CHAPTER V

GLOSSARY OF COMPUTER ENGINEERING AND PROGRAMMING TERMINOLOGY
The following glossary is a compilation of terms used in the computer and data processing field. It will serve to clarify terms used in this report. It is exhaustive in the sense that it includes almost every term that occurs at least once in the sources shown below. In many terms, explanations were added and examples were given for purposes of clarity. In other cases, a composite definition was made up from several sources. The engineering terms are defined according to the accepted practices of the profession. The author borrowed heavily from the "First Glossary of Programming Terminology" prepared by the Committee on Nomenclature of the Association for Computing Machinery, Grace Murray Hopper, Chairman.

Information for the glossary was obtained from the following sources:

"First Glossary of Programming Terminology"
Association for Computing Machinery

"IRE Standards on Electronic Computers: Definitions of Terms".
Proceedings IRE, September 1956

"Glossary of Terms in the Field of Computers and Automation"
Computers and Automation, Berkeley Enterprises, Inc.

Computing Laboratory
Ballistic Research Laboratories

"Automation Dictionary"
Minneapolis-Honeywell, Inc.

"Electronic Digital Computer Survey for the USAF-Glossary"
Vitro Corporation of America

"Introduction to Electronic Computers - Glossary"
Prudential Insurance Company of America

"TM-11-666 Radar Electronic Fundamentals - Glossary"
United States Army

AC
a suffix meaning "automatic computer" as in ORDVAC, EDVAC, ENIAC, etc.

ACCESS, RANDOM
access to storage under conditions in which the next position from which information is to be obtained is in no way dependent on the previous one.

ACCESS TIME
(1) the time interval between the instant at which information is: (a) called for from storage and the instant at which delivery is completed, i.e., the read time; or (b) ready for storage and the instant at which storage is completed, i.e., the write time. (2) the latency plus the word-time.

ACCUMULATOR
the zero-access register (and associated equipment) in the arithmetic unit in which are formed sums and other arithmetical and logical results; a unit in a digital computer where numbers are totaled, i.e., accumulated. Often the accumulator stores one quantity and upon receipt of any second quantity, it forms and stores the sum of the first and second quantities.

ACCURACY
freedom from error. Accuracy contrasts with precision; e.g., a four-place table, correctly computed, is accurate; a six-place table containing an error is more precise, but not accurate.

ADDER
a device capable of forming the sum of two or more quantities.

ADDRESS
a label such as an integer or other set of characters which identifies a register, location, or device in which information is stored.

ADDRESS, ABSOLUTE
the label(s) assigned by the machine designer to a particular storage location; specific address.

ADDRESS, RELATIVE
a label used to identify a word in a routine or subroutine with respect to its position in that routine or subroutine. Relative addresses are translated into absolute addresses by the addition of some specific "reference" address, usually that at which the first word of the routine is stored, e.g., if a relative address instruction specifies an address n and the address of the first word of the routine is k, then the absolute address is n + k.

ADDRESS, SYMBOLIC
a label chosen to identify a particular word, function or other information in a routine, independent of the location of the information within the routine; floating address.

ALLOCATE
to assign storage locations to the main routines and subroutines, thereby fixing the absolute values of any symbolic addresses. In some cases allocation may require segmentation.

AMPLIFIER, BUFFER
an amplifier used to isolate the output of any device, e.g. oscillator, from the effects produced by changes in voltage or loading in subsequent circuits.
AMPLIFIER, TORQUE
a device which produces an output turning moment in proportion to the input moment, wherein the output moment and associated power is supplied by the device, and the device requires an input moment and power smaller than the output moment and power.

ANALOG
the representation of numerical quantities by means of physical variables, e.g., translation, rotation, voltage, resistance; contrasted with "digital".

ANALYZER, DIFFERENTIAL
an analog computer designed and used primarily for solving many types of differential equations.

AND
a logical operator which has the property such that if P and Q are two statements, then the statement "P and Q" is true or false precisely according to the following table of possible combinations:

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The "and" operator is often represented by a centered dot (.), or by no sign as in P . Q or PQ.

AND-GATE
a signal circuit with two or more input wires which has the property that the output wire gives a signal only if all input wires receive co-incident signals.

AQUADAG
a graphite coating on the inside of certain cathode ray tubes for collecting secondary electrons emitted by the screen.

ARITHMETIC UNIT
that portion of the hardware of an automatic computer in which arithmetical and logical operations are performed.

ASSEMBLE
to integrate subroutines (supplied, selected, or generated) into the main routine, by adapting, or specializing to the task at hand by means of preset parameters, by adapting, or changing relative and symbolic addresses to absolute form, or incorporating, or placing in storage.

ATTENUATE
to obtain a fractional part or reduce in amplitude an action or signal. Measurement may be made as percentage, per unit, or in decibels, which is 10 times \( \log_{10} \) of power ratio; contrasted with amplify.

AUTOMATION
the entire field of investigation, design, development, application and methods of rendering or making processes or machines self-acting or self-moving; rendering automatic; theory, art or technique of making a device, machine, process or procedure more fully automatic; the implementation of a self-acting or self-moving, hence, automatic process or machine.

AVAILABLE-TIME, MACHINE
time during which a computer has the power turned on, is not under maintenance, and is known or believed to be operating correctly.

AZIMUTH
the angular measurement in an horizontal plane and in a clockwise direction from a specific reference direction, usually a form of North, i.e., true azimuth is measured from true north, magnetic azimuth from magnetic north, grid-azimuth from grid north or thrust or base line.

BAND
a group of recording tracks on a magnetic drum.

BASE
a number base; a quantity used implicitly to define some system of representing numbers by positional notation; radix.

BEAM, HOLDING
a diffused beam of electrons used for regenerating the charges stored on the screen of a cathode ray storage tube.

BIAS
the average D.C. voltage maintained between the cathode and control grid of a vacuum tube.

BINARY
a characteristic or property involving a selection, choice or condition in which there are but two possible alternatives.

BINARY, NUMBER
a single digit or group of characters or symbols representing the total, aggregate or amount of units utilizing the base two; usually using only "0" and "1" digits to express quantity.

BIQUINARY
a form of notation utilizing a mixed base; see Notation, Biquinary.

BIT
see Digit, Binary, a contraction of binary digit.

BLOCK
a group of words considered or transported as a unit; an item; a message; in flow charts, an assembly of boxes, each box representing a logical unit of programming, usually requiring transfer to and from the high speed storage; in circuitry, a group of electrical circuits performing a specific function, as in a "block" diagram, in which unit, e.g. oscillator, is represented as a block (symbol).
BLOCK, INPUT

a section of internal storage of a computer reserved for the receiving and processing of input information.

BOOTSTRAP

the special coded instructions at the beginning of an input tape, together with one or two instructions inserted by switches or buttons into the computer; in circuitry, a positive feedback or regenerative circuit.

BRANCH

a conditional jump.

BREAKPOINT

a point in a routine at which the computer may, under the control of a manually-set switch, be stopped for a visual check of progress.

BUFFER

an isolating circuit used to avoid any reaction of a driven circuit upon the corresponding driving circuit, e.g., a circuit having an output and a multiplicity of inputs so designed that the output is energized whenever one or more inputs are energized. Thus, a buffer performs the circuit function which is equivalent to the logical "OR".

BUS

a path over which information is transferred; a trunk; an electrical conductor, channel or line; a heavy wire or heavy lead.

CABLE

an electrical conductor designed to provide common electric potential between two or more points.

CABLE, COAXIAL

a transmission line consisting of two conductors concentric with and insulated from each other.

CALL-NUMBER

a set of characters identifying a subroutine and containing information concerning parameters to be inserted in the subroutine, information to be used in generating the subroutine, or information related to the operands; a call-word when exactly one word is filled.

CAPACITANCE

the property of two or more bodies which enables them to store electrical energy in an electrostatic field between the bodies.

CAPACITY

the upper and lower limits of the numbers which may be processed in a computer register, e.g., in the accumulator, e.g., the capacity of a computer may be ten decimal digits or the capacity of a computer may be +0.0000000001 to +.99999 99999. Quantities which exceed the capacity usually interrupt the operation of the computer in some fashion; the quantity of information which may be stored in a storage unit.

CARD

heavy, stiff paper of uniform size and shape, adapted for being punched in an intelligent array of holes. The punched holes are sensed electrically by wire brushes or mechanically by metal feelers. One standard card is 7 3/8 inches long by 3 and 1/4 inches wide and contains 80 columns in each of which any one of 12 positions may be punched.

CARRIAGE, AUTOMATIC

a typewriting paper guiding or holding device which is automatically controlled by information and program so as to feed forms or continuous paper to a set of impression keys and to provide the necessary space, skip, eject, tabulate, or performing operations.

CARRY

(1) A signal, or expression, produced as a result of an arithmetic operation on one digit place of two or more numbers expressed in Positional Notation and transferred to the next higher place for processing there.

(2) Usually a signal or expression as defined in (1) above which arises in adding, when the sum of two digits in the same digit place equals or exceeds the base of the number system in use. If a carry into a digit place will result in a carry out of the same digit place, and if the normal adding circuit is bypassed when generating this new carry, it is called a High-Speed Carry, or Standing-on-Mines Carry. If the normal adding circuit is used in such a case, the carry is called a Cascaded Carry. If a carry resulting from the addition of carries is not allowed to propagate (e.g., when forming the partial product in one step of a multiplication process), the process is called a Partial Carry. If it is allowed to propagate, the process is called a Complete Carry. If a carry generated in the most significant digit place is sent directly to the least significant place (e.g., when adding two negative numbers using nine complements) that carry is called an End-Around Carry. (3) In direct subtraction, a signal or expression as defined in (1) above which arises when the difference between the digits is less than zero. Such a carry is frequently called a Borrow. (4) The action of forwarding a carry. (5) The command directing a carry to be forwarded.

CATHODE-FOLLOWER

a vacuum-tube circuit in which the input signal is applied to the control grid and the output is taken from the cathode, possessing high input impedance and low output impedance characteristics.

CELL

storage for one unit of information, usually one character or one word; usually a location specified by whole or part of the address and possessed of the faculty of store; specific terms as column, field, location and block are preferable when appropriate.

CELL, BINARY

an element that can have one or the other of two stable states or conditions and thus can store a unit of information.
a path along which information, particularly a series of digits or characters, may flow. In storage which is serial by character and parallel by bit (e.g., a magnetic tape or drum in some coded-decimal computers), a channel comprises several parallel tracks. In a circulating storage a channel is one recirculating path containing a fixed number of words stored serially by word.

