

Avoiding false negatives. Testing the algorithm. The role of sensing strategies. *Chapter 19: Applications.* Hand-eye coordination systems. Mobile robot localization. Inspection. Inspection. *Chapter 20: The Next Steps.*

Frank Markham Brown, Boolean Reasoning: The Logic of Boolean Equations (Kluwer Academic Publishers, Boston, 1990) 273 pages

Preface. Two logical languages. Boolean reasoning. Boolean algebra and switching theory. An approach to Boolean problem-solving. Boolean reasoning vs. predicate logic. *Chapter 1: Fundamental Concepts.* Formulas. Propositions and predicates. Sets. Operations on sets. Partitions. Relations. Functions. Operations and algebraic systems. *Chapter 2: Boolean Algebras.* Postulates for a Boolean algebra. Examples of Boolean algebras (The algebra of classes (subsets of a set). The algebra of propositional functions. Arithmetic Boolean algebras. The two-element Boolean algebra. Summary of examples). The Stone representation theorem. The inclusion-relation (Intervals). Some useful properties. n -variable Boolean formulas. n -variable Boolean functions. Boole's expansion theorem. The minterm canonical form (Truth-tables. Maps). The Löwenheim-Müller verification theorem. Switching functions. Incompletely-specified Boolean functions. Boolean algebras of Boolean functions (Free Boolean algebras). Orthonormal expansions (Löwenheim's expansions). Boolean quotient. The Boolean derivative. Recursive definition of Boolean functions. What good are "big" Boolean algebras? *Chapter 3: The Blake Canonical Form.* Definitions and terminology. Syllogistic & blake canonical formulas. Generation of $BCF(f)$. Exhaustion of implicants. Iterated consensus (Quine's method. Successive extraction). Multiplication (Recursive multiplication. Combining multiplication and iterated consensus. Unwanted syllogistic formulas). *Chapter 4: Boolean Analysis.* Review of elementary properties. Boolean systems (Antecedent, consequent, and equivalent systems. Solutions). Reduction. The extended verification theorem. Poretsky's law of forms. Boolean constraints. Elimination. Eliminants. Redundant variables. Substitution. The tautology problem (Testing for tautology. The sum-to-one theorem. Nearly-minimal SOP formulas). *Chapter 5: Syllogistic Reasoning.* The principle of assertion. Deduction by consensus. Syllogistic formulas. Clausal form. Producing and verifying consequents (Producing consequents. Verifying consequents. Comparison of clauses). Class-logic. Selective deduction. Functional relations. Dependent sets of functions. Sum-to-one subsets. Irredundant formulas. *Chapter 6: Solution of Boolean Equations.* Particular solutions and consistency. General solutions. Subsumptive general solutions (Successive elimination. Deriving eliminants from maps. Recurrent covers and subsumptive solutions. Simplified subsumptive solutions. Simplification via marquand diagrams). Parametric general solutions (Successive elimination. Parametric solutions based on recurrent covers. Löwenheim's formula). *Chapter 7: Functional Deduction.* Functionally deducible arguments. Eliminable and determining subsets (u -eliminable subsets. u -determining subsets. Calculation of minimal u -determining subsets). *Chapter 8: Boolean Identification.* Parametric and diagnostic models (Parametric models. The diagnostic axiom. Diagnostic equations and functions. Augmentation). Adaptive identification (Initial and terminal specifications. Updating the model. Effective inputs. Test-procedure). *Chapter 9: Recursive Realizations of Combinational Circuits.* The design-process. Specifications (Specification-formats. Consistent specifications). Tabular specifications. Strongly combinational solutions. Least-cost recursive solutions. Constructing recursive solutions (The procedure. An implementation using BORIS). *Chapter A: Syllogistic Formulas.* Absorptive formulas. Syllogistic formulas. Prime implicants. The blake canonical form.