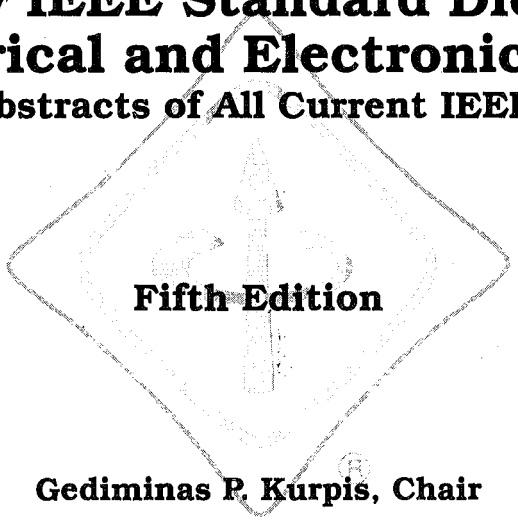
Exhibit B

CLASS SEP.

IEEE Std 100-1992

The New IEEE Standard Dictionary of Electrical and Electronics Terms

[Including Abstracts of All Current IEEE Standards]



Fifth Edition

Gediminas P. Kurpis, Chair

Christopher J. Booth, Editor

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equal power flux density incident upon the surface form specified contours. 145-1983

contour encoding. An image compression technique in which a region that has a constant gray level is encoded by specifying only its border. 610.4-1990

contouring control system (numerically controlled machines). A system in which the controlled path can result from the coordinated, simultaneous motion of two or more axes. [74]

contract (1) (C) (diode-type camera tube). The ratio of the difference between the peak and minimum values of irradiance to the peak irradiance of an image or specified portion of an image.

$$C = \frac{E_p - E_m}{E_p} \times 100 \text{ (percent)}$$

503-1978w

(2) (software requirements specifications). A legally binding document agreed upon by the customer and supplier. This includes the technical, organizational, cost and schedule requirements of a product. 830-1984

contract curve (rotating electric machinery). A specified machine characteristic curve that becomes part of the contract. 11-1980

contract demand (power operations). The demand that the supplier of electric service agrees to have available for delivery. 858-1987

contractor (1) (hydroelectric power plants). A device used for repetitive opening and closing operation of an electric circuit, and that has load-current interrupting capability. It has no fault-current interrupting capability. 1020-1988

(2) (metal transmission structures). *See:* **constructor.** 951-1988

(3) (power and distribution transformer). A device for repeatedly establishing and interrupting an electric power circuit. C57.12.80-1978

contrast (1) (image processing and pattern recognition). The difference between the average brightness of two subsets of an image. 610.4-1990

(2) (computer graphics). The relationship between the highest and lowest intensity levels of a display image, usually expressed as the ratio of light to dark. 610.6-1991

(3) (display presentation). The subjective assessment of the difference in appearance of two parts of a field of view seen simultaneously or successively. (Hence: luminosity contrast, lightness contrast, color contrast, simultaneous contrast, successive contrast). *See:* **photometry; television.** [34], [84]

(4) (electric power systems in commercial buildings). Indicates the degree of difference in light reflectance of the details of a task compared with its background. 241-1990

contrast control. A control, associated with a picture-display device, for adjusting the contrast ratio of the reproduced picture. *Note:* The contrast control is normally an amplitude control for the picture signal. In a monochrome-television system, both average luminance and the contrast ratio are affected. In a color-television system, saturation and hue also may be affected. *See:* **television.** [119]

contrast ratio (1) (television). The ratio of the maximum to the minimum luminance values in a television picture or a portion thereof. *Note:* Generally, the entire area of the picture is implied, but smaller areas may be specified as in detail contrast. 201-1979w

(2) (amplitude, frequency, and pulse modulation). For any diffraction order, the ratio of the maximum light intensity to the minimum light intensity in the order, so that $C = I_{max}/I_{min}$, where C is the contrast ratio. *Note:* In the limiting case when the depth of modulation is equal to 1, the minimum light intensity is due to background light, so that $C = I_{max}/I_b$. In the other extreme, when $m = 0$, the contrast ratio is equal to 1. [17]