CHARACTER

one of a set of elementary symbols such as those corresponding to the keys on a typewriter. The symbols may include the decimal digits 0 through 9, the letters A through Z, punctuation marks, operation symbols, and any other single symbols which a computer may read, store, or write; a pulse code representation of such a symbol.

CHECK

a means of verification of information during or after an operation.

CHECK, BUILT-IN OR AUTOMATIC

any provision constructed in hardware for verifying the accuracy of information transmitted, manipulated, or stored by any unit or device in a computer. Extent of automatic checking is the relative proportion of machine processes which are checked or the relative proportion of machine hardware devoted to checking.

CHECK, DUPLICATION

a check which requires that the results of two independent performances (either concurrently on duplicate equipment or at a later time on the same equipment) of the same operation be identical.

CHECK, FORBIDDEN-COMBINATION

a Check (usually an Automatic Check) which tests for the occurrence of a nonpermissible code expression. A self-checking code (or error-detecting code) uses code expressions such that one (or more) error(s) in a code expression produces a forbidden combination. A parity check makes use of a self-checking code employing binary digits in which the total number of 1's or 0's in each permissible code expression is always even or always odd. A check may be made for even parity or odd parity. A redundancy check employs a self-checking code which makes use of redundant digits called check digits.

CHECK, MATHEMATICAL or ARITHMETICAL

a check making use of mathematical identities or other properties, frequently with some degree of discrepancy being acceptable; e.g., checking multiplication by verifying that A \times B = B \times A, checking a tabulated function by differencing, etc.

CHECK, MODULO N

a form of check digits, such that the number of ones in each number A operated upon is compared with a check number B, carried along with A and equal to the remainder of A when divided by N, e.g., in a "modulo 4 check", the check number will be 0, 1, 2, or 3 and the remainder of A when divided by 4 must equal the reported check number B, or else an error or malfunction has occurred; a method of verification by congruences, e.g. casting out nines.

CHECK, ODD-EVEN

a check system in which a one or zero is carried along in a word depending on whether the total number of ones (or zeros) in a word is odd or even.

CHECK, PARITY

a summation check in which the binary digits, in a character or word, are added (modulo 2) and the sum checked against a single, previously computed parity digit; i.e., a check which tests whether the number of ones is odd or even.

CHECK, PROGRAMMED

a system of determining the correct program and machine functioning either by running a sample problem with similar programming and known answer, including mathematical or logical checks such as comparing A times B with B times A and usually where reliance is placed on a high probability of correctness rather than built-in error-detection circuits or by building a checking system into the actual program being run and utilized for checking during the actual running of the problem.

CHECK, REDUNDANT

a check which uses extra digits, short of complete duplication, to help detect malfunctions and mistakes.

CHECK, SUMMATION

a redundant check in which groups of digits are summed, usually without regard for overflow, and that sum checked against a previously computed sum to verify accuracy.

CHECK, TRANSFER

verification of transmitted information by temporary storing, re-transmitting and comparing.

CHECK, TWIN

a continuous duplication check achieved by duplication of hardware and automatic comparison.

CHECKING, MARGINAL

a system or method of determining computer circuit weaknesses and incipient malfunctions by varying the power applied to various circuits, usually by a lowering of the D.C. supply or filament voltages.

CLAMPING-CIRCUIT

a circuit which maintains either amplitude extreme of a waveform at a given voltage level, or potential.

CLEAR

to replace all information in a storage device by ones or zeros as expressed in the number system employed.
CLOCK, MASTER

the source of standard signals required for
sequencing computer operation, usually consisting of
a timing pulse generator, a cycling unit and sets of
special pulses that occur at given intervals of time.
Usually in synchronous machines the basic frequency
utilized is the clocking pulse.

CLOSED-SHOP

this is intended to mean that mode of computing
machine support wherein the applied programs and
utility routines are written by members of a
specialized group whose only professional concern is
the use of computers.

CODE

a system of symbols and their use in representing
rules for handling the flow or processing of informa-
tion; to actually prepare problems for solution on
a specific computer.

CODE, COMPUTER

the code representing the operations built into
the hardware of the computer.

CODE, EXCESS-THREE

A coded decimal notation for decimal digits which
represents each decimal digit as the corresponding
binary number plus three, e.g., the decimal digits 0,
1, 2, 3, 4, 5, 6, 7, 9 are represented as 0011, 0100,
1010, 1100, respectively. In this notation, the nine com-
plement of the decimal digit is equal to the ones
complement of the corresponding four binary digits.

CODE, INSTRUCTION

an artificial language for describing or expressing
the instructions which can be carried out by a
digital computer. In automatically sequenced
computers, the instruction code is used when de-
scribing or expressing sequences of instructions,
and each instruction word usually contains a part
specifying the operation to be performed and one or
more addresses which identify a particular location
in storage. Sometimes an address part of an in-
struction is not intended to specify a location in
storage but is used for some other purpose.

If more than one address is used, the code is
called a multiple-address code.

CODE, INTERPRETER

a code which is acceptable to an interpretive
routine.

CODE, MULTIPLE-ADDRESS

an instruction or code in which more than one
address or storage location is utilized. In a
typical instruction of a Four-Address Code the
addresses specify the location of two operands, the
destination of the result, and the location of the
next instruction in the sequence. In a typical
Three-Address Code, the fourth address specifying
the location of the next instruction is dispensed
with the instructions are taken from storage in a
prereassigned order. In a typical Two-Address Code,
the addresses may specify the locations of the
operands. The results may be placed at one of the
addresses or the destination of the results may be
specified by another instruction.

CLOCK, MASTER

the source of standard signals required for
sequencing computer operation, usually consisting of
a timing pulse generator, a cycling unit and sets of
special pulses that occur at given intervals of time.
Usually in synchronous machines the basic frequency
utilized is the clocking pulse.

CODE, OPERATIONAL

that part of an instruction which designates the
operation to be performed.

CODING

the list, in computer code or in pseudo-code, of
the successive computer operations required to solve
a given problem.

CODING, ABSOLUTE, RELATIVE or SYMBOLIC

coding in which one uses absolute, relative, or
symbolic addresses, respectively; coding in which
all addresses refer to an arbitrarily selected
position, or in which all addresses are represented
symbolically.

CODING, ALPHABETIC

a system of abbreviation used in preparing
information for input into a computer such that
information is reported in the form of letters, e.g.,
New York as NY, carriage return as CN, etc.

CODING, AUTOMATIC

any technique in which a computer is used to help
bridge the gap between some "easiest" form, intel-
lectually and manually, of describing the steps to
be followed in solving a given problem and some
"most efficient" final coding of the same problem
for a given computer; two basic forms are Routine,
compilation and Routine, interpretation.

CODING, NUMERIC

a system of abbreviation used in the preparation
of information for machine acceptance by reducing
all information to numerical quantities; in contrast
to alphabetic coding.

COLLATE

to combine two or more similarly ordered sets of
items to produce another ordered set composed of
information from the original sets. Both the number
of items and the size of the individual items in the
resulting set may differ from those of either of the
original sets and of their sums, sequence 23, 24, 48
may be collated into 12, 23, 24, 29, 42, 48; to
combine two or more sequences of items according to
a prescribed rule such that all items appear in the
final sequence.

COLLATOR

a machine which has two card feeds, four card
packets and three stations at which a card may be
compared or sequenced with regard to other cards so
as to select a pocket in which it is to be placed,
e.g., the machine is suitable for matching detail
cards with master cards, merging cards in proper
sequence, etc.

COLUMN

one of the character or digit positions in a
positional notation representation of a unit of
information, columns are usually numbered from right
to left column, zero being the right-most column if
there is no point, or the column immediately to the
left of the point if there is one; a position or
place in a number in which the position designates
the power of the base and the digit is the coeffi-
cient, e.g., in 3876, the 8 is the coefficient of
10^2, the position of the 8 designating the 2.
COMMAND
a pulse, signal, or set of signals initiating one step in the performance of a computer operation. See instruction and order.

COMPARATOR
a device for comparing two different transcriptions of the same information to verify the accuracy of transcription, storage, arithmetic operation or other process, in which a signal is given dependent upon the relative state of two items, i.e. larger, smaller, equal, difference, etc.

COMPARE
to examine the representation of a quantity for the purpose of discovering its relationship to zero, or of two quantities for the purpose of discovering identity or relative magnitude.

COMPARISON
determining the identity, relative magnitude and relative sign of two quantities and thereby initiating an action.

COMPARISON, LOGICAL
the operation concerned with the determination of similarity or dissimilarity of two items, e.g. if A and B are alike, the result shall be "1" or yes, if A and B are not alike or equal, the result shall be "0" or no, signifying "not alike".

COMPILER
a program making routine, which produces a specific program for a particular problem by determining the intended meaning of an element of information expressed in pseudo-code, selecting or generating the required subroutine, transforming the subroutine into specific coding for the specific problem, assigning specific storage registers, etc. and entering it as an element of the problem program, maintaining a record of the subroutines used and their position in the problem program and continuing to the next element of information in pseudo-code.

COMPLEMENT
a quantity which is derived from a given quantity, expressed to the base n, by one of the following rules and which is frequently used to represent the negative of the given quantity. (a) Complement on n: subtract each digit of the given quantity from n-1, add unity to the least significant digit, and perform all resultant carries. For example, the twos complement of binary 11010 is 00110; the tens complement of decimal 456 is 544. (b) Complement on 2-1: subtract each digit of the given quantity from n-1. For example, the ones complement of binary 11010 is 00110; the nines complement of decimal 456 is 543.

COMPUTER
any device capable of accepting information, applying prescribed processes to the information, and supplying the results of these processes; sometimes, more specifically, a device for performing sequences of arithmetic and logical operations; sometimes, still more specifically, a stored-program digital computer capable of performing sequences of internally-stored instructions, as opposed to calculators on which the sequence is impressed manually (desk calculator) or from tape or cards (card programmed calculator).

COMPUTER, ANALOG
a calculating machine which solves problems by translating physical conditions like flow, temperature or pressure into electrical quantities and using electrical equivalent circuits for the physical phenomenon.

COMPUTER, ASYNCHRONOUS
a calculating device in which the performance of any operation starts as a result of a signal that the previous operation has been completed; contrasted with synchronous computer.

COMPUTER, AUTOMATIC
a calculating device which handles long sequences of operations without human intervention.

COMPUTER, DIGITAL
a calculating device utilizing numbers to express all the variables and quantities of a problem. The numbers are usually expressed as a space-time distribution of punched holes, electrical pulses, sonic pulses, etc.

