

H

H ⚡ HENRYS.

Half-adder a circuit using binary signals, having two inputs and two outputs.

Half byte 4 bits or binary digits. Some programming languages make it possible to address a half byte of memory. In this case it means that the memory may be more efficiently utilised than those machines where a full byte (8 bits) is the smallest module of memory which a programming language can address.

Half-duplex alternate transmission over a communications channel, in both directions. ⚡ FULL DUPLEX.

Hall effect a phenomenon which takes place when a conductor is placed in a magnetic field where that conductor is perpendicular to the magnetic field and current. This effect is exploited by, for example, proximity switches. In operation the proximity switch creates its own magnetic field which is affected by bodies passing through it. The alteration to the magnetic field can be observed and measured.

HALT a condition that interrupts the normal RUN mode of a processor, enabling only certain very specific commands to be entered via the system console.

Handshake receive and transmit signals. A synchronous process can more easily pass data if two or more handshake signals are provided. Typically the transmitter requests attention, and the receiver acknowledges completion. It is used to synchronise data transmission systems. In practice it enables a receiving device to tell a transmitting device that it has received data.

Hard copy printed or graphical output produced on paper by a computer system.

Hard disk a hard disk has much greater storage capacity than a floppy disk, the actual capacity depending upon the manufacturer and the specific design of disk drive and read/write head. The disk itself is made from a rigid alloy plate and coated with mylar, a magnetisable compound. ⚡ DISK, FLOPPY DISK.

Hardware the individual components, i.e. mechanical, electro-

46 *Hardwired logic*

mechanical, magnetic and electronic devices that comprise any computer system. ◊ FIRMWARE and SOFTWARE.

Hardwired logic systems built up with transistors and integrated circuits requiring wired connections, where the interconnecting pattern determines the operation. Compare to systems implemented in Random Access Memory (RAM) or Read Only Memory (ROM), which can be relatively easily altered, by program changes.

Hash a technique used by programmers to check that accumulated totals are accurate. Hash totals are often a system-generated approximate sub total to give an order of magnitude that will easily validate values in a register or accumulator.

Hazardous environment an environment where physical danger exists. An environment where failure to meet laid down safety criteria could result in damage or even danger to human life. Met in conditions of radioactivity, high/low temperatures, explosion risk, etc.

Header data information printed at the start of a run to identify the program and data being used, file generation, date and so on.

Heat Sinks the generic term for any device, method or material which can be used to dissipate unwanted heat from an electric circuit, or any other source of heat.

Henrys (H) a measure of the inductance present in a circuit or produced by individual components such as coils. The SI unit of inductance. ◊ INDUCTANCE.

Hertz (Hz) The SI Unit of frequency; the count of cyclical phenomena occurring each second. It replaces the old cps or cycles per second unit of measure. ◊ CPS, CYCLE, FREQUENCY.

Heuristic a programming technique to enable a system to gradually create an optimum value for a specific variable by means of learning from previous operations. A technique used in programming cybernetic or artificial intelligence systems. ◊ STOCHASTIC.

Hexadecimal a system of numbers and letters using 16 as a base. It uses the characters 0 to 9 and A to F and is interchangeable with binary. The system is easier to use and remember than binary. It can offer more efficient use of memory.

Decimal	Binary	Hexadecimal
0	0	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

See appendix for CODES

Hi (High) where there are two or more BITS, or BYTES, used for software addressing purposes, the address numbers go from Lo (Low) to Hi (High). They may be directly addressed as Lo or Hi.

High level language a computer language which is easy to understand and use, but which requires extensive translation (compiling) into machine code before it can be used by a computer system. The general aim of high level languages is to offer English-like instructions. Thus programmers who do not have ASSEMBLY LANGUAGE experience can still be productive fairly quickly since high level languages are easy to learn. However, they are inefficient in use of memory compared to assembly or machine level languages. In microcomputers therefore, many high level languages are in fact a sub-set of the original. Examples of high level languages are: COBOL, FORTRAN, BASIC and PL/1.

High threshold METAL OXIDE SEMICONDUCTOR (MOS) logic which switches at 4V to 5V; not directly TTL compatible.

Hobbyist someone who uses a home computer for pleasure and not for a profession.

Hollerith code named after Dr. Herman Hollerith who invented a punch card code in 1891 in order to reduce the data analysis task of the American census. The census took place every 10 years; in 1891 he calculated that it would take 20 years effort to analyse the results of one 10 year census. He therefore devised a punch card code, based on Jacquard's much earlier principles used in conjunction with weaving looms. Hollerith also designed machines to punch and interpret the code, to sort, collate and calculate. This generation of machines, sometimes called unit record, i.e. one record per card, was later taken up by commercial companies including IBM, NCR, Remington, Power Samas and many others.

The code comprises up to twelve vertical positions, from top to bottom representing 0 to 12. Depending upon manufacturer the card then had from 40 to 80 horizontal rows.

