

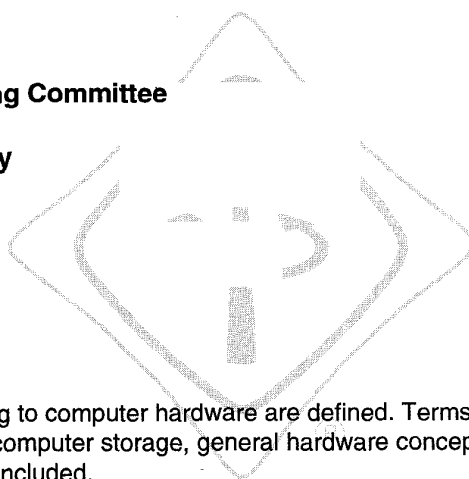
IEEE Standard Glossary of Computer Hardware Terminology

Sponsor

**Standards Coordinating Committee
of the
IEEE Computer Society**

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Abstract: Terms pertaining to computer hardware are defined. Terms falling under the categories of computer architecture, computer storage, general hardware concepts, peripherals, and processors and components are included.

Keywords: computer, hardware, definition, glossary, terminology

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Introduction

(This introduction is not a part of IEEE Std 610.10-1994, IEEE Standard Glossary of Computer Hardware Terminology.)

As the computer field continues to expand, new terms are being generated and new meanings are being adopted for existing terms. The IEEE Computer Dictionary project (the 610 computer glossary series of documents) was undertaken to document this vocabulary. Its purpose is to identify terms currently in use in the computer field and to establish standard definitions for these terms. The dictionary is intended to serve as a useful reference for those in the computer field and for those who come into contact with computers, either through their work or in their everyday lives.

The completed dictionary will contain terms from each of the following areas: Computer Hardware, Software Engineering, Mathematics of Computing, Theory of Computation, Computer Applications, Artificial Intelligence, Data Management, Image Processing and Pattern Recognition, Modeling and Simulation, Computer Graphics, Computer Networking, Computer Languages, and Computer Security and Privacy. This glossary contains the terms related to Computer Hardware.

Every effort has been made to use definitions from established standards in this dictionary. When existing standards were found to be incomplete, unclear, or inconsistent with other entries in the dictionary, however, new, revised, or composite definitions have been developed.

At the time this glossary was approved, the following people formed the steering committee of the Computer Dictionary working group:

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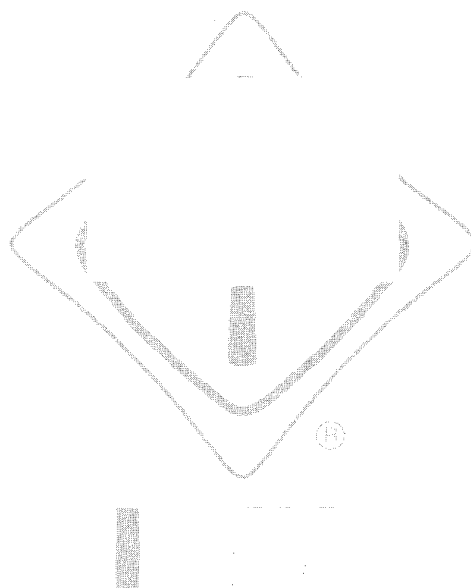
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IEEE Standard Glossary of Computer Hardware Terminology

1. Overview

1.1 Scope

This glossary defines terms pertaining to computer hardware. It includes terms from the following areas:

- Computer storage
 - Storage media (nonspecific)
 - Storage media—card form
 - Storage media—optical
 - Storage media—paper form
 - Storage media—magnetic
 - Types of storage
 - General storage concepts
 - Storage functions
 - General memory concepts
 - Characters, words, bytes, and bits
 - Storage devices
 - Recording techniques
 - Virtual storage concepts
- Processors and components
 - General circuit concepts
 - Integrated circuits
 - Circuits elements
 - Types of circuits
 - Components—bus
 - Components—channels
 - Components—circuit boards
 - Components—registers
 - Components—processors
 - Components—uncategorized
 - Logic elements and concepts
 - Logic—operations
 - Mathematic elements
 - Timers, rates, clocks, and counters
- Peripherals
 - Display devices
 - Input devices
 - Keyboards and keys
 - Printers and plotters
 - Tape devices
 - Card readers
 - Fonts
- Computer architecture
 - Types of computers/machines
 - Types of systems/networks/environments
 - Computer architecture—types
 - Computer architecture—general
 - Instructions and addressing
 - Engines
 - Computer performance
 - Construction and packaging
- General hardware concepts
 - Analog computer concepts
 - Things that hardware can do
 - General terms—applications
 - General terms—electrical
 - Hardware errors
 - Languages
 - Hardware signalling
 - Standards and standard organizations

Some terms are the names of commercial products. Many times such products are developed by a particular group, then the product name is accepted as a generic description of all products performing similar functions. For this reason, this glossary does not, in most cases, attempt to identify the owner or developer of a product. The reader should exercise caution in drawing inferences concerning ownership, trademarks, and copyright of names.

Some technical terms that appear in the definitions are defined in other glossaries in the 610 series and are not included as entries here. For example, IEEE Std 610.12-1990, IEEE Glossary of Software Engineering Terminology, defines terms relating to computer programs, while IEEE Std 610.5-1990, IEEE Standard Glossary of Data Management Terminology, defines terminology relating to data management.

1.2 Glossary Structure

Entries in the glossary are arranged alphabetically. An entry may consist of a single word, such as “hardwired” or “processor,” or a phrase, such as “print head.” Phrases are given in their natural order, as in “printed circuit board,” rather than in reversed order, “circuit board, printed.”

Blanks and numerals precede all other characters in alphabetizing. Hyphens and slashes are treated as blanks.

The following distinction is made between acronyms and abbreviations: An acronym is a combination of the first one (or few) letters from two or more words in the term, put together to make a single term. An acronym does not have to be pronounceable. Generally, acronyms are capitalized. An abbreviation is a shortened version of a single word or anything that is not an acronym.

If a term has more than one definition, the definitions are numbered. The order of the definitions does not imply preference or frequency of use. In most cases, noun definitions are given first, followed by verb and adjective definitions as applicable. Examples and notes have been added to clarify selected definitions.

The following cross-references are used to show a term’s relationship to other terms in the glossary:

- *Contrast with:* refers to a term with an opposite or substantially different meaning.
- *Syn:* refers to a synonymous term.
- *See also:* refers to a related term.
- *See:* refers to a preferred term or to a term where the desired definition can be found.

The word “deprecated” indicates a term or definition whose use is discouraged because such use is obsolete, misleading, or ambiguous.

2. References

In those cases in which a definition is directly quoted from an existing dictionary or glossary, the following references apply:

ANSI X3.138-1988, Information Systems—Information Resource Dictionary System (IRDS).¹

IEEE Std 1084-1986 (W1993), IEEE Standard Glossary of Mathematics of Computing Terminology.²

IEEE Std 610.2-1987, IEEE Standard Glossary of Computer Applications Terminology (ANSI).³

IEEE Std 610.3-1989, IEEE Standard Glossary of Modeling and Simulation Terminology (ANSI).

IEEE Std 610.4-1990, IEEE Standard Glossary of Image Processing and Pattern Recognition Terminology (ANSI).

IEEE Std 610.5-1990, IEEE Standard Glossary of Data Management Terminology (ANSI).

IEEE Std 610.6-1991, IEEE Standard Glossary of Computer Graphics Terminology (ANSI).

IEEE Std 610.7-1995, IEEE Standard Glossary of Computer Networking (ANSI).

IEEE Std 610.12-1990, IEEE Standard Glossary of Software Engineering Terminology (ANSI).

IEEE Std 610.13-1993, IEEE Standard Glossary of Computer Languages (ANSI).

NOTE—Numbers in brackets that follow a definition refer to the source document for the definition. A lowercase “a” after the number indicates that an editorial change was made in the definition for inclusion in this document.

¹ANSI publications are available from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA.

²IEEE Std 1084-1986 has been withdrawn; however, copies can be obtained from the IEEE Standards Department, IEEE Service Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA.

³IEEE publications are available from the Institute of Electrical and Electronics Engineers, Service Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA.

3. Terms and Definitions

3.1 absolute address. (1) An address that is permanently assigned to a device or storage location and that identifies the device or location without the need for translation or calculation. *Syn:* explicit address; machine address; specific address. *See also:* base address; relative address; relocatable address; symbolic address; virtual address. [IEEE Std 610.12-1990]⁴ (2) The actual complete address of a device or storage location. *Syn:* address reference.

3.2 absolute instruction. A computer instruction in which all addresses are absolute addresses. [IEEE Std 610.12-1990]

3.3 absolute-value circuit. A transducer or circuit employed in analog computers that produces an output signal equal in magnitude to the input signal but always of one polarity.

3.4 AC. Acronym for alternating current.

3.5 AC analog computer. An analog computer in which electrical signals are of the form of carrier signals where the absolute value of a mathematical variable is represented by the amplitude of the carrier and the sign of the mathematical variable is represented by the phase (0 or 180 degrees) of the carrier relative to the computer.

3.6 acceleration time. The part of access time that is required to bring a storage device, typically a tape or disk drive, to the speed at which data can be read or written. *Syn:* start time. *Contrast with:* deceleration time.

3.7 accelerator. A circuit or device that accelerates some unit in a computer, as in an accelerator board. *See also:* hardware accelerator.

3.8 accelerator board. A printed circuit board that replaces or augments the computer's main processor with a faster processor.

3.9 access. (1) The process of obtaining data from or placing data into a storage device. *Syn:* storage access. *Note:* Specific types of accesses and access modes, such as direct access and sequential access, are defined in IEEE Std 610.5-1990. Terminology relating to access

protection will be defined in IEEE P610.9, Glossary of Security & Privacy Terminology.⁵ [IEEE Std 610.5-1990a] (2) To obtain data from or place data into a storage device as in (1). [IEEE Std 610.5-1990]

3.10 access arm. In a magnetic disk device, an arm that supports and positions one or more magnetic heads. *See also:* voice-coil actuator.

3.11 access mechanism. A mechanism that is responsible for moving an access arm. *Syn:* actuator.

3.12 access time. The elapsed time required to read from or write to a storage device after the proper controls and address have been applied. *See also:* acceleration time; latency; mean access time; seek time; transfer time.

3.13 accounting machine. A device that reads data from external storage media, such as cards or tapes, and automatically produces accounting records or tabulation, usually on continuous forms.

3.14 accumulator. A register or storage location in which the result of an operation is formed.

3.15 accuracy. The degree of exactness of an approximation or measurement. *Note:* Accuracy denotes the absolute quality of computed results; precision refers to the amount of detail used in representing those results. *See also:* precision.

3.16 acoustic delay line. A delay line whose operation is based on the time of propagation of sound waves within a given medium. *Syn:* sonic delay line. *See also:* mercury storage.

3.17 acoustic memory. *See:* acoustic storage.

3.18 acoustic storage. A type of storage consisting of acoustic delay lines.

3.19 acoustic tablet. A data tablet on which the position of the sensor or stylus is determined by acoustic sensing techniques.

3.20 active storage. Storage that holds data that is being processed.

⁴The numbers in brackets refer to the source document for the definition. Information on these source documents can be found in clause 2. A lowercase "a" after the number indicates that an editorial change was made in the definition for inclusion in this document.

⁵This authorized standards project, IEEE P610.9, was not approved by the IEEE Standards Board at the time this went to press.