COMPUTER, SYNCHRONOUS
a calculating device in which the performance of all operations is controlled with equally spaced signals from a master clock.

CONDITIONAL
subject to the result of a comparison made during computation; subject to human intervention.

CONTENTS
the information stored in any storage medium. Quite prevalently, the symbol ( ) is used to indicate "the contents of"; e.g., (A) indicates the contents of the storage location whose address is A; ( register A) may indicate the contents of the tape on input-output unit two, etc.

CONTROL
(1) Usually, those parts of a digital computer which effect the carrying out of instructions in proper sequence, the interpretation of each instruction, and the application of the proper signals to the arithmetic unit and other parts in accordance with this interpretation. (2) Frequently, one or more of the components in any mechanism responsible for interpreting and carrying out manually-initiated directions. Sometimes called manual control. (3) In some business applications of mathematics, a mathematical check.

CONTROL, CASCADE
an automatic control system in which various control units are linked in sequence, each control unit regulating the operation of the next control unit in line.
CONTROL-SEQUENCE
the normal order of selection of instructions for execution. In some computers, one of the addresses in each instruction specifies the control sequence. In most other computers the sequence is consecutive except where a jump occurs.

CONTROL, SEQUENTIAL
a manner of operation of a computer such that instructions are fed in a given order to the computer during the solution of a problem.

CONTROL-UNIT
that portion of the hardware of an automatic digital computer which directs the sequence of operations, interprets the coded instructions, and initiates the proper commands to the computer circuits to execute the instructions.

CONVERT
to change numerical information from one number base to another (e.g., decimal to binary) and/or from some form of fixed point to some form of floating-point representation, or vice versa.

CONVERTER
a unit which changes the language of information from one form to another so as to make it available or acceptable to another machine, e.g., a unit which takes information punched on cards to information recorded on magnetic tape, possibly including editing facilities.

COPY
to reproduce information in a new location replacing whatever was previously stored there and leaving the source of the information unchanged.

CORE, MAGNETIC
a magnetic material capable of assuming and remaining at one of two or more conditions of magnetization, thus capable of providing storage, gating or switching functions, usually of toroidal shape and pulsed or polarized by electric currents carried on wire wound around the material.

COUNTER
a device, register, or storage location for storing integers, permitting these integers to be increased or decreased by unity or by an arbitrary integer, and capable of being reset to zero or to an arbitrary integer.

COUNTER, CONTROL
a device which records the storage location of the instruction word, which is to be operated upon following the instruction word in current use. The control counter may select storage locations in sequence, thus obtaining the next instruction word from the following storage location, unless a transfer or special instruction is encountered.

COUNTER, RING
a loop of interconnected bistable elements such that one and only one is in a specified state at any given time and such that, as input signals are counted, the position of the one specified state moves in an ordered sequence around the loop.

COUPLING
the means by which energy is transferred from one circuit to another; the common impedance necessary for coupling.

COUPLING, CAPACITIVE
a method of transferring energy from one circuit to another by means of a capacitor that is common to both circuits.

COUPLING, DIRECT
a method of transferring energy from one circuit to another by means of resistors common to both circuits.

CRT
cathode ray tube; a device yielding a visual plot of the variation of several parameters by means of a proportionally deflected beam of electrons.

CYBERNETICS
the comparative study of the control and intercommunication of information handling machines and nervous systems of animals and man in order to understand and improve communication, e.g., a study of the art of the pilot or steersman.

CYCLE
a set of operations repeated as a unit; a non-arithmetic shift in which the digits dropped off at one end of a word are returned at the other end in circular fashion; cycle right and cycle left. To repeat a set of operations a prescribed number of times including, when required, supplying necessary address changes by arithmetic processes or by means of a hardware device such as a R-box or cycle-counter.

CYCLE COUNT
to increase or decrease the cycle index by unity or by an arbitrary integer.

CYCLE-CRITERION
the total number of times the cycle is to be repeated; the register which stores that number.

CYCLE-INDEX
the number of times a cycle has been executed; or the difference, or the negative of the difference, between that number and the number of repetitions desired.

CYCLE, MAJOR
the maximum access time of a recirculating serial storage element; the time for one rotation, e.g., of a magnetic drum or of pulses in an acoustic delay line; a whole number of minor cycles.

CYCLE, MINOR
the word time of a serial computer, including the spacing between words.

CYCLE, RESET
to return a cycle index to its initial value.
DAMPING

a characteristic built into electrical circuits and mechanical systems to prevent rapid or excessive corrections which may lead to instability or oscillatory conditions, e.g., connecting a resistor on the terminal of a pulse transformer to remove natural oscillations; placing a moving element in oil or sluggish grease to prevent overshoot.

DATA-REDUCTION

the art or process of transforming masses of raw test or experimentally obtained data, usually gathered by instrumentation, into useful, ordered, or simplified intelligence.

DATA-REDUCTION, ON-LINE

the processing of information as rapidly as the information is received by the computing system.

DEBUG

to isolate and remove all malfunctions from a computer or all mistakes from a routine.

DECADEx

a group or assembly of ten units, e.g., a decade counter counts to ten in one column; a decade resistor box inserts resistance quantities in multiples of powers of 10.

DECIMAL, CODED, BINARY

decimal notation in which the individual decimal digits are represented by some binary code, e.g., in the 8-4-2-1 coded decimal notation, the number twelve is represented as 1001 010 for 1 and 2, respectively. Whereas in pure binary notation, it is represented as 1100. Other coded decimal notations are known as: 5-4-3-2-1, excess three, 2-3-2-1, etc.

DECODE

to ascertain the intended meaning of the individual characters or groups of characters in the pseudo-coded program.

DECODER

a device capable of ascertaining the significance or meaning of a group of signals and initiating a computer event based thereon; matrix.

DEPLETION-SENSITIVITY

the quotient of the displacement of the electron beam at the place of impact by the change in deflecting field. It is usually expressed in millimeters per volt applied between the deflection electrodes, or in millimeters per gauss of the deflecting magnetic field.

DELAY-LINE, ELECTRIC

a transmission line of lumped or distributed capacitive and inductive elements in which the velocity of propagation of electromagnetic energy is small compared with the velocity of light. Storage is accomplished by re-circulation of wave patterns containing information, usually in binary form.

DELAY-LINE, MAGNETIC

a metallic medium along which the velocity of propagation of magnetic energy is small relative to the speed of light. Storage is accomplished by re-circulation of wave patterns containing information, usually in binary form.

DELAY-LINE, MERCURY or QUARTZ

a sonic or acoustic delay-line in which mercury or quartz is used as the medium of sound transmission. See Delay-line, Sonic or Acoustic.

DELAY-LINE, SONIC or ACOUSTIC

a device capable of transmitting retarded sound pulses, transmission being accomplished by wave patterns of elastic deformation. Storage is accomplished by re-circulation of wave patterns containing information, usually in binary form.

DENSIY PACKING

the number of units of useful information contained within a given linear dimension, usually expressed in units per inch, e.g., the number of binary digit magnetic pulses stored on tape or drum per linear inch on a single track by a single head.

DESIGN, LOGICAL

(1) The planning of a computer or data-processing system prior to its detailed engineering design. 2) The synthesizing of a network of logical elements to perform a specified function. 3) The result of 1) and 2) above, frequently called the logic of the system, machine, or network.

DIAGRAM

a schematic representation of a sequence of subroutines designed to solve a problem; a coarser and less symbolic representation than a flow chart, frequently including descriptions in English words; a schematic or logical drawing showing the electrical circuit or logical arrangements within a component.

DIAGRAM, LOGICAL

in logical design, a diagram representing the logical elements and their interconnections without necessarily expressing construction or engineering details.

DIFFERENTIATOR

a device whose output function is proportional to a derivative of its input function with respect to one or more variables.

DIGIT

one of the n symbols of integral value ranging from 0 to n-1 inclusive in a scale of numbering of base n, e.g., one of the ten decimal digits, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

DIGIT, BINARY

a whole number in the binary scale of notation; this digit may be only 0 (zero) or 1 (one). It may be equivalent to an "on" or "off" condition, a "yes" or a "no", etc.
DIGIT, DECIMAL, CODED

one of ten arbitrarily-selected patterns of ones and zeros used to represent the decimal digits.

DIGITAL

the quality of utilizing numbers in a given scale of notation to represent all the quantities that occur in a problem or a calculation.

DIGITIZE

to render an analog measurement of a physical variable into a numerical value, expressing the quantity in digital form.

DIGITS, CHECK

one or more redundant digits in a character or word, which depend upon the remaining digits in such a fashion that if a digit changes, the malfunction can be detected, e.g., a given digit may be zero if the sum of other digits in the word is odd, and this (check) digit may be one if the sum of other digits in the word is even.

DIGITS, EQUIVALENT BINARY

the number of binary digits required to express a number in another base with the same precision, e.g., approximately 3 1/3 times the number of decimal digits is required to express a decimal number in binary form. For the case of coded decimal notation, the number of binary digits required is 4 times the number of decimal digits.

DOWN-TIME

the period during which a computer is malfunctioning or not operating correctly due to machine failures; contrasted with available time, idle time or standby time.

DRUM, MAGNETIC

a rotating cylinder on whose magnetic-material coating information is stored in the form of magnetized dipoles, the orientation or polarity of which is used to store binary information.

DUMMY

an artificial address, instruction, or other unit of information inserted solely to fulfill prescribed conditions (such as word-length or block-length) without affecting operations.

DUMP, A. C.

the removal of all A. C. power, intentionally, accidentally or conditionally from a system or component. An A. C. dump usually results in the removal of all power.

DUMP, D. C.

the removal of all D. C. power, intentionally, accidentally, or conditionally, from a system or component.

DUMP, POWER

the removal of all power accidentally or intentionally.

ECCLES-JORDON (TRIGGER)

a direct coupled multivibrator circuit possessing two conditions of stable equilibrium. Also known as a flip-flop circuit or "toggle".

ECHO CHECKING

a system of assuring accuracy by reflecting the transmitted information back to the transmitter and comparing the reflected information with that which was transmitted.

EDIT

to rearrange information. Editing may involve the deletion of unwanted data, the selection of pertinent data, the insertion of invariant symbols such as page numbers and typewriter characters, and the application of standard processes such as zero-suppression.

ELECTRONIC

pertaining to the application of that branch of science which deals with the motion, emission and behavior of currents of free electrons, especially in vacuum, gas or phototubes and special conductors or semi-conductors. Contrasted with electric which pertains to the flow of large currents in wires only.

