

IEEE 100
The Authoritative Dictionary of
IEEE Standards Terms

Seventh Edition

LIBRARY

NOV 04 2003

LATHAM & WATKINS
SILICON VALLEY, CA



IEEE

Published by
Standards Information Network
IEEE Press

Trademarks and disclaimers

IEEE believes the information in this publication is accurate as of its publication date; such information is subject to change without notice. IEEE is not responsible for any inadvertent errors.

Other tradenames and trademarks in this document are those of their respective owners.

*The Institute of Electrical and Electronics Engineering, Inc.
3 Park Avenue, New York, NY, 10016-5997, USA*

Copyright © 2000 by the Institute of Electrical and Electronics Engineers, Inc. All rights reserved. Published December 2000. Printed in the United States of America.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

To order IEEE Press publications, call 1-800-678-IEEE.

Print: ISBN 0-7381-2601-2

SP1122

See other standards and standards-related product listings at: <http://standards.ieee.org/>

The publisher believes that the information and guidance given in this work serve as an enhancement to users, all parties must rely upon their own skill and judgement when making use of it. The publisher does not assume any liability to anyone for any loss or damage caused by any error or omission in the work, whether such error or omission is the result of negligence or any other cause. Any and all such liability is disclaimed.

This work is published with the understanding that the IEEE is supplying information through this publication, not attempting to render engineering or other professional services. If such services are required, the assistance of an appropriate professional should be sought. The IEEE is not responsible for the statements and opinions advanced in this publication.

Library of Congress Cataloging-in-Publication Data

IEEE 100 : the authoritative dictionary of IEEE standards terms.—7th ed.

p. cm.

ISBN 0-7381-2601-2 (paperback : alk. paper)

1. Electric engineering—Dictionaries. 2. Electronics—Dictionaries. 3. Computer engineering—Dictionaries. 4. Electric engineering—Acronyms. 5. Electronics—Acronyms. 6. Computer engineering—Acronyms. I. Institute of Electrical and Electronics Engineers.

TK9 .J28 2000
621.3'03—dc21

00-050601

anode voltage, forward, peak *See*: peak forward anode voltage.

anode voltage, inverse, peak *See*: peak inverse anode voltage.

anodic polarization Polarization of an anode. *See also*: electrochemistry. (EEC/PE) [119]

anolyte The portion of an electrolyte in an electrolytic cell adjacent to an anode. If a diaphragm is present, it is the portion of electrolyte on the anode side of the diaphragm. *See also*: electrolytic cell. (IA) [59]

anomaly (1) (software verification and validation plans) Anything observed in the documentation or operation of software that deviates from expectations based on previously verified software products or reference documents. (C/SE) 1012-1986s, 610.12-1990

(2) **(data management)** An irregularity that arises when processing an improperly structured database. For example, in order to retrieve all the SUPPLIERS from the database in the figure below, one would have to search sequentially through all the PARTS INVENTORY segments.

PARTS INVENTORY

PART NO.	NAME	INVENTORY AMOUNT	SUPPLIER NO.
----------	------	------------------	--------------

SUPPLIER

SUPPLIER NO.	NAME	ADDRESS	NO. ORDERED
--------------	------	---------	-------------

anomaly

(C) 610.5-1990w

(3) Any deviation from requirements, expected or desired behavior, or performance of the software.

(C/SE) 1074-1995s

(4) Irregularity; deviation from usual behavior.

(ATLAS) 1232-1995

(5) Any condition that deviates from expectations based on requirements specifications, design documents, user documents, standards, etc., or from someone's perceptions or experiences. Anomalies may be found during, but not limited to, the review, test, analysis, compilation, or use of software products or applicable documentation.

(C/SE) 1044.1-1995, 1044-1993, 1028-1997

(6) Deviation from the normal behavior of a test subject. Faults (e.g., output stuck high, gain low) and manufacturing defects (e.g., missing or incorrect components, incorrectly installed components) are kinds of anomalies.

(SCC20) 1226-1998

A-N radio range (navigation aid terms) A radio range providing four radial lines of position identified aurally as a continuous tone resulting from the interleaving of equal amplitude A and N of international Morse code. The sense of deviation from these lines is indicated by deterioration of the steady tone into audible A or N code signals.

(AES/GCS) 172-1983w

ANSI *See*: American National Standards Institute.

ANSI standard A standard approved by The American National Standards Institute. Examples of ANSI standards include programming languages (C, FORTRAN, or COBOL), media formats (Hollerith cards), and interface standards (SCSI interfaces, device drivers).

(C) 610.7-1995, 610.10-1994w

ANSI C A standardized version of C established by ANSI.

(C) 610.13-1993w

answer To respond to a calling station, either automatically, under program control, or manually, to establish a connection between stations. (C) 610.7-1995

answered call (1) (telephone switching systems) A call on which an answer signal occurred. (COM) 312-1977w

(2) **(public telephone service)** The called party off-hook supervision duration exceeds the minimum chargeable duration (MCD) after an allowance equal to the worst possible inaccuracy known about the timing sensor has been applied. *See also*: charge delay. (COM/TA) 973-1990w

answering plug and cord A plug and cord used to answer a calling line. (EEC/PE) [119]

answer signal (telephone switching systems) A signal that indicates that the call has been answered. (COM) 312-1977w

answer supervision delay The time interval between the transition of the called line equipment from on-hook to off-hook and transfer of the answer signal to the originating system during a multi-office call. *Note*: To transmit an answer signal to an originating switching system in per-trunk-signaling, the terminating system sends an on-hook-to-off-hook transition and maintains the off-hook state until disconnect. (COM/TA) 973-1990w

antenna (1) (general) That part of a transmitting or receiving system that is designed to radiate or to receive electromagnetic waves. (AP/ANT) 145-1993

(2) **(data transmission)** A means for radiating or receiving radio waves. *See also*: horn antenna; effective height; dipole antenna; effective area antenna; loop antenna; helical antenna; slot antenna. (PE) 599-1985w

(3) **(overhead-power-line corona and radio noise)** A device used to radiate or receive electromagnetic waves. (T&D/PE) 539-1990

(4) A device used for transmitting or receiving electromagnetic signals or power. As such, it is designed to maximize its coupling to the electromagnetic field; as a receiver it is made to intercept as much of the field as possible. Those devices that are made to measure the power level of the electromagnetic field rather than its field components are included in this category. (EMC) 1309-1996

(5) A device used to send or receive radio waves. (SCC32) 1455-1999

antenna [aperture] illumination efficiency The ratio, usually expressed in percent, of the maximum directivity of an antenna [aperture] to its standard directivity. *Note*: For planar apertures, the standard directivity is calculated by using the projected area of the actual antenna in a plane transverse to the direction of its maximum radiation intensity. *Synonym*: normalized directivity. *See also*: standard directivity. (AP/ANT) 145-1993

antenna array *See*: array antenna.

antenna correction factor (land-mobile communications transmitters) A factor usually supplied with the antenna, which, when properly applied to the meter reading of the measuring instrument, yields the electric field in volts/meters (V/m) or the magnetic field strength in amperes/meters (A/m). *Notes*: 1. This factor includes the effects of antenna effective length and impedance mismatch plus transmission line losses. 2. The factor for electric field strength is not necessarily the same as the factor for the magnetic field strength. (EMC) 377-1980r

antenna effect (1) (radio direction finding) (navigation aid terms) The presence of output signals having no directional information and caused by the directional array acting as simple nondirectional antenna; the effect is manifested by angular displacement of the nulls, or a broadening of the nulls. (AES/GCS) 172-1983w

(2) **(loop antenna)** Any spurious effect resulting from the capacitance of the loop to ground. *See also*: antenna. (AP/ANT) 145-1983s

antenna, effective area *See*: effective area antenna.

antenna, effective height *See*: effective height antenna.

antenna, effective height base station *See*: effective height base station antenna.

antenna, effective length *See*: effective length antenna.

antenna efficiency (of an aperture-type antenna) For an antenna with a specified planar aperture, the ratio of the maximum

antenna factor

effective area of the antenna to the aperture area.