3.21 actual address. The real or designed address that is built into the computer by the manufacturer as a storage location or register.

3.22 actual instruction.* *See:* effective instruction. [IEEE Std 610.12-1990]

* Deprecated.

3.23 actual time. *See:* real time.

3.24 actuating signal. A particular input pulse in the control circuitry of a computer.

3.25 actuator. (1) A mechanism that moves an object in order to access a storage device. For example, the device that selects a laser disk in a jukebox, or an access arm in a magnetic disk drive. (2) In robotics, a motor or transducer that uses electrical, hydraulic, or pneumatic energy to effect motion in a robot.

3.26 A/D. Acronym for analog-to-digital, as in A/D converter.

3.27 ADC. Acronym for analog-to-digital converter.

3.28 add. *See:* adder; false add.

3.29 add-on board. *See:* expansion board.

3.30 add time. The elapsed time required to perform one addition operation, not including the time required to obtain the operands or to return the result to storage. *Contrast with:* multiply time; subtract time.

3.31 adder. A device whose output data is the arithmetic sum of the two or more quantities presented as input data. *See also:* adder-subtractor; full adder; half adder; parallel adder; quarter adder; serial adder; summer. *Contrast with:* subtracter.

3.32 adder-subtractor. A device that acts either as an adder or subtracter depending upon the control signal received. *Note:* The adder-subtractor may be constructed so as to yield the sum and the difference at the same time.

3.33 address. (1) A number, character or group of characters that identifies a given device or storage location. [IEEE Std 610.12-1990] (2) To refer to a device, data item, or storage location by an identifying number, character, or group of characters, known as its address, as in (1). *Syn:* address reference. [IEEE Std 610.12-1990a]

3.34 address bus. A bus used to carry an address from the processor to memory or to a peripheral device.

3.35 address field. Any of the fields of a computer instruction that contain addresses, information necessary to derive either other addresses, or values of operands. *See also:* operand field; operation field. *Syn:* address part. [IEEE Std 610.12-1990]

3.36 address format. (1) The number and arrangement of address fields in a computer instruction. *Note:* The expression “plus-one” is frequently used to indicate that one of the addresses specifies the location of the next instruction to be executed; for example in an three-plus-one address format, an instruction contains three addresses of operands for the present operation, plus one address representing the next instruction to be executed. Such an instruction is known as a “three-plus-one address instruction.” *See also:* four-address instruction; instruction format; n-plus-one address instruction format; one-address instruction; three-address instruction; two-address instruction. [IEEE Std 610.12-1990a] (2) The number and arrangement of elements within an address, such as the elements needed to identify a particular channel, device, disk sector or record on a storage device. [IEEE Std 610.12-1990a]

3.37 address mark. (1) A mark on a disk that is used to identify the specific areas on the disk such as an index, or free storage. (2) *See:* index mark.

3.38 address modification. Any arithmetic, logic or syntactic operation performed on an address. [IEEE Std 610.12-1990]

3.39 address part. *See:* address field.

3.40 address reference. *See:* address.

3.41 address register. A register in which an address is stored. *Note:* An address register is generally used in an operand field of a processor instruction and contains a pointer to the address holding the data value to be used by the instruction. *See also:* base address register; instruction address register.

3.42 address space. (1) The range of addresses that a computer program can access. *Note:* In some systems, this may be the set of physical storage locations that a program can access, disjoint from other programs, together with the set of virtual addresses referring to those storage locations which may be accessible by other programs. (2) The number of memory locations

that a central processing unit can address. *See also*: virtual address space.

3.43 address stop. An address that, when it is encountered by a program, causes the program to halt execution. *See also*: breakpoint instruction; instruction address stop.

3.44 address trace. (1) To monitor references made to a particular address. (2) A list of addresses of previously executed instructions, in the order in which they were executed. *Note*: Generally used for debugging.

3.45 address track. A track that contains addresses that may be used to locate data on other tracks of the same data medium. *Note*: Usually refers to disk drives.

3.46 address translator. (1) A device that transforms the address of an instruction to the address in main storage at which it is to be loaded or relocated. (2) In virtual storage, a device that transforms the address of an item of data or instruction from its virtual address into its real address.

3.47 addressable memory. A region of memory that can be located by an address. *Syn*: addressed memory.

3.48 addressable register. A register with a fixed location and address.

3.49 addressed memory. *See*: addressable memory.

3.50 addressability. The ability to locate an item in storage using an address.

3.51 addressing. The process of assigning or referring to an address.

3.52 addressing mode. A means of combining information in an instruction, in registers, or in memory to define the location of a datum; For example, direct addressing, immediate addressing; implied addressing; indirect addressing; indexed addressing; relative addressing; symbolic addressing; virtual addressing.

3.53 addressless instruction. *See*: zero-address instruction.

3.54 adjacent channel. A channel whose frequency band is adjacent to that of another channel, known as the reference channel.

3.55 AFIPS. Abbreviation for American Federation of Information Processing Societies.

3.56 air-floating head. *See*: floating head.

3.57 algebraic sum. The answer arrived at when adding two operands numerically. For example: $01102 + 01012 = 10112$. *Contrast with*: logical sum.

3.58 all-purpose computer.* *See*: general-purpose computer.

* Deprecated.

3.59 allocated storage. Portions of storage that are assigned or reserved for active instructions or for data.

3.60 alphabetic word. (1) A word consisting solely of letters from the same alphabet; for example, the word "CIRCUS." (2) A word that consists of letters and associated special characters, but not digits; for example, the word "HEAVY-DUTY."

3.61 alphanumeric display device. *See*: character display device.

3.62 ALT. Abbreviation for alternate key.

3.63 alternate function key. A function key that, when used in conjunction with the alternate key, performs a different function or command than when it is used alone.

3.64 alternate key (ALT). A control key that controls the interpretation of other keys. That is, when used in conjunction with another key it causes a different interpretation of that key than when the key is used alone. *See also*: shift key.

3.65 alternate track. On a disk, a spare track that is used in place of a normal track in the event that the latter is damaged or inoperable. *Syn*: alternative track.

3.66 alternating current (AC). An electric current that reverses direction at regularly recurring intervals of time. *Contrast with*: direct current.

3.67 alternative track. *See*: alternate track.

3.68 ALU. Acronym for arithmetic and logic unit.

3.69 American Federation of Information Processing Societies (AFIPS). A national (American) association of computing and information-related organizations that represents the United States in the International Federation of Information Processing (IFIP) organization.

3.70 American National Standards Institute (ANSI). An organization that establishes and maintains standards for the information processing industry within the United States.

3.71 amp. (1) Abbreviation for ampere. (2) Abbreviation for amplifier.

3.72 amplifier (amp). (1) An apparatus or device used to increase the amplitude or the power of an input signal by means of energy drawn from an external source. (2) In an analog computer, a device that enables an input signal to control a source of power and thus is capable of delivering at its output an enlarged reproduction or analytical modification of the essential characteristics of the signal. *See also:* buffer amplifier; high-gain amplifier; operational amplifier; relay amplifier; servo amplifier; unloading amplifier.

3.73 amplitude selection. In an analog computer, a summation of one or more variables with a constant resulting in a sudden change in rate or level at the output of a computing element as the sum changes sign.

3.74 analog (analogue). Pertaining to data in the form of continuously variable physical quantities. *Contrast with:* digital. *See also:* analog computer. [IEEE Std 1084-1986]

3.75 analog adder. *Syn:* summer.

3.76 analog channel. A channel in which transmitted information can take any value between the defined limits of the channel. *Note:* The limits for an analog channel are usually the upper and lower frequencies which will pass through the channel.

3.77 analog computer. A computer that processes analog data. *Syn:* electronic analog computer. *See also:* AC analog computer; DC analog computer. *Contrast with:* digital computer; hybrid computer. [ANSI X3.138-1988]

3.78 analog divider. A divider whose output analog variable is proportional to the quotient of the input analog variables.

3.79 analog multiplier. A multiplier whose output analog variable is proportional to the product of two input analog variables. *Note:* This term may also be applied to a device that can perform more than one multiplication, such as a servo multiplier. *See also:* quarter-squares multiplier. *Contrast with:* analog divider.

3.80 analog plotter. A plotter that presents analog data in the form of a two-dimensional graphic representation. *Contrast with:* digital plotter; raster plotter.

3.81 analog-to-digital converter (ADC or A/D converter). A device that provides the means to obtain a digital number representation from a specific analog value. *Contrast with:* digital-to-analog converter.

3.82 analytical engine. A device from which modern digital computers are descended, invented in the mid 1800's by Charles Babbage, a British mathematician, to solve mathematical problems.

3.83 AND element. *See:* AND gate.

3.84 AND gate. A gate that performs the Boolean operation of conjunction. *Syn:* AND element.

3.85 AND-NOT.* *See:* exclusion.

* Deprecated.

3.86 AND-parallelism. Pertaining to the performance of multiple predicate operations concurrently; the successful completion of which results in a true response. *Contrast with:* OR-parallelism.

3.87 ANSI. Acronym for American National Standards Institute.

3.88 ANSI standard. A standard approved by ANSI (The American National Standards Institute). Examples of ANSI standards include programming languages (C, FORTRAN, or COBOL), media formats (Hollerith cards), and interface standards (SCSI interfaces, device drivers).

3.89 aperture. An opening in a data medium or device such as the opening in the an aperture card, or an opening in a multiaperture core.

3.90 aperture card. A punch card of standard dimensions into which microfilm frames may be inserted.

3.91 aperture core. *See:* multiaperture core.

3.92 arbitrary sequence computer. A computer in which each instruction explicitly specifies the location of the next instruction to be executed. *Contrast with:* consecutive sequence computer. *See also:* nonsequential computer.

3.93 architectural design. (1) The process of defining a collection of hardware and software components and

their interfaces to establish the framework for the development of a computer system. *See also:* functional design. [IEEE Std 610.12-1990] (2) The result of the process in (1). [IEEE Std 610.12-1990]

3.94 architecture. In computer hardware, the organizational structure and interrelationship between the parts of a computing system, including the arrangement, design and interconnection of components. *See also:* computer architecture; network architecture. *Note:* This term is sometimes taken to mean the “instruction set” of a computer, since the physical architecture of a computer is often very tightly coupled with the instruction set of a computer.

3.95 arithmetic and logic unit (ALU). A functional component of a computer system that performs arithmetic and logical operations. *Syn:* arithmetic-logic unit. *See also:* arithmetic unit; exponent arithmetic and logic unit; logic unit; register arithmetic and logic unit.

3.96 arithmetic element. *See:* arithmetic unit.

3.97 arithmetic instruction. An instruction in which the operation field specifies an arithmetical operation; for example, an add instruction or a multiply instruction. *Contrast with:* logic instruction.

3.98 arithmetic-logic unit. *See:* arithmetic and logic unit.

3.99 arithmetic register. A register that holds the operands or the results of operations such as arithmetic operations, logic operations, and shift operations.

3.100 arithmetic unit. A functional component of a computer system that performs arithmetic operations. *Note:* The term is also sometimes used for an arithmetic and logic unit. *Syn:* arithmetic element. *See also:* scalar unit; vector unit.

3.101 array processor. A processor capable of executing instructions in which the operands may be arrays rather than scalar data elements. *Syn:* vector processor. *Note:* Arrays and other data structures are defined in IEEE Std 610.5-1990.

3.102 ASR. Acronym for automatic send/receive.

3.103 associative memory. A type of memory whose locations are identified by their contents or by a part of their contents, rather than by their names or positions. *Syn:* content-addressable storage; search memory.

