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GLOSSARY OF AUTOMOTIVE ELECTRONIC TERMS

Introduction—This Glossary has been compiled to serve for reference in an effort to assist communications between the automotive engineer and the electronics engineer.

Scope—This Glossary confines its content to the specific field of electronic systems and subsystems as they pertain to the automotive engineer.

Source of Terminology—A letter or letters in parentheses on the right hand margin of each term indicate the source, from a subcommittee of the SAE Electronic Systems Committee, of the particular term. They are:

(D) —Display Subcommittee
(DG)—Diagnostics Subcommittee
(J) —First issue of SAE J1213, as prepared by the Design Guides Subcommittee (1978)
(M) —Microprocessor Subcommittee
(T) —Transducer Subcommittee

Additionally, a parenthetical expression may appear at the end of the text for a particular term. These indicate a further specific source for the term and are:

(ASTM)— American Society for Testing and Materials, "Compilation of ASTM Standard Definitions," Fourth Edition, 1979, Philadelphia.
(GRAF)— "Modern Dictionary of Electronics," Rudolf F. Graf, Howard W. Sams & Co., Inc., Indianapolis, 1977.
(IEEE) — Institute of Electrical and Electronics Engineers, Standard Dictionary of Electrical and Electronic Terms, ANSI/IEEE 100-1977, Wiley-Interscience, New York.
(ISA) — Instrument Society of America, "Electrical Transducer Nomenclature and Terminology," (ISA S37.1-1982), Research Triangle Park, North Carolina.
(ISO) — ISO 4092, Road Vehicles—Diagnostic systems for motor vehicles—Vocabulary (Available from ANSI, New York) 1978.

Reference—For additional or expanded descriptions and definitions of SI units of measure, see NBS Special Publication 330, "The International System of Units (SI)," U.S. Department of Commerce, National Bureau of Standards, U.S. Government Printing Office, Washington, DC, 1981.

GLOSSARY OF AUTOMOTIVE ELECTRONIC TERMS

ABSORPTION FACTOR (A) (D)
The absorption factor is the ratio of the light absorbed to the incident light.

AC PLASMA PANEL (D)
A gas discharge display using AC coupled electrodes. Typical units utilize the inherent memory properties and are mainly used for graphic applications.

ACCELERATION ERROR (T)
The maximum difference, at any measurand value within the specified range, between output readings taken with and without the application of specified constant acceleration along specified axes. (ISA)

ACCELERATION, TRANSDUCER (T)
An acceleration perpendicular to the sensitive axis of the transducer.

ACCEPTANCE TEST (GENERAL) (T)
(A) A test to demonstrate the degree of compliance of a device with purchaser's requirements. (B) A conformance test demonstrates the quality of the units of a consignment, without implication of contractual relations between buyer and seller. (IEEE)

ACCESS TIME (M)
The time interval between the request for information and the instant this information is available.

ACCUMULATOR (M)
In computing, one of the operands for arithmetic and logic operations is commonly held in the accumulator, and the result of the operation becomes the new stored data.

ACCURACY (M)
The degree of freedom from error; that is, the degree of conformity to truth or to a rule. Accuracy is contrasted with precision. For example, four-place numerals are less precise than six-place numerals, nevertheless a properly computed four-place numeral might be more accurate than an improperly computed six-place numeral.

(T)
The ratio of the error to the full-scale output or the ratio of the error to the output, as specified, expressed in percent. Note 1: Accuracy may be expressed in terms of units of measurand, or as within percent of full scale output. Note 2: Use of the term accuracy should be limited to generalized descriptions of characteristics. It should not be used in specifications. The term error is preferred in specifications and other specific descriptions of transducer performance. (ISA)

ACTIVE DISPLAY (D)
An active display is one that emits light. Typical examples are gas discharge and incandescent.

ACTIVE ELEMENT (J)
A component capable of producing power gain such as a transistor, tunnel diode, thyristor, etc. Also active device, active component.

ACTIVE FILTER (J)
A device employing passive network elements and amplifiers used for transmitting or rejecting signals in certain frequency ranges or for controlling the relative output of signals in certain frequency ranges or for controlling the relative output of signals as a function of frequency. (GRAF)

ACTIVE TRANSDUCER (T)
A transducer whose output waves are dependent upon sources of power, apart from that supplied by any of the actuating waves, which power is controlled by one or more of the waves. Note: The definition of active transducer is a restriction of the more general active network; that is, one in which there is an impressed driving force. (IEEE)

ACTUATOR (T)
A transducer whose output is a force or torque and usually involves motion.

ADDER (M)
Switching circuit that combines binary bits to generate the sum and carry of these bits.

ADDRESS (M)
An expression, usually numerical, which designates a specific location in a storage or memory device.

ADDRESS FORMAT (M)
1. The arrangement of the address parts of an instruction. The expression "plus-one" is frequently used to indicate that one of the addresses specifies the location of the next instruction to be executed, such as one-plus-one, two-plus-one, three-plus-one, four-plus-one.
2. The arrangement of the parts of a single address such as those required for identifying channel, module, track, etc., in a disc system.

ADDRESS REGISTER (M)
A register in which an address is stored.

ALGORITHM (M)
A prescribed sequence of well-defined rules or operations for the solution of a problem in a specified number of steps.

ALPHANUMERIC CODE (M)
A code whose code set consists of letters, digits, and associated special characters.

ALPHANUMERIC DISPLAY (D)
An alphanumeric display is one which can present numeric, common alphabetic characters and sometimes other special symbols. Dot-matrix and segmented (with more than 7 segments) displays are typical examples.

ALU (M)
Arithmetic logic unit, a computational subsystem which performs the mathematical operations of a digital system.

AMBIENT CONDITIONS (J)
The conditions (pressure, temperature, etc.) of the surrounding medium.

AMBIENT PRESSURE ERROR (T)
The maximum change in output, at any measurand value within the specified range, when the ambient pressure is changed between specified values. (ISA)

AMERICAN WIRE GAUGE (AWG) (J)
System of numerical designations for wire size based on specified ranges of circular mil area. American wire gauge starts with 4/0 (0000) at the largest size going to 3/0 (000), 2/0 (00), 1/0 (0), 1, 2, and up to 40 and beyond for the smallest sizes.

AMPERE (A) (J)
The standard unit for measuring the strength of an electric current. The rate of flow of a charge in a conductor or conducting medium of one coulomb per second.

AMPLIFIER (J)
A device, circuit, or component which produces as an output an enlarged reproduction of the essential features of its input.

AMPLITUDE MODULATION (AM) (J)
Modulation in which the amplitude of a wave is the characteristic subject to variation. (GRAF)

ANALOG (J)
Of or pertaining to the general class of devices or circuits in which the output varies as a continuous function of the input.

ANALOG COMPUTER (J)
A computer which represents numerical quantities as electrical and physical variables and manipulates these variables in accomplishing solutions to mathematical problems.

ANALOG OUTPUT (T)
Transducer output which is a continuous function of the measurand except as modified by the resolution of the transducer. (ISA)

ANALOG REPRESENTATION (M)
A representation that does not have discrete values but is continuously variable.

AND GATE (J)
A combinational logic element such that the output channel is in its one state, if and only if, each input channel is in its one state.

ANGSTRÖM (D)
The angström is a commonly used unit of length for light wavelength measurements equal to 10^{-10} meter. Nanometer is the preferred SI unit.

ANNUNCIATOR
An arrangement of indicators, tripped by relays, for indicating which of a number of circuits has operated a sound signalling device.

ANODE (J)
The positive pole (+) in batteries, galvanic cells, or plating apparatus. In diodes, the positive lead.

(M)

A more positive lead when conducting in the forward direction.

ANTI-REFLECTION COATING (D)
A coating applied to the front surface of a display device or optical element to reduce the reflection of incident light. This improves readability in high ambient light conditions.

APOSTILB (ASB) (D)
A unit of luminance equal to $\frac{1}{\pi}$ candela/m^2 (1 unit). A surface of 1 m^2 all points of which are 1 m from a 1 candela source has a luminance of 1 apostilb.

APPARENT CANDLEPOWER (D)
The apparent candlepower (luminous intensity) of an extended source measured at a specific distance is the candlepower of a point source that would produce the same illumination at the same distance.

ARITHMETIC SHIFT (M)
1. A shift that does not affect the sign position.
2. A shift that is equivalent to the multiplication of a number by a positive or negative integral power of the radix.

ARRAY LOGIC (M)
A logic network whose configuration is a rectangular array of intersections of its input-output leads, with elements connected at some of these intersections. The network usually functions as an encoder or decoder.

AS-NEW (DG)
Having performance capabilities equal to level of performance of units when offered for sale after manufacture.

ASSEMBLE (M)
To prepare a machine language program from a symbolic language program by substituting absolute operation codes for symbolic operation codes and absolute or relocatable addresses for symbolic addresses.

ASSEMBLER (M)
A computer program that assembles.

ASYMMETRICAL LIGHT DISTRIBUTION (D)
An asymmetrical light distribution is one in which the emitted or reflected light distribution is not the same for conjugate viewing angles.

ASYNCHRONOUS DEVICE (M)
A device in which the speed of operation is not related to any frequency in the system to which it is connected.

ATTITUDE ERROR (T)
The error due to the orientation of the transducer relative to the direction in which gravity acts upon the transducer. (ISA)

AVALANCHE BREAKDOWN (J)
In a semi-conductor diode, a nondestructive breakdown caused by the cumulative multiplication of carriers through field-induced impact ionization. (GRAF)

AVALANCHE DIODE (J)
Also called breakdown diode. A silicon diode that has a high ratio of reverse-to-forward resistance until avalanche breakdown occurs. After breakdown, the voltage drop across the diode is essentially constant and is independent of the current. Used for voltage regulating and voltage limiting. Originally called Zener diode before it was found that the Zener effect had no significant role in the operation of diodes of this type.

BANDWIDTH (J)
The range within the limits of a band. The least frequency interval of a wave form. The range of frequencies of a device, within which its performance, with respect to some characteristic, conforms to a specified standard.

BARRIER LAYER (J)
See Depletion Layer.

BASE (J)
(Transistor) A region that lies between an emitter and a collector of a transistor and into which minority carriers are injected. (IEEE)

BASE RESISTANCE (J)
Resistance in series with the base lead in the common T equivalent circuit of a transistor. (GRAF)

BATTERY (J)
A DC voltage source which converts chemical, nuclear, thermal or solar energy into electrical energy. (GRAF)

BATTERY-BACKED (M)
(Not defined) A technique of using a standby power source of the battery variety to supply power to a system or part of a system for maintaining essential data, etc., during the loss of main power.

"BEST STRAIGHT LINE" (T)
A line midway between the two parallel straight lines closest together and enclosing all output vs. measurand values on a calibration curve. (ISA)

BIAS (J)
To influence or dispose to one direction, as for example, with a direct voltage or with a spring. (IEEE)

(T)
A constant or systematic error as opposed to a random error. It manifests itself as a persistent positive or negative deviation of the method average from the accepted reference value. (ASTM)

BIDIRECTIONAL DIODE-THYRISTOR (J)
A two terminal thyristor having substantially the same switching behavior in the first and third quadrants of the principal voltage-current characteristic. (IEEE)

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

BINARY CODED DECIMAL (BCD) (M)
A binary numbering system for coding decimal numbers in groups of 4 bits. The binary value of these 4-bit groups ranges from 0000 to 1001, and codes the decimal digits "0" to "9." To count to 9 takes 4 bits; to count to 99 takes two groups of 4 bits; to count to 999 takes three groups of 4 bits, etc.