(AP/ANT) 145-1993

antenna factor (1) Quantity relating the strength of the field in which the antenna is immersed to the output voltage across the load connected to the antenna.

(EMC) C63.5-1988, 1128-1998

(2) A factor that, when properly applied to the meter reading of the measuring instrument, yields the electric field strength in volts/meter or the magnetic field strength in amperes/meter. *Notes:* 1. This factor includes the effects of antenna effective length and mismatch and may include transmission line losses. 2. The factor for electric field strength is not necessarily the same as the factor for the magnetic field strength.

(EMC) [53], C63.4-1991

(3) A factor that, when properly applied to the voltage meter reading of the measuring instrument, yields the electric field strength in volts/meter or the magnetic field strength in amperes/meter. *Notes:* 1. This factor includes the effects of antenna effective length and mismatch and may include transmission line loss. 2. The factor for the electric field strength is not necessarily the same as the factor for the magnetic field strength.

(EMC) 1128-1998

antenna figure of merit (communication satellite) An antenna performance parameter equaling the antenna gain G divided by the antenna noise temperature T , measured at the antenna terminals. It can be expressed as a ratio, $M = G/T$, or logarithmically,

$$M(\text{dB}) = 10 \log_{10} G - 10 \log_{10} T$$

(COM) [25]

antenna pattern *See:* radiation pattern.

antenna-pattern loss *See:* beamshape loss.

antenna resistance (1) (general) The real part of the input impedance of an antenna.

(AP/ANT) 145-1993

(2) **(test procedures for antennas)** The ratio of the power accepted by the entire antenna circuit to the mean-square antenna current referred to a specified point. *Note:* Antenna resistance is made up of such components as radiation resistance, ground resistance, radio-frequency resistance of conductors in the antenna circuit, and equivalent resistance due to corona, eddy currents, insulator leakage, and dielectric power loss. *See also:* antenna.

(AP) 149-1979r

antenna sensitivity-test input (amplitude-modulation broadcast receivers) The sensitivity input is the least signal-input voltage of a specified carrier frequency, modulated 30% at 400 cycles and applied to the receiver through a standard dummy antenna, which results in normal test output when all controls are adjusted for greatest sensitivity. It is expressed in decibels below one volt, or in microvolts.

(CE) 186-1948w

antenna temperature The temperature of a blackbody that, when placed around a matched, loss-free antenna similar to the actual antenna, produces the same available noise power, in a specified frequency range, as the actual antenna in its normal electromagnetic environment. *See also:* blackbody.

(AP/PROP) 211-1997

antenna terminal conducted interference Any undesired voltage or current generated within a receiver, transmitter, or their associated equipment appearing at the antenna terminals. *See also:* electromagnetic compatibility.

(EMC) [53]

anti-aliasing (1) By the Nyquist Theorem, the maximum reproducible frequency is one-half the sampling rate. Aliasing is caused when frequencies higher than one half of the sampling rate are present. This results in the higher frequencies being "aliased" down to look like lower frequency components. Anti-aliasing is providing low pass filtering to block out frequencies higher than those that can be accurately reproduced by the given sampling rate.

(PE/PSR) 1344-1995

(2) A technique that reduces the visual effects of aliasing.

(C) 610.6-1991w

anticathode *See:* anode.

anticipatory buffering A buffering technique in which data are stored in a buffer in anticipation of a need for the data. *See*

also: simple buffering; dynamic buffering.

antipump device

(C) 610.12-1991

anticipatory paging A storage allocation technique in which pages are transferred from auxiliary storage to main storage in anticipation of a need for those pages. *Contrast:* demand paging.

(C) 610.12-1991

anticlutter circuits Circuits that attenuate undesired reflections from the natural environment (clutter) to permit detection of targets otherwise obscured by such reflections. *See also:* clutter.

(AES) 696-1991

anticlutter gain control (nonlinear, active, and nonreciprocal waveguide components) (radar) A device that automatically and smoothly increases the gain of a radar receiver from a low level to the maximum, within a specified period after each transmitter pulse, so that short-range echoes producing clutter are amplified less than long-range echoes.

(MTT) 457-1992a

anticoincidence (radiation counter) The occurrence of a count in a specified detector unaccompanied simultaneously at within an assignable time interval by a count in one or more other specified detectors.

(ED) [45]

anticoincidence circuit (pulse techniques) A circuit that produces a specified output pulse when one (frequently predesignated) of two inputs receives a pulse and the other receives no pulse within an assigned time interval.

(NPS) 398-1972

anticollision light (illuminating engineering) A flashing aircraft aeronautical light or system of lights designed to provide a red signal throughout 360° of azimuth for the purpose of giving long-range indication of an aircraft's location to pilots of other aircraft.

(ED) [127]

antiferroelectric material A material that exhibits structural phase changes and anomalies in dielectric permittivity, as do ferroelectrics, but has zero net spontaneous polarization, and hence, exhibits no hysteresis phenomena. *Note:* In some cases, it is possible to apply electric fields sufficiently high to produce a structural transition to a ferroelectric phase as evidenced by appearance of a double hysteresis loop. *See also:* paraelectric region; ferroelectric material.

(UFC) [21]

antifouling Pertaining to the prevention of marine organism attachment and growth on a submerged metal surface (through the effects of chemical action).

(IA) [59]

antifreeze pin, relay *See:* relay antifreeze pin.

anti-lock means (laser gyro) A means of preventing lock-in, such as magneto-optical (Faraday cell, magnetic mirrors), mechanical (dither, rate biasing), or mechanical-optical (mirror dither). *See also:* lock-in.

(AES/GYAC) 528-1994

anti-lock residual (laser gyro) Output noise remaining after compensation for anti-lock means.

(AES/GYAC) 528-1994

antinoise microphone A microphone with characteristics that discriminate against acoustic noise. *See also:* microphone.

(EEC/PE) [118]

anti-overshoot The effect of a control function or a device that causes a reduction in the transient overshoot. *Note:* Anti-overshoot may apply to armature current, armature voltage, field current, etc. *See also:* feedback control system.

(IA/ICTL/IAC) [60]

antioxidant *See:* oxidation inhibitor.

antiplugging protection The effect of a control function or a device that operates to prevent application of counter torque by the motor until the motor speed has been reduced to an acceptable value. *See also:* feedback control system.

(IA/ICTL/IAC) [60]

antipodal focusing Ionospheric focusing sometimes observed in the vicinity of the antipodal point or region.

(AP/PROP) 211-1997

antipump device A device that prevents reclosing after an opening operation as long as the device initiating closing is maintained in the position for closing. *Synonym:* pump-free device

(SWG/PE) C37.100-1997

$$F = (U^2 - P^2)^{1/2} \\ = (Q^2 - D^2)^{1/2}$$

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

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/AC) [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.

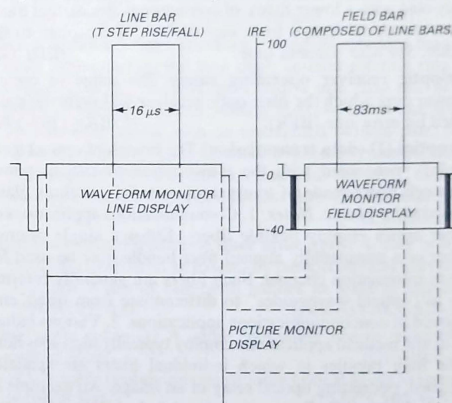
(SUB/PE) C37.2-1979s

(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], [11]

(2) A force that resists the sudden buildup of electric current.
Note: Inductance can cause errors during transmission.

