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FA *See*: functional address; oil-immersed transformer.

fabric (1) (rotating machinery) A planar structure comprising two or more sets of fiber yarns interlaced in such a way that the elements pass each other essentially at right angles and one set of elements is parallel to the fabric axis.

(IA/PE/TFF) [66], [9]

(2) A device or a collection of devices which provides a general routing capability, constructed from one or more switches using links. *See also*: link; switch.

(C/BA) 1355-1995

fac *See*: facsimile.

faceplate (1) The large transparent end of the envelope through which the image is viewed or projected.

(ED) [45], [84]

(2) By convention, the edge of the module that is furthest from the backplane, also known as the *front panel* or *front plane*.

(C/MM) 1101.2-1992

faceplate controller An electric controller consisting of a resistor and a faceplate switch in which the electric contacts are made between flat segments, arranged on a plane surface, and a contact arm. *See also*: electric controller.

(IA/ICTL/IAC) [60]

faceplate rheostat A rheostat consisting of a tapped resistor and a panel with fixed contact members connected to the taps, and a lever carrying a contact rider over the fixed members for adjustment of the resistance.

(IA/ICTL/IAC) [60]

face validation The process of determining whether a model or simulation based on performance seems reasonable to people knowledgeable about the system under study. The process does not review software code or logic, but rather reviews the inputs and outputs to assure that they appear realistic or representative.

(DIS/C) 1278.3-1996

facilitation The brief rise of excitability above normal either after a response of after a series of subthreshold stimuli.

(EMB) [47]

facilities charge The amount paid by the customer as a lump sum, or periodically, as reimbursement for facilities furnished. The charge may include operation and maintenance as well as fixed costs.

(PE/PSE) 858-1993w, 346-1973w

facility, communication *See*: communication facility.

facing (rotating machinery) (planar structure) A fabric, mat, film, or other material used in intimate conjunction with a prime material and forming a relatively minor part of the composite for the purpose of protection, handling, or processing. *See also*: direct-current commutating machine; asynchronous machine.

(PE) [9]

facsimile (1) (electrical communication) (data transmission) The process, or the result of the process, by which fixed graphic material including pictures or images is scanned and the information converted into signal waves which are used either locally or remotely to produce in record form a likeness (facsimile) of the subject copy.

(PE) 599-1985w

(2) (A) An exact copy or likeness. (B) The process by which fixed graphic images are scanned, transmitted electronically, and reproduced either locally or remotely. (C) The result of the process in definition (B). *See also*: microfacsimile.

(C) 610.2-1987

(3) A process by which textual or pictorial images are communicated, typically but not exclusively, over telephone lines. The images may be coded in raster or compressed raster format (such as CCITT group 3) or in a page description language such as Adobe[®] PostScript[®]. Facsimile typically operates down to the physical link level and includes protocols providing control and addressing mechanisms specific to the media being used. This is distinguished from the process of communicating similarly encoded images over local or wide area networks. However, both may be considered implementations of remote printing.

(C/MM) 1284.1-1997

facsimile receiving converter (frequency-shift to amplitude-modulation converter) A device which changes the type of

modulation from frequency shift to amplitude. *See also*: facsimile transmission.

(COM) 168-1956w

facsimile signal (picture signal) A signal resulting from the scanning process.

(COM) 168-1956w

facsimile-signal level The maximum facsimile signal power or voltage (root-mean-square or direct-current) measured at any point in a facsimile system. *Note*: It may be expressed in decibels with respect to some standard value, such as one milliwatt. *See also*: facsimile signal.

(COM) 168-1956w

facsimile system An integrated assembly of the elements used for facsimile. *See also*: facsimile.

(COM) 168-1956w

facsimile telegraphy A facsimile transmission system designed specifically for the transmission of photographic images. The reproduction may be in two significant states only (for example, black and white), may contain intermediate shades, or may be colored. *Synonym*: telephotography.

(C) 610.2-1987

facsimile terminal A terminal used in facsimile transmission.

(C) 610.2-1987, 610.10-1994w

facsimile transient A damped oscillatory transient occurring in the output of the system as a result of a sudden change in input. *See also*: facsimile transmission.

(COM) 168-1956w

facsimile transmission (1) The transmission of signal waves produced by the scanning of fixed graphic material, including pictures, for reproduction in record form.

(AP/COM/ANT) 145-1983s, 168-1956w

(2) The use of a telecommunication system to transmit fixed graphic images. *Synonym*: telefax. *See also*: facsimile telegraphy; facsimile.

(C) 610.2-1987

facsimile transmitter The apparatus employed to translate the subject copy into signals suitable for delivery to the communication system. *See also*: facsimile.

(COM) 168-1956w

factor (1) (A) Any of the operands in a multiplication operation.

(B) A number used as a multiplier to cause a set of quantities to fall within a given range of values. *Synonym*: factor scale.

(C) 1084-1986

(2) *See also*: quality factor.

(C/SE) 1061-1992s

factoring (A) The process of decomposing a system into a hierarchy of modules. *See also*: modular decomposition.

(B) The process of removing a function from a module and placing it into a module of its own.

(C) 610.12-1990

factor of assurance (wire or cable insulation) The ratio of the voltage at which completed lengths are tested to that at which they are used.

(T&D/PE) [10]

factor of influence (thermal classification of electric equipment and electrical insulation) A specific physical stress imposed by operation, environment, or test that influences the performance of an insulating material, insulation system, or electric equipment.

(EI) 1-1986r

factor sample A set of factor values that is drawn from the metrics database and used in metrics validation.

(C/SE) 1061-1992s

factor scale *See*: factor.

factor value A value of the direct metric that represents a factor. *See also*: metric value.

(C/SE) 1061-1992s

factory fabricated (1) A heating cable assembled by the manufacturer, including terminations and connections.

(BT/LA/AV/PC) 152-1953s, 515.1-1995

(2) A heating cable or surface heating device assembled by the manufacturer, including terminations and connections.

(IA) 515-1997

factory-renewable fuse unit A fuse unit that, after circuit interruption, must be returned to the manufacturer to be restored for service.

(SWG/PE) C37.40-1993, C37.100-1992

fade (A) The condition occurring during a braking cycle at low speed wherein the fundamental characteristics of the propulsion system utilized do not support the power requirement of the level of dynamic electric brake called for. Consequently, the level of dynamic electric brake actually generated decreases as a function of speed along an inherent characteristic. **(B)** In electric braking systems capable of supporting the level called for to zero speed, a deliberately created characteristic wherein the level of electric brake decreases as a function of speed to allow a smooth transition to friction brake for the purpose of the final stop. (VT) 1475-1999

fade depth The ratio, usually expressed in decibels, of a reference signal power to the signal power during a fade.

(AP/PROP) 211-1997

fade duration The time interval during which a signal is below a reference value. (AP/PROP) 211-1997

fade in To increase signal strength gradually in a sound or television channel. (EEC/PE) [119]

fade out To decrease signal strength gradually in a sound or television channel. (EEC/PE) [119]

fade slope The time rate of change of the signal power during a fade, expressed in decibels per second.

(AP/PROP) 211-1997

fading (1) (A) (data transmission) (Flat). That type of fading in which all frequency components of the received radio signal fluctuate in the same proportions simultaneously. *See also:* selective fading. **(B) (data transmission) (Radio).** The variation of radio field intensity caused by changes in the transmission medium, and transmission path, with time. *See also:* selective fading. (PE) 599-1985

(2) The temporal variation of received signal power caused by changes in the transmission medium or path(s).

(AP/PROP) 211-1997

fading range The ratio of maximum signal to minimum signal during fading, usually expressed in dB. Often the fading range is specified over a range of percentages. For example, the 5–95% fading range is the ratio of the signal exceeded 5% of the time to that exceeded 95% of the time.

(AP/PROP) 211-1997

fading rate The average number of fades occurring per unit time. (AP/PROP) 211-1997

fading spectrum The spatial or temporal frequency spectrum of a fading signal. (AP/PROP) 211-1990s

fail-off photocontrol A photocontrol that is designed so that the load remains off when the most likely failure occurs.

(RL) C136.10-1996

fail-on photocontrol A photocontrol that is designed so that the load remains on when the most likely failure occurs.

(RL) C136.10-1996

Fail-Operate system A system that can operate in the presence of faults. (C/BA) 896.9-1994w

failover (1) The process of reconfiguration after a fault or for planned maintenance. Failover may be manual or automatic. (C/BA) 896.2-1991w

(2) The transfer of a function or functions to a backup device. (SUB/PE) C37.1-1994

fail-safe (1) (software) Pertaining to a system or component that automatically places itself in a safe operating mode in the event of a failure; for example, a traffic light that reverts to blinking red in all directions when normal operation fails. *Contrast:* fail soft. *See also:* fault tolerance; fault secure. (C) 610.12-1990

(2) A designed property of an item that prevents its failures being critical failures. (R) [29]

(3) A design philosophy applied to safety-critical systems such that the result of a hardware failure or the effect of software error shall either prohibit the system from assuming or maintaining an unsafe state or shall cause the system to assume a state known to be safe. (VT/RT) 1475-1999, 1474.1-1999, 1483-2000

(4) A characteristic where, upon failure or malfunction of a component, subsystem, or system, the output automatically

reverts to a predetermined design state of least critical consequence. Typical failsafe states are listed as follows:

Typical failsafe states

System or component	Preferred failsafe states
Cooling water valve	As is or open
Alarm system	Annunciate
Burner valve	Shutdown, limited, or as is an alarm
Propulsion speed control	As is
Feedwater valve	As is or open
Controllable pitch propeller	As is
Propulsion safety trip	As is and alarm

(IA/MT) 45-1998

fail-safe circuit A circuit in which the occurrence of a failure causes a specified set of outputs of the circuit to assume predetermined values. (C) 610.10-1994w

fail-safely The implementation of a function in a fail-safe manner. (VT/RT) 1483-2000

fail-safe sequential circuit A sequential circuit designed so that a failure in the internal logic causes the output to assume either a predetermined one or zero state.

(C) 610.10-1994w

Fail-Safe system A system whose failures can only be, or are to an acceptable extent, benign failures.

(C/BA) 896.9-1994w

fail soft Pertaining to a system or component that continues to provide partial operational capability in the event of certain failures; for example, a traffic light that continues to alternate between red and green if the yellow light fails. *Contrast:* fail-safe. *See also:* fault secure; fault tolerance. (C) 610.12-1990

Fail-Stop system A system whose failures can only be, or are to an acceptable extent, stopping failures.

(C/BA) 896.9-1994w

failure (1) (A) The termination of the ability of an item to perform a required function. **(B) (complete)** Failure resulting from deviations in characteristic(s) beyond specified limits such as to cause complete lack of the required function. *Note:* The limits referred to in this category are special limits specified for this purpose. **(C) (critical)** Failure that is likely to cause injury to persons or significant damage to material. **(D) (degradation)** Failure that is both gradual and partial. *Note:* In time such a failure may develop into a complete failure. **(E) (inherent weakness)** Failure attributable to weakness inherent in the item when subjected to stresses within the stated capabilities of the item. **(F) (intermittent)** Failure of an item for a limited period of time, following which the item recovers its ability to perform its required function without being subjected to any external corrective action. *Note:* Such a failure is often recurrent. **(G) (major)** Failure, other than a critical failure, which is likely to reduce the ability of a more complex item to perform its required function. **(H) (minor)** Failure, other than a critical failure, which does not reduce the ability of a more complex item to perform its required function. **(I) (nonrelevant)** Failure to be excluded in interpreting test results or in calculating the value of a reliability characteristic. *Note:* The criteria for the exclusion should be stated. **(J) (partial)** Failure resulting from deviation in characteristic(s) beyond specified limits, but not such as to cause complete lack of the required function. *Note:* The limits referred to in this category are special limits specified for this purpose. **(K) (primary)** Failure of an item, not caused either directly or indirectly by the failure of another item. **(L) (relevant)** Failure to be included in interpreting test results or in calculating the value of a reliability characteristic. *Note:* The criteria for the inclusion should be stated. **(M) (wear-out)** Failure whose probability of occurrence increases with the passage of time and which occurs as a result of processes which are characteristic of the population. **(N) (software reliability)** The termination of the ability of a functional unit to perform its required function. **(O) (software reliability)** An event in which a system or system component does not perform a required function within specified limits. A failure may

be produced when a fault is encountered. **(P) (reliability data)** A subset of a fault and represents an irreversible state of a component such that it must be repaired in order for it to provide its design function. A component failure is generally defined in terms of the system in which it resides. For example, any leak might be considered a failure in a system where fission products are to be contained, and yet leaks may be considered as normal or even required states of other systems (for example, pump packing gland leakage). Failures are sometimes classified as either primary or secondary: A primary failure is the so-called "random failure" found in literature. *I* results from no external cause. A secondary failure results when the component is subject to conditions that exceed its design envelope (for example, excessive voltage, pressure, shock, vibration, temperature).

(R/SE/C/BA/PE/NP) [29], 982.2-1988, 982.1-1988, 896.9-1994, 500-1984

(2) (A) (test, measurement, and diagnostic equipment) (dependent) A failure that is caused by the failure of an associated item, distinguished from independent failure.

(B) (test, measurement, and diagnostic equipment) (independent) A failure that occurs without being related to the failure of associated items, distinguished from dependent failure. (MIL) [2]

(3) (gradual) Failures that could be anticipated by prior examination or monitoring.

(4) (A) (major) (of a circuit breaker) Failure of a circuit breaker that causes the termination of one or more of its fundamental functions, which necessitates immediate action.

Note: A major failure will result in an immediate change in system operation condition; e.g., the backup protective equipment being required to remove the fault, or will result in mandatory removal from service for non-scheduled maintenance (intervention required within 30 min). **(B) (minor)** (of a circuit breaker) Any failure of a part or a sub-assembly that does not cause a major failure of a circuit breaker. **(C)** Termination of the ability of an item to perform its required functions. *Note:* The occurrence of a failure does not necessarily imply the presence of a defect if the stress is beyond that originally specified. (PE) C37.10-1995

(5) (misuse) Failure attributable to the application of stresses beyond the stated capabilities of the item.

(6) (random) Any failure whose cause and/or mechanism make its time of occurrence unpredictable.

(7) (secondary) Failure of an item caused either directly or indirectly by the failure of another item.

(8) (sudden) Failure that could not be anticipated by prior examination or monitoring.

(9) (nuclear power generating station) The termination of the ability of an item to perform its required function. Failures may be unannounced and not detected until the next test (unannounced failure), or they may be announced and detected by any number of methods at the instant of occurrence (announced failure). 352-1975s

(10) (software) The inability of a system or component to perform its required functions within specified performance requirements. *Note:* The fault tolerance discipline distinguishes between a human action (a mistake), its manifestation (a hardware or software fault), the result of the fault (a failure), and the amount by which the result is incorrect (the error). *See also:* incipient failure; hard failure; soft failure; exception; failure mode; random failure; failure rate; crash. (C) 610.12-1990

(11) (raceway) (raceway systems for Class 1E circuits for nuclear power generating stations) The termination of the ability of the raceway system to perform its function. The level of damage done to the raceway system is such that either collapse is imminent or an electrical circuit is interrupted or degraded to an unacceptable level, or both. (PE/NP) 628-1987r

(12) (reliable industrial and commercial power systems planning and design) Any trouble with a power system component that causes any of the following to occur:

- a) Partial or complete plant shutdown, or below-standard plant operation;
- b) Unacceptable performance of user's equipment;
- c) Operation of the electrical relaying or emergency operation of the plant electrical system;
- d) Deenergization of any electric circuit or equipment. A failure on a public utility supply system may cause the user to have either of the following:
 - A power interruption or loss of service;
 - A deviation from normal voltage or frequency outside the normal utility profile

A failure on an in-plant component causes a forced outage of the component, that is, the component is unable to perform its intended function until it is repaired or replaced. *Synonym:* forced outage. (IA/PSE) 493-1997

(13) (safety systems equipment in nuclear power generating stations) The loss of ability of a component, equipment or system to perform a required function. (PE/NP) 627-1980r

(14) (supervisory control, data acquisition, and automatic control) An event that may limit the capability of an equipment or system to perform its function(s). (SUB/PE) C37.1-1994

(15) (nuclear power generating systems) The termination of the ability of an item to perform a required function. (PE/NP) 338-1987r, 500-1984w, 308-1980s, 379-1994, 933-1999

(16) (outages) The inability of a component to perform its required function. (PE/PSE) 859-1987w

(17) (electric utility power systems) The termination of the ability of a transformer to perform its specified function. In the study of power transformer reliability, it is often difficult to distinguish between major and minor failures; therefore, the following failure definitions are given. (PE/TR) C57.117-1986r

(18) The inability of a system or component to perform its required functions within specified performance requirements. (C/BA) 896.3-1993w

(19) The loss of ability of a diagnostic unit, equipment, or system to perform a required function. The manifestation of a fault. Within the context of AI-ESTATE models, a manifestation is given by the outcome of a test unit. (ATLAS) 1232-1995

(20) The inability of a product to meet its operating specification. (EMC) C63.16-1993

(21) The termination of the capability of the subassembly to perform its required function. (SPD/PE) C62.38-1994r

(22) (supervisory) An event that may limit the capability of a piece of equipment or system to perform its function(s).

1) **critical.** Causes a false or undesired operation of apparatus under control.

2) **major.** Loss of control or apparatus that does not involve a false operation.

3) **minor.** Loss of data relative to power flow or equipment status. (SWG/PE) C37.100-1992

(23) (A) (infant mortality) A characteristic pattern of failure, sometimes experienced with new equipment that may contain marginal components, wherein the number of failures per unit of time decrease rapidly as the number of operating hours increase. A burn-in period may be utilized to age (or mature) a piece of equipment to reduce the number of marginal components. **(B) (random)** The pattern of failures for equipment that has passed out of its infant mortality period and has not reached the wear-out phase of its operating lifetime. The reliability of equipment in this period may be computed by the equation

$$R = e^{-t}$$

where

R = failure rate

t = time period of interest

(C) (wear out) The pattern of failures experienced when equipment reaches its period of deterioration. Wear-out failure profiles may be approximated by a Gaussian (bell-curve) distribution centered on the nominal life of the equipment.

(SWG/PE) C37.100-1992

(24) Any trouble with a power system component that causes any of the following to occur:

- Partial or complete shutdown, or below-standard plant operation
- Unacceptable performance of user's equipment
- Operation of the electrical protective relaying or emergency operation of the plant electrical system
- De-energization of any electric circuit or equipment

A failure on a public utility supply system can cause the user to have either of the following:

- A power interruption or loss of service
- A deviation from normal voltage or frequency outside the normal utility profile

A failure of an in-plant component causes a forced outage of the component, that is, the component is unable to perform its intended function until repaired or replaced. *Synonym:* forced outage. (IA) 399-1997

(25) Any deviation from specified post condition of a test case is considered a failure for that specific test case. Post conditions should require adherence to the specification, documentation, or functional base-line for the system.

(C/PA) 2000.2-1999

failure analysis The logical, systematic examination of an item or its diagram(s) to identify and analyze the probability, causes, and consequences of potential and real failure.

(SWG/MIL/PE) [2], C37.10-1995

failure category *See:* error category.

failure cause The circumstances during design, manufacture, or use which have led to failure.

(SWG/R/PE) [29], C37.10-1995

failure commutation (thyristor converter) A failure to commute the direct current from the conducting arm to the succeeding arm of a thyristor connection. *Note:* In inverter operation, a commutation failure results in a conduction-through. (IA/IPC) 444-1973w

failure criteria Rules for failure relevancy such as specified limits for the acceptability of an item. *See also:* reliability.

(R) [29]

failure data *See:* error data.

failure, degradation *See:* degradation failure.

failure detection Examination to determine the position, evidence, and type of failure. (SWG/PE) C37.10-1995

failure distribution (supervisory control, data acquisition, and automatic control) The manner in which failures occur as a function of time; generally expressed in the form of a curve with the abscissa being time.

(SWG/PE/SUB) C37.100-1992, C37.1-1994

failure management *See:* fault management.

failure mechanism (reliability data for pumps and drivers, valve actuators, and valves) (reliability data) The physical, chemical, or other process that results in failure. *Note:* The circumstance that induces or activates the process is termed the root cause of the failure. (PE/NP) 500-1984w

failure mode (1) (reliability data for pumps and drivers, valve actuators, and valves) (reliability data) The effect by which a failure is observed to occur.

(PE/IA/NP/PSE) 500-1984w, 1100-1999

(2) (gas-insulated substations) A process of failure of equipment that causes a loss of its proper function.

(SWG/PE/SUB) C37.122-1983s, C37.100-1992

(3) (software) The physical or functional manifestation of a failure. For example, a system in failure mode may be characterized by slow operation, incorrect outputs, or complete termination of execution. (C) 610.12-1990

(4) The manner in which failure occurs; generally categorized as electrical, mechanical, thermal, and contamination.

(SWG/PE) C37.10-1995

failure modes and effects analysis (FMEA) (1) (Class 1E battery chargers and inverters) (FMEA) The identification of significant failures, irrespective of cause, and their consequences. This includes electrical and mechanical failures that could conceivably occur under specified service conditions and their effect, if any, on adjoining circuitry or mechanical interfaces displayed in a table, chart, fault tree or other format.

(PE/NP) 650-1979s

(2) A systematic procedure for identifying the modes of failure and for evaluating their consequences.

(PE/NP) 933-1999

failure mode types (A) (reliability data for pumps and drivers, valve actuators, and valves) (reliability data) Catastrophic. A failure mode which is both sudden and complete.

Note: This failure causes cessation of one or more fundamental functions. This refers to system related failure modes. See Appendix A of IEEE Std 500-1984 P&V. (B) (reliability data for pumps and drivers, valve actuators, and valves) (reliability data)

Degraded. A failure which is gradual, partial, or both. *Note:* Such a failure does not cease all function but compromises a function. The function may be compromised by any combination of reduced, increased, or erratic outputs. In time, such a failure may develop into catastrophic failure. (C) (reliability data for pumps and drivers, valve actuators, and valves) (reliability data)

Incipient. An imperfection in the state or condition of an item or equipment so that a degraded or catastrophic failure can be expected to result if corrective action is not taken. (PE/NP) 500-1984

failure of continuously required function The inability of a component to perform a function that is continuously required. *Note:* Continuously required functions include carrying current, providing electrical isolation, and abstaining from tripping in the absence of a signal. Examples of inability to perform continuously required functions are: component short circuit, component open circuit, switching equipment opening without proper command, and switching equipment closing without proper command. (PE/PSE) 859-1987w

failure of response function The inability of a component to perform a function that is required as a response to system conditions or to a manually or automatically initiated command. *Note:* Response functions include responding to fault conditions (protective systems), to command (circuit breakers), and to manual operation (disconnect switches). Inabilities to perform a response function do not cause an immediate interruption of power flow, as they can be disclosed by subsequent inspection or by failure to respond to conditions as intended. This type of failure has been referred to as dormant failure, latent failure, and unrevealed failure. Examples are: switching equipment failing to open on command, switching equipment failing to close on command, and protection system tripped incorrectly (overreach during fault). (PE/PSE) 859-1987w

failure of thyristor-level A thyristor-level is deemed to have failed if it becomes short circuited or in any other way has degraded to the extent to make it functionally inoperative. (SUB/PE) 857-1996

failure rate (1) (general) (any point in the life of an item) The incremental change in the number of failures per associated incremental changes in time. (R)

(2) (reliability data for pumps and drivers, valve actuators, and valves) (reliability data) The expected number of failures of a given type, per item, in a given time interval (for example, valve failures per million valve hours). *Note:* For cyclic items or equipment insert "in a given number of operating cycles."

(PE/NP) 500-1984w

(3) (nuclear power generating station) The expected number of failures of a given type, per item, in a given time interval (for example, capacitor short-circuit failures per million capacitor hours). (PE/NP) 380-1975w, 352-1975s, 933-1999

(4) **(software)** The ratio of the number of failures of a given category to a given unit of measure; for example, failures per unit of time, failures per number of transactions, failures per number of computer runs. (C) 610.12-1990

(5) **(outages)** The number of failures of a continuously required function per unit of time exposed to such failures = number of failures of a particular type/exposure time. *Notes:* 1. Rates for different failure modes can be calculated. The exposure time for each failure mode may be different. 2. Failure rates can be computed for a specific component, a class of components or units, or per unit of length in the case of lines, common structure, or common right-of-way exposure. (PE/PSE) 859-1987w

(6) **(electric utility power systems)** The ratio of the number of "failures with forced outages" of a given population over a given period of time, to the number of accumulated service years for all transformers in that population over the same period of time. *Note:* The failure rate defined here is composed of "failures with forced outages." This is used for statistical analysis in system mathematical studies. Other reports may be made using "failure with scheduled outages" and "defects." Tabulation of scheduled outages and defects needs to be aggressively pursued from the standpoint of reliability improvement. It should be recognized that reliability improvement is different from reliability measurement. Quantitative, mathematically correct, reliability measurement can only be accomplished by counting "failures with a forced outage." Reliability improvement, on the other hand, can be accomplished through tabulating and reporting a wide variety of problems. (PE/TR) C57.117-1986r

(7) The mean number of failures of a component per unit exposure time. Usually exposure time is expressed in years and failure rate is given in failures per year. (IA/PSE) 493-1997

(8) **(forced outage rate)** The mean number of failures of a component per unit of exposure time. Usually, expressed in failures per year. (IA) 399-1997

failure-rate acceleration factor The ratio of the accelerated testing failure rate to the failure rate under stated reference test conditions and time period. *See also:* reliability. (R) [29]

failure rate, assessed *See:* assessed failure rate.

failure rate, extrapolated *See:* extrapolated failure rate.

failure rate level For the assessed failure rate, a value chosen from a specific series of failure rate values and used for stating requirements or for the presentation of test results. *Note:* In a requirement, it denotes the highest permissible assessed failure rate. (R) [29]

failure rate, observed *See:* observed failure rate.

failure rate, predicted *See:* predicted failure rate.

failure ratio *See:* failure rate.

failure recovery (software) The return of a system to a reliable operating state after failure. *See also:* system; failure. (C/SE) 729-1983s

failures (A) (supervisory control, data acquisition, and automatic control) Infant mortality. A characteristic pattern of failure, sometimes experienced with new equipment which may contain marginal components, wherein the number of failures decreases rapidly as the number of operating hours increases. A burn-in period may be utilized to age (mature) an equipment to reduce the number of marginal components. **(B) (supervisory control, data acquisition, and automatic control)** Random. The pattern of failures for equipment that has passed out of its infant mortality period and has not reached the wear-out phase of its operating lifetime. The reliability of an equipment in this period may be computed by the equation $R = e^{-\lambda t}$, where λ = failure rate, and t = time period of interest. **(C) (supervisory control, data acquisition, and automatic control)** Wear out. The pattern of failures experienced when equipment reaches its period of deterioration. Wear-out failure profiles may be approximated by a Gaussian (bell curve) distribution centered

on the nominal life of the equipment.

(SUB/PE) C37.1-1987

failures in time (FIT) A statistical measure of failure rate corresponding to one failure in 10^9 hours of device operation. (ED) 1005-1998

failure to trip In the performance of a relay or relay system, the lack of tripping that should have occurred considering the objectives of the relay system design. *See also:* relay.

(SWG/PE/PSR) C37.100-1992, [103], [6], C37.90-1978s

failure with forced outage Failure of a transformer that requires its immediate removal from service. This is accomplished either automatically or as soon as switching operations can be performed. (PE/TR) C57.117-1986r

failure with scheduled outage Failure for which a transformer must be deliberately taken out of service at a selected time. (PE/TR) C57.117-1986r

fairlead (aircraft) A tube through which a trailing wire antenna is fed from an aircraft, with particular care in the design as to voltage breakdown and corona characteristics. *Note:* An antenna reel and counter are frequently a part of the assembly. (EEC/PE) [119]

fairness (1) (multiprocessor architecture) A bus request protocol in which a module refrains from acquiring the bus in order to allow other modules of the fairness class to use the bus. (C/MM) 896.1-1987s

(2) (NuBus) A property of some arbitration techniques that ensures all modules will get access to the bus on approximately the same terms. This prevents modules from being "starved." (C/MM) 1196-1987w
®NuBus is a registered trademark of Texas Instruments, Inc.

fairness interval (1) A group of back-to-back transfers during which each competing source using the fairness protocol gets a single transfer. The delimiters of the fairness interval are arbitration reset gaps. (C/MM) 1394-1995

(2) A time period delimited by arbitration reset gaps. Within a fairness interval, the total number of asynchronous packets that may be transmitted by a node is limited. Each node's limit may be explicitly established by the bus manager or it may be implicit. (C/MM) 1394a-2000

fair queuing In networking, a method for controlling congestion in a network node by restricting other nodes to an equal share of the node's bandwidth. *See also:* source queue. (C) 610.7-1995

fair weather The weather condition when the precipitation intensity is zero and the transmission line conductors are dry. *Note:* This should not be confused with the general connotation of fair weather as descriptive of pleasant weather conditions. Common usage is subject to misinterpretation, for it is a purely subjective description. Technically, when this term is used in weather forecasts, it is meant to imply no precipitation; less than 40% sky cover of low clouds; and no other extreme conditions of cloudiness, visibility, or wind. (T&D/PE) 539-1990

fair weather distribution A frequency or probability distribution of corona-effect data collected under fair weather conditions. (T&D/PE) 539-1990

fall arrester A device, such as a rope grab, which travels on a lifeline and will automatically engage the lifeline and lock so as to arrest an accidental fall of a worker. (T&D/PE) 1307-1996

fall arrest system The assemblage of equipment, such as a line-worker's body belt, aerial belt, or full body harness in conjunction with a connecting means, with or without an energy absorbing device, and an anchorage to limit the forces a worker can experience during a fall. *Note:* A fall arrest system is designed to prevent a worker, in the process of a fall, from falling more than the designed fall limit. After January 1, 1998 a line-worker's body belt is prohibited from use as part of a fall arrest system. (NESC/T&D/PE) C2-1997, 1307-1996

fall clearance distance The total fall distance plus the distances between the location of a line-worker's body belt or full body

harness attachment point under load and the nearest possible point of contact, plus the dynamic elongation.

(T&D/PE) 1307-1996

falling edge (1) A transition from a high to a low logic level. In positive logic, a change from logic 1 to logic 0.

(C/TT) 1149.1-1990

(2) The transition from a logic one to logic zero.

(TT/C) 1149.5-1995

fall prevention system (1) A system, which may include a positioning system, intended to prevent a worker from falling from an elevation. Such systems include positioning device systems, guardrail, barriers, and restraint systems. Fall prevention systems are used in an attempt to prevent workers from falling from an elevation.

(T&D/PE) 1307-1996

(2) A system, which may include a positioning device system, intended to prevent a worker from falling from an elevation.

(NESC) C2-1997

fall protection program A program intended to protect workers from injury due to falls from elevations.

(NESC/T&D/PE) C2-1997, 1307-1996

fall protection system (hardware) Consists of either a fall prevention system or a fall arrest system.

(NESC/T&D/PE) C2-1997, 1307-1996

fall time (1) (electric indicating instruments) The time, in seconds, for the pointer to reach 0.1 (plus or minus a specified tolerance) of the end scale from a steady end-scale deflection when the instrument is short-circuited. *See also*: moving element.

(EEC/AII) [102]

(2) **(pulse transformers)** (last transition duration) The time interval of the pulse trailing edge between the instants at which the instantaneous value first reaches specified upper and lower limits of 90% and 10% of AT.

(PEL/ET) 390-1987r

(3) **(of a pulse)** The interval between the 90% and 10% points (unless otherwise specified) on the last transition.

(NPS) 300-1988r

(4) **(A)** The time required for a voltage or current pulse to decrease from 90% to 10% of its maximum value. *Synonym*: decay time. *Contrast*: rise time. **(B)** In digital logic, the time required to transition from a high state to a low state.

(C) 610.10-1994

(5) (of a pulse) The time interval of the trailing edge of a pulse between stated limits. *See also*: pulse.

(IM/HFIM) [40]

fall time t_f (of a pulse) The interval on the last transition between the 90% and 10% points (unless other levels are specified) with respect to peak height. *See also*: transition.

(NPS) 325-1996

false add To form a partial sum, that is, to add without recognizing a carry.

(C) 610.10-1994w

false alarm (1) (test, measurement, and diagnostic equipment) An indicated fault where no fault exists.

(MIL/ATLAS) [2], 1232-1995

(2) An indicated alarm where no danger, safeguards threat, or equipment failure condition exists.

(PE/NP) 692-1997

(3) An erroneous radar target detection decision caused by noise or other interfering signals exceeding the detection threshold.

(AES) 686-1997

(4) *See also*: false identification.

(C) 610.4-1990w

false-alarm number The number of possible independent detection decisions during the false-alarm time. *Note*: When there is no pulse integration, it is equal to the reciprocal of the false-alarm probability.

(AES) 686-1997

false-alarm probability The probability that noise or other interfering signals will erroneously cause a target detection decision. *See also*: detection probability.

(AES) 686-1997

false-alarm time The average time between false alarms; that is, the average time between crossings of the target decision threshold by signals not representing targets. *Note*: In the early work of Marcum, false-alarm time is defined as the time in which the probability of one or more false alarms is one-

half. Marcum's definition is no longer commonly used.

(AES) 686-1997

false course (navigation systems normally providing one or more course lines) (navigation aid terms) A spurious additional course line indication due to undesired reflections or to a maladjustment of equipment.

(AES/RS/GCS) 686-1982s, [42], 172-1983w

false identification In pattern classification, the assignment of a pattern to a pattern class other than its true pattern class. *Synonym*: false alarm. *Contrast*: misidentification.

(C) 610.4-1990w

false operation probability False operation probability = number of unintended operations/exposure operations for which component should not respond.

(PE/PSE) 859-1987w

false-proceed operation The creation or continuance of a condition of the vehicle apparatus in an automatic train control or cab signal installation that is less restrictive than is required by the condition of the track of the controlling section, when the vehicle is at a point where the apparatus, is or should be, in operative relation with the controlling track elements. *See also*: automatic train control.

(EEC/PE) [119]

false-restrictive operation The creation or continuance of a condition of the automatic train control or cab signal vehicle apparatus that is more restrictive than is required by the condition of the track of the controlling section when the vehicle apparatus is in operative relation with the controlling track elements, or that is caused by failure or derangement of some part of the apparatus. *See also*: automatic train control.

(EEC/PE) [119]

false start Occurs if the customer or distant office abandons without dialing any digits and before timeout.

(COM/TA) 973-1990w

false tripping In the performance of a relay or relay system, the tripping that should not have occurred considering the objectives of the relay system design. *See also*: relay.

(SWG/PE/PSR) C37.100-1992, C37.90-1978s, [6], [103]

FAMOS® Floating gate avalanche metal-oxide semiconductor (MOS) transistor used in erasable programmable read-only memory (EPROM).

(ED) 1005-1998

fan (rotating machinery) (blower) The part that provides an air stream for ventilating the machine.

(PE) [9]

fan-beam antenna An antenna producing a major lobe whose transverse cross section has a large ratio of major to minor dimensions.

(AP/ANT) 145-1993

fan cover (rotating machinery) An enclosure for the fan that directs the flow of air. *See also*: fan.

(PE) [9]

fan duty resistor A resistor for use in the armature or rotor circuit of a motor in which the current is approximately proportional to the speed of the motor.

(IA/MT) 45-1998

fan fold paper *See*: continuous form.

fan housing (rotating machinery) The structure surrounding a fan and which forms the outer boundary of the coolant gas passing through the fan.

(PE) [9]

fan-in network (power-system communication) A logic network whose output is a binary code in parallel form of n bits and having up to $2n$ inputs with each input producing one of the output codes. *See also*: digital.

(PE) 599-1985w

fan marker (1) (electronic navigation) A marker having a vertically directed fan beam intersecting an airway to provide a position fix. *See also*: radio navigation.

(AES) [42]

(2) **(navigation aid terms)** A vhf (very high frequency) radio facility having a vertically-directed fan beam intersecting an airway to provide a fix.

(AES/GCS) 172-1983w

fan-marker beacon (navigation aid terms) A beacon that transmits vertical beam-horizontal cross section in the shape of a double convex lens.

(AES/GCS) 172-1983w

fanout The pin count of a net (the number of pins connected to the net), minus one. This includes all input, output, and bidirectional pins on the net with the sole exception of one pin (assumed to be related to the particular timing arc currently of interest). Although less fundamental than pin count, fanout

is frequently used in the definition of wireload models.

(C/DA) 1481-1999

fan-out box A device that provides the capability to connect multiple devices to a single transceiver. *Synonyms:* multi-port; multi-tap. *See also:* tap. (C) 610.7-1995

fan-out network (power-system communication) A logic network taking n input bits in parallel and producing a unique logic output on the one and only one of up to $2n$ outputs that corresponds to the input code. *See also:* digital. (PE) 599-1985w

fan shroud (rotating machinery) A structure, either stationary or rotating, that restricts leakage of gas past the blades of a fan. (PE) [9]

farad (metric practice) The capacitance of a capacitor between the plates of which there appears a difference of potential of one volt when it is charged by a quantity of electricity equal to one coulomb. (QUL) 268-1982s

faraday The number of coulombs (96 485) required for an electrochemical reaction involving one chemical equivalent. *See also:* electrochemistry. (EEC/PE) [119]

Faraday cage A conducting enclosure that is used to measure the net space charge per unit volume. (T&D/PE) 539-1990, 1227-1990r

Faraday cell (laser gyro) A biasing device consisting of an optical material with a Verdet constant, such as quartz, that is placed between two quarter-wave plates and surrounded by a magnetic field in such a fashion that a differential phase change is produced for oppositely directed plane polarized waves. (AES/GYAC) 528-1994

Faraday dark space (gas tube) The relatively nonluminous region in a glow-discharge cold-cathode tube between the negative flow and the positive column. *See also:* gas tube. (ED) [45]

Faraday effect *See:* Faraday rotation; magnetic rotation.

Faraday rotation (1) (communication satellite) The rotation of the plane of polarization of an electromagnetic wave when traveling through a magnetic field. In space communications this effect occurs when signals transverse the ionosphere. (COM) [25]

(2) **(nonlinear, active, and nonreciprocal waveguide components) (nonreciprocal wave rotation)** A nonreciprocal phenomenon in which the plane of polarization of a linearly polarized electromagnetic plane is rotated clockwise for one direction of propagation, and counterclockwise for the other direction (viewed from the source in each direction), when passing through a gyromagnetic material having a magnetostatic field component along the direction of propagation. (MTT) 457-1982w

(3) The rotation of the polarization ellipse of an electromagnetic wave as it propagates in a gyrotropic medium such as a plasma in the presence of a finite magnetic field, in a ferrite, or in some dielectric crystals. *Note:* A gyrotropic material is one in which the permittivity tensor, $\epsilon =$, or the permeability tensor, $\pi =$, is antisymmetric such that $\epsilon_{ji} = -\epsilon_{ij}$ or $\mu_{ji} = -\mu_{ij}$, respectively. (AP/PROP) 211-1997

Faraday rotator (nonlinear, active, and nonreciprocal waveguide components) (nonreciprocal wave rotator) A nonreciprocal device providing Faraday rotation, usually in waveguide of circular or square cross section. (MTT) 457-1982w

Faraday's law (electromagnetic induction; circuit) The electromotive force induced is proportional to the time rate of change of magnetic flux linked with the circuit. (Std100) 270-1966w

faradic current (electrotherapy) An asymmetrical alternating current obtained from or similar to that obtained from the secondary winding of an induction coil operated by repeatedly interrupting a direct current in the primary. *See also:* electrotherapy. (EMB) [47]

faradization (faradism) (electrotherapy) The use of a faradic current to stimulate muscles and nerves. *See also:* electrotherapy; faradic current. (EMB) [47]

far-end crosstalk Crosstalk that is propagated in a disturbed channel in the same direction as the direction of propagation of the current in the disturbing channel. The terminal of the disturbed channel at which the far-end crosstalk is present and the energized terminals of the disturbing channel are ordinarily remote from each other. *See also:* coupling. (EEC/PE) [119]

far-field diffraction pattern (fiber optics) The diffraction pattern of a source (such as a light emitting diode (LED), injection laser diode (ILD), or the output end of an optical waveguide) observed at an infinite distance from the source. Theoretically, a far-field pattern exists at distances that are large compared with $(s^2)/\lambda$, where s is a characteristic dimension of the source and λ is the wavelength. Example: If the source is a uniformly illuminated circle, then s is the radius of the circle. *Note:* The far-field diffraction pattern of a source may be observed at infinity or (except for scale) in the focal plane of a well-corrected lens. The far-field pattern of a diffracting screen illuminated by a point source may be observed in the image plane of the source. *Synonym:* Fraunhofer diffraction pattern. *See also:* diffraction limit; diffraction. (Std100) 812-1984w

far-field radiation pattern Any radiation pattern obtained in the far-field of an antenna. *Note:* Far-field patterns are usually taken over paths on a spherical surface. *See also:* radiation sphere; radiation pattern cut. (AP/PE/T&D/ANT) 145-1993, 1260-1996

far-field region (1) (fiber optics) The region, far from a source, where the diffraction pattern is substantially the same as that at infinity. *See also:* far-field diffraction pattern. (Std100) 812-1984w

(2) **(land-mobile communications transmitters)** The region of the field of an antenna where the angular field distribution is essentially independent of the distance from the antenna. *Notes:* 1. If the antenna has a maximum overall dimension (D) that is large compared to the wavelength (λ), the far field region is commonly taken to exist at distances greater than $2D^2/\lambda$ from the antenna. 2. For an antenna focused at infinity, the far field region is sometimes referred to as the Fraunhofer region on the basis of analogy to optical terminology. (EMC) 377-1980r

(3) That region of the field of an antenna where the angular field distribution is essentially independent of the distance from a specified point in the antenna region. *Notes:* 1. In free space, if the antenna has a maximum overall dimension, D , that is large compared to the wavelength, the far-field region is commonly taken to exist at distances greater than $2D^2/\lambda$ from the antenna, λ being the wavelength. The far-field patterns of certain antennas, such as multi-beam reflector antennas, are sensitive to variations in phase over their apertures. For these antennas, $2D^2/\lambda$ may be inadequate. 2. In physical media, if the antenna has a maximum overall dimension, D , that is large compared to π/γ , the far-field region can be taken to begin approximately at a distance equal to $\gamma D^2/\pi$ from the antenna, γ being the propagation constant in the medium. (AP/ANT) 145-1993

(4) That region of the field of an antenna array where the angular field distribution is essentially independent of the distance from the center of the array. A general far field approximation is $2d^2/\lambda$, where d is the largest separation between elements in the array. (T&D/PE) 1260-1996

(5) That region of the field of an antenna where the angular field distribution is essentially independent of the distance from the antenna. In this region (also called the free space region), the field has a predominantly plane-wave character, i.e., locally uniform distributions of electric field strength and magnetic field strength in planes transverse to the direction of propagation. (NIR) C95.1-1999

(6) *See also:* Fraunhofer region. (AP/PROP) 211-1997

far-field region in physical media *See:* far-field region.

far field region, radiating *See:* radiating far field region.

far-side (of an SI or BI) That port of an SI or BI electrically farther from the originating master. (NID) 960-1993

- fast approach** Approach speeds that engender short, subnanosecond risetime ESD current waves. Fast-approach speed depends on the voltage difference between the intruder and receptor, e.g., for rounded electrodes of 8 mm diameter, greater than 0.05 m/s, 1 m/s, and 10 m/s at charge voltages of 4 kV, 8 kV, and 16 kV respectively. (SPD/PE) C62.47-1992r
- FASTBUS** The standard modular high-speed data acquisition and control system. (NID) 960-1993
- FASTBUS protocol (FBP) (FASTBUS acquisition and control)** The format and sequence of control and data messages in FASTBUS. Formats are specified by the FASTBUS signal line assignments. Sequences are specified by operations. (NID) 960-1993
- fastener (lightning protection)** A device used to secure the conductor to the structure that supports it. (NFPA) [114]
- fast groove (disk recording) (fast spiral)** An unmodulated spiral groove having a pitch that is much greater than that of the recorded grooves. *See also*: phonograph pickup. (SP) [32]
- fast handshake** A high-speed mode of operation that uses the same communication registers as the word-serial protocol and allows data transfer without the need for polling after each transfer. (C/MM) 1155-1992
- Fast Link Pulse (FLP) Burst** A group of no more than 33 and not less than 17 10BASE-T compatible link integrity test pulses. Each FLP Burst encodes 16 bits of data using an alternating clock and data pulse sequence. (C/LM) 802.3-1998
- Fast Link Pulse (FLP) Burst Sequence** The sequence of FLP Bursts transmitted by the local station. This term is intended to differentiate the spacing between FLP Bursts from the individual pulse spacings within an FLP Burst. (C/LM) 802.3-1998
- fast-operate, fast-release relay** A high-speed relay specifically designed for both short operate and short release time. (PE/EM) 43-1974s
- fast-operate relay** A high-speed relay specifically designed for short operate time but not necessarily short release time. (PE/EM) 43-1974s
- fast-operate, slow-release relay** A relay specifically designed for short operate time and long release time. (PE/EM) 43-1974s
- fast packet switching** A packet switching technique in which formats and procedures are designed to minimize packet processing time. *See also*: frame relay; cell relay. (C) 610.7-1995
- fast spiral** *See*: fast groove.
- fast time** (A) Simulated time with the property that a given period of actual time represents more than that period of time in the system being modeled; for example, in a simulation of plant growth, running the simulation for one second may result in the model advancing time by one full day; that is, simulated time advances faster than actual time. *Contrast*: slow time; real time. (B) The duration of activities within a simulation in which simulated time advances faster than actual time. *Contrast*: slow time; real time. (C) 610.3-1989
- fast-time-constant circuit** A circuit with short time-constant (such as a differentiator or high-pass filter) used to emphasize signals of short duration and reduce the receiver response to signals from extended clutter, long-pulse jamming, or noise. It is a form of pulsewidth discriminator (PWD). (AES) 686-1997
- fast wave** An electromagnetic wave propagating close to a boundary or within a bounded medium with a phase velocity greater than that of a free wave which would exist in an unbounded medium with the same electromagnetic properties. *See also*: slow wave. (AP/PROP) 211-1997
- fast writing devices (metal-nitride-oxide field-effect transistor)** Metal-nitride-oxide semiconductor (MOS) memory transistors whose threshold window Δv_{HL} is sufficiently large after a writing pulse width of t_w near 1 μs . A write cycle time of about 1 μs makes these devices useful for random access memory (RAM) applications. (ED) 581-1978w
- fatal error** An error that results in the complete inability of a system or component to function. (C) 610.12-1990
- father** *See*: parent node.
- father file** A file that contains data that have since been updated in another file, called the son file. *See also*: son file; grandfather file. (C) 610.5-1990w
- fatigue** The tendency for a metal to fracture in brittle manner under conditions of repeated cyclic stressing at stress levels below its tensile strength. (SWG/IA/PE) [59], [71], C37.100-1981s
- fault (1) (wire or cable)** A partial or total local failure in the insulation or continuity of a conductor. *See also*: center of distribution. (T&D/PE) [10]
- (2) (components)** A physical condition that causes a device, a component, or an element to fail to perform in a required manner, for example, a short-circuit, a broken wire, an intermittent connection. *See also*: pattern-sensitive fault; program-sensitive fault. (C/T&D/PE) [20], 1048-1990, [85]
- (3) (surge arresters)** A disturbance that impairs normal operation, for example, insulation failure or conductor breakage. (PE) [8], [84]
- (4) (thyristor power converter)** A condition existing when the conduction cycles of some semiconductors are abnormal. *Note*: This usually results in fault currents of substantial magnitude. (IA/IPC) 444-1973w
- (5)** *See also*: short circuit. (SWG/PE) C37.100-1981s
- (6) (test, measurement, and diagnostic equipment)** A degradation in performance due to detuning, maladjustment, misalignment, failure of parts, and so forth. (MIL) [2]
- (7) (A) (software)** An incorrect step, process, or data definition in a computer program. *Note*: This definition is used primarily by the fault tolerance discipline. In common usage, the terms "error" and "bug" are used to express this meaning. *See also*: intermittent fault; program-sensitive fault; data-sensitive fault; fault masking; equivalent faults. (B) (protective grounding of power lines) (current). A current that flows from one conductor to ground or to another conductor owing to an abnormal connection (including an arc) between the two. (C) (software reliability) An accidental condition that causes a functional unit to fail to perform its required function. (D) (software reliability) A manifestation of an error in software. A fault, if encountered, may cause a failure. *Synonym*: bug. (C) 610.12-1990
- (8) (reliability data for pumps and drivers, valve actuators, and valves)** Any undesired state of a component or system. A fault does not necessarily require failure (for example, a pump may not start when required because its feeder breaker was inadvertently left open—a "command block"). (PE/NP) 500-1984w
- (9)** A defect in a hardware device or component; for example, a short circuit or broken wire. *Synonym*: physical defect. (C/BA) 896.9-1994w, 610.10-1994w, 610.12-1990
- (10) (components)** A physical condition that causes a device, a component, or an element to fail to perform in a required manner, for example, a short-circuit, a broken wire, and an intermittent connection. (T&D/PE) 524a-1993r
- (11)** Erroneous hardware or software state resulting from component failure, operator error, physical interference from the environment, design error, program error, or data structure error. (C/BA) 896.3-1993w
- (12)** A physical condition that causes a device or a diagnostic unit to fail to perform nominally. (ATLAS) 1232-1995
- (13)** A defect or flaw in a hardware or software component. (SCC20) 1232.1-1997
- fault bus** A bus connected to normally grounded parts of electric equipment, so insulated that all of the ground current passes to ground through fault-detecting means. *Synonym*: fault ground bus. (SWG/PE) C37.100-1992
- fault bus protection (relaying)** A method of ground fault protection that makes use of a fault bus. (SWG/PE) C37.100-1992

fault category *See*: error category.

