treated at greater length than the remainder. Such longer entries are intended to act as foci for particular parts of the field: cross-references from and to them allow more specialized entries to be placed in their appropriate context.

Equally, a reader who works through the longer entries should gain a good overall picture of the present state of the art ... Graphics have been introduced whenever it seems necessary to enhance the verbal descriptions.

A few words should be said in conclusion about the use of this dictionary. An italicized word in any entry means that there is a cross-reference to that word: it can therefore be looked up if you feel unsure as to its meaning. Some words, eg 'computer', have entries in the dictionary, but occur so frequently that they are only italicized in special circumstances. Many words can occur in different forms, eg as a noun or a verb. Only one form is normally given in this dictionary; so it is advisable to check under different headings. Several terms have variant meanings: these are distinguished in their respective entries by separate numbers. If there is likely to be any ambiguity of meaning, cross-references include the relevant entry number. As a general rule, acronyms have been printed in block capitals.

## Introduction to Second Edition

The original version of this dictionary included computing terms only where these were very commonly used in information technology. This present edition introduces several hundred additional terms, particularly in the area of computing, with the intention of making the dictionary as self-standing as possible. The change in coverage has been matched by a modification in the title of the book. It should now be possible for a user to follow most discussions involving computer jargon, as well as those concerned with information technology, from this dictionary alone. We have also taken the opportunity to modify and extend some of our original definitions and to introduce new terms in information technology. These have proved necessary because of the extremely rapid changes in terminology which are occurring throughout the field.

My colleagues and I would like to express our thanks to Arthur Phillips, Dave Adams and Kate Waters for their help in compiling this dictionary.
We would greatly appreciate comments from users of this dictionary on any problems they encounter.

Jack Meadows, *University of Leicester*

# A

**A and I** Abstracting and indexing.

**AB** Automated bibliography.

**ABC** 1. American Broadcasting Corporation. 2. Australian Broadcasting Corporation.

**ABCA** American Business Communication Association.

**ABEND** An abnormal end to a computer task because of an error, or an intervention by the operator.

**ABES** Association for Broadcast Engineering Standards, US.

**ABI/INFORM** Abstracted Business Information/Information Needs. A *bibliographic database* covering business management and administration (see *INFORM*).

**abort** To abandon an activity, usually because an error has been made.

**abort timer** A device which terminates *dial up* data transmission if no data are sent within a predetermined time.

**absolute address** In computing, a string of characters that identifies a *storage* location, without further modification or intermediate address.

**absolute coding** *Program instruction* in *machine code*.

**absolute loader** A *routine* that reads a program into core *storage*.

**absolute value** Magnitude of a number, regardless of whether it is positive or negative.

**absorption** In communications, the loss of power of a signal (wave) during propagation through a *medium*.

**ABSTI** Advisory Board on Scientific and Technical Information, Canada.

**abstract** An abbreviated representation of the contents of a document. The two most important types of abstract are: a. indicative abstracts. These indicate the content of the document (ie what it is about), rather than its methods and findings; b. informative abstracts. These emphasize the main findings, conclusions, and, if appropriate, methods. Abstracts provided by abstracts, journals and information services will typically be a mixture of informative and indicative. The word is also used as a verb to indicate the activity of abstracting.

**AC** 1. Alternating current. 2. Automatic computer. 3. Analog computer.

**ACARD** *Advisory Council for Applied Research and Development*.

**ACCC** Ad Hoc Committee for Competitive Communications, US.

**acceleration potential** The potential difference (ie voltage) between a cathode electron emitter and the face of the tube in a *CRT*.

**accent** Mark placed above or below a character; usually to indicate its pronunciation (see *diacritic*).

**acceptance testing** Used to prove the capabilities of a computerized system by a potential user.

**ACCESS** Automated Catalog of Computer Equipment and Software Systems, US Army.

**access** 1. Used either as a verb or noun to indicate either gaining control of a system or the acquisition of data from a *storage device or peripheral unit*. 2. A US *teleordering* system.

**access arm** A mechanical device within a *disc drive* that positions the *read/write head*.

**access barred** In communications, a facility which only permits transmission in one direction.

**access control** In computer networks, refers to the control of system usage for the purposes of *data security*, user charging, system monitoring, etc.