BIPOLAR (J)
Having to do with a device in which both majority and minority carriers are present. In connection with IC's, the term describes a specific type of construction; bipolar and MOS are the two most common types of IC construction. (GRAF)

BIT (BINARY DIGIT) (J)
The smallest element of information in binary language. A contraction of binary digit. These characters in system (computer) language signify "on" and "off" (1 and 0). Word length, memory capacity, etc., can be expressed in number of "bits."

BLACK BODY (D)
A body which has an absorption factor of 1 for all wavelengths of interest is a black body. The radiation from a black body is a function solely of its temperature and is useful as a standard for light measurements.

BLEEDER RESISTOR (J)
A resistor used to draw a fixed current. Also used to discharge a filter capacitor after the circuit is de-energized. (GRAF)

BLOCK (M)
1. A set of things, such as words, characters, or digits handled as a unit.
2. A collection of continuous records recorded as a unit. Blocks are separated by block gaps and each block may contain one or more records.

BLOCK DIAGRAM (M)
A diagram of a system, instrument, or computer in which the principal parts are represented by suitable associated geometrical figures to show both the basic functions and the functional relationships among the parts.

B-MULTIPLIER (J)
See Darlington Amplifier.

BOMB TEST (T)
A form of leak test in which enclosures are immersed in a fluid which is then pressurized for the purpose of driving it through possible leak passages and thus into the internal cavities where its presence will usually cause some form of electrical disturbance. (ASTM)

BOOLEAN ALGEBRA (J)
The algebra of logic named for mathematician George Boole using alphabetic symbols to stand for logical variables and "zero" and "one" to represent states. AND, OR, NOT are the three basic logic operations in this algebra. NAND and NOR are combinations of the three basic operations.

BOOTSTRAP (M)
A technique or device designed to bring itself into a desired state by means of its own action; e.g., a machine routine whose first few instructions are sufficient to bring the rest of itself into the computer from an input device.

BORROW (M)
An arithmetically negative carry.

BRANCHING (M)
A method of selecting, on the basis of results, the next operation to execute while the program is in progress. (See *conditional jump.*)

BREAK POINT (T)

1. The point in the pressure-time curve that is preceded by a pressure drop of exactly 2 psi (13.8 kPa) within 15 min and succeeded by a drop of not less than 2 psi (13.8 kPa) in 15 min.
2. The junction of two confluent straight-line segments of a plotted curve. Note: In the asymptotic approximation of a log-gain versus log-frequency relation in a Bode diagram, the value of the abscissa is called the corner frequency. (IEEE)
3. (a) Pertaining to a type of instruction, instruction digit, or other condition used to interrupt or stop a computer at a particular place in a routine when manually requested. (b) A place in a routine where such an interruption occurs or can be made to occur. (IEEE)

BREAKDOWN VOLTAGE (J)

See Dielectric Strength.

(T)

The voltage at which a disruptive discharge takes place through or over the surface of the insulation. (IEEE)

BREAKDOWN VOLTAGE RATING(S) (T)

The DC or sinusoidal AC voltage which can be applied across specified insulated portions of a transducer without causing arcing or conduction above a specified current value across the insulating material. (ISA)

BRIDGE RESISTANCE (T)

See Input Impedance and Output Impedance.

BRIGHTNESS (LUMINANCE) (D)

Brightness or luminance is the luminous intensity per projected area normal to the line of observation.

BRIGHTNESS RATIO (D)

Brightness ratio is the ratio of the brightnesses of any two surfaces. When the two surfaces are adjacent, the brightness ratio is called the brightness contrast.

BUFFER (M)

An isolating circuit used to avoid reaction of a driven circuit on the corresponding driver circuit. Also, a storage device used to compensate for a difference in the rate of flow of information or the time of occurrence of events when transmitting information from one device to another.

BULBS (DG)

Integral incandescent lamps exclusive of socket, lens, reflector, etc., that might be included in a "lamp assembly".

BURST PRESSURE RATING (S) (T)

The pressure which may be applied to the sensing element or the case (as specified) of a transducer without rupture of either the sensing element or transducer case as specified. Note: (1) minimum number of applications and time duration of each application must be specified, (2) in the case of transducers intended to measure a property of a pressurized fluid, burst pressure is applied to the portion subjected to the fluid. (ISA)

BUS (M)

As applied to computer technology, one or more conductors used as a path over which information is transmitted.

BYTE (M)

An IBM developed term used to indicate a specific number of consecutive bits treated as a single entity. A byte is most often considered to consist of eight bits which as a unit can represent one character or two numerals.

CALIBRATION (T)
A test during which known values of measurand are applied to the device and corresponding output readings are recorded under specified conditions.

CALIBRATION CURVE (T)
A graphical representation of the calibration record. (ISA)

CALIBRATION TRACEABILITY (T)
The relation of a transducer calibration, through a specified step-by-step process, to an instrument or group of instruments calibrated by the National Bureau of Standards. (ISA)

CALIBRATION UNCERTAINTY (T)
The maximum calculated error in the output values, shown in a calibration record, due to causes not attributable to the transducer. (ISA)

CALL (M)
To transfer control to a specified closed subroutine.

CANDELA (cd) (D)
The candela is the unit of luminous intensity. It is defined as 1/60 of the intensity of 1 square cm of a blackbody radiator at the temperature of solidification of platinum (2046K). The candela replaces the candle as the standard unit.

CANDLEPOWER (D)
See luminous intensity.

CAPACITANCE (C) (J)
In a system of conductors and dielectrics, that property which permits the storage of electrically separated charges when potential differences exist between the conductors. Its value is expressed as the ratio of a quantity of electricity to a potential difference (Q/V). (IEEE)

(M)
In second sentence, "electricity" should read "charge."

CAPACITOR (J)
(Condenser) A device consisting of two electrodes separated by a dielectric, which may be air, for introducing capacitance into an electric circuit. (IEEE)

CARRIER (J)
An AC voltage having a frequency suitably high to be modulated by electrical signals.

(M)
Not defined with respect to semi-conductors, but used in definition of "base," "bipolar," etc.

CARRY (M)
1. One or more digits, produced in connection with an arithmetic operation on one digit place of two or more numerals in positional notation, that are forwarded to another digit place for processing there.
2. The number represented by the digit or digits in definition 1 above.
3. Most commonly, a digit as defined in definition 1 above that arises when the sum or product of two or more digits equals or exceeds the radix of the number representation system.
4. Less commonly, a borrow.

5. To forward a carry.
6. The command directing that a carry be forwarded.

CARRY LOOK-AHEAD (M)
A type of adder in which the inputs to several stages are examined and the proper carries are produced simultaneously, rather than propagated through a sequence of operations.

CASCADE (J)
An arrangement of two or more similar circuits or amplifying stages in which the output of one provides the input of the next. (GRAF)

CASE PRESSURE (T)
See burst pressure rating, proof pressure or reference pressure.

CATHODE (J)
A general name for any negative electrode. (GRAF)

CATHODE-RAY TUBE (CRT) (J)
An electron-beam tube in which the beam can be focused to a small cross section on a luminescent screen and varied in position and intensity to produce a visible pattern. (IEEE)

CENTRAL PROCESSOR UNIT (CPU) (M)
The section of a computer that contains the arithmetic, logic and control circuits. In some systems, it may also include the memory unit and the operator's console. Also called main frame in larger systems. It performs arithmetic operations, controls instruction processing, and provides timing signals and other housekeeping operations.

CHANNEL (M)
A path along which signals can be sent or received; e.g., data channel, output channel.

CHARACTER (M)
Any of a set of symbols used to express information, singularly or in combination. Characters are not necessarily limited to the numerals 0 through 9 and the standard alphabet but can also include punctuation marks, typewriter symbols, or any other single symbol used for expressing information.

CHARACTERISTIC CURVE (D)
A characteristic curve is a curve expressing a relation between two variable properties of a device; e.g., luminance and volts.

CHECK BIT (M)
A binary check digit; e.g., a parity bit (used for validation of data).

CHIP (J)
1. A single substrate on which all the active and passive elements of an electronic circuit have been fabricated. A chip is not ready for use until it is packaged and provided with terminals for connection to the outside world. (Not true, however, for hybrid circuits such as IAR and TFI). Also called a die. (GRAF)
2. A leadless discrete component such as a resistor or capacitor intended for surface mounting to printed circuit boards or film hybrid substrates.

CHIP SETS (J)
A term describing the microprocessor chip in addition to RAM's, ROM's and interface I/O devices. Chip sets, mounted on a board are also referred to as the CPU portion of the microcomputer.

CHROMATICITY (D)
Chromaticity is the expression of dominant wavelength and purity.

CHROMATICITY DIAGRAM (D)
A chromaticity diagram is a two dimensional plot used to define a given color by the proportions of the three primary colors which when mixed match the given color.

CLOCK (J)
1. A device that generates periodic signals used for synchronization. (IEEE)
2. A device that measures and displays time.

CLOSED LOOP (M)
A control system implementation in which information on output parameter is used to improve the system accuracy and/or response.

CODE (M)
1. A set of unambiguous rules specifying the way in which data may be represented; e.g., the set of correspondence in the standard code for information interchange. Synonymous with coding schemes.
2. In data processing, to represent data or a computer program in a symbolic form that can be accepted by a data processor.

COIL (J)
See Inductor.

COLLECTOR (TRANSISTOR) (J)
A region through which primary flow of charge carriers leaves the base. (IEEE)

COLOR (D)
Color is a subjective visual response determined mainly by the wavelength of light emitted or reflected by a body.

COLOR TEMPERATURE (D)
Color temperature is the temperature of a block body whose emitted light is a match for the given color.

COLORANT (D)
A colorant is any substance such as a dye, pigment, or paint used to produce color in an object.

COMBINATORIAL LOGIC SYSTEM (M)
Digital system not utilizing memory elements.

COMMON COLLECTOR AMPLIFIER (J)
A transistor amplifier in which the collector element is common to both the input and output circuit. Also known as an emitter-follower and a ground-collector amplifier. (GRAF)

COMMON MODE REJECTION (J)
A measure of how well a differential amplifier ignores a signal which appears simultaneously and is in phase at both input terminals. Also called in-phase rejection. (GRAF)

COMPENSATION (T)
A modifying or supplementary action (also, the effect of such action) intended to improve performance with respect to some specified characteristic. (IEEE)

Provision of a supplemental device, circuit, or special materials to counteract known sources of systematic error. (ISA)

COMPILE (M)
(Computing) The process of converting a computer program from another programming language into machine-recognizable codes.

COMPILER (M)
A program that compiles.

COMPLEMENT NOTATION (M)
A system of notation where positive binary numbers are identical to positive numbers in sign and magnitude notation, but where negative numbers are the exact complement of the magnitude of the corresponding positive value.

COMPLEMENTARY MOS (CMOS) (J)
Pertaining to N- and P-channel enhancement-mode devices fabricated compatibly on a silicon chip and connected into push-pull complementary digital circuits. These circuits offer low quiescent power dissipation and potentially high speeds, but they are more complex than circuits in which only one channel type is used. (GRAF)

COMPUTER (J)
Any device capable of accepting information, applying prescribed processes to the information and supplying the results of the process.

(DG)
An electronic device that can perform substantial computation on data including numerous arithmetic or logic operations without intervention by a human operator. A true computer must possess at least the following five characteristics: provision for data input, a control unit, a storage or memory capability, an arithmetic logic section, and a provision for discharging its output in usable form.

CONDITIONAL JUMP (M)
A jump that occurs if specified criteria are met. (See branching.)

CONDUCTIVITY (J)
The ability to transmit heat or electricity. Electrical conductivity is expressed in terms of the current per unit of applied voltage. The reciprocal of resistivity.