fault, circulating current *See*: circulating current fault.

fault-closure current rating The designated rms fault current that a load-break connector can close under specified conditions. (T&D/PE) 386-1995

fault coverage Quality metric used to measure diagnostic tests or automatic test equipment. (C/BA) 896.3-1993w

fault current (1) (health care facilities) A current in an accidental connection between an energized and a grounded or other conductive element resulting from a failure of insulation, spacing, or containment of conductors. (EMB) [47]

(2) (faulted circuit indicators) Any current through the sensor equal to or in excess of the trip current of the faulted circuit indicator (FCI). (T&D/PE) 495-1986w

(3) (general) A current that flows from one conductor to ground or to another conductor owing to an abnormal connection (including an arc) between the two. A fault current flowing to ground may be called a ground fault current. (T&D/PE) [10], [8], [84], 524a-1993r

(4) The current from the connected power system that flows in a short circuit. (SPD/PE) C62.11-1999, C62.62-2000

fault current division factor A factor representing the inverse of a ratio of the symmetrical fault current to that portion of the current that flows between the grounding grid and surrounding earth.

$$S_F = \frac{I_g}{3I_0}$$

where

S_F = the fault current division factor

I_g = the rms symmetrical grid current in A

I_0 = the zero-sequence fault current in A

Note: In reality, the current division factor would change during the fault duration, based on the varying decay rates of the fault contributions and the sequence of interrupting device operations. However, for the purposes of calculating the design value of maximum grid current and symmetrical grid current per definitions of symmetrical grid current and maximum grid current, the ratio is assumed constant during the entire duration of a given fault. (PE/SUB) 80-2000

fault current withstand (surge arresters) The maximum root-mean-square (rms) symmetrical fault current of a specified duration that a failed distribution class arrester will withstand without an explosive fracture of the arrester housing. (PE/SPD) C62.1-1981s

fault detection (test, measurement, and diagnostic equipment) One or more tests performed to determine if any malfunctions or faults are present in a unit. (MIL) [2]

fault-detector relay A monitoring relay whose function is to limit the operation of associated protective relays to specific system conditions. (SWG/PE) C37.100-1992

fault diagnosis The action of determining the cause of an error in location and nature. 896.9-1994w

fault dictionary A list of faults in a system or component, and the tests that have been designed to detect them. (C) 610.12-1990

faulted circuit indicator (FCI) A single or multiphase device designed to sense fault current and provide an indication that the fault current has passed through the power conductor(s) at the point where the FCI (faulted circuit indicator) sensor is installed. (T&D/PE) 495-1986w

fault electrode current (electron tube) The peak current that flows through an electrode under fault conditions, such as arc-backs and load short-circuits. *Synonym*: surge electrode current. *See also*: electrode current. (ED/EEC/ACO) 161-1971w, [84], [109]

fault ground bus *See*: fault bus.

fault hazard current (health care facilities) The hazard current of a given isolated power system with all devices connected except the line isolation monitor. *See also*: hazard current. (EMB) [47]

fault impedance An impedance, resistive or reactive, between the faulted power system phase conductor(s) or ground. (PE/PSR) C37.113-1999

fault-incidence angle The phase angle as measured between the instant of fault inception and a selected reference, such as the zero point on a current or voltage wave. (SWG/PE) C37.100-1992

fault indicator (test, measurement, and diagnostic equipment) A device that presents a visual display, audible alarm, and so forth, when a failure or marginal condition exists. (MIL) [2]

fault-initiating switch A mechanical switching device used in applied-fault protection to place a short circuit on an energized circuit and to carry the resulting current until the circuit has been de-energized by protective operation. *Notes*: 1. This switch is operated by a stored-energy mechanism capable of closing the switch within a specified rated closing time at its rated making current. The switch may be opened either manually or by a power-operated mechanism. 2. The applied short circuit may be intentionally limited to avoid excessive system disturbance. (SWG/PE) C37.100-1992

fault insertion *See*: fault seeding.

fault, intermittent *See*: intermittent fault.

fault interrupter A self-controlled mechanical switching device capable of making, carrying, and automatically interrupting an alternating current. It includes an assembly of control elements to detect overcurrents and control the fault interrupter. (SWG/PE) C37.100-1992

fault isolation (1) (test, measurement, and diagnostic equipment) Tests performed to isolate within the unit under test. (MIL) [2]

(2) Fault localization to a degree sufficient to undertake repair. (ATLAS) 1232-1995

(3) The process of reducing the number of anomalies that comprise a diagnosis. Identification of an anomaly or anomalies to a degree sufficient to undertake an appropriate corrective action. (SCC20) 1232.1-1997

(4) The process of reducing the number of anomalies that constitute a diagnosis; identification of an anomaly or anomalies to a degree sufficient to undertake an appropriate corrective action. (SCC20) 1232.2-1998

fault localization The reduction of ambiguity by the application of tests, observations, or other information. (ATLAS) 1232-1995

fault management In networking, a management function that is defined for detecting, isolating, and recovering from abnormal network behavior. *Synonym*: failure management. (C) 610.7-1995

fault masking The result of applying error compensation systematically, even in the absence of error. (C/BA) 896.9-1994w

fault, permanent *See*: permanent fault.

fault removal Methods and techniques aimed at reducing the presence (number, seriousness) of faults. (C/BA) 896.9-1994w

fault resistance (surge arresters) The resistance of that part of the fault path associated with the fault itself. (PE) [8], [84]

fault secure Pertaining to a system or component in which no failures are produced from a prescribed set of faults. *See also*: fail-safe; fail soft; fault tolerance. (C) 610.12-1990

fault seeding *See*: error seeding.

fault set A group of one or more faults with the same fault signature. (SCC20) 1445-1998

fault signature A set of unique primary output patterns in which the fault will produce a response different from the good machine response. (SCC20) 1445-1998

fault symptom (test, measurement, and diagnostic equipment) A measurable or visible abnormality in an equipment parameters. (MIL) [2]

fault time *See*: down time.

fault title A two-part description that includes a node name and a fault type [i.e., (U5)6 SA1 (component: U5, pin: 6, fault type: Stuck at 1)]. (SCC20) 1445-1998

fault tolerance (1) (A) (software) The ability of a system or component to continue normal operation despite the presence of hardware or software faults. *See also:* error tolerance; robustness; fail-safe; fault secure; fail soft. **(B) (software)** The number of faults a system or component can withstand before normal operation is impaired. **(C) (software)** Pertaining to the study of errors, faults, and failures, and of methods for enabling systems to continue normal operation in the presence of faults. *See also:* redundancy; restart; recovery. (C) 610.12-1990

(2) The ability of a system or a component to continue normal operation despite the presence of hardware or software faults. (C/BA) 896.9-1994w, 896.3-1993w

(3) Methods and techniques aimed at providing a service complying with the specification in spite of faults. (C/BA) 896.9-1994w

fault tolerant (software) Pertaining to a system or component that is able to continue normal operation despite the presence of faults. (C) 610.12-1990, 610.10-1994w

fault-tolerant sequential circuit A sequential circuit designed so that a predetermined set of failures in internal state logic or output logic cause no error in the circuit output. (C) 610.10-1994w

fault, transient *See:* transient fault.

fault tree (1) An ordered arrangement of tests that are intended to lead to the localization of faults. (ATLAS) 1232-1995

(2) A graphical representation of an analytical technique whereby an undesired state of a system is specified and the patterns leading to that state can be evaluated to determine how the undesirable system failure can occur. (PE/NP) 1082-1997

fault tree analysis (FTA) (1) A technique by which failures that can contribute to an undesired event are organized deductively and represented pictorially. (PE/NP) 933-1999

(2) A structured analysis method used to comprehensively identify faults and combinations of faults of software and hardware components as they relate to a hazard. (VT/RT) 1483-2000

fault withstandability The ability of electrical apparatus to withstand the effects of prescribed electrical fault current conditions without exceeding specified damage criteria. (SWG/PE) C37.100-1981s

Faure plate (storage cell) (pasted plate) A plate consisting of electroconductive material, which usually consists of lead-antimony alloy covered with oxides or salts of lead, that is subsequently transformed into active material. *See also:* battery. (PE/EEC) [119]

fax *See:* facsimile.

FB+ *See:* Futurebus+.

f-bits *See:* frame bits.

FBP *See:* FASTBUS protocol.

FC assembly *See:* flat cable assembly.

FCA *See:* functional configuration audit.

FCC (Federal Communications Commission (ARCHIVE)) *See:* Federal Communications Commission; flow control character.

FCFS *See:* first-come, first-served.

FCI *See:* faulted circuit indicator.

FCode A computer programming language defined by this standard, which is semantically similar to the Forth programming language but is encoded as a sequence of binary byte codes representing a defined set of Forth definitions. (C/BA) 1275-1994

FCode driver A device driver, written in FCode, intended for use by Open Firmware and its client programs. (C/BA) 1275-1994

FCode evaluator The portion of Open Firmware that processes FCode programs by reading a sequence of bytes representing

FCode numbers and executing or compiling the associated FCode functions. (C/BA) 1275-1994

FCode function A self-contained procedural unit of the FCode programming language to which an FCode number may be assigned. (C/BA) 1275-1994

FCode number A number from 0 to 4095 (conventionally written in hexadecimal as 0x00 to 0x0FFF) that denotes a particular FCode function. (C/BA) 1275-1994

FCode probing The process of locating and evaluating an FCode program. (C/BA) 1275-1994

FCode program A program encoded as a sequence of byte codes according to the rules of the FCode programming language. (C/BA) 1275-1994

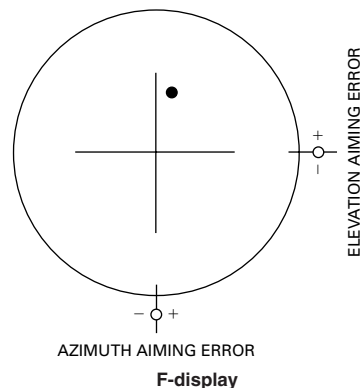
FCode source An FCode program in text form. *See also:* tokenizer. (C/BA) 1275-1994

FCS *See:* frame check sequence.

FDDI *See:* fiber distributed data interface.

FDHM *See:* full width (duration) half maximum.

F-display A rectangular display in which a target appears as a centralized blip when the radar antenna is aimed at it. Horizontal and vertical aiming errors are respectively indicated by horizontal and vertical displacement of the blip.



F-display

(AES) 686-1997

FDM *See:* frequency-division multiplexing.

FE *See:* format effector character.

feasibility The degree to which the requirements, design, or plans for a system or component can be implemented under existing constraints. (C) 610.12-1990

feature (1) A negotiable aspect of an interface. (C/PA) 1224.1-1993w

(2) An individual characteristic of a part, such as screw-thread, taper, or slot. (SCC14/QUL) SI 10-1997, 268-1982s

(3) (image processing and pattern recognition) In pattern recognition, an attribute of a pattern that may contribute to pattern classification; for example, size, texture, or shape. (QUL/C) 268-1982s, 610.4-1990w

feature extraction A step in pattern recognition, in which measurements or observations are processed to find attributes that can be used to assign patterns to pattern classes. (C) 610.4-1990w

feature reference An expression that unambiguously identifies a diagram feature in a diagram. (C/SE) 1320.1-1998

feature space In pattern recognition, a set of all possible n -tuples (x_1, x_2, \dots, x_n) that can be used to represent n features of a pattern. *See also:* measurement space. (C) 610.4-1990w

feature test macro A defined symbol used to determine whether a particular set of features will be included from a header. (C/PA) 9945-1-1996, 9945-2-1993

FEC *See:* forward error correction.

Federal Communications Commission (FCC) A U.S. regulatory body operating under the Communications Act of 1934

to regulate all interstate telecommunications systems in the United States. (C/Std100) 610.7-1995, 610.10-1994w

federal information processing standard publication (FIPS PUB XXXX) Issued by the National Institute of Standards and Technology and available from the National Technical Information Service. (C/BA) 896.3-1993w

feed (1) (A) (machines) To supply the material to be operated upon to a machine. **(B) (machines)** A device capable of feeding as in (A). (C) 162-1963

(2) (A) To supply the material to be operated upon to a machine. *See also:* friction feed; tractor feed; single-sheet feed; continuous feed; cut-sheet feed. **(B)** A device capable of feeding as in (A). *See also:* card feed; hand-feed punch; automatic-feed punch; paper feed. **(C)** A command or signal sent to a printer to instruct it to perform a feed operation as in (A). *See also:* form feed; line feed. (C) 610.10-1994

(3) (A) For continuous aperture antennas, the feed is the primary radiator; for example, a horn feeding a reflector. **(B)** For array antennas, that portion of the antenna system which functions to produce the excitation coefficients. (AP/ANT) 145-1993

feedback (1) (transmission system or section thereof) The returning of a fraction of the output of the input. (AP/BT/ANT) 145-1983s, 182-1961w

(2) That portion of the output of a control system used as input for another phase of the system, particularly for self-correcting, after-regulating, or control purposes, as in closed-loop control. (C) 610.2-1987

(3) (A) A signal that is derived from the output of a circuit and applied to one or more inputs of the same circuit. **(B)** Pertaining to components or subcircuits that transform a portion of the output of a circuit into a form suitable for application to input of the same circuit. *See also:* servomechanism. (C) 610.10-1994

(4) *See also:* control loopback. (C/SE) 1320.1-1998

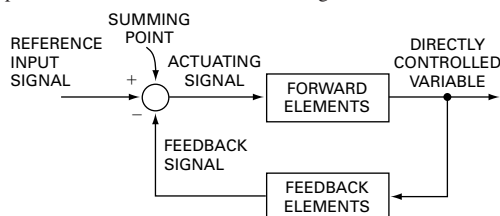
feedback admittance, short-circuit *See:* short-circuit feedback admittance.

feedback branch *See:* feedback node.

feedback control *See:* closed-loop control.

feedback control system (1) (hydraulic turbines) A control system in which the controlled quantity is measured and compared with a standard representing the desired value of the controlled quantity. In hydraulic governors, any deviation from the standard is fed back into the control system in such a sense that it will reduce the deviation between the controlled quantity and the standard providing negative feedback. (PE/EDPG) 125-1977s

(2) (general) A control system that operates to achieve prescribed relationships between selected system variables by comparing functions of these variables and using the comparison to effect control. *See the diagram below.*



Simplified block diagram indicating essential elements of an automatic control system.

control system, feedback

feedback elements The elements in the controlling system that change the feedback signal in response to the directly controlled variable. *See also:* feedback control system. (PE/EDPG) 421-1972s

feedback impedance (analog computer) In an analog computer, a passive network connected between the output terminal of an operational amplifier and its summing junction. (C) 165-1977w

feedback limit *See:* limiter circuit.

feedback limiter A limiter circuit that limits the amount of positive or negative signal in an operational amplifier. *See also:* limiter circuit. (C) 610.10-1994w

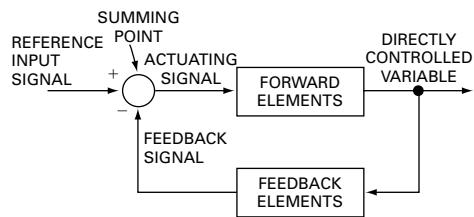
feedback loop (numerically controlled machines) The part of a closed-loop system that provides controlled response information allowing comparison with a referenced command. (IA/EEC) [61], [74]

feedback node (network analysis) A node (branch) contained in a loop. *Synonym:* feedback branch. (CAS) 155-1960w

feedback oscillator An oscillating circuit, including an amplifier, in which the output is coupled in phase with the input, the oscillation being maintained at a frequency determined by the parameters of the amplifier and the feedback circuits such as inductance-capacitance, resistance-capacitance, and other frequency-selective element. *See also:* oscillatory circuit. (AP/ANT) 145-1983s

feedback signal (1) (general) A function of the directly controlled variable in such form as to be used at the summing point. *See also:* feedback control system. (IA/IAC) [60]

(2) (control system feedback) The return signal that results from the reference input signal. (*See the corresponding figure.*) *See also:* feedback control system.



Simplified block diagram including essential elements of an automatic control system

signal, feedback

(PE/EDPG) 421-1972s, [3]

feedback winding (saturable reactor) A control winding to which a feedback connection is made. (PE/EEC) [119]

feed circuit (1) An arrangement for supplying dc power to a telephone set and an ac path between the telephone set and a terminating circuit. (COM/TA) 269-1992

(2) An electrical circuit for supplying dc power to a handsfree telephone set and an ac path between the handsfree telephone and a terminating circuit. (COM/TA) 1329-1999

feed direction On most printers, the direction that the medium is moved through the marking engine. For a printer in which the medium is not moved, the feed direction may be considered as along the Y axis. The across feed direction is the direction orthogonal to the feed direction; it is also called the crossfeed or scan direction on some printers. (C/MM) 1284.1-1997

feeder (1) All circuit conductors between the service equipment, or the generator switchboard of an isolated plant, and the final branch-circuit overcurrent device. (NESC/NEC) [86]

(2) (packaging machinery) The circuit conductors between the service equipment, or the generator switchboard of an isolated plant, and the branch-circuit overcurrent device. (IA/PKG) 333-1980w

(3) (system) The portion of a broadband coaxial cable system that distributes signals to and receives signals from the user outlet ports. Characterized primarily by the presence of cable taps and distribution amplifiers. (LM/C) 802.7-1989r

(4) A cable or set of conductors that originates at a main distribution center (main switchboard) and supplying secondary distribution centers, transformers, or motor control centers. (Bus tie circuits between generator and distribution switchboards, including those between main and emergency switchboards, are not considered as feeders.) (IA/MT) 45-1998

feeder assembly The overhead or under-chassis feeder conductors, including the grounding conductor, together with the

necessary fittings and equipment or a power-supply cord approved for mobile home use, designed for the purpose of delivering energy from the source of electrical supply to the distribution panelboard within the mobile home.

(NEC/NEC) [86]

feeder cable (communication practice) A cable extending from the central office along a primary route (main feeder cable) or from a main feeder cable along a secondary route (branch feeder cable) and providing connections to one or more distribution cables. *See also:* cable. (EEC/PE) [119]

feeder distribution center A distribution center at which feeders or subfeeders are supplied. *See also:* distribution center. (EEC/PE) [119]

feeder maker A splitting device used to provide multiple line connections from trunk amplifiers. (LM/C) 802.7-1989r

feeder reactor (power and distribution transformers) A current-limiting reactor for connection in series with an alternating-current feeder circuit for the purpose of limiting and localizing the disturbance due to faults on the feeder. *See also:* reactor. (PE/TR) C57.12.80-1978r, C57.16-1996, [57]

feed function (numerically controlled machines) The relative velocity between the tool or instrument and the work due to motion of the programmed axis (axes).

(IA/EEC) [61], [74]

feed groove (rotating machinery) A groove provided to direct the flow of oil in a bearing. *See also:* bearing. (PE) [9]

feed hole A hole punched in a data medium to enable it to be positioned or fed into a machine. *Synonym:* sprocket hole. (C) 610.10-1994w

feeding bridge A device to supply telephone lines with feeding current and signaling current. Feeding bridges are typically located in local exchanges, private branch exchanges, and remote terminals of subscriber line carrier systems. *Notes:* 1. Feeding current (for a telephone set) is the direct current primarily used to power the speech circuit in a telephone set. 2. Signaling current (in telephony) is the direct current supplied to a telephone set to enable the set to send supervision and addressing signals.

feeding coefficients *See:* excitation coefficients.

feeding point The point of junction of a distribution feeder with a distribution main or service connection. *See also:* center of distribution. (T&D/PE) [10]

feed line (1) A transmission line interconnecting an antenna and a transmitter or receiver or both. (AP/ANT) 145-1993

(2) (rotating machinery) A supply pipe line. *See also:* oil cup. (PE) [9]

feed pitch The distance between corresponding points of adjacent feed holes along the feed track. (C) 610.10-1994w

feed punch *See:* automatic-feed punch.

feed rate bypass (numerically controlled machines) A function directing the control system to ignore programmed feed rate and substitute a selected operational rate. (IA/EEC) [61], [74]

feed rate override (numerically controlled machines) A manual function directing the control system to modify the programmed feed rate by a selected multiplier. (IA/EEC) [61], [74]

feedthrough power meter (1) (bolometric power meters) A power-measuring system in which the detector structure is inserted or incorporated in a waveguide or coaxial transmission line to provide a means for measuring (monitoring) the power flow through or beyond the system. (IM) 470-1972w

(2) (measuring system) (electrothermic power meters) A device which is inserted or incorporated in a waveguide or transmission line and provides a means for measuring (monitoring) the power flow through or beyond the system. (IM) 544-1975w

feedthrough signal The undelayed signal resulting from direct coupling between the input and output of the device.

(UFFC) 1037-1992w, [22]

feed track A track of a data medium that contains the feed holes. *Synonym:* sprocket track. (C) 610.10-1994w

feed tube (cable plowing) A tube attached to the blade of a plow which guides and protects the cable as it enters the earth. *See also:* fixed feed tube; hinged removable feed tube; floating removable feed tube. (T&D/PE) 590-1977w

FEFO *See:* first-ended, first-out.

fence (A) A line or network of early-warning radars. **(B)** The locus of the positions of a surveillance radar beam that describes the search area covered by space-based radar. *See also:* clutter fence. (AES) 686-1997

fenestra method (illuminating engineering) A procedure for predicting the interior illuminance received from daylight through windows. (EEC/IE) [126]

fenestration (illuminating engineering) Any opening or arrangement of openings (normally filled with media for control) for the admission of daylight. (EEC/IE) [126]

FEO page *See:* For Exposition Only page.

FEP *See:* fuse-enclosure package.

ferreed relay Coined name (Bell Telephone Laboratories) for a special form of dry reed switch having a return magnetic path of high remanence material that provides a bistable, or latching, transfer contact. (PE/EM) 43-1974s

ferri-diode limiter (nonlinear, active, and nonreciprocal waveguide components) A hybrid power limiting device incorporating a ferrite power limiter in cascade with a p-i-n diode or varactor limiter. *See also:* ferrite limiter. (MTT) 457-1982w

ferrite An iron compound frequently used in the construction of magnetic cores components. (C) 610.10-1994w

ferrite devices figure of merit (nonlinear, active, and nonreciprocal waveguide components) A measure of performance of the device. It is usually expressed as the ratio of the quantity of interest to the insertion loss in decibels (dB).

ferrite limiter (nonlinear, active, and nonreciprocal waveguide components) A power limiter utilizing the nonlinear characteristics of ferrimagnetic material above a critical or threshold radio-frequency (rf) power level. *See also:* ferri-diode limiter. (MTT) 457-1982w

ferritic The body-centered cubic crystal structure of ferrous metals. (IA) [59], [71]

ferrodynamic instrument An electrodynamic instrument in which the forces are materially augmented by the presence of ferromagnetic material. *See also:* instrument. (EEC/PE) [119]

ferroelastic crystal (primary ferroelectric terms) One that has two or more orientation states in the absence of mechanical stress and electric field, and can be shifted from one to another of these states by a mechanical stress. (UFFC) 180-1986w

ferroelectric axis The crystallograph direction is parallel to the spontaneous polarization vector. *Note:* In some materials the ferroelectric axis may have several possible orientations with respect to the macroscopic crystal. *See also:* ferroelectric domain. (UFFC) 180w

ferroelectric ceramic (primary ferroelectric terms) Typically, a sintered polycrystalline material comprising an aggregate of ferroelectric single crystal grains (or crystallites). Each ceramic grain has properties similar to a ferroelectric single crystal, with the possible exception of grains with major dimensions $\ll 1 \mu\text{m}$. *Notes:* 1. A ceramic is, in general, any inorganic, nonmetallic, ordered or disordered material. A ceramic is commonly typified by polycrystallinity and the unique properties associated with grain boundaries. 2. Both single crystal and sintered materials are, strictly speaking, ferroelectric ceramics even though they are often separated in common usage of the terms. (UFFC) 180-1986w

ferroelectric Curie point (1) (primary ferroelectric terms) Temperature at which a ferroelectric material undergoes a

structural phase transition to a state where spontaneous polarization vanishes. *Note:* The Curie point is determined at zero applied field.

(UFFC) 180-1986w

(2) The temperature T_C at which a ferroelectric material undergoes a structural phase transition to a state in which the spontaneous polarization vanishes in the absence of an applied electric field. *Note:* In a normal ferroelectric, the Curie point can be shifted by application of an external electric field, a mechanical stress or by doping with chemical impurities. *See also:* Curie-Weiss temperature; spontaneous polarization.

(UFFC) [21]

ferroelectric Curie temperature The temperature above which ferroelectric materials do not exhibit reversible spontaneous polarization. *Note:* As the temperature is lowered from above the ferroelectric Curie temperature spontaneous polarization is detected by the onset of a hysteresis loop. The ferroelectric Curie temperature should be determined only with unstrained crystals, at atmospheric pressure, and with no externally applied direct-current fields. (In some ferroelectric multiple hysteresis-loop patterns may be observed at temperatures slightly higher than the ferroelectric Curie temperature under alternating-current fields.) *See also:* ferroelectric domain.

(UFFC) 180w

ferroelectric domain (1) A region of a crystal exhibiting homogeneous and uniform spontaneous polarization. *Note:* An unpoled ferroelectric material may exhibit a complex domain structure consisting of many domains, each with a different polarization orientation. The direction of the spontaneous polarization within each domain is constrained to a small number of equivalent directions (see polar axis) dictated by the symmetry of the crystal structure above the ferroelectric Curie point. The transition region between two ferroelectric domains is called a domain wall. Domains can usually be detected by pyroelectric, optical, powder decoration or electrooptic means. *See also:* ferroelectric Curie point; spontaneous polarization; poling; polar axis.

(UFFC) [21]

(2) A region of a ferroelectric crystal exhibiting homogeneous and uniform spontaneous polarization. In the close vicinity of domain walls, P_s is different from that in the bulk of the domain, due to the energy associated with the domain wall. The equilibrium domain structure is determined by minimization of the domain wall energy and the depolarizing energy. In a conducting ferroelectric crystal, the depolarizing fields can be neutralized by free charge so that the depolarizing energy vanishes and a single domain structure is energetically the most favorable in a perfect crystal. The formation of a domain wall is affected by the local electric field and mechanical stresses. In crystals with many small domains, the field and stress gradients can be large enough to change the measured apparent spontaneous polarization. In small domains P_s can vary considerably across a domain, and even at the domain center may differ from that measured in a large single domain. *Note:* An unpoled ferroelectric material may exhibit a complex domain structure consisting of many domains, each with a different polarization orientation. The direction of the spontaneous polarization within each domain is constrained to a small number of equivalent directions dictated by the symmetry of the prototype. The boundary region between two ferroelectric domains is called a domain wall. Domains can usually be observed by pyroelectric, optical, powder decoration, or electrooptic means.

(UFFC) 180-1986w

ferroelectric glass-ceramics (primary ferroelectric terms) A multiphase solid containing ferroelectric crystal grains and other phases, one of which must be a glass. Typical grain sizes vary from 10^{-2} – 50 μm , depending on chemical composition and nucleation-crystallization conditions. The principal fabrication process of a glass-ceramic has three steps:

- 1) A molten solution is formed of the ferroelectric and the glass-forming constituents.
- 2) The melt is rapidly quenched to form a vitreous body.

- 3) Controlled devitrification is accomplished by annealing. A chief advantage of a glass-ceramic is a wide range of formability, depending upon the viscosity-temperature behavior prior to devitrification.

(UFFC) 180-1986w

ferroelectric material (A) (primary ferroelectric terms) A material that exhibits, over some range of temperature, a spontaneous electric polarization that can be reversed or reoriented by application of an electric field. The requirement of a nonvanishing spontaneous polarization P_s is a necessary criterion, and the requirement of reversibility or reorientability of P_s is a sufficient criterion for a ferroelectric phase. Materials belonging to nonpolar crystal classes at all temperatures, and in which a metastable polar state can be induced by an applied electric field, can also show reversible pyroelectric behavior, but are not included in the definition of ferroelectrics. The various possible stable orientations of P_s for a given ferroelectric phase are designated as orientation states. A ferroelectric crystal has two or more such orientation states in the absence of an electric field, and it can be switched from one to another of these states by a realizable electric field. Any two of the orientation states are identical (or enantiomorphous) in crystal structure, but different in their P_s orientation at zero electric field. **(B)** A crystalline material that exhibits, over some range of temperature, a remanent polarization that can be reversed or reoriented by application of an external electric field. *Note:* The saturation remanent polarization is equal to the spontaneous polarization in a single domain ferroelectric material. Since the spontaneous polarization in a ferroelectric material is strongly temperature dependent, poled ferroelectric materials exhibit a large pyroelectric effect near the Curie point. Ferroelectric materials also exhibit anomalies in small-signal dielectric permittivity, dielectric loss tangent, piezoelectric coefficients, and electrooptic coefficients near their ferroelectric Curie point. *See also:* polarization; Curie-Weiss temperature; ferroelectric domain; paraelectric region; poling; remanent polarization; antiferroelectric material; small-signal permittivity; polar axis; ferroelectric Curie point; spontaneous polarization.

(UFFC) 180-1986, [21]

ferroelectric polymers (primary ferroelectric terms) Typically, a semicrystalline polymer with a large net dipole moment per unit volume. These materials exhibit a spontaneous electric polarization that can be reversed by the application of a strong electric field (0.1–0.5 MV/cm) and also exhibit piezoelectric and pyroelectric behavior. Examples of ferroelectric polymers include polyvinyl fluoride (PVF), polyvinylidene fluoride (PVF₂), and copolymers of vinylidene fluoride with vinyl trifluoroethylene or tetrafluoroethylene. The copolymers of vinylidene fluoride with trifluoroethylene exhibit Curie temperatures in the range of 50-160°C. The higher trifluoroethylene content materials (greater than 55 mol% VF₃) have a second-order transition at lower Curie points; while the materials with higher vinylidene fluoride content (greater than 65 mol% VF₂) have a first-order transition at higher Curie points.

(UFFC) 180-1986w

ferromagnetic material (A) (electrical heating systems) A material that, in general, exhibits hysteresis phenomena and whose permeability is dependent on the magnetizing force. **(B)** Material whose relative permeability is greater than unity and depends upon the magnetizing force. A ferromagnetic material usually has relatively high values of relative high values of relative permeability and exhibits hysteresis.

(Std100/IA/PC) 844-1991, 270-1966

ferroresonance (1) (power and distribution transformers) A phenomenon usually characterized by overvoltages and very irregular wave shapes and associated with the excitation of one or more saturable inductors through capacitance in series with the inductor.

(PE/TR) C57.12.80-1978r

(2) An electrical resonant condition associated with the saturation of a ferromagnetic device, such as a transformer, through capacitance. Ferroresonance can arise when (1) due

to dissimilar phase switching, the capacitance normally in shunt with the ferromagnetic device becomes energized in series with the device, (2) a weak source is isolated with a lightly loaded feeder containing power factor correction capacitors. For example, if the resulting voltage buildup produces saturation of the feeder transformers, there will be an interchange of energy between the system capacitance and the nonlinear magnetizing reactance of the transformers.

(SWG/PE) C37.100-1992

(3) Occurs between the capacitance to ground of an ungrounded circuit and voltage transformers with primary windings that are grounded. This phenomenon is also possible in gas-insulated systems. (SPD/PE) C62.22-1997

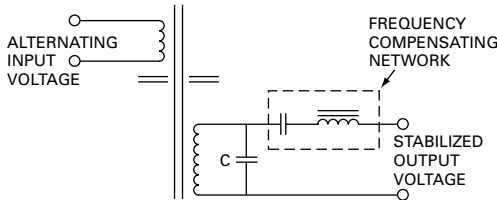
(4) The steady-state mode of operation that exists when an alternating voltage of sufficient magnitude is applied to a circuit consisting of capacitance and ferromagnetic inductance causing changes in the ferromagnetic inductance that are repeated each half cycle. *Note:* When certain critical relations exist among circuit parameters, self-sustaining subharmonic or harmonic oscillations may also be excited in the circuit.

(PEL) 449-1998

ferroresonant voltage regulation The effect obtained by the limiting action of the saturation characteristic of the magnetic material in a ferroresonant circuit, which regulates the output voltage over a specified range of input voltages and a specified frequency of excitation. *Note:* This effect regulates the half-cycle average value of the output voltage.

(PEL) 449-1998

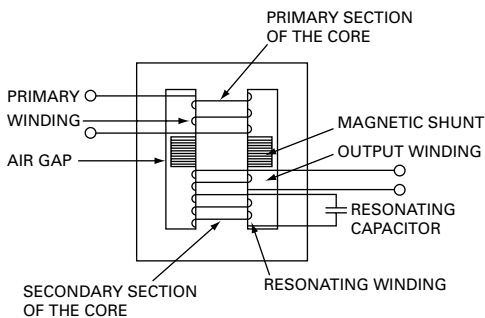
ferroresonant voltage regulator provided with a frequency-compensating network Output voltage of a ferroresonant voltage regulator changes considerably with the change of the input frequency. An LC network can be added to the regulator output, in series with the load, to compensate this voltage change. See corresponding figure. *Note:* Frequency compensating networks, of this series type, are effective in cases where regulators are operated with constant loads but they produce only limited improvement of regulation when loads are variable.



ferroresonant voltage regulator provided with a frequency-compensating network

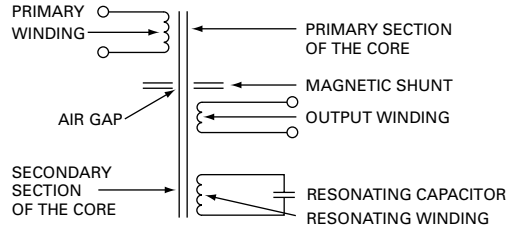
(MAG/ET) 449-1984s

ferroresonant voltage regulator transformer A high-reactance transformer employing magnetic shunts that allow the magnetic functions of the basic series parallel ferroresonant regulator circuits to be combined into a single magnetic component. See the figures below.



Common form of the ferroresonant transformer voltage regulator

Ferroresonant voltage regulator transformer

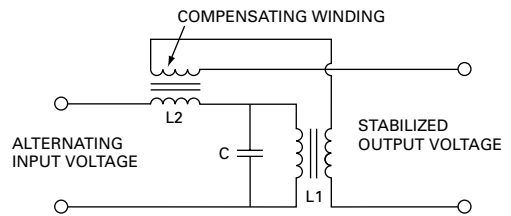


Schematic of a common form of the ferroresonant transformer voltage regulator

Ferroresonant voltage regulator transformer

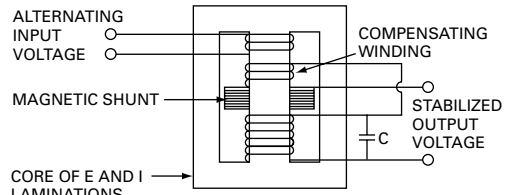
(PEL) 449-1998

ferroresonant voltage regulator with compensating winding (ferroresonant voltage regulators) A ferroresonant voltage regulator having a compensating winding connected in series with the output winding to attain improved load and line regulation. See figures below.



Two-core ferroresonant circuit with compensating winding

ferroresonant voltage regulator with compensating winding



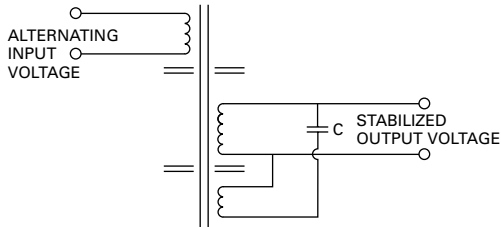
ferroresonant transformer circuit with compensating winding

(MAG/ET) 449-1984s

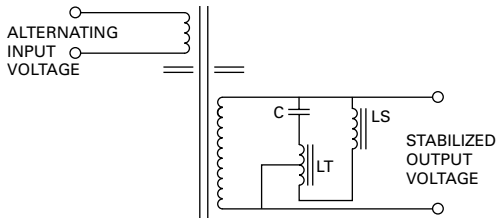
ferroresonant voltage regulator with compensation for varying load power factor (ferroresonant voltage regulators) Reduction of the amount of output voltage change caused by other than resistive loading and by large changes of load power factor is obtained by providing a capacitive impedance, inserted in series with the output, that essentially matches the output reactance of the regulator. The power factor compensation circuit is usually a capacitive reactance obtained by capacitors alone. (MAG/ET) 449-1984s

ferroresonant voltage regulator with harmonic filter (A) (harmonic neutralized) (ferroresonant voltage regulators) (magnetically coupled type). Reduction of output harmonics is obtained by effectively filtering the odd harmonics through use of a neutralizing winding that is magnetically coupled to the resonating winding as shown in the corresponding figure. **(B) (ferroresonant voltage regulators) (harmonic neutralized)** (electrically coupled tuned). Cancellation type reduction of output harmonics is obtained by effectively filtering the odd harmonics through use of an inductance in series with the resonating capacitor which effectively filters the major harmonic (the third harmonic) and a saturating inductor to produce odd harmonics which are induced back into the circuit of the regulator to cancel out the remaining odd harmonics. This type of filtering is shown in the corresponding figure. **(C) (ferroresonant voltage regulators) (harmonic neutralized)** (tuned type). Reduction of output harmonics is obtained by dividing the resonating capacitance into several sections and connecting them to filter

the various odd harmonics that exist in the output of the basic regulator.



magnetically coupled tuned-cancellation type harmonic filter



electrically connected tuned-cancellation type harmonic filter

(MAG/ET) 449-1984

ferrule (1) (fiber optics) A mechanical fixture, generally a rigid tube, used to confine the stripped end of a fiber bundle or a fiber. *Notes:* 1. Typically, individual fibers of a bundle are cemented together within a ferrule of a diameter designed to yield a maximum packing fraction. 2. Nonrigid materials such as shrink tubing may also be used for ferrules for special applications. *See also:* reference surface; packing fraction; fiber bundle. (Std100) 812-1984w

(2) (protection and coordination of industrial and commercial power systems) The cylindrical-shaped fuse terminal that also encloses the end of the fuse. In low-voltage fuses, the design is only used in fuses rated up to and including 60 A. The ferrule may be made of brass or copper, and may be plated with various materials. (IA/PSP) 242-1986r

(3) (of a cartridge fuse) A fuse terminal of cylindrical shape at the end of a cartridge fuse. (SWG/PE) C37.100-1992

fertilizer *See:* explosives.

festoon lighting A string of outdoor lights suspended between two points more than 15 feet apart. (NESC/NEC) [86]

FET *See:* field-effect transistor.

fetch To locate and load computer instructions or data from storage. *See also:* store; move. (C) 610.12-1990

(2) (A) That portion of an instruction cycle in which the next instruction is loaded from memory into the processor. **(B)** To obtain a data item from a storage location. (C) 610.10-1994

fetch cycle That portion of an instruction cycle during which a fetch takes place. (C) 610.10-1994w

FET photodetector (fiber optics) A photodetector employing photogeneration of carriers in the channel region of a field-effect transistor (FET) structure to provide photodetection with current gain. *See also:* photodiode; photocurrent. (Std100) 812-1984w

FF *See:* form feed character.

F Filter A 5 kHz to 245 kHz bandpass filter used for measuring the power of a High-bit-rate Digital Subscriber Line (HDSL) signal, noise, or impulse noise on an HDSL. (COM/TA) 743-1995

F format *See:* fixed format.

FGRAAL *See:* FORTRAN Extended GRaph Algorithmic Language.

fiber *See:* optical fiber.

fiber axis (fiber optics) The line connecting the centers of the circles that circumscribe the core, as defined under bold tol-

erance field. *Synonym:* optical axis. *See also:* tolerance field. (Std100) 812-1984w

fiber bandwidth (fiber optics) The lowest frequency at which the magnitude of the fiber transfer function decreases to a specified fraction of the zero frequency value. Often, the specified value is one-half the optical power at zero frequency. *See also:* transfer function. (Std100) 812-1984w

fiber buffer (fiber optics) A material that may be used to protect an optical fiber waveguide from physical damage, providing mechanical isolation or protection or both. *Note:* Cable fabrication techniques vary, some resulting in firm contact between fiber and protective buffering, others resulting in a loose fit, permitting the fiber to slide in the buffer tube. Multiple buffer layers may be used for added fiber protection. *See also:* fiber bundle. (Std100) 812-1984w

fiber bundle (1) (fiber optics) An assembly of unbuffered optical fibers. Usually used as a single transmission channel, as opposed to multifiber cables, which contain optically and mechanically isolated fibers, each of which provides a separate channel. *Notes:* 1. Bundles used only to transmit light, as in optical communications, are flexible and are typically unaligned. 2. Bundles used to transmit optical images may be either flexible or rigid, but must contain aligned fibers. *See also:* optical fiber; multifiber cable; optical cable; packing fraction; aligned bundle; ferrule; fiberoptics. (Std100) 812-1984w

(2) An assembly of unbuffered optical fibers, usually employed as a single transmission channel. (C) 610.7-1995

fiber distributed data interface An ANSI standard based on fiber optics configured in a dual, counter-rotating ring and operating at 125 million baud with a user data rate of 100 Mb/s. FDDI uses a token passing MAC so that it can operate on non-fiber media such as unshielded twisted pair. *Note:* With the physical layer protocol overhead removed, the net throughput is 100 000 000 b/s and with the MAC overhead removed, the net throughput is less than 100 000 000 b/s. (C) 610.7-1995

fiber laser (interferometric fiber optic gyro) A laser in which the lasing medium is an externally pumped optical fiber doped with low levels of rare-earth halides to make it capable of amplifying light. (AES/GYAC) 528-1994

fiber optic cable (1) A cable containing one or more of the optical fibers. (C) 610.7-1995

(2) A cable containing one or more optical fibers as specified in IEEE 802.3. (LM/C) 802.3u-1995s

fiber-optic cable—communication A fiber-optic cable meeting the requirements for a communication line and located in the communication space of overhead or underground facilities. (NESC) C2-1997

fiber-optic cable—supply A fiber-optic cable located in the supply space of overhead or underground facilities. (NESC) C2-1997

fiber-optic conductor *See:* fiber-optic cable—supply; fiber-optic cable—communication.

Fiber Optic Inter-Repeater Link (FOIRL) A Fiber Optic Inter-Repeater Link segment and its two attached Medium Attachment Units (MAUs). (C/LM) 802.3-1998

Fiber Optic Physical Medium Attachment For 10BASE-F, the portion of the Fiber Optic Medium Attachment Unit (FO-MAU) that contains the functional circuitry. (C/LM) 802.3-1998

Fiber Optic Inter-Repeater Link (FOIRL) bit error rate (BER) For 10BASE-F, the mean bit error rate of the FOIRL. (C/LM) 802.3-1998

Fiber Optic Inter-Repeater Link (FOIRL) collision For 10BASE-F, the simultaneous transmission and reception of data in a Fiber Optic Medium Attachment Unit (FOMAU). (C/LM) 802.3-1998

Fiber Optic Inter-Repeater Link (FOIRL) Compatibility Interface For 10BASE-F, the FOMDI and Attachment Unit

Interface (AUI) (optional); the two points at which hardware compatibility is defined to allow connection of independently designed and manufactured components to the baseband optical fiber cable link segment. (C/LM) 802.3-1998

Fiber Optic Inter-Repeater Link (FOIRL) Segment A fiber optic link segment providing a point-to-point connection between two FOIRL Medium Attachment Units (MAUs) or between one FOIRL MAU and one 10BASE-FL MAU. *See also:* link segment. (C/LM) 802.3-1998

Fiber Optic Medium Attachment Unit A medium attachment unit (MAU) for fiber applications. (C/LM) 802.3-1998

Fiber Optic Medium Attachment Unit's (FOMAU's) Receive Optical Fiber For 10BASE-F, the optical fiber from which the local FOMAU receives signals. (C/LM) 802.3-1998

Fiber Optic Medium Attachment Unit's (FOMAU's) Transmit Optical Fiber For 10BASE-F, the optical fiber into which the local FOMAU transmits signals. (C/LM) 802.3-1998

Fiber Optic Medium Dependent Interface (FOMDI) For 10BASE-F, the mechanical and optical interface between the optical fiber cable link segment and the Fiber Optic Medium Attachment Unit (FOMAU). (C/LM) 802.3-1998

fiber optic physical medium attachment (FOPMA) For 10BASE-F, the portion of the FOMAU that contains the functional circuitry. (LM/C) 802.3u-1995s

fiber-optic plate (camera tubes) An array of fibers, individually clad with a lower index-of-refraction material, that transfers an optical image from one surface of the plate to the other. *See also:* camera tube. (ED) [45]

fiber-optic receiver operating range The range of optical power over which the fiber-optic receiver will meet the specified bit error rate (BER). (C/BA) 1393-1999

fiberoptics (1) (data transmission) The branch of optical technology concerned with the transmission of radiant power through fibers made of transparent materials, such as glass, fused silica plastic. *Notes:* 1. Communications applications of fiber optics employ flexible fibers. Either a single discrete fiber or a nonspatially aligned fiber bundle may be used for each information channel. Such fibers are generally referred to as "optical waveguides" to differentiate from fibers employed in noncommunications applications. 2. Various industrial and medical applications employ typically high-loss flexible fiber bundles in which individual fibers are spatially aligned, permitting optical relay of an image. An example is the endoscope. 3. Some specialized industrial applications employ rigid (fused) aligned fiber bundles for image transfer. An example is the fiber optics cathode-ray tube (CRT) faceplate used on some high-speed oscilloscopes. (PE) 599-1985w, 812-1984w

(2) A technology that uses light as a digital information carrier. (C) 610.7-1995, 610.10-1994w

fiber pair Optical fibers interconnected to provide two continuous light paths terminated at each end in an optical connector. (C/LM) 802.3-1998

Fibonacci number An integer in the Fibonacci series. (C) 1084-1986w

Fibonacci search A dichotomizing search in which, at each step in the search, the set of items is partitioned in accordance with the Fibonacci series. For example, a set of 8 items is partitioned to 5 and 3, the subset of 5 is partitioned to 3 and 2, and so on. If the number of items in the original set is other than a Fibonacci number, the next higher Fibonacci number is used to partition the set. *Contrast:* interpolation search; binary search. (C) 610.5-1990w

Fibonacci series A series of integers formulated by the Italian mathematician Leonardo Fibonacci, in which each integer is equal to the sum of the two preceding integers in the series, that is, 0, 1, 1, 2, 3, 5, 8, 13,.... Represented mathematically by

$$x_i = x_{i-1} + x_2$$

where

$$x_0 = 0$$

$$x_1 = 1$$

(C) 1084-1986w

fiber A filament-shaped optical waveguide made of dielectric materials.