3.104 astable circuit. A circuit that alternates between its two unstable states.

3.105 asymmetric multiprocessor. A multiprocessor in which the processors are not assigned equal tasks. *Note:* Typically one processor is in charge of assigning tasks to processors and controlling I/O for them all. *Contrast with:* symmetric multiprocessor.

3.106 asynchronous circuit. A logic circuit in which the timing of the result is not related to a clock. *Contrast with:* synchronous circuit. *See also:* double rail logic.

3.107 asynchronous computer. A computer in which each event or operation is performed upon receipt of a signal generated by the completion of a previous event or operation, or upon availability of the system resources required by the event or operation. *Contrast with:* synchronous computer.

3.108 asynchronous operation. An operation that occurs without a regular or predictable time relationship to a specified event; for example, an interrupt.

3.109 attention key (ATTN). A control key that causes an attention or input-output interrupt signal to be generated, thereby causing the processing unit to cease processing. *See also:* escape key. *Syn:* break key; program attention key.

3.110 attenuation. (1) A decrease in the magnitude of current, voltage, or power of a transmitted signal due to loss through a communication medium. *See also:* equalization. (2) A decrease in the magnitude of current, voltage, or power of a signal during transmission from one point to another.

3.111 ATTN. Abbreviation for attention key.

3.112 audio response device. An output device capable of generating spoken language.

3.113 autochanger. *See:* jukebox.

3.114 automatic. Pertaining to a function, operation, process, or device that, under specified conditions, functions without intervention by a human operator. [IEEE Std 610.2-1989]

3.115 automatic carriage. A control mechanism for a typewriter or other output device that can automatically control the feeding, spacing, skipping and ejecting of paper and preprinted forms.

3.116 automatic check. A check that is built into a device in order to verify the accuracy of information transmitted, manipulated, or stored by that device. *Syn:* built-in check; hardware check. [IEEE Std 610.5-1990]

3.117 automatic component interconnection matrix. A hardware system for connecting inputs and outputs of parallel computing components according to a predetermined program. *Note:* This system, which may consist of a matrix of mechanical and/or electronic switches, replaces the manual program patch boards and patch cords on analog computers. *Syn:* autpatch.

3.118 automatic computer.* A computer that can perform a sequence of operations without intervention by a human operator.

* Deprecated.

3.119 automatic-feed punch. A card punch or key-punch into which cards are fed automatically. *Contrast with:* hand-feed punch.

3.120 automatic punch. *See:* card punch.

3.121 automatic send/receive (ASR). (1) A teletypewriter with a keyboard, printer, and paper tape punch/reader, allowing tape to be produced and edited off-line for automatic transmission. *Contrast with:* keyboard send-receive. (2) A keyboard/printer device that uses asynchronous set-serial connection to a computer.

3.122 autpatch. *See:* automatic component interconnection matrix.

3.123 auxiliary console. In a computer system with more than one console, an alternate console used primarily to supervise operations within the computer. *Contrast with:* master console.

3.124 auxiliary operation. Any operation that is performed by equipment that is not under continuous control of the central processing unit.

3.125 auxiliary storage. A type of secondary storage that is available to a processor only through input-output channels; for example, storage on magnetic tape or a disk drive. *See also:* paging device. *Contrast with:* main storage. *Syn:* peripheral storage.

3.126 available time. (1) The time during which a functional unit is on and is operating correctly or is ready to use. *See also:* makeup time. *Contrast with:* unavailable time. (2) In time-sharing computer systems, the time

during which a system or system component is performing tasks for the user.

3.127 b. Abbreviation for bit.

3.128 B. Abbreviation for byte.

3.129 B-box. *See:* index register.

3.130 B-line. *See:* index register.

3.131 b-register.* *See:* index register.

* Deprecated.

3.132 backend. Pertaining to one part of a process which has two parts, the frontend and the backend; the frontend usually denotes what the user sees and the backend denotes some special process. *See also:* backend computer. *Contrast with:* frontend.

3.133 backend computer. A specialized computer that is attached to another computer, known as a frontend, or host, computer that handles the interface to the users while the backend computer performs functions such as database access, simulation, or vector processing. *Syn:* backend machine; backend processor. *Contrast with:* frontend computer. *See also:* bifunctional machine.

3.134 backend machine. *See:* backend computer.

3.135 backend processor. *See:* backend computer.

3.136 backplane. (1) The circuitry and mechanical elements used to connect the circuit boards within a computer system. *Note:* This circuitry is usually limited to terminating the bus signals, and sometimes generating central clocks or providing an arbiter. (2) The main circuit board of a computer into which other circuit boards are plugged. *Contrast with:* motherboard.

3.137 backward channel. A channel, associated with the forward channel, used for supervisory or error control signals, but with a direction of transmission opposite to that of the forward channel in which user information is being transferred. *Note:* In the case of simultaneous transfer of user information in both directions, this definition applies with respect to the data source under consideration. *Syn:* reverse channel.

3.138 backward read. To read data from a sequential storage medium in a reverse direction; for example, to read a magnetic tape from the end to the beginning.

3.139 badge reader. A reader capable of reading information on specially coded badges or cards.

3.140 balance check. In an analog computer, the computer-control state in which all amplifier summing junctions are connected to the computer zero reference level (usually signal ground) to permit zero balance of the operational amplifiers.

3.141 balanced. Pertaining to a relationship between two or more objects that are alike or symmetrical in some respect. *Contrast with:* unbalanced.

3.142 band. A group of tracks on a magnetic drum or a magnetic disk which are read or written as a group.

3.143 band printer. An element printer in which type slugs are carried on a flexible band.

3.144 bank. (1) One or more disk drives lined up in a row. (2) Any group of similar devices that are connected together for use as a single device. For example, a row of light-emitting diodes connected to form a display. (3) A contiguous section of addressable memory. For example, eight memory devices, each of which is 64 kB by 1; forming a 64 kB × 8 memory bank.

3.145 bar. *See:* type bar.

3.146 bar-code. An identification code consisting of a pattern of vertical bars whose width and spacing identifies the item marked. [IEEE Std 610.2-1989]

3.147 bar-code reader. *See:* bar-code scanner.

3.148 bar-code scanner. An optical scanner used to read a bar-code using reflected light. *Syn:* bar-code reader. *See also:* light pen.

3.149 bar printer. An element printer in which the members of the character set are carried on a type bar.

3.150 barrel shifter. A circuit which will shift a word a certain number of bits in either direction within a single clock cycle.

3.151 base address. (1) An address that is used as a reference point to which a relative address is added to determine the absolute address of a particular storage location to be accessed. *Syn:* constant address; presumptive address; reference address. [IEEE Std 610.12-1990a] (2) A given address from which an absolute address is derived by combination with a relative address.

3.152 base address register. A register used in an operand field of a processor instruction with a specified offset, the sum of which points to a data value within a data structure to be used by the instruction. *See also:* base register.

3.153 base font. The font that is used by a printer or other peripheral device when no font is specified. *Syn:* default font.

3.154 base register. *See:* base address register.

3.155 baud. A unit of signaling speed, expressed as the number of times per second the signal can change in the electrical state of the transmission line. *Note:* Depending on the encoding strategies, a signal event may represent a single bit or less than one bit. [IEEE Std 610.7-1995]

3.156 baud rate. The rate of signal transitions per unit time, usually expressed in baud. *Note:* Often confused with bit rate. *See also:* data signaling rate. [IEEE Std 610.7-1995]

3.157 beginning-of-file label (BOF). An internally-recorded label that identifies a file, marks its location, and contains information for use in file control. *Syn:* header label. *Contrast with:* end-of-file label.

3.158 beginning-of-tape marker (BOT). A marker on a magnetic tape used to indicate the beginning of the permissible recording area. *Note:* It might be a photo reflective strip, a unique data pattern, or a transparent section of tape. *Contrast with:* end-of-tape marker. *See also:* load point.

3.159 beginning-of-volume label (BOV). An internally-recorded label that identifies a volume and which indicates the beginning of the recording area on that volume. *Syn:* volume header; volume label. *Contrast with:* end-of-volume label.

3.160 bel. The fundamental unit in a logarithmic scale for expressing the ratio of two amounts of power. *Note 1:* The number of bels is equal to the $\log_{10}(P_1/P_2)$, where P_1 is the power level being considered and P_2 is an arbitrary reference level. *Note 2:* The decibel, a more commonly used unit, is equal to 0.1 bel.

3.161 belt printer. An element printer in which the type slugs are carried on a flexible belt.

3.162 benchmark. A standard against which measurements or comparisons can be made. *See also:* benchmark problem; benchmark program.

3.163 benchmark problem. (1) A problem used to evaluate the performance of hardware, software, or both. [ANSI X3.138-1988] (2) A problem used to evaluate the performance of several computer systems relative to one another, or relative to system specification.

3.164 benchmark program. A standard program that can be used to evaluate the performance of a computer system. *See also:* kernel benchmark program; local benchmark program; synthetic benchmark program.

3.165 bias. A systematic deviation of a value from a reference value. [IEEE Std 1084-1986]

3.166 biasing. A technique used in memory mapping whereby the translation from a logical address to a physical address is performed by simply adding a bias to the logical address to determine the physical address. *Syn:* relocation. *See also:* segmenting.

3.167 bidirectional bus (BIDI). A bus which provides a communication path in either direction between two or more devices; for example, between a central processor and peripheral devices.

3.168 bidirectional printer. A printer that can print in two directions, that is, left-to-right and right-to-left. *Syn:* reverse printer.

3.169 bifunctional machine. A computer that can perform either the host computer or backend computer functions.

3.170 bin. *See:* pocket.

3.171 binary card. A punch card that is to contain information in column binary or row binary form.

3.172 binary cell. A storage cell that can hold one binary digit. For example, a single-bit register.

3.173 binary digit (bit). (1) A unit of information that can be represented by either a zero or a one. *See also:* byte; word. [IEEE Std 610.12-1990] (2) An element of computer storage that can hold a unit of information as in (1). [IEEE Std 610.12-1990]

3.174 binary symmetric channel. A channel designed to convey messages consisting of binary characters and which has the property that the conditional probabilities

of changing any one character to the other character are equal.

3.175 binder-hole card. A punch card that contains one or more holes used to bind the cards together.

3.176 bipolar. (1) Having two opposite states, such as positive and negative; For example, in computer logic, a value of true is represented by an electrical voltage polarity opposite to that representing a value of false. *Contrast with:* unipolar. (2) Pertaining to a semiconductor technology in which transistors are built from alternating layers of positively and negatively doped semiconductor material. *See also:* diode-transistor logic; emitter coupled logic; transistor-transistor logic.

3.177 bistable. Pertaining to a circuit or device that is capable of assuming one of two stable states. *See also:* monostable.

3.178 bit (b). Acronym for binary digit. *See also:* block; byte; clocking bit; overhead bit; start bit; stop bit; synchronization bit. [IEEE Std 1084-1986, IEEE Std 610.5-1990, IEEE Std 610.12-1990]

3.179 bit blitter circuit. A circuit that performs bit block transfer operations. *Syn:* blitter. *See also:* blt chip.

3.180 bit block transfer. (1) To move information, optionally with a masking step, from one storage location to another. *Note:* Used extensively in bit mapped displays. Often abbreviated as bit blt, bitblt, or just blt (pronounced "blit"). *See also:* bit blitter circuit. (2) The transfer or combination of the pixel values in rectangular regions of bit maps.

3.181 bit blt (bitblt). Abbreviation for bit block transfer.