(C) 610.7-1995

inductance coil *See:* inductor.

inductance coupling (interference terminology) The type of coupling in which the mechanism is mutual inductance between the interference is induced in the signal system by a magnetic field produced by the interference source. *See also:* interference.
 (IE) [43]

inductance, effective *See:* effective inductance.

inductance grounded (system grounding) Grounded through impedance, the principal element of which is inductance.
Note: The conditions of an inductance-grounded system are that X_0/X_1 lie within the range of 3–10 and $R_0/X_0 \leq 1$. The ground-fault current becomes 25% or more of the three-phase fault current. Inductance grounding becomes "effective grounding" if X_0/X_1 is reduced to 3 or less.

(IA/PSE) 142-1982s

induction (A) The process of generating time-varying voltages and/or currents in conductive objects or electric circuits by the influence of the time-varying electric, magnetic, or electromagnetic fields. **(B) (coupling)** The process of generating time-varying voltages and/or currents in otherwise unenergized conductive objects or electric circuits by the influence of the time-varying electric and/or magnetic fields.

(T&D/PE) 539-1990, 1048-1990

induction coil (A) A transformer used in a telephone set for interconnecting the transmitter, receiver, and line terminals. **(B)** A transformer for converting interrupted direct current into high-voltage alternating current. *See also:* telephone station.
 (PE/EM) 43-1974

induction compass A device that indicates an aircraft's heading, in azimuth. Its indications depend on the current generated in a coil revolving in the earth's magnetic field.

(EEC/PE) [119]

induction-conduction heater A heating device in which electric current is conducted through but is restricted by induction to a preferred path in a charge. *See also:* induction heating.

(IA) 54-1955w

induction coupling (electric coupling) An electric coupling in which torque is transmitted by the interaction of the magnetic field produced by magnetic poles on one rotating member and induced currents in the other rotating member. *Note:* The magnetic poles may be produced by direct current excitation, permanent magnet excitation, or alternating current excitation. The induced currents may be carried in a wound armature or squirrel cage, or may appear as eddy currents.

(PE/EM) 290-1980w, [9]

induction cup (of a relay) A form of relay armature in the shape of a cylinder with a closed end that develops operating torque by its location within the fields of electromagnets that are excited by the input quantities.

(SWG/PE/PSR) C37.100-1992, C37.90-1978s

induction cylinder (of a relay) A form of relay armature in the shape of an open-ended cylinder that develops operating torque by its location within the fields of electromagnets that are excited by the input quantities.

(SWG/PE/PSR) C37.100-1992, C37.90-1978s

induction disk (1) (of a relay) A form of relay armature in the shape of a disk that usually serves the combined function of providing an operating torque by its location within the fields of an electromagnet excited by the input quantities and a restraining force by motion within the field of a permanent magnet.

(SWG/PE/PSR) C37.100-1992, C37.90-1978s

(2) (utility consumer interconnections) A thin circular (or spiraled) disk of nonmagnetic conducting material in which eddy currents are produced to create torque about an axis of rotation.

(PE/PSR) C37.95-1973s

induction, electrostatic *See:* electrostatic induction.

induction factor (magnetic core testing) Under stated conditions, the self inductance that a coil of specified shape and

dimensions placed on the core in a given position should have, if it consisted of one turn.

$$A_L = \frac{L}{N^2}$$

A_L = Induction factor (henrys/turns²); L = Self inductance of the coil on the core, in henrys; N = Number of turns of the coil.
 (MAC) 393-1977s

induction frequency converter A wound-rotor induction machine in which the frequency conversion is obtained by induction between a primary winding and a secondary winding rotating with respect to each other. *Notes:* 1. The secondary winding delivers power at a frequency proportional to the relative speed of the primary magnetic field and the secondary member. 2. In case the machine is separately driven, this relative speed is maintained by an external source of mechanical power. 3. In case the machine is self-driven, this relative speed is maintained by motor action within the machine obtained by means of additional primary and secondary windings with number of poles differing from the number of poles of the frequency-conversion windings. In special cases one secondary winding performs the function of two windings, being short-circuited with respect to the poles of the driving primary winding and open-circuited with respect to the poles of the primary-conversion winding. *See also:* converter.

(PE) [9]

induction furnace A transformer of electric energy to heat by electromagnetic induction.
 (EEC/PE) [119]

induction generator (1) (A) (rotating machinery) An induction machine, when driven above synchronous speed by an external source of mechanical power, used to convert mechanical power to electric power. *See also:* asynchronous machine. **(B)** A generator that produces power with rotor speeds slightly higher than synchronous speed. It does not have the rotor field excitation requirement of synchronous generators.
 (PE/EDPG) [9], 1020-1988

(2) An induction machine driven above synchronous speed by an external source of mechanical power.

(IA/MT) 45-1998

induction heater (interference terminology) A device for causing electric current to flow in a charge of material to be heated. Types of induction heaters can be classified on the basis of frequency of the induced current, for example, a low-frequency induction heater usually induces power-frequency current in the charge; a medium-frequency induction heater induces currents of frequencies between 180 and 540 hertz; a high-frequency induction heater induces currents having frequencies from 1000 hertz upward.
 (PE/PSR) [6]

induction heating (electrical heating systems) The generation of heat in any conducting material by means of magnetic flux-induced currents.
 (IA/PC) 844-1991

induction instrument An instrument that depends for its operation on the reaction between a magnetic flux (or fluxes) set up by one or more currents in fixed windings and electric currents set up by electromagnetic induction in movable conducting parts. *See also:* instrument.
 (EEC/PE) [119]

induction loop (of a relay) A form of relay armature consisting of a single turn or loop that develops operating torque by its location within the fields of electromagnets that are excited by the input quantities.

(SWG/PE/PSR) C37.100-1992, C37.90-1978s

induction loudspeaker A loudspeaker in which the current that reacts with the steady magnetic field is induced in the moving member.
 (SP) [32]

induction machine An asynchronous ac machine that comprises a magnetic circuit interlinked with two electric circuits, or sets of circuits, rotating with respect to each other and in which power is transferred from one circuit to another by electromagnetic induction. Examples of induction machines are induction generators, induction motors, and certain types of frequency converters and phase converters.

(IA/MT) 45-1998

natural priority The order of packet transmission of a node given that all nodes start arbitration at the same instant using the same priority level. For the cable environment, the closer a node is to the root, the higher its natural priority. For the backplane environment, the priority level and node_offset are concatenated to give its natural priority.

(C/MM) 1394-1995

natural two-way merge sort (data management) A two-way merge sort in which the set to be sorted is repeatedly divided into two ordered subsets and merged, taking advantage of runs which occur naturally in the input set. *Contrast:* straight two-way merge sort.

(C) 610.5-1990w

Naval Electronics Laboratory International Algorithmic Compiler (NELIAC) A programming language used primarily for solving scientific and real-time control problems.

(C) 610.13-1993w

Naveam (navigation aid terms) A radio navigational warning of dangers to shipping in the Eastern, Atlantic, Mediterranean, and Red Seas.

(AES/GCS) 172-1983w

navigation (navigation aid terms) The process of directing a vehicle so as to reach the intended destination.

(AES/GCS) 172-1983w

navigational aid (navigation aid terms) An instrument, system, device, chart, or method intended to assist in the navigation of a vehicle.

(AES/GCS) 172-1983w

navigational astronomy (navigation aid terms) That part of astronomy of direct use to a navigator, comprised principally of celestial coordinates, time, and apparent motions of celestial bodies.