(LM/C) 11802-4-1994, 8802-3-1990s, 802.3u-1995s, 610.7-1995

Fibre Distributed Data Interface (FDDI) A 100 Mb/s, fiber optic-based, token-ring local area network standard (ISO/IEC 9314, formerly X3.237-1995). (C/LM) 802.3-1998

fiber-optic cable A cable containing one or more optical fibres. (C/LM) 8802-12-1998, 11802-4-1994

fiber optic channel The data path from any transmitting station's FMIC or transmitting concentrator's FMIC to the next receiving FMIC. (C/LM) 11802-4-1994

fiber optic concentrator lobe port *See:* fiber optic trunk coupling unit.

fiber optic interface (FOI) The interface between a station's PHY and the optical medium. It is bounded on one side by the MIC or PHY-layer I/O interface, and on the other side by the FMIC. (C/LM) 11802-4-1994

fiber-optic link A link segment configured from fiber optic cables and two attached Medium Dependent Interface (MDI) connectors.local area networks. (C) 8802-12-1998

fiber optic medium interface connection (FMIC) The mechanical and optical interface between the station or FOI and the fiber optic cable. This is a duplex optical port at which conformance testing is performed. (C/LM) 11802-4-1994

fiber optic station (FODTE) A compliant token ring station with an FOI as described in ISO/IEC TR 11802-4:1994. (C/LM) 11802-4-1994

fiber optic trunk coupling unit (FOTCU) A physical device that enables a fiber optic station to connect to a trunk cable. The FOTCU contains the means for inserting the fiber optic station into the ring, or conversely, bypassing the fiber optic station. (C/LM) 11802-4-1994

fiber pair Optical fibres interconnected to provide two continuous light paths terminated at both ends in an optical connector.local area networks. (C) 8802-12-1998

fibrillation (medical electronics) A continued, uncoordinated activity in the fibers of the heart, diaphragm, or other muscles consisting of rhythmical but asynchronous contraction and relaxation of individual fibers. (EMB) [47]

fictitious power (A) (polyphase circuit) At the terminals of entry, a vector equal to the (vector) sum of the fictitious powers for the individual terminals of entry. *Note:* The fictitious power for each terminal of entry is determined by considering each phase conductor and the common reference point as a single-phase circuit, as described for distortion power. The sign given to the distortion power in determining the fictitious power for each single-phase circuit shall be the same as that of the total active power. Fictitious power for a polyphase circuit has as its two rectangular components the reactive power and the distortion power. If the voltages have the same waveform as the corresponding currents, the magnitude of the fictitious power becomes the same as the reactive power. Fictitious power is expressed in volt-amperes when the voltages are in volts and the currents in amperes.

(B) (single-phase two-wire circuit) At the two terminals of entry into a delimited region, a vector quantity having as its rectangular components the reactive power and the distortion power. *Note:* Its magnitude is equal to the square root of the difference of the squares of the apparent power and the amplitude of the active power. Its magnitude is also equal to the square root of the sum of the squares of the amplitudes of reactive power and distortion power. If voltage and current have the same waveform, the magnitude of the fictitious power is equal to the reactive power. The magnitude of the fictitious power is given by the equation

$$F = (U^2 - p^2)^{1/2}$$

$$= (Q^2 - D^2)^{1/2}$$

$$\left\{ \sum_{r=1}^{\infty} \sum_{q=1}^{\infty} \left[E_r^2 I_q^2 - E_r E_q I_r I_q \cos(\alpha_r - \beta_r) \cos(\alpha_q - \beta_q) \right] \right\}^{1/2}$$

where the symbols are those of power, apparent (single-phase two-wire circuit). In determining the vector position of the fictitious power, the sign of the distortion power component must be assigned arbitrarily. Fictitious power is expressed in volt-amperes when the voltage is in volts and the current in amperes. *See also*: distortion power. (Std100) 270-1966

fiche *See*: microfiche.

fidelity (1) The degree with which a system, or a portion of a system, accurately reproduces at its output the essential characteristics of the signal that is impressed upon its input. (AP/PE/ANT) 145-1983s, 599-1985w

(2) (modeling and simulation) The degree of similarity between a model and the system properties being modeled. *Synonym*: correspondence. *See also*: model validation. (C) 610.3-1989w

(3) The degree to which the representation within a simulation is similar to a real-world object, feature, or condition in a measurable or perceivable manner. (DIS/C) 1278.1-1995

field (1) (television) One of the two (or more) equal parts into which a frame is divided in interlaced scanning. (BT/AV) [34]

(2) (computers) (record) A specified area used for a particular category of data, for example, a group of card columns used to represent a wage rate or a set of bit locations in a computer word used to express the address of the operand. (C) [20], [85]

(3) (diode-type camera tube) A single raster scan of the target. In the usual 2:1 interlace scan, two fields are required to completely scan the raster frame. (ED) 503-1978w

(4) (power cable systems) (in the field) The terms "field" or "in the field" refer generally to apparatus installed in the operating location. However, this may include material not yet installed or material that has been removed from the operating environment. (PE/IC) 400-1991

(5) (electric submersible pump cable) The term field or in the field may include cable not yet installed or cable that has been removed from its operating environment. (IA/PC) 1017-1985s

(6) (A) (data management) A specified area within a record, used for a particular data item; for example a group of card columns in which a telephone number is recorded. **(B) (data management)** The smallest unit of data that can be referred to in a database. *See also*: database segment. (C/Std100) 610.5-1990

(7) A group of any number of adjacent binary digits operated on as a unit. (SUB/PE) 999-1992w

(8) A series of contiguous bits treated as an instance of a particular data type that may be part of a higher level data structure. (DIS/C) 1278.1-1995

(9) In the shell command language, a unit of text that is the result of parameter expansion, arithmetic expansion, command substitution, or field splitting. During command processing, the resulting fields are used as the command name and its arguments. (C/PA) 9945-2-1993

(10) (A) A region near an electric charge, a source of electromagnetic radiation, or a magnet in which components or materials may be affected. **(B)** A portion of a computer instruction. *See also*: operation field; address field; operand field. **(C)** A portion of a data item such as the zone field of zoned decimal data. (C) 610.10-1994

(11) A defined subdivision of an ATLAS statement. (SCC20) 771-1998

(12) An area of the display screen that is reserved for the display of data or for user entry of a data item. In a database, it is a specified area used for a particular category of data

(e.g., equipment operational status). *See also*: display.

(PE/NP) 1289-1998

field accelerating relay A relay that functions automatically to maintain the armature current within limits, when accelerating to speeds above base speed, by controlling the excitation of the motor field. (IA/ICTL/IAC) [60]

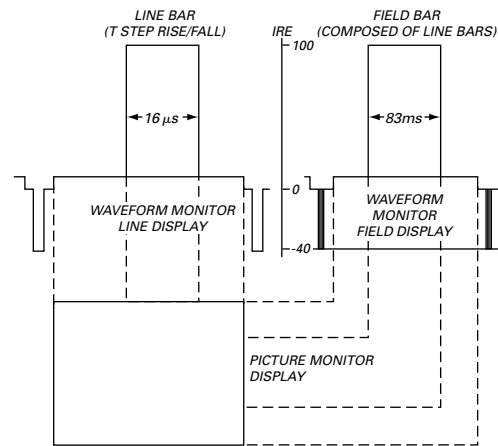
field application relay (1) (power system device function numbers) A relay that automatically controls the application of the field excitation to an alternating-current (ac) motor at some predetermined point in the slip cycle. (SUB/PE) C37.2-1979s

(2) A relay that initiates the application of field excitation to a synchronous machine under specified conditions. *Note*: It is usually a polarized relay sensitive to the slip frequency of the induced field current. It may also remove excitation during an out-of-step condition. (SWG/PE) C37.100-1992

field assembled (1) Heating cable supplied in bulk form with terminating components and connections to be assembled by field personnel. (BT/IA/AV/PC) 152-1953s, 515.1-1995

(2) Heating cable or surface heating device supplied in bulk form with terminating components to be assembled in the field. (IA) 515-1997

field bar (line waveform distortion) A composite pulse, nominally of 8 ms duration, of reference-white amplitude. The field bar is composed of line bars as defined. This signal when displayed on a picture monitor has the form of the window signal shown in the corresponding figure.



The window signal

field bar

(BT) 511-1979w

field-changing contactor (power system device function numbers) A contactor that functions to increase or decrease, in one step, the value of field excitation on a machine. (SUB/PE) C37.2-1979s

field charging Charging of aerosols by small ions moving under the influence of an electric field. (T&D/PE) 539-1990

field circuit breaker (power system device function numbers) A device that functions to apply or remove the field excitation of a machine. (SUB/PE) C37.2-1979s

field coil (A) (rotating machinery) (direct-current and salient-pole alternating-current machines). A suitably insulated winding to be mounted on a field pole to magnetize it. **(B) (rotating machinery)** (cylindrical-rotor synchronous machines). A group of turns in the field winding; occupying one pair of slots. *See also*: asynchronous machine; direct-current commutating machine. (PE) [9]

field-coil flange (rotating machinery) Insulation between the field coil and the pole shoe, and between the field coil and the member carrying the pole body, in a salient-pole machine. *See also*: stator; rotor. (PE) [9]

field contacts (sequential events recording systems) Electrical contacts that define the state of monitored equipment or a process. (PE/EDPG) [5], [1]

field contact voltage (sequential events recording systems)

The voltage applied to field contacts for the purpose of sensing contact status. (PE/EDPG) [5], [1]

field control (motors) A method of controlling a motor by means of a change in the magnitude of the field current. *See also:* control. (IA/ICTL/APP/IAC) [69], [60]

field, critical *See:* critical field.

field, cutoff *See:* critical field.

field data Data from observations during field use. *Note:* The time stress conditions, and failure or success criteria should be stated in detail. (R) [29]

field decelerating relay A relay that functions automatically to maintain the armature current or voltage within limits, when decelerating from speeds above base speed, by controlling the excitation of the motor field. *See also:* relay. (IA/ICTL/IAC) [60]

field discharge (as applied to a switching device) A qualifying term indicating that the switching device has main contacts for energizing and de-energizing the field of a generator, motor, synchronous condenser or exciter; and has auxiliary contacts for short-circuiting the field through a discharge resistor at the instant preceding the opening of the main contacts. The auxiliary contacts also disconnect the field from the discharge resistor at the instant following the closing of the main contacts. *Note:* For dc generator operation, the auxiliary contacts may open before the main contacts close. (SWG/PE) C37.100-1992

field discharge circuit breaker (1) (rotating electric machinery) A circuit breaker having main contacts for energizing and deenergizing the field of a generator, motor, synchronous condenser, or rotating exciter, and having discharge contacts for short-circuiting the field through the discharge resistor at the instant preceding the opening of the circuit breaker main contacts. The discharge contacts also disconnect the field from the discharge resistor at the instant following the closing of the main contacts. For direct-current generator operation, the discharge contacts may open before the main contacts close. *Note:* When used in the main field circuit of an alternating or direct-current generator, motor, or synchronous condenser, the circuit breaker is designated as a main field discharge circuit breaker. When used in the field circuit of the rotating exciter of the main machine, the circuit breaker is designated as an exciter field discharge circuit breaker. (SWG/PE) C37.18-1979r

(2) (excitation systems for synchronous machines) A circuit breaker having main contacts for energizing and deenergizing the field of a synchronous machine or rotating exciter and having discharge contacts for short-circuiting the field through the discharge resistor prior to the opening of the circuit breaker main contacts. The discharge contacts also disconnect the field from the discharge resistor following the closing of the main contacts. *Notes:* 1. When used in the main field of a synchronous machine the circuit breaker is designated as a main field discharge circuit breaker. 2. When used in the field circuit of a rotating exciter of the main machine, the circuit breaker is designated as an exciter field discharge circuit breaker. (PE/EDPG) 421.1-1986r

field discharge protection A control function or device to limit the induced voltage in the field when the field current is disrupted or when an attempt is made to change the field current suddenly. *See also:* control. (IA/ICTL/APP/IAC) [69], [60]

field displacement (nonlinear, active, and nonreciprocal waveguide components) The condition, in a uniform single-mode waveguide, in which the presence of magnetized gyromagnetic material causes the transverse-plane field distributions to be significantly different in the two directions of propagation. (MTT) 457-1982w

field-disturbance sensor (measurement procedure for field-disturbance sensors) A device that employs a point source of radio-frequency (rf) energy to detect motion in the vicinity of the source, and in which the emitter and the receiver (or

detector) are essentially at the same point, that is, a space-protected system. (EMC) 475-1983r

field-effect transistor A transistor in which the conduction is due entirely to the flow of majority carriers through a conduction channel controlled by an electric field arising from a voltage applied between the gate and source electrodes. (ED) 641-1987w

field emission Electron emission from a surface due directly to high-voltage gradients at the emitting surface. *See also:* electron emission. (ED) 161-1971w, [45]

field-enhanced photoelectric emission The increased photoelectric emission resulting from the action of a strong electric field on the emitter. *See also:* phototube. (ED) 161-1971w, [45]

field-enhanced secondary emission The increased secondary emission resulting from the action of a strong electric field on the emitter. *See also:* electron emission. (ED) [45], 161-1971w

field excitation current (Hall effect devices) The current producing the magnetic flux density in a Hall multiplier. (MAG) 296-1969w

field-failure protection The effect of a device, operative on the loss of field excitation, to cause and maintain the interruption of power in the motor armature circuit. (IA/ICTL/IAC) [60]

field-failure relay A relay that functions to disconnect the motor armature from the line in the event of loss of field excitation. *See also:* relay. (IA/ICTL/IAC) [60]

field flashing Short-time application of an external direct current source to the field of a synchronous generator to enable it to build up its voltage and become self-excited. (PE/EDPG) 1020-1988r

field forcing (1) (excitation systems for synchronous machines) A control function that rapidly drives the field current of a synchronous machine in the positive or in the negative direction. (PE/EDPG) 421.1-1986r

(2) A control function that temporarily overexcites or underexcites the field of a rotating machine to increase the rate of change of flux. *See also:* control. (IA/ICTL/IAC/APP) [60], [75]

field forcing relay A relay that functions to increase the rate of change of field flux by underexciting the field of a rotating machine. *See also:* relay. (IA/ICTL/IAC) [60]

field frame *See:* frame yoke.

field-free emission current (1) (general) The emission current from an emitter when the electric gradient at the surface is zero. (ED) [45], [84]

(2) (cathode) The electron current drawn from the cathode when the electric gradient at the surface of the cathode is zero. *See also:* electron emission. (ED) 161-1971w, [45]

field frequency (television) The product of frame frequency multiplied by the number of fields contained in one frequency. *See also:* television. (BT/AV) [34]

field intensity *See:* average detector.

field-intensity meter* A calibrated radio receiver for measuring field intensity. *See also:* interference measurement; interference. (IA) 54-1955w

* Deprecated.

field I²R loss The product of the measured resistance, in ohms, of the field winding, corrected to a specified temperature, and the square of the field current in amperes. (PE) [9], [84]

field-lead insulation (rotating machinery) The dielectric material applied to insulate the enclosed conductor connecting the collector rings to the coil end windings. *Note:* Field leads also include the pole jumpers forming the series connection between the concentric windings on each pole. Where rectangular strap leads are employed, the insulation may consist of either taped mica and glass or moduled mica and glass or moduled mica and glass composites. Where circular rods are used, moulded laminate tubing is frequently employed as the primary insulation. *See also:* asynchronous machine; direct-current commutating machine. (PE) [9]

field length The number of words or characters in a field.

(C) 610.5-1990w

field length type An indication of whether the field is fixed or variable in length. *Note:* If a field is a variable length type, the field length expresses the maximum length possible.

(C) 610.5-1990w

field-limiting adjusting means The effect of a control function or device (such as a resistor) that limits the maximum or minimum field excitation of a motor or generator. *See also:* control.

(IA/ICTL/IAC/APP) [60], [75]

field-locking *See:* lock.

field mark A mark that identifies the beginning or the end of a field.

(C) 610.10-1994w

field measuring instrument A device used to sense and read out the electric or magnetic field intensities surrounding a VDT under test. (For this standard, this instrumentation consists of three parts: probe; readout detector, where the signal from the probe is processed and the data displayed; and any leads between the probe and readout detector.)

(EMC) 1140-1994r

field mill A device in which a conductor is alternately exposed to the electric field to be measured and then shielded from it. *Note:* The resulting current induced in the conductor is a measure of the electric field strength at the conductor surface. *Synonym:* generating electric field meter.

(T&D/PE) 539-1990, 1227-1990r

field molded joint (power cable joints) A joint in which the solid-dielectric joint insulation is fused and curved thermally at the job site.

(PE/IC) 404-1986s

field pattern *See:* radiation pattern.

field pole (rotating machinery) A structure of magnetic material on which a field coil may be mounted. *Note:* There are two types of field poles: main and commutating. *See also:* direct-current commutating machine; asynchronous machine.

(PE/EEC) [119]

field probe An electrically small field sensor or set of multiple field sensors with various electronics (for example, diodes, resistors, amplifiers, etc.). The output from a field probe cannot be theoretically determined from easily measured physical parameters.

(EMC) 1309-1996

field programmable gate array (FPGA) A device containing many circuits whose interconnections and functions are programmable by the user. *Note:* Generally larger than a field programmable logic array. *See also:* dynamically programmable logic gate.

(C) 610.10-1994w

field programmable logic array (FPLA) A logic array integrated circuit which can be programmed after manufacture, typically at the time of installation. *Note:* The programming is typically done by passing a high current through fusible links on the integrated circuit. *See also:* programmable logic array; field programmable gate array.

(C) 610.10-1994w

field protection The effect of a control function or device to prevent overheating of the field excitation winding by reducing or interrupting the excitation of the shunt field while the machine is at rest. *See also:* control.

(IA/ICTL/IAC/APP) [60], [75]

field protective relay A relay that functions to prevent overheating of the field excitation winding by reducing or interrupting the excitation of the shunt field. *See also:* relay.

(IA/ICTL/IAC) [60]

field relay (power system device function numbers) A relay that functions on a given or abnormally low value or failure of machine field current, or on an excessive value of the reactive component of armature current in an alternating-current (ac) machine indicating abnormally low field excitation.

(PE/SUB) C37.2-1979s

field-reliability test A reliability compliance or determination test made in the field where the operating and environmental conditions are recorded and the degree of control is stated.

(R) [29]

field-renewable fuse *See:* renewable fuse.

field-renewable fuse unit (1) (high-voltage switchgear) A fuse unit that, after circuit interruption, may be readily restored for service by the replacement of the fuse link or refill unit.

(SWG/PE) C37.40-1993

(2) *See also:* renewable fuse; fuse unit.

(SWG/PE) C37.100-1981s

field-renewable fuse or fuse unit *See:* renewable fuse unit.

field replaceable unit (FRU) The smallest subassembly that can be swapped in the field to repair a fault.

(C/BA) 896.3-1993w

field-reversal permanent-magnet focusing (microwave tubes) Magnetic focusing by a limited series of field reversals, not periodic, whose location is usually related to breaks in the slow-wave circuit. *See also:* magnetron.

(ED) [45]

field rheostat A rheostat designed to control the exciting current of an electric machine.

(IA/IAC) [60]

field sensor An electrically small device without electronics (passive) that is used for measuring electric or magnetic fields, with a minimum of perturbation to field being measured. The field sensor transfer function (ratio of output signal-to-input electromagnetic field) can be theoretically determined from measured physical (geometrical) properties, such as length, radius, area, etc., as well as the electrical characteristics of the construction material. The measured physical properties must be traceable to internationally accepted standards via a national standards authority (for example, NIST in the USA).

(EMC) 1309-1996

field separator A character or byte used to identify a boundary between two fields.

(C) 610.5-1990w

field sequential (color television) Sampling of primary colors in sequence with successive television fields.

(BT/AV) 201-1979w

field shunting control (shunted-field control) A system of regulating the tractive force of an electrically driven vehicle by shunting, and thus weakening, the traction motor series fields by means of a resistor. *See also:* multiple-unit control.

(EEC/PE) [119]

field splice (nuclear power generating station) A permanent joining and reinsulating of conductors in the field to meet the service conditions required.

(PE/NP) 380-1975w, 383-1974r

field spool (rotating machinery) A structure for the support of a field coil in a salient-pole machine, either constructed of insulating material or carrying field-spool insulation. *See also:* direct-current commutating machine; asynchronous machine.

(PE) [9]

field-spool insulation (rotating machinery) Insulation between the field spool and the field coil in a salient-pole machine. *See also:* asynchronous machine; direct-current commutating machine.

(PE) [9]

field strength (1) (electromagnetic wave) A general term that usually means the magnitude of the electric field vector, commonly expressed in volts per meter, but that may also mean the magnitude of the magnetic field vector, commonly expressed in amperes (or ampere-turns) per meter. *Note:* At frequencies above about 100 megahertz, and particularly above 1000 megahertz, field strength in the far zone is sometimes identified with power flux density P . For a linearly polarized wave in free space $P = E^2/(\mu_v \epsilon_v)$, where E is the electric field strength, and μ_v and ϵ_v are the magnetic and electric constants of free space, respectively. When P is expressed in watts per square meter and E in volts per meter, the denominator is often rounded off to 120π . *See also:* magnetic field strength; measurement system; electric field strength.

(IM/COM) 284-1968w, [48]

(2) (overhead power lines) *See also:* voltage gradient.

(T&D/PE) 539-1990

(3) The magnitude of the electric field vector.

(T&D/PE) 1260-1996

(4) *See also:* radio field strength.

(AP/PROP) 211-1997

field strength meter A calibrated radio receiver for measuring field strength. These meters employ a shielded loop antenna, which measures the magnetic component of the electromagnetic field, and then converts it to an electric field by multiplying the magnetic field strength by the impedance of free space for a plane wave.

(PE/T&D/IA) 1260-1996, 169-1955w, 54-1955w

field system (rotating machinery) The portion of a direct-current or synchronous machine that produces the excitation flux. *See also:* asynchronous machine; direct-current commutating machine. (PE) [9]

field terminal (rotating machinery) A terminations for the field winding. *See also:* rotor; stator. (PE) [9]

field tests (1) (power cable joints) Tests that may be made on the cable and accessories after installation.

(PE/IC) 404-1986s

(2) (metal-clad and station-type cubicle switchgear) (metal-enclosed interrupter switchgear) (metal-enclosed bus and calculating losses in isolated-phase bus) (metal-enclosed low-voltage power circuit-breaker switchgear) Tests made after the assembly has been installed at its place of utilization.

(SWG/PE) C37.23-1987r, C37.20.2-1993, C37.20.4-1996, C37.20.1-1993r, C37.20.3-1996

(3) Tests that may be made on a cable system (including the high-voltage cable terminations) by the user after installation, as an acceptance or proof test. (PE/IC) 48-1996

(4) (A) Tests made on operating systems usually for the purpose of investigating the performance of switchgear or its component parts under conditions that cannot be duplicated in the factory. *Note:* Field tests are usually supplementary to factory tests and therefore may not provide a complete investigation of capabilities. **(B)** Tests made after the assembly has been installed at its place of utilization.

(SWG/PE) C37.100-1992

field-time waveform distortion (video signal transmission measurement) The linear TV waveform distortion of time components from 64 μ s to 16 ms, that is, time components of field-time domain. (BT) 511-1979w

field-turn insulation (rotating machinery) Insulation in the form of strip or tape separating the individual turns of a field winding. *See also:* asynchronous machine; direct-current commutating machine. (PE) [9]

field uniformity The extent to which the magnitude and direction of a field are uniform at any instant of time and at all points within a defined region. (T&D/PE) 539-1990

field voltage, base The synchronous machine field voltage required to produce rated voltage on the air-gap line of the synchronous machine at field temperatures of 75°C for field windings designed to operate at rating with a temperature rise of 60°C or less; or 100°C for field windings designed to operate at rating with a temperature rise greater than 60°C. *Note:* This defines one per unit excitation system voltage for use in computer representation of excitation systems.

(PE/EDPG) 421-1972s

field voltage, no-load The voltage required across the terminals of the field winding of an electric machine under conditions of no load, rated speed and terminal voltage, and with the field winding at 25°C. (PE/EDPG) 421-1972s

field voltage, rated-load The voltage required across the terminals of the field winding of an electric machine under rated continuous-load conditions with the field winding at 75°C for field windings designed to operate at rating with a temperature rise of 60°C or less; or 100°C for field windings designed to operate at rating with a temperature rise greater than 60°C.

(PE/EDPG) 421-1972s

field vulcanized A joint that is constructed in the field with externally applied heat and pressure to cross-link the joint dielectric. (PE/IC) 404-1993

field winding (rotating machinery) (excitation systems for synchronous machines) A winding on either the stationary or the rotating part of a synchronous machine whose sole

purpose is the production of the main electromagnetic field of the machine. (PE/EDPG) [9], 421.1-1986r

field winding terminals (excitation systems for synchronous machines) The place of input to the field winding of the synchronous machine. If there are brushes and sliprings these are to be considered to be part of the field winding.

(PE/EDPG) 421.1-1986r

FIFO *See:* first-in, first-out.

FIFO special file (FIFO) A type of file with the property that data written to such a file is read on a first-in-first-out basis.

(PA/C) 9945-1-1996, 9945-2-1993, 1003.5-1999

fifo special file A type of file with the property that data written to such a file is read on a first-in-first-out basis. Other characteristics of FIFOs are described in packages POSIX_Files and POSIX_IO. *Synonym:* FIFO. (C/PA) 1003.5b-1995

fifth generation A period during the evolution of electronic computer in which very large scale integration is employed, along with approaches to computing that include artificial intelligence, knowledge engineering, and distributed processing. *Note:* Introduced in mid-1980's, this generation of computers has not yet reached maturity. *See also:* second generation; third generation; first generation; fourth generation. (C) 610.10-1994w

fifth generation language A computer language that incorporates the concepts of knowledge-based systems, expert systems, inference engines, and natural language processing. *Contrast:* machine language; assembly language; fourth generation language; high-order language.

(C) 610.12-1990, 610.13-1993w

fifth normal form One of the forms used to characterize relations; a relation is said to be in fifth normal form if it is in fourth normal form and if every join dependency in the relation is a consequence only of the candidate keys of the relation. *Synonym:* projection/join normal form.

(C) 610.5-1990w

fifth voltage range *See:* voltage range.

50 cm test point (50TP) The acoustic test point 50 cm from the front center of the handsfree telephone (HFT) and 30 cm above the test table. (COM/TA) 1329-1999

fifty percent disruptive discharge voltage (V_{50}) The prospective value of the test voltage that has a 50% probability of producing a disruptive discharge. (PE/PSIM) 4-1995

figurative constant A data name that is reserved for a specific constant in a programming language. For example, the data name THREE may be reserved to represent the value 3. *See also:* literal. (C) 610.12-1990

figure (metric practice) (numerical) An arithmetic value expressed by one or more digits.

(SCC14/QUL) SI 10-1997, 268-1982s

figure of merit (1) (magnetic amplifier) The ratio of power amplification to time constant in seconds.

(MAG) 107-1964w

(2) (thermoelectric couple)

$$\alpha^2 \left[(\rho_1 \kappa_1)^{1/2} + (\rho_2 \kappa_2)^{1/2} \right]^{-2}$$

where α is the Seebeck coefficient of the couple and ρ_1 , ρ_2 , κ_1 , and κ_2 are the respective electric resistivities and thermal conductivities of materials 1 and 2. *Note:* This figure of merit applies to materials for the thermoelectric devices whose operation is based on the Seebeck effect or the Peltier effect. *See also:* thermoelectric device.

(3) (thermoelectric couple, ideal)

$$\bar{\alpha}^{-2} \left[(\bar{\rho}_1 \bar{\kappa}_1)^{1/2} + (\bar{\rho}_2 \bar{\kappa}_2)^{1/2} \right]^{-2}$$

where $\bar{\alpha}$ is the average value of the Seebeck coefficient of the coupled and $\bar{\rho}_1 \bar{\kappa}_1$ and $\bar{\rho}_2 \bar{\kappa}_2$ are the average values of the products of the respective electric resistivities and thermal conductivities of materials 1 and 2, where the averages are found by integrating the parameters over the specified temperature range of the couple. *See also:* thermoelectric device.

(4) (**thermoelectric material**) The quotient of “the square of the absolute Seebeck coefficient α ” by “the product of the electric resistivity ρ and the thermal conductivity κ ”

$$\alpha^2/\rho\kappa$$

Note: This figure of merit applies to materials for thermoelectric devices whose operation is based on the Seebeck effect or the Peltier effect. *See also:* thermoelectric device.

(ED) [46], 221-1962w

(5) (of an antenna) The ratio of the gain to the noise temperature of an antenna. *Notes:* 1. Usually the antenna-receiver system figure of merit is specified. For this case, the figure of merit is the gain of the antenna divided by the system noise temperature referred to the antenna terminals. 2. The system figure of merit at any reference plane in the RF system is the same as that taken at the antenna terminals since both the gain and system noise temperature are referred to the same reference plane.

(AP/ANT) 145-1993

(6) (**dynamically tuned gyro**) A design constant that relates the rotor polar moment of inertia and the principal moments of inertia of the gimbal(s). A simplified expression for the figure of merit is:

$$\text{FOM} = \frac{C}{\sum_{n=1}^N (A_n + B_n - C_n)}$$

where

C = rotor polar moment of inertia

A_n, B_n = transverse moments of inertia of the n^{th} gimbal

C_n = polar moment of inertia of the n^{th} gimbal

(AES/GYAC) 528-1994

(7) *See also:* pumped figure of merit; beta figure of merit; ferrite devices figure of merit; detector figure of merit.

filament (electron tube) A hot cathode, usually in the form of a wire or ribbon, to which heat may be supplied by passing current through it. *Note:* This is also known as a filamentary cathode. *See also:* electrode. (ED) 161-1971w, [45]

filamentary transistor A conductivity-modulation transistor with a length much greater than its transverse dimensions. *See also:* semiconductor; transistor. (ED) 216-1960w

filament current The current supplied to a filament to heat it. *See also:* heater current; electronic controller. (ED) [45]

filament power supply (electron tube) The means for supplying power to the filament. *See also:* power pack. (ED) [45]

filament voltage The voltage between the terminals of a filament. *See also:* electronic controller; electrode voltage. (EEC/PE) [119]

File An instance of the class `IEEE1451_File` or of a subclass thereof. (IM/ST) 1451.1-1999

file (1) (computers) A collection of related records treated as a unit. *Note:* Thus in inventory control, one line of an invoice forms an item, a complete invoice forms a record, and the complete set of such records forms a file. (C) [20], [85]

(2) (**software (data management)**) A set of related records treated as a unit. For example, in stock control, a file could consist of a set of invoice records. *See also:* logical file; data set; data file. (C) 610.5-1990w, 610.12-1990

(3) (**information transfer**) One named collection of data. (MM/C) 949-1985w

(4) An object that can be written to, or read from, or both. A file has certain attributes, including access permissions and type. File types include regular file, character special file, block special file, FIFO special file, and directory. Other types of files may be defined by the implementation. (C/PA) 9945-1-1996, 9945-2-1993

(5) An object that can be written to, or read from, or both. A file has certain attributes, including access permissions and type. File types include regular file, character special file, block special file, FIFO special file, socket, character special file for use with XTI calls, and directory. Other types of files may be defined by the implementation. (C) 1003.5-1999

(6) A set of related records usually treated as a named unit of storage. (C/MM) 855-1990

(7) An abstraction of the mechanism for the allocation, deallocation, initialization, and use of memory resources in a device. (IM/ST) 1451.1-1999

file access mode The type of access allowed for a given file and a given user. For example, the file access mode for a given file might be read-only access for one user, and read/write access for another. *Synonym:* access type. (C) 610.5-1990w

file access permissions A concept of the underlying system, as follows: The standard file access control mechanism uses the file permission bits, as described below. These bits are set at file creation by `open()`, `creat()`, `mkdir()`, and `mkfifo()` and are changed by `chmod()`. These bits are read by `stat()` or `fstat()`. Implementations may provide *additional* or *alternate* file access control mechanisms, or both. An additional access control mechanism shall only further restrict the access permissions defined by the file permission bits. An alternate access control mechanism shall:

- 1) Specify file permission bits for the file owner class, file group class, and file other class of the file, corresponding to the access permissions, to be returned by `stat()` or `fstat()`.
- 2) Be enabled only by explicit user action, on a per-file basis, by the file owner or a user with the appropriate privilege.
- 3) Be disabled for a file after the file permission bits are changed for that file with `chmod()`. The disabling of the alternate mechanism need not disable any additional mechanisms defined by an implementation.

Whenever a process requests file access permission for read, write, or execute/search, if no additional mechanism denies access, access is determined as follows:

- 1) If a process has the appropriate privilege:
 - a) If read, write, or directory search permission is requested, access is granted.
 - b) If execute permission is requested, access is granted if execute permission is granted to at least one user by the file permission bits or by an alternate access control mechanism; otherwise, access is denied.
- 2) Otherwise:
 - a) The file permission bits of a file contain read, write, and execute/search permissions for the file owner class, file group class, and file other class.
 - b) Access is granted if an alternate access control mechanism is not enabled and the requested access permission bit is set for the class (file owner class, file group class, or file other class) to which the process belongs, or if an alternate access control mechanism is enabled and it allows the requested access; otherwise, access is denied.

(C/PA/C/PA) 9945-1-1996, 9945-2-1993

file attribute A property, feature, or characteristic of a file. (C) 610.5-1990w

file attributes The name and other identifiable properties of a file. (C/PA) 1238.1-1994w

file cleanup The removal of superfluous data from a file. *Synonym:* file tidying. (C) 610.5-1990w

file description *See:* open file description.

file descriptor (1) A value used to identify an open file for the purpose of file access. File descriptors are unique within a process. (C/PA) 1003.5-1992r

(2) A per-process unique nonnegative integer value used to identify an open file for the purpose of file access. (C/PA) 1003.5-1999, 9945-1-1996, 9945-2-1993

file directory (A) A list of files and their locations within a computer system. *See also:* catalog. **(B)** A list of the files and their locations on a particular storage device or volume. (C) 610.5-1990

file gap (1) An area on a storage medium, such as tape, used to indicate the end of a file. (C) [20], [85]

(2) (**data management**) An unused area on a data medium between the end of one file or group of data and the beginning of another file or group of data. (C) 610.5-1990w

(3) An area between two consecutive files used to indicate the end of the file. *Note*: Frequently used for other purposes such as to indicate the end or beginning of some other group of data. (C) 610.10-1994w

file group class A property of a file indicating access permissions for a process related to the group identification of the process. A process is in the file group class of a file if the process is not in the file owner class and if the effective group ID or one of the supplementary group IDs of the process matches the group ID associated with the file. Other members of the class may be implementation defined.

(C/PA) 1003.5-1999, 9945-1-1996, 9945-2-1993

file hierarchy A concept of the underlying system, as follows. Files in the system are organized in a hierarchical structure in which all of the nonterminal nodes are directories and all of the terminal nodes are any other type of file. Because multiple directory entries may refer to the same file, the hierarchy is properly described as a “directed graph.”

(C/PA) 9945-1-1996, 9945-2-1993

file layout The arrangement and structure of data in a file. *Synonym*: file organization. (C) 610.5-1990w

file-locking *See*: lock.

file maintenance (1) (computers) The activity of keeping a file up to date by adding, changing, or deleting data.

(C) [20], [85]

(2) (**data management**) The activity of adding, changing, or deleting data in a file as needed. (C) 610.5-1990w

file mark A mark that identifies the end of a file.

(C) 610.10-1994w

file mode An object containing the file permission bits and other characteristics of a file. (C/PA) 9945-1-1996, 9945-2-1993

file mode bits The file permission bits, set-user-ID-on-execution bit (S_ISUID), and set-group-ID-on-execution bit (S_ISGID) of a file. (C/PA) 9945-2-1993

file name (A) One or more characters used to identify a file.

(B) A name associated with a set of file data or output data.

(C) 610.5-1990

filename (1) A name consisting of 1 to {NAME_MAX} bytes used to name a file. The characters composing the name may be selected from the set of all character values excluding the slash character and the null character. The filenames dot and dot-dot have special meaning. A filename is sometimes referred to as a pathname component. *See also*: pathname resolution.

(C/PA) 9945-1-1996, 9945-2-1993

(2) A POSIX.1 filename with characters drawn from the POSIX.1 portable filename character set.

(C/PA) 1387.2-1995

(3) A nonempty string that is used to name a file. A filename consists of, at most, `POSIX_Limits.Filename_Maxima` ‘Last components of type `POSIX.POSIX_Character`. The characters composing the name may be selected from the set of all the character values excluding the slash character and the null character. A filename is sometimes referred to as a pathname component. (C) 1003.5-1999

file offset The byte position in the file where the next I/O operation begins. Each open file description associated with a regular file, block special file, or directory has a file offset. A character special file that does not refer to a terminal device may have a file offset. There is no file offset specified for a pipe or FIFO.

(C/PA) 9945-1-1996, 9945-2-1993, 1003.5-1999

filename character string A sequence of characters from the portable filename character set, not including the / (slash) character. Within software definition files of exported catalogs, all such strings shall be encoded using IRV.

(C/PA) 1387.2-1995

file organization The order of physical records within a file that determines the access method to be implemented in order to use the file. *See also*: file layout. (C) 610.5-1990w

File-Oriented Interpretive Language (FOIL) A computer language, based on FORTRAN, used to provide conversational lesson-writing; used commonly in computer-aided instruction applications. (C) 610.13-1993w

file other class A property of a file indicating access permissions for a process related to the user and group information of the process. A process is in the file other class of a file if the process is not in the file owner class or file group class.

(C/PA) 1003.5-1999, 9945-2-1993, 9945-1-1996

file owner class A property of a file indicating access permissions for a process related to the user identification of the process. A process is in the file owner class of a file if the effective user ID of the process matches the user ID of the file. (C/PA) 1003.5-1999, 9945-1-1996, 9945-2-1993

file permission Information about a file that is used, along with other information, to determine whether a process has read, write, or execute/search permission to a file. The file permission information is divided into three parts: owner, group, and other. Each part is used with the corresponding file class of processes. (C) 1003.5-1999

filename portability A concept of the underlying system, as follows: Filenames should be constructed from the portable filename character set because the use of other characters can be confusing or ambiguous in certain contexts.

(C/PA) 9945-1-1996, 9945-2-1993

file permission bits Information about a file that is used, along with other information, to determine if a process has read, write, or execute/search permission to a file. The bits are divided into three parts: owner, group, and other. Each part is used with the corresponding file class of processes. These bits are contained in the file mode.

(C/PA) 9945-1-1996, 9945-2-1993

file processing The periodic updating of one or more master files to reflect the effects of current data, often from a transaction file. For example, a monthly run updating the inventory file. (C) 610.2-1987

file-protection ring *See*: write ring.

file serial number (1) A per-file-system unique identifier for a file. File serial numbers are unique throughout a file system.

(C/PA) 9945-1-1996, 9945-2-1993

(2) A per-file-system unique value for a file. File serial numbers are unique throughout a file system. (C) 1003.5-1999

file server On a network, a server that provides access to requesters at the file level; that is, an entire file or a file segment is sent to a requestor. *See also*: mail server; disk server; database server; print server; network server; terminal server.

(C) 610.7-1995

file system (1) A collection of files and certain of their attributes. It provides a name space for file serial numbers referring to those files. (C/PA) 9945-1-1996, 9945-2-1993

(2) A collection of files, together with certain of their attributes. Each file system provides a separate binding of file serial numbers to files. A given file serial number is associated with at most one file in a file system, but it may refer to distinct files in distinct file systems. In other words, each file system defines a new *name space*, giving meaning to the *names* (file serial numbers) that designate files. (C) 1003.5-1999

fileset Defines the files that make up a software object, and is the lowest level of software object that can be specified as input to the software administration utilities.

(C/PA) 1387.2-1995

file storage structure The storage directories in the software packaging layout under which the actual software files for each fileset are located. (C/PA) 1387.2-1995

filestore action One of the actions specified as part of the definition of the virtual filestore. (C/PA) 1238.1-1994w

file tidying *See*: file cleanup.

file times update A concept of the underlying system, as follows. Each file has three distinct associated time values: `st_atime`, `st_mtime`, and `st_ctime`. The `st_atime` field is associated with the times that the file data is accessed; `st_mtime` is associated with the times that the file data is modified; and

st_ ctime is associated with the times that file status is changed. These values are returned in the file characteristics structure. Any function in this standard that is required to read or write file data or change the file status indicates which of the appropriate time-related fields are to be "marked for update." If an implementation of such a function marks for update a time-related field not specified by this standard, this shall be documented, except that any changes caused by path-name resolution need not be documented. For the other functions in this standard (those that are not explicitly required to read or write file data or change file status, but that in some implementations happen to do so), the effect is unspecified. An implementation may update fields that are marked for update immediately, or it may update such fields periodically. When the fields are updated, they are set to the current time and the update marks are cleared. All fields that are marked for update shall be updated when the file is no longer open by any process or when a *stat()* or *fstat()* is performed on the file. Other times at which updates are done are unspecified. Updates are not done for files on read-only file systems.

(C/PA) 9945-1-1996, 9945-2-1993

file transfer protocol A protocol for transferring files between computers. (C) 610.7-1995

file type *See:* file.

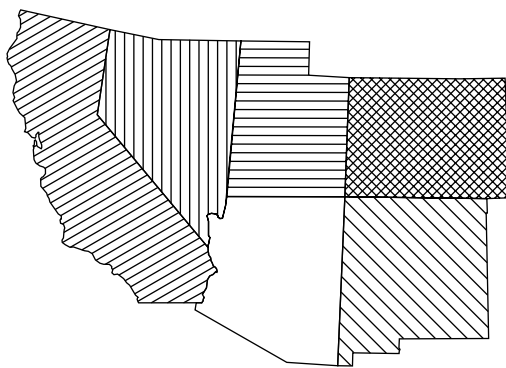
filiform corrosion *See:* underfilm corrosion.

fill (1) (computer graphics) To insert a color, pattern, or hatch into a closed polygon or area bounded by lines or curves. *Synonyms:* area fill; polygon fill. (C) 610.6-1991w

(2) A sequence of data symbols of any combination of 0 and 1 data bits (as opposed to non-data-J and non-data-K bits) whose primary purpose is to maintain timing and spacing between frames and tokens. (C/LM) 8802-5-1998

(3) (data management) *See also:* filler character; zero fill; character fill. (C) 610.5-1990w

fill area A display element that consists of a closed polygon that is hollow or filled with a uniform color, pattern, or hatch.



fill area

(C) 610.6-1991w

fill area attribute A characteristic of a filled region. For example, color index, interior style. (C) 610.6-1991w

filled A joint that consists of an outer shell that is filled with an insulating material to occupy the space around the individual insulated conductor(s). (PE/IC) 404-1993

filled-core annular conductor A conductor composed of a plurality of conducting elements disposed around a nonconducting supporting material that substantially fills the space enclosed by the conducting elements. *See also:* conductor. (T&D/PE) [10]

filled-system thermometer An all-metal assembly consisting of a bulb, capillary tube, and Bourdon tube (bellows and diaphragms are also used) containing a temperature-responsive fill. A mechanical device associated with the Bourdon is designed to provide an indication or record of temperature. *See also:* Bourdon. (PE/PSIM) 119-1974w

filled tape Fabric tape that has been thoroughly filled with a rubber or synthetic compound, but not necessarily finished on

either side with this compound. *See also:* conductor.

(T&D/PE) [10]

filler (1) (rotating machinery) Additional insulating material used to insure a tight depth-wise fit in the slot. *See also:* rotor; stator. (PE) [9]

(2) (mechanical recording) The inert material of a record compound as distinguished from the binder. *See also:* phonograph pickup. (SP) [32]

(3) (data management) One or more data items adjacent to an item of data that forces that item to take on a specified size; for example, in an 80-character output record in which a 30-character NAME, 20-character ADDRESS, and a 3-character AGE is to be placed, filler would be used to expand the data to be 80 characters. *Synonym:* filler strip. *See also:* padding; pad; character fill. (C) 610.5-1990w

(4) Three- or six-bit reserved code patterns that are appended to the end of individual MII channel data streams to equalize the stream lengths in all four channels.local area networks. (C) 8802-12-1998

filler character (A) A character used to occupy an area on a printed medium; for example, on a legal document, dashes or asterisks used to fill out a field to ensure that nothing is added to the field once the document has been issued. *See also:* filler.

(B) A character that does not itself convey data but that may delete unwanted data, as in blanks used to fill out a field. *See also:* filler; character fill. (C) 610.5-1990

filler strip *See:* filler.

filling compound (power cable joints) A dielectric material poured or otherwise injected into the joint housing. Filling compounds may require heating or mixing prior to filling. Some filling compounds may also serve as the insulation. (PE/IC) 404-1986s

filling factor A factor that describes the fraction of energy flow confined in the substrate of a planar transmission line of inhomogeneous cross section.

a) *dielectric filling factor (single-layer microstrip).* The ratio of

$$\frac{\epsilon_r \epsilon_{eff} - 1}{\epsilon_r - 1}$$

where

ϵ_r = relative dielectric constant of the substrate of a microstrip line

$\epsilon_r \epsilon_{eff}$ = effective dielectric constant

b) *dielectric loss filling factor.* The ratio of

$$\frac{\tan \delta_{eff}}{\tan \delta}$$

where

$\tan \delta$ = dielectric loss tangent of the substrate of a microstrip line

$\tan \delta_{eff}$ = effective dielectric loss tangent of the line

c) *magnetic filling factor.* The ratio of

$$\frac{1}{\mu_{eff}} - 1$$

$$\frac{1}{\mu} - 1$$

where

μ = relative permeability of the substrate of a microstrip line

μ_{eff} = effective relative permeability

d) *magnetic loss filling factor.* The ratio of

$$\frac{\tan \delta_{m, eff}}{\tan \delta_m}$$

where

$\tan \delta_m$ = magnetic loss tangent of the substrate of a microstrip line

$\tan \delta_{m, eff}$ = effective magnetic loss tangent of the line

Synonym: filling fraction.

(MTT) 1004-1987w

filling fraction *See*: filling factor.

fill light (illuminating engineering) Supplementary illumination used to reduce shadow or contrast. (EEC/IE) [126]

film (1) (rotating machinery) Sheet having a nominal thickness not greater than 0.030 centimeters and being substantially homogeneous in nature. *See also*: electrochemical valve; direct-current commutating machine; asynchronous machine. (PE) [9]

(2) (electrochemical valve) The layer adjacent to the valve metal and in which is located the high-potential drop when current flows in the direction of high impedance. *See also*: electrochemical valve. (PE/EEC) [119]

film frame In micrographics, a line on microfilm, perpendicular to the document reference edge, on which binary characters may be written or read. (C) 610.2-1987

film integrated circuit An integrated circuit whose elements are films formed in situ upon an insulating substrate. *Note*: To further define the nature of a film integrated circuit, additional modifiers may be prefixed. Examples are: thin-film integrated circuit, and thick-film integrated circuit. *See also*: magnetic thin film; integrated circuit; electrochemical valve; thin film. (ED) 274-1966w, [46]

film storage *See*: magnetic thin film storage.