**accession number** The number assigned to a record in a file, indicating the order of its entry.

**access line** A telecommunications *line* that continuously connects a *remote station* to a *switching exchange*.

**access mechanism** See *access arm*.

**access point** The part of a *record* which is used to identify that record in a given *search* (eg in the case of a *bibliographic file*, the access point might be an author's surname).

**access time** The time taken to retrieve information from a storage device. For examples of typical access times, see *storage devices*.

**accordion fold** Synonymous with *fan fold*.

**Accounts Index** *Database* compiled by the American Institute of Certified Public Accountants covering accounting, auditing, banking, finance, investment and related areas. It is available for *on-line searching* via *SDC*, and offers *off-line* services.

**accumulator** A memory location in the computer which stores data temporarily while they are being processed.

**accuracy** Freedom from error, or the size of an error: used in relation to *programs*, *data* and machine operations. Should not be confused with *precision*.

**ACIA** Asynchronous communications interface adapter. A device which *formats* and controls *data* at an asynchronous communications interface.

**ACK** Affirmative acknowledgement sent down a *transmission line* to indicate either that a block of *data* has been received or that the receiver is ready to receive data (see *NAK*).

**ACL** Audit Command Language. A *high level programming language*.

**ACLS** American Council of Learned Societies.

**ACM** Association for Computing Machinery. A US based international organization aimed at advancing computer technology and its applications.

**ACOMPLIS** A Computerized London Information Service. An information service operated by the Library of the Greater London Council.

**acoustic coupler** A device capable of transmitting and receiving specified sound tones along telephone lines. It allows a computer and *terminal* to be connected via these lines, using a *modem* and telephone handset.

**acoustic delay line** A *delay line* whose action is based on the time of propagation of sound waves.

**ACRL** Association of College and Research Libraries. A US organization within the *ALA*.

**action frame** See *response frame*.

**action message** A message issued by a computer indicating the need for a user or systems operator to take some action.

**active device** In electronics, a device which produces *gain*.

**active file** A computer *file* in current use.

**activity** In data processing, the percentage of records in a file that are processed in a *run*.

**activity loading** A way of storing records in a file so that the most frequently

processed records can be accessed most readily.

**activity ratio** In data processing, the ratio of the number of records in a file that are in use to the total number of records in the file.

**ACTSU** Association of Computer Time Sharing Users, US.

**ACU** *Automatic calling unit.*

**ADA** A *high level programming language*, based on PASCAL, with important additions. It is a significant (and controversial) language, partly because of its adoption by the US Department of Defense, and its projected use in the control of nuclear power plants. It is named after Ada Lovelace, a colleague of Charles Babbage, who designed a 'calculating engine' considered to be the forerunner of present-day computers.

**ADAM** Automatic document abstracting method (see *automatic abstracting*).

**ADAPSO** Association of Data Processing Service Organizations, US and Canada.

**adaptive channel location** A method of *multiplexing* in which *channels* are allocated according to varying patterns of demand.

**adaptive routing** A *packet switching* technique for optimizing the use of available *channels* in response to varying patterns of demand.

**ADB** A Danish *teleordering* system.

**ADC** *Analog* to *digital* conversion.

**added entry** In cataloguing, a secondary entry (ie any entry other than the main entry).

**add-on conference feature** Originally a Bell telephone service for telephones with more than one line. A user can put a conversation on 'hold', call another party on a second line, and then retrieve the first caller so that there are three speakers on the line.

**address** 1. In telecommunications, this refers to the coded representation either of the destination of data, or of the terminal from which the data originate. 2. In computers, it is a number which identifies a location in the computer's memory.

**addressability** The number of *pixels* which can be separately coded in a *computer graphics* display.

**ADI** American Documentation Institute.

**ADIS** Automatic Data Interchange System.

**adjacency** A term in *character recognition*. It refers to print where the reference lines between two consecutive *characters* are separated by less than a specified distance.