3.182 bit density. *See:* recording density.

3.183 bit map. A data structure that stores information about entities in the form of a series of one-bit entries, each of which describes the state of the corresponding entity; for example, in graphics, a block of memory that stores a raster image in a device-specific format in which the characteristics of each pixel are determined by a set of bits. *See also:* bit-mapped; bit plane. [IEEE Std 610.6-1991a]

3.184 bit map font. A font defined in the form of a bit map that specifies the bit pattern which makes up each character. *Contrast with:* outline font; vector font. *Syn:* intrinsic font. *Contrast with:* derived font.

3.185 bit-mapped. Pertaining to a display screen on which a character or image is generated from a bit map in memory.

3.186 bit pad. *See:* data tablet.

3.187 bit parallel. Pertaining to a method for simultaneously processing all bits as a contiguous set of bits over separate wires, one wire for each bit.

3.188 bit pattern. The image created on the screen of a display device by the mapping of the bit map onto the screen.

3.189 bit plane. A portion of a bit map that stores one bit of every pixel of a raster image. *Note:* Several bit planes are combined to make the full image.

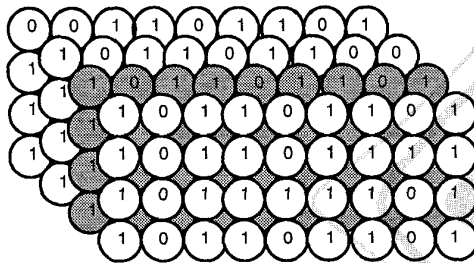


Figure 1—Bit plane

3.190 bit rate. The rate at which data are transmitted, expressed in bits per unit time. *Syn:* bit transfer rate. *See also:* baud rate. [IEEE Std 610.7-1995]

3.191 bit serial. Pertaining to a method of sequentially processing a contiguous set of bits one at a time over a single wire, according to a fixed sequence.

3.192 bit slice. Pertaining to a device consisting of an n-bit functional component, such as an arithmetic and logic unit (ALU), or a sequencer, which may be cascaded with one or more identical devices to expand the width of its function by multiples of n. *See also:* bit slice device; bit slice processor.

3.193 bit slice architecture. An architecture in which a section of the register and the arithmetic and logic unit in a computer is placed into one package. *See also:* bit slice processor.

3.194 bit slice device. A device that uses bit slice technology.

3.195 bit slice microprocessor.* *See:* bit slice device; bit slice processor.

* Deprecated.

3.196 bit slice processor. A processor that is built from multiple bit slices to any given word-size.

3.197 bit stream. A continuous stream of bits, transmitted over a channel with no separators between the character groups. [IEEE Std 610.7-1995]

3.198 bit transfer rate. *See:* bit rate.

3.199 blank medium. A data medium on which neither marks of reference, nor user data are recorded; For example, an unformatted floppy disk. *See also:* empty medium; virgin medium.

3.200 blitter. *See:* bit blitter circuit; bit block transfer.

3.201 block. (1) A group of contiguous storage locations, computer program statements, records, words, characters, or bits that are treated as a unit. *See also:* interblock gap. [IEEE Std 610.12-1990, IEEE Std 610.5-1990] (2) To form a group as in (1). (3) A circuit assemblage that functions as a unit. For example, a logic block within a sequential circuit.

3.202 block gap.* *See:* interblock gap. [IEEE Std 610.5-1990]

* Deprecated.

3.203 blt. *See:* bit block transfer.

3.204 blt chip. An integrated circuit whose purpose is to perform bit block transfer operations.

3.205 board. A generic term used as an abbreviation for circuit board.

3.206 BOF. Acronym for beginning-of-file label.

3.207 boolean vector machine. A special type of attractor neural network that uses binary values for its connectivity-states matrix.

3.208 boost. In an analog computer, to increase the power output capability of an operational amplifier by circuit modification in the output stage.

3.209 bore. The inside diameter of a spool of magnetic tape.

3.210 BOT. Acronym for beginning-of-tape marker.

3.211 bounds register. A register which holds an address specifying a storage boundary. *Note:* An access outside the boundary results in an error.

3.212 BOV. Acronym for beginning-of-volume label.

3.213 branch instruction. A computer instruction that changes the sequence in which computer instructions are performed. *Note:* A branch instruction generally specifies the next instruction in terms of a relative address based on the program counter. *Syn:* decision instruction. *See also:* conditional branch instruction; jump instruction.

3.214 breadboard. An experimental model of a circuit, usually roughly conceived, that can be used as a prototype for planning, design, and feasibility evaluation.

3.215 break key. *See:* attention key.

3.216 breakpoint halt. *See:* breakpoint instruction.

3.217 breakpoint instruction. (1) A computer instruction that causes program flow to be halted. *See also:* address stop. (2) A computer instruction that causes program flow to be redirected to a monitor or debugging program. *Syn:* breakpoint halt; dynamic stop.

3.218 bridge circuit. A circuit of elements that is arranged such that when an electromotive force is present in one branch, the response of a detecting device in another branch can be zeroed by adjusting the electrical constants of the other branches. *See also:* bridge limiter.

3.219 bridge limiter. A bridge circuit that is used as a limiter circuit.

3.220 bubble memory. A type of nonvolatile storage that uses magnetic fields to create regions of magnetization; a pulsed field breaks the regions into isolated bubbles, free to move along the surface and the presence or absence of a bubble represents digital information. *Syn:* magnetic bubble memory.

3.221 bucket. A colloquial reference for an area of storage that may contain more than one record and that is referenced as a whole by some addressing technique. [IEEE Std 610.5-1990a]

3.222 buffer. A device or storage area used to store data temporarily to compensate for differences in rates of data flow, time or occurrence of events, or amounts of data that can be handled by the devices or processes involved in the transfer or use of the data. *Syn:* input

buffer; input-output area; output buffer. [IEEE Std 610.5-1990, IEEE Std 610.12-1990]

3.223 buffer amplifier. An amplifier employed in analog computers that produces an output signal equal in magnitude to the input signal but always of one polarity. *Note:* This isolates a preceding circuit from the effects of the following circuit. *See also:* unloading amplifier.

3.224 buffer prefix. An area contained within a buffer that is used to store control information for the buffer.

3.225 buffer register. *See:* data buffer register; input buffer register.

3.226 buffer storage. (1) A type of storage that is used as temporary storage; to compensate for differences in data rate and data flow. *See also:* dynamic buffering. [IEEE Std 610.5-1990a] (2) A portion of main storage that is assigned to temporary storage as in (1).

3.227 buffered computer. A computer that can perform input-output and process operations simultaneously by using input and output buffers.

3.228 buffering. The process of using a buffer. *See also:* dynamic buffering.

3.229 bug. In computer hardware, a recurring physical problem that prevents a system or system component from working together properly.

3.230 built-in check. *See:* automatic check. [IEEE Std 610.5-1990]

3.231 built-in font. *See:* internal font.

3.232 bulk storage. *See:* mass storage.

3.233 burn in. The process of running a device for a period in order to identify early failures caused by "infant mortality." *Note:* This is not the same as programming, or "burning" electrically programmable read-only memory.

3.234 burning. *See:* electrically programmable; fusible link.

3.235 burst. (1) To read or write data in such a manner that does not require or permit an interruption to occur. (2) To separate the pages of a continuous form, often by means of a device called a burster. *See also:* decollate.

3.236 bus. One or more conductors that are used for the transmission of signals, data, or power. *See also:* address bus; bidirectional bus; control bus; data bus; data chain bus; memory bus; time-multiplexed bus.

3.237 bus-based architecture. A computer architecture in which the components such as processors, peripheral devices and memory are interconnected by one or more busses. *Contrast with:* non-bus architecture.

3.238 bus driver. (1) A device capable of providing sufficient current to drive all loads connected to a bus. *See also:* bus slave. (2) A device which controls access to a bus.

3.239 bus master. A device connected to a bus which controls all other devices connected to the same bus. *Note:* The bus master controls which slave devices may, and when they may, place data on the bus. *Contrast with:* bus slave.

3.240 bus mouse. A mouse that connects to the computer system using a bus, generally contained within a special expansion board. *Contrast with:* serial mouse.

3.241 bus slave. (1) A device which responds to signals on a bus. *Contrast with:* bus master. (2) A device connected to a bus which cannot put data onto the bus until given permission by the bus driver or bus master.

3.242 button device. *See:* choice device. [IEEE Std 610.6-1991]

3.243 byte. (1) A group of adjacent binary digits operated upon as a unit and is usually shorter than a computer word. *Note:* Although most people refer to a byte as having 8 bits used for data representation, hardware designers may add one or more parity bits to be used for error detection and correction. *See also:* doublet; gigabyte; gulp; kilobyte; megabyte; nibble; n-bit byte; octet; quintet; quartet; septet; sextet; triplet. [IEEE Std 610.12-1990a] (2) An element of computer storage that can hold a group of bits as in (1). *See also:* bit; word. [IEEE Std 610.12-1990]

3.244 cache. A small portion of high-speed memory used for temporary storage of frequently-used data, instructions, or operands. *See also:* cache architecture; cache memory; caching; data cache; disk cache; high-speed buffer; instruction cache.

3.245 cache architecture. (1) A computer architecture that employs an extremely high-speed memory block, called a cache, in which data is stored. (2) The organiza-

tion of cache memory; for example, direct mapped cache, two-way set associative cache.

3.246 cache hit. *See:* hit.

3.247 caching. The process of accessing a cache.

3.248 cage. *See:* card cage.

3.249 calculating punch. A calculator, with card reader and card punch, that reads data from a punch card, performs some arithmetic operations or logic operations on the data, and punches the results on the same or another punch card. *Syn:* multiplying punch.

3.250 calculator. A device that is suitable for performing logic and arithmetic digital operations, but that requires manual intervention to initiate each operation. *See also:* calculating punch.

3.251 capacitor. An element within a circuit consisting of two conductors, each with an extended surface exposed to that of the other, but separated by a layer of insulating material called the dielectric. *Note:* The dielectric is designed so the electric charge on one conductor is equal in value but opposite in polarity to that of the other conductor. *See also:* storage capacitor.

3.252 capacitor storage. A type of storage that uses the capacitive properties of certain materials.

3.253 capstan. A rotating shaft within a tape drive that pulls the tape across the read or write heads.

3.254 card. (1) A generic term used as an abbreviation for a circuit board. (2) An input medium made of paper-board, formed in a uniform size and shape such that it may be punched or marked and sensed electronically. *See also:* magnetic card; mark-sensing card; punch card.

3.255 card cage. A chassis in which a printed circuit board may be mounted.

3.256 card code. The set or combination of punched holes in a punch card that represent a character.

3.257 card column. A single vertical line of punch positions on a punch card. *Contrast with:* card row.

3.258 card deck. A group of punch cards.

3.259 card duplicator. *See:* card reproducing punch.

3.260 card feed. A mechanism that moves cards one at a time from the card hopper to the card path.

3.261 card hopper. The part of a card-processing device that holds the cards to be processed and makes them available to the card feed mechanism. *Contrast with:* card stacker. *Syn:* punched card holder.

3.262 card image. A representation of the hole patterns found in a punched card, for example, a matrix in which a one represents a punch and a zero represents the absence of a punch.

3.263 card path. In a card-processing device, a path along which cards are moved and guided. *See also:* card feed.

3.264 card-processing device. Any device that can read or write data to punch cards. *See also:* card punch; card reader; card reproducing punch.