CONNECTING DEVICES (DG)
On or off vehicle devices for the necessary mechanical and/or electrical connections between the motor vehicle and the diagnostic equipment. (ISO)

CONSTANT CURRENT SOURCE (J)
A regulated source which acts to keep its output current constant in spite of changes in load, line or temperature while the output voltage changes by whatever amount is necessary to maintain the constant output current. (GRAF)

CONTAMINANT (T)

1. A foreign material present on or in the contact surface. (ASTM)
2. An impurity or foreign substance present in or on a material which affects one or more properties of the material.

CONTINUOUS RATING (J)

The rating applicable to specified operation for a specific uninterrupted length of time. (ISA)

CONTRAST RATIO (CONTRAST) (D)

Contrast ratio is the quotient of the luminous intensity of an activated area of a display and the luminous intensity of the same point in the unactivated state. Contrast ratio (relative contrast) is also used as the quotient between the active and background area luminous intensities of a display. A complete definition requires that the ambient light conditions be specified for a given contrast ratio value.

CONTROL HIERARCHY (M)

Design development used in complex systems to ensure an order of priority to several controls coming from more than one source.

CONTROLLER (M)

Digital subsystem responsible for implementing "how" a system is to function. Not to be confused with "timing," as timing tells the system "when" to perform its function.

COUNTER (M)

A digital circuit which counts input pulses and will give an output pulse after receiving a predetermined number of input pulses.

CREEP (J)

A change in output occurring over a specific time period while the input and all environmental conditions are held constant.

(T)

A change in output occurring over a specific time period while the measurand and all environmental conditions are held constant.

CRITICAL DAMPING (J)

The value of damping which provides the most rapid transient response without overshoot. Operation between underdamping and overdamping. (GRAF)

CROSS-AXIS SENSITIVITY, CROSS SENSITIVITY (T)

See Transverse Sensitivity.

CROSSTALK (M)

Interference which appears in a given channel but has its origin in another channel.

CURRENT DENSITY (J)

The amount of electric current passing through a given cross-sectional area of a conductor. (GRAF)

CURVE OF LIGHT DISTRIBUTION (D)

A curve of light distribution is a curve showing the variation of luminous intensity of a display with angle of observation.

CYCLE (M)
1. An interval of space or time in which one set of events of phenomena is completed.
2. Any set of operations that is repeated regularly in the same sequence. The operations may be subject to variations on each repetition.

DAMPING (J)
The transitory decay of the amplitude of a free oscillation of a system, associated with energy loss from the system. (IEEE)

(T)
Dissipation of energy in a vibrating or oscillating system.

DAMPING CONSTANT (T)
The component of applied force which is 90 deg out of phase with the deformation, divided by the velocity of deformation. (ASTM)

DAMPING RATIO (J)
The ratio of the degree of actual damping to the degree of damping required for critical damping. (GRAF)

DARLINGTON AMPLIFIER (J)
A transistor circuit which, in its original form, consists of two transistors in which the collectors are tied together and the emitter of the first transistor is directly coupled to the base of the second transistor. Therefore, the emitter current of the first transistor equals the base current of the second transistor. This connection of two transistors can be regarded as a compound transistor with three terminals. (GRAF)

DARLINGTON PAIR (J)
See Darlington amplifier.

D'ARSONVAL CURRENT (J)
A high-frequency, low voltage current of comparatively high amperage. (GRAF)

DATA (M)
1. A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by humans or automatic means.
2. Any representations such as characters or analog quantities to which meaning is or might be assigned.

DATA BUS (M)
Most microprocessors communicate externally through the use of a data bus. Most are bi-directional; e.g., capable of transferring data to and from the CPU, storage and peripheral devices.

DATA PROCESSING (M)
The execution of a systematic sequence of operations performed upon data. Synonymous with information processing.

DATA PROCESSOR (M)
A device capable of performing data processing, including desk calculators, punched card machines, and computers. Synonymous with processor.

DC PLASMA PANEL (D)
A gas discharge panel using electrodes in direct contact with the gas. Typical units are for numeric and alphanumeric applications.

DEAD BAND (T)
The range through which the measured signal can be varied without initiating response.

DEBUG (M)
An instruction, program or action designed in microprocessor software to search for, correct, and/or eliminate sources of errors in programming routines. There are many types of "bugs" or glitches that can be located by single step testers, specifically designed programs, or operational procedures.

DECIBEL (J)
One-tenth of a bel, the number of decibels denoting the ratio of the two of power being ten times the logarithm to the base 10 of this ratio. Note: the abbreviation dB is commonly used for the term decibel. With P1 and P2 designating two amounts of power and n the number of decibels denoting their ratio:

$$n = 10 \log 10 (P1/P2) \text{ decibel}$$

When the conditions are such that ratios of currents or ratios of voltages (or analogous quantities in other fields) are the square roots of the corresponding power ratios, the number of decibels by which they differ is expressed by the following equations:

$$n = 20 \log 10 (I1/I2) \text{ decibel}$$
$$n = 20 \log (V1/V2) \text{ decibel}$$

Where I1/I2 and V1/V2 are the given current and voltage ratios, respectively. By extension, these relations between numbers of decibels and ratios of currents or voltages are sometimes applied where these ratios are not the square roots of the corresponding power ratios; to avoid confusion, such usage should be accompanied by a specific statement of this application, such extensions of the term described should preferably be avoided. (IEEE)

DECIMAL (M)
1. Pertaining to a characteristic or property involving a selection, choice, or condition in which there are ten possibilities.
2. Pertaining to the number representation system with a radix of ten.

DECIMAL DIGIT (M)
In decimal notation, one of the characters 0 through 9.

DECODER (M)
A conversion circuit that accepts digital input information—in the case of a memory address decoder, a binary address information—that appears as a small number of lines and selects and activates one line of a large number of output lines.

DELAY (J)
1. The amount of time by which an event is retarded.
2. The amount of time by which a signal is delayed.

Note: It may be expressed in time (milliseconds, microseconds, etc.) or in number of characters (pulse times, word times, major cycles, minor cycles, etc.). (IEEE)

DELAY LINE (J)
(Electronic Computers)
1. Originally, a device utilizing wave propagation for producing a time delay of a signal.
2. Commonly, any real or artificial transmission line or equivalent device designed to introduce delay. (IEEE)

DEPLETION LAYER **(J)**
In a semi-conductor, the region in which the mobile carrier charge density is insufficient to neutralize the net fixed charge density of donors and acceptors. (GRAF)

DETECTOR **(T)**
1. FM Broadcast Receiver—A) A device to effect the process of detection; B) A mixer in superheterodyne receiver. Note: In definition B), the device is often referred to as a first detector and the device is not used for detection as defined above.
2. Electromagnetic Energy—A device for the indication of the presence of electromagnetic fields. Note: In combination with an instrument, a detector may be employed for the determination of the complex field amplitudes. See also auxiliary device to an instrument.
3. Nuclear Power Generating Stations—Any device for converting radiation flux to a signal suitable for observation and measurement.

DEVICE CONTROL CHARACTER **(M)**
A control character intended for the control of ancillary devices associated with a data processing or telecommunication system, usually for switching devices "on" or "off."

DIAGNOSIS **(DG)**
The careful investigation of symptoms and facts leading to the determination of the cause of a problem.

DIAGNOSTIC **(M)**
Pertaining to the detection and isolation of a malfunction or mistake.

DIAGNOSTICIAN **(DG)**
One who is trained and experienced in the diagnosis of the modifying adjectives. (As in vehicle diagnostician, or radio diagnostician.)

DIAGNOSTIC CENTER **(DG)**
A term coined in the mid 1960's to describe "state of health" vehicle inspection stations. Usually involves the measurement of ten or more component characteristics or outputs and comparing these measured values against new part specifications. The comparison process is sometimes performed semi-automatically.

DIAGNOSTIC EQUIPMENT **(DG)**
Equipment that can identify specific faults or provide specific information as to what vehicle components should be adjusted, repaired, or replaced. (Example: A vacuum gage is test equipment, not diagnostic equipment.)

DIAGNOSTIC SENSOR **(DG)**
Any sensing device used partly or exclusively for diagnostic purposes, to provide information on conditions of a motor vehicle or parts of it. (ISO)

Built-in Diagnostic Sensor: A sensor for diagnostic purposes, which is part of the permanent equipment of a motor vehicle. (ISO)

Plug-in Diagnostic Sensor: A sensor for diagnostic purposes, which is part of the off-vehicle diagnostic equipment, to be fitted prior to diagnosis to a receiving device already provided on the motor vehicle for this purpose. (ISO)

Clip-on Diagnostic Sensor: A sensor for diagnostic purposes, which is part of the off-vehicle diagnostic equipment, to be attached to the motor vehicle prior to diagnosis. No special on-vehicle equipment is necessary. (ISO)

Reference Cylinder Sensor: Sensor for diagnostic purposes, the signal of which corresponds to the beginning of the reference cylinder ignition pulse in the case of a spark ignition engine, or to the beginning of the reference cylinder injection in the case of a compression ignition engine. (ISO)

DIAGNOSTIC TESTER **(DG)**
Self-contained autonomous off-vehicle equipment permitting motor vehicle diagnosis. (ISO)

DIELECTRIC **(T)**
A medium in which it is possible to maintain an electric field with little or no supply of energy from outside sources.

DIELECTRIC CONSTANT **(J)**
The property that determines the electrostatic energy stored per unit volume for unit potential gradient. Note: This numerical value usually is given relative to a vacuum. (IEEE)

DIELECTRIC STRENGTH **(J)**
(Electric Strength) (Breakdown Strength) The potential gradient at which electric failure or breakdown occurs. To obtain the true dielectric strength, the actual maximum gradient must be considered or the test piece and electrodes must be designed so that uniform gradient is obtained. The value obtained for the dielectric strength in practical tests will usually depend on the thickness of the material and on the method and conditions of test. (IEEE)

DIFFUSE REFLECTION **(D)**
Diffuse reflection is that in which the light is reflected in all directions.

DIFFUSE-SPECULAR **(D)**
Diffuse-specular surfaces are those which are essentially diffuse but contain an outer layer of glazed material which reflects specularly. A typical example is porcelain enamel.

DIFFUSE TRANSMISSION **(D)**
Diffuse transmission is that in which the transmitted light is emitted in all directions.

DIFFUSE TRANSMISSION FACTOR **(D)**
The diffuse transmission factor is the ratio of the diffuse transmitted light to the incident light.

DIFFUSING SURFACE **(D)**
A diffusing surface is one which breaks up (diffuses) the incident light and distributes it angularly approximately in accordance with Lambert's Law. Rough plaster is a typical example of such a surface.

DIGIT **(M)**
A symbol that represents one of the non-negative integers smaller than the radix. For example, in decimal notation, a digit is one of the characters from 0 to 9. Synonymous with numeric character.

DIGITAL COMPUTER **(J)**
A computer that processes information in numerical form. Electronic digital computers generally use binary or decimal notation and process information by repeated high speed use of the fundamental arithmetic processes of addition, subtraction, multiplication and division.

DIGITAL OUTPUT **(T)**
Transducer output that represents the magnitude of the measurand in the form of a series of discrete quantities coded in a system of notation. (ISA)

DIGITAL-TO-ANALOG (D/A) CONVERTER (J)
A device which transforms digital data into analog data by translating digital magnitude to equivalent voltage level.

DIGITIZE (M)
To use numeric characters to express or represent data; e.g., to obtain from an analog representation of a physical quantity, a digital representation of the quantity.

DIMMING RANGE (D)
Dimming range is a dimensionless number giving the ratio of maximum to minimum luminous intensity of an active display.