(AES/GCS) 172-1983w

navigational radar (surface search radar) A high-frequency radio transmitter-receiver for the detection, by means of transmitted and reflected signals, of any object (within range) projecting above the surface of the water and for visual indication of its bearing and distance. *See also:* radio direction-finder.

navigational satellite (navigation aid terms) An artificial earth orbiting satellite designed for navigational purposes. *See also:* satellite navigation.

(AES/GCS) 172-1983w

navigation coordinate (navigation aid terms) Any one of a set of quantities; the set serving to define a position.

(AES/GCS) 172-1983w

navigation light system (illuminating engineering) A set of aircraft aeronautical lights provided to indicate the position and direction of motion of an aircraft to pilots of other aircraft or to ground observers.

(EEC/IE) [126]

navigation parameter (navigation aid terms) A measurable characteristic of motion or position used in the process of navigation.

(AES/GCS) 172-1983w

navigation quantity (navigation aid terms) A measured value of a navigation parameter.

(AES/GCS) 172-1983w

n-bit byte (1) A group of n adjacent binary digits operated upon as a unit.

(C) 1084-1986w

(2) A string that consists of n bits; for example, an octet is an eight-bit byte.

(C) 610.10-1994w

N/C *See:* NC.

NC *See:* not connected; numerical control.

NCAP Block An instance of the class IEEE1451.NCAPBlock or of a subclass thereof.

(IM/ST) 1451.1-1999

n-channel device (metal-nitride-oxide field-effect transistor) Insulated-gate field-effect transistor (IGFET) where source and drain are regions of n -type conductivity.

(ED) 581-1978w

n-channel metal-oxide semiconductor (NMOS) A type of semiconductor technology which employs a metal-oxide semiconductor device, using electrons to conduct current in the semiconductor channel. *Note:* The channel has a predominantly negative charge. *Synonym:* high-speed metal-oxide semiconductor. *Contrast:* p-channel metal-oxide semiconductor. *See also:* complementary metal-oxide semiconductor; V-channel metal-oxide semiconductor.

(C) 610.10-1994w

N-char *See:* normal character.

n-conductor cable *See:* multiple-conductor cable.

n-conductor concentric cable *See:* multiple-conductor concentric cable.

n-core-per-bit storage A type of storage in which each storage cell uses n magnetic cores per binary character, where n may be any positive integer. *See also:* one-core-per-bit storage.

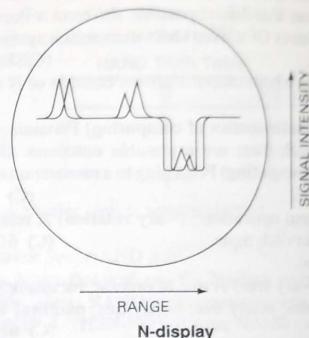
(C) 610.16-1996w

NCP *See:* network control program.

N-contours *See:* phase contours.

NDB *See:* nondirectional beacon.

N-display A K-display having an adjustable pedestal, track, or step, as in the M-display, for the measurement of range. *Note:* This display is usually regarded as a variant of an A-display or a K-display rather than as a separate type.



(AES) 686-1997

NDR *See:* nondestructive read.

near end crosstalk (NEXT) (1) Crosstalk that is propagated in a disturbed channel in the direction opposite to the direction of propagation of the current in the disturbing channel. *Note:* The terminal of the disturbed channel at which the near-end crosstalk is present is ordinarily near to or coincides with the energized terminal of the disturbing channel. *See also:* coupling.

(EEC/PE) [119]

(2) Crosstalk that is propagated in a distributed channel in the direction opposite to the direction of the propagation of the signal in the disturbing channel and is measured at or near the source of the disturbing signal.

(LM/C) 610.7-1995, 8802-5-1998

near field The field of a source at distances that are small compared to the wavelength. *Notes:* 1. The near field includes the quasi-static and induction fields varying as r^{-3} and r^{-2} , respectively, but does not include the radiation field varying as r^{-1} . 2. Often refers to points within the Fresnel region of a large antenna.

(AP/PROP) 211-1997

near-field diffraction pattern (fiber optics) The diffraction pattern observed close to a source or aperture, as distinguished from far-field diffraction pattern. *Note:* The pattern in the output plane of a fiber is called the near-field radiation pattern. *Synonym:* Fresnel diffraction pattern. *See also:* diffraction; far-field diffraction pattern; far-field region.

(Std100) 812-1984w

near-field pattern *See:* radiation pattern.

near-field radiation pattern (1) Any radiation pattern obtained in the near-field of an antenna. *Note:* Near-field patterns are usually taken over paths on planar, cylindrical, or spherical surfaces. *See also:* Fresnel pattern; radiation pattern cut.

(AP/ANT) 145-1993

(2) *See also:* radiation pattern.

near-field region (1) That part of space between the antenna and far-field region. *Note:* In lossless media, the near-field may be further subdivided into reactive and radiating near-field regions.

(AP/ANT) 145-1993

(2) (fiber optics) The region close to a source, or aperture. The diffraction pattern in this region typically differs significantly from that observed at infinity and varies with distance from the source. *See also:* far-field region; far-field diffraction pattern.

(Std100) 812-1984w

(3) That part of space between the antenna array and the far-field region. Refers to the field of a source at distances small compared to the wavelength. *Note:* The near field includes the quasi-static and induction fields varying as r^{-3} and r^{-2} , respectively, but does not include the radiation field varying as r^{-1} . (T&D/PE) 1260-1996

(4) A region generally in proximity to an antenna or other radiating structure, in which the electric and magnetic fields do not have a substantially plane-wave character, but vary considerably from point to point. The near-field region is further subdivided into the reactive near-field region, which is closest to the radiating structure and that contains most or nearly all of the stored energy, and the radiating near-field region where the radiation field predominates over the reactive field, but lacks substantial plane-wave character and is complicated in structure. *Note:* For most antennas, the outer boundary of the reactive near-field region is commonly taken to exist at a distance of one-half wavelength from the antenna surface. (NIR) C95.1-1999

near-field region, radiating *See:* radiating near-field region.

near-field region, reactive That portion of the near-field region immediately surrounding the antenna, wherein the reactive field predominates. *Note:* For a very short dipole, or equivalent radiator, the outer boundary is commonly taken to exist at a distance $\lambda/2\pi$ from the antenna surface, where λ is the wavelength. (AP/ANT) 145-1993

near-field scanning (fiber optics) The technique for measuring the index profile of an optical fiber by illuminating the entrance face with an extended source and measuring the point-by-point radiance of the exit face. *See also:* refracted ray method. (Std100) 812-1984w

near-field test point (NFTP) The acoustical measurement point located 1 cm from the center of the handsfree telephones (HFTs) loudspeaker along the axis of the speaker. (COM/TA) 1329-1999

near-letter quality (NLQ) Pertaining to printed output that is of nearly as high quality as that of a standard typewriter. *Contrast:* letter-quality; draft quality. (C) 610.10-1994w

near-side (of an SI or BI) That part of an SI or BI that is electrically closer to the originating master. (NID) 960-1993

neck (cathode-ray tubes) The small tubular part of the envelope near the base. *See also:* cathode-ray tube. (ED) [45], [84]

negate (1) To perform the logic operation NOT. (C) [20], [85]

(2) **(mathematics of computing)** To perform the NOT operation. (C) 1084-1986w

(3) To drive a signal or a parallel set of signals to the zero logic state. (C/BA) 1496-1993w

negation The monadic Boolean operation whose result has a Boolean value opposite to that of the operand. *See also:* NOT gate. (C) 610.10-1994w

negative Pertaining to a voltage or charge that is associated with an excess of electrons. *Contrast:* positive. (C) 610.10-1994w

negative acknowledge character (NAK) A transmission control character transmitted by a station as a negative response to the station with which the connection has been set up. (C) 610.5-1990w

negative acknowledgment A reply transmitted by a receiving station to inform the sending station that an error in data has been detected. *Contrast:* acknowledgment. (C) 610.7-1995

negative after-potential (electrobiolgy) Relatively prolonged negativity that follows the action spike in a homogeneous fiber group. *See also:* contact potential. (EMB) [47]

negative conductance The conductance of a negative-resistance device. (CAS) [13]

negative conductor A conductor connected to the negative terminal of a source of supply. *Note:* A negative conductor is frequently used as an auxiliary return circuit in a system of

electric traction. *See also:* center of distribution.