(3) (acoustically tunable optical filter). The ratio of the dynamic transmission at a given acoustic frequency and power level to the dynamic transmission with no applied acoustic power. *Note:* The contrast ratio is a measure of light leakage through the device. It should be specified for either a monochromatic or white light source input, and the angular spread of the input light. [17]

contrast rendition factor (CRF) (illuminating engineering). The ratio of visual task contrast with a given lighting environment to the contrast with sphere illumination. [126]

contrast sensitivity (illuminating engineering). The ability to detect the presence of luminance differences. Quantitatively, it is equal to the reciprocal of the brightness contrast threshold. *See:* **brightness contrast threshold.** [126]

contrast stretching. An image enhancement technique in which the contrast between image subsets and their complements is increased. 610.4-1990

contrast transfer function square-wave response (diode-type camera tube). The contrast transfer function or CTF represents the response of the imaging system in the spatial frequency domain to a square-wave input. A bar pattern represents a one-dimensional input to a two-dimensional imaging sensor. CTF is synonymous with the square-wave amplitude response, $R_{sq}(N)$. 503-1978w

control (1) (supervisory control, data acquisition, and automatic control). The execution of a system change by manual means, remote means, automatic means, or partially automatic means. *(A) (automatic).* An arrangement

of electrical controls that provides for switching or controlling, or both, of equipment in an automatic sequence and under predetermined conditions. *(B) (closed loop).* A type of automatic control in which control actions are based on signals fed back from the controlled equipment or system. For example, remote stations can manage local voltage conditions by control of load tap changers and volt amperes reactive (VAR) control compensation equipment. *(C) (open loop).* A form of control without feedback. *(D) (manual).* Control in which the system or main device, whether direct or power aided in operation, is directly controlled by an attendant. *(E) (partial automatic).* Control that is a combination of manual and automatic control. For example, to cause a voltage reduction the local automatic load tap changing closed-loop control may be biased by way of a supervisory control command. *(F) (remote).* Control of a device from a distant point. C37.1-1987

(2) (electronic computation). (A) Usually, those parts of a digital computer that effect the carrying out of instructions in proper sequence, the interpretation of each instruction, and the application of the proper signals to the arithmetic unit and other parts in accordance with this interpretation. (B) In some business applications of mathematics, a mathematical check. *See:* **computer control state.** 162-1963

(3) (cryotron). An input element of a cryotron. *See:* **super conductivity.** [46]

(4) (packaging machinery). A device or group of devices that serves to govern in some predetermined manner the electric power delivered to the apparatus to which it is connected. 333-1980w

(5) (power switchgear). A designation of how the equipment is governed, that is, by an attendant, by automatic means, or partially by automatic means and partially by an attendant. *Note:* The word "control" is often used in a broad sense to include "indication" also. C37.100-1981

(6) (station control and data acquisition). The execution of a system change by manual means, remote means, automatic means, or partially automatic means. C37.1-1979

(7) (electric power systems in commercial buildings). Any device used for regulation of a system or component. 241-1990

(8) (overhead power lines). In experiments, establishment of an untreated group of animals, plants, cells, etc., that serve as the basis for comparing responses of a similar, but treated, group that has been subjected (exposed) to some agent (i.e., an electric field). 539-1990

control accuracy (industrial control). The degree of correspondence between the final value and the ideal value of the directly controlled variable. *See:* **control system, feedback.** [60]

control action (automatic control). Of a control element or a controlling system, the nature of change of the output effected by the input. *Note:* The output may be a signal or the value of a manipulated variable. The input may be the control loop feedback signal when the command is constant, an actuating signal, or the output of another control element. One use of control action is to effect compensation. *See:* **compensation.** [3]

control action, derivative (1) (industrial control). The component of control action for which the output is proportional to the rate of change to the input. *See:* **control system, feedback.** 94-1970w, [60]

(2) (automatic control). Action in which the output of the controller is proportional to the first time derivative of the input. 94-1970w

control action, integral (1) (industrial control). Control action in which the output is proportional to the time integral of the input. *See:* **control system, feedback.** 94-1970w, [60]

(2) (control system). Control action in which the output is proportional to the time integral of the input, that is the rate of change of output is proportional to the input. *Note:* In the practical embodiment of integral control action the relation between output and input, neglecting high frequency terms, is given by

$$\frac{Y}{X} = \pm \frac{I/s}{\frac{bI}{s} + 1} \qquad 0 \le b \ll 1$$

where
b = reciprocal of static gain
$I/2\pi$ = gain cross-over frequency in cycles per unit time
s = complex variable
X = input transform
Y = output transform [3]

control action, lead. *See:* **lead, first order.**

control action, proportional (1) (industrial control). Control action in which there is a continuous linear relation between the output and the input. *Note:* This condition applies when both the output and input are within their normal operating ranges. [60]