DIODE (J)
(Electronic Tube) A two electrode electron tube containing an anode and a cathode. (Semi-conductor) A semi-conductor device having two terminals and exhibiting a non-linear voltage-current characteristic; in more restricted usage, a semi-conductor device that has the asymmetrical voltage-current characteristic exemplified by a single P-N junction. (IEEE)

DIODE TRANSISTOR LOGIC (DTL) (J)
A logic circuit that uses diodes at the input to perform the electronic logic function that activates the circuit transistor output. In monolithic circuits, the DTL diodes are a positive level logic and function or a negative level or function. The output transistor acts as an inverter to result in the circuit becoming a positive nand or a negative nor function. (GRAF)

DIP (J)
Abbreviation for Dual In-line package. (GRAF)

DIPOLE ANTENNA (J)
Any one of a class of antennas producing the radiation pattern approximating that of an elementary electronic dipole. Note: Common usage considers a dipole to be a metal radiating structure that supports a line current distribution similar to that of a thin straight wire, a half wavelength long, so energized that the current has two modes, one at each of the far ends. (IEEE)

DIRECT ACCESS (M)
1. Pertaining to the process of obtaining data from, or placing data into storage where the time required for such access is independent of the location of the data most recently obtained or placed in storage.
2. Pertaining to a storage device in which the access time is effectively independent of the location of the data.
3. Synonymous with random access.

DIRECT ADDRESSING (M)
Method of programming that has the address pointing to the location of data or the instruction that is to be used.

DIRECTIVITY (T)
The solid angle or the angle in a specified plane over which sound or radiant energy incident on a transducer is measured within specified tolerances and a specified band of measurand frequencies. (ISA)

DIRECT MEMORY ACCESS CHANNEL (DMA) (M)
A method of input-output for a system that uses a small processor whose sole task is that of controlling input-output. With DMA, data are moved into or out of the system without program intervention.

DITHER (T)
(Control Circuits) A useful oscillation of small amplitude introduced to overcome the effects of friction, hysteresis or clogging. (IEEE)

DITHERING (T)
The application of intermittent or oscillatory forces just sufficient to minimize static friction within the transducer.

DOMINANT WAVELENGTH (D)
The wavelength of radiant energy of a single frequency that matches the color of the light under test when combined in suitable proportion with the radiant energy of the reference standard.

DOT MATRIX DISPLAY (D)
A form of display organized in an x-y matrix of light emitting dots. Such a display may be used for numeric, alphanumeric, or graphic information.

DOUBLE PRECISION (M)
Pertaining to the use of two computer words to represent a number.

DRAIN (D) (J)
In a field effect transistor, the element that corresponds to the collector of a transistor. (GRAF)

DRIFT (J)
An undesired change in output over a period of time, which change is not a function of the input.

(T)
A change in output over a period of time, which change is not a function of the measurand. (ISA)

DUMP (M)
1. To copy the contents of all or part of a storage, usually from an internal storage into an external storage.
2. A process as in definition 1 above.
3. The data resulting from the process as in definition 1 above.

DUTY CYCLE (J)
The ratio of the time "on" of a device or system divided by the total cycle time (i.e., "on" plus time "off"). For a device that normally runs intermittently rather than continuously; the amount of time a device operates as opposed to its idle time.

DYNAMIC STORAGE ELEMENTS (M)
Storage elements which contain storage cells that must be refreshed at appropriate intervals to prevent the loss of information content.

DYNAMOMETER (DG)
An energy absorbing device designed to allow measured dynamic operation of a vehicle's drive train while the vehicle remains stationary.

ECL CIRCUITS (EMITTER-COUPLED LOGIC) (M)
Nonsaturated bipolar logic in which the emitters of the input logic transistors are coupled to the emitter of a reference transistor.

EDDY CURRENTS (T)
(General) Those currents that exist as a result of voltages induced in the body of a conducting mass by a variation of magnetic flux. Note: The variation of magnetic flux is the result of a varying magnetic field or of a relative motion of the mass with respect to the magnetic field. (IEEE)

EDGE TRIGGERING (M)
Activation of a circuit at the edge of the pulse as it begins its change. Circuits then trigger at the edge of the input pulse rather than sensing a level change.

EDIT (M)
To modify the form or format of data; e.g., to insert or delete characters such as page numbers or decimal points.

EEROM (M)
Electrical eraseable read only memory. The contents of this type of memory may be electronically erased and new information programmed into the device. Also known as EAROM; or electrically alterable ROM.

ELECTRIC (DG)
Any device or system operating on the direct flow of electrons or the low frequency (below 1,000 Hz) alternating flow of electrons.

ELECTROCHROMIC DISPLAY (D)
A passive display whose operating principle is the electric field control of a chemical reaction. One of the chemical species is transparent, the other is colored, allowing electric field control of light transmission or reflection.

ELECTROLUMINESCENCE (J)
Luminescence resulting from a high-frequency discharge through a gas or from application of an alternating current to a layer of phosphor. (GRAF)

ELECTROLUMINESCENT DISPLAY (D)
An active display whose operating principle is the emission of light from a phosphor which is excited by energy from an electric field. AC and DC operated types are common.

ELECTROMAGNETIC COMPATABILITY (EMC) (J)
The ability of electronic communications equipment, subsystems and systems to operate in their intended environments without suffering or causing unacceptable degradation of performance as a result of unintentional electromagnetic radiation or response. (GRAF)

(T)
The capability of electronic equipment or systems to be operated in the intended operational electromagnetic environment at designed levels of efficiency.

ELECTROMAGNETIC INTERFERENCE (EMI) (J)
Electromagnetic phenomena which, either directly or indirectly, can contribute to the degradation in performance of an electronic receiver or system. (GRAF)

(T)
Impairment of a wanted electromagnetic signal by an electromagnetic disturbance. See also electromagnetic compatibility.

ELECTROMAGNETIC WAVES (J)
The radiant energy produced by the oscillation of an electric charge. (GRAF)

ELECTROMOTIVE FORCE (emf) (J)
The force which may cause current to flow when there is a difference of potential between two points. (GRAF)

ELECTRON (J)
One of the natural elementary constituents of matter. It carries a negative electric charge of one electronic unit. (GRAF)

ELECTRONIC (DG)
Any device or system in which electrons flow through a vacuum, gas, or semiconductor. Normally operative in frequency range above 1,000 Hz.

ELECTRONIC DISPLAY (D)
An electronic display is a device which presents information to a viewer by control of light, either emitted, reflected, or transmitted, in response to an electrical driving signal.

ELECTROPHORETIC DISPLAY (D)
A passive display whose operating principle is the movement of particles in a fluid under the influence of an electric field.

ELECTROSTATIC STORAGE (M)
A storage device that stores data as electrostatically charged areas on a dielectric surface.

EMISSIVITY (D)
The ratio of light emitted from the source in question to the light emitted from a black body at the same temperature.

EMITTER (J)
A region from which charge carriers that are minority carriers in the base are injected into the base. (IEEE)

EMULATE (M)
To initiate one system with another such that the imitating system accepts the same data, executes the same programs, and achieves the same results as the imitated system.

ENCODE (M)
To apply a set of unambiguous rules specifying the way in which data may be represented such that a subsequent decoding is possible. Synonymous with code.

END-AROUND CARRY (M)
A carry generated in the most significant digit place and sent directly to the least significant place.

ENTRY POINT (M)
In a routine, any place to which control can be passed.

EQUIVALENCE (M)
A logic operator having the property that if P is a statement, Q is a statement, R is a statement, ... then the equivalence of P, Q, R, ... is true if and only if all statements are true or all statements are false.

ERASE (M)
To obliterate information from a storage medium; e.g., to clear, to overwrite.

ERG (D)
The unit of energy in the CGS system is the erg. One erg = 10^{-7} joules.

ERROR (M)
Any discrepancy between a computed, observed or measured quantity and the true, specified or theoretically correct value or condition.

(T)
The algebraic difference between the indicated value and the true value of the measurand. (ISA)

ERROR BAND (T)
The band of maximum deviations of output values from a specified reference line or curve due to those causes attributable to the device.

EXCLUSIVE OR (J)
A logic operator having the property that if P is a statement and Q is a statement, then P exclusive OR Q is true if either but not both statements are true, false if both are true or both are false. (IEEE)

(M)
A modified form of the OR function which is true when one and only one input is true.

EXECUTE (M)
That portion of a computer cycle during which a selected control word or instruction is accomplished.

EXPONENT (M)
In a floating point representation, the numeral or a group of numerals representing a number, that indicates the power to which the base is raised.

EYE RECEPTORS (D)
Eye receptors, rods and cones, are the specialized structures in the eye which respond to visible light.

FAILURE MODE (DG)
A particular manner of malfunction.

FAILURE MODE ANALYSIS (DG)
The critical review of the design and function of an item to identify and describe all primary ways of malfunctioning and the effect of each on system performance.

FAILURE (TOTAL) (T)(DG)
The termination of the ability of an item to perform its required function.

FALL TIME (D)
Fall time is the time required for the specified optical property to fall from 90 to 10 percent of its maximum excursion after a step function decrease in the driving signal level.

The time required for the leading edge of a pulse to fall from 90 to 10 percent of its initial value. It is proportionate to the time constant and is a measure of the steepness of the waveform. Also, the measured length of the time required for an output voltage of a digital circuit to change once the change has started.

The length of time for the output of a transducer to fall from a large specified percentage of its initial value to a small specified percentage of its initial value as a result of a step change of measurand.

FALL TIME DELAY (D)
Fall time delay is the time required for the specified optical or electrical property to fall from its steady state level to 90 percent of that level after a step function decrease in signal level.

FEEDBACK (J)
The recycling of a portion of the output to the input of a system. Systems employing feedback are called closed-loop systems.

FEEDBACK AMPLIFIER (J)
An amplifier that uses a passive network to return a portion of the output signal to modify the performance of the amplifier. (GRAF)

FERRITES (J)
Chemical compounds of iron oxide and other metallic oxides combined with ceramic material. They have ferromagnetic properties but are poor conductors of electricity. Hence, they are useful where ordinary ferromagnetic materials (which are good electrical conductors) would cause too great a loss of electrical energy. (GRAF)

FERROMAGNETIC MATERIAL (J)
Material whose relative permeability is greater than unity and depends upon the magnetizing force. A ferromagnetic material usually has relatively high values of relative permeability and exhibits hysteresis. (IEEE)

FET (FIELD EFFECT TRANSISTOR) (J)
A semi-conductor device in which the resistance between the source and drain terminals depends on a field produced by a voltage applied to the gate terminal. (GRAF)

FETCH (M)
That portion of a computer cycle during which the next instruction is retrieved from memory.

FIELD (M)
In a record, a specified area used for a particular category of data; e.g., a set of bit locations in a computer word used to express the address of the operand.

FILTER (D)
A device placed between a display and the observer for the purpose of modifying the optical characteristics of the display. Filters are generally used to improve contrast ratio and sometimes to change color. Examples include neutral density, colored, and polarizing types.

(J)
A selective network which may contain resistors, inductors, capacitors or active elements which offers comparatively little opposition to certain frequencies or to direct current, while blocking or attenuating other frequencies. (GRAF)

FIXED-POINT BINARY NUMBER (M)
A binary number represented by a sign bit and one or more number bits with a binary point fixed somewhere between two neighboring bits.

FLAG (M)
1. Any of various types of indicators used for identification; e.g., a wordmark.
2. A character that signals the occurrence of some condition, such as the end of a word, its sign, its parity, etc.
3. Synonymous with mark, sentinel, tag.

FLAT PACK (J)
A flat, rectangular integrated circuit or hybrid-circuit package with co-planar leads. (GRAF)

FLIP-FLOP (M)
(Storage Element) A circuit having two stable states and the capability of changing from one state to another with the application of a control signal and remaining in that state after removal of signals.