FIFO *See*: first-in, last-out.

filter (1) (wave filter) A transducer for separating waves on the basis of their frequency. *Note*: A filter introduced relatively small insertion loss to waves in one or more frequency bands and relatively large insertion loss to waves of other frequencies. (SP) 151-1965w

(2) (A) A device or program that separates data, signals, or material in accordance with specified criteria. **(B)** A mask. (C) [20], [85]

(3) (illuminating engineering) A device for changing, by transmission or reflection, the magnitude or the spectral composition, or both, of the flux incident upon it. Filters are called selective (or colored) or neutral, according to whether or not they alter the spectral distribution of the incident flux. (EEC/IE) [126]

(4) (broadband local area networks) A circuit that selects or rejects one or more components of a signal related to frequency. (LM/C) 802.7-1989r

(5) A generic term used to describe those types of equipment whose purpose is to reduce the harmonic current or voltage flowing in or being impressed upon specific parts of an electrical power system, or both. (IA/SPC) 519-1992

(6) A command whose operation consists of reading data from standard input or a list of input files and writing data to standard output. Typically, the function of a filter is to perform some transformation on the data stream. (C/PA) 9945-2-1993

(7) (A) A circuit that eliminates certain portions of a signal, by frequency, voltage, or some other parameter. **(B)** A mathematical model which performs the same function on a sampled version of the signal. *Synonym*: mask. (C) 610.10-1994

(8) An assertion about the presence or value of certain attributes of an entry in order to limit the scope of a search. (C/PA) 1328.2-1993w, 1224.2-1993w, 1326.2-1993w, 1327.2-1993w

(9) *See also*: low-pass filter; band-pass filter; high-pass filter. (PE) 599-1985w

filter, active *See*: active filter.

filter, all-pass *See*: all-pass filter.

filter attenuation band (filter stop band) A continuous range of frequencies over which the filter introduces an insertion loss whose minimum value is greater than a specific value. (CAS) [13]

filter, band-elimination *See*: band-elimination filter.

filter bank A contiguous set of filters covering the Doppler frequency range of interest, used to separate moving targets. Commonly used in continuous wave (CW) and pulsed-Dopp-

ler radars and in the moving target detector (MTD) for detecting moving targets in clutter. (AES) 686-1997

filter, Butterworth *See*: Butterworth filter.

filter capacitor A capacitor used as an element of an electric wave filter. *See also*: electronic controller. (IA/IAC) [60]

filter capacitors Capacitors utilized with inductors and/or resistors for controlling harmonic problems in the power system, such as reducing voltage distortion due to large rectifier loads or arc furnaces. power systems relaying. (T&D/PE) 1036-1992, C37.99-2000

filter, Chebyshev *See*: Chebyshev filter.

filter, comb *See*: comb filter.

filter, damped *See*: damped filter.

filter effectiveness (shunt) Defined by the following two terms:

ρ_f = the impedance ratio that determines the per unit current that will flow into the shunt filter

ρ_s = the impedance ratio that determines the per unit current that will flow into the power source

ρ_f should approach unity and ρ_s should be very small at the tuned frequency. (IA/SPC) 519-1992

filter factor (illuminating engineering) The transmittance of "black light" by a filter. *Note*: The relationship among these terms is illustrated by the following formula for determining the luminance of fluorescent materials exposed to "black light":

candelas per square meter

$$= \frac{1}{\pi^*} \frac{\text{fluorens}}{\text{square meter}} \times \text{glow factor} \times \text{filter factor}$$

* π is omitted when luminance is in footlamberts and the area is in square feet. When integral-filter "black light" lamps are used, the filter factor is dropped from the formula because it already has been applied in assigning fluorens ratings to these lamps. (EEC/IE) [126]

filter, high-pass *See*: high-pass filter.

filter impedance compensator An impedance compensator that is connected across the common terminals of electric wave filters when the latter are used in parallel in order to compensate for the effects of the filters on each other. *See also*: network analysis; filter. (Std100) 270-1966w

filter inductor An inductor used as an element of an electric wave filter. *See also*: electronic controller. (IA/IAC) [60]

filter, low-pass *See*: low-pass filter.

filter matching loss The loss in output signal-to-noise ratio relative to a matched filter, caused by using a filter whose response is not matched to the transmitted signal. (AES/RS) 686-1990

filter mismatch loss The loss in output signal-to-noise ratio of a filter relative to the signal-to-noise ratio from a matched filter. *Note*: Filter mismatch loss is caused by using a filter whose response is not matched to the transmitted signal. (AES) 686-1997

filter pass band A frequency band of low attenuation (low relative to other regions termed stop bands). *See also*: filter transmission band. (CAS) [13]

filter, passive *See*: passive filter.

filter reactor (power and distribution transformers) A reactor used to reduce harmonic voltage in alternating-current or direct-current circuits. *See also*: reactor. (PE/TR) C57.12.80-1978r, [57]

filter, rejection *See*: rejection filter; filter.

filters (power supplies) Resistance-capacitance or inductance-capacitance networks arranged as low-pass devices to attenuate the varying component that remains when alternating-current voltage is rectified. *Note*: In power supplies without subsequent active series regulators, the filters determine the amount of ripple that will remain in the direct-current output. In supplies with active feedback series regulators, the regulator mainly controls the ripple, with output filtering serving

chiefly for phase-gain control as a lag element.

(AES/PE) [41], [78]

filter, series *See*: series filter.

filter, shunt *See*: shunt filter.

filter, sound effects *See*: sound-effects filter.

filter stop band A frequency band of high attenuation (high relative to other regions termed pass bands). *See also*: filter attenuation band. (CAS) [13]

filter transmission band A continuous range of frequencies over which the filter introduces an insertion loss whose maximum value does not exceed a specified value. *See also*: filter pass band. (CAS) [13]

filter, tuned A filter generally consisting of combinations of capacitors, inductors, and resistors that have been selected in such a way as to present a relative minimum (maximum) impedance to one or more specific frequencies. For a shunt (series) filter, the impedance is a minimum (maximum). Tuned filters generally have a relatively high Q (X/R).

(IA/SPC) 519-1992

final approach path *See*: approach path.

final condition The values assumed by the variables in a system, model, or simulation at the completion of some specified duration of time. *Synonym*: equilibrium condition. *Contrast*: boundary condition; initial condition. (C) 610.3-1989w

final contact pressure The force exerted by one contact against the mating contact when the actuating member is in the final contact-closed position. *Note*: Final contact pressure is usually measured and expressed in terms of the force that must be exerted on the yielding contact while the actuating member is held in the final contact-closed position, and with the mating contact fixed in position, in order to separate the mating contact surfaces. *See also*: contactor. (IA/ICTL/IAC) [60]

final controlling element (1) (electric power system) The controlling element that directly changes the value of the manipulated variable. (PE/PSE) 94-1970w

(2) That forward controlling element that directly changes the value of the manipulated variable. (CS/PE/EDPG) [3]

final design (nuclear power quality assurance) Approved design output documents and approved changes thereto.

(PE/NP) [124]

final emergency circuits All circuits (including temporary emergency circuits) that, after failure of a ship's service supply, may be supplied by the emergency generator. *See also*: emergency electric system. (EEC/PE) [119]

final emergency lighting Temporary emergency lighting plus manually controlled lighting of the boat deck and overside to facilitate lifeboat loading and launching. *See also*: emergency electric system. (EEC/PE) [119]

final relay actuation time The time of termination of chatter following contact actuation. (EEC/REE) [87]

final sag The sag of a conductor under specified conditions of loading and temperature applied, after it has been subjected for an appreciable period to the loading prescribed for the loading district in which it is situated, or equivalent loading, and the loading removed. Final sag shall include the effect of inelastic deformation (creep).

(NESC/T&D) C2-1997, C2.2-1960

final state The values assumed by the state variables of a system, component, or simulation at the completion of some specified duration of time. *Contrast*: initial state.

(C) 610.3-1989w

final-terminal stopping device (elevators) A device that automatically causes the power to be removed from an electric elevator or dumbwaiter driving-machine motor and brake or from a hydraulic elevator or dumbwaiter machine independent of the functioning of the normal-terminal stopping device, the operating device, or any emergency terminal stopping device, after the car has passed a terminal landing. *See also*: control. (EEC/PE) [119]

final test result code A test result code obtained from an assertion test that requires no further processing.

(C/PA) 2003-1997

final trunk (data transmission) A group of trunks to the higher class office which has no alternate route, and in which the number of trunks provided results in a low probability of calls encountering "all trunks busy." (PE) 599-1985w

final unloaded conductor tension (electric systems) The longitudinal tension in a conductor after the conductor has been stretched by the application for an appreciable period, and subsequent release, of the loadings of ice and wind, and temperature decrease, assumed for the loading district in which the conductor is strung (or equivalent loading). *See also*: conductor. (BT/AV) [34]

final unloaded tension The longitudinal tension in a conductor after it has been subjected for an appreciable period to the loading prescribed for the loading district in which it is situated, or equivalent loading, and the loading removed. Final unloaded tension shall include the effect of inelastic deformation (creep). (NESC) C2-1997

final unloaded sag (1) (general) The sag of a conductor after it has been subjected for an appreciable period to the loading prescribed for the loading district in which it is situated, or equivalent loading, and the loading removed. *See also*: sag.

(BT/AV) [34]

(2) The sag of a conductor after it has been subjected for an appreciable period to the loading prescribed for the loading district in which it is situated, or equivalent loading, and the loading removed. Final unloaded sag shall include the effect of inelastic deformation (creep). (NESC) C2-1997

final value The steady-state value of a specified variable. *See also*: control. (IA/ICTL/APP/IAC) [69], [60]

final voltage *See*: cutoff voltage.

finder switch An automatic switch for finding a calling subscriber line or trunk and connecting it to the switching apparatus. (EEC/PE) [119]

finding (telephone switching systems) Locating a circuit requesting service. (COM) 312-1977w

fine chrominance primary (national television system committee color television) An obsolete term. Use the preferred term, I chrominance signal. (BT/AV) 201-1979w

fine-grain parallel architecture Parallel architecture that uses between 1K and 256K processors. *Contrast*: coarse-grain parallel architecture; medium-grain parallel architecture.

(C) 610.10-1994w

finer (cable plowing) Particles of earth or rock smaller than .125 in greatest dimension. (T&D/PE) 590-1977w

finger *See*: end finger.

finger line (conductor stringing equipment) A lightweight line, normally sisal, manila, or synthetic fiber rope, which is placed over the traveler when it is hung. It usually extends from the ground, passes through the traveler and back to the ground. It is used to thread the end of the pilot line or the pulling line over the traveler and eliminates the need for workers on the structure. These lines are not required if pilot lines are installed when the travelers are hung.

(T&D/PE) 524a-1993r, 524-1992r

finger overlap (acoustic aperture) The length of a finger pair between which electromechanical interaction takes place.

(UFFC) 1037-1992w

finishing (1) (electrotype) The operation of bringing all parts of the printing surface into the same plane, or, more strictly speaking, into positions having equal printing values.

(EEC/PE) [119]

(2) An operation or group of operations performed on the printed media after it emerges from the printer output mechanism. Finishing includes operations such as stapling (stitching), punching, binding, folding, cutting, etc., which may or may not be considered part of the printing process. Note that operations of collating and sorting are normally considered printer output functions rather than finishing.

(C/MM) 1284.1-1997

finishing rate (storage battery) (storage cell) The rate of charge expressed in amperes to which the charging current for some types of lead batteries is reduced near the end of

charge to prevent excessive gassing and temperature rise. *See also:* charge. (PE/EEC) [119]

finite difference frequency domain (FDFD) A numerical technique for solving partial differential equations by first Fourier transforming the time variable of the equation from the time domain to the frequency domain. Then the resultant partial equation is discretized and solved using the finite difference method. (AP/PROP) 211-1997

finite difference time domain (FDTD) A numerical technique for solving a partial differential equation involving time and space variables. The solution is implemented sequentially in the time domain. (AP/PROP) 211-1997

finite element frequency domain (FEFD) A numerical technique for solving partial differential equations by first Fourier transforming the time variable of the equation to the frequency domain and then using the finite element method. (AP/PROP) 211-1997

finite element time domain (FETD) A numerical technique for solving a partial differential equation directly in the time domain. Discretization of the time variable can be accomplished by the finite difference scheme or by the Galerkin method. *Note:* This method differs from the finite difference time domain (FDTD) method in that the space variable is made discrete by the finite element method rather than the finite difference method. *See also:* finite difference time domain. (AP/PROP) 211-1997

finite state machine (software) A computational model consisting of a finite number of states and transitions between those states, possibly with accompanying actions. (C) 610.12-1990

finite-time stability (solutions) For all initial states that originate in a specified region R at time t_0 , the resulting solutions remain in another specified region R_e over the given time interval $t_0 \leq t \leq T$. *Notes:* 1. In the definition of finite-time stability the quantities R_m , R_e , and T are prespecified. Obviously, R must be included in R_e . 2. A system may be Lyapunov unstable and still be finite-time stable. For example, a system with dynamics $\dot{x} = ax$, $a > 0$, is Lyapunov unstable, but if

$$R_\delta: |x| \leq \delta$$

$$R_\varepsilon: |x| \leq \varepsilon$$

and $T < a^{-1} \ln(\varepsilon/\delta)$, the system is finite-time stable (relative to the given values of δ , ε , and T). *See also:* control system. (CS/IM) [120]

finline An E-plane line in which the planar conducting structure is affixed to a dielectric substrate. The thin conducting strips (fins) may be insulated or grounded. They can be arranged in various configurations. (MTT) 1004-1987w

finzen The recommended practical unit of erythermal flux or intensity of radiation. It is equal to one unit of erythermal flux per square centimeter. (EEC/PE) [119]

FIPS PUB XXXX *See:* federal information processing standard publication.

fire-alarm system An alarm system signaling the presence of fire. *See also:* protective signaling. (EEC/PE) [119]

fire-control radar (navigation aid terms) A radar whose prime function is to provide information for the manual or automatic control of artillery or other weapons. (AES/GCS) 686-1997, 172-1983w

fire detection and fire protection systems (nuclear power generating station) Definitions of terms relating to fire detection and protection systems and equipment may be found in the National Fire Protection Association (NFPA) Handbook. (PE/NP) 567-1980w

fire-door magnet An electromagnet for holding open a self-closing fire door. (EEC/PE) [119]

fire-door release system A system providing remotely controlled release of self-closing doors in fire-resisting bulkheads to check the spread of fire. *See also:* marine electric apparatus. (EEC/PE) [119]

fire endurance A measure of the elapsed time during which a material or assembly continues to exhibit fire resistance under specified conditions of test and performance. (DEI) 1221-1993w

fire exposure The heat flux of a fire, with or without direct flame impingement, to which a material, product, building element, or assembly is exposed. (DEI) 1221-1993w

fire gases The airborne products emitted by a material undergoing pyrolysis or combustion that at the relevant temperature exist in the gas phase. (DEI) 1221-1993w

fire hazard A fire risk greater than an acceptable level. (DEI) 1221-1993w

fire performance characteristic A response of a material, product, or assembly to a prescribed source of heat or flame under controlled fire conditions. Such characteristics include ease of ignition, flame spread, smoke generation, fire endurance of the material, corrosiveness, and toxicity of the smoke generated. (DEI) 1221-1993w

fire performance test A procedure that measures a response of a material, product, or assembly to heat or flame under controlled fire conditions. (DEI) 1221-1993w

fire point The lowest temperature at which a specimen will sustain burning for five seconds. (DEI) 1221-1993w

fire products Heat, smoke, and toxic and corrosive products. (DEI) 1221-1993w

fire propagation The movement of a flame front on the surface of materials and products beyond the ignition zone. (DEI) 1221-1993w

fire-protected cable systems Cable systems to which a fire-protective enclosure material has been applied either in direct contact with the cables or applied over the raceway to protect cables from fire. (PE/IC) 848-1996

fire-protective coatings A material applied to a completed cable or assembly of cables to prevent the propagation of flame. Fire-protective coatings include liquids, mastics, and tapes. (SUB/PE) 525-1992r

fire quenching Shock cooling by immersion of liquid or molten material in a cooling medium (crushed stones in collecting pits). (SUB/PE) 980-1994

fire rating (cable penetration fire stop qualification test) The term applied to cable penetration fire stops to indicate the endurance in time (hours and minutes to the standard time-temperature curve in ANSI/ASTM E119-76, while satisfying the acceptance criteria specified in this standard. (PE) 634-1978w

fire resistance The property of a material or assembly to withstand fire or give protection from it. As applied to elements of buildings, it is characterized by the ability to confine a fire or to continue to perform a given structural function, or both. (DEI) 1221-1993w

fire-resistance rating The measured time, in hours or fractions thereof, that the material or construction will withstand fire exposure as determined by fire tests conducted in conformity to recognize standards. (EEC/PE) [119]

fire-resistant So constructed or treated that it will not be injured readily by exposure to fire. (EEC/PE) [119]

fire-resistive barrier (A) (cable penetration fire stop qualification test) A wall, floor, or floor-ceiling assembly erected to prevent the spread of fire. (To be effective, fire barriers must have sufficient fire resistance to withstand the effects of the most severe fire that may be expected to occur in the area adjacent to the fire barrier and must provide a complete barrier to the spread of fire.) **(B) (nuclear power generating station) (cable-penetration fire stops, fire breaks, and system enclosures)** A wall, floor, or floor-ceiling assembly erected to prevent the spread of fire. (PE/SUB/EDPG) 634-1978, 525-1992, 690-1984

fire-resistive barrier rating This is expressed in time (hours and minutes) and indicates that the wall, floor, or floor-ceiling assembly can withstand, without failure, exposure to a standard fire for that period of time. (PE/SUB/EDPG) 634-1978w, 690-1984r, 525-1992r

fire-resistive construction A method of construction that prevents or retards the passage of hot gases or flames as defined by the fire-resistance rating. (EEC/PE) [119]

fire-retardant coatings Material applied along the length of cables or in localized areas, as deemed necessary, to retard the flame propagation properties of cables in trays. (PE/IC) 848-1996

fired tube (nonlinear, active, and nonreciprocal waveguide components) (microwave gas tubes) The condition of the tube during which a radio frequency glow exists at either the resonant gap, the resonant window, or both. *See also:* gas tube. (MTT/ED) 457-1982w, [45], 161-1971w

fireproofing (of cables) The application of a fire-resistant covering. (NESC) C2-1997

firing angle *See:* angle of retard.

firing power (nonlinear, active, and nonreciprocal waveguide components) The radio-frequency (rf) power level above which a gas tube becomes nonlinear. *See also:* gas tube. (MTT) 457-1982w

firm capacity (1) (electric power supply) (purchase or sales) That firm capacity that is purchased, or sold, in transactions with other systems and that is not from designated units, but is from the over-all system of the seller. *Note:* It is understood that the seller provides reserve capacity for this type of transaction. *See also:* generating station. (PE/PSE) [54]
(2) Capacity that is purchased, or sold, at the highest level of system generation availability. It is understood that the seller treats this type of transaction as a demand obligation. (PE/PSE) 858-1993w

firm power (1) (power operations) Power intended to be available at all times during the period covered by a commitment, even under adverse conditions. (PE/PSE) 858-1987s

(2) (emergency and standby power) Power intended to be always available, even under emergency conditions. *See also:* generating station. (IA/PE/T&D/PSE) 446-1987s, [10]

firm transfer capability (electric power supply) (transmission) The maximum amount of power that can be interchanged continuously, over an extended period of time. *See also:* generating station. (PE/PSE) [54]

firmware (1) (software) The combination of a hardware device and computer instructions and data that reside as read-only software on that device. *Notes:* 1. This term is sometimes used to refer only to the hardware device or only to the computer instructions or data, but these meanings are deprecated. 2. The confusion surrounding this term has led some to suggest that it be avoided altogether. (C) 610.12-1990

(2) (supervisory control, data acquisition, and automatic control) Hardware used for the nonvolatile storage of instructions or data that can be read only by the computer. Stored information is not alterable by any computer program. *See also:* station. (SWG/SUB/PE) C37.1-1987s, C37.100-1992

(3) (watthour meters) A register control program stored in read-only memory and considered to be an integral part of the register. (ELM) C12.13-1985s

(4) (electromechanical watthour meters) A program to control the solid-state demand register that is stored in read-only memory and considered to be an integral part of the register that cannot be changed in its operating environment. (ELM) C12.15-1990

(5) The combination of software and data that reside on read-only memory. (PE/NP) 7-4.3.2-1993

(6) A program, typically stored in read-only memory, that controls a computer from the time that it is turned on until the time that the primary operating system assumes control of the computer. (C/BA) 1275-1994

(7) The combination of a hardware device and computer instructions and data that reside as read-only software on that device. *Notes:* 1. This term is sometimes used to refer only to the hardware device or only to the computer instructions or data, but these meanings are deprecated. 2. The confusion surrounding this term has led some to suggest that it be avoided altogether. (C) 610.10-1994w

(8) The combination of a hardware device and computer instructions and/or computer data that reside as read-only software on the hardware device. (C/SE) J-STD-016-1995

firmware device driver A device driver intended for use by firmware. *Contrast:* operating system device driver. *See also:* device driver. (C/BA) 1275-1994

first-bit access time (of a BORAM) The time interval between the application of addressing and enabling signals and the availability at an output of the first bit from a block of data. (ED) 641-1987w

first-class object An object that can be the value of a variable or can be stored in a data structure. In Scheme, first-class objects have unlimited extent. *See also:* extent. (C/MM) 1178-1990r

first-come, first-served *See:* first-in, first-out.

first contingency incremental transfer capability (power operations) The amount of power, incremental above normal base power transfers, that can be transferred over the transmission network in a reliable manner, based on the following conditions:

- With all transmission facilities in service, all facility loadings are within normal ratings, and all voltages are within normal limits;
- The bulk power system is capable of absorbing the dynamic power swings and remaining stable following a disturbance resulting in the loss of any single generating unit, transmission circuit or transformer;
- After the dynamic power swings following a disturbance resulting in the loss of any single generating unit, transmission circuit, or transformer, but before operator-directed system adjustments are made, all transmission facility loadings are within emergency ratings, and all voltages are within emergency limits.

(PE/PSE) 858-1987s

first dial (register) That graduated circle or cyclometer wheel, the reading on which changes most rapidly. The test dial or dials, if any, are not considered. *See also:* watthour meter. (EEC/PE) [119]

first-ended, first-out A queuing technique for concurrent processes in which items are retrieved from the queue based on the time at which the item is placed completely in the queue. That is, the item whose final segment is placed in the queue before those of all other items, will exit the queue before those other items. *Note:* Often used in message queuing applications. (C) 610.5-1990w

first Fresnel zone (data transmission) In optics and radio communication, the circular portion of a wave front transverse to the line between an emitter and a more distant point where the resultant disturbance is being observed, whose center is the intersection of the front with the direct ray and whose radius is such that shortest path from the emitter through the periphery to the receiving point is one-half wave longer than the ray. *Note:* A second zone, a third, etc., are defined by successive increases of the path by half-wave increments. (PE) 599-1985w

first generation A period during the evolution of electronic computers in which computers were designed around vacuum tubes. *Note:* Introduced in 1949, first generation computers were thought to have been the state of the art from 1951 to 1959, when the transistor was developed. *See also:* third generation; fourth generation; fifth generation; second generation. (C) 610.10-1994w

first-generation language *See:* machine language.

first-in, first-out (A) A technique for managing a set of items to which additions and deletions are to be made; items are appended to one end of a list and retrieved from the other end. *See also:* queue. **(B)** Pertaining to a system in which the next item to exit the system is the item that has been in the system for the longest time. *Synonym:* first-come, first-served. *Contrast:* last-in, first-out. (C) 610.5-1990

first-in-first-out (FIFO) queue A data structure from which entries are removed in the same order that they were added. In this document, entries are added at the "tail" of the queue and removed from the "head." (C/MM) 1212.1-1993

first-in, last-out *See:* last-in, first-out.

first (last) transition duration (pulse terminology) The transition duration of the first (last) transition waveform in a pulse waveform. *See also:* waveform epoch.

(IM/WM&A) 194-1977w

first-level address *See:* direct address.

first-line release (telephone switching systems) Release under the control of the first line that goes-on-hook.

(COM) 312-1977w

first normal form One of the forms used to characterize relations; a data structure or relation is said to be in first normal form if it has no repeating groups. For example:

First Normal Form

UNNORMALIZED

ORDER0 = {ORDER-NO} + DATE + CUSTOMER-NO
+ CUSTOMER-NAME + CUSTOMER-ADDRESS
+ ((SEQUENCE-NO + ITEM-NO + ITEM-DESCRIPTION
+ QUANTITY-ORDERED + UNIT-PRICE
+ EXTENDED-PRICE)) + TOTAL-ORDER-AMOUNT

FIRST NORMAL FORM

ORDER1 = {ORDER-NO} + DATE + CUSTOMER-NO
+ CUSTOMER-NAME + CUSTOMER-ADDRESS
+ TOTAL-ORDER-AMOUNT

ITEM1 = {ORDER-NO + SEQUENCE-NO} + ITEM-NO
+ ITEM-DESCRIPTION + QUANTITY-ORDERED
+ UNIT-PRICE + EXTENDED-PRICE

(C) 610.5-1990w

Note: repeating group enclosed in parenthesis. Keys in brackets.

first open (1) (of a file) When a process opens a file that is not currently an open file within any process.

(C/PA) 9945-1-1996

(2) (of a file) The act when a process opens a file, message queue, or shared memory object that is not currently open within any process.

(C) 1003.5-1999

first-order lag The change in phase due to a linear element of transfer function, $1/(1 + Ts)$. *Synonym:* linear lag. *See also:* lag.

(ELM) C12.1-1982s

first-order lead (control system feedback) The change in phase due to a factor $(1 + Ts)$ in the numerator of a transfer function. *See also:* feedback control system. (IM) [120]

first Townsend discharge (gas) A semi-self-maintained discharge in which the additional ions that appear are due solely to the ionization of the gas by electron collisions. *See also:* discharge. (ED) [45], [84]

first transition (pulse terminology) The major transition waveform of a pulse waveform between the base and the top.

(IM/WM&A) 194-1977w

first voltage range *See:* voltage range.

fishbone antenna An end-fire, traveling wave antenna consisting of a balanced transmission line to which is coupled, usually through lumped circuit elements, an array of closely spaced, coplanar dipoles. (AP/ANT) 145-1993

fish tape (fishing wire) (snake) A tempered steel wire, usually of rectangular cross section, that is pushed through a run of conduit or through an inaccessible space, such as a partition, and that is used for drawing in the wires. (PE/EEC) [119]

fission (power operations) The splitting of a nucleus into parts (which are nuclei of lighter elements), accompanied by the release of a relatively large amount of energy (about 200 million electron volts per fission in the case of ²³⁵U fission) and frequently one or more neutrons.

(PE/PSE) 858-1987s, 346-1973w

fitting An accessory such as a locknut, bushing, or other part of a wiring system that is intended primarily to perform a mechanical rather than an electrical function.

(NESC/NEC) [86]

fittings (raceway systems for Class 1E circuits for nuclear power generating stations) (raceway) Raceway sections that are joined to other raceway sections for the purpose of coupling together or changing the size or direction of the raceway system. These include such items as couplings, elbows, tees, wyes, pulling sleeves, and pull boxes.

(PE/NP) 628-1987r

five-bit byte *See:* quintet.

5B6B encoding A method whereby data quintets are mapped (encoded) as code sextets.local area networks.

(C) 8802-12-1998

5GL *See:* fifth generation language.

fix (1) (navigation) A position determined without reference to any former position.

(AES/RS/GCS) 686-1982s, 172-1983w

(2) A device or equipment modification to prevent interference or to reduce an equipment's susceptibility to interference. *See also:* electromagnetic compatibility.

(EMC/INT) [53]

(3) (mathematics of computing) To convert a number from floating-point representation to fixed-point representation. *Contrast:* float.

(C) 1084-1986w

fixed *See:* read-only access.

fixed addressing (64-bit) An address model implemented by bus standards supporting only 64-bit addresses. The initial node space is large (258 Tbytes), is fixed in size, and extended spaces are not supported.

(C/MM) 1212-1991s

fixed appliance (electric systems) An appliance that is fastened or otherwise secured at a specific location. *See also:* appliance.

(NESC) [86]

fixed bank A capacitor bank that does not have a capacitor control and must be manually switched.power systems relaying.

(T&D/PE) 1036-1992, C37.99-2000

fixed binary data *See:* fixed-point binary data.

fixed block format (numerically controlled machines) A format in which the number and sequence of words and characters appearing in successive blocks is constant.

(IA/EEC) [61], [74]

fixed-called-address line (telephone switching systems) A line for originating calls to a fixed called address.

(COM) 312-1977w

fixed cycle (numerically controlled machines) A preset series of operations that direct machine axis movement and/or cause spindle operation to complete such actions as boring, drilling, tapping, or combinations thereof.

(IA) [61], [84]

fixed-cycle operation An operation that is completed in a specified number of regularly timed execution cycles.

(C) [20], [85], 610.10-1994w

fixed decimal data *See:* fixed-point real data.

fixed disk A magnetic disk that is permanently mounted within a disk drive. *Synonym:* nonremovable disk. *Contrast:* removable disk. *See also:* hard disk.

(C) 610.10-1994w

fixed error *See:* bias.

fixed error in sample time A nonrandom error in the instant of sampling. A fixed error in sample time may be fixed with respect to the data samples acquired or correlated with an event that is detected by the sampling process. Unless otherwise specified, usually taken to mean the maximum fixed error that may be observed.

(IM/WM&A) 1057-1994w

fixed feed tube (cable plowing) A feed tube permanently attached to a blade. It may have removable back plate. *See also:* feed tube.

(T&D/PE) 590-1977w

fixed format A file organization in which all logical records in the file are of fixed length. *Synonym:* F format. *Contrast:* variable format.

(C) 610.5-1990w

fixed-frequency transmitter A transmitter designed for operation on a single carrier frequency. *See also:* radio transmitter.

(AP/BT/PE/ANT) 145-1983s, 182-1961w, 599-1985w

fixed head A magnetic head that is in a fixed position, and which can access data only within a particular disk track. *Contrast:* floating head. *See also:* head-per-track disk drive.

(C) 610.10-1994w

fixed impedance-type ballast A reference ballast designed for use with one specific type of lamp and, after adjustment during the original calibration, is expected to hold its established impedance throughout normal use. (EEC/LB) [97]

fixed-instruction computer A computer in which the instruction set cannot be changed. *Contrast:* user-programmable computer. (C) 610.10-1994w

fixed investment costs (power operations) Monies associated with investment in plant. (PE/PSE) 858-1987s

fixed length Pertaining to a record or field that has a constant length, regardless of the specific data contained in it. Filler characters may be used to maintain the fixed length. *Contrast:* variable length. *See also:* fixed format. (C) 610.5-1990w

fixed-length field A field whose length is constant. *Contrast:* variable-length field. *See also:* fixed format. (C) 610.5-1990w

fixed light (illuminating engineering) A light having a constant luminous intensity when observed from a fixed point. (EEC/IE) [126]

fixed motor connections A method of connecting electric traction motors wherein there is no change in the motor interconnections throughout the operating range. *Note:* This term is used to indicate that a transition from series to parallel relation is not provided. *See also:* traction motor. (EEC/PE) [119]

fixed operation cost Cost other than that associated with investment in plant, which does not vary or fluctuate with changes in operation or use of plant. (PE/PSE) 858-1993w

fixed point (mathematics of computing) (data management) Pertaining to a numeration system in which the position of the radix point is fixed with respect to one end of the numerals, according to some convention. *Contrast:* floating point; variable point. (MIL/C) [2], 162-1963w, [20], 1084-1986w, [85], 610.5-1990w

fixed-point arithmetic A method of arithmetic in which the numbers are expressed in the fixed-point representation system. *Contrast:* floating-point arithmetic. (C) 1084-1986w

fixed-point binary data Fixed-point data used to represent signed binary numbers.

decimal	75 ₁₀
fixed-point binary	0100 1011 ₂
decimal	-91 ₁₀
fixed point binary	1010 0101 ₂

Synonym: real fixed binary data. (C) 610.5-1990w

fixed-point data Integer data that can be expressed in a specific number of digits, with a radix point implicitly located at a predetermined position. *Synonym:* computational data. *Contrast:* floating-point data. *See also:* fixed-point real data; fixed-point binary data. (C) 610.5-1990w

fixed-point number A number expressed in fixed-point representation. (C) 1084-1986w

fixed-point part *See:* significand.

fixed-point real data Fixed-point data used to represent signed decimal numbers. For example, 75.6, 0, and -253. *Synonyms:* fixed real data; fixed decimal data; real fixed decimal data. (C) 610.5-1990w

fixed-point register A register used to manipulate fixed-point data. (C) 610.10-1994w

fixed-point representation system A numeration system in which the position of the radix point is fixed with respect to one end of the numerals, according to some convention. (C) 1084-1986w

fixed-point system *See:* point.

fixed-program read-only storage A form of read-only storage in which the data content of each storage cell is determined during manufacture and is thereafter unalterable. (C) 610.10-1994w

fixed rack An assembly enclosed at the top and sides, either open or with door(s) for access, with a top-to-bottom front

panel opening for equipment mounting (for example, nominal 19-inch-wide chassis and subpanel assemblies). *Synonym:* cabinet. (SWG/PE) C37.100-1992, C37.21-1985r

fixed-radix notation A radix notation system in which all digit positions have the same radix. The weights of successive digit places are successive integral powers of a single radix. *Synonyms:* fixed-radix scale; numeration system. (C) 1084-1986w

fixed-radix numeration system *See:* fixed-radix notation.

fixed-radix scale *See:* fixed-radix notation.

fixed real data *See:* fixed-point real data.

fixed routing A routing strategy for store-and-forward network, in which the next path to each specific destination is always the same at each point in the network. (C) 610.7-1995

fixed sequential format A means of identifying a word by its location in the block. *Note:* Words must be presented in a specific order and all possible words preceding the last desired word must be present in the block. (IA/EEC) [61], [74]

fixed signal The signal of fixed location indicating a condition affecting the movement of a train or engine. (EEC/PE) [119]

fixed storage (computers) A storage device that stores data not alterable by computer instructions, for example, magnetic core storage with a lockout feature or punched paper tape. *See also:* nonerasable storage; permanent storage. (C) [20], [85]

fixed temperature heat detector (fire protection devices) A device that will respond when its operating element becomes heated to a predetermined level. (NFPA) [16]

fixed threshold transistor (metal-nitride-oxide field-effect transistor) Another name for a metal-oxide semiconductor (MOS) type transistor, used in contradistinction to the metal-nitride-oxide semiconductor (MNOS) transistor, which has a variable threshold voltage. (ED) 581-1978w

fixed transmitter A transmitter that is operated in a fixed or permanent location. *See also:* radio transmitter. (AP/BT/ANT) 145-1983s, 182-1961w

fixed word length (test, measurement, and diagnostic equipment) Property of a storage device in which the capacity for bits in each storage word is fixed. (MIL) [2]

fixing (electrostatography) The act of making a developed image permanent. *See also:* electrostatography. (ED) 224-1965w, [46]

fixnum A limited-precision computer representation for integers, where the limitation is imposed by machine-architecture constraints. *See also:* bignum. (C/MM) 1178-1990r

fixture *See:* luminaire.

fixture stud A threaded fitting used to mount a lighting fixture to an outlet box. *Synonym:* stud. *See also:* cabinet. (EEC/PE) [119]

flag (1) (microprocessor operating systems parameter types) A yes/no or true/false value. (MM/C) 855-1985s

(2) A character that signals the occurrence of some event. Usually a field of 1 b. (SUB/PE) 999-1992w

(3) A signal used to delimit packets in parallel signal transmission implementations. For example, in the 16bit parallel implementation the flag is a 17th signal. In some serial implementations special symbols could be used in place of flag transitions. (C/MM) 1596-1992

(4) A signal used to delimit packets in parallel-signal-transmission implementations. (C/MM) 1596.3-1996

(5) The first character of an ATLAS statement used to mark that statement as having a special purpose or capability. (SCC20) 771-1998

flag alarm An indicator in certain types of navigation instruments used to warn when the readings are unreliable. *See also:* navigation. (AES/RS/GCS) 686-1982s, [42], 172-1983w

flag register (A) A register used to hold one or more bit indicators called flags, for example: a register holding the nega-

- tive, zero, and overflow bits. *See also*: condition code register. (B) A register used to hold a flag. (C) 610.10-1994
- flame detector (1) (fire protection devices)** A device which detects the infrared, or ultraviolet, or visible radiation produced by a fire. (NFPA) [16]
- (2) (power system device function numbers)** A device that monitors the presence of the pilot or main flame in such apparatus as a gas turbine or a steam boiler. (PE/SUB) C37.2-1979s
- flame flicker detector (fire protection devices)** A photoelectric flame detector including means to prevent response to visible light unless the observed light is modulated at a frequency characteristic of the flicker of a flame. (NFPA) [16]
- flameproof apparatus** Apparatus so treated that it will not maintain a flame or will not be injured readily when subjected to flame. (EEC/PE) [119]
- flameproof terminal box** A terminal box so designed that it may form part of a flameproof enclosure. (PE) [9]
- flame protection of vapor openings** Self-closing gauge hatches, vapor seals, pressure-vacuum breather valves, flame arresters, or other reasonably effective means to minimize the possibility of flame entering the vapor space of a tank. *Note*: Where such a device is used, the tank is said to be flameproofed. (NFPA) [114]
- flame-resistant cable** A portable cable that will meet the flame test requirements of the United States Bureau of Mines. *See also*: mine feeder circuit. (EEC/PE) [119]
- flame resisting** *See*: flame-retarding.
- flame retardant (1) (Class 1E equipment and circuits) (unclear power generating station)** Capable of limiting the propagation of a fire beyond the area of influence of the energy source that initiated the fire. (PE/NP) 384-1992r
- (2)** So constructed or treated that it will not support flame. (SWG/PE) C37.100-1992
- flame-retardant coatings** A material applied to a completed cable or assembly of cables to prevent the propagation of flame when exposed to a flame source. Flame-retardant coatings include tapes, blankets, liquids, or mastics. (PE/IC) 817-1993w
- flame-retarding (electric installations on shipboard)** Flame-retarding materials and structures should have such fire-resisting properties that they will not convey flame nor continue to burn for longer times than specified in the appropriate flame test. Compliance with the requirements of the preceding paragraph should be determined with the apparatus and according to the methods described in the Underwriters' Laboratories Standards for the materials and structures unless specific applicable tests are invoked in these recommendations. (IA/MT) 45-1983s
- flame spread index** A number or classification indicating a comparative measure derived from observations made during the progress of the boundary of a zone of flame under defined test conditions. (DEI) 1221-1993w
- flammable** Subject to easy ignition and rapid flaming combustion. (DEI) 1221-1993w
- flammable air-vapor mixtures** When flammable vapors are mixed with air in certain proportions, the mixture will burn rapidly when ignited. *Note*: The combustion range for ordinary petroleum products, such as gasoline, is from 1 1/2 to 6% of vapor by volume, the remainder being air. (NFPA) [114]
- flammable anesthetics (health care facilities)** Gases or vapors such as fluorene, cyclopropane, divinyl ether, ethyl chloride, ethyl ether, and ethylene, which may form flammable or explosive mixtures with air, oxygen, or reducing gases such as nitrous oxide. (NESC/NEC) [86]
- flammable anesthetizing location (health care facilities)** Any operating room, delivery room, anesthetizing room, corridor, utility room, or any other area if intended for the application of flammable anesthetics. (NESC/NEC) [86]
- flammable vapors** The vapors given off from a flammable liquid at and above its flash point. (NFPA) [114]
- flange** *See*: coupling flange.
- flange, choke** *See*: choke flange.
- flange, contact** *See*: contact flange.
- FLAP** A programming language used widely for manipulating formulas and performing symbolic mathematical calculations. (C) 610.13-1993w
- flare-out (navigation aid terms)** That portion of the approach path of an aircraft in which the slope is modified to provide the appropriate rate of descent at touchdown. *See also*: navigation. (AES/RS/GCS) 686-1982s, [42], 172-1983w
- flarescan (navigation)** A ground-based navigation system used in conjunction with an instrument approach system to provide flare-out vertical guidance to an aircraft by the use of a pulse-space-coded vertically scanning fan beam that provides elevation angle data. *See also*: navigation. (AES/RS/GCS) 686-1982s, [42], 172-1983w
- flash** An on-hook/off-hook signal with a duration between specified lower and upper bounds, from either the calling or called party to the SPCS indicating that some calling feature is desired. *See also*: hit, flash, and disconnect timing; hit; disconnect. (COM/TA) 973-1990w
- flash barrier (rotating machinery)** A screen of fire-resistant material to prevent the formation of an arc or to minimize the damage caused thereby. (PE) [9]
- flash card** In micrographics, a target printed with distinctive markings to be photographed to facilitate the indexing of microfilm. *Synonym*: flash target. *See also*: flash indexing. (C) 610.2-1987
- flash current (primary cell)** The maximum electric current indicated by an ammeter of the dead-beat type when connected directly to the terminals of the cell or battery by wires that together with the meter have a resistance of 0.01 ohm. *See also*: electrolytic cell. (EEC/PE) [119]
- flash EEPROM** An electrically erasable programmable read-only memory (EEPROM) in which clearing can be performed only on blocks or the entire array. (ED) 1005-1998
- flasher** A device for alternately and automatically lighting and extinguishing electric lamps. *See also*: appliance. (EEC/PE) [119]
- flasher relay** A relay that is so designed that when energized its contacts open and close at predetermined intervals. *See also*: appliance. (EEC/PE) [119]
- flash indexing** In micrographics, the process of dividing a roll of microfilm into batches of information using flash cards to identify each of the sections, thus providing a method of retrieval. *Synonym*: flash target coding. (C) 610.2-1987
- flashing light (illuminating engineering)** A rhythmic light in which the periods of light are of equal duration and are clearly shorter than the periods of darkness. (EEC/IE) [126]
- flashing-light signal** A railroad-highway crossing signal the indication of which is given by two red lights spaced horizontally and flashed alternately at predetermined intervals to give warning of the approach of trains, or a fixed signal in which the indications are given by color and flashing of one or more of the signal lights. (EEC/PE) [119]
- flashing signal (telephone switching systems)** A signal for indicating a change or series of changes of state, such as on-hook/off-hook, used for supervisory purposes. (COM) 312-1977w
- flashlight battery** A battery designed or employed to light a lamp of an electric hand lantern or flashlight. *See also*: battery. (EEC/PE) [119]
- flashover (1) (general)** A disruptive discharge through air around or over the surface of solid or liquid insulation, between parts of different potential or polarity, produced by the application of voltage wherein the breakdown path becomes sufficiently ionized to maintain an electric arc. (PE/T&D/PE/T&D/PE/T&D/PSIM) 28-1974, [8], 270-1966w, [10], [55], 1243-1997, 1410-1997

(2) A disruptive discharge over the surface of a solid insulation in a gas or liquid. (PE/PSIM) 4-1995

(3) A disruptive discharge around or over the surface of an insulating member, between parts of different potential or polarity, produced by the application of voltage wherein the breakdown path becomes sufficiently ionized to maintain an electric arc. (PE/IC) 48-1996

(4) The transition from a localized fire to the general conflagration within the compartment when all fuel surfaces are burning. (DEI) 1221-1993w

(5) A disruptive discharge around or over the surface of a solid or liquid insulator. (SPD/PE) C62.11-1999, C62.62-2000

flash plate A thin electrodeposited coating produced in a short time. (EEC/PE) [119]

flash point (1) The minimum temperature at which a liquid will give off vapor in sufficient amount to form a flammable air-vapor mixture that can be ignited under specified conditions. (NFPA) [114]

(2) The lowest temperature of a sample at which application of an ignition source causes the vapor of the sample to ignite momentarily under specified conditions of test. (DEI) 1221-1993w

flash target *See*: flash card.

flash target coding *See*: flash indexing.

flash timing *See*: hit, flash, and disconnect timing; hit; disconnect; flash.

flashtube (illuminating engineering) A tube of glass or quartz with electrodes at the ends and filled with a gas, usually xenon. It is designed to produce high intensity flashes of light of extremely short duration. (EEC/IE) [126]

flat-band voltage (metal-nitride-oxide field-effect transistor) Gate voltage that results in zero field at the surface of the silicon. It is related to the threshold voltage by a constant, generally small, voltage increment. (ED) 581-1978w

flatbed plotter A plotter that draws an image on a display surface mounted on a flat surface. (C) 610.10-1994w

flat cable assembly An assembly of parallel conductors formed integrally with an insulating material web specifically designed for field installation in metal surface raceway approved for the purpose. (NESC/NEC) [86]

flat-compound A qualifying term applied to a compound-wound generator to denote that the series winding is so proportioned that the terminal voltage at rated load is the same as at no load. (EEC/PE) [119]

flat file (A) A set of records that are identically formatted to contain no more than one occurrence of each data item. *Note*: records in such a file do not contain data aggregates or repeating groups. *See also*: relational file. **(B)** A two-dimensional array of data items that is stored as in definition (A). (C) 610.5-1990

flat flange *See*: cover flange.

flat leakage power (nonlinear, active, and nonreciprocal waveguide components) (microwave gas tubes) The peak radio-frequency power transmitted through the tube after the establishment of the steady-state radio-frequency discharge. *See also*: gas tube. (MTT/ED) 457-1982w, [45], 161-1971w

flat loss (1) (gain) The frequency independent contribution to the total transfer-function loss (or gain) or a four-terminal network. (CAS) [13]

(2) **(broadband local area networks)** Loss created by a component or set of components that maintains a constant attenuation across a specified bandwidth. (LM/C) 802.7-1989r

flat pack An integrated circuit package that has leads extending from the package in the same plane as the package so that leads can be spot welded to terminals on a substrate or soldered to a printed circuit board. (C) 610.10-1994w

flat-panel display device A display device whose physical depth (front-to-back) is relatively small. For example, a plasma panel or a liquid-crystal diode display device. (C) 610.10-1994w

flat-rate call (telephone switching systems) A call for which no billing is required. (COM) 312-1977w

flat-rate service (telephone switching systems) Service in which a fixed charge is made for all answered local calls during the billing interval. (COM) 312-1977w

flat-strip conductor *See*: strip-type transmission line.

flat-top antenna A short vertical monopole antenna with an end capacitor whose elements are all in the same horizontal plane. *See also*: top-loaded vertical antenna; end capacitor. (AP/ANT) 145-1993

flat-type relay armature An armature that rotates about an axis perpendicular to that of the core, with the pole face on a side surface of the core. (EEC/REE) [87]

flat weighting (data transmission) A noise measuring set measuring amplitude frequency characteristics which are flat over a specified frequency range. The frequency range must be stated. Flat noise power may be expressed in dBm (F1-F2) or in dBm (F1-F2). The terms "3 kHz flat weighting" and "15 kHz flat weighting" from 30 Hz mean to the upper frequency indicated. (PE) 599-1985w

FLAVORS An object-oriented language originally developed as an extension of LISP. (C) 610.13-1993w

flection-point emission current That value of current on the diode characteristic for which the second derivative of the current with respect to the voltage has its maximum negative value. *Note*: This current corresponds to the upper flection point of the diode characteristic. *See also*: electron emission. (ED) 161-1971w, [45]

flexcircuit Flexible printed wiring board. A patterned arrangement of printed circuit and components utilizing flexible base materials with or without flexible cover layers. (C/BA) 14536-1995

flexibility The ease with which a system or component can be modified for use in applications or environments other than those for which it was specifically designed. *Synonym*: adaptability. *See also*: extendability; maintainability. (C) 610.12-1990

flexibility of the electric system The adaptability to development and expansion as well as to changes to meet varied requirements during the life of the building. (IA/PSE) 241-1990r

flexible connector (rotating machinery) An electric connection that permits expansion, contraction, or relative motion of the connected parts. (PE) [9]

flexible coupling (rotating machinery) A coupling having relatively high transverse or torsional compliance. *Notes*: 1. May be used to reduce or eliminate transverse loads or deflections of one shaft from being carried, or felt by the other coupled shaft. 2. May be used to reduce the torsional stiffness between two rotating masses in order to change torsional natural frequencies of the shaft system or to limit transient or pulsating torques carried by the shafts. *See also*: rotor. (PE) [9]

flexible disk *See*: floppy disk.

flexible equipment Equipment, structures, and components whose lowest resonant frequency is less than the cutoff frequency on the response spectrum. (PE/SUB/NP) 693-1997, 344-1987r

flexible manufacturing system A computer-integrated manufacturing system that can be reprogrammed to make a variety of parts or products. (C) 610.2-1987

flexible metal conduit A flexible raceway of circular cross section specially constructed for the purpose of the pulling in or the withdrawing of wires or cables after the conduit and its fittings are in place. *See also*: raceway. (EEC/PE) [119]

flexible mounting (rotating machinery) A flexible structure between the core and foundation used to reduce the transmission of vibration. (PE) [9]

flexible nonmetallic tubing (loom) A mechanical protection for electric conductors that consists of a flexible cylindrical tube having a smooth interior and a single or double wall of non-conducting fibrous material. *See also*: raceway. (PE/EEC) [119]

flexible tower (frame) A tower that is dependent on the line conductors for longitudinal stability but is designed to resist transverse and vertical loads. *See also:* tower.