(PE/T&D) [10]

negative-differential-resistance region (thyristor) Any portion of the principal voltage-current characteristic in the switching quadrant(s) within which the differential resistance is negative. *See also:* principal voltage-current characteristic. (IA/ED) 223-1966w, [46], [12]

negative electrode (1) (primary cell) The anode when the cell is discharging. *Note:* The negative terminal is connected to the negative electrode. *See also:* electrolytic cell.

(2) **(metallic rectifier)** The electrode from which the forward current flows within the cell. *See also:* rectification.

(PE/EEC) [119]

negative feedback (1) The process by which part of the signal in the output circuit of an amplifying device reacts upon the input circuit in such a manner as to counteract the initial power, thereby decreasing the amplification. (CAS) [13]

(2) **(control)** A feedback signal in a direction to reduce the variable that the feedback represents. *See also:* feedback; feedback control system. (IA/ICTL/APP/IAC) [69], [60]

(3) **(stabilized feedback) (data transmission)** The process by which a part of the power in the output circuit of an amplifying device reacts upon the input circuit in such a manner as to reduce the initial power, thereby decreasing the amplification. *Synonym:* degeneration. (PE) 599-1985w

negative glow (1) (gas tube) The luminous glow in a glow-discharge cold-cathode tube between the cathode dark space and the Faraday dark space. *See also:* gas tube. (ED) [45]

(2) **(overhead-power-line corona and radio noise)** Corona mode that occurs at electric field strengths above those required for Trichel streamers. Negative glow is confined to a small portion of the electrode and appears as a small, stationary, luminous bluish fan. The corona current of negative glow is essentially pulse less. *See also:* Trichel streamers. (T&D/PE) 539-1990

negative logic An electronic logic system where the voltage representing one, active, or true has a more negative value than the voltage representing zero, inactive, or false. Also known as negative-true logic, it is normally used in electronic and computing data and communications switching systems for noise immunity reasons. (IM/ST) 1451.2-1997

negative logic convention The representation of the 1-state and the 0-state by the low (L) and high (H) levels, respectively. (GSD) 91-1984r

negative matrix A matrix the surface of which is the reverse of the surface to be ultimately produced by electroforming. (EEC/PE) [119]

negative modulation (amplitude-modulation television system) That form of modulation in which an increase in brightness corresponds to a decrease in transmitted power. *See also:* television. (PE/EEC) [119]

negative-phase-sequence impedance (rotating machinery) The quotient of the negative-sequence rated-frequency component of the voltage, assumed to be sinusoidal, at the terminals of a machine rotating at synchronous speed, and the negative-sequence component of the current at the same frequency. *Note:* It is equal to the asynchronous impedance for a slip equal to 2. *See also:* asynchronous machine. (PE) [9]

negative-phase-sequence (phase-reversal) relay A relay that responds to the negative-phase-sequence component of a polyphase input quantity. *Note:* Frequently employed in three-phase systems. *See also:* relay.

(SWG/PE/PSR) C37.90-1978s, C37.100-1981s

negative-phase-sequence reactance (rotating machinery) The quotient of the reactive fundamental component of negative-sequence primary voltage due to sinusoidal negative-sequence primary current of rated frequency, and the value of this current, the machine running at rated speed. *See also:* asynchronous machine. (PE/EDPG) [5]

specific use, no possible errors or confusion are foreseen. This practice is in accord with the International Lighting Vocabulary (CIE No. 17 (E-1.1.) 1970) and the practice of the National Bureau of Standards (NBS Technical Note 910-1, 1976). The quotient of the radiant flux leaving, passing through, or arriving at an element of the surface surrounding the point, and propagated in directions defined by an elementary cone containing the given direction, by the product of the solid angle of the cone and the area of the orthogonal projection of the element of the surface on a plane perpendicular to the given direction. *Note:* In the defining equation Φ/Ω the angle between the normal to the element of the surface and the given direction. (EEC/IE) [126]

radiant frequency (1) The number of radians per unit time. The unit of time is generally the second and the radiant frequency ω is therefore $2\pi f$, where f is the frequency in hertz. (CAS) [13]

(2) *See also:* angular frequency. (AP/PROP) 211-1997

radiant density (light-emitting diodes) ($w_e = dQ_e/dV$) Radiant energy per unit volume; joules per m^3 . (ED) [127]

radiant efficiency of a source of radiant flux (light-emitting diodes) The ratio of the total radiant flux to the forward power dissipation (total electrical lamp power input). (ED) [127]

radiant emittance (fiber optics) Radiant power emitted into a full sphere (4π steradians) by a unit area of a source; expressed in watts per square meter. *Synonym:* radiant exitance. *See also:* radiant flux density at a surface; radiometry. (Std100) 812-1984w

radiant energy (1) (fiber optics) Energy that is transferred via electromagnetic waves, that is, the time integral of radiant power; expressed in joules. *See also:* radiometry. (Std100) 812-1984w

(2) **(light-emitting diodes)** Energy traveling in the form of electromagnetic waves. It is measured in units of energy such as joules, ergs or kilowatt-hours. (IE/EEC/ED) [126], [127]

(3) **(laser maser)** Energy emitted, transferred, or received in the form of radiation. Unit: joule (J). (LEO) 586-1980w

radiant energy density (illuminating engineering) ($w = dQ/dV$) Radiant energy per unit volume; for example, joules per cubic meter. (EEC/IE) [126]

radiant exitance *See:* radiant emittance.

radiant exposure (laser maser) Surface density of the radiant energy received. Unit: $J \cdot cm^{-2}$. (LEO) 586-1980w

radiant flux (1) (A) (light-emitting diodes) ($\Phi_e = dQ_e/dt$) The time rate of flow of radiant energy. *Note:* It is expressed preferably in watts, or in ergs per second. **(B) (laser maser)** Power emitted, transferred, or received in the form of radiation. Unit: W. *Synonym:* radiant power. (BT/IE/EEC/LEO/AV) 201-1979, [34], [126], 586-1980

(2) **(television)** Power emitted, transferred, or received in the form of radiation. *Note:* It is expressed preferably in watts. (BT/AV) 201-1979w

radiant flux density at a surface (A) ($M_e = d\Phi_e/dA$, $E_e = d\Phi_e/dA$) The quotient of radiant flux at that element of surface of the area of that element: that is, watts per cm^2 . When referring to radiant flux emitted from a surface, this has been called "radiant emittance" (symbol: M). The preferred term for radiant flux leaving a surface is "radiant exitance" (symbol: M). When referring to radiant flux incident on a surface, it is called "irradiance" (symbol: E). *Note:* "radiant emittance" is obsolete. **(B) (illuminating engineering)** ($d\Phi/dA$) The quotient of radiant flux at an element of surface to the area of that element; e.g., watts per square meter. When referring to radiant flux emitted from a surface, this has been called "radiant emittance" (a deprecated term) (symbol: M). The preferred term for radiant flux leaving a surface is "radiant exitance" (symbol: M). The radiant exitance per unit wavelength interval is called "spectral radiant exitance." When referring to radiant flux incident on a surface it is called "irradiance" (symbol: E). (ED/EEC/IE) [127], [126]

radiant gain (optoelectronic device) The ratio of the emitted radiant flux to the incident radiant flux. *Note:* The emitted and incident radiant flux are both determined at specified ports. *See also:* optoelectronic device. (ED) [46]

radiant heater A heater that dissipates an appreciable part of its heat by radiation rather than by conduction or convection. *See also:* appliance.