ELEMENT, LOGICAL

in a computer or data-processing system, the smallest building blocks which can be represented by operators in an appropriate system of symbolic logic. Typical logical elements are the and-gate and the flip-flop, which can be represented as operators in a suitable symbolic logic.

ELEVATION

the angular measurement in a vertical plane from a specific reference, usually the horizontal plane.

ENCODER

a network or system in which only one input is excited at a time and each input produces a combination of outputs. Sometimes called a matrix.

ERASE

to replace all the binary digits in a storage device by binary zeros. In a binary computer, erasing is equivalent to clearing, while in a coded decimal computer where the pulse code for decimal zero may contain binary ones, clearing leaves decimal zero while erasing leaves all-zero pulse codes.

ERROR

the amount of loss of precision in a quantity; the difference between an accurate quantity and its calculated approximation; errors occur in numerical methods; mistakes occur in programming, coding, data transcription, and operating; malfunctions occur in computers and are due to physical limitations on the properties of materials; the differential margin by which a controlled unit deviates from its target value.
ERROR, INHERITED

the error in the initial values; especially the error inherited from the previous steps in the step-by-step integration.

ERROR, ROUNDOFF

the error resulting from deleting the less significant digits of a quantity and applying some rule of correction to the part retained. A common round-off rule is to take the quantity to the nearest digit. Thus, pi = 3.14159265..., rounded to four decimals is 3.1416. Note; Alston S. Householder suggests the following terms: "initial errors", "generated errors", "propagated errors" and "residual errors". If x is the true value of the argument, and x' the quantity used in computation, then, assuming one wishes f(x), x - x' is the initial error; f(x') - f(x') is the propagated error. If f(x') is the Taylor, or other, approximation utilized, then f(x') - f(x') is the residual error. If f(x') is the actual result then f(x') - f is the generated error, and this is what builds up as a result of rounding.

ERROR, TRUNCATION

the error resulting from the use of only a finite number of terms of an infinite series, or from the approximation of operations in the integral calculus by operations in the calculus of finite differences.

EXCHANGE

to interchange the contents of two storage devices or locations.

EXTRACT

to remove from a set of items of information all those items that meet some arbitrary criterion; to replace the contents of specific parts of a quantity (as indicated by some other quantity called an extractor) by the contents of specific parts of a third quantity, e.g., if the number 01101 is stored, the machine can remove and set upon or according to the third digit, in this case a 1.

FACTOR, SCALE

one or more coefficients used to multiply or divide quantities in a problem in order to convert them so as to have them lie in a given range of magnitude, e.g., plus one to minus one.

FEED, CARD

a mechanism which moves cards serially into a machine.

FERROELECTRIC

a phenomenon exhibited by materials within which permanent electric dipoles exist and a residual displacement in the D-E plane occurs.

FERROMAGNETICS

in computer technology, the science that deals with the storage of information and the logical control of pulse sequences through the utilization of the magnetic polarization properties of materials to store binary information.

FIELD

a set of one or more characters (not necessarily all lying on the same word) which is treated as a whole; a set of one or more columns on a punched card consistently used to record similar information.

FIELD, CARD

a set of card columns fixed as to number and position in which the same unit of information is regularly entered.

FILE

a sequential set of items.

FIXED-POINT

a notation or system of arithmetic in which all numerical quantities are expressed by a predetermined number of digits with the point implicitly located at some pre-determined position; contrasted with floating-point.

FLIP-FLOP

a bi-stable device; a device capable of assuming two stable states; a bi-stable device which may assume a given stable state depending upon the pulse history of one or more input points and having one or more output points. The device is capable of storing a bit of information; controlling gates, etc.; a toggle. See Eccles Jordan.

FLOATING-POINT

a notation in which a number x is represented by a pair of numbers y and z (and two integers n and m which are understood parameters in any given representation) with y and z chosen so that x = y zn where z is an integer, ordinarily either \( m > |y| \geq m/n \), or \( y = 0 \) (where \( n \) is usually 2 or 10 and \( m \) is usually 1). The quantity \( y \) is called the fraction or mantissa; the integer \( z \) is called the exponent or characteristic, e.g. a decimal number 241,000,000 might be shown as 2.41, 8, since it is equal to 2.41 \( \times 10^8 \).

FLOW-CHART

a graphical representation of a sequence of operations, using symbols to represent the operations such as compute, substitute, compare, jump, copy, read, write, etc. A flow chart is a more detailed representation than a diagram.

FORCE

to intervene manually in a routine and cause the computer to execute a jump instruction.

FOUR-ADDRESS

see code, Multiple-address.

FUNCTION-TABLE

two or more sets of information so arranged that an entry in one set selects one or more entries in the remaining sets; a dictionary; a device constructed of hardware, or a subroutine, which can either (a) decode multiple inputs into a single output or (b) encode a single input into multiple outputs; a tabulation of the values of a function for a set of values of the variable.
FUNCTOR

A logical element which performs a specific function or provides a linkage between variables.

GATE

A circuit which has the ability to produce an output which is dependent upon a specified type or the co-incidence nature of the input, e.g. an "and" gate has an output pulse when there is time coincidence at all inputs; and an "or" gate has an output when any one or any combination of input pulses occur in time coincidence; any gate may have no output under any condition of input if there is time coincidence of an inhibit or except signal.

GENERATE

To produce a needed subroutine from parameters and skeletal coding.

GENERATOR

A program for a computer which generates the coding of a problem; a mechanical device which produces an electrical output.

GRID, CONTROL

The electrode of a vacuum tube other than a diode upon which a signal voltage is impressed in order to control the plate current.

HALF-ADDER

A circuit having two output points, S and C, and two input points, A and B, such that the output is related to the input according to the following table:

<table>
<thead>
<tr>
<th>INPUT</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A B</td>
<td>S C</td>
</tr>
<tr>
<td>0 0</td>
<td>0 0</td>
</tr>
<tr>
<td>0 1</td>
<td>0 1</td>
</tr>
<tr>
<td>1 0</td>
<td>1 0</td>
</tr>
<tr>
<td>1 1</td>
<td>1 1</td>
</tr>
</tbody>
</table>

If A and B are arbitrary input pulses, and S and C are "sum without carry" and carry, respectively, it may be seen that two half-adders, properly connected may be used for performing binary addition.

HARDWARE

The mechanical, magnetic, electronic and electrical devices from which a computer is fabricated; the assembly of material forming a computer.

HEAD

A device which reads, records or erases information in a storage medium, usually a small electromagnet used to read, write or erase information on a magnetic drum or tape or the set of perforating or reading fingers and block assembly for punching or reading holes in paper tape.

HOLD

The function of retaining information in one storage device after transferring it to another device; in contrast to clear.

HUNTING

A continuous attempt on the part of an automatically controlled system to seek a desired equilibrium condition. The system usually contains

a standard, a method of determining deviation from standard and a method of influencing the system such that the difference between the standard and the state of the system is brought to zero. See Servomechanism.

IGNORE

A typewriter character indicating that no action whatsoever be taken. (In Teletype or Flexwriter code, all holes punched is an ignore); an instruction requiring non-performance of what normally might be executed; not to be executed.

IMPEDANCE, CHARACTERISTIC

The ratio of voltage to current at every point along a transmission line on which there are no standing waves; the square root of the product of the open and short circuit impedance of the line.

INFORMATION

An aggregation of data.

INPUT

The information which is transferred from external storage into the internal storage; a modifier designating the device performing this function.

INSTRUCTION

A set of characters which defines an operation together with one or more addresses (or no address) and which, as a unit, causes the computer to operate accordingly on the indicated quantities. The term "instruction" is preferable to the terms "command" and "order"; command is reserved for electronic signals; order is reserved for "the order of the characters" (implying sequence) or "the order of the interpolation", etc.

INSTRUCTION, BREAKPOINT

An instruction which, if some specified switch is set, will cause the computer to stop.

INSTRUCTION, BREAKPOINT, CONDITIONAL

A conditional jump instruction which, if some specified switch is set, will cause the computer to stop, after which either the routine may be continued as coded or a jump may be forced.

INSTRUCTION, MULTIPLE-ADDRESS

See code, Multiple-address.

INSTRUCTION, ONE-ADDRESS

An instruction consisting of an operation and exactly one address. The instruction code of a single-address computer may include both zero- and multi-address instructions as special cases.

INSTRUCTION, ONE-PLUS-ONE OR THREE-PLUS-ONE ADDRESS

A two- or four-address instruction, respectively, in which one of the addresses always specifies the location of the next instruction to be performed.

INSTRUCTION, TRANSFER

A computer operational step in which a signal or set of signals specifies the location of the next operation to be performed and directs the computer to that operation (or instruction).
INSTRUCTION, TWO, THREE OR FOUR ADDRESS

an instruction consisting of an operation and
2, 3, or 4 addresses, respectively.

INSTRUCTION, ZERO-ADDRESS

an instruction specifying an operation in which
the location of the operands are defined by the
computer code, so that no address need be given
explicitly.

INTEGRATOR

a device whose output is proportional to the
integral with respect to the input variable.

INTERLACE

to assign successive storage locations to
physically separated storage positions, e.g. on a
magnetic drum or tape, usually for the express
purpose of reducing access time.

ITEM

a set of one or more fields containing related
information; a unit of correlated information
relating to a single person or object; the contents
of a single message.

INTERPRETER

an interpretive routine.

JUMP

an instruction or signal which, conditionally or
unconditionally, specifies the location of the next
instruction and directs the computer to that in-
straction. A jump is used to alter the normal
sequence control of the computer. Under certain
special conditions, a jump may be forced by manual
intervention, in other words a transfer of control
is made to a specified instruction.

JUMP, CONDITIONAL

an instruction which will cause the proper one
of two (or more) addresses to be used in obtaining
the next instruction, depending upon some property
of one or more numerical expressions or other
conditions.

KEY

a group of characters usually forming a field,
utilized in the identification or location of an
item; a marked lever manually operated for copying
a character, e.g. typewriter, paper tape perforator,
card punch, manual keyboard, digitizer or manual
word generator.

LAG

a relative measure of the time delay between two
events, states, or mechanisms.

LANGUAGE, MACHINE

information recorded in a form which may be made
available to a computer, e.g. punched paper tape
may contain information available to a machine,
whereas the same information in the form of printed
characters on a page is not available to a machine;
information which can be sensed by a machine.

LATENCY

in a serial storage system, the access time less
the word time, e.g. the time spent waiting for the
desired location to appear under the drum heads or
at the end of an acoustic tank.