3.265 card punch. An output device that produces a record of data as hole patterns in punch cards. *Syn:* automatic punch. *See also:* card-reproducing punch; key-punch.

3.266 card reader. An input device that reads or senses hole patterns in a punch card, transforming the data from hole patterns to electrical signals. *Syn:* punched card reader. *See also:* card hopper; card stacker; card track; paper tape reader.

3.267 card reproducer. *See:* card reproducing punch.

3.268 card reproducing punch. A card-processing device that prepares one punch card, copying all or part of the data from another punch card. *Syn:* card duplicator; card reproducer.

3.269 card row. A single horizontal line of punch positions on a punch card. *Contrast with:* card column.

3.270 card sorter. A sorting device that deposits punch cards in pockets selected according to the hole patterns in the cards.

3.271 card stacker. The part of a card-processing device that receives the cards after they have been processed. *Contrast with:* card hopper.

3.272 card-to-disk converter. An input device that converts data from punch cards to disk storage. *See also:* card-to-tape converter; key-to-disk converter.

3.273 card-to-tape converter. An input device that converts data from punch cards to magnetic or paper tape. *See also:* card-to-disk converter; key-to-tape converter.

3.274 card track. That part of a card-processing device that moves and guides the card along the card path.

3.275 carriage. The mechanism in a typewriter or other printing device that holds the paper and moves it past the printing position. *See also:* automatic carriage.

3.276 carriage control tape. (1) A tape that is used to control vertical tabulation of printing or display positions. (2) A tape that contains line feed and form feed control data for a printing device.

3.277 carriage restore key. *See:* carriage return key.

3.278 carriage return (CR). A command or signal sent to a printer to instruct it to move to the beginning of the writing line. *Note:* Often used in conjunction with a line feed to move to the beginning of the next writing line.

3.279 carriage return key. A control key on a keyboard that initiates a carriage return. *Syn:* carriage restore key. *Note:* Often used to terminate a command or to request its execution. *Syn:* enter key.

3.280 cartridge. A container holding some form of data medium such that the medium can be accessed without separating it from the container; for example, a magnetic tape cartridge or a font cartridge. *See also:* cassette.

3.281 cartridge font. A font that is stored on a font cartridge.

3.282 cassette. A container holding some form of data medium on reels which are driven at their axis at a variable speed which allows the tape to be accessed without separating it from the container. *See also:* cartridge; magnetic tape cassette.

3.283 cathode ray storage. A type of matrix storage in which a cathode ray beam is used to access data.

3.284 cathode ray tube (CRT). An evacuated glass tube in which a well-defined and controllable beam of electrons is focused onto a phosphor-coated display surface of the tube causing the phosphors to emit light. *Note:* A beam deflection system moves the beam as required to generate an image. *See also:* storage tube; Williams-tube storage. [IEEE Std 610.6-1991a]

3.285 CBEMA. Acronym for the Computer and Business Equipment Manufacturers Association.

3.286 CCD. Acronym for charge-coupled device.

3.287 CCITT. Acronym for Comité Consultatif International de Télégraphique et Téléphonique (French). *Note:* Also known in English as International Telegraph and Telephone Consultative Committee.

3.288 CCR. Acronym for condition code register.

3.289 CD. Acronym for compact disc.

3.290 CD-ROM. Acronym for compact disc read-only memory. *See:* CD-ROM storage.

3.291 CD-ROM storage. A read-only form of optical storage employing compact discs to store information.

3.292 cell. (1) A module used in assembling application-specific integrated circuits. *See also:* photocell. (2) The storage position of one unit of information, such as a character, a bit, or a word. *See also:* storage cell.

3.293 cell library. A collection of cells used to design and lay out application-specific integrated circuits in accordance with the functional requirements of particular end users

3.294 cell-organized raster display device. A raster display device on which an image is constructed by a collection of rectangular characters, each character represented by an n-by-m set of illuminated control indicators.

3.295 central computer.* *See:* host computer.
* Deprecated.

3.296 central processing unit (CPU). That unit of a computer system which fetches, decodes and executes programmed instructions and maintains the status of results as the program is executed. *Syn:* central processor. *See also:* processor; uniprocessor.

3.297 central processor. *See:* central processing unit.

3.298 chad. The bit of material resulting from punching a hole in a paper card or tape. *Syn:* chip.

3.299 chadless tape. Perforated tape that has been punched in such a way that chad is not formed.

3.300 chain printer. An element printer in which the type slugs are carried by the links of a revolving chain, called a print chain.

3.301 change recording. *See:* non-return-to-zero (change) recording.

3.302 channel. (1) A one-way path for transmission of signals between two or more points; for example, an output channel or a data channel. *See also:* circuit. *Syn:* line; link; path. [IEEE Std 610.7-1995] (2) The portion of a storage medium that is accessible to a given reading or writing station, such as a track, or a band. (3) A two-way communications path between the central processor and its peripheral devices. [IEEE Std 610.7-1995]

3.303 channel-attached terminal. A terminal that is connected directly to the computer by wires or cables. *Syn:* locally-attached terminal. *Contrast with:* link-attached terminal.

3.304 channel path. The routing, switching and line links between an input-output channel and some peripheral device. *Note:* There may be multiple channel paths between a channel and a device. [IEEE Std 610.7-1995]

3.305 channel router. A machine used to determine a path between two points. *Note:* Often used in the design and layout of integrated circuits and printed circuit boards.

3.306 character device. A printer or other peripheral device that receives data character by character.

3.307 character display device. A display device that provides a representation of data only in the form of characters. *Syn:* alphanumeric display device; readout device. *Contrast with:* graphic display device.

3.308 character font. A family or related set of graphic characters that are of the same style of type. For example, Courier Bold Oblique. [IEEE Std 610.12-1990a]

3.309 character generator. A device that forms character images on a display device or printer.

3.310 character printer. A printer that can print only character text. *Contrast with:* graphic printer.

3.311 character reader. A reader that can recognize hand-written or printed characters using character recognition. *See also:* magnetic ink character reader; optical character reader; page reader.

3.312 character-at-a-time printer. A printer that prints a single character at a time. *Syn:* serial printer. *Contrast with:* line printer; page printer.

3.313 character-based user interface. A user interface in which commands must be expressed in characters entered on a keyboard. *Syn:* text-based user interface. *Contrast with:* graphical user interface.

3.314 charactron. A CRT display device that incorporates a metallic foil into which characters are embossed. The electron beam is directed to the location of a desired character on the foil and its image focused onto the display surface.

3.315 charge-coupled device (CCD). A storage device in which individual semiconductor components are connected to each other so that the electrical charge at the output of one device provides the input to the next.

3.316 charge-storage tube. *See:* storage tube display device.

3.317 CHDL. Acronym for computer hardware description language. *See:* hardware description language.

3.318 check card. A punch card so formatted as to be suitable for use as a negotiable bank check; for example, a U.S. series E bond.

3.319 Chinese binary. *See:* column binary.

3.320 chip. (1) *See:* integrated circuit. (2) A small piece of silicon or other semiconductive material on which circuits can be placed. (3) *See:* chad

3.321 chip density. The number of transistors implemented on a single integrated circuit.

3.322 choice device. A logical input device used to make a selection from a set of predefined menu options in a graphics system. A typical physical device is a function keyboard or a set of function keys. *Syn:* button device. [IEEE Std 610.6-1991]

3.323 chopper. A mechanical, electrical, or electromechanical device that converts direct current into alternating current. *Note:* As applied to a direct-coupled operational amplifier, it is a modulator used to convert the direct current at the summing junctions to alternating current for amplification and reinsertion as a correcting voltage to reduce offset.

3.324 circuit. (1) An arrangement of interconnected components that has at least one input and one output terminal, and whose purpose is to produce at the output terminals a signal that is a function of the signal at the input terminals. *See also:* channel; element node; expansion board; telecommunication circuit. *Syn:* network; physical circuit. (2) An arrangement of interconnected electronic components that can perform specific functions upon application of proper voltages and signals. *See also:* integrated circuit; logic circuit.

3.325 circuit board. A flat piece of insulating material, often multi-layered, constituted of epoxy-glass or phenolic resin, on which electrical components are mounted and interconnected by etched copper foil so patterned as to form a circuit. *Note:* Sometimes referred to as a "board" or a "card." *See also:* printed circuit board.

3.326 circuit limiter. *See:* limiter circuit.

3.327 circulating register. A shift register in which data that are moved out of one end of the register are reentered into the other end, as in a closed loop.

3.328 circulating storage. Dynamic storage in the form of a closed loop. *Syn:* cyclic storage. *See also:* regenerative track.

3.329 CISC. Acronym for complex-instruction-set computer.

3.330 CIU. Acronym for computer interface unit.

3.331 clamping circuit. (1) A circuit used in analog computers to provide automatic hold and reset action electronically for the purpose of switching or supplying repetitive operation. (2) *See:* limiter circuit

3.332 clear. To replace a variable, register, or other storage location with a zero, blank, or null value. *See also:* initialize; reset. [IEEE Std 610.12-1990a]

3.333 clock. (1) A device that measures and indicates time. *See also:* master clock; real-time clock; time-of-day clock; timer; wall clock. (2) A device that generates periodic, accurately spaced signals used for such purposes as timing, regulation of the operations of a processor, or generation of interrupts. (3) To trigger a circuit to perform an operation, such as to accept data into a register.

3.334 clock pulse. *See:* clock signal.

3.335 clock register. *See:* timer.

3.336 clock signal. A periodic signal used for synchronizing events. *Syn:* clock pulse; timing pulse.

3.337 clock track. A track on which a pattern of signals, known as synchronization bits, is recorded to provide a timing reference. *Syn:* timing track. *See also:* clocking bits.

3.338 clocking bit. A bit containing an encoded signal, preceding the data within a data stream, or on a separate channel; used for establishing timing intervals. *See also:* clock track; synchronization bits. [IEEE Std 610.7-1995]

3.339 closed architecture. An architecture for which design parameters and specifications are not available to anyone except the manufacturer of the system. *Contrast with:* open architecture.

3.340 cluster. One or more contiguous sectors on a magnetic disk.

3.341 CMOS. Acronym for complementary metal-oxide semiconductor.

3.342 coarse-grain parallel architecture. Parallel architecture that uses between 2 and 16 processors. *Contrast with:* fine-grain parallel architecture; medium-grain parallel architecture.

3.343 coated card. *See:* edge-coated card.

3.344 code converter. A converter that changes the representation of data from one code to another. [IEEE Std 610.5-1990a]

3.345 coefficient potentiometer. A parameter potentiometer that is used to represent a coefficient.

3.346 collator. A device that compares and merges sets of punch cards or other documents into a sequence.

3.347 color display device. A display device that can display more than one color, in addition to the background color. *Contrast with:* monochrome display device. *See also:* red, green, blue (RGB) display device. [IEEE Std 610.6-1991a]

3.348 color printer. A printer that utilizes multi-colored ribbons, pens, or ink supplies, allowing it to print in more than one color.

3.349 column binary. Pertaining to the binary representation of data on punch cards in which the weights of

punch positions are assigned along card columns, for example, each column in a 12-row card may be used to represent 12 consecutive bits. *Syn:* Chinese binary. *See also:* binary card. *Contrast with:* row binary.

3.350 COM printer. Acronym for computer output microfilm printer.

3.351 combinational. Pertaining to a logic whose output values at any given instant depend only upon the input values at that time. *Contrast with:* sequential.

3.352 combinational circuit. A logic circuit whose output values at any given instant depend only upon the input values at that time. *Syn:* combinatorial circuit. *Contrast with:* sequential circuit. *See also:* gate.