(T&D/PE) [10]

flexible waveguide A waveguide constructed to permit limited bending and twisting or stretching, or both, without appreciable change in its electrical properties.

(MTT) 147-1979w, 146-1980w

flex model *See:* CODASYL model.

flexure (inertial sensors) (dynamically tuned gyro) An elastic element in a dynamically tuned gyro rotor suspension system, which permits limited angular freedom about axes perpendicular to the spin axis.

(AES/GYAC) 528-1994

flicker (1) (A) (television) (general) Impression of fluctuating brightness or color, occurring when the frequency of the observed variation lies between a few hertz and the fusion frequencies of the images. **(B) (television)** A repetitive variation in luminance of a given area in a monochromatic or color display, the visibility of which is a function of repetition rate, duty cycle, luminance, and the decay characteristic.

(BT/AV) 201-1979

(2) (computer graphics) The undesirable blinking of a graphical display image that occurs when the refresh rate is so low that regeneration of the display image is noticeable.

(C) 610.6-1991w

(3) A perceptible change in electric light source intensity due to a fluctuation of input voltage. *Note:* The general meaning of this term could make it applicable to describe the pulsation of luminous flux from a low-inertia source (such as gas discharge lamps) caused by the zero crossings of the supply voltage at twice the power-system frequency. However, in the context of power supply disturbances, the term applies to perceptible, subjective, objectionable, and random or periodic variations of the light output.

(T&D/PE) 1250-1995

(4) A variation of input voltage, either magnitude or frequency, sufficient in duration to allow visual observation of a change in electric light source intensity.

(IA/PSE) 1100-1999

flicker effect (electron tube) The random variations of the output-current in a valve or tube with an oxide-coated cathode. *Note:* Its value varies inversely with the frequency. *See also:* electron tube.

(ED) [45], [84]

flicker fusion frequency (illuminating engineering) The frequency of intermittent stimulation of the eye at which flicker disappears.

(EEC/IE) [126]

flicker noise (nonlinear, active, and nonreciprocal waveguide components) One of the sources of noise associated with solid-state devices such as mixers or diode detectors, the amplitude of which varies inversely with frequency. It is also referred to as 1/f noise. In the audio-frequency region this noise becomes more significant than either thermal or shot noise.

(MTT) 457-1982w

flicker threshold (television) The luminance at which flicker is just perceptible at a given repetition rate, with other variables held constant.

(BT/AV) 201-1979w

flight instrument (navigation aid terms) A vehicle instrument used in the control of the direction of flight, attitude, altitude, or speed of a vehicle.

(AES/GCS) 172-1983w

flight path (navigation) A proposed route in three dimensions. *See also:* navigation; course line.

(AES/RS/GCS) 686-1982s, 172-1983w, [42]

flight-path computer (electronic navigation) Equipment providing outputs for the control of the motion of a vehicle by along a flight path. *See also:* navigation.

(AES/RS/GCS) 686-1982s, [42], 172-1983w

flight-path deviation (electronic navigation) The amount by which the flight track of a vehicle differs from its flight path expressed in terms of either angular or linear measurement. *See also:* navigation.

(AES/RS) 686-1982s, [42]

flight-path-deviation indicator (electronic navigation) A device providing a visual display of flight-path deviation. *See also:* navigation.

(AES/RS) 686-1982s, [42]

flight track (electronic navigation) The path in space actually traced by a vehicle. *See also:* track.

(AES/RS) 686-1982s, [42]

flip-flop (1) (A) (electronic computation) A circuit or device, containing active elements, capable of assuming either one or two stable states at a given time, the particular state being dependent upon the nature of an input signal, for example, its polarity, amplitude, and duration, and which of two input terminals last received the signal. *Note:* The input and output coupling networks, and indicators, may be considered as an integral part of the flip-flop. **(B) (electronic computation)** A device, as in definition (A), that is capable of counting modulo 2, in which case it might have only one input terminal. **(C) (electronic computation)** A sequential logic element having properties similar to definition (A) or (B) above. *See also:* toggle; feedback control system.

(C) 162-1963

(2) A circuit or device capable of assuming either of two stable states, and which can be made to switch states by applying the proper signal or combination of signals to its inputs. *See also:* trigger circuit; R-S flip-flop; latch.

(C) 610.10-1994w

flip-flop circuit A trigger circuit having two conditions of permanent stability, with means for passing from one to the other by an external stimulus. *See also:* trigger circuit.

(PE) 599-1985w

flip-out The action of a worker or test torso being unintentionally separated from the body support component during or after fall arrest.

(T&D/PE) 1307-1996

flippy *See:* floppy disk.

float (1) (mathematics of computing) To convert a number from fixed-point representation to floating-point representation. *Contrast:* fix.

(C) 1084-1986w

(2) (gyros) An enclosed gimbal assembly housing the spin motor and other components, such as the pickoff and torquer. This assembly is immersed in a fluid, usually at the condition of neutral buoyancy.

(AES/GYAC) 528-1994

float charge A constant potential normally applied to a battery to maintain it in a charged condition.

(PE/EDPG) 1106-1995

float-displacement hysteresis (accelerometer) (gyros) The difference in rebalance torque or equivalent input after displacing the float about the output axis from its null position in successive clockwise and counterclockwise directions by equal amounts (up to its full range of angular freedom, unless otherwise specified). The float may be displaced by applying torques to the float through a torquer or through gyroscopic or acceleration torques in either open or closed-loop mode. The amount of float-displacement hysteresis may depend on the methods of applying torques, on the mode of operation (open or closed loop), and on the amount and duration of float displacement.

(AES/GYAC) 528-1994

floating A method of operation for storage batteries in which a constant voltage is applied to the battery terminals sufficient to maintain an approximately constant stage of charge. *See also:* charge; trickle charge.

(EEC/PE) [119]

floating battery A storage battery that is kept in operating condition by a continuous charge at a low rate.

(EEC/PE) [119]

floating carrier *See:* controlled carrier.

floating character A character placed in the position that is one place more significant than the otherwise most significant position.

(C) 1084-1986w

floating control *See:* floating control system.

floating control system (automatic control) A control system in which the rate of change of the manipulated variable is a continuous (or at least a piecewise continuous) function of the actuating signal. *Note:* The manipulated variable can remain at any value in its operating range when the actuating signal is zero and constant. Hence the manipulated variable is said to "float." When the forward elements in a control loop have integral control action only, the mode of control has been called "proportional-speed floating." The use of the term

integral control action is recommended as a replacement for "proportional-speed floating control." *Synonym:* floating control. *See also:* integral control action; neutral zone; single-speed floating control system; multiple-speed floating control system. (PE/EDPG) [3]

floating decimal* *See:* floating point.

* Deprecated.

floating grid (electron tube) An insulated grid, the potential of which is not fixed. (ED) [45], [84]

floating head A magnetic head that is suspended on a layer of air at a small distance away from the surface of the recording medium and which can move from track to track. *Synonyms:* air-floating head; movable head; flying head. *Contrast:* fixed head. *See also:* head positioner. (C) 610.10-1994w

floating network or component A network or component having no terminal at ground potential. (CAS) [13]

floating neutral One whose voltage to ground is free to vary when circuit conditions change. *See also:* center of distribution. (PE/NP) 338-1977s

floating point (1) (mathematics of computing) (data management) Pertaining to a numeration system in which each number is represented as a fractional quantity multiplied by an integral power of the radix. *Contrast:* fixed point; variable point. (C) 610.5-1990w, 1084-1986w

(2) Pertaining to a system in which the location of the point does not remain fixed with respect to one end of numerical expressions, but is regularly recalculated. The location of the point is usually given by expressing a power of the base. *See also:* variable point; fixed point. (C) 162-1963w

floating-point arithmetic A method of arithmetic in which the numbers are expressed in the floating-point representation system. *Contrast:* fixed-point arithmetic. (C) 1084-1986w

floating-point coding compaction A method of numerical data compaction that uses the floating-point representation system. (C) 1084-1986w

floating-point coefficient *See:* exponent.

floating-point data Real data in which numbers are represented using only an exponent, y , and a mantissa, x , where x and y are integers. *Note:* The number is expressed in the form $x \cdot 10^y$, and only x and y are stored in fixed-point binary format.

decimal	12.3 = .123 · 10 ²
floating-point	0111 1011 0000 0010 ₂ = 7B02 ₁₆
---x--- ----y---	

Synonym: floating-point real data. *Contrast:* fixed-point data. (C) 610.5-1990w

floating-point exception An *fp_exception* of one of the following floating-point trap types, caused by execution of an FPop: *unfinished_FPop*, *unimplemented_FPop*, *sequence_error*, *hardware_error*, *invalid_fp_register*, or floating-point IEEE-754_ exception that occurs while the corresponding bit in FSR.TEM is set to 1. (C/MM) 1754-1994

floating-point IEEE-754 exception A floating-point exception, as specified by IEEE Std 754-1985. (C/MM) 1754-1994

floating-point number (radix-independent floating-point arithmetic) A digit string characterized by three components: a sign, a signed exponent, and a significand. Its numerical value, if any, is the signed product of its significand and the radix raised to the power of its exponent. (C/MM) 854-1987r, 1084-1986w

floating-point operate (FPop) instructions Instructions that perform floating-point calculations, as defined by the FPop1 and FPop2 opcodes. FPop instructions do not include FBfcc instructions, nor loads and stores between memory and the FPU. (C/MM) 1754-1994

floating-point real data *See:* floating-point data.

floating-point register A register used to manipulate floating point data. (C) 610.10-1994w

floating-point representation system A numeration system in which each number is represented as a sign, a signed exponent, and a significand, where the numerical value, if any, is

the signed product of its significand and the radix raised to the power of the exponent. (C) 1084-1986w

floating-point system *See:* point.

floating-point trap type The specific type of floating-point exception that has occurred, encoded in the FSR.*fti* field. (C/MM) 1754-1994

floating-point unit (FPU) A processing unit that contains a set of floating-point registers and performs floating-point operations, as defined by this standard. (C/MM) 1754-1994

floating removable feed tube (cable plowing) A feed tube removably attached to a blade so relative motion may occur between the feed tube and the blade around axis that are essentially vertical and horizontal (perpendicular to direction of travel). *See also:* feed tube. (T&D/PE) 590-1977w

floating speed (process control) In single-speed or multiple-speed floating control systems, the rate of change of the manipulated variable. (PE/EDPG) [3]

floating zero (numerically controlled machines) A characteristic of a numerical machine control permitting the zero reference point on an axis to be established readily at any point in the travel. *Note:* The control retains no information on the location of any previously established zeros. *See also:* zero offset. (IA/EEC) [61], [74]

float service applications Storage batteries applied for reserve use and maintained at a continuous "float" voltage point selected to just exceed the batteries' internal (self-discharge) losses. (PE/EDPG) 1184-1994

float-state A logic value that indicates the lack of an active drive condition, generally used in an environment with multiple drivers connected to a single signal, and commonly referenced in digital simulation as a "Z" state. (C/TT) 1450-1999

float storage (gyros) The sum of attitude storage and torque command storage in a rate-integrating gyro. *See also:* torque-command storage; attitude storage. (AES/GYAC) 528-1994

float switch (liquid-level switch) A switch in which actuation of the contacts is effected when a float reaches a predetermined level. *See also:* switch. (IA/ICTL/IAC) [60], [84]

float voltage (1) The voltage applied to a battery to maintain it in a fully charged condition during normal operation. (PE/EDPG) 450-1995

(2) The voltage maintained across the battery by the charger in order to keep the battery at its best operational condition with minimum water loss. Float voltage is expressed in volts/cell. (IA/PSE) 602-1996

flonum A floating-point number. (C/MM) 1178-1990r

fluid (charge-storage tubes) To direct a large-area flow of electrons, containing no spatially distributed information, toward a storage assembly. *Note:* A large-area flow of electrons with spatially distributed information is used in image-converter tubes. *See also:* charge-storage tube. (ED) 158-1962w, [45]

flooded cable A special coaxial cable containing a corrosion-resistant material between the aluminum sheath and the outer jacket. The corrosion inhibitor flows into imperfections in the jacket to prevent sheath corrosion in high moisture environments. (LM/C) 802.7-1989r

flooded cell A liquid electrolyte filled vented cell. (PE/EDPG) 1184-1994

fluid gun A device in a cathode ray tube that emits a stream of electrons that uniformly covers the entire screen, used to maintain the energy level of the phosphors that have been energized by the electron gun. (C) 610.6-1991w, 610.10-1994w

floodlight (illuminating engineering) A projector designed for lighting a scene or object to a brightness considerably greater than its surroundings. It usually is capable of being pointed in any direction and is of weatherproof construction. *Note:* The beam spread of floodlights may range from relatively narrow (10 degrees) to wide (more than 100 degrees). (EEC/IE) [126]

floodlighting (illuminating engineering) A system designed for lighting a scene or object to a brightness greater than its surroundings. It may be for utility, advertising, or decorative purposes. (EEC/IE) [126]

floor-lubricated bearing (rotating machinery) A bearing in which a continuous flow of lubricant is poured over the top of the bearing or journal at about normal atmospheric pressure. *See also:* bearing. (PE) [9]

floor projection (facsimile) The optical method of scanning in which the subject copy is floodlighted and the scanning spot is defined in the path of the reflected or transmitted light. *See also:* scanning. (COM) 168-1956w

floor The result obtained by rounding a number down to the nearest integer. For example, the floor of 5.3 is 5. *Contrast:* ceiling. (C) 1084-1986w

floor acceleration (1) (seismic qualification of Class 1E equipment for nuclear power generating stations) The acceleration of a particular building floor (or equipment mounting) resulting from the motion of a given earthquake. The maximum floor acceleration is the zero period acceleration (ZPA) of the floor response spectrum. (PE/NP) 344-1987r

(2) (nuclear power generating station) The acceleration of a particular building floor (or equipment mounting) resulting from a given earthquake's motion. The maximum floor acceleration can be obtained from the floor response spectrum as the acceleration at high frequencies (in excess of 33 Hz) and is sometimes referred to as the ZPA (zero period acceleration). (PE/NP) 380-1975w

floor bushing A bushing intended primarily to be operated entirely indoors in a substantially vertical position to carry a circuit through a floor or horizontal grounded barrier. Both ends must be suitable for operating in air. *See also:* bushing 49-1948w

floor cavity ratio (illuminating engineering) For a cavity formed by the work-plane, the floor, and the wall surfaces between these two planes, the FCR is computed by using the distance from the floor to the work plane (hf) as the cavity height in the equations given in the definition for cavity ratio. (EEC/IE) [126]

floor lamp (illuminating engineering) A portable luminaire on a high stand suitable for standing on the floor. (EEC/IE) [126]

floor-standing equipment Equipment designed to be used directly in contact with the floor, or supported above the floor on a surface designed to support both the equipment and the operator (e.g., a raised computer floor). (EMC) C63.4-1991

floor trap (burglar-alarm system) A device designed to indicate an alarm condition in an electric protective circuit whenever an intruder breaks or moves a thread or conductor extending across a floor space. *See also:* protective signaling. (EEC/PE) [119]

floppy disk A magnetic disk made of flexible plastic material that is coated with magnetic material and encased in a protective plastic cover. *Note:* Although the name implies that the disk itself is flexible, this term is also used to refer to magnetic disks with rigid plastic covers. *Synonyms:* flexible disk; floppy diskette. *Contrast:* hard disk. *See also:* mini-floppy disk; double-sided disk; single-sided disk; high-density disk; double-density disk; microfloppy disk. (C) 610.10-1994w

floppy diskette *See:* floppy disk.

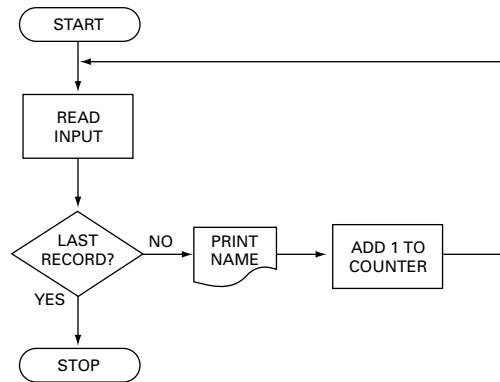
flotation fluid (accelerometer) (inertial sensors) (gyros) The fluid that suspends the float inside the instrument case. The float may be fully or partially floated within the fluid. The degree of flotation varies with temperature because the specific gravity of the fluid varies with temperature. In addition, the fluid provides damping. *See also:* damping fluid. (AES/GYAC) 528-1994

flow Water movement in a stream or conduit. It is generally measured in cubic feet per second or cubic meters per second. (PE/EDPG) 1020-1988r

flow angle (gas tube) That portion, expressed as an angle, of the cycle of an alternating voltage during which current flows. *See also:* gas tube. (ED) [45]

flowchart (1) (computers) A graphical representation for the definition, analysis, or solution of a problem, in which symbols are used to represent operations, data, flow, and equipment. *See also:* logic diagram. (MIL/C) [2], [20], [85]

(2) (software) A control flow diagram in which suitably annotated geometrical figures are used to represent operations, data, or equipment, and arrows are used to indicate the sequential flow from one to another. *Synonym:* flow diagram. *See also:* structure chart; box diagram; graph; block diagram; input-process-output chart; bubble chart.



flowchart

(C) 610.12-1990

flowcharter A software tool that accepts as input a design or code representation of a program and produces as output a flowchart of the program. (C) 610.12-1990

flow control (1) A mechanism used in open systems to regulate data communications to ensure that no data is lost in the case of insufficient buffer size, or other limited resources. Flow control is done using receive not ready (RNR), receive ready (RR), and the flow control primitives. Flow control in devices or systems entails operations from the Data Link through the Application layer. (EMB/MIB) 1073.3.1-1994

(2) A mechanism for signaling the producer when messages may or must not be sent. It is used to avoid overrunning the limits of the consumer, memory, queue-depth, or message-passing facilities. (C/MM) 1212.1-1993

(3) (local area networks) An operational capability that allows a peer MAC client entity to cause a temporary delay in further packet transmission from the MAC to that entity. (C) 802.12c-1998

(4) The mechanism employed by a communications provider that constrains a sending entity to wait until the receiving entities can safely receive additional data without loss. (C) 1003.5-1999

(5) The function performed by a receiving entity to limit the amount of data that is sent by a transmitting entity. (C/MM) 1284.4-2000

flow control character (FCC) A control character transmitted on a link in the opposite direction to data flow for each direction of data flow, i.e., to the transmitter of data from the receiver, indicating that the receiver has space reserved to receive a further F_N chars. The value of F is specified separately for each technology in this standard. (C/BA) 1355-1995

flow diagram (1) Graphic representation of a program or a routine. (C) 270-1966w

(2) (software) *See also:* flowchart. (C) 610.12-1990

flow down Passing to a lower level or tier contractual requirements related to administrative, technical or quality performance. (NI) N42.23-1995

flow-duration curve Graphical representation that shows how stream flow has varied historically. (PE/EDPG) 1020-1988r

Flowmatic The first automatic programming language, developed specifically for the UNIVAC II computer.

(C) 610.13-1993w

flow of control (software) *See also:* control flow.

(C) 610.12-1990

flow relay A relay that responds to a rate of fluid flow.

(SWG/PE) C37.100-1992

flow soldering *See:* dip soldering.

flow switch (power system device function numbers) A switch which operates on given values, or on a given rate of change, of flow.

(SUB/PE) C37.2-1979s

FLP Burst *See:* Fast Link Pulse (FLP) Burst.

FLP Burst Sequence *See:* Fast Link Pulse (FLP) Burst Sequence.

fluctuating power (rotating machinery) A phasor quantity of which the vector represents the alternating part of the power, and that rotates at a speed equal to double the angular velocity of the current. *See also:* asynchronous machine. (PE) [9]

fluctuating target A radar target whose echo amplitude varies as a function of time. *See also:* target fluctuation.

(AES) 686-1997

fluctuation (1) (pulse terminology) Dispersion of the pulse amplitude or other magnitude parameter of the pulse waveforms in a pulse train with respect to a reference pulse amplitude or a reference magnitude. Unless otherwise specified by a mathematical adjective, peak-to-peak fluctuation is assumed. *See also:* mathematical adjectives. (IM/WM&A) 194-1977w

(2) (radar) *See also:* target fluctuation. (AES) 686-1997

fluctuation loss The change in radar detectability or measurement accuracy for a target of given average echo return power due to target fluctuation. *Note:* It may be measured as the change in required average echo return power of a fluctuating target as compared to a target of constant echo return, to achieve the same detection probability or measurement accuracy.

(AES) 686-1997

fluctuation noise *See:* random noise.

fluence (solar cells) The total time-integrated number of particles that cross a plane unit area from either side.

(AES/SS) 307-1969w

fluence-to-dose-equivalent conversion factor The numerical quantity that relates the neutron fluence to the dose equivalent at a specified depth in tissue.

(NI) N42.20-1995

fluid-filled joints (power cable joints) Joints in which the joint housing is filled with an insulating material that is fluid at all operating temperatures.

(PE/IC) 404-1986s

fluid loss (rotating machinery) That part of the mechanical losses in a machine having liquid in its air gap that is caused by fluid friction. *See also:* asynchronous machine; direct-current commutating machine. (PE) [9]

fluidly delayed overcurrent trip *See:* overcurrent release; fluidly delayed release.

fluidly delayed release (trip) A release delayed by fluid displacement or adhesion.

(SWG/PE) C37.100-1992

fluid pressure supply system (hydraulic turbines) The pumps, means for driving them, pressure and sump tanks, valves and piping connecting the various parts of the governing system and associated and accessory devices.

(PE/EDPG) 125-1977s

fluids from essential freeze protection (electric pipe heating systems) The use of electric pipe heating systems to prevent the temperature of fluids from dropping below the freezing point of the fluid in desirably available or essential outdoor (usually) piping systems at fossil fueled generating stations. An example of an essential freeze protection system is the heating for the feedwater system. (PE/EDPG) 622A-1984r

fluorescence (illuminating engineering) The emission of light as the result of, and only during, the absorption of radiation of shorter wavelengths. (EEC/IE) [126]

fluorescent lamp (illuminating engineering) A low-pressure mercury electric-discharge lamp in which a fluorescing coating (phosphor) transforms some of the ultraviolet energy generated by the discharge into light. (EEC/IE) [126]

flush (A) To empty one or more storage locations of their contents; for example, to clear the contents of a buffer after saving its contents on disk. **(B)** To ensure that a buffer has been written to the permanent storage location.

(C) 610.10-1994

flush antenna (aircraft) An antenna having no projections outside the streamlined surface of the aircraft. In general, flush antennas may be considered as slot antennas.

(PE/EEC) [119]

flush instruction A flush (cache-control) instruction changes a line to the uncached state. If the data are dirty, they are copied back to memory before the old cache line is invalidated.

(C/MM) 1596-1992

flush left In text formatting, justification of text such that it is aligned on the left and has a ragged right margin. *Contrast:* flush right. *See also:* left justification. (C) 610.2-1987

flush-mounted antenna An antenna constructed into the surface of a mechanism, or of a vehicle, without affecting the shape of that surface. *Contrast:* conformal antenna.

(AP/ANT) 145-1993

flush-mounted device (power and distribution transformers) A device in which the body projects only a small specified distance in front of the mounting surface.

(SWG/PE/TR) C37.100-1992, C57.12.80-1978r

flush-mounted or recessed (illuminating engineering) A luminaire that is mounted above the ceiling (or behind a wall or other surface) with the opening of the luminaire level with the surface. (EEC/IE) [126]

flush mounting So designed as to have a minimal front projection when set into and secured to a flat surface.

(PE/TR) C57.12.80-1978r

flush right In text formatting, justification of text such that it is aligned on the right and has a ragged left margin. *Contrast:* flush left. *See also:* right justification. (C) 610.2-1987

flutter (sound recording and reproducing equipment) Frequency modulation of the signal in the range of approximately 6 Hz to 100 Hz resulting in distortion which may be perceived as a roughening of the sound quality of a tone or program.

(SP) 193-1971w

flutter echo A rapid succession of reflected pulses resulting from a single initial pulse. (SP) [32]

flutter rate (sound recording and reproducing) The number of frequency excursions in hertz, in a tone that is frequency-modulated by flutter. *Notes:* 1. Each cyclical variation is a complete cycle of deviation, for example, from maximum-frequency to minimum-frequency and back to maximum-frequency at the rate indicated. 2. If the over-all flutter is the resultant of several components having different repetition rates, the rates and magnitudes of the individual components are of primary importance.

flux (1) (photovoltaic power system) The rate of flow of energy through a surface. *See also:* photovoltaic power system.

(AES) [41]

(2) (soldering) (connections) A liquid or solid which when heated exercises a cleaning and protective action upon the surfaces to which it is applied. (SWG/PE) [103]

(3) (fiber optics) (solar cells) The number of particles that cross a plane unit area per unit time from either side. *Synonym:* radiant power. (AES/SS) 307-1969w, 812-1984w

fluxgate magnetometer An instrument for measuring magnetic fields by making use of the nonlinear magnetic characteristics of a probe or sensing element that has a ferromagnetic core.

(T&D/PE) 1308-1994

flux guide (induction heating usage) Magnetic material used to guide electromagnetic flux in desired channels. *Note:* The guides may be used either to direct flux to preferred locations or to prevent the flux from spreading beyond definite regions. *See also:* induction heater. (IA) 54-1955w, 169-1955w

flux linkages The sum of the fluxes linking the turns forming the coil, that is, in a coil having N turns, the flux linkage is $\lambda = \phi_1 + \phi_2 + \phi_3 \dots \phi_N$ where $\phi_1 =$ flux linking turn 1, $\phi_2 =$ flux linking turn 2, etc., and $\phi_N =$ flux linking the N th turn. (CHM) [51]

fluxmeter An instrument for use with a test coil to measure magnetic flux. It usually consists of a moving-coil galvanometer in which the torsional control is either negligible or compensated. *See also*: magnetometer. (EEC/PE) [119]

flux method *See*: lumen method.

flux transfer theory (illuminating engineering) A method of calculating the illuminance in a room by taking into account the interreflection of the light flux from the room surfaces based on the average flux transfer between surfaces. (EEC/IE) [126]

fly ash The finely divided particles of ash entrained in flue gases arising from the combustion of fuel. The particles of ash may contain incompletely burned fuel. The term has been applied predominantly to the gas-borne ash from boilers with spreader stoker, underfeed stoker, and pulverized fuel (coal) firing. *Note*: The above definition is consistent with the generic concept of the word ash. However, all the particulates (including unburned carbon) in suspension in the flue gases are generally called fly ash and the term herein is used in this sense. (PE/EDPG) 548-1984w

flyback (television) The rapid return of the beam in a cathode-ray tube in the direction opposite to that used for scanning. (BT/AV) 201-1979w

flying head *See*: floating head.

flying spot scanner (optical character recognition) A device employing a moving spot of light to scan a sample space, the intensity of the transmitted or reflected light being sensed by a photoelectric transducer. (C) [20], [85]

flywheel ring (rotating machinery) A heavy ring mounted on the spider for the purpose of increasing the rotor moment of inertia. *See also*: rotor. (PE) [9]

FM *See*: frequency modulation.

FM-CW radar *See*: frequency-modulated continuous wave radar.

FM-FM *See*: frequency modulation-frequency modulation.

FM-FM telemetry *See*: frequency modulation-frequency modulation telemetry.

FMIC *See*: fibre optic medium interface connection.

FM radio broadcast band (overhead-power-line corona and radio noise) A band of frequencies assigned for frequency-modulated broadcasting to the general public. *Note*: In the United States and Canada, the frequency band is 88 MHz–108 MHz. (T&D/PE) 539-1990

FMS *See*: flexible manufacturing system.

FN *See*: function key.

FOA *See*: oil-immersed transformer.

focal length (laser maser) The distance from the secondary nodal point of a lens to the primary focal point. In a thin lens, the focal length is the distance between the lens and the focal point. (LEO) 586-1980w

focal point (laser maser) The point toward which radiation converges or from which radiation diverges or appears to diverge. (LEO) 586-1980w

FOCUS A fourth-generation language used to develop information systems, characterized by its integrated database manipulation language and its ability to be used on a wide range of computer platforms. (C) 610.13-1993w

focus (oscillograph) Maximum convergence of the electron beam manifested by minimum spot size on the phosphor screen. *See also*: oscillograph; astigmatism. (IM/HFIM) [40]

focused tests Tests performed to identify a particular area of failure. (SWG/PE) C37.10-1995

focus emphasis A type of emphasis that indicates the current location for entering text. (C) 1295-1993w

focusing (1) (electron tube) The process of controlling the convergence of the electron beam. (ED/BT/AV) 161-1971w, [34], [84]

(2) The concentration of electromagnetic energy into a smaller region of space. *See also*: defocusing. (AP/PROP) 211-1997

focusing and switching grille (color picture tubes) A color-selecting-electrode system in the form of an array of wires including at least two mutually-insulated sets of conductors in which the switching function is performed by varying the potential difference between them, and focusing is accomplished by maintaining the proper average potentials on the array and on the phosphor screen. (ED) 161-1971w

focusing coil *See*: focusing magnet.

focusing device An instrument used to locate the filament of an electric lamp at the proper focal point of lens or reflector optical systems. (EEC/PE) [119]

focusing, dynamic *See*: dynamic focusing.

focusing electrode (beam tube) An electrode the potential of which is adjusted to focus an electron beam. *See also*: electrode. (ED/NPS/BT/AV) 161-1971w, [84], 398-1972r, [34]

focusing, electrostatic *See*: electrostatic focusing.

focusing grid *See*: focusing electrode.

focusing magnet An assembly producing a magnetic field for focusing an electron beam. (ED) 161-1971w, [45]

focusing, magnetic *See*: magnetic focusing.

focusing transducer An interdigital transducer with curved electrodes to focus the launched acoustic wave to a narrower beamwidth. (UFFC) 1037-1992w

FODTE *See*: fibre optic station.

fog Visible aggregate of minute water droplets suspended in the atmosphere near the earth's surface. According to international definition, fog reduces visibility below 1 km. Fog differs from clouds only in that the base of fog is at the earth's surface while clouds are above its surface. When composed of ice crystals, it is termed ice fog. Fog is easily distinguished from haze by its appreciable dampness and gray color. Mist may be considered as intermediate between fog and haze. Mist particles are microscopic in size. Mist is less damp than fog and does not restrict visibility to the same extent. There is no distinct division, however, between any of these categories. Near industrial and heavy traffic areas, fog often is mixed with smoke and vehicle exhaust, and this combination is known as smog. *Note*: Under fog or other dew formation conditions, conductors can become wet or dry depending upon the level of the load current in the conductors. Medium to high load currents produce enough heat through I^2R (resistance) losses to discourage dew formation. Load current also speeds up the drying process after rain, fog, wet snow, etc. (T&D/PE) 539-1990

fog-bell operator A device to provide automatically the periodic bell signals required when a ship is anchored in fog. (EEC/PE) [119]

fog lamps (A) Lamps that may be used in lieu of headlamps to provide road illumination under conditions of rain, snow, dust, or fog. *Synonym*: adverse-weather lamps. *See also*: headlamp. **(B) (illuminating engineering)** Units that may be used in lieu of headlamps or in connection with the lower beam headlights to provide road illumination under conditions of rain, snow, dust, or fog. *Synonym*: adverse-weather lamps. (EEC/IE) [126]

FOI *See*: fibre optic interface.

FOIL *See*: File-Oriented Interpretive Language.

foil (burglar-alarm system) (foil tape) A fragile strip of conducting material suitable for fastening with an adhesive to glass, wood, or other insulating material in order to carry the alarm circuit and to initiate an alarm when severed. *See also*: protective signaling. (EEC/PE) [119]

foil shield A thin, self-supported, metallic tape wrapped longitudinally or spirally around the cable core, and intended to act as a shield against EMI. (PE/IC) 1143-1994r

FOIRL *See*: Fiber Optic Inter-Repeater Link.

FOIRL BER For 10BASE-F, the mean bit error rate of the FOIRL. (LM/C) 802.3u-1995s

FOIRL Compatibility Interface For 10BASE-F, the FOMDI and AUI (optional); the two points at which hardware com-

patibility is defined to allow connection of independently designed and manufactured components to the baseband optical fiber cable link segment. (LM/C) 802.3u-1995s

FOIRL Segment *See*: Fiber Optic Inter-Repeater Link (FOIRL) Segment.

FOIRL collision For 10BASE-F, the simultaneous transmission and reception of data in a FOMAU. (LM/C) 802.3u-1995s

FOIRL compatibility interfaces The FOMDI (fiber-optic medium dependent interface) and the AUI (optional); the two points at which hardware compatibility is defined to allow connection of independently designed and manufactured components to the baseband optical fiber cable link segment. (LM/C) 802.3b-1989s, 802.3d-1989s, 802.3c-1989s, 802.3e-1989s

folded backplane A backplane in which the electrical bus runs the length of the backplane twice, connecting to alternating modules on each pass. (C/BA) 14536-1995

folded dipole (antenna) An antenna composed of two or more parallel, closely-spaced dipole antennas connected together at their ends with one of the dipole antennas fed at its center and the others short-circuited at their centers. (AP/ANT) 145-1993

folded monopole antenna A monopole antenna formed from half of a folded dipole with the unfed element(s) directly connected to the imaging plane. (AP/ANT) 145-1993

foldover convolution (self convolution) The undesired spurious convolution response that occurs when a portion of an input waveform is reflected into the convolution region and interacts with the input signals. (U/FFC) 1037-1992w

Foldy's approximation The approximate solution for the propagation constant of the mean field in a random medium based on the scattering properties of a single particle. (AP/PROP) 211-1997

Foldy-Twersky theory *See*: Foldy's approximation.

follow (surge arresters) (power) The current from the connected power source that flows through an arrester during and following the passage of discharge current. (PE/SPD) 28-1974, C62.1-1981s

follow current (1) The current from the connected power source that flows through a surge-protective device during and following the passage of discharge current. (SPD/PE) C62.62-2000

(2) The current from the connected power source that flows through an arrester during and following the passage of discharge or surge current. (RL) C136.10-1996

(3) **(surge arresters) (power) (gas tube surge-protective device)** The current from the connected power source that flows through an arrester during and following the passage of discharge current. (SPD/PE) C62.31-1987r, C62.32-1981s, [8], C62.1-1981s

follower drive (slave drive) A drive in which the reference input and operation are direct functions of another drive, called the master drive. *See also*: feedback control system. (IA/ICTL/APP/IAC) [69], [60]

follow-up potentiometer A servo potentiometer that generates the signal for comparison with the input signal. *See also*: electronic analog computer. (C) 165-1977w

FOMAU *See*: Fiber Optic Medium Attachment Unit.

FOMAU's receive optical fiber For 10BASE-F, the optical fiber from which the local FOMAU receives signals. (LM/C) 802.3u-1995s

FOMAU's transmit optical fiber For 10BASE-F, the optical fiber into which the local FOMAU transmits signals. (LM/C) 802.3u-1995s

FOMDI (Fiber Optic Medium-Dependent Interface) *See*: Fiber Optic Medium Dependent Interface.

F1A line weighting (data transmission) A noise weighting used in a noise measuring set to measure noise on a line that would be terminated by a 302 type, or similar, subset. The meter scale readings are in dBa (F1A). (PE) 599-1985w

F1 layer The lower of the two ionized layers normally existing in the F region in the day hemisphere. *See also*: F region. (AP/PROP) 211-1997

font (1) (computers) A family or assortment of characters of a given size and style. *See also*: type font. (C) [20], [85]

(2) **(mathematics of computing)** A family or related set of characters and symbols of a particular style of type. (C) 610.6-1991w

(3) A family or related set of characters and symbols of a particular style of type face; for example, 10-point Times Roman. *See also*: optical font; outline font; bit map font; downloadable font; character font. (C) 610.10-1994w

font cartridge A removable storage medium that is used with an output device such as a printer to store on-line fonts. *Note*: By changing the font cartridge, the user can access new fonts. *See also*: cartridge font; font disk. (C) 610.10-1994w

font disk (1) In phototypesetting, a glass disk, imprinted with a specific character font, used by a phototypesetter to generate characters in that character font. (C) 610.2-1987

(2) A disk that is used to store one or more fonts. *See also*: font cartridge. (C) 610.10-1994w

foot (rotating machinery) The part of the stator structure, end shield, or base, that provides means for mounting and fastening a machine to its foundation. *See also*: stator. (PE) [9]

footcandle (fc) (1) (A) (illuminating engineering) A unit of illuminance. One footcandle is one lumen per square foot (lm/ft²). (B) A unit of illuminance (light incident upon a surface) that is equal to 1 lm/ft². In the international system, the unit of illuminance is lux (1 fc = 10.76 lux). (EEC/IE/IA/PSE) [126], 241-1990

(2) **(television)** *See also*: illumination. (BT/AV) 201-1979w

footer *See*: running footer.

footings (foundations) Structures set in the ground to support the bases of towers, poles, or other overhead structures. *Note*: Footings are usually skeleton steel pyramids, grills, or piers of concrete. *See also*: tower. (T&D/PE) [10]

footlambert* (1) (light-emitting diodes) (television) (illuminating engineering) A lambertian unit of luminance equal to (1/π) candela per square foot. This term is obsolete. (IE/EEC/BT/ED/AV) [126], 201-1979w, [127]

(2) A unit of luminance (photometric brightness) equal to 1/π candela per square foot (10.7639/π candelas per square meter), or to the uniform luminance of a perfectly diffusing surface emitting or reflecting light at the rate of 1 lumen per square foot (10.7639 lumens per square meter), or to the average luminance of any surface emitting or reflecting light at that rate. *Notes*: 1. A footcandle is a unit of incident light, and a footlambert is a unit of emitted or reflected light. For a perfectly reflecting or perfectly diffusing surface, the numbers of footcandles is equal to the number of footlamberts. 2. The average luminance of any reflecting surface in footlamberts is, therefore, the product of the illumination in footcandles by the luminous reflectance of the surface. (BT/AV) 201-1979w

(3) A unit of luminance (photometric brightness) equal to 1/π candela per square foot, or to the uniform luminance of a perfectly diffusing surface emitting or reflecting light at the rate of one lumen per square foot. (ED) [127]

(4) **(electric power systems in commercial buildings)** The unit of illuminance that is defined as 1 lm uniformly emitted by an area of 1 ft². In the international system, the unit of luminance is candela per square meter (cd/m²). (IA/PSE) 241-1990r

* Deprecated.

footprint (1) (of an antenna beam on a specified surface) An area bounded by a contour on a specified surface formed by the intersection of the surface and that portion of the beam of an antenna above a specified minimum gain level, the orientation of the beam with respect to the surface being specified. (AP/ANT) 145-1993

(2) The physical space that a device occupies on a desk or other work surface. *Synonym:* real estate.

(C) 610.10-1994w

foot switch A switch that is suitable for operation by an operator's foot. *See also:* switch.

(IA/ICTL/APP/IAC) [69], [60]

FOPMA (Fiber Optic Physical Medium Attachment) *See:* fiber optic physical medium attachment.

forbidden character *See:* illegal character.

forbidden combination A code expression that is defined to be nonpermissible and whose occurrence indicates a mistake or malfunction.

(ED) 161-1971w

forbidden-combination check (1) (data management) A check in which a combination of bits or other representations is not valid according to some criteria. *Contrast:* illegal character.

(C) 610.5-1990w

(2) **(electronic computation)** *See also:* forbidden combination; check.

force Any physical cause that is capable of modifying the motion of a body. The vector sum of the forces acting on a body at rest or in uniform rectilinear motion is zero.

270-1966w

forced-air cooling system (1) (rectifier) An air cooling system in which heat is removed from the cooling surfaces of the rectifier by means of a flow of air produced by a fan or blower. *See also:* rectification.

(IA/EEC/PCON) [62], [110]

(2) **(thyristor controller)** A cooling system in which the heat is removed from the cooling surfaces of the thyristor controller components by means of a flow of air produced by a fan or blower.

(IA/IPC) 428-1981w

forced collision A collision that occurs when a packet is transmitted even when traffic is detected on the network and, therefore, the packet will collide with other packets already on the network.

(C) 610.7-1995

forced derated hours (electric generating unit reliability, availability, and productivity) The available hours during which a Class 1, 2, or 3 unplanned derating was in effect.

(PE/PSE) 762-1987w

forced drainage (underground metallic structures) A method of controlling electrolytic corrosion whereby an external source of direct-current potential is employed to force current to flow to the structure through the earth, thereby maintaining it in a cathode condition. *See also:* inductive coordination.

(EEC/PE) [119]

forced interruption (electric power system) An interruption caused by a forced outage. *See also:* outage.

(PE/T&D/PSE) [54], 346-1973w, 1366-1998

forced-lubricated bearing (rotating machinery) A bearing in which a continuous flow of lubricant is forced between the bearing and journal.

(PE) [9]

forced oscillation (linear constant-parameter system) The response to an applied driving force. *See also:* network analysis.

(Std100) 270-1966w

forced outage (1) (emergency and standby power) A power outage that results from the failure of a system component, requiring that it be taken out of service immediately, either automatically or by manual switching operations, or an outage caused by improper operation of equipment or human error. This type of power outage is not directly controllable and is usually unexpected.

(IA/PSE) 446-1995

(2) **(electric power system)** An outage that results from conditions directly associated with a component requiring that it be taken out of service immediately, either automatically or as soon as switching operations can be performed, or an outage caused by improper operation of equipment or human error. *Notes:* 1. This definition derives from transmission and distribution applications and does not necessarily apply to generation outages. 2. The key test to determine if an outage should be classified as forced or scheduled is as follows. If it is possible to defer the outage when such deferment is desirable, the outage is a scheduled outage; otherwise, the outage is a forced outage. Deferring an outage may be desirable, for

example, to prevent overload of facilities or an interruption of service to consumers.

(PE/PSE) 346-1973w

(3) **(outages of electrical transmission facilities)** An automatic outage, or a manual outage that cannot be deferred.

(PE/PSE) 859-1987w

(4) An outage (failure) that cannot be deferred.

(IA/PSE) 493-1997

(5) *See also:* failure.

forced outage duration *See:* repair time.

forced outage hours (electric generating unit reliability, availability, and productivity) The number of hours a unit was in a Class 1, 2, or 3 unplanned outage state. *See also:* unplanned outage.

(PE/PSE) 762-1987w

forced release (telephone switching systems) Release initiated from sources other than the calling or called line.

(COM) 312-1977w

forced response (1) The response of a system resulting from the application of an energy source with the system initially free of stored energy.

(CAS) [13]

(2) **(automatic control)** A time response which is produced by a stimulus external to the system or element under consideration. *Note:* The response may be described in terms of the causal variable. *See also:* acceleration-forced response; impulse-forced response.

(PE/EDPG) [3]

forced response [test] method A test that determines the power dissipation characteristics of a damper by the measurement of the force and velocity imparted to a damper that is mounted directly on the shaker.

(T&D/PE) 664-1993

forced-triggered gap A bypass gap that is designed to operate on external command on quantities such as varistor energy, current magnitude, or rate of change of such quantities. The sparkover of the gap is initiated by a trigger circuit. After initiation, an arc is established in the power gap. Forced-triggered gaps typically sparkover only during internal faults.

(T&D/PE) 824-1994

forced unavailability The long-term average fraction of time that a component or system is out of service due to a forced outage (failure).

(IA/PSE) 493-1997, 399-1997

forced-ventilated machine *See:* open pipe-ventilated machine.

force factor (A) (electroacoustic transducer) The complex quotient of the pressure required to block the acoustic system divided by the corresponding current in the electric system. **(B) (electroacoustic transducer)** The complex quotient of the resulting open-circuit voltage in the acoustic system. *Note:* Force factors (A) and (B) have the same magnitude when consistent units are used and the transducer satisfies the principle of reciprocity.

(SP) [32]

(2) **(A) (electromechanical transducer)** The complex quotient of the force required to block the mechanical system divided by the corresponding current in the electric system.

(B) (electromechanical transducer) The complex quotient of the resulting open-circuit voltage in the electric system divided by the velocity in the mechanical system. *Notes:* 1. Force factors (A) and (B) have the same magnitude when consistent units are used and the transducer satisfies the principle of reciprocity. 2. It is sometimes convenient in an electrostatic or piezoelectric transducer to use the ratios between force and charge or electric displacement, or between voltage and mechanical displacement.

(EEC/PE) [119]

force test A test used to assure that the fall arrest system itself does not severely injure a worker during a fall arrest. A test to ensure that the worker is not severely injured by limiting forces on the worker's body to 4.0 kN (900 pounds) with a line-worker's body belt or 8.0 kN (1800 pounds) with a full body harness.

(T&D/PE) 1307-1996

forcing The application of control impulses to initiate a speed adjustment, the magnitude of which is greater than warranted by the desired controlled speed in order to bring about a greater rate of speed change. *Note:* Forcing may be obtained by directing the control impulse so as to effect a change in the field or armature circuit of the motor, or both. *See also:* electric drive.

(IA/ICTL/IAC) [60]

foreground In job scheduling, the computing environment in which high-priority processes or those requiring user interaction are executed. *Contrast:* background. *See also:* foreground processing. (C) 610.12-1990

foreground image The part of a display image that can be modified. *Contrast:* background image. (C) 610.6-1991w

foreground job *See:* foreground process group.

foreground process A process that is a member of a foreground process group. (C/PA) 9945-1-1996, 9945-2-1993, 1003.5-1999

foreground process group [foreground job] A process group whose member processes have certain privileges, denied to processes in background process groups, when accessing their controlling terminal. Each session that has established a connection with a controlling terminal has exactly one process group of the session as the foreground process group of that controlling terminal. *Synonym:* foreground process group. (C/PA) 9945-1-1996, 9945-2-1993

foreground process group (1) A process group whose member processes have certain privileges, denied to processes in background process groups, when accessing their controlling terminal. Each session that has established a connection with a controlling terminal has exactly one process group of the session as the foreground process group of that controlling terminal. *Synonym:* foreground process group. (C/PA) 9945-1-1996, 9945-2-1993

(2) A group of processes that have certain privileges, denied to processes in background process groups, when accessing their controlling terminal. Each session that has established a connection with a controlling terminal has exactly one process group of the session as the foreground process group of that controlling terminal. (C) 1003.5-1999

foreground process group ID The process group ID of the foreground process group. (C/PA) 1003.5-1999, 9945-1-1996

foreground processing The execution of a high-priority process while lower-priority processes await the availability of computer resources, or the execution of processes that require user interaction. *Contrast:* background processing. (C) 610.12-1990

foreign area (telephone switching systems) A numbering plan area other than the one in which the calling customer is located. (COM) 312-1977w

foreign data dictionary A data dictionary developed by a non-Intelligent Transportation Systems (ITS) community. (SCC32) 1489-1999

foreign data source A data dictionary or message set developed by a non-ITS community. (SCC32) 1488-2000

foreign exchange An exchange that connects a customer's location to a remote customer. (C) 610.7-1995

foreign exchange circuit A circuit that provides foreign exchange service. *See also:* dial-up circuit; simplex circuit; four-wire circuit; two-wire circuit; leased circuit. (C) 610.7-1995

foreign exchange line (1) (data transmission) A subscriber line by means of which service is furnished to a subscriber at his request from an exchange other than the one from which service would normally be furnished. (PE) 599-1985w

(2) (telephone switching systems) A loop form an exchange other than the one from which service would normally be furnished. (COM) 312-1977w

foreign exchange service A service that provides a connection between a customer and a central office other than the one that serves the exchange area in which the customer is located. (C) 610.7-1995

foreign key (1) (A) An attribute that is a primary key, not to the record it is in, but to some related record. **(B)** In a relational data model, nonprime attributes of some relation that is defined on the same domain as a prime attribute of another relation. (C) 610.5-1990

(2) An attribute, or combination of attributes, of a child or category entity instance whose values match those in the primary key of a related parent or generic entity instance. A foreign key results from the migration of the parent or generic entity's primary key through a generalization structure or a relationship. (C/SE) 1320.2-1998

foreign potential Any voltage and resultant current imposed on telecommunications plant or equipment that is not supplied from the central office or from telecommunications equipment. (IA/PSE) 1100-1999

forensic engineering The application of engineering knowledge to questions of law affecting life and property. (SWG/PE) C37.10-1995

forest A set of disjoint trees. (C) 610.5-1990w

forestalling switch *See:* acknowledgedger.