**Administrative Support System** A *word processing* system aimed especially at business executives.

**Adonis** An electronic system being developed by a consortium of major European scientific publishers for the storage and supply of full-text documents. It is to be operated in conjunction with existing *document delivery systems*. Journal articles are to be stored on *digital video discs* in a form accessible for *on-demand retrieval* in response to inter-library loan requests. In the future, electronic transmission of documents to the US via a satellite link is envisaged.

**ADP** 1. Advanced data processing. 2. Automatic data processing (see *data processing*).

**ADPE** Automatic *data processing* equipment.

**ADPS** Automatic *data processing* system.

**ADRES** Army Data Retrieval System, US.

**ADRS** Automatic Document Request Service. A service provided by *Blaise* (a *host* information service). It allows subscribers at an *on-line terminal* to request loans or photocopies of documents from the *British Library Lending Division*.

**Advisory Council for Applied Research and Development** ACARD is a UK body which advises government and publishes reports on R&D policy (including new information technology).

**ADX** An *automatic exchange* in a data transmission *network*.

**AEBIG** Aslib Economics and Business Information Group (see *Aslib*).

**AECT** Association for Educational Communications and Technology, US.

**AEDS** Association for Educational Data Systems, US.

**aerial** In a radio communication system, this is the device which radiates the transmitted electrical signal into space. Equally, it is the device which receives the signal and feeds it in electrical form into the receivers.

**AEWIS** Army Electronic Warfare Information System, US.

**AFIPS** American Federation of Information Processing Societies.

**AFNOR** Association Française de Normalisation. The French national standards organization.

**AFR** Automatic field/format recognition: a computer *input* facility.

**afterdark** *User-friendly software* for *database access* developed by the *host BRS*. The name refers to the potential use of the service during 'off peak' periods for telecommunication.

**afterflow** Synonymous with *persistence*.

**Agate** A 5½ *point typeface* often used in setting classified advertisements in the US.

**AGLINET** Agricultural Libraries Information Network (under the aegis of the United Nations).

**Agricola** *Database* produced by the US Department of Agriculture, covering agriculture and related topics. Available via *BRS*, *Lockheed* and *SDC*.

**Agricultural Information System** (AGRIS) An international agricultural database organized under the aegis of the Food and Agricultural Organization (FAO).

**AGRIS** *Agricultural Information System*.

**AI** *Artificial intelligence*.

**AIDS** 1. Aerospace Intelligence Data System of *IBM*, US. 2. Automated information dissemination system.

**AIRS** Automatic Image Retrieval System.

**AKWIC** Author and Key Word In Context. A form of computerized index (see *KWIC*).

**ALA** American Library Association.

**ALA/ISAD** The *ALA*'s Information Science and Automation Division.

**ALA print train** A standard set of characters drawn up by the American Library Association for use in *machine-readable* bibliographic records.

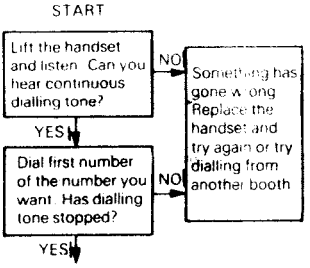
**ALAS** Automated Literature Alerting System. A *current awareness service* offered within the context of an *information retrieval system*.

**Albert** Name given by *British Telecom* to a machine intended to combine *teletext*, *telex*, *word processing* and *telephone* functions.

**ALGOL** Algorithmic Orientated Lan-

guage. A ***high level programming language*** used especially for scientific applications (see *algorithm*).

**algorithm** A procedure, or rule, for the solution of a problem in a finite number of steps. In computing it normally refers to a set of simple rules for the solution of a mathematically expressed problem, or for evaluating a function.




*Simple algorithm: using a telephone. The great advantage of this kind of problem-solving system, for computing purposes, is that it reduces the problem to a series of yes/no options, which are easily translated into binary form.*

**aliasing** The removal of the jagged line, or 'step edge' effect, on *graphic displays* (see *computer graphics*).

**ALIS** A general abbreviation for automated library information system.

**ALP** Automated language processing (see *data processing*, *word processing* and *machine translation*).

**ALPAC** National Academy of Sciences' Automated Language Processing Advisory Committee, US.

**alphabet length** The length of a lowercase alphabet in *points*. Used to compare different designs of printers' *typefaces*.