(2) (automatic control). Action in which there is a linear relation between the output and the input of the controller. *Note:* The ratio of the change in output produced by the proportional control action to the change in input is defined as the proportional gain. 94-1970w

control action, proportional plus derivative (control systems). Control action in which the output is proportional to a linear combination of the input and the time rate-of-change of input. *Syn:* **P.D.** *Note:* In the practical embodiment of proportional plus derivative

electronic navigation. *See:* **navigation.**

electronic office. An office that makes use of office automation. *Syn:* **automated office; office of the future.** *See also:* **paperless office.** 610.2-1987

electronic position indicator (EPI) (navigation aid terms). A radio navigation system used in hydrographic surveying that provides circular lines of position. 172-1983

electronic power converter. Electronic devices for transforming electric power. *See:* **rectification.** [119]

electronic raster scanning (facsimile). That method of scanning in which motion of the scanning spot in both dimensions is accomplished by electronic means. *See:* **scanning.** 168-1956w

electronic rectifier (industrial control). A rectifier in which electron tubes are used as rectifying elements. *See:* **electronic controller; rectification of an alternating current.** [60]

electronics (1) (adjective). Of, or pertaining to, the field of electronics. Examples: Electronics engineer, electronics course, electronics laboratory, and electronics committee. *See:* **electron; electronic.**
(2) (noun). That field of science and engineering that deals with electron devices and their utilization. *See:* **electron device.** [45]
(3) (electric installations on shipboard). That branch of science and technology which relates to devices in which conductance is principally by electrons moving through a vacuum, gas, or semiconductor. 45-1983

electronic scanning (antenna). Scanning an antenna beam by electronic or electric means without moving parts. *Syn:* **inertialess scanning.** *See:* **radiation.** 145-1983

electronic spread sheet. (A) A computer program that enables the user to set up a display of rows and columns in which some entries are manually entered and others are calculated automatically using formulas supplied by the user. *Syn:* **spread sheet.** (B) The display of rows and columns produced by a computer program as in (A). 610.2-1987

electronic storage register (watthour meters). An electronic circuit, which is an integral part of the time-of-use register, where data are stored for display or retrieval, or both. C12.13-1985
(2) (electromechanical watthour meters). An electronic circuit, which is an integral part of the solid-state register, where data are stored for display and/or retrieval. C12.15-1990

electronic switching system (telephone switching systems). An automatic switching system in which the control functions are performed principally by electronic devices. 312-1977w

electronic transformer (power and distribution transformer). Any transformer intended for use in a circuit or system utilizing electron or solid-state devices. *Note:* Mercury-arc rectifier transformers and luminous-tube transformers are normally excluded from this classification. C57.12.80-1978

electronic trigger circuit (industrial control). A network containing electron tubes in which the output changes abruptly with an infinitesimal change in input at one or more points in the operating range. [60]

electronic warfare support measures (ESM) (radar). Actions taken to search for, intercept, locate, record, and analyze radiated electromagnetic energy for the purpose of exploiting such radiations in support of military operations. 686-1982

electron injector. The electron gun of a betatron. [45]

electron lens. A device for the purpose of focusing an electron (ion) beam. *See:* **electron optics.** [84]

electron microscope. An electron-optical device that produces a magnified image of an object. *Note:* Detail may be revealed by virtue of selective transmission, reflection, or emission of electrons by the object. [45]

electron mirror. An electronic device causing the total reflection of an electron beam. *See:* **electron optics.** [45]

electron multiplier. A structure, within an electron tube, that employs secondary electron emission from solids to produce current amplification. *See:* **amplifier; electron emission.** 161-1971w, 398-1972

electron multiplier transit time. That portion of photomultiplier transit time corresponding to the time delay between an electron packet leaving the first dynode and the multiplier packet striking the anode. 398-1972

electron optics. The branch of electronics that deals with the operation of certain electronic devices, based on the analogy between the path of electron (ion) beams in magnetic or electric fields and that of light rays in refractive media. [45], [84]