3.353 combinatorial circuit. *See:* combinational circuit.

3.354 combined head. *See:* read/write head.

3.355 Comité Consultatif International de Télégraphique et Téléphonique (CCITT). An international organization that studies and issues recommendations on issues related to communication technology. *Note:* Also known in English as International Telegraph and Telephone Consultative Committee.

3.356 command. (1) In hardware, a control signal. (2) An expression that can be input to a computer system to initiate an action or affect the execution of a computer program; for example, the "log on" command to initiate a computer session. [IEEE Std 610.12-1990] (2) Loosely, a mathematical or logic operator. (3) Loosely, a computer instruction.

3.357 command key. Any control key on a keyboard used to represent a particular machine command.

3.358 common storage. A portion of main storage that can be accessed by two or more modules in a software system. [IEEE Std 610.12-1990]

3.359 communication. The flow of information from one point, known as the source, to another, the receive.

3.360 communications computer. A computer that is specially designed to be an interface between another computer or terminal and a network, or to control data flow in a network. *See also:* concentrator; frontend computer; switching computer. [IEEE Std 610.7-1995]

3.361 compact disc (CD). An optical disk that is compact in size, generally 4 to 5 inches in diameter. *See also:* CD-ROM storage; laser disk.

3.362 compact disc read-only memory (CD-ROM). *See:* CD-ROM storage.

3.363 compact disc storage. *See:* CD-ROM storage.

3.364 compatible. Pertaining to a computer system or system component that is capable of handling data and programs intended for use with some other system or component. *See also:* downward compatible; upward compatible.

3.365 complementary metal-oxide semiconductor (CMOS). A semiconductor technology in which circuits are composed of paired NMOS and PMOS devices; characterized by extremely low power dissipation when not changing states.

3.366 complements. A device whose output data are a representation of the complements of the numbers represented by its input data.

3.367 complex-instruction-set computer (CISC). A computer with a very expansive and robust instruction set, incorporating several types of addressing modes and varying length instruction words. *Note:* Such instructions are usually stored in microcode. *Contrast with:* reduced-instruction-set computer.

3.368 component. (1) One of the parts that make up a system. A component may be hardware or software and may be subdivided into other components. *Note:* The terms “module,” “component,” and “unit” are often used interchangeably or defined to be sub-elements of one another in different ways depending upon the context. The relationship of these terms is not yet standardized. [IEEE Std 610.12-1990] (2) Any part, assembly, or subdivision of a computer, such as a resistor, amplifier, power supply or rack.

3.369 computational bandwidth. The maximum number of operations per second a machine can perform.

3.370 compute-bound. Pertaining to programs that have an abundance of computations. *Contrast with:* input-output bound. *Syn:* process bound.

3.371 computer. A device that consists of one or more associated processing units and peripheral units, that is controlled by internally stored programs, and that can perform substantial computations, including numerous

arithmetic operations, or logic operations, without human intervention during a run. *Note:* May be stand alone, or may consist of several interconnected units.

3.372 Computer and Business Equipment Manufacturers Association (CBEMA). The Secretariat for ANSI X3 series standards on information processing.

3.373 computer architecture. The organizational structure of a computer system, including the hardware and the software. *Contrast with:* computer network architecture.

3.374 computer channel. *See:* input-output channel.

3.375 computer-control state. In an analog computer, one of several distinct and selectable conditions of the control circuit. *See:* balance check; hold; operate; potentiometer set; reset; static test.

3.376 computer control unit. *See:* instruction control unit.

3.377 computer description language. *See:* hardware description language.

3.378 computer hardware description language (CHDL). *See:* hardware description language.

3.379 computer instruction. (1) A statement in a computer language; specifying an operation to be performed by a computer and the addresses or values of the associated operands; for example, MOVE A to B. *See also:* address field; machine instruction; microinstruction; nanoinstruction; operand field; operation field. [IEEE Std 610.12-1990a] (2) Loosely, any executable statement in a computer program. [IEEE Std 610.12-1990] (3) An instruction expressed in machine language.

3.380 computer instruction code. A code used to represent the instruction within an instruction set. *See also:* machine code.

3.381 computer instruction set. The collection of computer instructions possible on a given computer. *Syn:* machine instruction set.

3.382 computer interface unit (CIU). A device used to connect peripheral devices with a computer.

3.383 computer language. A language designed to enable humans to communicate with computers and computer systems. *Note:* IEEE Std 610.13-1993 defines specific computer languages. [IEEE Std 610.13-1993]

3.384 computer network. A structured connection of computer systems and peripheral devices that exchange data as necessary to perform the specific function of the network. *See also:* centralized computer network; decentralized computer network; distributed computer network. *Note:* Terminology relating to networks can be found in IEEE 610.7-1995. [IEEE Std 610.7-1995]

3.385 computer network architecture. The logical structure and the operating principles, including those concerning services, functions, and protocols, of a computer network. *Contrast with:* computer architecture. [IEEE Std 610.7-1995]

3.386 computer operation. (1) An operation which can be performed by a computer with a single instruction. (2) An operation performed by a functional unit within a computer. For example: an instruction fetch, or an addition. *Syn:* machine operation.

3.387 computer output microfilm (COM). The end result of a process that converts and records data from a computer directly to a microfilm. *Syn:* microfilm. [IEEE Std 610.12-1990a]

3.388 computer output microfilm printer (COM printer). A page printer that produces a microimage of each page on a photographic film.

3.389 computer program. A combination of computer instructions and data definitions that enable computer hardware to perform computational or control functions. [IEEE Std 610.5-1990, IEEE Std 610.12-1990]

3.390 computer resources. The computer equipment, programs, documentation, services, facilities, supplies, and personnel available for a given purpose. [IEEE Std 610.12-1990]

3.391 computer system. A system containing one or more computers, peripheral devices and associated software. *Syn:* computing system. [IEEE Std 610.12-1990a]

3.392 computer word. (1) A unit of storage, typically a set of bits, that is suitable for processing by a given computer; for example, two bytes. *Syn:* fullword; machine word. *See also:* double word; halfword. (2) *See:* word. [IEEE Std 610.12-1990]

3.393 computing system. *See:* computer system

3.394 concentrator. A communications computer that provides communications capability between many low speed asynchronous channels and one or more high-

speed synchronous channels. *See also:* data concentrator; wiring concentrator.

3.395 condition code register (CCR). A flag register used to hold the status bits used to decide conditional branches. *Note:* These bits generally include: zero, negative, and overflow.

3.396 conditional branch instruction. A branch instruction that specifies conditions and, if those conditions are met, changes the program flow to a new location. *See also:* branch instruction; conditional jump instruction.

3.397 conditional control transfer instruction.* *See:* conditional jump instruction.

* Deprecated.

3.398 conditional jump instruction. A jump instruction that specifies conditions and, if those conditions are met, changes program flow to a new location. *See also:* conditional branch instruction. *Contrast with:* unconditional jump instruction.

3.399 conditional transfer instruction.* *See:* conditional jump instruction.

* Deprecated.

3.400 conducting material. A material, such as a metal, that has a very large number of free electrons that can easily be put into motion to create an electric current. *Contrast with:* insulating material; semiconducting material.

3.401 conductor. A device made from conducting material; For example, a metal wire.

3.402 configuration. (1) The arrangement of a computer system, network, or component as defined by the number, nature, and interconnections of its constituent parts. [IEEE Std 610.12-1990] (2) The physical and logical elements of an information processing system, the manner in which they are organized and connected, or both. *Note:* May refer to hardware configuration or software configuration. [IEEE Std 610.7-1995]

3.403 conjunction. The Boolean operation whose result has the value 1 if and only if each operand has the value 1. *See also:* AND gate. *Contrast with:* nonconjunction.

3.404 connect time. In time-sharing computer systems, the time that a terminal or user is connected and able to communicate with a computer. *See also:* CPU time.

3.405 connectionless service. A kind of delivery service offered by most hardware that treats each packet or datagram as a separate entity containing the source and destination address.

3.406 consecutive sequence computer. A type of computer in which instructions are executed in an implicitly defined sequence unless a jump instruction specifies the storage location of the next instruction to be executed. *Contrast with:* arbitrary sequence computer.

3.407 console. A functional unit used for communication between the computer operator and the computer. *Note:* May provide special-purpose keys, input devices, and display devices employed to operate and control the computer. *Syn:* console display; display console. *See also:* control panel.

3.408 console display. *See:* console.

3.409 constant address. *See:* base address.

3.410 constant-linear-bit recording. A method for recording information on a storage device whereby the rotational speed is kept constant, but the data rate (density) is varied with the track to ensure that data is stored with the same number of bits per inch in all tracks. *Contrast with:* constant-linear-velocity recording.

3.411 constant-linear-velocity recording. A method for recording information on a circular disk whereby the rotational speed is varied so that the speed of the storage medium past the recording head is constant for all tracks on the disk. *Note:* Since the outer-most tracks are longer than the inner-most tracks, this allows the device to store more information there. *Contrast with:* constant-linear-bit recording. *Syn:* group code recording.

3.412 content addressable storage. *See:* associative memory.

3.413 contiguous memory. An area of storage that occupies consecutive or adjacent address locations.

3.414 continuous feed. A mechanism enabling a printer to employ continuous form paper using friction feed or tractor feed. *Contrast with:* single-sheet feed.

3.415 continuous form. (1) A series of connected paper forms, each divided by a tear-off perforation, that feeds continuously through a printing device. *Syn:* fanfold paper; zip-zag fold paper; Z-fold paper. *Contrast with:* cut form. *See also:* burst. (2) Pertaining to a series of

cards or paper as in (1). For example, continuous form cards or continuous form paper.

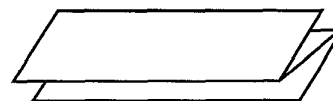


Figure 2—Continuous form

3.416 continuous-stream printer. A printer that can print processed data off-line in a continuous form.

3.417 control area. A storage area used to hold information necessary for the control of a task, function, or operation.

3.418 control ball. *See:* track ball.

3.419 control block. The circuitry within a computer that performs control functions such as decoding micro-instructions and generating the internal control signals that perform requested operations.

3.420 control bus. A bus that carries signals that regulate system operations.

3.421 control card. A punch card containing input parameters for controlling the execution of a program or job.

3.422 control counter.* *See:* program counter.
* Deprecated.

3.423 control flow architecture. A computer architecture in which execution is controlled by the need for a particular result; that is, an instruction is executed only when its result is needed by another process. *Contrast with:* data flow architecture. *Syn:* Von Neumann architecture. *Contrast with:* Harvard class architecture.

3.424 control hole. *See:* designation hole.

3.425 control instruction register.* *See:* program counter.
* Deprecated.

3.426 control key (CTRL). Any key on a keyboard that is used to control a process. *Note:* The control key, usually labelled “CTRL” is said to represent a control character, and when used in conjunction with another key, such as “C”, the combination is said to represent the control character “CONTROL C” or “^C”. *Contrast with:* typing key. *See also:* alternate key; attention key;

command key; cursor control key; enter key; escape key; function key; shift key.

3.427 control panel. The part of a console that contains switches, pushbuttons and indicators.

3.428 control punch. *See:* designation hole.

3.429 control read-only memory (CROM). A type of read-only storage in the control block of some processors such that the ROM has been programmed to decode the control logic.

3.430 control register. (1) A register in a computer or peripheral device, the contents of which control the operations of the computer or peripheral. *See also:* device register. (2)* *See:* program counter.