For Exposition Only page A model page that contains pictorial and graphical information (in contrast to text) about a specific diagram. Unlike a diagram, the contents of a For Exposition Only page (FEO page) need not comply with IDEF0 rules. (C/SE) 1320.1-1998

fork *See:* branch.

fork beat *See:* carrier beat.

form (1) Any article, such as a printing plate, that is used as a pattern to be reproduced. (EEC/PE) [119]

(2) A medium, sometimes preprinted, on which information is to be printed or plotted. *See also:* form feed; printed card form; index hole; continuous form. (C) 610.10-1994w

FORMAC *See:* FORMula Manipulation Compiler; FORMula Manipulation Language.

formalization The precise description of the semantics of a language in terms of a formal language such as first order logic. (C/SE) 1320.2-1998

formal language (software) A language whose rules are explicitly established prior to its use. Examples include programming languages and mathematical languages. *Contrast:* natural language. (C) 610.12-1990, 610.13-1993w

formal logic The study of the structure and form of valid argument without regard to the meaning of the terms in the argument. (C) [20], [85]

formal parameter (software) A variable used in a software module to represent data or program elements that are to be passed to the module by a calling module. *Contrast:* argument. (C) 610.12-1990

formal qualification review (FQR) The test, inspection, or analytical process by which a group of configuration items comprising a system are verified to have met specific contractual performance requirements. *Contrast:* requirements review; test readiness review; design review; code review. (C) 610.12-1990

formal specification (A) (software) A specification written and approved in accordance with established standards.

(B) (software) A specification written in a formal notation, often for use in proof of correctness. (C) 610.12-1990

formal testing (software) Testing conducted in accordance with test plans and procedures that have been reviewed and approved by a customer, user, or designated level of management. *Contrast:* informal testing. (C) 610.12-1990

formal test specification A specification of the assertion test using a formal method specified by the test method specification. The test method specification shall specify whether the formal test specification is normative or informative. (C/PA) 2003-1997

format (1) (computers) The general order in which information appears on the input medium.

(2) (data transmission) Arrangement of code characters within a group, such as a block or message. (COM) [49]

(3) Physical arrangement of possible locations of holes or magnetized areas. *See also:* address format. (MAG/EEC) 296-1969w, [74]

(4) (data management) The arrangement, order, or layout of data in or on a data medium. *See also:* variable format; fixed format. (C) 610.5-1990w

(5) (A) The structure or appearance of an object such as a storage medium, file, field, or page of text. (B) To establish or change the structure or appearance of an object as in definition (A). *See also*: high-level format; low-level format.

(C) 610.10-1994

format character A control character used to control a printer.

(C) 610.5-1990w

format classification (numerically controlled machines) A means, usually in an abbreviated notation, by which the motions, dimensional data, type of control system, number of digits, auxiliary functions, etc., for a particular system can be denoted. (MAG/EEC) 296-1969w, [74]

format detail (numerically controlled machines) Describes specifically which words and of what length are used by a specific system in the format classification. (IA) [61], [84]

format effector character Any control character used to control the positioning of printed, displayed, or recorded data. *Synonym*: layout character. *See also*: backspace character.

(C) 610.5-1990w

formation lights (illuminating engineering) A navigation light especially provided to facilitate formation flying.

(EEC/IE) [126]

formation voltage The final impressed voltage at which the film is formed on the valve metal in an electrochemical valve. *See also*: electrochemical valve. (EEC/PE) [119]

format status line A line displayed by many word processing systems that shows the current setting of text formatting parameters such as tabulation stops and margin positions.

(C) 610.2-1987

formatted (A) Pertaining to magnetic media, such as tapes or diskettes, that have been initialized and prepared to accept and store data. (B) Pertaining to text that has been organized into a particular arrangement for output or display.

(C) 610.2-1987

formatted information Information that has been arranged into discrete units and structures in a manner that facilitates its access and processing. *Contrast*: narrative information.

(C) 610.5-1990w

form C converter A single converter unit in which the direct current can flow in one direction only and which is capable of inverting energy from the load to the ac supply.

(IA/ID) 995-1987w

form designation (watthour meter) An alphanumeric designation denoting the circuit arrangement for which the meter is applicable and its specific terminal arrangement. The same designation is applicable to equivalent meters of all manufacturers. (ELM) C12.1-1982s

formed character printer A printer in which each character is a fully formed entity on a slug, drum, mask or other medium. *Contrast*: dot matrix printer. (C) 610.10-1994w

formette *See*: form-wound motorette.

form factor (1) (electric process heating) Coil ratio of conductor width to turn to turn space. *See also*: coil shape factor.

(IA) 54-1955w

(2) (illuminating engineering) (f_{1-2}) The ratio of the flux directly received by surface 2 (and due to lambertian surface 1) to the total flux emitted by surface 1. It is used in flux transfer theory. (EEC/IE) [126]

(3) (overhead power lines) (dc electric-field strength and ion-related quantities) An empirical parameter representing the increased electric field at the surface of a dc field meter that is mounted above the ground plane. The increased field is due to field perturbation by the instrument. In a uniform field, the unperturbed electric field is given by the measured field divided by the form factor for the instrument.

(T&D/PE) 539-1990, 1227-1990r

(4) (of a periodic function) (ff) The ratio of the rms value to the average absolute value $ff = y_{rms}/y_{AAV}$.

(PE/PSIM) 120-1989r

(5) (periodic function) The ratio of the root square value to the average absolute value, averaged over a full period of the function. (IA/PSE) 1100-1999

(~~form-feed~~) A character that in the output stream shall indicate that printing should start on the next page of an output device. The (~~form-feed~~) shall be the character designated by '\f' in the C-language binding. If (~~form-feed~~) is not the first character of an output line, the result is unspecified. It is unspecified whether this character is the exact sequence transmitted to an output device by the system to accomplish the movement to the next page. (C/PA) 9945-2-1993

form feed A command or signal sent to a printer to instruct it to eject the current page and go to the top of the next page. *See also*: tractor feed. (C) 610.10-1994w

form feed character (1) A format effector character that causes the print or display position to move to the next predetermined first line on the next form, the next page, or the equivalent. *Synonyms*: paper throw character; page eject character.

(C) 610.5-1990w

(2) A format effector character that instructs a device to move to the top of the next page or screen. (C) 610.10-1994w

form, fit, and function In configuration management, that configuration comprising the physical and functional characteristics of an item as an entity, but not including any characteristics of the elements making up the item. *See also*: configuration identification. (C) 610.12-1990

forming (1) (electrical) (semiconductor devices) The process of applying electric energy to a semiconductor device in order to modify permanently the electric characteristics. *See also*: semiconductor. (IA) [12]

(2) (semiconductor rectifiers) The electrical or thermal treatment, or both, of a semiconductor rectifier cell for the purpose of increasing the effectiveness of the rectifier junction. *See also*: rectification. (IA) 59-1962w, [12]

(3) (electrochemical) The process that results in a change in impedance at the surface of a valve metal to the passage of current from metal to electrolyte, when the voltage is first applied. *See also*: electrochemical valve. (EEC/PE) [119]

forming shell A metal structure designed to support a wet-niche lighting fixture assembly and intended for mounting in a swimming pool structure. (NESC/NEC) [86]

form letter *See*: iterative document.

form overlay A pattern used as a background image. For example, drawing format, report form, title block.

(C) 610.6-1991w

FORmula Manipulation Compiler (FORMAC) An extension of PL/1 used to perform symbolic manipulation of mathematical expressions. (C) 610.13-1993w

FORmula Manipulation Language (FORMAC) An extension of FORTRAN used to perform formal algebraic manipulations. (C) 610.13-1993w

FORmula TRANslator (FORTRAN (Fortran)) A high-order programming language used widely for solving scientific, mathematical and numerical problems. *Note*: At the time that this standard was written, FORTRAN 77 and Fortran 90 were both accepted IEEE language standards. *See also*: FGRAAL; common language; FOIL; algebraic language; DYNAMO; GASP IV. (C) 610.13-1993w

form-wound (rotating machinery) (performed winding) Applied to a winding whose coils are formed essentially to their final shape prior to assembly into the machine. *See also*: stator; rotor. (PE) [9]

form-wound motorette (rotating machinery) (formette) A motorette for form-wound coils. *See also*: asynchronous machine; direct-current commutating machine. (PE) [9]

FORTH A high-order programming language that can be used for a wide range of applications due to its ability to be used as an interpreter, command language, and even an operating system. *Note*: FORTH is not an acronym. *See also*: extensible language; Polyforth. (C) 610.13-1993w

Forth word *See*: command.

FORTRAN 66 A dialect of FORTRAN developed as a standard language in 1966. (C) 610.13-1993w

FORTRAN 77 A dialect of FORTRAN developed as a standard language in 1977. (C) 610.13-1993w

Fortran 90 A dialect of FORTRAN developed as a standard language in 1990. (C) 610.13-1993w

FORTTRAN IV A dialect of FORTRAN developed as a standard language in 1962. (C) 610.13-1993w

FORTTRAN Extended GRaph Algorithmic Language (FGRAAL) An extension of FORTRAN used widely to solve graph problems. *Note:* Includes facilities for manipulating sets and graphs. (C) 610.13-1993w

FORTTRAN (Fortran) *See:* FORmula TRANslator.

fortuitous distortion (data transmission) A random distortion of telegraph signals such as that commonly produced by interference. (PE) 599-1985w

fortuitous telegraph distortion Distortion that includes those effects that cannot be classified as bias or characteristic distortion and is defined as the departure, for one occurrence of a particular signal pulse, from the average combined effects of bias and characteristic distortion. *Note:* Fortuitous distortion varies from one signal to another and is measured by a process of elimination over a long period. It is expressed in percent of unit pulse. *See also:* distortion. (AP/ANT) 145-1983s

forward The direction of motion of the train corresponding to the direction of vision of an operator or attendant when occupying his or her normal position in a normal orientation. *Note:* For an unattended vehicle, forward may be defined by the prevailing direction of operation on the guideway segment being utilized. (VT) 1475-1999

forward-acting regulator A transmission regulator in which the adjustment made by the regulator does not affect the quantity that caused the adjustment. *See also:* transmission regulator. (EEC/PE) [119]

forward admittance, short-circuit *See:* admittance, short-circuit forward.

forward annotation The annotation of information from further upstream (earlier in the design flow) in the design process. *See also:* forward annotation file. (C/DA) 1481-1999

forward annotation file A file containing information to be read by a tool for the purpose of forward annotation, for example a Standard Delay Format (SDF) file containing PATHCONSTRAINTS. *See also:* forward annotation. (C/DA) 1481-1999

forward bias (VF) (light-emitting diodes) (forward voltage) The bias voltage which tends to produce current flow in the forward direction. (ED) [127]

forward breakover (thyristor) The failure of the forward blocking action of the thyristor during a normal OFF-state period. (IA/IPC) 428-1981w

forward channel (1) Data path from the host to the peripheral. (C/MM) 1284-1994

(2) A channel used to transmit data in which the direction of transmission coincides with that in which information is being transferred. *Contrast:* backward channel. (C) 610.10-1994w

forward controlling elements The elements in the controlling system that change a variable in response to the actuating signal. *See also:* feedback control system. (IM/PE/EDPG) [120], [3]

forward current (1) (metallic rectifier) The current that flows through a metallic rectifier cell in the forward direction. *See also:* rectification. (EEC/PE) [119]

(2) (semiconductor rectifier device) The current that flows through a semiconductor rectifier device in the forward direction. *See also:* rectification. (IA) 59-1962w, [12]

(3) (reverse-blocking or reverse-conducting thyristor) The principal current for a positive anode-to-cathode voltage. *See also:* principal current. (IA/ED/IA) 223-1966w, [12], [46], [62]

(4) (light-emitting diodes) The current that flows through a semiconductor junction in the forward direction. (SP) 347-1972w

forward current, average, rating *See:* average forward current rating.

forward direction (1) (metallic rectifier) The direction of lesser resistance to current flow through the cell; that is, from the negative electrode to the positive electrode. *See also:* rectification. (PE/EEC) [119]

(2) (semiconductor rectifier device) The direction of lesser resistance to steady direct-current flow through the device; for example, from the anode to the cathode. *See also:* semiconductor rectifier stack; semiconductor.

(3) (semiconductor rectifier diode) The direction of lower resistance to steady-state direct-current; that is, from the anode to the cathode. (IA) [12]

forward (reverse) direction in isolator (nonlinear, active, and nonreciprocal waveguide components) That direction of propagation between two ports of an isolator for which attenuation of waves is lower (higher) than in the opposite direction. (MTT) 457-1982w

forward elements (automatic control) Those elements situated between the actuating signal and the controlled variable in the closed loop being considered. *See also:* feedback control system. (PE/EDPG) 421-1972s

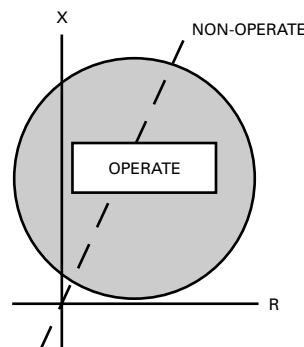
forward error-correcting system A system employing an error-correcting code and so arranged that some or all signals detected as being in error are automatically corrected at the receiving terminal before delivery to the data sink or to the telegraph receiver. (COM) [49]

forward error correction A technique that identifies errors incurred in transmission and allows corrections to be done at the receiving station without retransmission of the message. *See also:* hamming code. (C) 610.7-1995

forward gate current (thyristor) The gate current when the junction between the gate region and the adjacent anode or cathode region is forward biased. *See also:* principal current. (IA/ED) 223-1966w, [45], [62], [12]

forward gate voltage (thyristor) The voltage between the gate terminal and the terminal of the adjacent anode or cathode region resulting from forward gate current. *See also:* principal voltage-current characteristic. (IA/ED) 223-1966w, [62], [45], [12]

forward offset mho characteristic A variant of a mho characteristic in which the reach does not encompass the intersection of the *R-X* axes. *See figure below.*



FORWARD OFFSET MHO

(SWG/PE) C37.100-1992

forward path (feedback-control loop) (signal-transmission system) The transmission path from the loop-error signal to the loop-output signal. *See also:* feedback. (IE) [43]

forward period (rectifier circuits) (rectifier circuit element) The part of an alternating-voltage cycle during which forward voltage appears across the rectifier circuit element. *Note:* The forward period is not necessarily the same as the conducting period because of the effect of circuit parameters and semiconductor rectifier cell characteristics. *See also:* rectifier circuit element. (IA) 59-1962w, [12]

forward power dissipation (semiconductor) The power dissipation resulting from forward current. (IA) [12]

forward power loss (semiconductor devices) The power loss within a semiconductor rectifier device resulting from the flow of forward current. *See also:* rectification; semiconductor rectifier stack. (IA) 59-1962w, [12], [62]

forward progress A situation in which a module is not blocked from performing the tasks necessary to achieve its goal. Forward process is guaranteed only in the absence of deadlock or starvation.

(C/BA) 1014.1-1994w, 896.4-1993w, 896.3-1993w, 10857-1994

forward recovery (A) The reconstruction of a file to a given state by updating an earlier version, using data recorded in a chronological record of changes made to the file. *Contrast:* inline recovery; backward recovery. **(B)** A type of recovery in which a system, program, database, or other system resource is restored to a new, not previously occupied state in which it can perform required functions.

(C) 610.5-1990, 610.12-1990

forward recovery time (semiconductor diode) The time required for the current or voltage to recover to a specified value after instantaneous switching from a stated reverse voltage condition to a stated forward current or voltage condition in a given circuit. *See also:* rectification.

(IA) 59-1962w, [12]

forward resistance (metallic rectifier) The resistance measured at a specified forward voltage drop or a specified forward current. *See also:* rectification. (EEC/PE) [119]

forward scattering Scattering of an electromagnetic wave into directions that are at acute angles to the average direction of propagation of the original wave. (AP/PROP) 211-1997

forward-scattering cross section *See:* radar cross section.

forward supervision The use of supervisory sequences sent from a primary station or node to a secondary station or node. *Contrast:* backward supervision. (C) 610.7-1995

forward transadmittance (electron tube) The complex quotient of: the fundamental component of the short-circuit current induced in the second of any two gaps; and the fundamental component of the voltage across the first.

(ED) 161-1971w

forward transfer impedance An attribute similar to internal impedance of a power source, but at frequencies other than the nominal (e.g., 60 Hz power frequency). Knowledge of the forward transfer impedance allows the designer to assess the capability of the power source to provide load current (at the harmonic frequencies) needed to preserve a good output voltage waveform. Generally, the frequency range of interest is 60 Hz to 3 kHz for 50 to 60 Hz power systems, and 20 to 25 kHz for 380 to 480 Hz power systems.

(IA/PSE) 1100-1999

forward voltage (1) (rectifiers) Voltage of the polarity that produces the larger current, hence, the voltage across a semiconductor rectifier diode resulting from forward current. *See also:* ON-state voltage; forward voltage drop.

(2) (reverse-blocking or reverse-conducting thyristor) A positive anode-to-cathode voltage. *See also:* principal characteristics. (IA/ED) 223-1966w, [12], [46], [62]

forward voltage drop (1) (metallic rectifier) The voltage drop in the metallic rectifying cell resulting from the flow of current through a metallic rectifier cell in the forward direction.

(2) (semiconductor rectifiers) *See also:* forward voltage. (IA) 59-1962w, [12], 332-1972w

forward voltage overshoot (thyristor) The difference between the maximum forward OFF-state voltage following turn-off and the instantaneous ac voltage. (IA/IPC) 428-1981w

forward wave (traveling-wave tubes) A wave whose group velocity is in the same direction as the electron stream motion. (ED) [45]

forward-wave structure (microwave tubes) A slow-wave structure whose propagation is characterized on a ω/β dia-

gram (ω versus phase shift/section) by a positive slope in the region $0 < \beta < \pi$ (in which the group and phase velocity therefore have the same sign). (ED) [45]

Foster's reactance theorem States that the driving-point impedance of a network composed of purely capacitive and inductive reactances is an odd rational function of frequency (ω) that has the following characteristics: a positive slope, and the poles and zeros of the function are on the $j\omega$ axis, they are simple, they occur in complex conjugate pairs, and they alternate. (CAS) [13]

FOT *See:* Frequence Optimum de Travail.

FOTCU *See:* fibre optic trunk coupling unit.

foul electrolyte An electrolyte in which the amount of impurities is sufficient to cause an undesirable effect on the operation of the electrolytic cells in which it is employed.

fouling The accumulation and growth of marine organisms on a submerged metal surface. (IA) [59], [71]

fouling point (railway practice) The location in a turnout back of a frog at or beyond the clearance point at which insulated joints or details are placed. (EEC/PE) [119]

foul weather The weather condition when there is precipitation or that can cause the transmission line conductors to be wet. Fog is not a form of precipitation, but it causes conductors to be wet. Dry snow is a form of precipitation, but it may not cause the conductors to be wet. (T&D/PE) 539-1990

foul weather distribution A frequency or probability distribution of corona-effect data collected under foul weather conditions. Other distributions can also be defined for more specific foul weather conditions, such as rain, snow, fog, sleet, frost, etc. (T&D/PE) 539-1990

foundation (rotating machinery) The structure on which the feet or base of a machine rest and are fastened. (PE) [9]

foundation bolt (rotating machinery) A bolt used to fasten a machine to a foundation. (PE) [9]

foundation-bolt cone (rotating machinery) A cone placed around a foundation bolt when imbedded in a concrete foundation to provide clearance for adjustment during erection. (PE) [9]

four-address Pertaining to an instruction code in which each instruction has four address parts. *Note:* In a typical four-address instruction the address specify the location of two operands, the destination of the result, and the location of the next instruction to be interpreted. *See also:* three-plus-one address. (ED) 161-1971w

four-address instruction (1) (software) A computer instruction that contains four address fields. For example, an instruction to add the contents of locations A, B, and C, and place the result in location D. *Contrast:* three-address instruction; one-address instruction; two-address instruction; zero-address instruction. (C) 610.12-1990

(2) An instruction containing four addresses. *Synonym:* quadruple-address instruction. *See also:* address format. (C) 610.10-1994w

four-bit byte *See:* quartet.

four bolt *See:* conductor grip.

four conductor bundle *See:* bundle.

4GL *See:* fourth generation language.

488-VXIBus interface device A message-based device that provides communication between an IEEE 488 interface and the VXIBus instruments. (C/MM) 1155-1992

Fourier series A single-valued periodic function (that fulfills certain mathematical conditions) may be represented by a Fourier series as follows

$$f(x) = 0.5A_0 + \sum_{n=1}^{n=\infty} [A_n \cos nx + B_n \sin nx]$$

$$= 0.5A_0 + \sum_{n=1}^{n=\infty} C_n \sin (nx + \theta_n)$$

where

$$A_n = \frac{1}{\pi} \int_0^{2\pi} f(x) \cos nx \, dx$$

$$n = 0, 1, 2, 3, \dots$$

$$B_n = \frac{1}{\pi} \int_0^{2\pi} f(x) \sin nx \, dx$$

$$C_n = +(A_n^2 + B_n^2)^{1/2}$$

$$\theta_n = \arctan A_n/B_n$$

Note: $0.5A_0$ is the average of a periodic function $f(x)$ over one primitive period. (Std100) 270-1966w

Fourier spectrum (seismic qualification of Class 1E equipment for nuclear power generating stations) A complex valued function that provides amplitude and phase information as a function of frequency for a time domain waveform. (PE/NP) 344-1987r

four-plus-one address (computers) Pertaining to an instruction that contains four operand addresses and a control address. (C) [20], [85]

four-plus-one address format *See:* address format.

four-plus-one address instruction A computer instruction that contains five address fields, the fifth containing the address of the instruction to be executed next. For example, an instruction to add the contents of locations A, B, and C, place the results in location D, then execute the instruction at location E. *Contrast:* three-plus-one address instruction; two-plus-one address instruction; one-plus-one address instruction. (C) 610.12-1990

four-pole *See:* two-terminal pair network.

four quadrant DAM *See:* four quadrant digital-to-analog multiplier.

four quadrant digital-to-analog multiplier (hybrid computer linkage components) A digital-to-analog multiplier (DAM) that accepts both signs of the digital value, giving correct sign output in all four quadrants. (C) 166-1977w

four-quadrant multiplier (1) (analog computer) A multiplier in which operation is unrestricted as to the sign of both of the input variables. (C) 165-1977w, 166-1977w

(2) A multiplier in which the multiplication operation is unrestricted as to the sign of both of the input variables. *Contrast:* two-quadrant multiplier; one-quadrant multiplier. (C) 610.10-1994w

four-terminal network A network with four accessible terminals. *Note:* See two-terminal-pair network for an important special case. *See also:* two-terminal pair network; quadri pole. (Std100) 270-1966w

fourth generation A period during the evolution of electronic computers in which large scale integration is employed, enabling thousands of circuits to be incorporated on one chip, known as an integrated circuit. *Note:* Appearing in the mid-1970's, this generation is thought to be the state of the art at this time. *See also:* third generation; first generation; fifth generation; second generation. (C) 610.10-1994w

fourth generation language A computer language designed to improve the productivity achieved by high-order (third generation) languages and, often, to make computing power available to non-programmers. Features typically include an integrated database management system, query language, report generator, and screen definition facility. Additional features may include a graphics generator, decision support function, financial modeling, spreadsheet capability, and statistical analysis functions. *Contrast:* high-order language; machine language; assembly language; fifth generation language. (C) 610.12-1990, 610.13-1993w

fourth normal form (data management) One of the forms used to characterize relations; a relation R is said to be in fourth normal form if it is in Boyce/Codd normal form and if, when there exists a non-trivial multivalued dependency $A \twoheadrightarrow B$, then all attributes in R are also functionally dependent on A. (C) 610.5-1990w

4-UTP (local area networks) Four-pair 100 Ω balanced cable meeting or exceeding the Category 3 specifications in ISO/IEC 11801:1995. (C) 8802-12-1998

fourth voltage range *See:* voltage range.

fourth-wire control (telephone switching systems) The wire (in addition to the tip, ring, and sleeve wires) used for transmission of special signals necessary in the establishment or supervision of a call. (COM) 312-1977w

four-wire channel (1) (telephone loop performance) Consists of two unidirectional channels carrying signals in opposite directions. (COM/TA) 820-1984r

(2) (data transmission) *See also:* four-wire circuit. (PE) 599-1985w

four-wire circuit (1) (data transmission) A two-way circuit using two paths so arranged that the electric waves are transmitted in one direction only by one path and in the other direction only by the other path. *Note:* The transmission paths may or may not employ four wires. (PE) 599-1985w

(2) A leased circuit in which two pairs of conductors are set up for a two-way transmission path. *See also:* dial-up circuit; simplex circuit; two-wire circuit; foreign exchange circuit. (C) 610.7-1995

four-wire device A handset or headset having separate transmitting and receiving leads, each a pair of wires. (COM/TA) 1206-1994

four-wire repeater (data transmission) A telephone repeater for use in a four-wire circuit and in which there are two currents in one side of the four-wire circuit and the other serving to amplify the telephone currents in the other side of the four-wire circuit. (PE) 599-1985w

four-wire system A three-phase system consisting of three phase conductors and a neutral conductor. (PE/EDPG) 665-1995

four-wire switching (telephone switching systems) Switching using a separate path, frequency, or time interval for each direction of transmission. (COM) 312-1977w

four-wire terminating set (data transmission) A hybrid set for interconnecting a four-wire and two-wire circuit. (PE) 599-1985w

(2) (A) An arrangement in which four-wire circuits are terminated on a two-wire basis for interconnection with two-wire circuits. **(B)** An arrangement by which a four-wire equivalent circuit is converted to a four-wire circuit. (C) 610.7-1995

fovea (illuminating engineering) A small region at the center of the retina, subtending about 2 degrees, that contains cones but no rods, and forms the site of most distinct vision. (EEC/IE) [126]

foveal vision *See:* central vision.

FOW *See:* oil-immersed transformer.

Fowler-Nordheim (F-N) tunneling A quantum-mechanical effect in which electrons penetrate through a barrier region in which they have no allowed states and emerge in the conduction band of the barrier as a result of an externally applied electric field. (ED) 1005-1998

FPGA *See:* field programmable gate array.

FPLA *See:* field programmable logic array.

FPU *See:* floating-point unit.

FQR *See:* formal qualification review.

fractal surface A mathematically generated, irregular shape that can be used to model natural three-dimensional shapes such as coastlines or terrain on a graphical display device. (C) 610.6-1991w

fraction (1) (binary floating-point arithmetic) The field of the significand that lies to the right of its implied binary point. (C/MM) 754-1985r

(2) (mathematics of computing) In floating point arithmetic, the component of the significand that lies to the right of its implied radix point. (C/MM) 854-1987r, 1084-1986w

fractional binary Pertaining to a binary numeral with the binary point (expressed or implied) at the left end, representing a fraction. (C) 1084-1986w

fractional error (measurement) The magnitude of the ratio of the error to the true value. (IM/HFIM) 314-1971w

fractional fixed point Pertaining to fixed-point numeration system in which each number is represented by a numeral with the radix point (expressed or implied) at the left end. All numbers greater than or equal to one must be scaled accordingly. (C) 1084-1986w

fractional-horsepower brush (rotating machinery) A brush with a cross-sectional area of 1/4 square inch (thickness x width) or less and not exceeding 1 1/2 inches in length, but larger than a miniature brush and smaller than an industrial brush. *See also:* brush. (PE) [9]

fractional-horsepower motor (rotating machinery) A motor built in a frame smaller than that of a motor of open construction having a continuous rating of 1 horsepower at 1700-1800 revolutions per minute. *See also:* direct-current commutating machine; asynchronous machine. (PE) [9]

fractional-slot winding (rotating machinery) A distributed winding in which the average number of slots per pole per phase is not integral, for example 3 2/7 slots per pole per phase. *See also:* direct-current commutating machine; asynchronous machine. (PE) [9]

fragility (nuclear power generating station) (seismic qualification of Class 1E equipment) (seismic testing of relays) Susceptibility of equipment to malfunction as the result of structural or operational limitations, or both.

(SWG/PE/NP/PSR) 380-1975w, C37.98-1977s, 344-1975s, C37.100-1992

fragility level (nuclear power generating station) (seismic qualification of Class 1E equipment) (seismic testing of relays) The highest level of input excitation, expressed as a function of input frequency, that a piece of equipment can withstand and still perform the required Class 1E functions. (SWG/PE/PSR/NP) C37.98-1977s, C37.100-1992, C37.81-1989r, 344-1975s

fragility response spectrum (FRS) (nuclear power generating station) (seismic qualification of Class 1E equipment) (seismic testing of relays) A TRS (test response spectrum) obtained from tests to determine the fragility level of equipment. *See also:* test response spectrum.

(SWG/PE/PSR/NP) C37.98-1977s, C37.81-1989r, 344-1975s, C37.100-1992

Frame A unit of data transmission on an IEEE 802 LAN MAC that conveys a protocol data unit (PDU) between MAC Service users. There are three types of frame: *untagged*, *VLAN-tagged*, and *priority-tagged*. (C/LM) 802.1Q-1998

frame (1) (television) The total area, occupied by the picture, that is scanned while the picture signal is not blanked.

(2) **(facsimile)** A rectangular area, the width of which is the available line and the length of which is determined by the service requirements. (BT/COM/AV) [34], 168-1956w

(3) **(test, measurement, and diagnostic equipment)** A cross section of tape containing one bit in each channel and possibly a parity bit. *Synonym:* tape line. (MIL) [2]

(4) **(data) (data transmission)** A set of consecutive digit time slots in which the position of each digit time slot can be identified by reference to a framing signal. (PE) 599-1985w

(5) **(telecommunications circuits and systems)** A cyclic set of consecutive timeslots in which the relative position of each timeslot can be identified. (COM/TA) 1007-1991r

(6) A component of the module that provides structural support and enhanced thermal performance.

(C/BA) 1101.7-1995

(7) (A) A group of digits transmitted as a unit that carries a protocol data unit on a network. (B) A unit of transmission at the data link layer or, sometimes, the physical layer.

(C) 610.7-1995

(8) A set of consecutive time slots in which the position of each time slot can be identified by reference to a framing signal. (C/BA) 1393-1999

(9) A transmission unit that carries a protocol data unit (PDU) on the ring. (C/LM) 8802-5-1998

(10) **(local area networks)** The logical organization of control and data fields (e.g., addresses, data, error check sequences) defined for a MAC sublayer. (C) 8802-12-1998

(11) A continuous transmission of octets from one station [beside communications controller (BCC) or device communications controller (DCC)] to the other station. A Physical layer frame is also referred to as a Physical layer protocol data unit (PhPDU). The Physical layer service data unit (PhSDU) passed between the Data Link layer and the Physical layer consists of the data octets portion of the frame. The PhSDU consists of an integral number of binary octets. The frame consists of these octets, plus other encoded symbols that are added by the Physical layer. For low-speed operation, each octet consists of a binary-encoded start bit, eight data bits, and a stop bit. The first octet of a low-speed frame consists of a flag octet. The last octet of a low-speed frame is either a flag octet or an abort octet. For high-speed operation, each octet consists of eight Manchester biphasic-encoded data bits. For high-speed operation, each octet also has a start delimiter and either an end delimiter or an abort delimiter, indicating the beginning and end of individual frames, respectively. The operation of concatenating the delimiters to the data octets is performed by the Physical layer.

(EMB/MIB) 1073.4.1-2000

(12) *See also:* display frame. (C) 610.6-1991w

(13) *See also:* MAC frame. (C/LM) 802.1G-1996

frame alignment The state in which the frame of the receiving equipment is synchronized with respect to that of the received signal. (COM/TA) 1007-1991r

frame alignment signal The distinctive signal(s) inserted in every frame or once in *n* frames, always occupying the same relative position(s) within the frame, and used to establish and maintain frame alignment. (COM/TA) 1007-1991r

frame bits (f-bits) *See also:* frame alignment signal. (COM/TA) 1007-1991r

frame buffer *See:* bit map.

frame check sequence (1) The field immediately preceding the closing delimiter of a frame. The FCS used is the 16 b polynomial defined by the cyclic redundancy check sequence specified by ITU-T (RC-ITU-T). This field allows the detection of errors by the receiving station.

(EMB/MIB) 1073.3.1-1994

(2) A field in a bit-oriented protocol frame containing the remainder of the cyclic redundancy check calculation on the contents of the frame. (C) 610.7-1995

(3) **(local area networks)** A Cyclic Redundancy Check (CRC) used by the transmit and receive algorithms to detect errors in the bit sequence of a MAC frame.

(C) 8802-12-1998

frame check sequence error An error in which the frame check sequence value contained in a received frame does not match the frame check sequence value calculated by the receiver. *See also:* cyclic redundancy check. (C) 610.7-1995

framed plate (storage cell) A plate consisting of a frame supporting active material. *See also:* battery. (EEC/PE) [119]

frame, DS1 *See:* DS1 frame.

frame frequency (television) The number of times per second that the frame is scanned. *See also:* television. (EEC/PE) [119]

frame grabber An input device for digitizing, transferring and storing video frames, such as TV signals, in a computer. *See also:* frame store. (C) 610.10-1994w

frame, intermediate distributing *See:* intermediate distributing frame.

frame, main distributing *See:* main distributing frame.

frame rate (data transmission) The repetition rate of the frame. (PE) 599-1985w

frame relay A fast packet switching technology that provides a virtual circuit service relaying variable-size frames but only employing physical layer and data link layer protocols. *See also:* cell relay. (C) 610.7-1995

Frame relay The function of the Forwarding Process that forwards frames between the Ports of a Bridge.

(C/LM) 802.1Q-1998

frame ring (rotating machinery) A plate or assembly of flat plates forming an annulus in a radial plane and serving as a part of the frame to stiffen it. (PE) [9]

frame size (as applied to a low-voltage circuit breaker) The maximum continuous current rating in amperes for all parts except the coils of the direct-acting trip device. (SWG/PE) C37.100-1992

frame split (rotating machinery) A joint at which a frame may be separated into parts. (PE) [9]

frame store (A) Storage used for data to be sent to a display device. **(B)** Storage used to store data received from a frame grabber. (C) 610.10-1994

frame synchronization (data transmission) The process whereby a given channel at the receiving end is aligned with the corresponding channel at the transmitting end. (PE) 599-1985w

frame validity checking Verification, by a receiving station, of correct frame transmission by the transmitting station. Frame checking entails verifying for correct encoding of all transmitted delimiters and start and stop bits, data bits, and octet encoding. For the medical information bus (MIB), frame validity checking is performed by both the Physical layer and the Data Link layer. (EMB/MIB) 1073.4.1-2000

framework (1) (rotating machinery) A stationary supporting structure. (PE) [9]

(2) A conceptual system of tasks or activities used in a specified type of analysis. (PE/NP) 1082-1997

(3) A collection of classes created specifically to serve the needs of an application area. (SCC20) 1226-1998

(4) A reusable design (models and/or code) that can be refined (specialized) and extended to provide some portion of the overall functionality of many applications. (C/SE) 1320.2-1998

frame yoke (rotating machinery) (field frame) The annular support for the poles of a direct-current machine. *Note:* It may be laminated or of solid metal and forms part of the magnetic circuit. (PE) [9]

framing (facsimile) The adjustment of the picture to a desired position in the direction of line progression. *See also:* recording. (COM) 168-1956w

framing bit errors Frame bits that are in error. (COM/TA) 1007-1991r

framing signal (facsimile) A signal used for adjustment of the picture to a desired position in the direction of line progression. *See also:* facsimile signal. (COM) 168-1956w

Francis turbine Reaction-type turbine in which the water enters radially and leaves axially. (PE/EDPG) 1020-1988r

Fraunhofer diffraction pattern *See:* far-field diffraction pattern.

Fraunhofer pattern A radiation pattern obtained in the Fraunhofer region of an antenna. *Note:* For an antenna focused at infinity, a Fraunhofer pattern is a far-field pattern. (AP/ANT) 145-1993

Fraunhofer region (1) (data transmission) That region of the field in which the energy flow from an antenna proceeds essentially as though coming from a point source located in the vicinity of the antenna. *Note:* If the antenna has a well-defined aperture D in a given aspect, the Fraunhofer region in that aspect is commonly taken to exist at distances greater than $2D^2/\lambda$ from the aperture, being the wavelength. (PE) 599-1985w

(2) The region in which the field of an antenna is focused. *Note:* In the Fraunhofer region of an antenna focused at infinity, the values of the fields, when calculated from knowledge of the source distribution of an antenna, are sufficiently accurate when the quadratic phase terms (and higher order terms) are neglected. *See also:* far-field region. (AP/ANT) 145-1993

(3) That region around an electromagnetic radiator or scatterer (maximum dimension D) where the fields can be described in terms of a radial distance and azimuthal and polar

angles. *Note:* In this region, the distances of all points to the source's center are larger than $2D^2/\lambda$. *Synonym:* far-field region. (AP/PROP) 211-1997

FRE Conduit fabricated from fiberglass reinforced epoxy. (SUB/PE) 525-1992r

free-body meter A meter that measures the electric field strength at a point above the ground and that is supported in space without conductive contact to earth. *Note:* Free-body meters are commonly constructed to measure the induced current between two isolated parts of a conductive body. Since the induced current is proportional to the time derivative of the electric field strength, the meter's detector circuit often contains an integrating stage in order to recover the waveform of the electric field. The integrated current waveform also coincides with that of the induced charge. The integrating stage is also desirable, particularly for measurements of electric fields with harmonic content because this stage (i.e., its integrating property) eliminates the excessive weighting of the harmonic components in the induced current signal. (T&D/PE) 539-1990, 1308-1994

free bystander A free bystander can be a participating slave that is no longer an entrant, or a potential master that has no current need to acquire the bus and is not fairness inhibited. (C/MM) 896.1-1987s

free capacitance (1) (conductor) The limiting value of its self-capacitance when all other conductors, including isolated ones, are infinitely removed.

(2) (between two conductors) The limiting value of the plenary capacitance as all other, including isolated, conductors are infinitely removed. 270-1966w

free-code call (telephone switching systems) A call to a service or office code for which no charge is made. (COM) 312-1977w

free cyanide (electroplating) (electrodepositing solution) The excess of alkali cyanide above the minimum required to give a clear solution, or above that required to form specified soluble double cyanides. *See also:* electroplating. (PE/EEC) [119]

free fall distance The vertical displacement of a fall arrest attachment point on the line-worker's body belt, aerial belt, or full body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, lifeline and lanyard elongation, but includes any energy absorbing device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur. The component slack (D-ring slide) distance should be included in the free fall distance. (T&D/PE) 1307-1996

free field (1) A field (wave or potential) in a homogeneous, isotropic medium free from boundaries. In practice, a field in which the effects of the boundaries are negligible over the region of interest. *Note:* The actual pressure impinging on an object (for example, electroacoustic transducer) placed in an otherwise free sound field will differ from the pressure that would exist at that point with the object removed, unless the acoustic impedance of the object matches the acoustic impedance of the medium. (SP) [32]

(2) Also known as a free space field. The electromagnetic field in a volume far removed from physical objects, conductive or non conductive; it is usually thought of, but not restricted to, a plane wave. For the case of a plane wave, the electrical and magnetic vectors are transverse to the propagation vector and to each other (TEM), and their ratio yields the intrinsic impedance of free space. (EMC) 1309-1996

free-field current response (receiving current sensitivity) (electroacoustic transducer used for sound reception) The ratio of the current in the output circuit of the transducer when the output terminals are short-circuited to the free-field sound pressure existing at the transducer location prior to the introduction of the transducer in the sound field. *Notes:* 1. The free-field response is defined for a plane progressive sound wave whose direction of propagation is a specified orientation.

tation with respect to the principal axis of the transducer. 2. The free-field current response is usually expressed in decibels, namely, 20 times the logarithm to the base 10 of the quotient of the observed ratio divided by the reference ratio, usually 1 ampere per newton per square meter. (SP) [32]

free-field microphone (audible noise measurements) A microphone that has been designed to have a flat frequency response to sound waves arriving with perpendicular incidence (i.e., straight at the microphone).

(T&D/PE) 539-1990, 656-1992

free-field voltage response (receiving voltage sensitivity) (electroacoustic transducer used for sound reception) The ratio of the voltage appearing at the output terminals of the transducer when the output terminals are open-circuited to the free-field sound pressure existing at the transducer location prior to the introduction of the transducer in the sound field. *Notes:* 1. The free-field response is determined for a plane progressive sound wave whose direction of propagation has a specified orientation with respect to the principal axis of the transducer. 2. The free-field voltage response is usually expressed in decibels, namely, 20 times the logarithm to the base 10 of the quotient of the observed ratio divided by the reference ratio, usually 1 volt per newton per square meter.

(SP) [32]

free-form typing In word processing, the process of entering text that does not include text formatting commands.

(C) 610.2-1987

free gyro A two-degree-of-freedom gyro in which the spin axis may be oriented in any specified attitude. In this gyro, output signals are produced by an angular displacement of the case about an axis other than the spin axis.

(AES/GYAC) 528-1994

free impedance (transducer) The impedance at the input of the transducer when the impedance of its load is made zero. *Note:* The approximation is often made that the free electric impedance of an electroacoustic transducer designed for use in water is that measured with the transducer in air. *See also:* self-impedance.

(SP) [32]

free-line call (telephone switching systems) A call to a directory number for which no charge is made.

(COM) 312-1977w

free motion (automatic control) One whose nature is determined only by parameters and initial conditions for the system itself, and not by external stimuli. *Note:* For a linear system, this motion is described by the complementary function of the associated homogeneous differential equation. *Synonym:* free oscillation.

(PE/EDPG) [3]

free motional impedance (electroacoustics) (transducer) The complex remainder after the blocked impedance has been subtracted from the free impedance. *See also:* self-impedance.

(SP) [32]

free oscillation The response of a system when no external driving force is applied and energy previously stored in the system produces the response. *Note:* The frequency of such oscillations is determined by the parameters in the system or circuit. The term shock-excited oscillation is commonly used. *See also:* oscillatory circuit. (AP/ANT) 145-1983s, 270-1966w

free progressive wave (free wave) A wave in a medium free from boundary effect. A free wave in a steady state can only be approximated in practice. (SP/ACO) [32]

free-radiation frequencies for industrial, scientific, or medical (ISM) apparatus Center of a band of frequencies assigned to industrial, scientific, or medical equipment either nationally or internationally for which no power limit is specified. *See also:* ISM apparatus; electromagnetic compatibility. (EMC/EEC/IE/INT) [70], [126]

free-running frequency The frequency at which a normally synchronized oscillator operates in the absence of a synchronizing signal. (BT/AV) [34]

free-running sweep (non-real time spectrum analyzer) (oscilloscopes) (spectrum analyzer) A sweep that recycles without being triggered and is not synchronized by any ap-

plied signal. *See also:* oscillograph.

(IM/AES) [14], 748-1979w, [41]

free space Space that is free of obstructions and characterized by the constitutive parameters of a vacuum.

(AP/PROP) 211-1997

free-space field intensity The radio field intensity that would exist at a point in a uniform medium in the absence of waves reflected from the earth or other objects. *See also:* radiation.

(EEC/PE) [119]

free-space loss The loss between two isotropic radiators in free space, expressed as a power ratio. *Note:* The free-space loss is not due to dissipation, but rather due to the fact that the power flux density decreases with the square of the separation distance. It is usually expressed in decibels and is given by the formula $20\log(4\pi R/\lambda)$, where R is the separation of the two antennas and λ is the wavelength.

(AP/ANT) 145-1993

free space permeability (μ_0) A scalar constant such that, in vacuum, its product with the magnetic field \vec{H} is equal to the magnetic flux density:

$$\vec{B} = \mu_0 \vec{H}$$

The numerical value of μ_0 is $4\pi \times 10^{-7}$ H/m.

(AP/PROP) 211-1997

free space permittivity (ϵ_0) A scalar constant such that in vacuum, the product of ϵ_0 and the electric field, \vec{E} , is equal to the electric flux density:

$$\vec{D} = \epsilon_0 \vec{E}$$

The numerical value for ϵ_0 is 8.854×10^{-12} F/m.

(AP/PROP) 211-1997

free-space transmission (mobile communication) Electromagnetic radiation that propagates unhindered by the presence of obstructions, and whose power or field intensity decreases as a function of distance squared. *See also:* mobile communication system. (VT) [37]

free time (availability) The period of time during which an item is in a condition to perform its required function but is not required to do so. (R) [29]

free wave *See:* free progressive wave.

freeze-out (telephone circuit) A short-time denial to a subscriber by a speech-interpolation system. (EEC/PE) [119]

freeze protection (1) (electric pipe heating systems) The use of electric pipe heating systems to prevent the temperature of fluids from dropping below the freezing point of the fluid. Freeze protection is usually associated with piping, pumps, valves, tanks, instrumentation, etc., such as water lines, that are located outdoors, or in unheated buildings.

(PE/EDPG) 622A-1984r

(2) (electric heat tracing systems) The use of electric heat tracing systems to prevent the temperature of fluids from dropping below the freezing point of the fluid. Freeze protection is usually associated with piping, pumps, valves, tanks, instrumentation, etc., such as water lines, that are located outdoors or in unheated buildings. (PE/EDPG) 622B-1988r

freezing fog A fog whose droplets freeze upon contact with exposed objects and form a coating of hoarfrost and/or glaze. (T&D/PE) 539-1990

freezing rain Rain that falls in liquid form but freezes on impact to form a coating of glaze upon the ground and on exposed objects. (PE/T&D) 539-1990

F region The region of the terrestrial ionosphere from about 150–1000 km altitude. *Notes:* 1. The daytime F region is characterized by an F1 layer and an F2 layer, and at night the lower (F1) layer merges with the upper (F2) layer. 2. The maximum (or peak) of the F2 layer normally occurs in the 300–600 km altitude range. (AP/PROP) 211-1997

f register One of the floating-point registers.

(C/MM) 1754-1994

freight elevator An elevator primarily used for carrying freight on which only the operator and the persons necessary for loading and unloading the freight are permitted to ride. *See also:* elevator. (EEC/PE) [119]

Frenkel defect (solar cells) A defect consisting of the displacement of a single atom from its place in the atomic lattice of a crystal, the atom then occupying an interstitial position.

(AES/SS) 307-1969w

Frequency Optimum de Travail (FOT) (radio-wave propagation) The French phrase for Optimum Working Frequency (OWF) applies to ionospheric propagation. *Note:* The FOT is estimated as 0.85 of the predicted monthly median maximum useable frequency (MUF). *See also:* optimum working frequency.

(AP/PROP) 211-1990s

frequency (1) (automatic control) The number of periods, or specified fractions of periods, per unit time. *Notes:* 1. The frequency may be stated in cycles per second, or in radians per second, where 1 cycle = 2 pi radians. (PE/EDPG) [3]
(2) (periodic function) (data transmission) (Wherein time is the independent variable)

- a) (general). The number of periods per unit time.
- b) (automatic control). The number of periods, or specified fractions of periods, per unit time. *Note:* The frequency may be stated in cycles per second, or in radians per second, where 1 cycle = two radians.
- c) (transformer). The number of periods occurring per unit time.
- d) (pulse terms). The reciprocal of period.