electron-ray indicator tube. An elementary form of cathode-ray tube used to indicate a change of voltage. *Note:* Such a tube used to indicate the tuning of a circuit is sometimes called a magic eye. *See:* **cathode-ray tubes.** [45], [84]

electron resolution. The ability of the electron multiplier section of the photomultiplier to resolve inputs consisting of n and $n + 1$ electrons. This may be expressed as a fractional full width at half maximum of the nth peak, as the peak to valley ratio of the nth

electrotherapy. The use of electric energy in the treatment of disease. [47]

electrothermal efficiency. The ratio of energy usefully employed in a furnace to the total energy supplied. *See:* **electrothermics.** [119]

electrothermal recording (facsimile). That type of recording that is produced principally by signal-controlled thermal action. *See:* **recording (facsimile).** 168-1956w

electrothermic-coupler unit (electrothermic power meter). A three-port directional coupler with an electrothermic unit attached to either the side arm or the main arm which is normally used as a feed-through power measuring system. Typically, an electrothermic unit is attached to the side arm of the coupler so that the power at the output port of the main arm can be determined from a measurement of the power in the side arm. This system also can be used as a terminating powermeter by terminating the output port of the directional coupler. 544-1975w

electrothermic element (electrothermic power meter). A power absorber and a thermocouple (or thermopile) which are either two separate units or where the thermocouple (or thermopile) is also the power absorber. 544-1975w

electrothermic instrument. An instrument that depends for its operation on the heating effect of a current or currents. *Note:* Among the several possible types are (1) the expansion type, including the hot-wire and hot-strip instruments; (2) the thermocouple type; and (3) the bolometric type. *See:* **instrument.** [119]

electrothermic mount (electrothermic power meter). A waveguide or transmission line structure which is designed to accept the electrothermic element. It normally contains internal matching devices or other reactive elements to obtain specified impedance conditions at its input terminal when an electrothermic element is installed. It usually contains a means of protecting the electrothermic element and the immediate environment from thermal gradients which would cause an undesirable thermoelectric output. 544-1975w

electrothermic power indicator (electrothermic power meter). An instrument that may or may not amplify the low level dc output voltage from the electrothermic unit and provides a display, usually in the form of the D'Arsonval type indication or a digital readout. 544-1975w

electrothermic power indicator error (electrothermic power meter). Ability of the metering circuitry to indicate exactly the substituted power within an electrothermic unit. Included are such factors as meter calibration, open loop gain, meter linearity, tracking errors, range switching errors, line voltage errors, and temperature compensation errors. 544-1975w

electrothermic power meter. This consists of an electrothermic unit and an electrothermic power indicator. 544-1975w

electrothermics. The branch of science and technology that deals with the direct transformation of electric energy and heat. [119]

electrothermic substitution power (electrothermic power meter). The power at a reference frequency which, when dissipated in the electrothermic element, produces the same dc electrothermic output voltage that the element produces when subjected to radio frequency power. 544-1975w

electrothermic technique of power measurement (electrothermic power meter). A technique wherein the heating effect of power dissipated in an electrothermic element (which consists of an energy absorber and a thermocouple or thermopile) is used to generate a dc voltage. The power is dissipated either in a separate absorber or in the resistance of the electrothermic element. The resultant heat causes a temperature rise in a portion of the element. This temperature rise is sensed by the thermocouple which generates a dc output voltage proportional to the power. 544-1975w

electrothermic unit (electrothermic power meter). An assembly consisting of the electrothermic element installed in the electrothermic mount. 544-1975w

electrotonic wave (electrobiology). A brief nonpropagated change of potential on an excitable membrane in the vicinity of an applied stimulus; it is often accompanied by a propagated response and always by electrotonus. *See:* **excitability (electrobiology).** [47]

electrotonus (1) (physical). The change in distribution of membrane potentials in nerve and muscle during or after the passage of an electric current. *See:* **excitability (electrobiology).** [47]
(2) (physiological). The change in the excitability of a nerve or muscle during the passage of an electric current. *See:* **excitability (electrobiology).** [47]

electrotyping. The production or reproduction of printing plates by electroforming. *See:* **electroforming.** [119]

electrowinning. The electrodeposition of metals or compounds from solutions derived from ores or other materials using insoluable anodes. [119]

element (1) (graphic symbols for logic functions). As used within IEEE Std 91-1984, a representation of all or part of a logic function within a single outline, which may, in turn, be subdivided into smaller elements representing subfunctions of the overall function. Alternatively, the function so represented. 91-1984
(2) (measuring longitudinal balance of telephone equipment operating in the voice

band). Any electric device (such as inductor, resistor, capacitor, generator, or line) with terminals at which it may be directly connected to other devices, elements, or apparatus. 455-1985