**alphageometrics** A method for generating *videotex* images on a screen. Displays are constructed out of geometric elements, such as diagonal lines, arcs and circles (see, in contrast, *alphamosaics*).

**alphameric** Synonymous with *alphanumeric*.

**alphamosaics** A method for generating *videotex* images on a screen. Displays are constructed using a mosaic of dots. Alpha-mosaics have been chosen in preference to *alphageometrics* as a European standard for the next *generation* of videotex systems.

**alphanumeric** An acronym formed from the words 'alphabetic' and 'numeric'. It signifies that data may contain both alphabetical and numerical information.

**alternating current** (AC) An electrical current, the direction of which is periodically reversed. The frequency of reversal is usually of the order of many cycles per second.

**alternative mode** A computing mode which permits two interacting users of systems to access shared files in turn.

**ALU** *Arithmetic and logic unit*.

**Alvey Report** An influential report prepared in 1982 for the Department of Industry (UK), assessing how Britain should respond to the challenge presented by the Japanese Fifth Generation Computer Programme. It proposed an investment of £250m into research in four priority areas: *intelligent knowledge-based systems*, man-machine interface, *software* engineering and *VLSI*. In addition, it suggested that a further £19m should be spent on building up a communications network linking research groups, £58m on demonstrations and £20m on education in advanced information technology.

**AM** *Amplitude modulation*.

**AMACUS** Automated Microfilm Aperture Card Update System. A system which uses an *aperture card* as the primary unit of information *storage*.

**America: History of Life** A *bibliographic database* covering US and Canadian history and affairs, available via *Lockheed*.

**AMFIS** Automatic Microfilm Information System (see *COM*).

**amplitude** The peak positive or negative value of a wave (or signal).

**amplitude modulation** A form of *modulation* in which the *amplitude* of a *carrier wave* is varied by an amount proportional to the amplitude of the modulating signal.

**AMR** *Automatic message routing*.

**AMTD** Automatic *Magnetic Tape* Dissemination service offered by the US Defense Documentation Center.

**ANA** *Article Numbering Association*.

**analog** Representation of information by an output signal which varies in a continuous manner with respect to the input. It is to be contrasted with *digital* representation of information.

**AND** A *Boolean operator*.

**AND circuit** Synonymous with *AND gate*.

**AND element** Synonymous with *AND gate*.

**AND gate** A *gate* that implements the *logic* of the *AND* function. An AND gate is used in computer logic to combine *binary* signals in such a way that there is an output signal only if all input channels carry a signal. For the case of two input signals, this leads to the following table:

| Input 1 | Input 2 | Output |
|---|---|---|
| 1 | 1 | 1 |
| 1 | 0 | 0 |
| 0 | 1 | 0 |
| 0 | 0 | 0 |

**angle modulation** See *modulation*.

**ANIK** A series of Canadian *communication satellites* launched from the early 1970s onwards. (ANIK is 'brother' in Eskimo.)

**ANSI** American National Standards Institute. It has established many standards in the fields of computing and information handling which are accepted world-wide.

**answerback** See *voice answerback*.

**answerphone** A device for automatically responding to telephone calls, recording any messages for playing back later.

**anticipatory staging** A computing technique in which *blocks* of data are moved from one storage device to another, with shorter *access time*, in anticipation of being requested by a program. Compare with *demand staging*.

**Antiope** A French *videotex* (*viewdata* and *teletext*) system. The name is an acronym for 'L'Acquisition Numérique et Télévisualisation d'Images Organisées en Pages d'Ecriture'. (The Numerical Acquisition and Televisual Display of Images organized into Pages of Text.)

**Antiope-Didon** The *teletext* component of the French *Antiope videotex* system.

**Antiope-Titan** *Viewdata* component of the French *Antiope videotex* system. Often referred to by the brand name *Teletel*.

**AOIPS** Atmospheric and Oceanic Information Processing System. Employs *computer graphics* to enhance images received from meteorological satellites (see also *DIDS*).