* Deprecated.

3.431 control signal. Any signal that purposely affects the recording, processing, transmission or interpretation of data by a system element.

3.432 control store. In a microprogrammed computer, the computer memory in which microprograms reside. *See also:* microword. [IEEE Std 610.12-1990]

3.433 control tape. *See:* carriage control tape.

3.434 control terminal. *See:* master terminal.

3.435 control transfer instruction.* *See:* jump instruction.

* Deprecated.

3.436 control unit. A functional unit of a computer that interprets and executes the instructions of a program in a prescribed sequence. *See also:* instruction control unit; main control unit.

3.437 controller. (1) A functional unit in a computer system that controls one or more units of the peripheral equipment. *Syn:* peripheral control unit. *See also:* dual-channel controller; input-output controller. (2) In robotics, a processor that takes as input desired and measured position, velocity or other pertinent variables and whose output is a drive signal to a controlling motor or activator. (3) A device through which one can introduce commands to a control system.

3.438 convention. Any practice that is not formally standardized, but which is adopted by a group in a given situation. For example, programmers usually adopt the convention of indenting subordinate instructions in a

routine so that the structure of the program is more easily visualized. *See also:* standard.

3.439 converter. A device capable of converting impulses from one mode to another, such as analog to digital, parallel to serial, or from one code to another. *See also:* code converter; digital-to-analog converter; power supply.

3.440 coprocessor. A processor used in conjunction with a central processing unit, designed to perform specific functions that may not be executed efficiently by the central processing unit, for example: a floating-point coprocessor.

3.441 core. *See:* magnetic core.

3.442 core memory.* *See:* magnetic core.

* Deprecated.

3.443 core storage. A type of storage in which the data medium consists of magnetic cores. *Contrast with:* semiconductor storage.

3.444 corrective maintenance. Maintenance that is performed specifically to overcome existing faults. *Contrast with:* preventive maintenance.

3.445 corrupt data error. (1) An error condition that results when hardware components fail or an external impulse enters into the system upsetting at least one data bit. (2) A condition that results from erratic hardware performance, characterized by introduction of a high degree of random errors in the data.

3.446 counter. (1) A device with a finite number of states each of which represents a number which, upon receipt of an appropriate signal, can be incremented or decremented by a given constant. *Note:* The device may be capable of being set to a particular state such as zero. *See also:* keystroke counter; line counter; modulo-n counter; reversible counter. (2) A register or storage location used to accumulate the number of occurrences of some event. *See also:* program counter.

3.447 CPU. Acronym for central processing unit.

3.448 CPU busy time. *See:* CPU time.

3.449 CPU time. In time-sharing computer systems, the time devoted by the central processing unit to the execution of instructions of a particular process, task, or user. *Syn:* CPU busy time. *See also:* connect time.

3.450 CPU timer. A feature of some computer systems that measures elapsed CPU time and that causes an interrupt when a previously specified amount of time has elapsed.

3.451 CR. Acronym for carriage return.

3.452 crash. (1) The sudden and complete failure of a computer system or component. *Note:* IEEE Std 610.12-1990 defines specific failure terminology. *See also:* disk crash; head crash; hard failure. [IEEE Std 610.12-1990] (2) To fail as in (1).

3.453 CROM. Acronym for control read-only memory.

3.454 cross bar switch. A relay-operated device that makes a connection between a line in a set of lines and a line in another set, where the two sets are arranged along adjacent sides of a matrix of contacts or switch points.

3.455 crowbar. A protective circuit in a power distribution circuit that rapidly shorts the output voltage to ground when an over-voltage or other error condition occurs.

3.456 CRT. Acronym for cathode ray tube. [IEEE Std 610.6-1991]

3.457 CRT display device. A display device that displays data onto a phosphor coated display screen using controlled electron beams within a CRT. *Note:* Raster display devices and random-scan display devices are two major categories of CRT display devices. *See also:* charactron; dark-trace tube display device; penetration CRT display device; raster display device; storage tube display device.

3.458 cryogenic storage. A type of storage that uses the superconductive and magnetic properties of certain materials at temperatures near absolute zero.

3.459 cryotron. A device that makes use of the effects of extremely low temperatures on conductive materials such that small magnetic field changes can control large current changes.

3.460 CTRL. Acronym for control key.

3.461 cursor. (1) In computer graphics, a cross, flashing underscore, or other symbol that represents a position on a graphics display surface. [IEEE Std 610.6-1991] (2) A moveable icon or spot of light on the screen of a display device that indicates a particular object or character. [IEEE Std 610.2-1987a] (3) A moveable mark as in (1)

that indicates the position on which the next operation will occur.

3.462 cursor control device. An input device used to control the position of the cursor on a display device. *Syn:* pointing device. *See also:* cursor control keypad; joystick; mouse; paddle. [IEEE Std 610.6-1991]

3.463 cursor control key. Any key on the keyboard that may be used to control a cursor function such as moving the cursor up or down a line. *See also:* carriage return key; home key.

3.464 cursor control keypad. A keypad comprising a set of cursor control keys such as in the following diagram of a standard inverted "T" cursor control keypad.

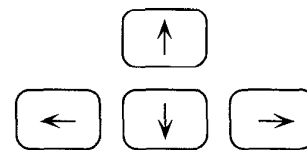


Figure 3—Cursor control keypad

3.465 cut form. A series of individual paper forms that feed into a printing device. *Contrast with:* continuous form.

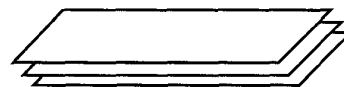


Figure 4—Cut form

3.466 cut-sheet feed. A mechanism enabling a printer to print on multiple sheets of paper. *See also:* single-sheet feed.

3.467 cycle. (1) In an AC voltage or current, exactly one complete set of positive and negative values. (2) Any set of operations that is repeated regularly in the same sequence. *See also:* cycle time; instruction cycle, machine cycle. *See also:* read cycle; read-write-modify cycle; write cycle. (3) To perform, or cause to perform, one set of operations as in (2). (4) An interval of space or time in which one set of operations as in (2) is completed.

3.468 cycle counter. *See:* index register.

3.469 cycle stealing. The process of suspending the operation of a central processing unit for one or more cycles to permit the occurrence of other operations, such

as transferring data from main storage in response to an output request from an input-output controller. [IEEE Std 610.12-1990a]

3.470 cycle time. The minimum amount of time between the start of successive read or write cycles of a storage device. *See also:* read cycle time; write cycle time.

3.471 cyclic storage. *See:* circulating storage.

3.472 cylinder. In an assembly of magnetic disks, the set of all tracks that can be accessed by all the magnetic heads at a given fixed position.

3.473 D flip-flop. A flip-flop that has one data input, one trigger, and an output which assumes the state of the data input when the trigger is received.

3.474 D/A. Acronym for digital-analog computer. *See:* digital-to-analog converter.

3.475 D/A converter. *See:* digital-to-analog converter.

3.476 d-to-a converter. *See:* digital-to-analog converter.

3.477 DAC. Acronym for digital-to-analog converter.

3.478 daisy wheel printer. A wheel printer in which the type slugs are mounted on a “daisy wheel,” a central hub with numerous spring fingers each of which is embossed with one character.

3.479 dark trace tube display device. A CRT display device whose electron beam causes the display surface of the tube to darken rather than to brighten. For example, the image may be viewed by illumination from the rear as a reverse image against the otherwise transparent or translucent face of the tube.

3.480 DASD. Acronym for direct-access storage device.

3.481 data. A representation of facts, concepts, or instructions in a manner suitable for communication, interpretation, or processing by humans or by automatic means. *Note:* “Data” is plural for datum, but is often used as collective noun, as in “The data is in this file.” IEEE Std 610.5-1990 defines terminology pertaining to data management. [IEEE Std 610.5-1990]

3.482 data access register. A register that is used for arithmetic associated with random-access of data.

3.483 data buffer register. A register in a central processing unit or peripheral device capable of receiving or transmitting data at different data transfer rates. *See also:* input buffer register.

3.484 data bus. A bus used to communicate data to and from a processing unit or a storage device. *Contrast with:* storage bus. *See also:* bidirectional bus.

3.485 data cache. An area of high-speed buffer storage, used to store data and operands. *Contrast with:* instruction cache.

3.486 data card. A punch card that contains data to be used by a computer program. *See also:* source data card.

3.487 data carrier. Material that serves as a data medium or to which a data medium is applied and that facilitates the transport of data; for example, a punch card, a magnetic disk or a plastic card with a magnetic surface that serves as the data medium. [IEEE Std 610.5-1990a]

3.488 data cell. *See:* storage cell.

3.489 data chain bus. A connection by which electrical signals are transmitted and/or received at multiple circuit elements.

3.490 data channel. *See:* input-output channel.

3.491 data collection station. *See:* data input station.

3.492 data converter. A device whose purpose it is to convert data from one representation to an equivalent representation. *See also:* code converters; protocol converters.

3.493 data entry device. An input device used to prepare data so that a computer can accept it. For example, a keyboard, or bar-code scanner.

3.494 data flow architecture. A computer architecture in which execution is controlled only by the data needed for that operation and not the order in which instructions are stored in memory. *Contrast with:* control flow architecture.

3.495 data input station. A workstation that is used primarily as an input device. *Syn:* data collection station; input workstation.

3.496 data medium. A material in or on which data are or may be represented. *See also:* data carrier; media; prerecorded data medium. [IEEE Std 610.5-1990a]

3.497 data processing system. A system, including computer systems and associated personnel, that performs input, processing, storage, output, and control functions to accomplish a sequence of operations on data. *See also:* information system. [IEEE Std 610.12-1990a]

3.498 data processor. *(1) A processor capable of performing operations on data. For example: a desk calculator or tabulating machine, or a computer. *(2) A person who operates a computer.

* Deprecated.

3.499 data signaling rate. The rate of data transmission, generally expressed as bits per second. *See also:* baud rate. [IEEE Std 610.7-1995]

3.500 data stream. (1) All data that is transmitted through an input-output channel in a single read or write operation. (2) A continuous stream of data elements being transmitted, or intended for transmission.

3.501 data striping RAID storage. A form of RAID storage, known as level 0, in which data is striped across the multiple drives by system block size. *Note:* No parity check is performed.

3.502 data tablet. A graphical input device, used as a locator, consisting of a flat surface with a sensing apparatus, such as a grid of wires, and a pointing device such as a mouse, puck, or stylus to indicate tablet locations. *Syn:* bit pad; writing tablet. *See also:* acoustic tablet; graphic tablet; locator. [IEEE Std 610.6-1991]

3.503 data-transfer interface. An interface that enables a connection between a computer and a peripheral unit such as a magnetic disk. *See:* enhanced small device interface; integrated drive electronics interface; small computer system interface; ST-506 interface.

3.504 database engine. A software engine that is specially designed for database applications; performs low-level database operations such as record creation, editing, and deletion. *See also:* relational engine.

3.505 datum. Singular form for data. [IEEE Std 610.5-1990]

3.506 daughter board. A printed circuit board that attaches to another, often the main system board, or

motherboard, to provide additional functionality or performance. *Syn:* piggyback board.

3.507 dB. Abbreviation for decibel.

3.508 DC. (1) Pertaining to an electric current or voltage that is constant over the time interval of interest. (2) Acronym for direct current.

3.509 DC analog computer. An analog computer in which variables are represented by the instantaneous positive or negative values of voltages. *Contrast with:* AC analog computer.