FLOATING-POINT BINARY NUMBER (M)
A binary number expressed in exponential notation. That is, a part of the binary word represents the mantissa and is a part of the exponent.

FLOW CHART (M)
A graphical representation for the definition, analysis, or solution of a problem, in which symbols are used to represent operations, data, flow, equipment, etc.

FLUX (J)
(Magnetic) The sum of all the lines of force in a magnetic field crossing a unit area per unit time.

FLUX DENSITY (J)
Flux per unit area perpendicular to the direction of the flux. (GRAF)

FONT (D)
A font is the set of symbols which a display can present. The particular form of certain characters which may be displayed in alternative forms must be given to define a font. For example, b or 6 are two ways to display a six on a seven segment display.

FOOTCANDLE (fc) (D)
The footcandle is the unit of illumination given by the illumination on a surface one square foot in area on which there is a flux of one lumen. A surface all points of which are one foot from a one candela source has an illumination of one footcandle.

FOOTLAMBERT (fl) (D)
The footlambert is a unit of brightness (luminance) equal to the uniform brightness of a perfectly diffusing surface emitting or reflecting light at the rate of one lumen per square foot. The average brightness of a reflecting surface is the product of the illumination in footcandles times the reflection factor of the surface. A one square foot surface all points of which are one foot from a one candela source has a luminance of one footlambert.

FORMAT (M)
The arrangement of data.

FORTRAN (M)
(FORmula TRANslating system) A programming language primarily used to express computer programs by arithmetic formulas.

FORWARD VOLTAGE (Vf) (J)
The voltage across a semi-conductor diode associated with the flow of forward current. The P-region is at a positive potential with respect to the N-region.

FRAME TIME (D)
In a multiplexed display, the frame time is the time for one complete scan of the display.

FREQUENCY MODULATED OUTPUT fm (FREQUENCY MODULATION) (J)
A scheme for modulating a carrier frequency in which the amplitude remains constant but the carrier frequency is displaced in frequency proportionally to the amplitude of the modulating signal. A frequency modulation broadcast system is practically immune to atmospheric and man-made interference.

(T)
An output in the form of frequency deviations from a center frequency, where the deviation is a function of the input.

FREQUENCY OUTPUT (T)
An output in the form of frequency which varies as a function of the applied measurand (e.g., angular speed or flow rate). (ISA)

FREQUENCY, NATURAL (T)
The frequency of free (not forced) oscillations of the sensing element of a fully assembled transducer.

FREQUENCY, RESONANT (T)
The measurand frequency at which a transducer responds with maximum output amplitude.

FREQUENCY RESPONSE (J)
A measure of how the gain or loss of a circuit device or system varies with the frequencies applied to it. Also, the portion of the frequency spectrum which can be sensed by a device within specified limits of error.

(T)
The change with frequency of the output/measurand amplitude ratio (and of the phase difference between output and measurand), for a sinusoidally varying measurand applied to a transducer within a stated range of measurand frequencies. (ISA)

FRICTION ERROR (T)
The maximum change in output at any measurand value within the specified range, before and after minimizing friction within the transducer by dithering. (ISA)

FRICTION-FREE ERROR BAND (T)
The error band applicable at room conditions and with frictions within the transducer minimized by dithering.

FULL-ADDER (M)
A logic circuit like the half-adder, but with a provision for a carry-in from a preceding addition.

FULL SCALE (T)
See Range.

FULL-SCALE OUTPUT (T)
The algebraic difference between the end points for bi-directional sensors, the difference between zero and the larger end point.

FUNCTION (M)
A specific purpose of an entity, or its characteristic action.

FUSIBLE LINK MEMORY (M)
A read only memory in which the program or data is inserted after the chip is packaged. Once programmed, the contents of this memory cannot be erased.

GAGE FACTOR (T)
A measure of the ratio of the relative change of resistance to the relative change in length of a resistive strain transducer (strain gage). (ISA)

GAGE PRESSURE (T)
A term used to indicate the difference between the absolute pressure and atmospheric pressure. This term is seldom used in a vacuum technology. (ASTM)

GAIN (J)
Any increase in power when a signal is transmitted from one point to another. Usually expressed in decibels. (GRAF)

GAS DISCHARGE DISPLAY (D)
An active display whose operating principle is the emission of light by a rare gas mixture ionized by an electric field. AC and DC types are common.

GATE (J)
1. A device or element that, depending upon one or more specified inputs, has the ability to permit or inhibit the passage of a signal.
2. (Electronic Computers) A) A device having one output channel and one or more input channels, such that the output channel state is completely determined by the contemporaneous input channel states, except during switching transients. B) A combinational logic element having at least one input channel. C) An AND gate. D) An OR gate.
3. In a field effect transistor, the electrode that is analogous to the base of a transistor or the grid of a vacuum tube. (GRAF)

GCS (J)
Abbreviation for gate controlled switch. (GRAF)

GENERAL-PURPOSE COMPUTER (M)
A computer that is designed to handle a wide variety of problems.

GLITCH (M)
A transient signal or operation, usually in error.

GRAPHIC DISPLAY (D)
A graphic display is one which can display general graphic information such as histograms or graphs.

HALF-ADDER (M)
A logic circuit capable of adding two binary numbers with no provision for a carry-in from a preceding addition.

HALL EFFECT (J)
The development of a transverse electric potential gradient in a current carrying conductor or semi-conductor upon the application of a magnetic field.

(T)
The development of a transverse electric potential gradient or voltage in a current carrying conductor or semi-conductor upon the application of a magnetic field.

HARDWARE (J)

1. Mechanical, magnetic, electrical or electronic devices; physical equipment (contrasted with software).
2. Particular circuits of functions built into a system. (IEEE)

(M)

Physical equipment, as opposed to the computer program or method of use; e.g., mechanical, magnetic, electrical, or electronic devices.

HARMONIC DISTORTION (J)

The production of harmonic frequencies at the output by the nonlinearity of a system when a sinusoidal input is applied. (GRAF)

HEAT SINK (J)

A mounting base, usually metallic, that dissipates, carries away, or radiates into the surrounding atmosphere the heat generated within a semi-conductor device. (GRAF)

HELIUM BOMBING (T)

A method of testing for leaks in which hermetically sealed units containing an internal volume are subjected to a helium pressure prior to being bell jar tested. If leaks are present in the sealed unit, the helium pressure will drive some helium into the internal volume and this may be subsequently detected during bell jar testing.

HENRY

The henry is the inductance of a closed circuit in which an electromotive force of 1 volt is produced when the electric current in the circuit varies uniformly at the rate of one ampere per second.

HERTZ (J)

The unit of frequency, one cycle per second. (IEEE)

HIGH-THRESHOLD LOGIC (HTL) (J)

Logic with a high noise margin, used primarily in industrial applications, it closely resembles DTL, except that in HTL a reverse-biased emitter junction is used as a threshold element operating as a Zener diode. A typical noise margin is 6 volts with a 15-volt supply. (GRAF)

HOLE (J)

In the electronic valence structure of a semi-conductor, a mobile vacancy which acts like a positive electronic charge with a positive mass. (GRAF)

HOLE CONDUCTION (J)

The apparent movement of a hole to the more negative terminal in a semi-conductor. Since the hole is positive, this movement is equivalent to a flow of positive charges in that direction.

HYBRID CIRCUIT (J)

A circuit which combines the thin-film (or thick film) and semi-conductor technologies. Generally, the passive components are made by thin-film techniques, and the active components by semi-conductor techniques. (GRAF)

HYSTERESIS (J)

The difference between the response of a unit or system to an increasing and a decreasing signal. Hysteretical behavior is characterized by inability to retrace exactly on the reverse swing a particular locus of input/output conditions. (GRAF)

(T)

In a transducer, the maximum difference in output, at any measurand value within the specified range, when the value is approached first with increasing and then with decreasing measurand. (ISA)

I^2L (M)

A semi-conductor technology which can be used for both analog and digital functions on the same chip. I^2L is an acronym for current (I) Injected Logic.

ILLUMINATION (ILLUMINANCE) (D)

Illumination is the density of luminous flux on a surface. It is equal to the flux divided by the area when the surface is uniformly illuminated.

IMMEDIATE ADDRESS MODE (M)

Pertaining to an instruction in which an address part contains the value of an operand rather than its address.

IMPEDANCE (Z) (J)

The total opposition offered by a component or circuit to the flow of alternating or varying current. Impedance is expressed in ohms and is similar to the actual resistance in a direct current circuit. Impedance may be computed as Z = E/I, where E is the applied AC voltage and I is the resulting alternating current flow in the circuit.

INCANDESCENT DISPLAY (D)

An active display whose operating principle is the emission of light from a heated filament in vacuum or an inert gas.

INCIPIENT FAILURE (DG)

A failure condition which is just commencing or is in an initial stage and is beginning to show or reveal itself to a suitable sensor and detector.

INDEXED ADDRESS (M)

An address that is modified by the content of an index register prior to or during the execution of a computer instruction.

INDEXING (M)

In computers, a method of address modification that is implemented by means of index registers.

INDEX REGISTER (M)

A register whose content may be added to or subtracted from the operand address prior to or during the execution of a computer instruction.

INDICATOR (DG)

A device that makes information available about a measured characteristic but does not store the information nor initiate a responsive or corrective action.

INDIRECT ADDRESSING (M)

Programming method that has the initial address being the storage location of a word that contains another address. This indirect address is then used to obtain the data to be operated upon.

INDUCTANCE (J)

The property of an electric circuit by which a varying current in it produces a varying magnetic field that induces voltage in the same circuit or in a nearby circuit—measured in henrys.

INDUCTIVE (T)
Converting a change of measurand into a change of the self-inductance of a single coil.

INDUCTOR (J)
A device consisting of one or more associated windings, with or without a magnetic core, for introducing inductance into an electric circuit. (IEEE)

INFRARED (D)
The infrared is that portion of the light spectrum with wavelength greater than the visible.

INPUT IMPEDANCE (J)
The impedance a transducer presents to a source. The effective impedance seen looking into the input terminals of an amplifier, circuit details, signal level, and frequency. (GRAF)

INPUT/OUTPUT DEVICES (I/O) (M)
Computer hardware through which data are entered into or transmitted from a digital system or by which data are recorded for immediate or future use.

INSPECTION (DG)
To measure an item or characteristic of an item and compare the observed value(s) with pre-established standards.

INSTALL (DG)
To fix an item in its appointed location and make all integral connections necessary for the item's function.

INSTRUCTION (M)
A statement that specifies an operation and the values or locations of its operands.

INSTRUCTION COUNTER (M)
A counter that indicates the location of the next computer instruction to be interpreted.

INSTRUCTION REGISTER (M)
A register that stores an instruction for execution.

INSTRUMENT RESPONSE (T)
The behavior of the instrument output as a function of the measured signal, both with respect to time. (ASTM)

INSTRUMENT STANDARD (T)
A standard calibrated for use with a particular instrument; usually not suitable for use with an instrument of a different type.

INSULATION RESISTANCE (S) (T)
The resistance measured between specified insulated portions of a transducer when a specified DC voltage is applied at room conditions unless otherwise stated.

INSULATOR (J)
A high resistance device that supports or separates conductors to prevent a flow of current between them or to other objects. (GRAF)

INTEGRATED CIRCUIT (J)
A combination of interconnected circuit elements inseparably associated on or within a continuous substrate. Note: To further define the nature of an integrated circuit, additional modifiers may be prefixed. Examples are: (1) Dielectric-isolated monolithic integrated circuit. (2) Beam lead monolithic integrated circuit. (3) Silicon-chip tantalum thin-film hybrid integrated circuit. (IEEE)

INTERFACE (M)
A shared boundary. An interface might be a hardware component to link two devices or it might be a portion of storage or registers accessed by two or more computer programs.