(PE) 599-1985w

(3) (pulse terminology) A pulse radar in which the transmitter carrier frequency is changed between pulses in a random or pseudo-random way by an amount comparable to the reciprocal of the pulsewidth, or a multiple thereof.

(AES/RS) 686-1982s

(4) (power and distribution transformers) The number of periods occurring per unit time. (PE/TR) C57.12.80-1978r

(5) (overhead power lines) The number of complete cycles of sinusoidal variation per unit time. *Notes:* 1. Typically, for ac power lines, the power frequency is 60 Hz in North America and certain other parts of the world and 50 Hz in Europe and many other areas of the world. 2. Electric and magnetic field strength components produced by power lines have frequencies equal to that of power line voltages and currents. 3. The term "power frequency" is often used to avoid specifying whether the power line in question operates at 50 Hz or 60 Hz.

(PE/T&D) 539-1990

(6) (broadband local area networks) The number of times a periodic signal repeats itself in a unit of time, usually one second. One hertz (Hz) is one cycle per second. One kilohertz (kHz) is 1000 cycles per second. One megahertz (MHz) is 1 000 000 cycles per second.

(LM/C) 802.7-1989r

(7) The number of complete cycles of sinusoidal variation per unit time. *Note:* 1) Electric and magnetic field components have a fundamental frequency equal to that of the power line voltages and currents. 2) For ac power lines, the most widely used frequencies are 60 Hz and 50 Hz.

(T&D/PE) 644-1994

(8) The number of times per second that a wave cycle (one peak and one trough) repeats at a given amplitude.

(C) 610.7-1995

(9) (of a periodic oscillation or wave) The number of identical cycles per second, measured in Hertz.

(AP/PROP) 211-1997

(10) The number of periods occurring in unit time of a periodic quantity, in which time is the independent variable.

(IA/MT) 45-1998

frequency-agile radar A pulse radar in which the transmitter-carrier frequency is changed between pulses or between groups of pulses by an amount comparable to or greater than the pulse bandwidth.

(AES) 686-1997

frequency allocation The process of designating radio-frequency bands for use by specific radio services. *See also:* frequency allocation table; electromagnetic compatibility.

(EMC) [53]

frequency allocation table The table of frequency allocations resulting from the process of designating radio-frequency

bands for use by specific radio services. *See also:* electromagnetic compatibility; frequency allocation. (EMC) [53]

frequency allotment The process of designating radio frequencies within an allocated band for use within specific geographic areas. *See also:* frequency allotment plan; electromagnetic compatibility. (EMC) [53]

frequency allotment plan The plan (of frequency allotment) resulting from the process of designating radio frequencies within an allocated band for use within specific geographic areas. *See also:* frequency allotment; electromagnetic compatibility. (EMC) [53]

frequency assignment The process of designating radio frequency for use by a specific station under specified conditions of operations. *See also:* electromagnetic compatibility; frequency assignment list. (EMC) [53]

frequency assignment list The list of frequency assignments resulting from the process of designating radio frequency for use by a specific station under specified conditions of operations. *See also:* frequency assignment; electromagnetic compatibility. (EMC) [53]

frequency band (1) A continuous range of frequencies extending between two limiting frequencies. *Note:* The term frequency band or band is also used in the sense of the term bandwidth. *See also:* channel; signal; signal wave.

(IM/IE/BT/AP/ANT) [14], [43], 270-1966w, 182-1961w, 145-1983s

(2) (overhead-power-line corona and radio noise) A continuous range of frequencies extending between two limiting frequencies. *Note:* Some bands of frequencies that are defined by agreement are called "channels." A band used in a particular communication link is also called a channel.

(T&D/PE) 539-1990

(3) (spectrum analyzer) A continuous range of frequencies extending between two limiting frequencies.

(IM) 748-1979w

frequency-band number The number N in the expression $0.3 \times 10N$ that defines the range of band N. Frequency band N extends from $0.3 \times 10N$ hertz, the lower limit exclusive, the upper limit inclusive. (Std100) 270-1966w

frequency band of emission (communication band) The band of frequencies effectively occupied by that emission, or the type of transmission and the speed of signaling used. *See also:* radio transmission. (AP/ANT) 145-1983s

frequency bands (mobile communication) The frequency allocations that have been made available for land mobile communications by the Federal Communications Commission, including the spectral bands: 25.0 to 50.0 megahertz, 150.8 to 173.4 megahertz, and 450.0 to 470.0 megahertz.

(VT) [37]

frequency bias (1) (electric power system) An offset of the scheduled net interchange that varies with frequency error.

(PE/PSE) 858-1993w, 94-1991w

(2) (electric power system) An offset in the scheduled net interchange power of a control area that varies in proportion to the frequency deviation. *Note:* This offset is in a direction to assist in restoring the frequency to schedule. *See also:* power system. (PE/PSE) [54]

frequency bias setting A coefficient that, when multiplied by frequency error, yields the frequency bias component of the area control error. (PE/PSE) 94-1991w

frequency changer (1) (general) A motor-generator set that changes power of an alternating-current system from one frequency to one or more different frequencies, with or without a change in the number of phases, or in voltage. *See also:* converter. (EEC/PE) [119]

(2) (rotating machinery) A motor-generator set or other equipment which changes power of an alternating-current system from one frequency to another. (PE) [9]

(3) (self-commutated converters) An alternating current (ac) converter for changing frequency. (IA/SPC) 936-1987w

frequency-changer set (rotating machinery) A motor-generator set that changes the power of an alternating-current system from one frequency to another. (PE) [9]

frequency-change signaling (telecommunications) A method in which one or more particular frequencies correspond to each desired signaling condition. *Note:* The transition from one set of frequencies to the other may be either a continuous or a discontinuous change in frequency or in phase. *See also:* frequency modulation. (COM) 49]

frequency characteristic (telephone sets) Electrical and acoustical properties as functions of frequency. *Note:* Examples include an amplitude-frequency characteristic and an impedance-frequency characteristic. (COM/TA) 269-1971w

frequency, chopped *See:* chopping rate.

frequency control The regulation of frequency within a narrow range. *See also:* generating station. (T&D/PE) [10]

frequency-conversion transducer *See:* conversion transducer.

frequency converter (1) A machine, device, or system for changing ac at one frequency to ac at a different frequency. (PEL/ET) 388-1992r

(2) *See also:* frequency changer.

frequency converter, commutator type (rotating machinery) A polyphase machine the rotor of which has one or two windings connected to slip rings and to a commutator. *Note:* By feeding one set of terminals with a voltage of given frequency, a voltage of another frequency may be obtained from the other set of terminals. *See also:* asynchronous machine. (PE) [9]

frequency, corner *See:* corner frequency.

frequency, cyclotron *See:* cyclotron frequency.

frequency, damped *See:* damped frequency.

frequency departure (telecommunications) The amount of variation of a carrier frequency or center frequency from its assigned value. *Note:* The term frequency deviation, which has been used for this meaning, is in conflict with this essential term as applied to phase and frequency modulation and is therefore deprecated for future use in the above sense. *See also:* radio transmission. (AP/ANT) 145-1983s

frequency-dependent negative resistor An impedance of the form $1/(Ks^2)$, where K is a real positive constant and s is the complex frequency variable. (CAS) [13]

frequency-derived channel (1) A channel obtained from multiplexing a channel by frequency division. (C) 610.7-1995

(2) A channel obtained from multiplexing a channel by frequency-division. (C) 610.10-1994w

frequency deviation (1) (power system) System frequency minus the scheduled frequency. *See also:* frequency modulation; frequency departure. (PE/PSE) 94-1970w, 858-1993w

(2) **(telecommunication; frequency modulation)** The peak difference between the instantaneous frequency of the modulated wave and the carrier frequency. (AP/PE/IM/ANT/HFIM) 145-1983s, 599-1985w, [40], 270-1964w

(3) **(frequency modulation broadcast receivers)** The difference between the instantaneous frequency of the modulated wave and the carrier frequency. (BT) 185-1975w

(4) Instantaneous, normalized, or fractional frequency departure from a nominal frequency. (SCC27) 1139-1999

(5) An increase or decrease in the power frequency from nominal. The duration of a frequency deviation can be from several cycles to several hours. (IA/PSE) 1100-1999

frequency distortion A term commonly used for that form of distortion in which the relative magnitude of the different frequency components of a complex wave are changed in transmission. *Note:* When referring to the distortion of the phase-versus-frequency characteristic, it is recommended that a more specific term such as phase-frequency distortion or delay distortion be used. *See also:* amplitude distortion; distortion; distortion, amplitude-frequency. (AP/ANT) 145-1983s

frequency diversity *See:* frequency diversity reception.

frequency diversity radar A radar that operates at more than one frequency, using either parallel channels or sequential groups of pulses. *Note:* Parallel channels may have complete

duplicate transmitters and receivers, or may divide the transmitted pulse into subpulses at different frequencies, to which parallel receiver channels are tuned. (AES) 686-1997

frequency diversity reception (data transmission) That form of diversity reception that utilizes transmission at different frequencies. (PE) 599-1985w

frequency divider (1) A device for delivering an output wave whose frequency is a proper fraction, usually a submultiple, of the input frequency. *Note:* Usually the output frequency is an integral submultiple or an integral proper fraction of the input frequency. *See also:* harmonic conversion transducer. (AP/PE/ANT) 145-1983s, 599-1985w

(2) **(nonlinear, active, and nonreciprocal waveguide components)** A device for delivering output power at a frequency that is usually an integral proper fraction or integral submultiple of the input frequency. (MTT) 457-1982w

frequency division multiple access (communication satellite) A method of providing multiple access to a communication satellite in which the transmissions from a particular earth station occupy a particular assigned frequency band. In the satellite the signals are simultaneously amplified and transposed to a different frequency band and retransmitted. The earth station identifies its receiving channel according to its assigned frequency band in the satellite signal. (COM) [19]

frequency-division multiplex (data transmission) (telecommunications) The process or device in which each modulating wave modulates a separate subcarrier and the subcarriers are spaced in frequency. *Note:* Frequency division permits the transmission of two or more signals over a common path by using different frequency bands for the transmission of the intelligence of each message signal. (AP/PE/ANT) 145-1983s, 599-1985w, 270-1964w

frequency-division multiplexing (1) Dividing a communication channel's bandwidth among several sub-channels with different carrier frequencies. Each sub-channel can carry separate data signals. (LM/C) 802.7-1989r

(2) A multiplexing technique for sharing a transmission channel wherein carrier signals of different frequencies are transmitted simultaneously. (C) 610.7-1995

frequency-division switching (telephone switching systems) A method of switching that provides a common path with a separate frequency band for each of the simultaneous calls. (COM) 312-1977w

frequency domain A function in which frequency is the independent variable. (EMC) 1128-1998

frequency domain calibration A result which is the transfer function of the sensor or probe. A continuous wave calibration is a transfer function at a single frequency. (EMC) 1309-1996

frequency doubler (nonlinear, active, and nonreciprocal waveguide components) A device for delivering output power at a frequency that is twice the input frequency. (MTT/AP/ANT) 457-1982w, 145-1983s

frequency drift (1) (nonreal time spectrum analyzer) Gradual shift or change in displayed frequency over a period of time due to change in components (Hz/sec), (Hz/°C), etc. (IM) [14]

(2) **(spectrum analyzer)** Gradual shift or change in displayed frequency over a period of time due to internal changes in the spectrum analyzer (Hz/s, Hz/°C, etc.). (IM) 748-1979w

frequency droop (electric power system) The absolute change in frequency between steady-state no load and steady-state full load. (IA/PSE) 446-1995

frequency error (1) System frequency minus the scheduled frequency. (PE/PSE) 94-1991w

(2) **(power system)** System frequency minus the scheduled frequency. *See also:* frequency modulation; frequency departure. (PE/PSE) 94-1970w, 858-1993w

frequency hopping (communication satellite) A modulation technique used for multiple access; frequency-hopping systems employ switching of the transmitted frequencies at a rate

equal to or lower than the sampling rate of the information transmitted. Selection of the particular frequency to be transmitted can be made from a fixed sequence or can be selected in pseudo-random manner from a set of frequencies covering a wide bandwidth. The intended receiver would frequency-hop in the same manner as the transmitter in order to retrieve the desired information. (COM) [19]

frequency, image *See*: image frequency.

frequency influence (instruments other than frequency meters) (electric instruments) The percentage change (of full-scale value) in the indication of an instrument that is caused solely by a frequency departure from a specified reference frequency. *Note*: Because of the dominance of 60 hertz as the common frequency standard in the United States, alternating-current (power-frequency) instruments are always supplied for that frequency unless otherwise specified. *See also*: accuracy rating. (EEC/ERI/AII) [111], [102]

frequency instability ($S_y(f)$) One-sided spectral density of the fractional frequency deviation. (SCC27) 1139-1999

frequency, instantaneous *See*: instantaneous frequency.

frequency interlace (color television) The effect of intermeshing of the frequency spectrum of a modulated color subcarrier and the harmonics of the horizontal scanning frequency for the purpose of minimizing the visibility of the modulated color subcarrier. (BT/AV) 201-1979w

frequency linearity (non-real time spectrum analyzer) The linearity of the relationship between the input frequency and the displayed frequency. *See also*: linearity. (IM) [14], 748-1979w

frequency lock (1) (power-system communication) A means of recovering in a single-sideband suppressed-carrier receiver the exact modulating frequency that is applied to a single-sideband transmitter. *See also*: power-line carrier. (PE) 599-1985w

(2) For a vibrating beam accelerometer (VBA), the phenomenon where, in a certain band of acceleration around the crossover point of the dual resonator frequencies, the resonator frequencies lock together and do not normally respond to changes in acceleration. (AES/GYAC) 1293-1998

frequency locus For a nonlinear system or element whose describing function is both frequency-dependent and amplitude-dependent, a plot of the describing function, in any convenient coordinate system. (CS/PE/EDPG) [3]

frequency meter An instrument for measuring the frequency of an alternating current. *See also*: instrument. (EEC/PE) [119]

frequency meter, cavity resonator (waveguide components) A cavity resonator used to determine frequency. *See also*: cavity resonator. (MTT) 147-1979w

frequency-modulated continuous wave radar A radar transmitting a continuous carrier modulated by a periodic function such as a sinusoid or sawtooth wave to provide range data. (AES) 686-1997

frequency-modulated cyclotron A cyclotron in which the frequency of the accelerating electric field is modulated in order to hold the positively charged particles in synchronism with the accelerating field despite their increase in mass at very high energies. (ED) [45]

frequency-modulated radar A form of radar in which the radiated wave is frequency modulated and the returning echo beats with the wave being radiated, thus enabling the range to be measured. *See also*: radar. (EEC/PE) [119]

frequency-modulated ranging A technique in which a continuous carrier is frequency modulated by a sinusoidal or triangular waveform, permitting the echo time delay to be measured as the phase shift of the sinusoid or the difference between transmitted and received frequencies. (AES) 686-1997

frequency-modulated transmitter A transmitter that transmits a frequency-modulated wave. *See also*: radio transmitter. (AP/BT/ANT) 145-1983s, 182-1961w

frequency modulation (FM) (1) (electrical conversion) The cyclic or random dynamic variation, or both, of instantaneous frequency about a mean frequency during steady-state electric system operation. (AES) [41]

(2) (telecommunications) (data transmission) Angle modulation in which the instantaneous frequency of a sine-wave carrier is caused to depart from the carrier frequency by an amount proportional to the instantaneous value of the modulating wave. *Note*: Combinations of phase and frequency modulation are commonly referred to as frequency modulation. (COM/AP/PE/ANT) [49], 270-1964w, 145-1983s, 599-1985w

(3) (overhead-power-line corona and radio noise) Modulation in which the instantaneous frequency of a sine wave carrier is caused to depart from the carrier frequency by an amount proportional to the instantaneous value of the modulating signal. *Note*: Combinations of phase and frequency modulation are commonly referred to as frequency modulation. (T&D/PE) 539-1990

(4) A modulation technique in which a data signal is sent onto a carrier by modifying the transmitted frequency. (C) 610.7-1995

frequency modulation-frequency modulation (FM-FM) *See*: frequency modulation-frequency modulation telemetry.

frequency modulation-frequency modulation telemetry (communication satellite) A method of multiplexing many telemetry channels by first frequency modulating subcarriers, combining the modulated subcarriers and finally frequency modulating the radio carrier. This method is widely used for satellite transmissions and follows standards set by Inter Range Instrumentation Group (IRIG). *Synonym*: FM-FM telemetry. (COM) [19]

frequency-modulation (friction) noise ("scrape flutter") Frequency modulation of the signal in the range above approximately 100 Hz resulting in distortion which may be perceived as a noise added to the signal (that is, a noise not present in the absence of a signal). (SP) 193-1971w

frequency monitor An instrument for indicating the amount of deviation of a frequency from its assigned value. *See also*: instrument. (EEC/PE) [119]

frequency multiplier (1) (nonlinear, active, and nonreciprocal waveguide components) A device for delivering output power at a frequency that is an exact positive integer (except for 0 and 1) multiple of an input frequency. Frequency doublers, triplers, quadruplers, etc., are all special cases of frequency multipliers. (MTT) 457-1982w

(2) A device for delivering an output wave whose frequency is an exact integral multiple of the input frequency. *Note*: Frequency doublers and triplers are common special cases of frequency multipliers. *See also*: harmonic conversion transducer. (PE/AP/ANT) 599-1985w, 145-1983s

frequency of charging, resonance The frequency at which resonance occurs in the charging circuit of a pulse-forming network. (MAG) 306-1969w

frequency of occurrence If a process is repeated n times, during which an event occurs m times, the frequency of occurrence of the event, h , is defined as $h = m/n$. For large values of n , the frequency approaches the asymptotic value, called probability of occurrence. (T&D/PE) 539-1990

frequency pulling (oscillators) A change of the generated frequency of an oscillator caused by a change in load impedance. *See also*: oscillatory circuit; waveguide. (ED) 161-1971w, [45]

frequency, pulse repetition *See*: pulse-repetition frequency.

frequency quadrupler (nonlinear, active, and nonreciprocal waveguide components) A device for delivering output power at a frequency that is four times the input frequency. (MTT) 457-1982w

frequency range (1) (general) A specifically designated part of the frequency spectrum.

(2) (transmission system) The frequency band in which the system is able to transmit power without attenuating or distorting it more than a specified amount.

(3) (device) The range of frequencies over which the device may be considered useful with various circuit and operating conditions. *Note:* Frequency range should be distinguished from bandwidth, which is a measure of useful range with fixed circuits and operating conditions. *See also:* signal wave.

(ED) 161-1971w, 270-1966w, [45]

(4) (acousto-optic deflector) The frequency range, Δf , over which the diffraction efficiency is greater than some specified minimum.

(UFFC) [17]

(5) (spectrum analyzer) That range of frequency over which the instrument performance is specified (hertz to hertz).

(IM) [14], 748-1979w

frequency record (electroacoustics) A recording a various known frequencies at known amplitudes, usually for the purpose of testing or measuring. *See also:* phonograph pickup.

(SP) [32]

frequency regulation (1) (emergency and standby power)

The percentage change in emergency or standby power frequency from steady-state no load to steady-state full load.

$$\%R = \frac{F_{n1} - F_{f1}}{F_{f1}} \cdot 100$$

(IA/PSE) 446-1995

(2) (ferroresonant voltage regulators) The maximum amount that the output voltage or current will change as the result of a specified change in line frequency. *See also:* over-all regulation.

(PEL/ET) 449-1990s

frequency relay (1) (power system device function numbers)

A relay that responds to the frequency of an electrical quantity, operating when the frequency of an electrical quantity, operating when the frequency or rate of change of frequency exceeds or is less than a predetermined value.

(PE/SUB) C37.2-1979s

(2) A relay that responds to the frequency of an alternating electrical input quantity.

(SWG/PE) C37.100-1992

frequency resolution The ability of a receiver or signal processing system to detect or measure separately two or more signals that differ only in frequency. *Note:* The classic measure of frequency resolution is the minimum frequency separation of two otherwise identical signals that permits the given system to distinguish that two frequencies are present and to extract the desired information from each of them. When the separation is done by means of a tunable bandpass filter system, the resolution is often specified as the width of the frequency-response lobe measured at a specific value (such as three decibels) below the peak response. *See also:* angular resolution.

(AES) 686-1997

frequency response (1) (power supplies) The measure of an amplifier or power supply's ability to respond to a sinusoidal program. *Notes:* 1. The frequency response measures the maximum frequency for full-output voltage excursion. 2. Frequency response connotes amplitude-frequency response, which should be used in full, particularly if phase-frequency response is significant. This frequency is a function of the slewing rate and unity-gain bandwidth. *See also:* amplitude-frequency response.

(AES/PE) [41], [78], 599-1985w

(2) (spectrum analyzer) The peak-to-peak variation of the displayed amplitude over a specified center frequency range, measured at the center frequency, (dB). *Note:* Frequency response is closely related to display flatness. The main difference is that the tuning control of the spectrum analyzer is readjusted so as to center the display.

(IM) 748-1979w

(3) (speed governing of hydraulic turbines) A characteristic, expressed by formula or graph, which describes the dynamic and steady-state response of a physical system in terms of the magnitude ratio and the phase displacement between a sinusoidally varying input quantity and the fundamental of

the corresponding output quantity as a function of the fundamental frequency.

(PE/EDPG) 125-1977s

(4) (broadband local area networks) The change of a parameter (usually signal amplitude) with frequency.

(LM/C) 802.7-1989r

(5) Electrical, acoustic, or electroacoustic sensitivity as a function of frequency.

(COM/TA) 269-1992, 1206-1994

(6) (bandwidth) The change in response (reading) of a field meter to a field of constant amplitude but different frequencies. *Note:* The range of frequencies over which the field meter response is constant to within 3 dB is often referred to as the bandwidth of the field meter.

(T&D/PE) 1308-1994

(7) The ratio of the magnitude of the system output to the magnitude of the stimulus over a specified frequency range.

(COM/TA) 1027-1996

(8) Electrical, acoustic, or electroacoustic sensitivity (output/input) or gain as a function of frequency.

(COM/TA) 1329-1999

(9) *See also:* transfer function.

(PAS) 812-1984w

(10) (telecommunications) *See also:* attenuation distortion.

(COM/TA) 1007-1991r

frequency-response characteristic (1) (signal-transmission system, industrial control)

The frequency-dependent relation, in both gain and phase difference, between steady-state sinusoidal outputs. *Notes:* 1. With nonlinearity, as evidenced by distortion of a sinusoidal input of specified amplitudes, the relation is based on that sinusoidal component of the output having the frequency of the input. 2. Mathematically, the frequency-response characteristic is the complex function of $S = j\omega$:

$$A_0(j\omega)/A_i(j\omega) \exp \{j[\theta_0(j\omega) - \theta_i(j\omega)]\}$$

See also: signal; feedback control system.

(IE/PE/IA/EDPG/IAC/APP) [43], [3], [60], [69]

(2) (linear system) In a linear system, the frequency-dependent relation, in both gain and phase difference, between steady-state sinusoidal inputs and the resultant steady-state sinusoidal outputs.

(PE/EDPG) 421.2-1990

(3) (automatic generation control on electric power systems) The sum of an area's generation-frequency and load-frequency characteristics.

(PE/PSE) 858-1993w, 94-1991w

frequency-response equalization (1) The effect of all frequency discriminative means employed in a transmission system to obtain a desired over-all frequency response.

(SP/ACO) [32]

(2) The process of modifying a frequency response of one network by introducing a frequency response of another network so that, within the band of interest, the combined response follows a specified characteristic.

(CAS) [13]

frequency selective bandwidth The inverse of the product $2\pi\sigma_t$, where σ_t is the time delay spread. *Synonyms:* coherent bandwidth; dispersive bandwidth.

(AP/PROP) 211-1997

frequency selective fading Fading which affects unequally the different spectral components of a radio signal.

(AP/PROP) 211-1997

frequency-selective ringing (telephone switching systems)

Selective ringing that employs currents of several frequencies to activate ringers, each of which is tuned mechanically or electrically, or both, to one of the frequencies so that only the desired ringer responds.

(COM) 312-1977w

frequency-selective voltmeter A selective radio receiver, with provisions for output indication.

(EMC) [53], 263-1965w

frequency selectivity (1) (A) (selectivity) A characteristic of an electric circuit or apparatus in virtue of which electric currents or voltages of different frequencies are transmitted with different attenuation. **(B) (selectivity)** The degree to which a transducer is capable of differentiating between the desired signal and signals or interference at other frequencies. *See also:* transducer.

(EEC/PE) [119]

(2) (attenuator) (characteristic insertion loss) Peak-to-peak variation in decibels through the specified frequency range.

(IM/HFIM) 474-1973w

frequency-sensitive relay A relay that operates when energized with voltage, current, or power within specific frequency bands. *See also:* relay. (EEC/REE) [87]

frequency shift A condition on a connection where all the frequencies in a signal are shifted by the same amount. (COM/TA) 743-1995

frequency shifter, optical *See:* optical frequency shifter.

frequency shift keying (FSK) (1) (data transmission) That form of frequency modulation in which the modulating signal shifts the output frequency between predetermined values, and the output wave has no phase discontinuity. (PE) 599-1985w

(2) (telecommunications) The form of frequency modulation in which the modulating wave shifts the output frequency between or among predetermined values, and the output wave has no phase discontinuity. *Note:* Commonly, the instantaneous frequency is shifted between two discrete values termed the mark and space frequencies. (IT) [7]

(3) A modulation technique in which binary 0 and 1 are represented by two different frequencies. *See also:* binary phase shift keying; amplitude shift keying. (C) 610.7-1995

frequency-shift pulsing (telephone switching systems) A means of transmitting digital information in which a sequence of two frequencies is used. (COM) 312-1977w

frequency span (nonreal time spectrum analyzer) (spectrum analyzer) The magnitude of the frequency segment displayed (Hz, Hz/div). (IM) [14], 748-1979w

frequency spectrum The distribution of the amplitude (and sometimes the phase) of the frequency components of a signal, as a function of frequency. (T&D/PE) 539-1990, 656-1992

frequency stability (1) (network analyzers) A measure of the amount that a signal source can be expected to vary from its nominal value in a specified time. *Notes:* 1. This can be separated into a short-term stability of limited excursion such as phase-jitter and noise, and a long-term stability such as drift. 2. May cause inaccuracies in measuring narrow band networks; may cause errors in stored corrections. (IM/HFIM) 378-1986w

(2) (data transmission) The measure of the ability to remain on its assigned channel as determined on both a short term (1-second) and a long term (24-hour) basis. (PE) 599-1985w

frequency stabilization The process of controlling the center or carrier frequency so that it differs from that of a reference source by not more than a prescribed amount. *See also:* frequency modulation. (AP/ANT) 145-1983s

frequency standard (1) (A) (electric power system) A device that produces a standard frequency. *See also:* standard frequency; speed-governing system. **(B)** A device that produces a standard frequency. (PE/PSE) 94-1970, 94-1991

(2) (facsimile) A local precision source supplying a stable frequency which is used, among other things, for control of synchronous scanning and recording devices. (COM) 167-1966w

frequency swing (data transmission) In frequency modulation, the peak difference between the maximum and the minimum values of the instantaneous frequency. *Note:* The term "frequency swing" is sometimes used to describe the maximum swing permissible under specified conditions. Such usage should preferably include a specific statement of the conditions. (PE) 599-1985w

frequency time matrix (communication satellite) A modulation technique used for multiple access: frequency-time matrix systems require the simultaneous presence of energy in more than one time and frequency assignment to produce an output signal. The requirement for presence in several time and/or frequency slots reduces the probability of mutual interference when a number of users are simultaneously transmitting. (COM) [19]

frequency tolerance (radio transmitters) The extent to which a characteristic frequency of the emission, for example, the

carrier frequency itself or a particular frequency in the sideband, may be permitted to depart from a specified reference frequency within the assigned band. *Note:* The frequency tolerance may be expressed in hertz or as a percentage of the reference frequency. *See also:* radio transmitter. (EEC/PE) [119]

frequency transformation The replacing of the frequency variable s in a function $f(s)$ with a new variable z implicitly defined by $s, g(z)$. This may be done, as examples, to convert a low-pass function into a band-pass function or to make calculations less affected by rounding errors. (CAS) [13]

frequency translation (1) (data transmission) The amount of frequency difference between the received audio signals and the original audio signals after passing through a communication channel. (PE) 599-1985w

(2) (broadband local area networks) Shifting the spectral location of a RF signal frequency from one location to another. (LM/C) 802.7-1989r

frequency translator *See:* translator.

frequency tripler (1) (nonlinear, active, and nonreciprocal waveguide components) A device for delivering output power at a frequency that is three times the input frequency. (MTT) 457-1982w

(2) A device delivering output voltage at a frequency that is three times the input frequency. (AP/ANT) 145-1983s

frequency-type telemeter A telemeter that employs the frequency of a periodically recurring electric signal as the translating means. (SWG/PE/SUB) C37.100-1992, C37.1-1994

frequency, undamped *See:* undamped frequency.

frequently-repeated overload rating The maximum direct current that can be supplied by the converter on a repetitive basis under normal operating conditions. *See also:* power rectifier. (IA/PCON) [62]

freshening charge (1) (lead storage batteries) (nuclear power generating station) The charge given to a storage battery following nonuse or storage. (PE/NP/EDPG) 380-1975w, 484-1987s

(2) The charging of batteries to assure that they are maintained "fresh" in a near-maximum state of charge, and to assure that there is no deterioration of the battery plates due to self-discharge and resulting sulfation. Freshening charges are usually performed using the manufacturer's recommended equalization or cycle-service charging voltage. (SCC21) 937-2000

Fresnel coefficients (for reflection and transmission) The ratio of the phasor value of the parallel or perpendicular polarization component of the electric field of a reflected or transmitted plane wave to that of the corresponding component of the incident plane wave, evaluated at an infinite planar interface separating two homogeneous media. *Synonyms:* reflection coefficient; reflection factor. (AP/PROP) 211-1997

Fresnel contour The locus of points on a surface for which the sum of the distances to a source point and an observation point is a constant, differing by a multiple of a half-wavelength from the minimum value of the sum of the distances. *Note:* This definition applies to media which are isotropic and homogeneous. For the general case, the distances along optical paths must be employed. (AP/ANT) 145-1993

Fresnel diffraction pattern *See:* near-field diffraction pattern.

Fresnel ellipse For a ground-reflected ray, the Fresnel ellipse is the locus of points in the ground plane for which the sum of the distances from the two antennas is an integral number of half wavelengths greater than the length of the specularly reflected ray. (AP/PROP) 211-1997

Fresnel ellipsoid The locus of points for which the sum of distances from two antennas is an integral number of half wavelengths greater than the length of the direct ray between the two antennas. The antennas are at the focal points of the set of ellipsoids. (AP/PROP) 211-1997

Fresnel emissivity The emissivity of an infinite planar interface between two homogeneous media. (AP/PROP) 211-1997

Fresnel lens antenna An antenna consisting of a feed and a lens, usually planar, that transmits the radiated power from the feed through the central zone and alternate Fresnel zones of the illuminating field on the lens. *Synonym:* zone-plate lens antenna. (AP/ANT) 145-1993

Fresnel pattern A radiation pattern obtained in the Fresnel region. (AP/ANT) 145-1993

Fresnel reflection (fiber optics) The reflection of a portion of the light incident on a planar interface between two homogeneous media having different refractive indices. *Notes:* 1. Fresnel reflection occurs at the air-glass interfaces at entrance and exit ends of an optical waveguide. Resultant transmission losses (on the order of 4 percent per interface) can be virtually eliminated by use of antireflection coatings or index matching materials. 2. Fresnel reflection depends upon the index difference and the angle of incidence; it is zero at Brewster's angle for one polarization. In optical elements, a thin transparent film is sometimes used to give an additional Fresnel reflection that cancels the original one by interference. This is called an antireflection coating. *See also:* reflectance; Brewster's angle; index matching material; refractive index; antireflection coating; reflection. (Std100) 812-1984w

Fresnel reflection method (fiber optics) The method for measuring the index profile of an optical fiber by measuring the reflectance as a function of position on the end face. *See also:* reflectance; index profile; Fresnel reflection. (Std100) 812-1984w

Fresnel region (1) (data transmission) The region between the antenna and the Fraunhofer region. *Note:* If the antenna has a well-defined aperture D in a given aspect, the Fresnel region in that respect is commonly taken to extend a distance of $2D^2/\lambda$ in that aspect, being the wavelength. (PE/PSCC) 599-1985w

(2) The region (or regions) adjacent to the region in which the field of an antenna is focused (that is, just outside the Fraunhofer region). *Note:* In the Fresnel region in space, the values of the fields, when calculated from knowledge of the source distribution of an antenna, are insufficiently accurate unless the quadratic phase terms are taken into account, but are sufficiently accurate if the quadratic phase terms are included. *See also:* radiating near-field region. (AP/PE/ANT) 145-1993, 599-1985w

(3) The region around an electromagnetic radiator or scatterer (maximum dimension D) up to a distance of $2D^2$ divided by the wavelength. Outside of this region the dominant part of the fields decay as $1/r$, while inside the region the distance dependence is more complicated. (AP/PROP) 211-1997

Fresnel zone (1) The region on a surface between successive Fresnel contours. *Note:* Fresnel zones are usually numbered consecutively, with the first zone containing the minimum path length. (AP/ANT) 145-1993

(2) In general, any surface or region bounded by adjacent Fresnel ellipses or ellipsoids. For instance, any plane through both antennas will intersect Fresnel ellipses and define Fresnel zones in that plane. Any plane normal to the ray path between antennas will define a series of circular (annular) Fresnel zones. (AP/PROP) 211-1997

fretting Deterioration resulting from repetitive slip at the interface between two surfaces. *Note:* When deterioration is further increased by corrosion, the term fretting-corrosion is used. (IA) [59], [71]

friction and windage loss (rotating machinery) The power required to drive the unexcited machine at rated speed with the brushes in contact, deducting that portion of the loss that results from: A) forcing the gas through any part of the ventilating system that is external to the machine and cooler (if used); B) the driving of direct-connected flywheels or other direct-connected apparatus. *See also:* asynchronous machine; direct-current commutating machine. (PE) [9], [84]

friction brake The system of pneumatic, electropneumatic, hydraulic, electrohydraulic, or electric valves, controls, actuators and associated components which, in combination, pro-

vide the capability of braking the vehicle to a stop purely by the action of friction devices upon the wheel tread, disc rotors, or other surfaces. (VT) 1475-1999

friction electrification *See:* triboelectrification.

friction feed A method for feeding paper into a printer in which friction is used to hold the paper in place. *Contrast:* tractor feed. *See also:* single-sheet feed; continuous feed. (C) 610.10-1994w

friction tape A fibrous tape impregnated with a sticky moisture-resistant compound that provides a protective covering for insulation.

Friis transmission formula The relationship defining the power transfer ratio between two antennas:

$$\frac{P_r}{P_t} = \frac{A_r A_t}{(\lambda d)^2}$$

where

A_r = the effective area of the receiving antenna

A_t = the effective area of the transmitting antenna

λ = the wavelength

d = the separation between the antennas

P_r = the received power

P_t = the transmitted power

Notes: 1. The antennas must be in free space and separated by at least $2D^2/\lambda$, where D is the largest dimension of the larger antenna. 2. The formula accounts for free space propagation loss and antenna gains. (AP/PROP) 211-1997

fringing capacitance (nonlinear, active, and nonreciprocal waveguide components) (semiconductor) The fixed capacitance between the connecting devices (wires and straps) and the pedestal of a diode enclosure. (MTT) 457-1982w

fritting, relay *See:* relay fritting.

frogging (measuring longitudinal balance of telephone equipment operating in the voice band) A switching technique whereby the tip and ring leads of the test specimen are reversed relative to the driving or terminating test circuits, or both. (COM/TA) 455-1985w

frog-leg winding (rotating machinery) A composite winding consisting of one lap winding and one wave winding placed on the same armature and connected to the same commutator. *See also:* direct-current commutating machine. (PE) [9]

front (motor or generator) The front of a normal motor or generator is the end opposite the largest coupling or driving pulley. *See also:* asynchronous machine; direct-current commutating machine. (PE) [9]

front- and back-connected device A device in which one or more current-carrying conductors are connected directly to the fixed terminals located at the front of the mounting base, with the remaining conductors connected to the studs on the back of the mounting base. (SWG/PE) C37.100-1992

front- and back-connected fuse A fuse in which one or more current-carrying conductors are connected directly to the fixed terminals located at the front of the mounting base, with the remaining conductors connected to the studs on the back of the mounting base. (SWG/PE) C37.40-1993

front-and-back connected switch (high-voltage switchgear) A switch having provisions for some of the circuit connections to be made in front of, and others in back of, the mounting base. (SWG/PE) C37.30-1971s

front-connected device A device in which the current-carrying conductors are connected to the fixed terminals in front of the mounting base. (SWG/PE) C37.100-1992

front-connected fuse (high-voltage switchgear) A fuse in which the current-carrying conductors are fastened to the fixed terminals in front of the mounting base. (SWG/PE) C37.40-1993

front-connected switch (high-voltage switchgear) A switch in which the current-carrying conductors are connected to the fixed terminal blocks in front of the mounting base. (SWG/PE) C37.30-1971s

front contact (1) (general) A part of a relay against which, when the relay is energized, the current-carrying portion of the movable neutral member is held so as to form a continuous path for current. *See also:* a contact.

(2) **(relay systems)** A contact that is closed when the relay is picked up. *Synonym:* a contact. (PE/PSR) C37.90-1978s

(3) **(utility-consumer interconnections)** A contact that is open when the relay is deenergized. (PE/PSR) C37.95-1973s

front end (communication satellite) The first stage of amplification or frequency conversion immediately following the antenna in a receiving system. (COM) [24]

frontend Pertaining to one part of a process which has two parts, the frontend and the backend; the frontend usually denotes what the user sees and the backend denotes some special process. *Contrast:* backend; frontend. *See also:* backend computer. (C) 610.10-1994w

front end computer A communications computer associated with a host computer. It may perform line control, message handling, code conversion, error control and applications functions such as control and operation of special purpose terminals. *See also:* communications computer. (LM/COM) 168-1956w

front-end computer A computer that interfaces between a group of terminals, communication links, and a host computer and performs communications, error checking code conversion, and other special purpose functions. *Synonym:* front-end processor. *Contrast:* backend computer. *See also:* communications computer. (C) 610.7-1995, 610.10-1994w

front-end processor *See:* front-end computer.

front-of-wave impulse sparkover voltage The impulse sparkover voltage with a wavefront that rises at a uniform rate and causes sparkover on the wavefront. (SPD/PE) C62.11-1999

front-of-wave lightning impulse test (power and distribution transformers) A voltage impulse, with a specified rate-of-rise, that is terminated intentionally by sparkover of a gap that occurs on the rising front of the voltage wave with a specified time to sparkover, and a specified minimum crest voltage. Complete front-of-wave tests (transformer) involve application of the following sequence of impulse waves: one reduced full wave; two front-of-waves; two chopped waves; one full wave. (PE/TR) C57.12.80-1978r

front-of-wave lightning impulse voltage shape A voltage impulse, with a specified rate-of-rise, that is terminated intentionally by sparkover of a gap that occurs on the rising front of the voltage wave with a specified time to sparkover, and a specified minimum crest voltage. (PE/C) 1313.1-1996

front pitch (rotating machinery) The coil pitch at the connection end of a winding (usually in reference to a wave winding). (PE) [9]

front porch (television) The portion of a composite picture signal that lies between the leading edge of the horizontal blanking pulse and the leading edge of the corresponding synchronizing pulse. *See also:* television. (BT/AV) [34]

front relay contacts Sometimes used for relay contacts, normally open. (EEC/REE) [87]

front-to-back ratio (1) (general) The ratio of the directivity of an antenna to directive gain in a specified direction toward the back. [35]

(2) **(data transmission)** For a directional antenna, the ratio of its effectiveness toward the front to its effectiveness toward the back. (PE) 599-1985w

(3) The ratio of the maximum directivity of an antenna to its directivity in a specified rearward direction. *Notes:* 1. This definition is usually applied to beamtype patterns. 2. If the rearward direction is not specified, it shall be taken to be that of the maximum directivity in the rearward hemisphere relative to the antenna's orientation. (AP/ANT) 145-1993

FRS *See:* fragility response spectrum.

FRU *See:* field replaceable unit.

fruit *See:* fruit pulse.

fruit pulse A pulse reply received as the result of interrogation of a transponder by interrogators not associated with the responder in question. *Synonym:* fruit. (IM/WM&A) 194-1977w

F scan *See:* F-display.

F-scope A cathode-ray oscilloscope arranged to present an F-display. (AES/RS) 686-1990

FSK *See:* frequency shift keying.

fsm *See:* finite state machine.

FS to AM converter *See:* facsimile receiving converter.

FTAM regime The initial regime negotiated between a pair of FTAM ASES, within which a series of file selection regimes may be established to select or create individual files. (C/PA) 1238.1-1994w

FTC circuit *See:* fast-time-constant circuit.

FTP *See:* file transfer protocol.

F2 layer The single ionized layer normally existing in the F region in the night hemisphere and the higher of the two layers normally existing in the F region in the day hemisphere. *See also:* F region. (AP/PROP) 211-1997

F2V A transaction that is originated at the Futurebus+ (the Bridge acts as a Futurebus+ slave), and has its destination at the VME64 (the Bridge acts as a VME64 master). (C/BA) 1014.1-1994w

F-type connector A 75- Ω connector used to connect coaxial cable to equipment. (LM/C) 802.7-1989r

fuel (fuel cells) A chemical element or compound that is capable of being oxidized. *See also:* electrochemical cell. (AES/IA/APP) [41], [73]

fuel adjustment clause (electric power utilization) (power operations) A clause in a rate schedule that provides for adjustment of the amount of the bill as the cost of fuel varies from a specified base amount per unit. (PE/PSE) 858-1987s, 346-1973w

fuel-and-oil quantity electric gauge A device that measures, by means of bridge circuits and an indicator with separate pointers and scales, the quantity of fuel and oil in the aircraft tanks. (EEC/PE) [119]

fuel battery An energy-conversion device consisting of more than one fuel cell connected in series, parallel, or both. *See also:* fuel cell. (AES/IA/APP) [41], [73]

fuel-battery power-to-volume ratio The kilowatt output per envelope volume of the fuel battery (exclusive of the fuel, oxidant, storage, and auxiliaries). *See also:* fuel cell. (AES/IA/APP) [41], [73]

fuel-battery power-to-weight ratio The kilowatt output per unit weight of the fuel battery (exclusive of the fuel, oxidant, storage, and auxiliaries). *See also:* fuel cell. (AES/IA/APP) [41], [73]

fuel cell An electrochemical cell that can continuously change the chemical energy of a fuel and oxidant to electric energy by an isothermal process involving an essentially invariant electrode-electrolyte system. (AES/IA/APP) [41], [73]

fuel-cell Coulomb efficiency The ratio of the number of electrons obtained from the consumption of a mole of the fuel to the electrons theoretically available from the stated reaction.

$$\text{Coulomb efficiency} = \frac{\int_0^{t_m} i dt}{nF} \times 100$$

where

t_m = time required to consume a mole of fuel

i = instantaneous current

n = number of electrons furnished in the stated reaction by the fuel molecule

F = Faraday's constant = 96485.3 ± 10.0 absolute joules per absolute volt gram equivalent

See also: fuel cell. (AES/IA/APP) [41], [73]

fuel-cell standard voltage (at 25°C) The voltage associated with the stated reaction and determined from the equation

$$E^0 = \frac{-J\Delta G^0}{nF}$$

where

E^0 = fuel-cell standard voltage

J = Joule's equivalent = 4.1840 absolute joules per calorie

ΔG^0 = standard free energy changes in kilocalories/mole of fuel

n = number of electrons furnished in the stated reaction by the fuel molecule

F = Faraday's constant = 96485.3 ± 10.0 absolute joules per absolute volt gram equivalent

See also: fuel cell. (AES/IA/APP) [41], [73]

fuel-cell system An energy conversion device consisting of one or more fuel cells and necessary auxiliaries. *See also:* fuel cell. (AES/IA/APP) [41], [73]

fuel-cell-system energy-to-volume ratio The kilowatt-hour output per displaced volume of the fuel-cell system (including the fuel, oxidant, and storage). *See also:* fuel cell. (AES/IA/APP) [41], [73]

fuel-cell-system energy-to-weight ratio The kilowatt-hour output per unit weight of the fuel-cell system (including the fuel, oxidant, and storage). *See also:* fuel cell. (AES/IA/APP) [41], [73]

fuel-cell-system power-to-volume ratio The kilowatt output per displaced volume of the fuel-cell system (exclusive of the fuel, oxidant, and storage). *See also:* fuel cell. (AES/IA/APP) [41], [73]

fuel-cell-system power-to-weight ratio The kilowatt output per unit weight of the fuel-cell system (exclusive of the fuel, oxidant, and storage). *See also:* fuel cell. (AES/IA/APP) [41], [73]

fuel-cell-system standard thermal efficiency The efficiency of a system made up of a fuel cell and auxiliary equipment. *Note:* This efficiency is expressed as the ratio of 1) the electric energy delivered to the load circuit to 2) the enthalpy change for the stated cell reaction.

$$\text{thermal efficiency} = \frac{\int_0^{t_m} (E_{IL} \times i_L) dt}{\Delta H^0}$$

where

t_m = time required to consume a mole of fuel

E_{IL} = fuel-cell-system working voltage

i_L = instantaneous current into the load

ΔH^0 = enthalpy change for the stated cell reaction at standard conditions

See also: fuel cell. (AES/IA/APP) [41], [73]

fuel-cell working voltage The voltage at the terminals of a single fuel-cell delivering current into system auxiliaries and load. *See also:* fuel cell. (AES/IA/APP) [41], [73]

fuel-control mechanism (gas turbines) All devices, such as power-amplifying relays, servomotors, and interconnections required between the speed governor and the fuel-control valve. *See also:* speed-governing system. (PE/EDPG) 282-1968w, [5]

fuel-control system (gas turbines) Devices that include the fuel-control valve and all supplementary fuel-control devices and interconnections necessary for adequate control of the fuel entering the combustion system of the gas turbine. *Note:* The supplementary fuel-control devices may or may not be directly actuated by the fuel-control mechanism. *See also:* speed-governing system. (PE/EDPG) 282-1968w, [5]

fuel-control valve (gas turbines) A valve or any other device operating as a final fuel-metering element controlling fuel input to the gas turbine. *Notes:* 1. This valve or device may be directly or indirectly controlled by the fuel-control mechanism. 2. Variable-displacement pumps, or other devices that

operate as the final fuel-control element in the fuel-control system, and that control fuel entering the combustion system are fuel-control valves. *See also:* speed-governing system. (PE/EDPG) [5], 282-1968Dw

fuel economy The ratio of the chemical energy input to a generating station to its net electric output. *Note:* Fuel economy is usually expressed in British thermal units per kilowatthour. *See also:* generating station. (T&D/PE) [10]

fuel elements, nuclear *See:* nuclear fuel elements.

fuel-pressure electric gauge A device that measures the fuel pressure (usually in pounds per square inch) at the carburetor of an aircraft engine. *Note:* It provides remote indication by means of a self-synchronous generator and motor. (EEC/PE) [119]

fuel replacement energy (1) (power operations) Energy generated to substitute for energy which would otherwise have been generated by a different fuel source. (PE/PSE) 858-1987s

(2) Energy generated at a hydroelectric plant as a substitute for energy which would otherwise have been generated by a thermal-electric plant. (T&D/PE/PSE) 346-1973w

fuel reprocessing, nuclear *See:* nuclear fuel reprocessing.

fuel stop valve (gas turbines) A device that, when actuated, shuts off all fuel flow to the combustion system, including that provided by the minimum fuel limiter. *See also:* speed-governing system. (PE/EDPG) 282-1968w, [5]

fulguration *See:* electrodesiccation.

full adder An adder that accepts three inputs (two operands and a carry digit), producing a sum and a carry as outputs according to the table below. *Synonym:* three-input adder. *Contrast:* quarter adder; half adder. *See also:* full subtractor.

input #1	0	0	1	1	0	0	1	1
input #2	0	1	0	1	0	1	0	1
input carry	0	0	0	0	1	1	1	1
output sum	0	1	1	0	1	0	0	1
output carry	0	0	0	1	0	1	1	1

full adder

(C) 610.10-1994w

full automatic plating Mechanical plating in which the cathodes are automatically conveyed through successive cleaning and plating tanks. (EEC/PE) [119]

full availability (telephone switching systems) Availability that is equal to the number of outlets in the desired group. (COM) 312-1977w

full backup To perform a backup in which all data within a system is stored on the backup copy. *Contrast:* incremental backup. (C) 610.5-1990w

full binary tree *See:* complete binary tree.

full data transport address The combination of a *functional address* and a *channel address*, that specifies whether data is being read or written, to which function, and to which channel. (IM/ST) 1451.2-1997

full-direct trunk group (telephone switching systems) A full trunk group between end offices. (COM) 312-1977w

full duplex (1) (communication circuits) (telecommunications) (data transmission) Method of operation where each end can simultaneously transmit and receive. *Note:* Refers to a communications system or equipment capable of transmission simultaneously in two directions. (PE) 599-1985w

(2) A mode of operation of a network, DTE, or Medium Attachment Unit (MAU) that supports duplex transmission as defined in IEEE Std 100-1996. This mode of operation allows for simultaneous communication between a pair of stations, provided that the Physical Layer is capable of supporting simultaneous transmission and reception without interference. (C/LM) 802.3-1998

(3) **(local area networks)** A link segment capable of transferring signals in both directions simultaneously. (C) 8802-12-1998

(4) An operating condition which allows simultaneous communication in both send and receive directions with 3 dB or less switched loss in either direction.