3.510 DCA. Acronym for digital coefficient attenuator.

3.511 DCTL. Acronym for direct-coupled transistor logic.

3.512 DD. Acronym for double-density disk.

3.513 de facto standard. A standard that is developed informally when a single entity develops a product or technology and, through success and imitation, that product or technology becomes so widely used that deviation causes compatibility problems or limits marketability. One such example is the Hayes modem handshake protocol.

3.514 decay time. *See:* fall time.

3.515 deceleration time. The time that is required to slow a storage device, typically a tape or disk drive, to a stop after data has been read or written. *Syn:* stop time. *Contrast with:* acceleration time.

3.516 decibel (dB). (1) A unit of measurement for the relative strength of a signal parameter such as power or voltage. [IEEE Std 610.7-1995] (2) The standard unit for expressing transmission gain or loss and relative power levels. Decibels indicate the ratio of power input to power output: $\text{dB} = 10 \log_{10}(P_{\text{out}}/P_{\text{in}})$. *Note:* One decibel is 0.1 bel. [IEEE Std 610.7-1995a]

3.517 decision instruction. (1) *See:* branch instruction. (2)* *See:* discrimination instruction.

* Deprecated.

3.518 decoder. (1) A device that has a number of input lines such that any number may carry signals and a number of output lines such that no more than one at a time may carry a signal. *Note:* the combination of input signals serves as a code to indicate which output line

carries the signal. *Syn.*: decoder matrix; many-to-one decoder. (2) A device that can decode data.

3.519 decoder matrix. *See*: decoder.

3.520 decollate. To separate the parts of a multipart form, often by means of a device called a decollator. *Syn.*: deleave. *See also*: burst.

3.521 decoupled architecture. A computer architecture in which a program is divided into two or more instruction streams, and a number of processors cooperate in the execution of the task.

3.522 decrement. (1) The quantity by which a variable is decreased. [IEEE Std 1084-1986] (2) To decrease the value of a variable. [IEEE Std 1084-1986] (3) To decrease the value of a variable by one. *Contrast with*: increment. [IEEE Std 1084-1986]

3.523 dedicated computer. A special-purpose computer that can be used exclusively for one purpose, such as a dedicated word processing system or a numerical control system for machine tooling.

3.524 defacto standard. *See*: de facto standard.

3.525 default font. *See*: base font.

3.526 deferred address. *See*: indirect address.

3.527 degauss. To apply a variable, alternating current field for the purpose of demagnetizing magnetic media or devices. *See also*: delete.

3.528 degausser. A device that removes unwanted magnetization from objects; commonly used to demagnetize read/write heads, and to erase information from magnetic storage media.

3.529 delay. The amount of time by which a signal or event lags due to an external condition or event. *See also*: delay line; duration of unscheduled interrupt; propagation delay; rotational delay; time delay.

3.530 delay line. A line or circuit designed to introduce a desired delay in the transmission of a signal. *See also*: acoustic delay line; electric delay line; electromagnetic delay line; magnetic delay line. *Syn.*: delay unit.

3.531 delay line storage. A storage technique in which data are stored by sending them through a circuit loop having a data capacity (measured in bits) equal to its propagation delay for one complete pass around the

loop, measured in bit times past the read position. *Syn.*: time delay register.

3.532 delay unit. *See*: delay line.

3.533 deleave. *See*: decollate.

3.534 delete. To remove data from a storage device or data medium. *See also*: read; write. *Syn.*: erase. [IEEE Std 610.5-1990]

3.535 density. (1) On an integrated circuit, the number of logic gates per unit area of usable surface. *See also*: chip density; surface density. (2) *See*: recording density. (3) A measure of the number of characters per inch on an output medium such as paper.

3.536 derived font. A font that has been scaled, or modified from a scalable font. *Contrast with*: bit map font.

3.537 designation hole. A hole that has been punched in a punch card to indicate the nature of the data on the card, or the functions that a machine is to perform. *Syn.*: control hole; control punch.

3.538 desktop computer. A computer designed to be placed on a desk or table. [IEEE Std 610.2-1987a]

3.539 destination address. The address of a device or storage location to which data are to be transferred. *Contrast with*: source address. [IEEE Std 610.12-1990a]

3.540 destructive read. A read operation that deletes the data being read. *Contrast with*: nondestructive read.

3.541 device. A mechanism or piece of equipment designed to serve a purpose or perform a function. [IEEE Std 610.12-1990]

3.542 device driver. A software component that permits a system to control and communicate with a peripheral device. *See also*: disk driver; printer driver.

3.543 device register. (1) An addressable register used to store information describing the device. *See also*: control register. (2) An addressable register used to store status and control information, and data for transmission to or from a device. *Syn.*: device status word.

3.544 device status word. *See*: device register.

3.545 diagonal microinstruction. A microinstruction capable of specifying a limited number of simultaneous operations needed to carry out a machine language

instruction. *Contrast with:* horizontal microinstruction; vertical microinstruction. [IEEE Std 610.12-1990]

3.546 diagonally integrated microprocessor. A microprocessor in which diagonal microinstructions can be performed. *Contrast with:* horizontally integrated microprocessor; vertically integrated microprocessor.

3.547 dicap storage. A type of storage that uses an array of diodes to control current directed to storage capacitors.

3.548 dice. Multiple pieces of silicon, each of which contains one or more circuits and is or will be packaged as a unit. *Note:* This is the plural form of die.

3.549 die. A single piece of silicon that contains one or more circuits and is packaged as a unit. *See also:* dice.

3.550 differential amplifier. An amplifier with two input circuits that amplifies the difference between the two input signals.

3.551 differential analyzer. An analog computer that uses interconnected integrators to solve differential equations.

3.552 differential gear. A mechanism used for addition and subtraction in an analog computer in which the angles of rotation of three shafts are related to each other such that the algebraic sum of the rotation of two shafts is equal to twice the rotation of the third.

3.553 differential phase shift keying (DPSK). A method for encoding a signal in which the value of a bit stream is encoded on the differences between the phase of adjacent signals; that is, if the signals are in phase, the bit is a one; if not, the bit is a zero.

3.554 differentiator. A circuit or device whose output signal is proportional to the derivative of its input signal with respect to one or more variables, usually time. For example, a resistor-capacitor circuit used to detect the edges of a pulse.

3.555 digit punch. A punch in one of the punch rows designated as 1 through 9 of a twelve-row punch card. *Contrast with:* zone punch.

3.556 digital. Pertaining to quantities in the form of discrete, integral values. *Contrast with:* analog. [IEEE Std 1084-1986]

3.557 digital-analog converter. *See:* digital-to-analog converter.

3.558 digital coefficient attenuator (DCA). A component that is used as a high-speed hybrid replacement for manual and servo potentiometers in analog computers. *Syn:* digital potentiometer. *See also:* digital-to-analog multiplier.

3.559 digital computer. (1) A computer that consists of one or more associated processing units and that is controlled by internally-stored programs. (2) A computer that utilizes digital circuitry to perform calculations and logical instructions, and to control sequencing of operations. *Contrast with:* analog computer; hybrid computer.

3.560 digital differential analyzer (DDA). A special-purpose digital computer consisting of many parallel computing elements, that performs integration by means of a suitable integration code on incremental quantities and that can be programmed for the solution of differential equations in a manner similar to an analog computer.

3.561 digital filter. A device that produces a predetermined digital output in response to a digital input. For example, a digital filter may use arithmetic or delays in order to obtain the desired transfer function.

3.562 digital logic. (1) Any logic used for digital integrated circuits and systems. (2) Circuitry that produces two or more distinct states, which can be used for logical operations.

3.563 digital optical disk. *See:* optical disk.

3.564 digital plotter. A plotter that presents digital data in the form of a two-dimensional graphic representation. *Contrast with:* analog plotter; raster plotter.

3.565 digital potentiometer. *See:* digital coefficient attenuator.

3.566 digital-to-analog converter. A converter that converts an input number sequence (digital) into a function of a continuous variable (analog). *Syn:* digital-analog converter; D/A converter; d-to-a converter. *Contrast with:* analog-to-digital converter. *See also:* digital-to-analog multiplier.

3.567 digitally controlled function generator. A hybrid component employed in analog computers to insert linear segment approximation values into a desired arbitrary function.

3.568 digitizer. A graphic input device that converts analog data, such as those derived from a drawing, into digital form. Examples include optical scanners and graphic tablets. *Syn:* quantizer. [IEEE Std 610.6-1991]

3.569 diode. A semiconducting device used to permit current flow in one direction and to inhibit current flow in the other direction. *Syn:* rectifier. *See also:* light-emitting diode display device.

3.570 diode array. An integrated circuit that contains two or more diodes.

3.571 diode-transistor logic (DTL). A family of bipolar integrated circuit logic formed by diodes, transistors, and resistors; characterized by medium speed, low power dissipation, high drive capability and low cost.

3.572 DIP. Acronym for dual in-line package.

3.573 DIP switch. One or more two-position switches housed in a dual in-line package (DIP); used on a circuit board to control certain functions or to specify particular operating characteristics.

3.574 dipole modulation. *See:* non-polarized return-to-zero recording.

3.575 direct access. *See:* access.

3.576 direct address. An address that explicitly specifies the location of an operand. *Contrast with:* indirect address. *Syn:* first-level address; one-level address. [IEEE Std 610.12-1990]

3.577 direct addressing. An addressing mode in which the address field of an instruction contains a direct address. *Contrast with:* indirect addressing.

3.578 direct current (DC). An electric current that flows in one direction. *Contrast with:* alternating current.

3.579 direct instruction. A computer instruction that contains the direct addresses of its operands. *Contrast with:* indirect instruction. [IEEE Std 610.12-1990]

3.580 direct memory access (DMA). A method for transferring data between an external device and memory without interrupting program flow or requiring CPU intervention. *Note:* The interface device takes control of the memory and transfers the data. *See also:* direct memory transfer; programmed input-output.

3.581 direct memory control (DMC). *See:* direct memory transfer.

3.582 direct memory transfer (DMT). A method for transferring data between an external device and memory without interrupting program flow. *Note:* The CPU microcode flow is changed to a routine which transfers the data. *Syn:* direct memory control. *See also:* direct memory access; programmed input-output.

3.583 direct reference address. A virtual address that is not modified by indirect addressing. *Note:* It can be modified by indexing.

3.584 direct-access storage device (DASD). An auxiliary storage device that can provide direct access to the data stored on the device. *See also:* immediate access storage.

3.585 direct-coupled transistor logic (DCTL). A family of circuit logic in which only transistors and resistors are used, with transistors directly connected to each other.

3.586 direct-view storage tube (DVST). *See:* storage tube display device.

3.587 disc. An alternative spelling of the word disk. *Note:* This is more common in British usage. *See also:* compact disc.

3.588 discrimination instruction. One of a class of instructions that comprises branch instructions and conditional instructions.

3.589 disjunction. The Boolean operation whose result has the value 0 if and only if each operand has the value 0. *Syn:* inclusive-OR operation; logical add; OR operation. *See also:* inclusive-OR gate. *Contrast with:* non-disjunction.

3.590 disk (disc). A generic term for any storage medium in the form of circular, flat recording surface. *Note:* Also known as a platter. *See also:* diskette; magnetic disk; magneto-optical disk; optical disk. *Syn:* platter.

3.591 disk array. Multiple disks arranged in such a manner as to increase storage capacity or to provide redundant data for disaster recovery. *See also:* RAID storage.

3.592 disk cache. A cache consisting of random-access memory, used by a disk driver as intermediate storage