INTERLEAVE (OR INTERLACE) (M)
To assign successive storage location numbers to physically separated memory storage locations. This serves to reduce access time.

INTERMITTENT RATING (T)
The rating applicable to specified operation over a specified number of time intervals of specified duration; the length of time between these time intervals must also be specified. (ISA)

INTERPOLATION (M)
A mathematical process by which intermediate values are computed between two known data points.

INTERRUPT (M)
To stop a process in such a way that it can be resumed.

INTERVAL OF CALIBRATION (T)
The elapsed time permitted between calibrations as required by the pertinent specifications, or when not specified, as determined under procedures in this method. (ASTM)

INVERSE VOLTAGE (J)
The effective voltage across a rectifier during the half-cycle when current does not flow. (GRAF)

ION IMPLANTATION (J)
A method of semi-conductor doping in which impurities that have been ionized and accelerated to a high velocity penetrate the semi-conductor surface and become deposited in the interior. (GRAF)

JERK (T)
The time rate of change of acceleration. Expressed in ft/s^3, cm/s^3, gm/s.

JFET (J)
Abbreviation for junction field effect transistor.

JOULE (D)
The joule is the unit of energy in the SI system.

JUMP (J)
(Electronic Computation)
1. To (conditionally or unconditionally) cause the next instruction to be obtained from a storage location specified by an address part of the current instruction when otherwise it would be specified by some convention.
2. An instruction that specifies a jump. (IEEE)

(M)

A departure from the normal sequence of executing instructions in a computer.

JUMP CONDITIONS (J)

Conditions defined in a transition table that determine the proper sequence for performing a jump.

KEEP ALIVE MEMORY (M)

A memory device which will lose information if power is removed but is normally supplied continuous power (via battery backed when main power is lost) so that the information is retained.

LABEL (M)

One or more characters used to identify a statement or an item of data in a computer program.

LAMBERT (D)

The lambert is a unit of luminance equal to 1 candela/cm^2 which is equal to 1 stilb. A one centimeter square surface, all points of which are one centimeter from a one candela source, has a luminance of one lambert.

LAMBERT'S LAW (D)

A surface where the light emitted in a given direction has an intensity that varies as the cosine of the angle between the emitted ray and the normal to the surface is said to be perfectly diffusing and obey Lambert's Law. Since projected area also varies as the cosine of the angle, the luminous intensity per projected area or luminance is constant for all angles.

LAMBERTIAN SURFACE (D)

A lambertian surface is one which obeys Lambert's Law. White bond paper is a reasonable approximation to such a surface.

LANGUAGE (M)

A set of representations, conventions, and rules used to convey information.

LARGE-SCALE INTEGRATION (LSI) (J)

1. The simultaneous achievement of large area circuit chips and high density of component packaging for the express purpose of cost reduction by maximization of the number of system interconnections made at the chip level.
2. Monolithic digital IC's with a typical complexity of 100 or more gates or gate-equivalent circuits. The number of gates per chip used to define LSI depends on the manufacturer. The term sometimes describes hybrid IC's built with a number of MSI or LSI chips. (GRAF)

LATCH (J)

A feedback loop used in a symmetrical digital circuit (such as a flip-flop) to retain a state. (GRAF)

LCD DISPLAY (D)

A liquid crystal display is a passive display whose operating principle is the change in light transmission or polarization in a liquid crystal under the influence of an electric field.

LEAD FRAME (J)

1. A metal frame that holds the leads of a plastic encapsulated package (DIP) in place before encapsulation and is cut away after encapsulation. (GRAF)
2. A stamped or etched strip of metal that incorporates the connecting leads of a device or circuit and retains their respective position through the fabrication process. The indexing and retaining portions are cut away leaving only the leads prior to electrical test.

LEAK DETECTOR (T)
A device for detecting, locating and/or measuring leakage.

LEAKAGE RATE (T)
The maximum rate at which a liquid or gas is permitted or determined to leak through a barrier. (ISA)

LEAST-SQUARES LINE (T)
The straight line for which the sum of the squares of the residuals (deviations) is minimized. (ISA)

LED DISPLAY (D)
An active display whose operating principle is the emission of light due to current flow in a semi-conductor diode.

LEGIBILITY (D)
See Readability.

LIFE, OPERATING (T)
The specified minimum length of time over which the specified continuous and intermittent rating of a transducer applies without change in transducer performance beyond specified tolerances. (ISA)

LIFE, STORAGE (T)
The specified minimum length of time over which a transducer can be exposed to specified storage conditions without changing its performance beyond specified tolerances. (ISA)

LIFETIME (D)
1. A characteristic expressing the useful operating life of a display. The nature of the endpoint, such as final luminance, and the operating conditions should be specified for a complete definition.
2. The time that a minority charge carrier can exist in a semiconducting material before it recombines with an opposite charge.

LIGHT-EMITTING DIODE (J)
A PN junction that emits light when biased in the forward direction.

LIGHTS (DG)
Devices that emit radiant energy of wavelength perceptible by the average human eye—400 to 700 nanometers.

LIMITS (DG)
The set of values that describe the established boundaries of acceptance. The same characteristic may have several sets of limits depending upon the time or basis of establishing acceptance (e.g., new part limits, overhaul limits, and safety limits).

LINEARITY (J)
The relationship between two quantities when a change in a second quantity is directly proportionate to a change in the first quantity. Also, deviation from a straight-line response to an input signal. (GRAF)

(T)
The closeness with which a curve of a function approximates a specified time. (IEEE)

LINEARITY, END POINT (T)
Linearity referred to the end-point line.

LINEARITY, INDEPENDENT (T)
Linearity referred to the "best straight line."

LINEARITY, LEAST SQUARES (T)
Linearity referred to the least-squares line.

LINEARITY, TERMINAL (T)
Linearity referred to the terminal line.

LOAD (T)
1. The force in weight units applied to a body.
2. The weight of the contents of the container or transportation device.
3. A qualitative term denoting the contents of a container.
4. The element or circuit driven by the output of a device or circuit.

LOAD IMPEDANCE (T)
The impedance presented in the output terminals of a transducer by the associated external circuitry.

LOADING ERROR (T)
An error due to the effect of the load impedance on the transducer output.

LOGIC (J)
A mathematical approach to the solution of complex situations by the use of symbols to define basic concepts. In computers and information-processing networks, the systematic method that governs the operations performed on the information, usually with each step influencing the one that follows. (GRAF)

LOGIC SHIFT (M)
A shift that affects all positions.

LOOK-UP (M)
A technique to utilize data in a table; to execute that technique.

LOOP (M)
A sequence of instructions that is executed repeatedly until a terminal condition prevails.

LUMEN (lm) (D)
The lumen is the unit of luminous flux. It is equal to the flux through a unit solid angle from a point source of one candela. The flux on a unit surface, all points of which are at unit distance from a one candela source, is one lumen.

LUMINANCE (D)
Luminance is the preferred term for brightness.

LUMINOUS EFFICACY (K) (D)
Luminous efficacy is the ratio of the luminous flux emitted by a source to the radiant power emitted by the source and has units of lumens per watt. The ratio is calculated using a standard spectral response curve for the average human observer.

LUMINOUS EFFICIENCY (D)
Luminous efficiency is the ratio, expressed as a percent, of the actual luminous efficacy of a source to the maximum possible luminous efficacy of 673 lumen per watt for a monochromatic source operating at 555 nm. Luminous efficiency is also used, loosely, for the ratio of luminous flux emitted by the source to its input power in watts. When used in this manner, the units are lumens per watt instead of a percent. Therefore, it is used as a relative figure of merit for the power consumption of various displays. Typical values for current active displays are in the range of .05 to .5 lumen per watt.

LUMINOUS ENERGY (QUANTITY OF LIGHT) (D)
Luminous energy is the product of the luminous flux and the time maintained. It is expressed in lumen-seconds.

LUMINOUS FLUX (D)
Luminous flux is the amount of light energy emitted per unit time. The unit is the lumen.

LUMINOUS INTENSITY (D)
Luminous intensity is the luminous flux emitted by a source per unit solid angle. The unit is the candela. Practical units for electronic displays are the milli and micro candela.

LUX (lx) (D)
The lux is the SI unit of illumination and is equal to one lumen per square meter.

MACHINE CODE (M)
An operations code that a machine is designed to recognize.

MACHINE LANGUAGE (M)
A language that is used directly by a machine.

MACROINSTRUCTION (M)
An instruction in a source language that is equivalent to a specified sequence of machine instructions.

MACROPROGRAMMING (M)
Programming with macroinstructions.

MAGNETIC PARTICLE DISPLAY (D)
A passive display whose operating principle is the orientation of permanently magnetized particles under the influence of an applied magnetic field.

MAGNETO RESISTIVE EFFECT (J)
The change in the resistance of a conductor or semi-conductor due to the application of a magnetic field.

MAIN FRAME (M)
The basic processing portion of a computing system, generally containing some basic storage, the arithmetic logic unit, and a group of registers.

MAJOR LOOP COMPUTATIONS (M)
Refers to those tasks which are performed at the lowest repetition rate. There are an integer number of minor loops per major loop.

MAJORITY CARRIER (M)
Refers to the predominant carrier in N-type semi-conductors, because there are more electrons than holes. Likewise, holes are the majority carrier in P-types, since they outnumber the electrons.

MASK (M)
1. A pattern of characters that is used to control the retention or elimination of portions of another pattern of characters.
2. A filter.

MATRIX (M)
1. In mathematics, a two-dimensional rectangular array of quantities. Matrices are manipulated in accordance with the rules of matrix algebra.
2. In computers, a logic network in the form of array of input leads and output leads with logic elements connected at some of their intersections.
3. By extension, an array of any number of dimensions.

MEASURAND (T)
A physical quantity, property or condition which is measured.

MEMORY (J)
(Electronic Computation) See Storage.

METALIZATION (J)
The deposition of a thin-film pattern of a conductive material onto a substrate to provide interconnection of electronic components or to provide conductive pads for interconnections. (GRAF)

MICROCOMPUTER (J)
A complete system capable of performing minicomputer functions, through a much lower power range. It is a combination of the chip sets; interface I/O along with the auxiliary circuits, power supply and control console.

MICROINSTRUCTION (M)
1. A small, single, short, add, shift or delete type of command.
2. A bit pattern that is stored in a microprogram memory word and specifies the operation of the individual LSI computing elements and related subunits, such as main memory and input/output interfaces.

MICRON (J)
A unit of length equal to 10^{-6} meter.

MICROPROCESSOR (J)
The digital processor on a chip which performs arithmetic logic and control logic. It is the basic building block of a microcomputer system.

(M)

The term applied to computer processor that is contained on one or a small number of chips.

MICROPROGRAMMING (M)
Control technique used to implement the stored program control function. Typically the technique is to use a preprogrammed read-only memory chip to contain several control sequences which normally occur together.

MINORITY CARRIER (J)
The less predominant carrier in a semi-conductor. Electrons are the minority carriers in P-type semi-conductors since there are fewer electrons than holes. Holes are the minority carriers in N-types since they are out-numbered by electrons. (GRAF)

MINOR LOOP COMPUTATIONS (M)
Refers to those tasks which must be performed at the highest repetition rate.

MNEMONIC SYMBOL (M)
A symbol chosen to assist the human memory; e.g., an abbreviation such as "MPY" for "multiply."

MONITOR (DG)
Something that reminds or warns. A device that measures a characteristic either constantly or on demand, compares the measured value against a standard or pre-established limit, and initiates a signaling action.

MONOLITHIC (J)
An integrated circuit which is built on a single slice of silicon substrate.