**AP** *Attached processor*.

**aperture card** An 80-column card (*punched card* or edge-punched card) which has a 35 x 48mm frame of microfilm inserted. Aperture cards can be used to form an index, which is sorted via the punched holes. After sorting,

more extensive information is immediately available on the inserted microfilm.

**APILIT** *Database* produced by the American Petroleum Institute, covering petroleum refining, storage and transportation, petrochemicals, petroleum products and petroleum substitutes. Available via *SDC*.

**APIPAT** As for *APILIT*, but covering patents.

**APL** A Programming Language; a *high level programming language* suitable for use on *mainframe* computers with large *memories*. It is sometimes used in conjunction with statistical *databases*.

**apogee** The point in an orbit at which a *communications satellite* is furthest from the earth's surface.

**APOLLO** Article Procurement with Online Local Ordering. An experimental *document delivery system* run by the *CEC* and *ESA*, which will use the European Communications Satellite.

**application program** See *applications package*.

**applications package** A *program*, or set of programs, designed to perform a particular application or task (as in *information retrieval*, *word processing*, *data analysis*).

**applications software** *Programs*, or packages (see *applications package*), designed to carry out specific tasks, or applications; as distinct from *systems software*, which controls the operation of the total computer system.

**APT** Automatically Programmed Tools. A computer language used for control of machine tools.

**AQL** Acceptance quality level. A general engineering term, usually used to refer to the performance of machines and components: in particular, their breakdown or failure rate.

**architecture** The way in which computer *hardware* and *software* interact so as to provide the type of facilities and performance required.

**archival storage** See *backing storage*.

**archive** Archive can be used either as a verb or noun to indicate: a. the process of storing data files in a retrievable form; b. the data files so stored.

**archive diskette** Synonymous with *diskette* or *floppy disc*.

**ARDIS** Army Research and Development Information System, US Army.

**area composition** In *phototypesetting*, usually refers to putting together a *page*, either by use of an automatic page *make-up program*, or by an operator calling up the necessary material for display at a *VDT*.

**area search** A term used in information retrieval for a search of those items within a database which make up a single group, or category (see *information retrieval system*).

**arithmetic and logic unit** (ALU) The *microprocessor* in the *central processing unit* which executes the arithmetic and logical operations required by an *input* command.

**arithmetic capability** When applied to a word processor, refers to its ability to act also as a calculator.

**ARPANET** A *resource-sharing computer network* supported by the Advanced Research Projects Agency of the US Department of Defense.

**ARQ** Automatic request for correction. A system which provides error correction by requesting retransmission of mutilated characters (see *automatic request for repetition*).

**array** 1. In telecommunications, refers to an arrangement of *antenna* elements. 2. In computing, refers to an ordered

arrangement of data (such as a table of numbers) identified by a single symbolic name.

**array declarator** Specifies the dimensions of an *array*.

**array processor** A powerful computer containing a number of linked sub-processors, performing similar tasks. It is designed to handle the form of *arrays*, and is used extensively for matrix and signal processing.

**Art Bibliographies Modern** A *database* covering literature on art from the beginning of the 19th century. Accessible via *Lockheed*.

**ARTEMIS** An acronym for Automatic Retrieval of Text through European Multipurpose Information Services. It is planned to be a *document delivery system* which will supply journal articles *on demand* via *facsimile* transmission or *digitized* text. Delivery will be either by a *facsimile receiver*, or as print out from a *teleprinter*. A fully integrated ARTEMIS system will require the establishment of a set of standards between *hosts*, *databases* and users. The European Commission is currently working towards this objective.

**Article Numbering Association** Concerned with *bar-coding* of retail merchandise.

**artificial cognition** The ability of a machine to sense a *character* by optical means, and then to determine its nature (by comparing it with a set of standard characters).

**artificial intelligence** (AI) Artificial intelligence concerns the design of intelligent computer systems: that is, systems which exhibit the characteristics commonly associated with human intelligence – understanding *natural language*, problem-solving, learning, logical reasoning, etc.

Computers are well suited to handling those forms of reasoning and problem-solving which can be clearly broken down into a series of 'logical' steps, eg the performance of numerical calculations. However, other aspects of intelligence cannot be so easily programmed: it is the goal of AI to overcome these difficulties.