radiant heating system (electric power systems in commercial buildings) A heating system in which the heat radiated from panels is effective in providing heating requirements. The term "radiant heating" includes panel and radiant heating. (IA/PSE) 241-1990r

radiant incidence *See:* irradiance.

radiant intensity (1) (fiber optics) Radiant power per unit solid angle, expressed in watts per steradian. *See also:* intensity; radiometry. (Std100) 812-1984w

(2) **(television)** (of a source, in a given direction) The quotient of the radiant power emitted by a source, or by an element of source, in an infinitesimal cone containing the given direction, by the solid angle of that cone. *Note:* It is expressed preferably in watts per steradian. (BT/AV) 201-1979w

(3) **(light-emitting diodes)** ($I_e = d\Phi_e/d\Omega$) The radiant flux proceeding from the source per unit solid angle in the direction considered; that is watts per steradian. (ED) [127]

(4) **(laser maser)** Quotient of the radiant flux leaving the source, propagated in an element of solid angle containing the given direction, by the element of solid angle. Unit: watt per steradian ($W \cdot sr^{-1}$). (LEO) 586-1980w

(5) **(illuminating engineering)** ($I = d\Phi/d\Omega$) The radiant flux proceeding from a source per unit solid angle in the direction considered; for example, watts per steradian. *Note:* Mathematically a solid angle must have a point as its apex; the definition of radiant intensity, therefore, applies strictly only to a point source. In practice, however, radiant energy emanating from a source whose dimensions are negligible in comparison with the distance from which it is observed may be considered as coming from a point. Specifically, this implies that with change of distance, 1) the variation in solid angle subtended by the source at the receiving point approaches $1/(distance)^2$ and that 2) the average radiance of the projected source area as seen from the receiving point does not vary appreciably. (EEC/IE) [126]

radiant power (fiber optics) The time rate of flow of radiant energy, expressed in watts. The prefix is often dropped and the term "power" is used. *Synonyms:* optical power; flux; radiant flux; power. *See also:* radiometry. (Std100) 812-1984w

radiant sensitivity (camera tubes or phototubes) The quotient of signal output current by incident radiant flux at a given wavelength, under specified conditions of irradiation. *Note:* Radiant sensitivity is usually measured with a collimated beam at normal incidence. *See also:* phototube; luminous flux; radiant flux. (ED) 161-1971w

radiated coupling Propagation of a wave through free space at radial distances greater than $\lambda/6$ from the power line carrying the disturbing energy. *See also:* coupling. (PE/PSC) 487-1992

radiated emission test site (1) (radio-noise emissions) A site meeting specified requirements suitable for measuring radio interference fields radiated by a device, equipment, or system under test. C63.5-1988

(2) **(radio-noise emissions)** A site meeting specified requirements suitable for measuring radio frequency fields radiated by an EUT. (EMC) C63.4-1991

radiated interference Radio interference resulting from radiated noise or unwanted signals. *See also:* electromagnetic compatibility. (EMC) [53]

radiated noise (1) (radio noise from overhead power lines and substations) Radio noise energy in the form of an electromagnetic field including both the radiation and induction components of the field. (T&D/PE) 430-1986w

(2) **(power line filters)** Electromagnetic interference that is radiated into the environment, either directly from equipment or from the power cord or any other cabling connected to it. (EMC) C63.13-1991

radiated power output (transmitter performance) The average power output available at the antenna terminals, less the losses of the antenna, for any combination of signals transmitted when averaged over the longest repetitive modulation cycle. *See also:* audio-frequency distortion. (VT) [37]

radiated radio noise (1) (overhead power lines) Radio noise that is propagated by radiation from a source into space in the form of electromagnetic waves; e.g., the undesired electromagnetic waves generated by corona sources on a transmission line. *Note:* Radiated radio noise includes both the radiation and the induction components of the electromagnetic fields generated by the noise source. (T&D/PE) 539-1990

(2) **(measurement of radio-noise emissions)** Radio-noise energy in the form of an electromagnetic field including both the radiation and induction components of the field. (EMC) C63.4-1991

radiated spurious emission power (land-mobile communications transmitters) Any part of the spurious emission power output radiated from the transmission enclosure, independent of any associated transmission lines or antenna, in the form of an electromagnetic field composed of variations of the intensity of electric and magnetic fields. (EMC) 377-1980r

radiating element A basic subdivision of an antenna that in itself is capable of radiating or receiving radio waves. *Note:* Typical examples of a radiating element are a slot, horn, or dipole antenna. (AP/ANT) 145-1993

radiating far field region (land-mobile communications transmitters) Measurement is performed at or beyond a distance of 3λ , but not less than 1 meter (m). *See also:* far-field region. (EMC) 377-1980r

radiating near-field region (1) (land-mobile communications transmitters) Measurement is limited to the region external to the induction field and extending to the outer boundary of the reactive field that is commonly taken to exist at a distance of $\lambda/2\pi$. Either the electric or magnetic component of the radiated energy may be used to determine the magnitude of power present. *See also:* near-field region. (EMC) 377-1980r

(2) That portion of the near-field region of an antenna between the farfield and the reactive portion of the near-field region, wherein the angular field distribution is dependent upon distance from the antenna. *Notes:* 1. If the antenna has a maximum overall dimension that is not large compared to the wavelength, this field region may not exist. 2. For an antenna focused at infinity, the radiating near-field region is sometimes referred to as the Fresnel region on the basis of analogy to optical terminology. (AP/ANT) 145-1993

radiation (1) (nuclear) (nuclear work) The usual meaning of radiation is extended to include moving nuclear particles, charged or uncharged. (ED) 161-1971w, [45]

(2) **(data transmission)** In radio communication, the emission of energy in the form of electromagnetic waves. The term is also used to describe the radiated energy. (PE) 599-1985w

(3) The electromagnetic waves or corpuscular emissions released as a result of atomic nuclear changes that penetrate into insulation to cause ionizing reactions that then change the chemical, electrical, or physical properties of the insulation. (DEI/RE) 775-1993w

(4) *See also:* ionizing radiation. (NI/NPS) 309-1999

radiation angle (fiber optics) Half the vertex angle of the cone of light emitted by a fiber. *Note:* The cone is usually defined by the angle at which the far-field irradiance has decreased to a specified fraction of its maximum value or as the cone within which can be found a specified fraction of the total radiated power at any point in the far field. *Synonym:* output

angle. *See also:* numerical aperture; acceptance angle; far-field region. (Std100) 812-1984w

radiation condition A condition implying that at large distances from a source, only outgoing waves can exist. (AP/PROP) 211-1997

radiation counter An instrument used for detecting or measuring radiation by counting action. (ED) 161-1971w

radiation coupling (interference terminology) The type of coupling in which the interference is induced in the signal system by electromagnetic radiation produced by the interference source. *See also:* interference. (IE) [43]

radiation detector Any device whereby radiation produces some physical effect suitable for observation and/or measurement. *See also:* anticoincidence. (ED) [45]

radiation efficiency The ratio of the total power radiated by an antenna to the net power accepted by the antenna from the connected transmitter. *See also:* antenna. (AP/PE/ANT) 145-1993, 599-1985w

radiation, electromagnetic *See:* electromagnetic radiation.

radiation-induced data-loss characteristics (1) Characteristics that define stored data integrity as a function of total dose or dose rate after a given test pattern has been written into the device. (ED) 641-1987w