LIBRARY, ROUTINE

an ordered set or collection of standard and
proven routines and subroutines by which problems
and parts of problems may be solved, usually stored
in relative or symbolic coding. (A library may be
subdivided into various volumes, such as floating
decimal, double-precision, or complex, according to
the type of arithmetic employed by the subroutines.)

LINE, DELAY

a device capable of causing an energy impulse to
be retarded in time from point to point, thus
providing a means of storage by circulating intelli-
gence bearing-pulse configurations and patterns.
Examples of delay lines are material media such as
mercury, in which sonic patterns may be propagated
in time; lumped constant electrical lines; co-axial
cables, transmission lines and recirculating mag-
netic drum loops.

LINE-PRINTING

printing an entire line of characters across a
page as the paper feeds in one direction past a
type bar or cylinder bearing all characters on a
single element.

LINE TRANSMISSION

any conductor or systems of conductors used to
carry electrical energy from its source to a load.

LOCATION

a unit storage position in the main internal
storage, storing one computer word; a storage
register.

LOCATION, STORAGE

a storage position holding one computer word,
usually designated by a specific address or a
specific register.

LOGGER

a device which automatically records physical
processes and events, usually with respect to time.

LOGIC

the science that deals with the canons and
criteria of validity in thought and demonstration;
the science of the formal principles of reasoning;
the basic principles and applications of truth
tables, gating, interconnection, etc. required for
arithmetical computation in a computer.

LOGIC, SYMBOLIC

exact reasoning about relations using symbols
that are efficient in calculation. A branch of
this subject known as Boolean algebra has been of
considerable assistance in the logical design of
computing circuits.

LOGICAL

see operation, logical.
LOOP
the repetition of a group of instructions in a routine.

LOOP, CLOSED
repetition of a group of instructions indefinitely.

MALFUNCTION
a failure in the operation of the hardware of a computer.

MATRIX
in mathematics, an array of quantities in a prescribed form, usually capable of being subject to a mathematical operation by means of an operator or another matrix according to prescribed rules; an array of circuit elements, e.g. diodes, wires, magnetic cores, relays, etc. which are capable of performing a specific function, e.g. conversion from one numerical system to another.

MEMORY
the term "storage" is preferred.

MERGE
to produce a single sequence of items, ordered according to some rule (i.e., arranged in some orderly sequence), from two or more sequences previously ordered according to the same rule, without changing the items in size, structure, or total number. Merging is a special case of collection.

MESSAGE
a group of words, variable in length, transported as a unit; a transported item of information.

MICROSECOND
a millionth part of a second.

MILLISECOND
a thousandth part of a second.

MISTAKE
a human blunder which results in an incorrect instruction in a program or in coding, an incorrect element of information, or an incorrect manual operation.

MENONOMIC
assisting, or intended to assist, memory; of or pertaining to memory; mnemonics is the art of improving the efficiency of the memory (in computers, storage).

MODIFIER
a quantity used to alter the address of an operand, e.g. the cycle index.

MODIFY
to alter in an instruction the address of the operand; to alter a subroutine according to a defined parameter.

MULTIVIBRATOR
a type of relaxation oscillator used for the generation of non-sinusoidal waves in which the output of each of its two tubes is coupled to the input of the other to sustain oscillations.

MULTIVIBRATOR, ASTABLE
a free running type of relaxation oscillator used for the generation of non-sinusoidal waves.

MULTIVIBRATOR, MONOSTABLE
a type of relaxation oscillator used to sustain a trigger pulse for a specified time, since the device assumes another state for a specified length of time at the end of which it returns to its original state, after being pulsed or forced into another state.

NORMALIZE
to adjust the exponent and mantissa of a floating-point result so that the mantissa lies in the prescribed standard (normal) range; standardize.

NOTATION
see "NUMBER-SYSTEM".

NOTATION, BINARY
one of any number of mixed-base notations in which the term $n_i$ in the definition of number $i-L$ system is replaced by the product $\prod_{j=0}^{m_j}$.

In the binary system, $m_j$ is two for $j$ odd, five for $j$ even; a scale of notation in the base is alternately 2 and 5, e.g. the decimal number 3672 is binary 03 11 12 01, the first of each pair of digits counting 0 or 1 units of five and the second counts 0, 1, 2, 3 or 4 units. For comparison, the same number in Roman numerals is MDCLXXVI. Biquinary notation expresses the representation of numbers by the abacus, and by the two hands and five fingers of man and is used in some computers.

NOTATION, CODED-DECIMAL
decimal notation in which the individual decimal digits are represented by some code.

NOTATION, MIXED-BASE
a number system in which the term $n_i$ in the definition of number-system in replaced by the $i-L$ product $\prod_{j=0}^{m_j}$ e.g. in the binary system $m_j$ is two for $j$ odd and five for $j$ even.

NUMBER, BINARY
a numerical value written in the base-two system of notation.

NUMBER, OPERATION
a number indicating the position of an operation or its equivalent subroutine in the sequence forming a problem routine. When a problem is stated in pseudo-code each step is sometimes assigned an operation number.
NUMBER, RANDOM

A set of digits constructed of such a sequence that each successive digit is equally likely to be any of n digits to the base n of the number.

NUMBER-SYSTEM

Numerical notation; positional notation; a systematic method for representing numerical quantities in which any quantity is represented approximately by the factors needed to equate it to a sum of multiples of powers of some chosen base n. That is, a number x

\[ x = \sum_{i=0}^{p-1} a_i n^i \]

where \( a_i \neq 0 \) for all i, is represented by \( a_q \ldots a_{-1} a_0 \ldots a_p \), with a point to the right of \( a_0 \) to identify it. For example, in decimal notation familiar to all, in which n equals ten, \( x = 371.426 \) represents \( 3 \cdot 10^2 + 7 \cdot 10^1 + 1 \cdot 10^0 + 4 \cdot 10^{-1} + 2 \cdot 10^{-2} + 6 \cdot 10^{-3} \); in binary notation, in which n equals two, \( x = 1101.01 \) represents \( 1 \cdot 2^3 + 1 \cdot 2^2 + 0 \cdot 2^1 + 1 \cdot 2^0 + 0 \cdot 2^{-1} + 1 \cdot 2^{-2} \), which is 13.75 in decimal notation. In writing numbers, the base is sometimes indicated as a subscript (always in decimal notation) whenever there is any doubt about what base is being employed (e.g., 1101.112 = 13.7510); Binary, Ternary, Quaternary, Quinary, Octal (Octonary), Decimal, Duodecimal, Sexadecimal (Hexadecimal) or Duotrigesimal Notation - notation using the base 2, 3, 4, 5, 8, 10, 12, 16 or 32 respectively.

OCTAL

Pertaining to the number base of eight, e.g., in octal notation, octal 214 is 2 times 64 plus 1 times 8 plus 4 times 1 equals decimal 140; octal 214 is binary 010,001,010.

ONE-ADDRESS

Single address; a system of machine instruction such that each complete instruction explicitly describes one operation and one storage location.

ON-LINE OPERATION

A type of system application in which the input data to the system is fed directly from the measuring devices and the computer results obtained during the progress of the event, e.g., a computer receives data from wind tunnel measurements during a run, and the computations of dependent variables are performed during the run enabling a change in the conditions so as to produce particularly desirable results.

OPERAND

Any one of the quantities entering or arising in an operation. An operand may be an argument, a result, a parameter, or an indication of the location of the next instruction.

OPERATION

A defined action; the action specified by a single computer instruction or pseudo-instruction; an arithmetical, logical, or transfer unit of a problem, usually executed under the direction of a subroutine.

OPERATION, ARITHMETICAL

An operation in which numerical quantities form the elements of the calculation (e.g., addition, subtraction, multiplication, division).

OPERATION, AVERAGE-CALCULATING

A common or typical calculating operation longer than an addition and shorter than a multiplication; often taken as the mean of nine addition and one multiplication time.

OPERATION, COMPLETE

An operation which includes (a) obtaining all operands from storage, (b) performing the operation, (c) returning resulting operands to storage, and (d) obtaining the next instruction.

OPERATION, COMPUTER

The electronic action of hardware resulting from an instruction; in general, computer manipulation required to secure computed results.

OPERATION, FIXED-CYCLE

A type of computer performance whereby a fixed amount of time is allocated to an operation; synchronous or clocked type arrangement within a computer in which events occur as a function of measured time.

OPERATION, LOGICAL

An operation in which logical (yes-or-no) quantities form the elements being operated on (e.g., comparison, extraction). A usual requirement is that the value appearing in a given column of the result shall not depend on the values appearing in more than one given column of each of the arguments.

OPERATION, REAL-TIME, ON-LINE, SIMULATED

The processing of data in synchronism with a physical process in such a fashion that the results of the data-processing are useful to the physical operation.

OPERATION, RED-TAPE

An operation which does not directly contribute to the result; i.e., arithmetical, logical, and transfer operations used in modifying the address section of other instructions in counting cycles, in rearranging data, etc.

OPERATION, SERIAL

The flow of information through a computer in time sequence, using only one digit, word, line or channel at a time. Contrasted with parallel operation.
OPERATION, TRANSFER

an operation which moves information from one storage location or one storage medium to another (e.g., read, copy, transmit, exchange). Transfer is sometimes taken to refer specifically to movement between different media; storage to movement within the same medium.

OPERATION, VARIABLE CYCLE

computer action in which any cycle of action or operation may be of different lengths. This kind of action takes place in an asynchronous computer.

OPERATOR

the person who actually manipulates the computer controls, places information media into the input devices, removes the output, presses the start button, etc.; a mathematical symbol which represents a mathematical process to be performed on an associated function.

OR-CIRCUIT

an electrical or mechanical device which will yield an output signal whenever there are one or more inputs on a multichannel input, e.g., an OR gate is one in which a pulse output occurs whenever one or more inputs are pulsed; forward merging of pulses simultaneously providing reverse isolation.

ORDER

a defined successive arrangement of elements or events. The word order is losing favor as a synonym for instruction, command or operation part due to ambiguity.

OR-OPERATOR

a logical operator which has the property such that if P or Q are two statements, then the statement "P or Q" is true or false precisely according to the following table of possible combinations:

<table>
<thead>
<tr>
<th>P</th>
<th>Q</th>
<th>P or Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>False</td>
<td>True</td>
<td>True</td>
</tr>
<tr>
<td>True</td>
<td>False</td>
<td>True</td>
</tr>
<tr>
<td>True</td>
<td>True</td>
<td>True</td>
</tr>
<tr>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
</tbody>
</table>

OSCILLATIONS, FREE

oscillating currents which continue to flow in a tuned circuit after the impressed voltage has been removed. Their frequency is the resonant frequency of the circuit.

