

“Frontmatter”

Electrical Engineering Dictionary.

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Preface

One can only appreciate the magnitude of effort required to develop a dictionary by actually experiencing it. Although I had written nine other books, I certainly did not know what I was getting into when in January of 1996 I agreed to serve as Editor-in-Chief for this project. Now, after 2 1/2 years I understand.

Unlike other books that I have written, creating this dictionary was more a test of will and stamina and an exercise in project management than mere writing. And although I have managed organizations of up to 80 academics, nothing is more like “herding cats” than motivating an international collection of almost 200 distinguished engineers, scientists, and educators scattered around the globe almost entirely via email. Yet, I think there is no other way to undertake a project like this. I still marvel at how Noah Webster must have managed to construct his English Dictionary without the benefits of modern communication.

But this project, as much as it is a monument to individual will, is really the collaborative work of many brilliant and dedicated men and women. This is their dictionary and your dictionary.

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evaporates the feedwater and generates high-pressure steam.

boiling water reactor a nuclear reactor from which heat is transferred in the form of high-pressure steam.

bolted fault a bolted fault is a short circuit fault with no fault resistance. Bolted faults deliver the highest possible fault current for a given location and system configuration, and are used in selecting equipment withstand and interrupting ratings and in the setting of protective relays.

Boltzmann machine in its simplest form, a discrete time Hopfield network that employs stochastic neurons and simulated annealing in its procedure for updating output values. More generally it can have hidden units and be subjected to supervised training so as to learn probabilities of different outputs for each class of inputs.

Boltzmann relation relates the density of particles in one region to that in an adjacent region, with the potential energy between both regions.

bond that which binds two atoms together.

bond pad areas of metallization on the IC die that permit the connection of fine wires or circuit elements to the die.

bonded magnet a type of magnet consisting of powdered permanent magnet material, usually isotropic ceramic ferrite or neodymium-iron-boron, and a polymer binder, typically rubber or epoxy, this magnet material can be molded into complex shapes.

bonding the practice of ensuring a low-resistance path between metallic structures such as water lines, building frames, and cable armor for the purpose of preventing lightning arcs between them.

Boolean an operator or an expression of George Boole's algebra (1847). A Boolean variable or signal can assume only two values: TRUE or FALSE. This concept has been ported in the field of electronic circuits by Claude Shannon (1938). He had the idea to use the Boole's algebra for coding the status of circuit: TRUE/FALSE as HIGH/LOW as CLOSE/OPEN, etc.

Boolean algebra the fundamental algebra at the basis of all computer operations. See also the other definitions with Boolean as the first word.

Boolean expression an expression of the Boole's algebra, in which can appear Boolean variables/signals and Boolean operators. Boolean expressions are used for describing the behavior of digital equipments or stating properties/conditions in programs.

Boolean function common designation for a binary function of binary variables.

Boolean logic the set of rules for logical operations on binary numbers.

Boolean operator the classical Boolean operators are AND, OR, NOT. Other operators such as XOR, NAND, NOR, etc., can be easily obtained based on the fundamental ones. In hardware these are implemented with gates, see for example AND gate.

boost converter a circuit configuration in which a transistor is switched by PWM trigger pulses and a diode provides an inductor-current continuation path when the transistor is off. During the transistor on-time, the current builds up in the inductor. During the transistor off-time, the voltage across the inductor reverses and adds to the input voltage, as a result, the output voltage is greater than the input voltage.

A boost converter can be viewed as a reversed buck converter. The output voltage v_o is related to the input voltage v_i by $v_o = v_i / (1 - d)$ and it can be controlled by