(2) The collection of threshold voltage data as a function of total dose or dose rate after initial high-conduction or low-conduction threshold voltage levels had been written into the device. (ED) 581-1978w

(3) Stored data integrity as a function of total dose or dose rate after a given test pattern has been written into the device. (ED) 1005-1998

radiation intensity (1) (data transmission) The radiation intensity in a given direction is the power radiated from an antenna per unit solid angle in that direction. (PE) 599-1985w

(2) In a given direction, the power radiated from an antenna per unit solid angle. (AP/ANT) 149-1979r, 145-1993

radiation lobe (antenna pattern) A portion of the radiation pattern bounded by regions of relatively weak radiation intensity. *See also:* antenna. (AP/ANT) 149-1979r, 145-1983s

radiation loss (1) (transmission system) That part of the transmission loss due to radiation of radio-frequency power. *See also:* waveguide. (MTT) 146-1980w

(2) **(waveguide)** A power loss due to electromagnetic radiation leaving a network. (MTT) 146-1980w

(3) **(planar transmission lines)** The loss associated with planar transmission lines having ideal conductors and lossless media, caused by energy leakage from the transmission line. (MTT) 1004-1987w

radiation mode (fiber optics) In an optical waveguide, a mode whose fields are transversely oscillatory everywhere external to the waveguide, and which exists even in the limit of zero wavelength. Specifically, a mode for which

$$\beta = [n^2(a)k^2 - (l/a)^2]^{1/2} [zc]$$

where β is the imaginary part (phase term) of the axial propagation constant, l is the azimuthal index of the mode, $n(a)$ is the refractive index at $r = a$, the core radius, and k is the free-space wavenumber, $2\pi/\lambda$, where λ is the wavelength. Radiation modes correspond to refracted rays in the terminology of geometric optics. *Synonym:* unbound mode. *See also:* bound mode; leaky mode; refracted ray; mode. (Std100) 812-1984w

radiation pattern (1) (fiber optics) Relative power distribution as a function of position or angle. *Notes:* 1. Near-field radiation pattern describes the radiant emittance ($W \times m^{-2}$) as a function of position in the plane of the exit face of an optical fiber. 2. Far-field radiation pattern describes the irradiance as a function of angle in the far-field region of the exit face of an optical fiber. 3. Radiation pattern may be a function of the length of the waveguide, the manner in which it is excited, and the wavelength. *See also:* near-field region; far-field region. (Std100) 812-1984w

radio transmission The transmission of signals by means of radiated electromagnetic waves other than light or heat waves. (EEC/PE) [119]

radio transmitter A device for producing radio-frequency power, for purposes of radio transmission. (AP/ANT) 145-1983s

radio warning See: radio detection.

radio wave An electromagnetic wave of radio frequency. Current usage includes frequencies up to 3 THz. See also: radio spectrum. (AP/PROP) 211-1997

radio-wave propagation The transfer of energy by electromagnetic radiation at radio frequencies. (AP/PROP) 211-1997

radix (1) (mathematics of computing) A quantity whose successive integer powers are the implicit multipliers of the sequence of digits that represent a number in some positional notation systems. For example, if the radix is 5, then 143.2 means 1 times 5 to the second power, plus 4 times 5 to the first power, plus 3 times 5 to the zero power, plus 2 times 5 to the minus-one power. *Synonyms*: base number; radix number; base. (C) 1084-1986w

(2) (radix-independent floating-point arithmetic) The base for the representation of floating point numbers. (MM/C) 854-1987r

radix alignment In text formatting, the formatting of numbers in a column such that their radix points, whether explicit or implicit, form a vertical line. See also: decimal alignment. (C) 610.2-1987

radix complement (mathematics of computing) The complement obtained by subtracting each digit of a given numeral from the largest digit in the numeration system, then adding 1 to the least significant digit of the result and executing any required carries. For example, twos complement in binary notation, tens complement in decimal notation. *Synonyms*: noughts complement; zero complement; true complement; base complement; complement on n . *Contrast*: diminished-radix complement. (C) 1084-1986w

radix exchange sort A radix sort in which items are compared and, if necessary, exchanged in multiple passes, using successive digits within the numeric representation of the sort key, starting with the most significant digit. *Synonym*: divide-and-conquer sort. (C) 610.5-1990w

radix insertion sort A radix sort in which each item is inserted into its proper position in the sorted set according to the digital properties of the numerical representation of the sort keys. (C) 610.5-1990w

radix list sort A radix sort implemented using the list sorting technique. (C) 610.5-1990w

radix-minus-one complement (1) A numeral in radix notation that can be derived from another by subtracting each digit from one less than the radix, for example, nines complement in decimal notation, ones complement in binary notation. (C) [20], [85]

(2) (mathematics of computing) See also: diminished-radix complement. (C) 1084-1986w

radix notation A positional representation system in which the ratio of the place values of adjacent digits is a positive integer (the radix). *Synonyms*: radix numeration system; radix scale. (C) 1084-1986w

radix number See: radix.

radix numeration system See: radix notation.

radix point (mathematics of computing) In positional notation, the character, expressed or implied, that separates the integral part of a numerical expression from the fractional part. For example, binary point, decimal point, hexadecimal point, or octal point. *Synonyms*: base point; arithmetic point; point. (C) 1084-1986w

radix point character A character within a picture specification that represents the radix point. *Synonym*: virtual point picture character. (C) 610.5-1990w

radix scale See: radix notation.

radix search A searching technique that takes advantage of the digital properties of the numerical representation of the search keys. *Contrast*: radix sort. See also: radix trie search; digital tree search; multiway radix trie search; binary radix trie search. (C) 610.5-1990w

radix sort A sort that takes advantage of the digital properties of the numerical representation of the sort keys; for example, sorting on keys with base 10 representation by first sorting on the hundreds place, then the tens place, then the ones place. *Contrast*: radix search. See also: radix insertion sort; radix list sort; digital sort; straight radix sort; radix exchange sort. (C) 610.5-1990w

radix transformation function In hashing, a hash function the result of which is the original key in a different numerical base from its original base. For example, in the function below, the original key (assumed to be in base 10) is expressed in base 16.

Original key	Calculation	Hash value
72	$72_{10} = 48_{16}$	48
157	$157_{10} = 9D_{16}$	9D

(C) 610.5-1990w

radix trie search A radix search in which the items in the set to be searched are placed in a trie. *Note*: The trie is traversed taking branches according to the search argument until a terminal node is encountered, and if the search is successful, the external node is equal to the search argument. See also: multiway radix trie search; binary radix trie search. (C) 610.5-1990w

radome A cover, usually intended for protecting an antenna from the effects of its physical environment without degrading its electrical performance. (AP/ANT) 145-1993

rads in Si (1) (metal-nitride-oxide field-effect transistor) Amount of radiation measured by its ionizing effect in silicon; 1 rad equals 100 erg of energy deposited in a gram of irradiated solid. This number can be translated into the density of electron-hole pairs (ehp/cm³) by the following operation:

$$n_{eh}[\text{ehp/volume}] = \gamma[\text{energy/mass}] \times \rho[\text{mass/volume}] \times N_{eh}[\text{ehp/energy}]$$

where

n_{eh} = volume density of ehp,

γ = total radiation dose as energy dissipated per unit mass, typically expressed in rads,

d = density of solid in mass/volume,

N_{eh} = number of ehps created per energy dissipated.

