IEEE Std 100-1996

The IEEE Standard Dictionary of Electrical and Electronics Terms

Sixth Edition

Published by the
Institute of Electrical and
Electronics Engineers, Inc.

CRUSOE 1027

The IEEE Standard Dictionary of Electrical and Electronics Terms

Sixth Edition

Standards Coordinating Committee 10, Terms and Definitions
Jane Radatz, Chair

This standard is one of a number of information technology dictionaries being developed by standards organizations accredited by the American National Standards Institute. This dictionary was developed under the sponsorship of voluntary standards organizations, using a consensus-based process.

ISBN 1-55937-833-6

When the IEEE Standards Board approved this standard on 10 December 1996, it had the following membership.

Donald C. Loughry, *Chair* **Richard J. Holleman,** *Vice Chair*
Andrew G. Salem, *Secretary*

Gilles A. Baril
Clyde R. Camp
Joseph A. Cannatelli
Stephen L. Diamond
Harold E. Epstein
Donald C. Fleckenstein
Jay Forster*
Donald N. Heirman
Ben C. Johnson
E. G. "Al" Kiener
Joseph L. Koepfinger*
Stephen R. Lambert
Lawrence V. McCall
L. Bruce McClung
Marco W. Migliaro
Mary Lou Padgett
John W. Pope
Jose R. Ramos
Arthur K. Reilly
Ronald H. Reimer
Gary S. Robinson
Ingo Rüsch
John S. Ryan
Chee Kiow Tan
Leonard L. Tripp
Howard L. Wolfman

*Member Emeritus

Also included are the following nonvoting IEEE Standards Board liaisons:

Satish K. Aggarwal
Alan H. Cookson
Chester C. Taylor

Kim Breitfelder (1995-present), *IEEE Std 100 Editor*
Stephen Huffman (1993-1995), *IEEE Std 100 Editor*

Assistance was provided by the IEEE Standards editorial staff.

How to use this dictionary

The terms defined in this dictionary are listed in *letter-by-letter* alphabetical order. Spaces are ignored in this style of alphabetization, so *cable value* will come before *cab signal*. Descriptive categories associated with the term in earlier editions of IEEE Std 100 will follow the term in parentheses. New categories appear after the definitions (see Categories, below), followed by the designation of the standard or standards that include the definition. If a standard designation is followed by the letter s, it means that edition of the standard was superseded by a newer revision and the term was not included in the revision. If a designation is followed by the letter w, it means that edition of the standard was withdrawn and not replaced by a revision. A bracketed number refers to the non-IEEE standard sources given in the back of the book.

Acronyms and abbreviations are no longer listed in a separate section in the dictionary; rather, they are incorporated alphabetically with other terms. Each acronym or abbreviation refers to its expanded term, where it is defined. Acronyms and abbreviations for which no definition was included in past editions have been deleted from this edition of IEEE Std 100.

Abstracts of the current set of approved IEEE standards are provided in the back of the book. It should be noted that updated information about IEEE standards can be obtained at any time from the IEEE Standards World Wide Web site at http://standards.ieee.org/.

Categories

The category abbreviations that are used in this edition of IEEE Std 100 are defined below. This information is provided to help elucidate the context of the definition. Older terms for which no category could be found have had the category "Std100" assigned to them. Note that terms from sources other than IEEE standards, such as the National Electrical Code® (NEC®) or the National Fire Protection Association, may not be from the most recent editions; the reader is cautioned to check the latest editions of all sources for the most up-to-date terminology.

conforms to manufacturer's recommendations. (NEC/NESC) [86]

controller (1) (electric pipe heating systems) A device that regulates the state of a system by comparing a signal from a sensor located in the system with a predetermined value and adjusting its output to achieve the predetermined value. Controllers, as used in electric pipe heating systems, regulate temperatures on the system and can be referred to as temperature controllers or thermostats. Controller sensors can be mechanical (bulb, bimetallic) or electrical (thermocouple, resistance-temperature detector [RTD] thermistor). (PE) 622A-1984r, 622B-1988r

(2) 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. (NEC/NESC) [86]

(3) (packaging machinery) A device or group of devices that serves to control in some predetermined manner the apparatus to which it is connected. (IA) 333-1980w

(4) The component of a system that functions as the system controller. A controller typically sends program messages to and receives response messages from devices. (IM) 488.2-1992

(5) (A) A functional unit in a computer system that controls one or more units of the peripheral equipment. *Synonym:* peripheral control unit. *See also:* dual-channel controller; input-output controller. **(B)** In robotics, a processor that takes as input desired and measured position, velocity or other pertinent variables and whose output is a drive signal to a controlling motor or activator. **(C)** A device through which one can introduce commands to a control system. (C) 610.10-1994

(6) The entity that initiates RamLink transactions. There is exactly one controller on each RamLink ringlet. (C/MM) 1596.4-1996

(7) (CAMAC system) *See also:* CAMAC crate.