(3) (electron tubes). A constituent part of the tube that contributes directly to its electrical operation. 161-1971w

(4) (semiconductor device). Any integral part that contributes to its operation. *See:* **semiconductor device.** 216-1960w

(5) (integrated circuit). A constituent part of the integrated circuit that contributes directly to its operation. *See:* **integrated circuit.** 274-1966w, [46]

(6) (computing systems). *See:* **combinational logic element; logic element; sequential logic element; threshold element.**

(7) (storage cell). Consists of the positive and negative groups with separators, or separators and retainers, assembled for one cell. *See:* **battery (primary or secondary).** [119]

(8) (data) (data transmission). Synonymous with bit as the minimum subdivision within a code grouping representing a character. 599-1985w

(9) (primary detecting). That portion of the feedback elements which first either utilizes or transforms energy from the controlled medium to produce a signal that is a function of the value of the directly controlled variable. 421-1972w

(10) (antenna). *See:* **array element; director element; driven element; parasitic element; radiating element; reflector element.** 145-1983

(11) (power switchgear) (of a relay). *See:* **relay element.** C37.100-1981

(12) (data management). *See:* **binary element; data element.** 610.5-1990

elemental area (facsimile). Any segment of the scanning line of the subject copy the dimension of which along the line is exactly equal to the nominal line width. *Note:* Elemental area is not necessarily the same as the scanning spot. *See:* **scanning.** 168-1956w

elementary diagram (packaging machinery). A diagram using symbols and a plan of connections to illustrate, in simple form, the scheme of control. 333-1980w

element cell (array antenna). In an array having a regular arrangement of elements which can be made congruent by translation, an element and a region surrounding it which when repeated by translation covers the entire array without gaps or overlays between cells. *Note:* There are many possible choices for such a cell. Some may be more convenient than others for analytic purposes. 145-1983

element conduction interval (thyristor). That part of an operating cycle in which ON-state current flows in the basic control element. 428-1981

element linear. *See:* **linear system or element.**

element, measuring (automatic control). That portion of the feedback elements which converts the signal from the primary detecting element to a form compatible with the reference input. [3]

element nonconduction interval (thyristor). That part of an operating cycle during which no ON-state current flows in the basic control element. 428-1981

element of a fix (navigation aid terms). The specific values of the navigation coordinates necessary to define a position. 172-1983

element, primary detecting (automatic control). That portion of the feedback elements that first either utilizes or transforms energy from the controlled medium to produce a signal that is a function of the value of the directly controlled variable. [3]

elements, feedback (control system). The elements in the controlling system that change the feedback signal in response to the directly controlled variable. *See:* **control system, feedback.** 421-1972w

elements, forward (automatic control). Those elements situated between the actuating signal and the controlled variable in the closed loop being considered. *See:* **control system, feedback.** 421-1972w

elements, loop (control system, feedback) (a closed loop). All elements in the signal path that begins with the loop error signal and ends with the loop return signal. *See:* **control system, feedback.** [3]

elements, reference-input (automatic control). The portion of the controlling system that changes the reference input signal in response to the command. *See:* **control system, feedback.** [60]

elevated duct. A tropospheric radio duct in which the lower boundary is above the surface of the Earth. 211-1990

elevated-zero range. A range where the zero value of the measured variable, measured signal, etc., is greater than the lower range value. *Note:* The zero may be between the lower and upper range values, at the upper range value, or above the upper range value. For example: (a) -20 to 100, (b) -40 to 0, and (c) -50 to -10. *See:* **instrument.** [112]

elevation (illuminating engineering). The angle between the axis of a searchlight drum and the horizontal. For angles above the horizontal, elevation is positive, and below the horizontal negative. [126]

elevation angle. Complement of the angle of incidence. *See also:* **grazing angle.** 211-1990

elevation rod (lightning protection). The vertical portion of conductor in an air terminal