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COMPUTER DICTIONARY

SECOND EDITION



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AMPS Acronym for Advanced Mobile Phone Service. An analog cellular communications technology developed by AT&T Bell Laboratories that relies on FDM (frequency-division multiplexing). AMPS is currently in use as the cellular telephone industry standard in the United States. *See also* FDM, NAMPS.

AMPS/NAMPS *See* AMPS, NAMPS.

analog A term applied to any device, usually electronic, that represents values by a continuously variable physical property, such as voltage in an electronic circuit. Derived from the Greek word *analogos*, meaning proportion or ratio, *analog* means both variation and proportion. An analog device can represent an infinite number of values within the range the device can handle. In contrast, digital representation maps values onto discrete numbers, limiting the possible range of values to the resolution of the digital device. *Compare* digital; *see also* analog computer, analog-to-digital converter, digital-to-analog converter.

analog channel A communications channel, as on a voice-grade telephone line, on which a transmitted signal can vary continuously and to any degree within defined upper and lower limits. A signal on an analog channel thus can have any of a multitude of values, as opposed to a digital signal, which has either of two values, represented by 1 or 0.

analog computer A computer that processes continuously variable data, such as voltage fluctuations, rather than digitally encoded information, such as binary numbers. Analog computers are typically used for scientific and industrial applications. A microcomputer is digital, but it can make use of analog information through an analog-to-digital converter and can convert digital information to analog form through a digital-to-analog converter. *See also* analog, analog data, analog-to-digital converter, digital-to-analog converter.

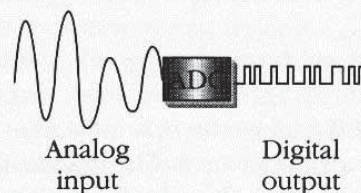
analog data Data (information) that is represented by continuously variable changes in a physical property such as voltage, fluid pressure, or rotation. *See also* analog.

analog display A video display capable of rendering a continuous range (an infinite number) of colors or gray shades, as opposed to a digital display, which is capable of rendering only a finite number of colors. Examples of analog displays include IBM's MCGA and VGA displays. *Compare* digital display; *see also* analog.

analog line A communications line, such as a telephone line, that carries information in analog (continuously variable) form. To minimize distortion and noise interference, an analog line uses amplifiers to strengthen the signal periodically during transmission. *Compare* digital line.

analog signal generator A device that generates analog (continuously variable) signals, sometimes used to activate a positioner, the portion of an extremely high-density disk drive that moves the read/write head to the appropriate location on a disk for a read or write operation.

analog-to-digital converter Abbreviated A-D converter or ADC. A device that translates analog signals to digital signals. An analog signal consists of a voltage or current that can vary continuously within a range of values, whereas a digital signal consists of discrete numeric values represented by binary patterns of 0's and 1's. An A-D converter periodically measures (samples) the analog signal and converts each measurement to the corresponding digital value. *See the illustration.* A-D converters are typically used to permit computers, which use digital signals, to "read" analog signals. An A-D converter, for example, can be used to convert sound represented as an analog electric signal to a series of digital samples that can be stored in memory, on hard disk, or on a compact disc (so-called digital or sampled sound). A digital-to-analog converter (DAC) can be used to transform this series of samples back



Analog-to-digital converter.



into an analog signal, which can then be fed into an amplifier/speaker system. The primary characteristics of an ADC are the number of samples per second it can convert and the precision of each sample in bits. For example, high-quality sound stored on compact disc is often digitized at 48,000 samples per second and 16 bits per sample, rendering up to 65,536 voltage levels in each sample. *Compare* digital-to-analog converter.

analysis The evaluation of a situation or a problem, including review from different aspects or points of view. In computing, analysis commonly involves such features as flow control, error control, and studies of efficiency. Often the larger problem is divided into smaller components that can be more easily examined and dealt with. *Compare* synthesis; *see also* flow analysis, numerical analysis, systems analysis.

analysis graphics *See* presentation graphics.

Analytical Engine A mechanical calculating machine that was conceived by British mathematician and scientist Charles Babbage in 1833 but only a part of which was ever constructed. The first general-purpose digital computer, the Analytical Engine, although conceived long before electronics technology appeared, was to have been capable of storing instructions, performing mathematical operations, and using punched cards as a form of permanent memory. *See also* Difference Engine.

ancillary equipment *See* peripheral.

AND A logical operation for combining two bits (0, 1) or two Boolean values (false, true). It returns the value 1 (true) if, and only if, both values are 1 (true). The possible combinations are shown in the following table.

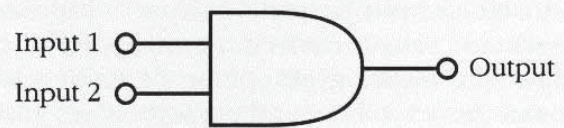
<i>a</i>	<i>b</i>	<i>a AND b</i>
0	0	0
0	1	0
1	0	0
1	1	1

AND gate A type of digital circuit that outputs a 1, or true, only when all inputs are 1. The truth table shows the results of all possible combinations of two input signals (1 = true, 0 = false) for such a

gate. Note that AND gates can have more than two inputs. *See also* truth table.

<i>Input 1</i>	<i>Input 2</i>	<i>Output</i>
0	0	0
0	1	0
1	0	0
1	1	1

The illustration shows the symbol for an AND gate as used in electronic schematics.



AND gate.

angstrom Abbreviated Å; also called angstrom unit. A unit of distance equal to one ten-billionth (10^{-10}) of a meter. One inch contains approximately 250,000,000 angstrom units. Wavelengths of light are often expressed in angstroms.

animation The simulation of movement produced by displaying a series of successive images on the screen. In computer graphics, animation can be accomplished in several ways, depending on the tools provided by the programmer's choice of programming language and on the working environment. One approach to animation involves drawing an image and then erasing it and redrawing it in a slightly different place on the screen. Another approach makes use of the creation of entire screen frames (pages), which are drawn in memory and displayed in sequence on the screen. Yet another uses built-in screen-management tools that enable the programmer to specify an object, a starting point, and a destination, leaving the process of movement to the underlying software. Animation can be generated either in *real time*, in which each frame is created as the viewer watches, or in *simulated time*. In the latter, the computer generates still frames, which are then printed and photographed or are sent to a film or video animation camera. In this way, a computer can spend seconds, minutes, or hours generating each frame, but on replay the tape or film displays each frame in a fraction of a