OUTPUT

information transferred from the internal storage of a computer to secondary or external storage; information transferred to any device exterior to the computer.

OUTPUT BLOCK

a portion of the internal storage reserved primarily for receiving, processing and transmitting data which is to be transferred out.

OVERFLOW

in an arithmetic operation, the generation of a quantity beyond the capacity of the register or location which is to receive the result; over capacity; the information contained in an item of information which is in excess of a given amount.

PACK

to include several brief or minor items of information into one machine item or word by utilizing different sets of digits for the specification of each brief or minor item.

PARALLEL

handled simultaneously in separate facilities; operating on two or more parts of a word or item simultaneously; contrasted with serial.

PARAMETER

in a subroutine, a quantity which may be given different values when the subroutine is used in different main routines or in different parts of a main routine, but which usually remains unchanged throughout any one such use; in a generator, a quantity used to specify input-output devices, to designate subroutines to be included, or otherwise to describe the desired routine to be generated.

PARAMETER, PRESET

a parameter incorporated into a subroutine during input.

PARAMETER, PROGRAM

a parameter incorporated into a subroutine during computation. A program parameter frequently comprises a word stored relative to either the subroutine or the entry point and dealt with by the subroutine during each reference. It may be altered by the routine and/or may vary from one point of entry to another.

PATCH

section of coding inserted into a routine to correct a mistake or alter the routine; explicitly transferring control from a routine to a section of coding and back again.

PENTODE

a five-electrode vacuum tube containing a cathode, control grid, suppressor grid, screen grid, and plate.

PERFORATION, RATE OF

number of characters, rows or words punched in a paper tape by a device per unit of time.

PHOSPHORESCENCE

the property of emitting light for some time after excitation.

PIEZOELECTRIC

the effect of producing a voltage by placing a stress, either by compression, by expansion, or by twisting, on a crystal; and, conversely, the effect of producing a stress in a crystal by applying a voltage to it.

PLOTTING-BOARD

a unit capable of graphically presenting information, usually as curves of one or more variables; analogue curve or point tracer.
PLUG-BOARD

A removable panel containing an ordered array of terminals which may be interconnected by short electrical leads according to a prescribed pattern and hence designating a specific program. The entire panel, pre-wired, may be inserted for different programs.

POINT

The dot that marks the separation between the integral and fractional parts of a quantity; i.e., between the coefficients of the zero and the minus one powers of the number base. It is usually called, for a number system using base two, a binary point; for base ten, a decimal point, etc; base point; radix.

POST MORTEM

A routine which, either automatically or on demand, prints information concerning the contents of the registers and storage locations at the time the routine stopped, in order to assist in the location of a mistake in coding.

POTentiometer

A variable voltage divider, a resistor which has a variable contact arm so that any portion of the potential applied between its ends may be selected.

precision

The degree of exactness with which a quantity is stated; a relative term often based on the number of significant digits in a measurement. See also Accuracy.

precision, double

Retention of twice as many digits of a quantity as the computer normally handles, e.g., a computer whose basic word consists of 10 decimal digits is called upon to handle 20 decimal digit quantities by keeping track of the 10-place fragments.

pre-store

To set an initial value for the address of an operand or a cycle index; to restore; to store a quantity in an available or convenient location before it is required in a routine.

program

A plan for the solution of a problem. A complete program includes plans for the transcription of data, coding for the computer and plans for the absorption of the results into the system. The list of coded instructions is called a routine; to plan a computation or process from the asking of a question to the delivery of the results, including the integration of the operation into an existing system. Thus programming consists of planning and coding, including numerical analysis, systems analysis, specification of printing formats, and any other functions necessary to the integration of a computer in a system.

program sensitive malfunction

A malfunction which occurs only when some unusual combination of program steps occur.

programmer

A person who prepares instruction sequences without necessarily converting them into the detailed codes.

programming automatic

Any technique in which the computer is used to help plan as well as to help code a problem; e.g., compiling routines, interpretive routines.

programming, optimum

Improper terminology for minimal latency coding, i.e., for producing a minimal latency routine.

programming, random access

Programming without regard for the time required for access to the storage positions called for in the program; contrast with minimum access programming.

pseudocode

An arbitrary code, independent of the hardware of a computer, which must be translated into computer code.

pseudorandom

Having the property of satisfying one or more of the standard criteria for statistical randomness but being produced by a definite calculation process.

pulse

A change in the intensity or level of some medium, usually over a relatively short period of time, e.g., a shift in electric potential of a point for a short period of time. If the voltage level of a point shifts from -10 to +20 volts with respect to ground for a period of 2 microseconds, one says that the point received a 30 volt 2 microsecond pulse.

pulse-code

Sets of pulses to which particular meanings have been assigned; the binary representations of characters.

punch, calculating, electronic

A card handling machine which reads a punched card, performs a number of sequential operations and punches the result on a card.

punch, card

A device which perforates or places holes in cards in specific locations designated by a program.

punch-position

The location of the row in a columnated card e.g., in an 80-column card the rows or "punch position" may be 0 to 9 or "x" and "y" corresponding to position 11 and 12.

punch, summary

A card handling machine which may be electrically connected to another machine, e.g., tabulator and which will punch out on a card the information produced, calculated or summarized by the other machine.
PUNCHING, RATE OF
number of cards, characters, blocks, fields or words of information placed in the form of holes distribution on cards, or tape per unit of time.

QUANTITY
a positive or negative real number in the mathematical sense. The term quantity is preferred to the term number in referring to numerical data; the term number is used in the sense of natural number and reserved for "the number of digits", the "number of operations", etc.

QUANTITY, DOUBLE-PRECISION
a quantity having twice as many digits as are normally carried in a specific computer.

RANDOM-ACCESS
access to storage under conditions in which the next position from which information is to be obtained is in no way dependent on the previous one.

RANGE
all the values which a function may have.

RATIO, OPERATING
the ratio obtained by dividing the number of hours of correct machine operation by the total hours of scheduled operation, e.g. on a 168 hour week scheduled operation, if 12 hours of preventive maintenance is required and 4.8 hours of unscheduled down time occurs, then the operating ratio is (168 - 16.8)/168, which is equivalent to a 90% operating ratio.

READ
to copy, usually from one form of storage to another, particularly from external or secondary storage to internal storage; to sense the meaning of arrangements of hardware; to sense the presence of information on a recording medium.

READ-AROUND-RATIO
in electrostatic storage tubes, the number of times a specific spot (digit or location) may be consulted before "spill over" will cause a loss of information stored in surrounding spots, immediately prior to which the surrounding information must be restored; read-around number.

READER, CARD
a mechanism that permits the sensing of information punched on cards by means of wire brushes or metal feelers.

READER, TAPE, MAGNETIC
a device capable of restoring to a train or sequence of electrical pulses, information recorded on a magnetic tape in the form of a series of magnetized spots, usually for the purpose of transferring the information to some other storage medium.

READER, TAPE, PAPER
a device capable of restoring to a train or sequence of electrical pulses, information punched on a paper tape in the form of a series of holes, usually for the purpose of transferring the information to some other storage medium.

READING, RATE OF
number of characters, words, fields, blocks or cards sensed by an input sensing device per unit of time.

REAL-TIME
the performance of a computation during the actual time that the related physical process transpires in order that results of the computations are useful in guiding the physical process.

RECORD
a listing of information, usually in printed or printable form; one output of a compiler consisting of a list of the operations and their positions in the final specific routine and containing information describing the segmentation and storage allocation of the routine; to copy an output information from reusable form for future reference; to make a transcription of data by a systematic alteration of the condition, property or configuration of a physical medium, e.g., placing information on magnetic tape or a drum by means of magnetized spots.

REGENERATION
the process of returning a part of the output signal of an amplifier to its input circuit in such a manner that it reinforces the grid excitation and thereby increases the total amplification; periodic restoration of stored information.

REGISTER
the hardware for storing one or more computer words. Registers are usually zero-access storage devices.

REGISTER, CIRCULATING or MEMORY
a register (or memory) consisting of a means for delaying information and a means for regenerating and reinserting the information into the delaying means.

REGISTER, CONTROL
the accumulator, register or storage unit which stores the current instruction governing a computer operation; an instruction register.

REGISTER, PROGRAM
a register in the control unit which stores the current instruction of the program and controls computer operation during the execution of the instruction; control register; program counter.

REGULATION, VOLTAGE
a measure of the degree to which power source maintains its output-voltage stability under varying load conditions.

REPEITION, RATE OF PULSE
the number of electric pulses per unit of time experienced by a point in a computer, usually the maximum, normal, or standard rate of pulses.
a method of evaluating the speed performance of a computer. One method is to use one-tenth of the time required to perform nine complete additions and one complete multiplication. A complete addition or a complete multiplication time includes the time required to procure two operands from high speed storage, perform the operation, and store the result and the time required to select and execute the required number of instructions to do this.

RESTART

to repeat all or part of a program on a computer.

RESTART-POINT

that stage of a computer run at which all information pertinent to the running of the routine is available either to the routine itself or to a rerun routine in order that a run may be reconstituted.

RESET

to return a device to zero or to an initial or arbitrarily selected condition.

RESOLVER

a device which separates or breaks up a quantity, particularly a vector, into constituent parts or elements, e.g. to form the three mutually perpendicular components of a space vector.

RESPONSE, FREQUENCY

a measure of the ability of a device to take into account, follow or act upon a rapidly varying condition, e.g. as applied to amplifiers, the frequency at which the gain has fallen to the one-half power point or to 0.707 of the voltage gain factor; as applied to a mechanical controller, the maximum rate at which changes in condition can be followed and acted upon.

RESTORE

to return a cycle index, a variable address, or other computer word to its initial or preselected value; periodic regeneration of charge, especially in volatile, condenser-action storage systems.

RETURN

to go back to a specific, planned point in a program, usually when an error is detected, for the purpose of rerunning the program. Rerun points are usually three to five minutes apart to avoid long periods of lost computer time. Information pertinent to a rerun is available in standby registers from point to point.

REWIND

to return a film or magnetic tape to its beginning.

ROLLBACK

equivalent to rerun when referring to tape-sequenced computers; to recapture tape-inscribed data.

ROLL-OUT

to read a register or counter by adding ones to the respective digits simultaneously obtaining a signal as each column returns to zero, until all columns have returned to zero, usually requiring n additions, where n is the number base.

ROUND-OFF

to change a more precise quantity to a less precise one, according to some rule.

ROUTINE

a set of coded instructions arranged in proper sequence to direct the computer to perform a desired operation or series of operations.