(8) *See also:* SBus Controller. (BA/C) 1496-1993

Controller *See:* SBus Controller.

controller, automatic (process control) A device that operates automatically to regulate a controlled variable in response to a command and a feedback signal. *Note:* The term originated in process control usage. Feedback elements and final control elements may also be part of the device. *See also:* control system, feedback. (PE) [3]

controller characteristics (thyristor) The electrical characteristics of an ac power controller measured or observed at its input or output terminal. (IA) 428-1981w

controller current (thyristor) The current flowing through the terminals of the controller. (IA) 428-1981w

controller diagram (electric-power devices) A diagram that shows the electric connections between the parts comprising the controller and that shows the external connections. (IA) [60], 270-1966w

controller equipment (thyristor) An operative unit for ac power control comprising one or more thyristor assemblies together with any input or output transformers, filters, other switching devices and auxiliaries required by the thyristor ac power controller to function. (IA) 428-1981w

controller faults (thyristor) A fault condition exists if the conduction cycles of some semiconductors are abnormal. (IA) 428-1981w

controller ON-state interval (thyristor) The time interval in which the controller conducts. *Note:* It is assumed that the starting instant of the controller ON-state interval is coincident with the starting instant of the trigger pulse. (IA) 428-1981w

controller power transformer (thyristor) A transformer within the controller employed to provide isolation or the transformation of voltage or current, or both. (IA) 428-1981w

controller section (thyristor) That part of a controller circuit containing the basic control elements necessary for controlling the load voltage. (IA) 428-1981w

controller, self-operated (automatic control) A control device in which all the energy to operate the final controlling element is derived from the controlled system through the primary detecting element. (PE) [3]

controllers for steel-mill accessory machines Controllers for machines that are not used directly in the processing of steel, such as pumps, machine tools, etc. *See also:* electric controller. (IA) [60]

controllers for steel-mill auxiliaries Controllers for machines that are used directly in the processing of steel, such as screwdowns and manipulators but not cranes and main rolling drives. *See also:* electric controller. (IA) [60]

controller, time schedule (process control) A controller in which the command (or reference input signal) automatically adheres to a pre-determined time schedule. *Note:* The time schedule mechanism may be programmed to switch motors or other devices. (PE) [3]

controlling element, final That forward controlling element which directly changes the value of the manipulated variable. (CS/PE) [3]

controlling elements The functional components of a controlling system. *See also:* control system, feedback. (IM/PE) [120], [3]

controlling elements, forward The elements in the controlling system that change a variable in response to the actuating signal. *See also:* control system, feedback. (IM/PE) [120], [3]

controlling means (of an automatic control system) Consists of those elements that are involved in producing a corrective action. (PE) 94-1970w

controlling section A length of track consisting of one or more track circuit sections, by means of which the roadway elements or the device that governs approach to or movement within a block are controlled. (EEC/PE) [119]

controlling system (1) (automatic control system without feedback) That portion of the control system that manipulates the controlled system. (IM/PE) [120], [3]

(2) (control system feedback) The portion that compares functions of a directly controlled variable and a command and adjusts a manipulated variable as a function of the difference. *Note:* It includes the reference input elements; summing point; forward and final controlling elements; and feedback elements. *See also:* control system, feedback. (IM/PE) [120], [3]

controlling voltage, composite *See:* composite controlling voltage.

control machine (A) (railroad practice) An assemblage of manually operated levers or other devices for the control of signals, switches, or other units, without mechanical interlocking, usually including a track diagram with indication lights. *See also:* car retarder. **(B) (railroad practice)** A group of levers or equivalent devices used to operate the various mechanisms and signals that constitute the car retarder installation. *See also:* car retarder; centralized traffic-control system. (EEC/PE) [119]

control, manual Those elements in the excitation control system which provide for manual adjustment of the synchronous machine terminal voltage by open-loop control. (PE) 421-1972s

control mechanism (control systems for steam turbine-generator units) Includes all systems, devices, and mechanisms between a controller and the controlled valves. (PE) 122-1985s

control metering point (1) (tie line) The location of the metering equipment that is used to measure power on the tie line for the purpose of control. *See also:* center of distribution; power system. (PE) [54]

(2) (electric power system) The actual or equivalent location of power flow measurement on an area tie line. (PE) 94-1991

control mode (thyristor) The starting instant of the controller ON-state interval is periodic. The control mode is defined