(COM/TA) 1329-1999

full-duplex operation (local area networks) A mode of operation in a network link that supports duplex transmission as defined in IEEE Std 610.7-1995. (C) 802.12c-1998

full duplex transmission See: duplex transmission.

full-energy peak (1) A peak in the spectrum resulting from the complete (total) absorption of a photon of a given energy in the active volume of the Ge crystal and the collection of all of the resulting charge. (NI) N42.14-1991

(2) The peak in a pulse height spectrum that corresponds to total absorption of a gamma photon in the NaI(Tl) detector. (NI) N42.12-1994

(3) (for a monoenergetic photon spectrum for a semiconductor spectrometer system) The distribution of events within the peak of the pulse-height distribution spectrum representing response to the monoenergetic photon source. *Note:* Notwithstanding other definitions or procedures for subtracting background and other distortions, the full energy peak intensity is defined as not including any events that exceed a Gaussian distribution by more than a factor of two σ . (NPS/NID) 759-1984r

full energy peak efficiency (1) (x-ray energy spectrometers) (of a semiconductor radiation detector) The ratio of the number of events in the full energy peak of the spectral distribution to the total number of photons incident on the active detector volume during the same time interval. (NPS/NID) 759-1984r

(2) The ratio between the number of counts in the net area of the full-energy peak to the number of photons of that energy emitted by a source with specified characteristics for a specified source-to-detector distance. (NI) N42.14-1991

full field In a propulsion system, the motor connection in which, for series motors, the exciting field current is the same as the armature current, or, for separately excited motors, the exciting field current is at its maximum value relative to the armature current. (VT) 1475-1999

full-field relay A relay that functions to maintain full field excitation of a motor while accelerating on reduced armature voltage. See also: relay. (IA/ICTL/IAC) [60]

full float (constant potential) operation Operation of a dc system with the battery, battery charger, and load all connected in parallel and with the battery charger supplying the normal dc load plus any self-discharge or charging current, or both, required by the battery. (The battery will deliver current only when the load exceeds the charger output.) (PE/EDPG) 1115-1992

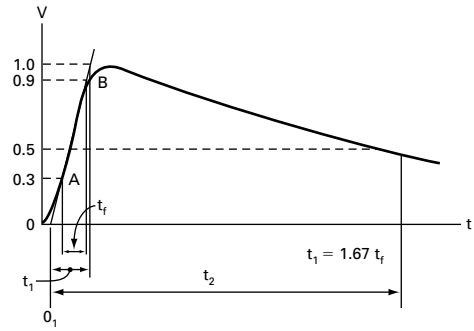
full float operation Operation of a dc system with the battery, battery charger, and load all connected in parallel and with the battery charger supplying the normal dc load plus any charging current required by the battery. (The battery will deliver current only when the load exceeds the charger output.) (SCC29) 485-1997

full functional dependency A functional dependency in which no attribute of the determinant can be omitted without voiding the dependent condition. (C) 610.5-1990w

full-height disk drive A disk drive that requires the whole height of the front panel of a standard computer cabinet bay. *Note:* Approximately 3.5 in, a full-height disk drive is twice the size of a half-height disk drive. (C) 610.10-1994w

Full Implementation Refers to the implementation of an operation on an Object. A Full Implementation means that all the referenced visible functionality of the operation is implemented as specified for the operation. (IM/ST) 1451.1-1999

full impulse voltage An aperiodic transient voltage that rises rapidly to a maximum value and falls, usually less rapidly, to zero. See the corresponding figure. See also: full-wave voltage impulse.



full impulse voltage

(PE/PSIM) 4-1978s

full-impulse wave (surge arresters) An impulse wave in which there is no sudden collapse. (PE) [8], [84]

full justification In text formatting, justification resulting in even margins on both the left and right margins. (C) 610.2-1987

full lightning impulse A lightning impulse not interrupted by any type of discharge. (PE/PSIM) 4-1995

full load (test, measurement, and diagnostic equipment) The greatest load that a circuit is designed to carry under specific conditions: any additional load is overload. (MIL/PE) [2], 599-1985w

full-load speed (electric drive) The speed that the output shaft of the drive attains with rated load connected and with the drive adjusted to deliver rated output at rated speed. *Note:* In referring to the speed with full load connected and with the drive adjusted for a specified condition other than for rated output at rated speed, it is customary to speak of the full-load speed under the (stated) conditions. See also: electric drive. (IA/ICTL/IAC) [60]

full magnetic controller An electric controller having all of its basic functions performed by devices that are operated by electromagnets. (IA/MT) 45-1998

full-page display device A display device that can display the contents of a full 8.5×11 in page at one time. (C) 610.10-1994w

full-pitch winding (rotating machinery) A winding in which the coil pitch is 100%; that is, equal to the pole pitch. See also: direct-current commutating machine; asynchronous machine. (PE) [9]

full range (accelerometer) (gyros) The algebraic difference between the upper and lower values of the input range. (AES/GYAC) 528-1994

full-range current-limiting fuse A fuse capable of interrupting all currents from the rated interrupting current down to the minimum continuous current that causes melting of the fusible element(s), with the fuse applied at the maximum ambient temperature specified by the fuse manufacturer. (SWG/PE) C37.40-1993

full scale In an analog computer, the nominal maximum value of a computer variable or the nominal maximum value at the output of a computing element. *Note:* Sometimes used to indicate the entire computing voltage range, for example, 20 V is full scale for a computer whose voltages ranges from +10 V to -10 V. (C) 610.10-1994w, 165-1977w

full scale input (accelerometer) (gyros) The maximum magnitude of the two input limits. (AES/GYAC) 528-1994

full-scale range The difference between the maximum and the minimum recordable input values as specified by the manufacturer. (IM/WM&A) 1057-1994w

full-scale signal A signal that spans the entire manufacturer's specified amplitude range of the instrument. (IM/WM&A) 1057-1994w

full-scale value (1) The largest value of the actuating electrical quantity that can be indicated on the scale or, in the case of instruments having their zero between the ends of the scale, the full-scale value is the arithmetic sum of the values of the

actuating electrical quantity corresponding to the two ends of the scale. *Note:* Certain instruments, such as power-factor meters, are necessarily excepted from this definition. *See also:* instrument; accuracy rating. (EEC/ERI/AII) [111], [102] (2) **(mechanical demand registers)** The maximum scale capacity of the register. If a multiplier exists, the full-scale value will be the product of the maximum scale marking and the multiplying constant. (ELM) C12.4-1984

full-screen editing A method of text editing that allows the user to view a full display screen of text at one time and to enter or alter text by using either commands or cursor control. Scrolling functions allow the user to move up and down within the document. *Contrast:* line editing. (C) 610.2-1987

full-screen editor A text editor that allows the user to view a full display screen of data at one time and to enter or alter text by using either commands or cursor control. Scrolling functions allow the user to move up and down within the document. *Synonym:* screen editor. *Contrast:* line editor. (C) 610.2-1987

full span—max span (spectrum analyzer) A mode of operation in which the spectrum analyzer scans an entire selected frequency band. (IM) 748-1979w

full speed (data transmission) Referring to transmission of data in teletypewriter systems at the full rated speed of the equipment. (PE) 599-1985w

full subtracter A subtracter that accepts three inputs (two operands and a borrow digit), producing a difference and a borrow as outputs according to the table below. *Contrast:* half subtracter. *See also:* full adder.

input #1	0	0	1	1	0	0	1	1
input #2	0	1	0	1	0	1	0	1
input carry	0	0	0	0	1	1	1	1
output differences	0	1	1	0	1	0	0	1
output borrow	0	1	0	0	1	1	0	1

full subtracter

(C) 610.10-1994w

full tree *See:* complete tree.

full-trunk group (telephone switching systems) A trunk group, other than a final trunk group, that does not overflow calls to another trunk group. (COM) 312-1977w

full-voltage starter A starter that connects the motor to the power supply without reducing the voltage applied to the motor. *Note:* Full-voltage starters are also designated as across-the-line starters. *See also:* starter. (IA/ICTL/IAC) [60]

full-wave lightning impulse test (power and distribution transformers) Application of the "standard lightning impulse" wave, a full wave having a front time of 1.2 microseconds and a time to half value of 50 microseconds, described as a 1.2/50 impulse. (PE/TR) C57.12.80-1978r

full-wave rectification (rectifying process) (power supplies) Full-wave rectification inverts the negative half-cycle of the input sinusoid so that the output contains two half-sine pulses for each input cycle. A pair of rectifiers arranged as a center-tapped transformer or a bridge arrangement of four rectifiers and no center tap are both methods of obtaining full-wave rectification. *See also:* rectifier; rectification. (AES/IA/PE) [41], [62], [78]

full-wave rectifier *See:* full-wave rectification.

full-wave rectifier circuit A circuit that changes single-phase alternating current into pulsating unidirectional current, utilizing both halves of each cycle. *See also:* rectification. (IA/NPS) 59-1962w, 325-1971w, [12]

full-wave voltage impulse (surge arresters) A voltage impulse that is not interrupted by sparkover, flashover, or puncture. *See also:* full impulse voltage. (PE) [8]

full width at fiftieth maximum (FWFM) (x-ray energy spectrometers) Same as full width at half maximum (FWHM), except that measurement is made at one fiftieth of the maximum ordinate rather than one half. (NPS/NID) 759-1984r

full width at half maximum (FWHM) (1) (A) (germanium gamma-ray detectors) (x-ray energy spectrometers) (charged-particle detectors) The full width of a distribution measured at half the maximum ordinate. For a normal distribution, it is equal to $2(2 \ln 2)^{1/2}$ times the standard deviation σ . (B) The full width of a distribution measured at 50% of its peak height. If the distribution is a spectral line due to radiation, it is assumed that the background level was averaged over the base of that line and the average subtracted from the ordinates of the distribution before the FWHM was determined. For a normal distribution, $FWHM = 2(2 \ln 2)^{0.5} = 2.355 \sigma$

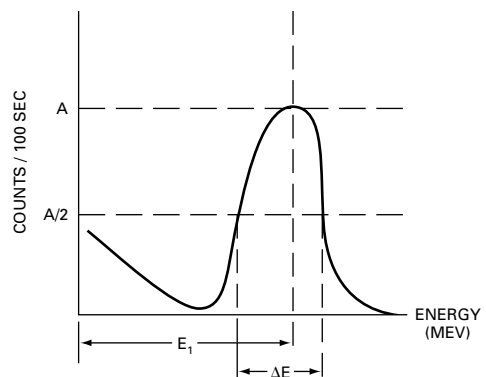
where σ = standard deviation and also the root-mean-square value of the distribution. (NPS/NID) 759-1984, 300-1988

(2) **(germanium detectors)** The full width of a gamma-ray peak distribution measured at half the maximum ordinate above the continuum. (PE/EDPG) 485-1983s

(3) **(scintillation counters)** The full width of a distribution measured at half the maximum ordinate. For a normal distribution, it is equal to $2(2 \ln 2)^{1/2}$ times the standard deviation (σ). *Note:* The expression full width at half maximum, given either as an absolute value or as a percentage of the value of the argument at the maximum of the distribution curve, is frequently used in nuclear physics as an approximate description of a distribution curve. Its significance can best be made clear by reference to a typical distribution curve, shown in the figure, of the measurement of the energy of the gamma rays from Cs¹³⁷ with a scintillation counter spectrometer. The measurement is made by determining the number of gamma-ray photons detected in a prescribed interval of time, having measured energies falling within a fixed energy interval (channel width) about the values of energy (channel position) taken as argument of the distribution function. The abscissa of the curve shown is energy in megaelectronvolts (MeV) units and the ordinate is counts per given time interval per megaelectronvolt energy interval. The maximum of the distribution curve shown has an energy E_1 megaelectronvolts. The height of the peak is A_1 counts/100 seconds/megaelectronvolts. The full width at half maximum ΔE is measured at a value of the ordinate equal to $A_1/2$. The percentage full width at half maximum is $100 \Delta E / E_1$. It is an indication of the width of the distribution curve, and where (as in the example cited) the gamma-ray photons are monoenergetic, it is a measure of the resolution of the detecting instrument. When the distribution curve is a Gaussian curve, the percentage full width at half maximum is related to the standard deviation σ by

$$100 \frac{\Delta E}{E_1} = 100 \times 2(2 \ln 2)^{1/2} \times \sigma$$

See also: scintillation counter.



full width at half maximum

(NPS) 398-1972r

(4) The full width of a gamma photon peak distribution measured at an ordinate half way between the maximum ordinate of the peak and the background. (NI) N42.12-1994

(5) The full width of a distribution measured at half the maximum ordinate. For a normal distribution, $FWHM = 2 \cdot (2 \ln 2)^{1/2} = 2.355$ times the standard deviation, s.
(NPS) 325-1996

full width at one-tenth maximum (FW.1M) The full width of a distribution measured at one tenth of the maximum ordinate measured above the background. (NPS) 300-1988r

full width at tenth maximum (FWTM) (x-ray energy spectrometers) Same as full width at half maximum (FWHM), except measurement is made at one tenth of the maximum ordinate rather than one half. (NPS/NID) 759-1984r

full width (duration) half maximum (fiber optics) A measure of the extent of a function. Given by the difference between the two extreme values of the independent variable at which the dependent variable is equal to half of its maximum value. The term "duration" is preferred when the independent variable is time. *Note:* Commonly applied to the duration of pulse waveforms, the spectral extent of emission or absorption lines, and the angular or spatial extent of radiation patterns.
(Std100) 812-1984w

fullword *See:* computer word; word.

fully concatenated key *See:* concatenated key.

fully connected network A network in which each node is directly connected with every other node.
(LM/COM) 168-1956w

fully decoded EAROM organization An EAROM organization in which rows and columns of memory cells are addressable through on-chip decoding circuitry. (ED) 641-1987w

fully inverted file An file that has been inverted on all secondary keys in the file. *Contrast:* partially inverted file.
(C) 610.5-1990w

fully qualified software_spec A *software_spec* that always identifies a software object unambiguously.
(C/PA) 1387.2-1995

fully relational Pertaining to a database management system that supports a relational database and a language that provides the functionality of the relational algebra.
(C) 610.5-1990w

fume-resistant So constructed that it will not be injured readily by exposure to the specified fume.
(SWG/PE/IA/ICTL/IAC) C37.100-1981s, [56], [60]

function (1) (general) When a mathematical quantity u depends on a variable quantity x so that to each value of x (within the interval of definition) there correspond one or more values of u , then u is a function of x written $u = f(x)$. The variable x is known as the independent variable or the argument of the function. When a quantity u depends on two or more variables x_1, x_2, \dots, x_n so that for every set of values of x_1, x_2, \dots, x_n (within given intervals for each of the variables) there correspond one or more values of u , then u is a function of x_1, x_2, \dots, x_n and is written $u = f(x_1, x_2, \dots, x_n)$. The variables x_1, x_2, \dots, x_n are the independent variables or arguments of the function.
(Std100) 270-1966w

(2) **(vector)** When a scalar or vector quantity u depends upon a variable vector V so that if for each value of V (within the region of definition) there correspond one or more values of u , then u is a function of the vector V .
(Std100) 270-1966w

(3) **(test, measurement, and diagnostic equipment)** The action or purpose which a specific item is intended to perform or serve.
(MIL) [2]

(4) **(A) (software)** A defined objective or characteristic action of a system or component. For example, a system may have inventory control as its primary function. **(B) (software)** A software module that performs a specific action, is invoked by the appearance of its name in an expression, may receive input values, and returns a single value. *See also:* subroutine.
(C) 610.12-1990

(5) **(mathematics of computing)** A mathematical entity whose value is uniquely determined by the value of one or more independent variables.
(C) 610.2-1987

(6) Normal or characteristic action of a component or the system of which it is a part. (PE/EDPG) 803.1-1992

(7) A task, action, or activity expressed as a verb-noun combination (e.g., Brake Function: stop vehicle) to achieve a defined outcome. (C/SE) 1220-1994s

(8) **(software user documentation)** A specific purpose of an entity or its characteristic action.
(SE/C) 1063-1987r, 1074-1995s

(9) A programming language construct, modeled after the mathematical concept. A function encapsulates some behavior. It is given zero or more arguments as input, performs some processing, and returns some results. Functions are also known as procedures, subprograms, or subroutines.
(C/PA) 1327.2-1993w, 1224.2-1993w, 1326.2-1993w, 1328.2-1993w

(10) A logical component of a unit that operates mostly independently. A function is independent of bus interface and node topology: a unit has registers that are externally accessible in the bus address space, a function may or may not. For example, a multi-function node may contain SCSI controller, LAN interface, and terminal interface Functions that are accessed via a shared DMA multiplex Unit. A function may also be a software entity (e.g., a Function driver), especially when messages are used for Processor-to-Processor communication.
(C/MM) 1212.1-1993

(11) A primitive operation on system-controlled resources. This standard defines a collection of functions together with suitable input and output parameters. (C/MM) 855-1990

(12) A task, action, or activity that must be accomplished to achieve a desired outcome. (C/SE) 1233-1998

(13) A single-valued mapping. The mapping M from D to R is a *function* if for any X in D and Y in R , there is at most one pair $[X, Y]$ in M . *Synonym:* single-valued. *Contrast:* multi-valued.
(C/SE) 1320.2-1998

(14) A transformation of inputs to outputs, by means of some mechanisms, and subject to certain controls, that is identified by a function name and modeled by a box. *Synonyms:* activity; task; process; operation.
(C/SE) 1320.1-1998

(15) **(scheme programming language)** *See also:* procedure.
(C/MM) 1178-1990r

functional A link interface becomes functional when the start-up procedure has successfully completed and the link interface is ready to transmit data.
(C/BA) 1355-1995

functional address (FA) (1) The portion of a full data transport address that specifies the read or write function that is to be performed.
(IM/ST) 1451.2-1997

(2) **(local area networks)** A bit-significant address used in the ISO/IEC 8802-5 MAC format to identify well-known functional groups.
(C) 8802-12-1998

functional address instruction An instruction whose format contains no operation field because the operation is implicitly specified by its address fields.
(C) 610.10-1994w

functional adjectives (A) (pulse terminology) Linear. Pertaining to a feature whose magnitude varies as a function of time in accordance with the following relation or its equivalent:

$$m = a + bt$$

(B) (pulse terminology) Exponential. Pertaining to a feature whose magnitude varies as a function of time in accordance with either of the following relations or their equivalents:

$$m = ae^{-bt}$$

$$m = a(1 - e^{-bt})$$

(C) (pulse terminology) Gaussian. Pertaining to a waveform or feature whose magnitude varies as a function of time in accordance with the following relation or its equivalent:

$$m = ae^{-b(t-c)^2}, b > 0$$

(D) (pulse terminology) Trigonometric. Pertaining to a waveform or feature whose magnitude varies as a function of time in accordance with a specified trigonometric function or by a specified relationship based on trigonometric functions (for example, cosine squared). (IM/WM&A) 194-1977

functional architecture An arrangement of functions and their subfunctions and interfaces (internal and external) that defines the execution sequencing, conditions for control or data flow, and the performance requirements to satisfy the requirements baseline. (C/SE) 1220-1998

functional area (nuclear power generating station) (or areas) Location(s) designated within the control room to which displays and controls relating to specific function(s) are assigned. (PE/NP) 566-1977w

functional-area data dictionary A data dictionary that standardizes data element syntax and semantics, within and among application areas within the same functional area. *Note:* Functional-area data dictionaries contain among their contents refined or synthesized composites of the contents of application-specific data dictionaries, primarily in the form of logical application data elements. (SCC32) 1489-1999

functional baseline In configuration management, the initial approved technical documentation for a configuration item. *Contrast:* allocated baseline; product baseline; developmental configuration. (C) 610.12-1990

functional character *See:* control character.

functional cohesion A type of cohesion in which the tasks performed by a software module all contribute to the performance of a single function. *Contrast:* procedural cohesion; communicational cohesion; sequential cohesion; temporal cohesion; logical cohesion; coincidental cohesion. (C) 610.12-1990

functional component A device that performs a necessary function for the proper operation and application of a unit of equipment. (SWG/PE) C37.100-1992

functional configuration audit An audit conducted to verify that the development of a configuration item has been completed satisfactorily, that the item has achieved the performance and functional characteristics specified in the functional or allocated configuration identification, and that its operational and support documents are complete and satisfactory. *See also:* physical configuration audit; configuration management. (C) 610.12-1990

functional configuration identification In configuration management, the current approved technical documentation for a configuration item. It prescribes all necessary functional characteristics, the tests required to demonstrate achievement of specified functional characteristics, the necessary interface characteristics with associated configuration items, the configuration item's key functional characteristics and its key lower level configuration items, if any, and design constraints. *Contrast:* product configuration identification; allocated configuration identification. *See also:* functional baseline. (C) 610.12-1990

functional decomposition (software) A type of modular decomposition in which a system is broken down into components that correspond to system functions and subfunctions. *See also:* hierarchical decomposition; stepwise refinement. (C) 610.12-1990

functional dependency A type of dependency between two attributes A and B in a relation, in which B is functionally dependent on A if, and only if, at every instant in time, each value of A is associated with no more than one value of B. *Note:* A is said to "identify" or "functionally determine" B. Written A - B. *See also:* full functional dependency; join dependency. (C) 610.5-1990w

functional design (1) (A) (software) The process of defining the working relationships among the components of a system. **(B) (software)** The result of the process in definition (A). (C) 610.12-1990, 610.10-1994

(2) The result of the process in (A). (C) 610.10-1994w

functional designation (1) (general) Letters, numbers, words, or combinations thereof, used to indicate the function of an item or a circuit, or of the position or state of a control of adjustment. *See also:* symbol for a quantity; abbreviation; reference designation; letter combination. (GSD) 267-1966

(2) (electric and electronics parts and equipment) Words, abbreviations, or meaningful number or letter combinations, usually derived from the function of an item (for example: slew, yaw), used on drawings, instructional material, and equipment to identify an item in terms of its function. *Note:* A functional designation is not a reference designation nor a substitute for it. (GSD) 200-1975w

functional diagram (test, measurement, and diagnostic equipment) A diagram that represents the functional relationships among the parts of a system. (MIL) [2]

functional dynamic tests (1) Operation of the MNOS array at nominal speed to determine functional performance. (ED) 641-1987w

(2) Operation of the array at specified dynamic conditions to determine functional performance. (ED) 1005-1998

functional element (1) A set of one or more modules that perform a particular function. (C/BA) 14536-1995

(2) A component of the AI-ESTATE architectural concept that is expected to perform specific duties. These include reasoning system, human presentation system, unit under test (UUT), knowledge/data base management system, test system, maintenance data/knowledge collection system, and other system. (ATLAS) 1232-1995

functional fault tree (FFT) A structured analysis method used to identify vital functions at the system functional level by comprehensively examining system functional faults that could precipitate hazards. (VT/RT) 1483-2000

functional grouping A grouping of functions into sets such that all the functions within the same group are performed by a homogenous set of equipment. *Note:* Grouping is based upon equipment's function rather than upon the actual physical realization. One function may be spread over multiple physical boxes or one physical device may perform several functions. (C) 610.7-1995

functional level The level of verification activities at which vital system functions are identified from system functional and operational requirements. (VT/RT) 1483-2000

functionality The capabilities of the various computational, user interface, input, output, data management, and other features provided by a product. (C/SE) 1362-1998

functional language A programming language used to express programs as a sequence of functions and function calls. Examples include LISP and C. *See also:* algebraic language; algorithmic language. (C) 610.13-1993w, 610.12-1990

function-limiting control table The first table in each decade specifies the limits designed into an end device with respect to variables used within the decade. (AMR/SCC31) 1377-1997

functionally determined *See:* functional dependency.

functional model An OSI management model that provides a conceptual and terminological framework for specific management functional areas. (C) 610.7-1995

functional module (1) (VSB) A collection of electronic circuitry that resides on one board and works to accomplish a specific task. Functional modules are used as a vehicle for discussing bus protocols, and should not be considered to constrain the design of actual logic. (C/MM) 1096-1988w

(2) (VMEbus) A collection of electronic circuitry that resides on one printed-circuit board (pcb) and works together to accomplish a task. (BA/C) 1014-1987

functional nomenclature (generating stations electric power system) Words or terms which define the purpose, equipment, or system for which the component is required. (PE/EDPG) 505-1977r

functional partitioning The logical separation of system or unit elements along interfaces that define and isolate these elements on the basis of function or purpose. (SCC20) 1226-1998

functional performance test Tests of the steady-state performance of control functions and sequences. (PE/SUB) 1378-1997

functional quality (FQ) A measure of the service level and performance expected in the support of a BSR by the technology solution proposed. These FQs may be used as assessment criteria for performance and conformance testing as well as for influencing the choice of standards to populate the physical design and the choice of products to turn the physical design into a (operational) solution that can be implemented. (C/PA) 1003.23-1998

functional requirement (1) (software) A requirement that specifies a function that a system or system component must be able to perform. (C) 610.12-1990

(2) A statement that identifies what a product or process must accomplish to produce required behavior and/or results. (C/SE) 1220-1998

functional specification (1) (software) A document that specifies the functions that a system or component must perform. Often part of a requirements specification. (C) 610.12-1990

(2) A formal description of the essential requirements of a software product. It specifies the objectives of the software application, the functions that will meet those objectives, the information requirements, the internal data flows, and the external interfaces. (PE/EDPG) 1150-1991w

functional test (1) (evaluation of thermal capability) (thermal classification of electric equipment and electrical insulation) A means of evaluation in which an insulating material, insulation system, or electric equipment is exposed to factors of influence, which simulate or are characteristic of actual service conditions. (EI) 1-1986r

(2) **(test pattern language)** A test in which the cells of a memory are accessed in a specific order and at a specific rate, while data is being written into them, or read from them. (TT/C) 660-1986w

(3) **(nuclear power generating station)** A test to determine the ability of a component or system to perform an intended purpose. (PE/NP) 338-1987r

(4) A sequence of tests applied to a unit under test (UUT) to establish whether it is functioning correctly. (SCC20) 771-1998

(5) A test that is intended to verify that a test subject is behaving as specified. (SCC20) 1226-1998

functional testing (A) Testing that ignores the internal mechanism of a system or component and focuses solely on the outputs generated in response to selected inputs and execution conditions. *Synonym:* black-box testing. *Contrast:* structural testing. **(B)** Testing conducted to evaluate the compliance of a system or component with specified functional requirements. *See also:* performance testing. (C) 610.12-1990

functional test pattern *See:* pattern.

functional unit (1) A system element that performs a task required for the successful operation of the system. *See also:* system. (SMC) [63]

(2) An entity of hardware, software, or both, capable of accomplishing a specified purpose. (C/SE) 610.7-1995, 729-1983s, 610.10-1994w

(3) A group of related functions. (C/PA) 1224.1-1993w

functional vector A pattern generated to exercise a device's functional behavior. Generally defined to run the device at system speeds to verify system behavior of a design. *Contrast:* structural vector. (C/TT) 1450-1999

functional verification The process of evaluating whether or not the functional architecture satisfies the validated requirements baseline. (C/SE) 1220-1998

Function Block An instance of a subclass of IEEE1451-FunctionBlock. (IM/ST) 1451.1-1999

function check A check of master and remote station equipment by exercising a predefined component or capability.

a) *Analog.* Monitor a reference quantity.

b) *Control.* Control and indication from a control-check relay.

c) *Scan.* Accomplished when control function check has been performed with all remotes.

d) *Poll.* Accomplished when analog function is performed with all remotes.

e) *Logging.* Accomplished when results of the control function check are logged.

(SWG/PE/SUB) C37.100-1992, C37.1-1987s

function Class-A (back-up) current-limiting fuse A fuse capable of interrupting all currents from the rated maximum interrupting current down to the rated minimum interrupting current. *Note:* The rated minimum interrupting current for such fuses is higher than the minimum melting current that causes melting of the fusible element in one hour.

(SWG/PE) C37.100-1981s

function Class-G (general purpose) current-limiting fuse (as applied to a high-voltage current-limiting fuse) A fuse capable of interrupting all currents from the rated maximum interrupting current down to the current that causes melting of the fusible element in one hour.

(SWG/PE) C37.100-1981s

function code (subroutines for CAMAC) The symbol *f* represents an integer that is the function code for a CAMAC action. (NPS) 758-1979r

function codes (subroutines for CAMAC) The symbol *fa* represents an array of integers, each of which is the function code for a CAMAC action. The length of *fa* is given by the value of the first element of *cb* at the time the subroutine is executed. *See also:* control block. (NPS) 758-1979r

function, coupling *See:* coupling function.

function, describing *See:* describing function.

function driver A software function in the Processor that is a logical peer to a hardware or firmware function in an I/O Unit. For example, a SCSI Function driver is the target of an I/O completion message from a SCSI Controller Function on an I/O module. (C/MM) 1212.1-1993

function, error transfer *See:* error transfer function.

function field *See:* operation field.

function generator (1) (analog computer) A computing element whose output is a specified nonlinear function of its input or inputs. Normal usage excludes multipliers and resolvers. (C) 165-1977w

(2) **(electric power system)** A device in which a mathematical function such as $y, f(x)$ can be stored so that for any input equal to x , an output equal to $f(x)$ will be obtained. *See also:* speed-governing system. (PE/PSE) 94-1970w

(3) A device whose output analog variable is equal to some function of its input variables. *See also:* digitally-controlled function generator. (C) 610.10-1994w

function generator, bivariant *See:* bivariant function generator.

function generator, card set *See:* card set function generator.

function generator, curve-follower *See:* curve-follower function generator.

function generator, digitally controlled *See:* digitally-controlled function generator.

function generator, diode *See:* diode function generator.

function generator, map-reader *See:* map-reader function generator.

function generator, servo *See:* servo function generator.

function generator, switch-type *See:* switch-type function generator.

function key A control key used to initiate a desired functional operation. *Note:* A function key is distinguished from other control keys in that the functional operation can usually be programmed or defined dynamically. *Synonym:* user-definable key. *See also:* control key; alternate function key; command key. (C) 610.10-1994w

function, loop-transfer *See:* loop-transfer function.

function name An active verb or verb phrase that describes what is to be accomplished by a function. A box takes as its box name the function name of the function represented by the box. (C/SE) 1320.1-1998

function, output-transfer *See*: output-transfer function.

function pin An analog or digital pin on an integrated component that takes data into and/or out of the core circuit when operating in normal function mode. *Note*: All pins carrying signals that affect the behavior of the component, including reference supply pins but excluding power supply pins and compliance-enable pins, are regarded as function pins. *Synonym*: system pin. (C/TT) 1149.4-1999

function point A measure of the delivered software functionality. (C/SE) 1045-1992

function potentiometer (1) A potentiometer employed in analog computers in which the voltage at the moveable contact of the potentiometer follows a prescribed functional relationship to the displacement of the contact. (C) 610.10-1994w
(2) A multiplier potentiometer in which the voltage at the moveable contact follows a prescribed functional relationship to the displacement of the contact. *See also*: linearity. (C) 165-1977w

function, probability density *See*: probability density function.

function, probability distribution *See*: probability density function.

function relay (analog computer) In an analog computer, a relay used as a computing element, generally driven by a comparator. (C) 165-1977w

function, return-transfer *See*: return-transfer function.

function switch In an analog computer, a manually operated switch used as a computing element. For example, a switch may be used to modify a circuit or to add or delete an input function or constant. (C/C) 610.10-1994w, 165-1977w

function, system-transfer *See*: system-transfer function.

function, transfer *See*: transfer function.

function, weighting *See*: weighting function.

function, work *See*: work function.

fundamental component The fundamental frequency component in the harmonic analysis of a wave. *See also*: signal wave. (Std100) 154-1953w

fundamental efficiency (thyristor) The ratio of the fundamental load power to the fundamental line power. (IA/IPC) 428-1981w

fundamental frequency (1) (A) (data transmission) (Signal-transmission system). The reciprocal of the period of a wave.
(B) (data transmission) (Mathematically). The lowest frequency component in the Fourier representation of a periodic quantity. (C) **(data transmission)** (Data transmission) (periodic quantity). The frequency of a sinusoidal quantity having the same period as the periodic quantity. (PE) 599-1985
(2) The frequency of the primary power-producing component of a periodic waveform supplied by the generation system (component of order 1 of the waveform's Fourier series representation). (PEL) 1515-2000

fundamental matrix *See*: transition matrix.

fundamental mode (fiber optics) The lowest order mode of a waveguide. In fibers, the mode designated LP₀₁ or HE₁₁. *See also*: mode. (Std100) 812-1984w

fundamental mode of propagation (laser maser) The mode in a beamguide or beam resonator which has a single maximum for the transverse field intensity over the cross-section of the beam. (LEO) 586-1980w

fundamental power (thyristor) The product of the root-mean-square (rms) value of the fundamental current and the rms value of the fundamental voltage multiplied by the cosine of the phase angle by which the fundamental current lags the fundamental voltage. (IA/IPC) 428-1981w

fundamental-type piezoelectric crystal unit A unit designed to utilize the lowest frequency of resonance for a particular mode of vibration. *See also*: crystal. (EEC/PE) [119]

furnace transformer (power and distribution transformers) A transformer that is designed to be connected to an electric arc furnace. (PE/TR) C57.12.80-1978r

furniture ESD (1) An ESD in which the intruder is an inanimate object such as a cart or chair, with or without a human in physical contact with the object. (EMC) C63.16-1993

(2) An electrostatic discharge in which the intruder is an inanimate object such as a cart or chair, with or without a human in electrical contact with the object.

(SPD/PE) C62.47-1992r

fuse (1) An overcurrent protective device with a circuit-opening fusible part that is heated and severed by the passage of the overcurrent through it. *Note*: A fuse comprises all the parts that form a unit capable of performing the prescribed functions. It may or may not be the complete device necessary to connect it into an electric circuit.

(SWG/NESC/PE) C37.100-1992, [86]

(2) (protection and coordination of industrial and commercial power systems) A device that protects a circuit by fusing open its current-responsive element when an overcurrent or short-circuit current passes through it.

(IA/PSP) 242-1986r

(3) (electric power systems in commercial buildings) An overcurrent protective device with a circuit opening, fusible element part that is heated and severed by the passage of overcurrent through it. (To re-energize the circuit, the fuse should be replaced.) (IA/PSE) 241-1990r

(4) A current-responsive protective device with a circuit-opening fusible part that is heated and severed by passage of current through it, creating an arc within the fuse. The interaction of the arc with certain other parts of the fuse results in current interruption. *Note*: A fuse comprises all the parts that form a unit capable of performing the prescribed functions. It may or may not be the complete device necessary to connect it into an electric circuit. (SWG/PE) C37.40-1993

fuse-arcing time *See*: arcing time.

fuse blade (of a cartridge fuse) A cartridge-fuse terminal having a substantially rectangular cross section.

(SWG/PE) C37.100-1992

fuse carrier (of an oil cutout) An assembly of a cap that closes the top opening of an oil-cutout housing, an insulating member, and fuse contacts with means for making contact with the conducting element and for insertion into the fixed contacts of the fuse support. *Note*: The fuse carrier does not include the conducting element (fuse link).

(SWG/PE) C37.100-1992, C37.40-1993

fuse clearing time *See*: clearing time.

fuse clips The current carrying parts of a fuse support that engage the fuse carrier, fuseholder, fuse unit, or blade. *Synonyms*: fuse contact; contact clips.

(SWG/PE) C37.40-1993, C37.100-1992

fuse condenser A device that, added to a vented fuse, converts it to a nonvented fuse by providing a sealed chamber for condensation of gases developed during circuit interruption. (SWG/PE) C37.40-1993, C37.100-1992

fuse contact *See*: fuse clips; fuse terminal.

fuse cutout A cutout having a fuse link or fuse unit. *Note*: A fuse cutout is a fuse-disconnecting switch.

(SWG/PE) C37.100-1992

fused capacitor (1) (series capacitor) A capacitor in combination with a fuse, either external or internal to the case.

(T&D/PE) 824-1994

(2) (power systems relaying) A capacitor having fuses mounted on its terminals, inside a terminal enclosure, or inside the capacitor case, for the purpose of interrupting a failed capacitor. (T&D/PE) C37.99-2000, 18-1992

fused capacitor unit (series capacitor) A capacitor unit in combination with a fuse, either external or internal to the case, intended to isolate a failed unit from the associated units.

(T&D/PE) [26]

fused electrolyte (bath) (fused salt) (electrolyte) A molten anhydrous electrolyte. (PE/EEC) [119]

fused-electrolyte cell A cell for the production of electric energy when the electrolyte is in a molten state. *See also*: electrochemistry. (EEC/PE) [119]

fuse-disconnecting switch (disconnecting fuse) A disconnecting switch in which a fuse unit or fuseholder and fuse link forms all or a part of the blade.

(SWG/PE) C37.100-1992, C37.40-1993

fused junction *See*: alloy junction.

fused-loadbreak way A fused way incorporating an integral switching device operated by opening and closing a fuse assembly.

(SWG/PE) C37.73-1998

fused quartz (fiber optics) Glass made by melting natural quartz crystals; not as pure as vitreous silica. *See also*: vitreous silica.

(Std100) 812-1984w

fused salt *See*: fused electrolyte.

fused silica *See*: vitreous silica; fused quartz.

fused switch A switch intended to operate with fuses connected in series, directly attached to or in close proximity to the switch.

(SWG/PE) C37.20.4-1996

fused-switched way A way connected to the bus through a three-phase group-operated switch or single-phase switch in series with high-voltage fuses.

(SWG/PE) C37.73-1998

fused trolley tap A specially designed holder with enclosed fuse for connecting a conductor of a portable cable to the trolley system or other circuit supplying electric power to equipment in mines. *See also*: mine feeder circuit.

(EEC/PE/MIN) [119]

fused-type voltage transformer (instrument transformers) One that is provided with means for mounting one or more fuses as integral parts of the transformer in series with the primary winding.

(PE/TR) C57.13-1993, C57.12.80-1978r

fused way A way connected to the bus through a high-voltage fuse.

(SWG/PE) C37.73-1998

fuse-enclosure package (FEP) (1) An enclosure supplied with one or more fuses as a package for which application data covering the specific fuse(s) and enclosure are supplied.

(SWG/PE) C37.40-1993

(2) An enclosure supplied with one or more fuses as a package for which application data covering the specific fuse(s) and enclosure are supplied.

(SWG/PE) C37.100-1992

fuse filler *See*: arc-extinguishing medium.

fuseholder (1) (cutout base) A device intended to support a fuse mechanically and connect it electrically in a circuit. *See also*: cabinet.

(PE/EEC) [119]

(2) (of a high-voltage fuse) An assembly of a fuse tube or tubes together with parts necessary to enclose the conducting element and provide a means of making contact with the conducting element and the fuse clips. The fuseholder does not include the conducting element (fuse link or refill unit).

(SWG/PE) C37.40-1993, C37.100-1992

(3) (of a low-voltage fuse) An assembly of base, fuse clips, and necessary insulation for mounting and connecting into the circuit the current-responsive element, with its holding means if used for making a complete device. *Notes*: 1. For low-voltage fuses, the current-responsive element and holding means are called a fuse. 2. For high-voltage fuses, the general type of assembly defined above is called a fuse support or fuse mounting. The holding means (fuseholder) and the current-responsive or conducting element are called a fuse unit.

(SWG/PE) C37.100-1992

fuse hook A hook provided with an insulating handle for opening and closing fuses or switches and for inserting the fuseholder, fuse unit, or disconnecting blade into, and for removing it from, the fuse support. *Synonym*: switch hook.

(SWG/PE) C37.40-1993, C37.100-1992

fuselage lights (illuminating engineering) Aircraft aeronautical lights, mounted on the top and bottom of the fuselage, used to supplement the navigation lights.

(EEC/IE) [126]

fuseless capacitor bank (power systems relaying) A capacitor bank without any fuses, internal or external, which is constructed of parallel strings of series-connected capacitor units between line and neutral (wye connection) or between line terminals (delta or single-phase). *See also*: unfused capacitor bank.

(PE) C37.99-2000

fuse link (1) (protection and coordination of industrial and commercial power systems) In British terminology only, a complete enclosed cartridge fuse; in such cases the addition of the carrier, or holder, completes the fuse. In the USA, a renewable, fusible element for fuse cutouts.

(IA/PSP) 242-1986r

(2) A replaceable part or assembly, comprised entirely or principally of the conducting element, required to be replaced after each circuit interruption to restore the fuse to operating conditions.

(SWG/PE) C37.100-1992, C37.40-1993

fuse melting time *See*: melting time.

fuse mounting *See*: fuse support.

fuse muffler (1) An attachment for the vent of a fuse, or a vented fuse, that confines the arc and substantially reduces the venting from the fuse.

(SWG/PE) C37.40-1993

(2) *See also*: muffler.

(SWG/PE) C37.100-1981s

fuse support (1) (fuse mounting) (high-voltage switchgear)

An assembly of base or mounting support or oil cutout housing, insulator(s) or insulator unit(s), and fuse clips for mounting a fuse carrier, fuse holder, fuse unit, or blade and connecting it into the circuit. *Synonym*: fuse mounting.

(SWG/PE) C37.40-1993

(2) (of a high-voltage fuse) An assembly of base, mounting support or oil-cutout housing, fuse clips, and necessary insulation for mounting and connecting into the circuit the current-responsive element with its holding means if such means are used for making a complete device. *Notes*: 1. For high-voltage fuses, the holding means is called a fuse carrier or fuseholder, and in combination with the current-responsive or conducting element is called a fuse unit. 2. For low-voltage fuses, the general type of assembly defined above is called a fuseholder. *Synonym*: fuse mounting.

(SWG/PE) C37.100-1992

fuse terminal The means for connecting the current-responsive element or its holding means, if such means is used for making a complete device, to the fuse clips. *Synonym*: fuse contact.

(SWG/PE) C37.100-1992

fuse time-current characteristic The correlated values of time and current that designate the performance of all or a stated portion of the functions of the fuse. *Note*: The time-current characteristics of a fuse are usually shown as a curve.

(SWG/PE) C37.100-1992, C37.40-1993

fuse time-current tests Tests that consist of the application of current to determine the relation between the root-mean-square (rms) alternating current or direct current and the time for the fuse to perform the whole or some specified part of its interrupting function.

(SWG/PE) C37.40-1981s, C37.100-1992

fuse tongs Tongs provided with an insulating handle and jaws. Fuse tongs are used to insert the fuseholder or fuse unit into the fuse support or to remove it from the support.

(SWG/PE) C37.40-1981s, C37.100-1992

fuse tube (1) (high-voltage switchgear) A tube of insulating material that encloses the conducting element.

(SWG/PE) C37.40-1993

(2) A tube of insulating material that surrounds the current-responsive element, the conducting element, or the fuse link.

(SWG/PE) C37.100-1992

fuse unit An assembly comprising a conducting element mounted in a fuseholder with parts and materials in the fuseholder essential to the operation of the fuse.

(SWG/PE) C37.40-1993, C37.100-1992

fusible element (of a fuse) That part, having predetermined current-responsive melting characteristics, which may be all or part of the current-responsive element.

(SWG/PE) C37.100-1992, C37.40-1993

fusible enclosed (safety) switch A switch complete with fuse holders and either with or without meter-testing equipment or accommodation for meters, having all current-carrying parts completely enclosed in metal, and operable without opening the enclosure. *See also*: switch.

(IA/ICTL/IAC) [60]

fusible link A programmable integrated circuit in which circuits form bit patterns by being "blasted" open (that is, by use of a heavy destructive current) or by being left closed. *Note:* This "blasting" is also called "burning" a PROM.

(C) 610.10-1994w

fusion (power operations) The formation of a heavier nucleus from two lighter ones with the attendant release of energy.

(T&D/PE/PSE) 858-1987s, 346-1973w

fusion frequency (television) Frequency of succession of retinal images above which their differences of luminosity or color are no longer perceptible. *Note:* The fusion frequency is a function of the decay characteristic of the display.

(BT/AV) 201-1979w

fusion splice (fiber optics) A splice accomplished by the application of localized heat sufficient to fuse or melt the ends of two lengths of optical fiber, forming a continuous, single fiber.

(Std100) 812-1984w

Futurebus+ (1) Refers to IEEE Std 896.1-1991 and IEEE Std 896.2-1991 which refine the earlier IEEE Std 896.1-1987. Those standards are intended for use with (or as an upgrade path from) MULTIBUSII (IEEE Std 1296-1987) systems, VME (IEEE Std 1014-1987) systems, and U.S.Navy next-generation hardware systems. They support cache-coherent multiprocessing with physical buses on the backplane. SCI may be used to interconnect Futurebus+ systems, since they share the same coherence line size and CSR Architecture.

(C/MM) 1596-1992

(2) A name that refers to IEEE 896.1-1991 and companion 896 series standards. Futurebus+ defines a physically bussed backplane bus standard, which supports 32-bit and 64-bit physical addresses. IEEE Std 896.3-1993 discusses bridge and other architectural considerations.

(C/MM) 1212.1-1993, 1212-1991s

(3) Refers to IEEE Std 896.1-1991 and IEEE Std 896.2-1991. Futurebus+ supports cache-coherent multiprocessing with physical buses on the backplane. SCI may be used to interconnect Futurebus+ systems, since they share the same coherence line size and CSR Architecture.

(C/MM) 1596.5-1993

Futurebus+ 1 (FB+ 1) Primary Futurebus+.

(C/BA) 14536-1995

Futurebus+ 2 (FB+ 2) Primary Futurebus+ 2.

(C/BA) 14536-1995

future point (for supervisory control or indication or telemeter selection) Provision for the future installation of equipment required for a point. *Note:* A future point may be provided with space only; drilling, or other mounting provisions only; or drilling, or other mounting provisions, and wiring only.

(SWG/PE) C37.100-1992

future regression Regression testing provides a quick way to test broad areas of a system's functionality. Future regression testing expands the normal regression process to include future data and advanced system dates. (C/PA) 2000.2-1999

FW *See:* forward wave.

FWFM *See:* full width at fiftieth maximum.

FWHM *See:* spectral width, full-width half maximum; full width at half maximum.

FW.1M *See:* full width at half maximum.

FWTM *See:* full width at tenth maximum.

FW.02M (germanium gamma-ray detectors) Same as FWHM (full width at half maximum) except that the width measurement is made at one fiftieth the maximum ordinate rather than at one half. (NPS) 325-1986s

FX *See:* foreign exchange.