ROUTINE, COMPILE

an executive routine which, before the desired computation is started, translates a program expressed in pseudo-code into machine code (or into another pseudo-code for further translation by an interpreter). In accomplishing the translation, the compiler is required to decode, convert, select, generate, allocate, adapt, orient, incorporate, or record.

ROUTINE, DIAGNOSTIC

a specific routine designed to locate either a malfunction in the computer or a mistake in coding.

ROUTINE, EXECUTIVE

a set of coded instructions designed to process and control other sets of coded instructions; a set of coded instructions used in realizing "automatic coding"; a master set of coded instructions.

ROUTINE, FLOATING-POINT

a set of coded instructions arranged in proper sequence to direct the computer to perform a specific set of operations which will permit floating-point operation, e.g. enable the use of a fixed-point machine to handle information on a floating-point basis from an external point of view. Floating-point routines are usually used in computers which do not have built-in floating-point circuity, in which case floating-point operation must be programmed.

ROUTINE, GENERAL

a routine expressed in computer coding designed to solve a class of problems, specializing to a specific problem when appropriate parametric values are supplied.

ROUTINE, INTERPRETIVE

an executive routine which, as the computation progresses, translates a stored program expressed in some machine-like pseudo-code into machine code and performs the indicated operations, by means of subroutines as they are translated. An interpretive routine is essentially a closed subroutine which operates successively on an indefinitely-long sequence of program parameters (the pseudo-instructions and operands). It may usually be entered as a closed subroutine and exited by a pseudo-code exit instruction.
ROUTINE, MINIMAL LATENCY

especially in reference to serial storage systems, a routine so coded, by judicious arrangement of data and instructions in storage, that the actual latency is appreciably less than the expected random-access latency.

ROUTINE, RERUN

a routine designed to be used in the wake of a computer malfunction or a coding or operating mistake to reconstitute a routine from the last previous rerun point; roll back routine.

ROUTINE, SEQUENCE CHECKING

a routine which checks every instruction executed, printing certain data, e.g., to print out the coded instruction with addresses, and the contents of each of several registers, or it may be designed to print out only selected data, such as transfer instructions and the quantity actually transferred.

ROUTINE, SERVICE

a routine designed to assist in the actual operation of the computer. Tape comparison, block location, certain post mortems, and correction routines fall in this class.

ROUTINE, SPECIFIC

a routine expressed in computer coding designed to solve a particular mathematical, logical, or data-handling problem in which each address refers to explicitly stated registers and locations.

ROUTINE, TEST

a routine designed to show whether a computer is functioning properly or not.

RUN

one performance of a program on a computer; performance of one routine, or several routines automatically linked so that they form an operating unit, during which manual manipulations are not required of the computer operator.

SCALE

to alter the units in which all variables are expressed so as to bring all magnitudes within the capacity of the computer or routine at hand.

SCANNER

an instrument which automatically samples or interrogates the state of various processes, conditions, or physical states and initiates action in accordance with the information obtained.

SEGMENT

to divide a routine in parts each consisting of an integral number of subroutines, each part capable of being completely stored in the internal storage and containing the necessary instructions to jump to other segments; in a routine too long to fit into internal storage, a part short enough to be stored entirely in the internal storage and containing the coding necessary to call in and jump automatically to other segments. Routines which exceed internal storage capacity may be automatically divided into segments by a compiler.

SELECT

to take the alternative A if the report on a condition is of one state, and alternative B if the report on the condition is of another state; to choose a needed subroutine from a file of subroutines.

SELECTOR

a device which interrogates a condition and initiates a particular operation according to the interrogation report.

SENSE

to examine, particularly relative to a criterion; to determine the present arrangement of some element of hardware, especially a manually-set switch; to read holes punched in paper.

SENTINEL

a symbol marking the beginning or the end of some element of information such as a field, item, block, tape, etc; a tag.

SEQUENCE, PSEUDO-RANDOM

an order of numbers produced by a definite recursive rule but satisfying one or more of the standard tests for randomness.

SEQUENCER

a machine which puts items of information into a particular order, e.g., it will determine whether A is greater than, equal to, or less than B, and sort or order accordingly.

SERIAL

handle one after the other in a single facility, such as transfer or store in a digit by digit time sequence.

SERVOMECHANISM

a closed loop system in which the error or deviation from a desired or pre-set norm is reduced to zero, and one in which mechanical position is usually the controlled variable, e.g., a synchronized drum storage system requires a servomechanism to insure synchronism between a crystal controlled electronic oscillator and a rotating cylinder; an AA fire control gun-positioning system requires a servo to insure that deviations are corrected.

SHIFT

to move the characters of a unit of information column-wise right or left. For a number, this is equivalent to multiplying or dividing by a power of the base of notation.

SHIFT, ARITHMETIC

to multiply or divide a quantity by a power of the number base, e.g. binary 1011 represents decimal 11, therefore two arithmetic shifts to the left is binary 101100, which represents decimal 44.
SHIFT, CYCLIC

a shift in which the digits dropped off at one end of a word are returned at the other in a circular fashion; logical, non-arithmetic or circular shift.

SIGNIFICANCE

the arbitrary rank, priority, or order of relative magnitude assigned to a given position or column in a number; the significant digits of a number are a set of digits, usually from consecutive columns beginning with the most significant digit different from zero and ending with the least significant digit whose value is known are assumed relevant, e.g., 2500.0 has five significant digits, whereas 2300 probably has two significant digits.

SIMULATION

the representation of physical systems and phenomena by computers, models or other equipment.

SKIP

an instruction to proceed to the next instruction; a "blank" instruction.

SOLVER, EQUATION

a calculating device, usually analog, which arrives at the solution to systems of linear simultaneous non-differential equations or determine the roots of polynomials or both.

SORT

to arrange items of information according to rules dependent upon a key or field contained in the items.

STACKER, CARD

a mechanism that accumulates cards in a bin after they have passed through a machine operation; a hopper.

STANDARDIZE

to adjust the exponent and mantissa of a floating-point result so that the mantissa lies in the prescribed normal range; normalize; see Floating-point Representation.

STORAGE

preferred to memory, any device into which units of information can be copied, which will hold this information, and from which the information can be obtained at a later time; devices, such as plugboards, which hold information in the form of arrangements of physical elements, hardware, or equipment; the erasable storage in any given computer.

STORAGE, BUFFER

a synchronizing element between two different forms of storage, usually between internal and external; an input device in which information is assembled from external or secondary storage and stored ready for transfer to internal storage; an output device into which information is copied from internal storage and held for transfer to secondary or external storage. Computation continues while transfers between buffer storage and secondary or internal storage or vice versa take place.

STORAGE, CIRCULATING

a device using a delay line, or unit which stores information in a train or pattern of pulses, where the pattern of pulses issuing at the final end are sensed, amplified, reshaped and re-inserted in the delay line at the beginning end.

STORAGE, DYNAMIC

storage such that information at a certain position is moving in time and so is not always available instantly; e.g., acoustic delay line, magnetic drum; circulating or re-circulating of information in a medium.

STORAGE, ELECTROSTATIC

a device possessing the capability of storing changeable information in the form of charged or uncharged areas on the screen of a cathode ray tube.

STORAGE, ERASABLE

media which may hold information that can be changed; i.e., the media can be re-used; e.g., magnetic tape, drum, or core.

STORAGE, EXTERNAL

storage facilities divorced from the computer itself but holding information in the form prescribed for the computer; e.g., magnetic tapes, magnetic wire, punched cards, etc.

STORAGE, INTERNAL

storage facilities forming an integral physical part of the computer and directly controlled by the computer; the total storage automatically accessible to the computer.

STORAGE, MAGNETIC

any storage system which utilizes the magnetic properties of materials to store information.

STORAGE, MERCURY

columns of a liquid mercury medium used as a storage element by the delaying action or time of travel of sonic pulses which are circulated by having electrical amplifier, shaper, and timer circuits complete the loop.

STORAGE, NON-ERASABLE

media used for containing information which cannot be erased and reused, such as punched paper tapes, and punched cards.

STORAGE, NON-VOLATILE

storage media which retain information in the absence of power and which may be made available upon restoration of power; e.g., magnetic tapes, drums, or cores.

STORAGE, PARALLEL

storage in which all bits, or characters, or (especially) words are essentially equally available in space, without time being one of the coordinates. Parallel storage contrasts with serial storage. When words are in parallel, the storage is said to be parallel by words; when characters within words (or binary digits within words or characters) are dealt with simultaneously, not one after the other,
the storage is parallel by characters (or parallel by bit respectively).

**STORAGE, SECONDARY**

storage facilities not an integral part of the computer but directly connected to and controlled by the computer; e.g., magnetic drum, magnetic tapes, etc.

**STORAGE, SERIAL**

storage in which time is one of the coordinates used to locate any given bit, character, or (especially) word. Storage in which words, within given groups of several words, appear one after the other in time sequence, and in which access time therefore includes a variable latency or waiting time of zero to many word-times, is said to be serial by word. Storage in which the individual bits comprising a word appear in time sequence is serial by bit. Storage for coded-decimal or other non-binary numbers in which the characters appear in time sequence is serial by character; e.g., magnetic drums are usually serial by word but may be serial by bit, or parallel by bit, or serial by character and parallel by bit, etc.

**STORAGE, STATIC**

storage such that information is fixed in space and available at any time; e.g., flip-flop, electrostatic, or coincident-current magnetic-core storage.

**STORAGE, TEMPORARY**

internal storage locations reserved for intermediate and partial results.

**STORAGE, VOLATILE**

storage media such that if the applied power is cut off, the stored information is lost; e.g., acoustic delay lines, electrostatic tubes.

**STORAGE, WORKING**

a portion of the internal storage reserved for the data upon which operations are being performed.

**STORAGE, ZERO-ACCESS**

storage for which the latency (waiting time) is negligible at all times.

**STORE**

to transfer an element of information to a device from which the unaltered information can be obtained at a later time.

**SUBROUTINE**

the set of instructions necessary to direct the computer to carry out a well defined mathematical or logical operation; a subunit of a routine. A subroutine is often written in relative or symbolic coding even when the routine to which it belongs is not.

**SUBROUTINE CLOSED**

a subroutine not stored in its proper place in the linear operational sequence, but stored away from the routine which refers to it. Such a subroutine is entered by a jump, and provision is made to return, i.e., to jump back to the proper point in the main routine at the end of the subroutine.

**SUBROUTINE, DYNAMIC**

a subroutine which involves parameters, such as decimal point position or item size, from which a relatively coded subroutine is derived. The computer itself is expected to adjust or generate the subroutine according to the parametric values chosen.