The nature of the difficulties is often illustrated in terms of computer chess. The computer is programmed to consider the possible moves it could make, and the possible responses from an opponent. It then evaluates the outcome of each sequence of moves in accord with prescribed criteria, and selects the best option. A computer can 'search' thousands of moves in the time a human can only consider a few, but no computer can, as yet, beat a human chess master. The master's advantage appears to lie in a form of intelligence derived from experience, and produces an ability to draw crucial inferences from the pattern of the pieces, and the opponent's pattern of play. The reasoning subsumed within the chess master's intelligence cannot be clearly explicated into steps, and cannot therefore be incorporated into a computer program. Nevertheless, computers can now play chess and other similar types of game to a high standard. These are generally referred to as problem-solving forms of AI. Similar problem-solving techniques, based on the principles of 'search' and 'problem reduction', have a variety of more practical uses, eg in performing mathematical integration of complex equations.

Related to 'problem solving' is 'logical reasoning'. In exploring this field, AI techniques have been used to develop methods for searching information in a *database*, so as to test the validity of generalized statements ('theorems'). The technique has been extended to include monitoring the acceptability of theorems as information is added to the database. Such systems can also identify crucial data, eg those which are anomalous in relation to a specific theorem, so that they can be scrutinized in more detail. A further development is the so-called '*expert system*' – a form of computer-based consultant. It is the AI component which distinguishes the expert system from a specialized *on-line information retrieval system*, allowing a dialogue,

rather than a simple interrogation of a database.

The understanding of language is a further area of application for AI which is of fundamental importance to information systems. For clearly, if AI could resolve all the inherent problems, computers could receive natural language as *input*, and perform automatic translation into *machine language*, or, indeed, into other natural languages (see *machine translation* and *HAMT*).

Somewhat similar in impact to the understanding of language is the field of visual *pattern recognition*. If computers could recognize objects (via, for example, television cameras), this would offer even greater flexibility in the input of information to computer systems. AI of this type is crucial in the field of *robotics*.

**ARU** *Audio response unit*.

**ASA** American Standards Association (formerly the USASA) Has groups responsible for the establishment of standards in the field of *data processing*.

**ASC** Automatic sequence control. A *program* feature.

**ASCA** Automatic Subject Citation Alert. A computer-produced *current awareness* service based on the *database* of the *Science Citation Index*.

**ascender** A typographic expression indicating that part of a lower-case character which rises above the normal body height, eg the upper part of the letters 'b' and 'h'.

**ASCII (code)** A US standard computer *code*, adopted in Europe, in which eight binary *bits* can be combined to represent the characters on a typewriter keyboard. Only seven bits (128 possible combinations) are necessary to describe all the characters. The eighth bit is either used for error checking purposes, or it remains unused. Most commercial VDUs and printers utilize the ASCII code.

**ASDI** Automated selective dissemination of information (see *selective dissemination of information*).

**ASI** American Statistics Index. *Databank* of American social, economic and demographical statistics, searchable via *Lockheed* or *SDC*.

**ASIS** American Society for Information Science.

**Aslib** Originally stood for Association of Special Libraries and Information Bureaux, but is now used as a name in its own right. Aslib is a British association with headquarters in London.

**aspect** In information retrieval, this refers to those features of the contents of documents, etc, which are represented by *index term*, *descriptors*, etc.

**aspect card** A card containing numbers which record the location of *documents* used in an *information retrieval system*.

**ASR** Answer, send and receive. A *teletypewriter* and receiver used in conjunction with a computer.

**ASSASSIN** Agricultural System for Storage and Subsequent Selection of Information. A bibliographic *information retrieval system* available from ICI.

**assemble** To put together a *machine language program* from a *symbolic language* program.

**assembler** A computer *program* which transfers a *symbolic language* program into a *machine language* program. The latter can then be directly executed by the computer.

**assembly language** A programming language in which each statement corresponds to a single *machine language* instruction. It is normally written in some form of *mnemonic code*.

**assembly listing** A list produced by an *assembler* which lists a *source program*, the *machine code* equivalent and details of any assembly errors.