A combination of zero punched holes to three punched holes in any column could then represent anything from absence of data (blank) to full numeric and alphabetic codes together with a range of special characters.

Home brew the type of computer used by a hobbyist. Synonymous with Home computer.

Home computer also known as hobbyist or 'home brew' computers. Cheap, limited facility, programmable microcomputers. Designed for use in the smaller business or the home. Designed to a price level, they are useful tools for an introduction to the micro-computer as an office or laboratory based problem solving aid.

Hostile environment synonymous with 'hazardous environment'. In practice there are some differences in performance standards and requirements. The usage of the term 'hostile' emphasises physical discomfort.

Hot start a system restart following a very brief period of inactivity. Virtually an immediate restart.

House keeping part of file and program maintenance where fields are reset to zero in programs and copies of files are created. The tasks that are important to the smooth running of an installation but are not directly productive.

Housing a case, box, cabinet, etc. which contains an electronic product or chassis.

Hybrid a small electronic module in which passive elements and

circuits are fabricated onto a substrate to which the active devices (for example, transistors) may be added, usually in chip form. A mixture of TTL and SOLID STATE technologies.

Hybrid computer a mixture of analog and digital technologies and principles.

Hz ◊ HERTZ.

I

IBM International Business Machines Corporation. One of the major forces in the computing industry ever since its inception. During the 1970s the term **IBM** become synonymous with computing systems through the medium of novels and films.

ic ◇ INTEGRATED CIRCUIT.

IEE abbreviation for the Institution of Electrical Engineers. IEE are the British professional body responsible for educational and industrial standards.

IEEE abbreviation for the Institution of Electrical and Electronics Engineers Inc; an American body widely concerned with the definition of standards.

IL ◇ INTEGRATED INJECTION LOGIC.

Illegal (address, character) a dramatic term used by programmers to describe data or parameters that are unacceptable to the program being run.

Immediate, immediate data constants which are included as an extension to the 'immediate' class of instruction. This avoids additional memory accesses since data defined in this way is immediately available to the program.

Impedance (Z) a measure of the total effective resistance or individual resistance in a circuit when the current flow is alternating (AC).

Impurities foreign bodies deliberately introduced into semiconductors to produce a desired performance. Such impurities deliberately introduced are called dopants. ◇ DOPANTS, DIFFUSION.

In circuit emulation a phrase attributed to Intel, a leading semiconductor fabricator; equivalents are available from other manufacturers. It refers to the ability to plug a prototype into a development system in order to simulate the real life environment. Thereafter the development system tests the prototype thus enabling laboratory simulation of the working environment to take place.

In-house describing facilities and expertise within an organisation.

Incident light natural light. ◇ PHOTORECEIVERS.

Increment generally the software descriptions of the operation of the STACK POINTER in a central processing unit. When a BYTE of information is removed from the stack the stack pointer is incremented (moved up) one place and when a byte of information is put into the stack the stack pointer is decremented (moved down) one place. More generally means adding to in very small values. ◊ DECREMENT.

Indexed addressing this addressing method enables the programmer to address any location in memory through the use of the pointer register and displacement (system or programming language facilities which keep track of data). The contents of the index register are not modified by indexed addressing. This method of addressing enables the computer to allocate storage in a random fashion thus making good use of all available space.

Indicator a device to draw attention to a specific condition. Could be an LED, flashing light, or asterisks on a report or on a video display unit.

Indirect in the indirect mode, an address is used to point to data which is in turn the address of the required data. This refers to any level of addressing other than the immediate direct method. Indexed addressing is a form of indirect addressing.

Indirect Addressing ◊ ADDRESS.

Inductance the measure of energy stored in a magnetic field, which is set up by an electric current. The unit of measure of inductance is the Henry (H).

Inductor a device which creates inductance, typically a coil of wire wound around an iron core. ◊ INDUCTANCE.

Industry marketing the practice of developing a product for a single, specific industry or industrial or commercial sector, and then marketing that product exclusively to the sector for which it has been developed. For example, a company might develop a computer system especially for newspaper production; this would be regarded as Industry marketing. The term vertical integration is synonymous with Industry marketing.

Inferiors used in mathematics and the physical sciences to denote an iota or qualifying letter or numeral. The character is written slightly below the main script. Synonymous with subscript.

Inherently safe any product which complies with the require-

52 *Inhibit*

ments which surround hazardous or hostile environments and can be expected not to cause fire or explosions, even under extreme circumstances, is termed inherently safe.

Inhibit to prevent a system from reacting in a certain manner to certain conditions. For example, it is possible to inhibit certain programs from accessing nominated files or memory arrays. It is also possible to inhibit anyone but an authorised person accessing privileged data.

Initialise the process of setting all memory and counters, timers, etc., to zero or start values. This is the normal commencement routine for a program and minimally involves clearing registers.