**SUBROUTINE, OPEN**

a subroutine inserted directly into the linear operational sequence, not entered by a jump. Such a subroutine must be recopied at each point that it is needed in a routine.

**SUBROUTINE, STATIC**

a subroutine which involves no parameters other than the addresses of the operands.

**SUBSTITUTE**

to replace an element of information by some other element of information.

**SWITCH, ELECTRONIC**

a circuit which causes a start-and-stop action or a switching action by electronic means.

**SWITCH, FUNCTION**

a circuit having a fixed number of inputs and outputs designed such that the output information is a function of the input information, each expressed in a certain code or signal configuration or pattern.

**SYMBOL, LOGICAL**

a symbol used to represent a logical element graphically.

**SYSTEM**

an assembly of components united by some form of regulated interaction; an organized whole.

**TABULATOR**

a machine which reads information from one medium, e.g., cards, paper tape, magnetic tape, etc. and produces lists, tables, and totals on separate forms or continuous paper.

**TAG**

a unit of information, whose composition differs from that of other members of the set so that it can be used as a marker or label; a sentinel.

**TANK**

a unit of acoustic delay line storage, containing a set of channels each forming a separate recirculation path; a circuit consisting of inductance and capacitance used for the purpose of sustaining electrical oscillations.

**TAPE, MAGNETIC**

a tape or ribbon of any material impregnated or coated with magnetic material on which information may be placed in the form of magnetically polarized spots.
Tape, program

A tape which contains the sequence of instructions required for solving a problem and which may be read by the computer.

Ternary

Pertaining to the system of notation utilizing the base of 3, employing the characters 0, 1, and 2.

Test, crippled-leap-frog

A variation of the leap-frog test, modified so that it repeats its tests from a single set of storage locations rather than a changing set of locations.

Test, leap-frog

A program designed to discover computer malfunction, characterized by the property that it performs a series of arithmetical or logical operations on one group of storage locations, transfers itself to another group of storage locations, checks the correctness of the transfer, then begins the series of operations over again. Eventually, all storage positions will have been occupied and the test will be repeated.

Tetrad

A group of four, usually four pulses, in particular, a group of four pulses used to express a decimal digit, or a hexadecimal digit by means of four (binary) pulses.

Tetrode

A four-electrode vacuum tube containing a cathode, control grid, screen grid, and plate.

Thermistor

The thermistor is a solid state, semiconducting device made by sintering mixtures of the oxide powders of various metals. It is made in many shapes, such as beads, disks, flakes, washers, and rods, to which metal wires are attached. As its temperature is changed, the electrical resistance of the thermistor varies. The associated temperature coefficient of resistance is extremely high, nonlinear, and negative.

Thermocouple

A device made up of two bi-metal joints (usually wires forming a closed loop) having the property that if the two junctions are maintained at different temperatures, a difference of potential is brought into existence equally distributed between the two junctions.

Three-address

See Code, Multiple-address.

Thyratron

A hot-cathode, gas-discharge tube in which one or more electrodes are used to control electrostatically the starting of an unidirectional flow of current.

Time, code checking

All time spent checking out a problem on the machine making sure that the problem is set up correctly, and that the code is correct.

Time, engineering or servicing

All machine down time necessary for routine testing (good or bad), for machine servicing due to breakdowns, or for preventive servicing, measures, e.g., block tube changes. Includes all test time (good or bad) following breakdown and subsequent repair or preventive servicing.

Time, idle

Time in which machine is believed to be in good operating condition and attended by service engineers but not in use on problems. To verify that the machine is in good operating condition, machine tests of the leapfrog variety may be run.

Time, no charge machine-fault

Unproductive time due to a computer fault such as the following: (1) non-duplication, (2) transcribing error, (3) input-output malfunction, (4) machine malfunction resulting in an incomplete run.

Time, no charge non-machine-fault

Unproductive time due to no fault of the computer such as the following: (1) good duplication, (2) error in preparation of input data, (3) error in arranging the program deck, (4) error in operating instructions or misinterpretation of instructions, (5) unscheduled good testing time, run during normal production period when machine malfunction is suspected but is demonstrated not to exist.

Time, production

Good computing time, including occasional duplication of one case for a check or rerunning of the test run. Also, duplication requested by the sponsor; any reruns caused by misinformation or bad data supplied by sponsor. Error studies using different intervals, convergence criteria, etc.

Time, standby unattended

Time in which the machine is in an unknown condition and not in use on problems. Includes time in which machine is known to be defective and work is not being done to restore it to operating condition. Includes breakdowns which render it unavailable due to outside conditions (power outages, etc.).

Time, system, improvement

All machine down time necessary for the installation and testing of new components, large or small, and machine down time necessary for modification of existing components. Includes all programmed tests following the above actions to prove machine is operating properly.

Track

In a serial magnetic storage element, a single path containing a set of pulses.
TRANSCRIBE

to copy, with or without translating, from one
external storage medium to another.

TRANSUSCE

d a device which converts energy from one form
to another, e.g., a quartz crystal imbedded in
mercury can change electrical energy to sound
energy as is done in sonic delay lines in computer
storage systems.

TRANSFER

to copy, exchange, read, record, store, transmit,
transport, or write data; to change control; to
jump to another location.

TRANSFER, CONDITIONALLY

to copy, exchange, read, record, store, transmit,
or write data or to change control or jump to
another location according to a certain specified
rule or in accordance with a certain criterion.

TRANSFER, PARALLEL

d a system of data transfer in which the char-
acters of an element of information are trans-
ferred simultaneously over a set of paths.

TRANSFER, SERIAL

d a system of data transfer in which the char-
acters of an element of information are trans-
ferred in sequence over a single path in con-
secutive time positions.

TRANSFER, UNCONDITIONAL

d an instruction which causes the subsequent
instruction to be taken from an address which is
not the next one in the sequence in a digital
computer which ordinarily obtains its instructions
serially from an ordered sequence at all other
times.

TRANSFORM

to change information in structure or compo-
sition without altering the meaning or value;
to normalize, edit, or substitute.

TRANSIENT

d a phenomenon experiencing a change as a function
time, something which is temporary; a build-up
or breakdown in the intensity of a phenomenon until
a steady state condition is reached; an aperiodic
phenomenon; the time rate of change of energy is
finite and some form of energy storage is usually
involved.

TRANSISTOR

d an electronic device utilizing semi-conductor
properties to control the flow of currents from
one source in one circuit by currents from another
circuit, e.g., a triode transistor permits the
control of current in one circuit by the use of a
smaller current in another circuit, with the
transistor common to both circuits.

TRANSLATE

to change information (e.g., problems statements
in pseudo-code, data, or coding) from one language
to another without significantly affecting the
meaning.

TRANSMIT

to reproduce information in a new location
replacing whatever was previously stored and clear-
ing or erasing the source of the information.

TRANSPORT

to convey as a whole from one storage device to
another.

TROUBLE-SHOOT

to search for or cause the cause of a
computer malfunction in order to remove same.

TRUNCATE

to drop digits of a number of terms of a series
thus lessening precision, e.g., the number
3.14159265 is truncated to five figures in 3.1415,
wheres one may round off to 3.1416.

TRUNK

d a path over which information is transferred;
a bus.

TUBE, ACORN

d a small vacuum tube designed for ultra-high-
frequency circuits. The tube has short electron
transit time and low interelectrode capacity.

TUBE, CATHODE-RAY

d an electronic vacuum tube containing a screen
on which information may be stored by means of a
multigrid modulated beam of electrons from the
thermonic emitter, storage effected by means of
charged or uncharged spots; a storage tube; a
Williams tube; an oscilloscope tube; a picture tube.

TUBE, WILLIAMS

d a cathode ray tube used as an electrostatic
storage device of the type designed by F. C.
Williams, University of Manchester, England.

TWO-ADDRESS

see Code, Multiple-address.

TYPWRITER, ELECTRIC

d a hand operated electric powered individual
character printing device having the property that
almost every operation of the machine after the
keys are touched by human fingers is performed by
electric power instead of mechanical power; a type-
writer powered by electricity, in all other respects
the same as a manually powered typewriter.

ULTRASONICS

d the field of science devoted to frequencies of
sound above the human audio range, i.e. above 20
kilocycles per second.
UNCONDITIONAL

not subject to conditions external to the specific instruction

UNPACK

to decompose packed information into a sequence of separate words or elements.

UNWIND

to code explicitly, at length and in full all the operations of a cycle thus eliminating all red-tape operations in the final problem coding. Unwinding may be performed automatically by the computer during assembly, generation, or compilation.

VALIDITY

correctness; especially the degree of the closeness by which iterated results approach the correct result.

VARISTOR

a passive resistor-like circuit element whose resistance is a function of the current through it or voltage across its terminals, i.e. the current through it is a non-linear function of the voltage across its terminals, hence the linear form of Ohm's law is not obeyed; a self-varying resistance.

VERIFIER

a device on which a manual transcription can be verified by comparing a retranscription with it character-by-character as it is being retranscribed.

VERIFY

to check a data transfer or transcription, especially those involving manual processes.

WIRE, MAGNETIC

wire made of a magnetic material along small incremental lengths of which magnetic dipoles are placed in accordance with binary information.

WORD

a set of characters which occupies one storage location and is treated by the computer circuits as a unit and transported as such. Ordinarily a word is treated by the control unit as an instruction, and by the arithmetic unit as a quantity. Word lengths are fixed or variable depending on the particular computer.

WORD, INFORMATION

an ordered set of characters bearing at least one meaning and handled by a computer as a unit, including separating spacing, which may be contrasted with instruction words.

WORD-TIME

especially in reference to words stored serially, the time required to transport one word from one storage device to another. See also Access Time.

WRITE

to transfer information to an output medium; to copy, usually from internal storage to external storage; to record information in a register, location, or other storage device or medium.

ZERO

nothing; positive binary zero is usually indicated by the absence of digits or pulses in a word; negative binary zero in a computer operating on one's complements by a pulse in every pulse position in a word; in a coded decimal machine, decimal zero and binary zero may not have the same representation. In most computers, there exist distinct and valid representation both for plus and for minus zero.

ZERO-SUPPRESSION

the editing or elimination of non-significant zeros to the left of the integral part of a quantity before printing operations are initiated; a part of editing.

ZONE

a portion of internal storage allocated for a particular function or purpose; any of the three top positions of 12, 11 and 0 on a punch card. In these zone positions, a second punch can be inserted so that with punches in the remaining positions 1 to 9, alphabetic characters may be represented.