MNOS (J)
Abbreviation for metal-nitride-oxide semi-conductor. (GRAF)

MOS (J)
Abbreviation for metal oxide semi-conductor.

MOS TRANSISTOR (METAL-OXIDE SEMI-CONDUCTOR TRANSISTOR) (M)
An active semi-conductor device in which a conducting channel is induced in the region between two electrodes by a voltage applied to an insulated electrode on the surface of the region.

MOUNTING ERROR (T)
The error resulting from mechanical deformation of the transducer caused by mounting the transducer and making all measurand and electrical connections. (ISA)

MULTIPLEX (M)
To interleave or simultaneously transmit two or more messages on a single channel.

(D)
A multiplexed display is one organized to use fewer drivers than the number of emitting points by time sharing them along one or both axes of the display. A given display element then only operates for a fraction of the time per scan of the complete display but due to the persistence of vision of the eye, appears to be lit steadily at an average luminous intensity.

MULTIPLEXING (J)
The process of combining several measurements for transmission over the same signal path. There are two widely used methods of multiplexing: time division and frequency division. Time division utilizes the principle of time sharing among measurement channels. Frequency division utilizes the principle of frequency sharing among information channels where the data from each channel are used to modulate sinusoidal signals called subcarriers so that the resultant signal representing each channel contains only frequencies in a restricted narrow frequency range. Multiplex radio transmission, for instance, is the simultaneous transmission of two signals over a common carrier wave. (GRAF)

"NAND" AND "NOR" OPERATIONS (M)
The grouping of an AND gate followed by an inverter is called a NOT AND or NAND gate. If all the inputs have a value of 1, the output is 0, and if any of the inputs have a value of 0, the output will be 1. (Note that this is just the opposite of an AND gate.)

NAND GATE (J)
A combination of a NOT function and an AND function in a binary circuit that has two or more inputs and one output. (GRAF)

NEGATIVE FEEDBACK (DEGENERATION) (J)
A process by which a part of the output signal of an amplifying circuit is fed back to the input. (GRAF)

NEGATIVE LOGIC (M)
Logic in which the more-negative voltage represents the "1" state. The less-negative voltage represents the "0" state.

NIT (D)
The NIT is the SI unit of luminance and is equal to one candela per square meter.

(Obsolete—See also Candela, Footlambert, and Lumen.)

NMOS (N-TYPE MOS) (J)
MOS devices made on P-type silicon substrates where the active carriers are electrons flowing between N-type source and drain contacts.

NOISE (J)
Unwanted disturbances superimposed on a useful signal that tend to obscure its information content.

NOISE IMMUNITY (M)
A measure of the insensitivity of a logic circuit to triggering or reaction to spurious or undesirable electrical signals or noise, largely determined by the signal swing of the logic. Noise can occur in either of two directions, positive or negative.

NON-VOLATILE MEMORY (NVM) (J)
Electronic memory which is not lost during power off conditions

(M)
A memory with the ability to maintain information without power applied. Usually used in reference to ROM or EAROM devices.

NON-VOLATILE RAM (NVRAM) (M)
A read-write RAM device that can preserve, through the use of non-volatile cells, data content without power. It has the speed of a RAM with non-volatility. (Not defined.)

NOR GATE (J)
An OR gate followed by an inverter to form a binary circuit in which the output is logic zero if any of the inputs is one, and vice versa. (GRAF)

NPN TRANSISTOR (J)
A transistor with a P-type base and N-type collector and emitter. (GRAF)

N-TYPE MATERIAL (J)
A crystal of pure semi-conductor material to which has been added an impurity so that electrons serve as the majority charge carriers. (GRAF)

NULL (J)
A condition (typically a condition of balance) which results in a minimum absolute value of output. Often specified as the calibration point when the least error can be tolerated by the associated control system.

(T)
A condition, such as a balance, which results in a minimum absolute value of output.

NULL BALANCE (T)
(Automatic Null-Balancing Electric Instruments) The condition that exists in the circuits of an instrument when the difference between an opposing electrical quantity within the instrument and the measured signal does not exceed the dead band. Note: The value of the opposing electrical quantity produced within the instrument is related to the position of the end device. See also control system, feedback, measurement system.

NUMERIC DISPLAY (D)
A numeric display is one which is capable of displaying only the numerals 0 to 9.

OBJECT CODE (M)
Output from a compiler or assembler which is itself executable machine code or is suitable for processing to produce executable machine code.

OBJECT LANGUAGE (M)
The language to which a statement is translated.

OFF-BOARD (DG)
Equipment or tools that are not a normal part of the content of the delivered new vehicle. Usually refers to special purpose shop or garage equipment that is attached to the vehicle when it is to be used.

OFF-VEHICLE EQUIPMENT (DG)
All off-vehicle devices for diagnostic purposes. (ISO)

OHM (J)
The unit of resistance. One ohm is the value of resistance through which a potential of one volt will maintain a current of one ampere. (GRAF)

ON-BOARD (DG)
Tools and/or equipment available as part of the delivered new vehicle.

ON-VEHICLE EQUIPMENT (DG)
All on-vehicle devices for diagnostic purposes. (ISO)

OPERAND (M)
That which is operated upon. An operand is usually identified by an address part of an instruction.

OPERATING TEMPERATURE **(D)**

Operating temperature is the ambient temperature at which a display device operates. The actual display temperature will be greater depending upon power dissipated. The operating temperature range is the range where practical display operation is possible. A complete definition requires the specification of parameters such as efficiency, life, or luminance which may be functions of temperature.

OPERATING TEMPERATURE RANGE **(T)**

The range of ambient temperatures, given by their extremes, within which a device is intended to operate; (i.e.) within this range of ambient temperature, all tolerances specified for temperature error, temperature error band, temperature gradient error, thermal zero shift and thermal sensitivity shift are applicable.

OPERATION **(M)**

1. A defined action; namely, the act of obtaining a result from one or more operands in accordance with a rule that completely specifies the result for any permissible combination of operands.
2. The set of such acts specified by such a rule, or the rule itself.
3. The act specified by a single computer instruction.
4. A program step undertaken or executed by a computer; e.g., addition, multiplication, extraction, comparison, shift, transfer. The operations are usually specified by the operator part of an instruction.
5. The event or specific action performed by a logic element.

OPERATIONAL AMPLIFIER **(J)**

An amplifier that performs various mathematical operations. Also called OP-AMP. (GRAF)

OPERATION CODE **(M)**

A code that represents specific operations. Synonymous with instruction code.

OR **(M)**

A logic operator having the property that if P and Q are logic quantities, then the quantity "P OR Q" assumes values as defined by the following table:

P	Q	P OR Q
0	0	0
0	1	1
1	0	1
1	1	1

The OR operator is represented in both electrical and FORTRAN terminology by a "plus;" i.e., P plus Q.

OR GATE **(J)**

A multiple-input gate circuit whose output is energized when any one or more of the inputs is in a prescribed state. Used in digital logic.

(M)

1. An electric circuit that implements the OR operator.
2. That specific gate which implements the OR operator.

OSCILLATOR **(J)**

An electronic device which generates alternating current power at a frequency determined by the values of certain constants in its circuits. (GRAF)

OUTPUT IMPEDANCE (T)
The impedance across the output terminals of a transducer presented by the transducer to the associated external circuitry. (ISA)

OUTPUT NOISE (T)
The unwanted RMS, peak or peak-to-peak (as specified) AC component of a transducer's DC output in the absence of variations. In the measurand and the environment.

OUTPUT REGULATION (T)
The change in output due to a change in excitation.

OVERHAUL (DG)
To dismantle, inspect, repair/replace parts as required, reassemble, and test a vehicle or system to a level of functional performance satisfactory for continued use, but not necessarily equal to new system performance levels.

OVERLOAD (T)
The maximum magnitude of measurand that can be applied to a transducer without causing a change in performance beyond specified tolerance. (ISA)

OVERRANGE (T)
See Overload.

OVERSHOOT (T)
The amount of output measured beyond the final steady output value, in response to a step change in the measurand. (ISA)

OVERVOLTAGE (GENERAL) (T)
A voltage above the normal rated voltage or the maximum operating voltage of a device or circuit. A direct test overvoltage is a voltage above the peak of the line alternating voltage. See also insulation testing.

PACK (M)
To compress data in a storage medium by taking advantage of known characteristics of the data in such a way that the original data can be recovered; e.g., to compress data in a storage medium by making use of bit or byte locations that would otherwise go unused.

PARALLEL OPERATION (M)
The organization of data manipulating within circuitry wherein all the digits of a word are transmitted simultaneously on separate lines in order to speed up operation.

PARALLEL PROCESSING (J)
Pertaining to the simultaneous execution of two or more sequences of instructions by a computer having multiple arithmetic or logic units. (IEEE)

PARAMETER (M)
A variable that is given a constant value for a specific purpose or process.

PARITY BIT (M)
A check bit appended to an array of binary digits to make the sum of all the binary digits, including the check bit, always odd or always even.

PARITY CHECK (M)
The technique of adding one bit to a digital word to make the total number of binary ones or zeros either always even or always odd. This type of checking will indicate a single error in data but will not indicate the location of the error.

PARTIAL FAILURE (DG)
Failures resulting from deviation in characteristics beyond specified limits but not such as to cause complete lack of the required function.

PASSIVE DISPLAY (D)
A passive display is one which modulates the transmission or reflection of external light. Typical examples are liquid crystal and electrochromic.

PASSIVE TRANSDUCER (T)
A transducer that has no source of power other than the input signal(s), and whose output signal-power cannot exceed that of the input. Note: The definition of a passive transducer is a restriction of the more general passive network; that is, one containing no impressed driving forces. (IEEE)

PERFECT DIFFUSION (D)
Perfect diffusion is that in which light is scattered uniformly in all directions by the diffusing medium.

PERFORMANCE (DG)
Degree of effectiveness of operation.

PERIPHERAL EQUIPMENT (M)
Units which work in conjunction with a computer but are not a part of it.

PERMEABILITY (J)
The measure of how much better a given material is than air as a path for magnetic lines or force. It is equal to the magnetic induction (B) in gausses, divided by the magnetizing force (H) in oersteds. (GRAF)

PHOT (ph) (T)
The phot is the CGS unit of illuminance and is equal to one candela per square centimeter.

PHOTOCELL (PHOTOELECTRIC CELL) (J)
1. A solid-state photosensitive electron device in which use is made of the variation of the current-voltage characteristic as a function of incident radiation.
2. A device exhibiting photovoltaic or photoconductive effects. (IEEE)

PHOTOMETER (T)
An instrument used for the measurement of photometric quantities. Photometers may be used for luminance or luminous intensity measurements. Spectral and time response are important characteristics.

PHOTOMETRIC (T)
Photometric units are quantities referring to light related to the human eye and hence have meaning only in the visible spectrum. The candela and the lumen are the basic photometric units.

PHOTOPIC CURVE (T)
The photopic curve is the curve giving relative eye response as a function of light wavelength for photopic vision. A standard response curve is used to allow calibration of electronic instruments for photometric quantities.

PHOTOPIC EYE RESPONSE (LIGHT ADAPTATION) (D)
Photopic vision is that dependent on the response of the cones in the eye and occurs at light intensities above approximately 3 nit.

PIEZOELECTRIC (J)
The property of certain crystals which: (1) Produce a voltage when subjected to a mechanical stress, (2) Undergo mechanical stress when subject to a voltage. (GRAF)

PLA (PROGRAMMABLE LOGIC ARRAY) (M)
An integrated circuit that employs ROM matrices to combine sum and product terms of logic networks.

PLASMA (J)
A gas made up of charged particles. Note: Usually plasmas are neutral, but not necessarily so, as, for example, the space charge in an electron tube. (IEEE)

PMOS (P-TYPE MOS) (J)
MOS devices made on an N-type silicon substrate where the active carriers are holes flowing between P-type source and drain controls.