Ink jet a technology used in computer printers, where small jets impel ink onto the paper. The character which is created is made up of dots of ink. The dots themselves are contained in an array, or matrix, and can be individually switched on and off under program control to form a complete character.

Input the signals that are given to a computer for processing. Input devices are the means and media to transmit those signals to the computer, more specifically to the central processing unit.

Input/output/(I/O) Ports connections to the internal BUS system of the central processing unit to interface the computer to other modules and peripherals.

Instruction a binary word which is interpreted by the central processing unit instruction decoder as a command to carry out specific tasks. A program is made up of instructions.

Instruction decoder an array of logic gates or circuits or a small Read Only Memory internal to the central processing unit. Used to interpret instructions fetched from memory.

Instruction register a register within the central processing unit which is used to hold instructions fetched from memory.

Instruction set the total set of unique instructions which can be executed by a given computer system, to provide basic information necessary to assemble a program. Every programming language has its own instruction set. Instruction sets from different computers may appear identical but will work in a slightly different fashion to each other.

Instrumentation devices for measuring, recording and controll-

ing physical properties and movements. The application of instrumentation devices. † TRANSDUCER.

Insulation the condition created by surrounding a conductor with insulation (or non-conducting) material so that current is limited to a known path. Insulating material is a non-conductive substance.

Integer a whole number.

Integrated circuit (IC or ic) a semiconductor device containing circuit elements which are fabricated from a single piece of material (e.g. silicon) directly connected to perform a unique given function.

Integrated Injection Logic (I²L) logic circuitry in which the speed of operation has a linear relationship with the current consumed. A very compact circuit offering high speed operation.

Integration refers to the density of packaging of active elements, for example gates, on a single chip. † SSI, LSI, MSI, VLSI.

Intelligent device a device (for example a terminal) which contains sufficient logic to enable it to be programmed independently of the host computer, to which it may be connected. In practice most computer peripherals now have independent intelligence. Spreading intelligence around in this fashion means that the more complex and elaborate programs which used to be necessary to enable a central computer to run a network of terminals can be broken down into smaller, more manageable programs. Many of these smaller programs can be loaded into intelligent devices to control their specific tasks. † DISTRIBUTED INTELLIGENCE.

Interactive the term given to a device (or system), usually a terminal, which communicates directly with a program in the computer to change values and display the results immediately.

Interchangeable parts the standards set up by international bodies such as IEEE define the measurements and performance criteria of interfaces and devices such that replacement parts may be ordered and fitted with confidence that they will perform as well as the original.

Charles Babbage may have been the first person, through his machine shop foreman (Whitworth), to encounter the need for machine made interchangeable parts when he first built his Difference Engine.

Interface a common boundary between adjacent systems to

enable them to interact. RS232C defines the EIA standard on interfaces. It specifies the preferred plug types, numbers of pins and signals levels which will allow two different manufacturers' products to perform satisfactorily in the same system.

Interlock describing the enabling of one device which automatically inhibits the other, where two devices are operating in concert.

Intermittent a phenomenon which can be observed or experienced with no apparent pattern of occurrence, generally described as random. Intermittent faults on electronic or computer systems are the worst to diagnose since it is not possible to predict when they will reoccur. Often the only way to be sure of curing such a fault is replacement of the whole printed circuit board, or assembly.

International Business Machines ◊ IBM.

International System (SI) an international system of standards that express all units in metre/kilogram/second multiples (MKS).

International Telegraph and Telephone Consultative Committee ◊ CCITT.

Interpolate the reverse of extrapolate. Deducing a result or point on a graph based on readings on either side or immediately before and after the result to be obtained.

Interpreter a program which translates an interpretive-language source program into machine code and executes it immediately, i.e. one line at a time. This contrasts to a COMPILER which produces object code for the whole program before execution.

Interrogate the act of enquiring into the contents of a computer file or program. Involves the use of special enquiry-type languages or programs, e.g. APL.

Interrupt the suspension of a normal programming routine of a computer to carry out a specific and immediate task. The computer then transfers control to an interrupt handling program which after execution, returns control to the interrupted program.

Interrupt mask a technique that allows the program to define whether interrupt requests will be accepted. ◊ ENABLE.

Interval timer synonymous with REAL TIME CLOCK.

Inverter a device or signal that converts a signal into the reverse signal. A device that converts Direct Current (DC) into Alternating Current (AC).

I/O ◊ INPUT/OUTPUT.

Ion an atom, molecule or their groupings that contains an electric charge.

Ion Implantation an alternative to DIFFUSION but having the same objective. In this case the surface of the semiconductor base material is bombarded with ions until the correct performance characteristics are determined to have been achieved. Sometimes used in conjunction with the diffusion process.

ISO International Standards Organisation.

Isolation disconnecting a circuit or device from electrical supply.

Iterate to repeat an instruction or function in software a given number of times or until a desired condition is reached. ◊ LOOPING.