In many solids, $N_{eh} \sim 1/bEg$, and in silicon particularly, $b = 3.6[\text{ehp}]^{-1}$. *Note*: [15], and $Eg = 1.0 \text{ eV}$. This means that one ehp is created per 3.6 electron-volts of energy dissipated. In order to permit the use of the total dose expressed in rads directly, use is made of the identity that $1 \text{ erg} = 6.2 \times 10^{11} \text{ eV}$. From this $N_{eh} \sim 6.2 \times 10^{11} [\text{ehp/erg}] [3.6[\text{eV}]]$, and since $1 \text{ rad} = 100 \text{ ergs/g}$, this makes $N_{eh} \sim 1.7 \times 10^{13} [\text{ehp/g rads}]$. Thus, for silicon, $n_{eh} [\text{ehp/cm}^3] = 1.7 \times 10^{13} \times \gamma[\text{rads}] \times \rho[\text{g/cm}^3]$. (ED) 581-1978w

(2) Amount of radiation measured by its ionizing effect in silicon; one rad equals 100 erg of energy deposited in a gram of irradiated solid. (ED) 1005-1998

ragged left margin In text formatting, a left margin that is not aligned. *Contrast*: left justification. (C) 610.2-1987

ragged right margin In text formatting, a right margin that is not aligned. *Contrast*: right justification. (C) 610.2-1987

RAID See: redundant arrays of inexpensive disks.

RAID level 2 A form of RAID storage, known as level 2, in which Hamming codes are used for error correction. (C) 610.10-1994w

RAID storage Acronym for redundant arrays of inexpensive disks; a type of storage that uses several magnetic or optical disks, known as a disk array, working in tandem to increase disk capacity, improve data transfer rates, and provide higher system reliability. *Note*: Six basic architectures of RAID stor-

transfer time, relay

(3) (uninterruptible power supply) The time that it takes an uninterruptible power supply to transfer the critical load from the output of the inverter to the alternate source, or back again. (IA/PSE) 1100-1999

transfer time, relay *See*: relay transfer time.

transfer trip (1) A form of remote trip in which a communication channel is used to transmit a trip signal from the relay location to a remote location. (SWG/PE) C37.100-1992

(2) The sending of a TRIP signal via a communication channel to a remote line terminal. (PE/PSR) C37.113-1999

transform analysis A software development technique in which the structure of a system is derived from analyzing the flow of data through the system and the transformations that must be performed on the data. *Synonyms*: transformation analysis; transform-centered design. *See also*: rapid prototyping; transaction analysis; data structure-centered design; structured design; stepwise refinement; modular decomposition; input-process-output; object-oriented design. (C) 610.12-1990

transformation A segment attribute that determines the translation, scaling, and rotation applied to a segment when it is displayed on a display surface. (C) 610.6-1991w

transformation analysis *See*: transform analysis.

transformation function A mapping function that performs graphical coordinate transformations such as scaling, rotation, and translation. (C) 610.6-1991w

transform-centered design *See*: transform analysis.

transformer (1) A device, which when used, will raise or lower the voltage of alternating current of the original source. (NESC/NEC) [86]

(2) (power and distribution transformers) A static electric device consisting of a winding, or two or more coupled windings, with or without a magnetic core, for introducing mutual coupling between electric circuits. Transformers are extensively used in electric power systems to transfer power by electromagnetic induction between circuits at the same frequency, usually with changed values of voltage and current. (PE/TR) C57.12.80-1978r

(3) (failure data for power transformers and shunt reactors) A static electric device consisting of a winding, or two or more coupled windings, with or without a magnetic core, for introducing mutual coupling between electric circuits. *Note*: The transformer includes all transformer-related components, such as bushings, LTCs, fans, temperature gauges, etc., and excludes all system-related components, such as surge arresters, grounding resistors, high voltage switches, low-voltage switches, and house service equipment. (PE/TR) C57.117-1986r

(4) An inductive electrical device which uses electromagnetic energy to transform voltage and current levels within a circuit. (C) 610.10-1994w

(5) *See also*: transformer coupled; dry-type encapsulated water-cooled transformer; liquid-filled, or liquid-cooled transformer; dry-type transformer. (IA) 668-1987w

transformer, alternating-current arc welder *See*: alternating-current arc welder transformer.

transformerboard Pressboard specifically manufactured for use as transformer dielectric insulation. (PE/TR) 1276-1997

transformer category definitions (distribution, power and regulating transformers) *n/a*. *Note*: All kVA ratings are minimum nameplate kVA for the principal windings. Category I includes distribution transformers manufactured in accordance with ANSI C57.12.20-1974, Requirements for Overhead-Type Distribution Transformers 67 000 Volts and Below; 500 kVA and Smaller, up through 500 kVA, single phase or three phase. In addition, autotransformers of 500 equivalent two-winding kVA or less that are manufactured as distribution transformers in accordance with ANSI C57.12.20-1974 are included in Category I, even through their nameplate kVAs may exceed 500. (PE/TR) C57.12.00-1987s

transformer class designations *See*: oil-immersed transformer.

transformer, constant-voltage *See*: constant-voltage transformer.

transformer correction factor (TCF) The ratio of the true watts or watt-hours to the measured secondary watts or watt-hours, divided by the marked ratio. *Note*: The transformer correction factor for a current or voltage transformer is the ratio correction factor multiplied by the phase angle correction factor for a specified primary circuit power factor. The true primary watts or watt-hours are equal to the watts or watt-hours measured, multiplied by the transformer correction factor and the marked ratio. The true primary watts or watt-hours, when measured using both current and voltage transformers, are equal to the current transformer ratio correction factor multiplied by the voltage transformer ratio correction factor multiplied by the marked ratios of the current and voltage transformers multiplied by the observed watts or watt-hours. It is usually sufficiently accurate to calculate true watts or watt-hours as equal to the product of the two transformer correction factors multiplied by the marked ratios multiplied by the observed watts or watt-hours. (PE/TR) C57.13-1993, C57.12.80-1978r, [57]

transformer coupled (electrical heating applications to melting furnaces and forehearth in the glass industry) The power modulation device is connected in the primary circuit of a transformer whose secondary circuit is connected to the glass. (IA) 668-1987w

transformer, dry-type *See*: dry-type transformer.

transformer, energy-limiting *See*: energy-limiting transformer.

transformer equipment rating A volt-ampere output together with any other characteristics, such as voltage, current, frequency, and power factor, assigned to it by the manufacturer. *Note*: It is regarded as a test rating that defines an output that can be taken from the item of transformer equipment without exceeding established temperature-rise limitations, under prescribed conditions of test and within the limitations of established standards. *See also*: duty. (PE/TR) [57]

transformer, grounding *See*: grounding transformer.

transformer grounding switch and gap (capacitance potential devices) Consists of a protective gap connected across the capacitance potential device and transformer unit to limit the voltage impressed on the transformer and the auxiliary or shunt capacitor, when used; and a switch that when closed removes voltage from the potential device to permit adjustment of the potential device without interrupting high-voltage line operation and carrier-current operation when used. *See also*: outdoor coupling capacitor. (PE/EM) 43-1974s

transformer, group-series loop insulating *See*: group-series loop insulating transformer.

transformer, high-power-factor *See*: high-power-factor transformer.

transformer, high-reactance *See*: high-reactance transformer.

transformer, ideal *See*: ideal transformer.

transformer, individual-lamp insulating *See*: individual-lamp insulating transformer.

transformer, insulating *See*: insulating transformer.

transformer insulation life For a given temperature of the transformer insulation, the total time between the initial state for which the insulation is considered new and the final state for which dielectric stress, short circuit stress, or mechanical movement, which could occur in normal service, and would cause an electrical failure. (PE/TR) C57.91-1995

transformer integrally mounted cable terminating box A weatherproof air-filled compartment suitable for enclosing the sidewall bushings of a transformer and equipped with any one of the following entrance devices:

- a) Single or multiple-conductor potheads with couplings or wiping sleeves;
- b) Wiping sleeves;