PNP TRANSISTOR (J)
A transistor consisting of two P-type regions separated by an N-type region. (GRAF)

PNPN DIODE (J)
A semi-conductor device which may be regarded as a two transistor structure with two separate emitters feeding a common collector. (GRAF)

POLARIZER (T)
A material used to generate polarized light from a non-polarized source. A polarizer may select linear or circularly polarized light. Typical uses include liquid crystal displays and contrast enhancement filters for high ambient applications.

POSITIVE FEEDBACK (REGENERATION) (J)
The process by which the amplification is increased by having part of the power in the output returned to the input in order to reinforce the input power. (GRAF)

POSITIVE LOGIC (M)
Logic in which the more positive voltage represents the "1", state; the less positive voltage represents the "0" state.

POTENTIAL (J)
The difference in voltage between two points of a circuit. Frequently, one point is assumed to be ground which has zero potential. (GRAF)

POTTING (J)
An embedding process for parts that are assembled in a container or can into which the insulating material is poured, with the container remaining an integral part as the outer surface of the finished unit. (GRAF)

PRECISION (T)
See Repeatability and Stability.

PRIMARY LUMINOUS STANDARD (D)
A primary luminous standard is one by which the unit of light is established and from which the values of other standards are derived. A satisfactory primary standard must be reproducible from specifications.

PRIORITY INTERRUPT (M)
Designation given to method of providing some interrupt commands to have precedence over others, thus giving one condition of operation priority over another.

PROBLEM ORIENTED LANGUAGE (M)
A programming language designed for the convenient expression of a given class of problems.

PROCESSOR (M)
1. In hardware, a data processor.
2. In software, a computer program that includes the compiling, assembling, translating, and related functions, for a specific programming language, COBOL processor or FORTRAN processor.

PROGRAM (M)
1. A series of actions proposed in order to achieve a certain result.
2. Loosely, a routine.
3. To design, write, and test a program as in definition 1 above.
4. Loosely, to write a routine.

PROM (J)
An acronym for programmable read only memory. An electronic memory which may be permanent (non-volatile) or semi-permanent (erasable electronically or with ultra-violet light) and therefore able to be programmed one or more time.

PROPAGATION DELAY (M)
The time required for a change in logic level to be transmitted through an element or a chain of elements.

P-TYPE MATERIAL (J)
A semi-conductor material that has been doped with an excess of acceptor impurity atoms, so that free holes are produced in the material. (GRAF)

PURITY (D)
Purity is the relative brightness of the spectrum color (dominant wavelength) to the white continuous background spectrum in a color mixture.

PUSHDOWN LIST (M)
A list that is constructed and maintained so that the item to be retrieved is the most recently stored item in the list; i.e., last in, first out.

PUSHDOWN STACK (M)
A register which implements a pushdown list.

PUSHUP LIST (M)
A list that is constructed and maintained so that the next item to be retrieved and removed is the oldest item still in the list; i.e., first in, first out (FIFO).

RADIO FREQUENCY INTERFERENCE (RFI) **(J)**
Radio frequency energy of sufficient magnitude to have an influence on the operation of other electronic equipment. (GRAF)

RADIOMETRIC **(T)**
Radiometric quantities are properties of light based on purely physical measurement without relation to the eye response. Standard units are the watt and joule.

RAM **(J)**
An acronym for random access memory. A memory that has stored information immediately available when addressed regardless of the previous memory address location. As the memory words can be selected in any order, there is equal access time to all.

RANDOM ERROR **(D)**
The chance variation encountered in all experimental work despite the closest possible control of variables. It is characterized by the random occurrence of both positive and negative deviations from the mean value for the method, the algebraic average of which will approach zero in a long series of measurements. (ASTM)

RANGE **(T)**
The measurand values, over which a transducer is intended to measure, specified by their upper and lower limits.

REACTION TIME **(T)**
The interval between the beginning of a stimulus and the beginning of the response of an observer. (IEEE)

READABILITY **(D)**
Readability is a subjective measure of the ease with which a given display can be read under given conditions. Character size and format, brightness, color and contrast ratio are important determining parameters.

REAL TIME **(M)**
1. Pertaining to the actual time during which a physical process transpires.
2. Pertaining to the performance of a computation during the actual time that the related physical process transpires, in order that results of the computation can be used in guiding the physical process.

REBUILD **(DG)**
To completely dismantle, inspect, repair/replace parts as required, reassemble, and test a vehicle or system to level of functional performance equal to as-new levels.

RECOVERY TIME **(T)**
The time interval, after a specified event (e.g., overload, excitation transients, output shortcircuiting) after which a transducer again performs within its specified tolerances. (ISA)

RECTIFIER **(J)**
A device which, by virtue of its asymmetrical conduction characteristic, converts an alternating current into a unidirectional current. (GRAF)

REDUNDANCY **(M)**
1. The employment of several devices, each performing the same function in order to improve the reliability of a particular function.
2. In the transmission of information, that fraction of the gross information content of a message which can be eliminated without loss of essential information.

REFERENCE PRESSURE (T)
The pressure relative to which a differential-pressure device measures pressure.

REFERENCE PRESSURE ERROR (T)
The error resulting from variations of a differential-pressure transducer's reference pressure within the applicable reference pressure range. (ISA)

REFERENCE JUNCTION (T)
That junction of a thermocouple which is held at a known temperature.

REFERENCE VOLTAGE (ANALOG COMPUTERS) (T)
A voltage used as a standard of reference, usually the nominal full scale of the computer.

REFLECTANCE (REFLECTION FACTOR) (D)
Reflectance is the ratio of the light reflected to the incident light.

REFLECTANCE, SPECTRAL (D)
Spectral reflectance is the reflectance as a function of the wavelength of the incident light.

REFLECTION FACTOR (DIFFUSE) (D)
The diffuse reflection factor is the ratio of the diffuse reflected light to the incident light.

REFLECTION FACTOR (REGULAR) (D)
The regular reflection factor is the ratio of the regularly reflected light to the incident light.

REFRESH (M)
1. Method which restores charge on capacitance which deteriorates because of leakage.
2. Method which restores the state of elements in a memory array that are depleted by read out.

REFRESH RATE (D)
Refresh rate is the frequency at which a multiplexed display repeats its information. Rates of greater than 60 Hz are typically employed to prevent perceptible flicker.

REGISTER (M)
Temporary storage for digital data.

REGULAR TRANSMISSION FACTOR (D)
The regular transmission factor is the ratio of the regularly transmitted light to the incident light.

REGULATED POWER SUPPLY (J)
A unit which maintains a constant output voltage or current for changes in line voltage, output load, ambient temperature of time. (GRAF)

REGULATION (OVERALL POWER SUPPLIES) (J)
The maximum amount that the output will change as a result of the specified change in line voltage, output load, temperature or time. Note: Line regulation, load regulation, stability, and temperature coefficient are defined and usually specified separately. (IEEE)

RELATIVE ADDRESS (M)
Some identifier used to indicate the position of a memory location in a computer routine relative to the base address as opposed to the memory location's absolute address.

RELAY (J)
An electric device that is designed to interpret input conditions in a prescribed manner and after specified conditions are met, to respond to cause contact operation or similar abrupt change in associated electric control circuits. Notes: (1) Inputs are usually electric, but may be mechanical, thermal, or other quantities. Limit switches and similar simple devices are not relays. (2) A relay may consist of several units, each responsive to specified inputs, the combination providing the desired performance characteristic. (IEEE)

RELIABILITY (T)
1. The ability of an item to perform a required function under stated conditions for a stated period of time. Note: The term reliability is also used as a reliability characteristic denoting a probability of success or a success ratio.
2. The probability that a device will function without failure over a specified time period or amount of usage. Note: 1) Definition 2 is most commonly used in engineering applications. In any case where confusion may arise, specify the definition being used. 2) The probability that the system will perform its function over the specified time should be equal to or greater than the reliability.

RELUCTIVE PATH (T)
Converting a change of measurand into an AC voltage change by a change in the reluctance path between two or more coils or separated portions of one coil when AC excitation is applied to the coil(s). (ISA)

REPAIR (DG)
To restore a malfunctioning item to serviceable use by maintenance action.

REPEATABILITY (T)
The ability of a device (transducer) to reproduce output readings when the same measurand value is applied to it consecutively, under the same conditions, and in the same direction.

RESISTIVITY (J)
The measure of the resistance of a material to electric current either through its volume or on a surface. (GRAF)

RESISTOR (J)
A device the primary purpose of which is to introduce resistance into an electric circuit. Note: Resistor as used in electric circuits for purposes of operation, protection, or control, commonly consists of an aggregation of units. Resistors as commonly supplied consist of wire, metal ribbon, cast metal or carbon compounds supported by or imbedded in an insulation medium. The insulating medium may enclose and support the resistance material as in the case of porcelain-tube type or the insulation may be provided only at the points of support as in the case of heavy-duty ribbon or cast iron grids mounted in metal frames. (IEEE)

RESISTOR-CAPACITOR-TRANSISTOR LOGIC (RCTL) (J)
A logic circuit design that employs a resistor and a speed-up capacitor in parallel for each input of the gate. A transistor's base is connected to one end of the RC network. A positive voltage on the RC input will energize the transistor and turn it on so that the output voltage is nearly zero volts. This circuit is a positive NOR or negative NAND when NPN transistors are used in the circuit. (GRAF)

RESISTOR-TRANSISTOR LOGIC (RTL) (J)
A form of logic that has a resistor as the input component that is coupled to the base of an NPN transistor. As in RCTL, the transistor is an inverting element that produces the positive NOR gate or the negative NAND gate function. (GRAF)

RESIST PLATING (J)
Any material which, when deposited on a conductive area, prevents the areas underneath from being plated. (GRAF)

RESOLUTION (T)
1. The act of deriving from a sound, scene or other form of intelligence, a series of discrete elements wherefrom the original may subsequently be synthesized.
2. The degree to which nearly equal values of a quantity can be discriminated.
3. The fineness of detail in a reproduced spatial pattern.
4. The degree to which a system or a device distinguishes fineness of detail in a spatial pattern.

RESONANCE (T)
1. The reinforced vibration of a body exposed to the vibration at the frequency of another body.
2. An oscillation of large amplitude in a mechanical or electrical system caused by a relatively small periodic stimulus of the same or nearly the same period as the natural oscillation period of the system.

RESONANT FREQUENCY (J)
The frequency at which a given system or object will respond with maximum amplitude when driven by an external sinusoidal force of constant amplitude. (GRAF)

RESPONSE TIME (D)
Response time is the time for the optical property (luminance, reflectance, etc.) of a display to respond to a step function change in the driving signal.

(T)
The length of time required for the output of a transducer to change to a specified percentage of its final value as a result of a step change of measurand.

RIPPLE (T)
Periodic modulations in the output of a transducer having a DC output. (IEEE)

RISE TIME (D)
Rise time is the time required for the specified optical property to rise from 10 to 90 percent of its maximum excursion after a step function increase in the driving signal level.

(J)
The time required for the leading edge of a pulse to rise from 10-90% of its final value. It is proportionate to the time constant and is a measure of the steepness of the wavefront. Also, the measured length of time required for an output voltage of a digital circuit to change once the change has started. (GRAF)

(T)
The length of time for the output of a transducer to rise from a small specified percentage of its final value to a large specified percentage of its final value as a result of a step-change of measurand. (ISA)

RISE TIME DELAY (D)
Rise time delay is the time required for the specified optical or electrical property to rise from its steady state level to 10 percent of its maximum excursion after a step function increase in the driving signal.