

American Institute of Physics Handbook

Third Edition



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WOLMAN · Handbook of Clinical Psychology

Section 1

MATHEMATICS

BIBLIOGRAPHY; SI UNITS

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The third edition of the AIP Handbook, like the second, presents a bibliography of mathematical references in lieu of an assortment of actual mathematical tables. Selection of such tables necessarily would have been arbitrary; they would have been bound to duplicate many tables already easily available to most physicists; and, most important, including them would have necessitated the omission of significant physics material. The basic pattern of the third-edition bibliography is described at the beginning of Sec. 1a. For reasons outlined in the first paragraph of Sec. 1b, it was believed neither practicable nor desirable to attempt exclusive use of the International System of Units in this edition of the Handbook. Section 1b outlines the background of SI Units, and presents a portion of a National Bureau of Standards bulletin on their interpretation.

Section 2

MECHANICS

R. BRUCE LINDSAY, Editor

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Editor, <i>Dr. R. Bruce Lindsay</i> , Brown University	
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Editor, <i>Dr. Richard K. Cook</i> , The National Bureau of Standards	
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HEAT 4
 Editor, *Dr. Mark W. Zemansky*, The City College of the City University of New York

Temperature scales, thermocouples, and resistance thermometers. Thermodynamic symbols, definitions, and equations. Critical constants. Compressibility. Heat capacities. Thermal expansion. Thermal conductivity. Thermodynamic properties of gases. Pressure-volume-temperature relationships of gases. Virial coefficients. Temperatures, pressures, and heats of transition, fusion, and vaporization. Vapor pressure. Heats of formation and heats of combustion.

ELECTRICITY AND MAGNETISM 5
 Editor, *Dr. D. F. Bleil*, U.S. Naval Ordnance Laboratory

Definitions, units, nomenclature, symbols, conversion tables. Formulas. Electrical standards. Properties of dielectrics. Electrical conductions in gases. Magnetic properties of materials. Electrochemical information. Electric and magnetic fields in the earth's environment. Lunar, planetary, solar, stellar, and galactic magnetic fields.

OPTICS 6
 Editor, *Dr. Bruce H. Billings*, Joint Commission on Rural Reconstruction, Taipei, Taiwan

Fundamental definitions, standards, and photometric units. Refractive index of special crystals and certain glasses. Transmission and absorption of special crystals and certain glasses. Geometrical optics and index of refraction of various optical glasses. Index of refraction for visible light of various solids, liquids, and gases. Optical characteristics of various uniaxial and biaxial crystals. Optical properties of metals. Reflection. Glass, polarizing, and interference filters. Colorimetry. Radiometry. Wavelengths for spectrographic calibration. Magneto-, electro-, and photoelastic optical constants. Nonlinear optical coefficients. Specific rotation. Radiation detection. Radio astronomy. Far infrared. Optical masers.

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ATOMIC AND MOLECULAR PHYSICS 7
Editor, *Dr. H. M. Crosswhite*, The Johns Hopkins University

The periodic system. The electronic structure of atoms. Energy-level diagrams of atoms. Persistent lines of the elements. Important atomic spectra. X-ray wavelengths and atomic energy levels. Constants of diatomic molecules. Constants of polyatomic molecules. Atomic transition probabilities.

NUCLEAR PHYSICS. 8
Editor, *Dr. J. B. Marion*, The University of Maryland

Nuclear constants and calibrations. Properties of nuclides. Atomic mass formulas. Passage of charged particles through matter. Gamma rays. Neutrons. Nuclear fission. Elementary particles and interactions. Health physics. Particle accelerators.

SOLID-STATE PHYSICS 9
Editor, *Dr. H. P. R. Frederikse*, The National Bureau of Standards

Crystallographic properties. Structure, melting point, density, and energy gap of simple inorganic compounds. Electronic properties of solids. Properties of metals. Properties of semiconductors. Properties of ionic crystals. Properties of superconductors. Color centers and dislocations. Luminescence. Work function and secondary emission.

Index follows Section 9.

Preface

The *American Institute of Physics Handbook* has won wide acceptance among scientists and engineers. It is just such a degree of acceptance that has stimulated the issuance of this revised and updated third edition. This edition, like the previous two, continues the philosophy of supplying authoritative reference material—including tables of data, graphs, and bibliographies—selected and described with a minimum of narration by leaders in physical methods for research.

Among the entirely new sections in this edition are those on nonlinear optics, calibration energies for alpha particles and gamma rays, nonlinear acoustics, atomic mass formulas, particle accelerator principles, atomic transition probabilities, electric and magnetic fields in the earth's environment, and far infrared. Examples of topics in which especially extensive revisions have been made are: optical masers, various optical constants, virial coefficients, heats of combustion and formation, and superconductors. A number of sections were completely rewritten; these include radioastronomy, radiometry, various crystal properties, molecular constants and phase transitions. The mathematics section now consists of a special treatment of SI units and a bibliography that has been revised to include references to new methods, algorithms, and computer programs.

Publication of this Handbook was a mammoth undertaking that required the contributions and cooperation of many individuals and two organizations. Leading the individuals is Dr. Dwight E. Gray, who served as coordinating editor for this 1972 edition, as he also did for the 1957 and 1963 editions. Dr. Gray, who is a master of the pen and is well grounded in physics, was able to coordinate successfully the efforts of the eight section editors and the some 125 contributors. He did this work while also serving as the Washington Representative of the American Institute of Physics. Through his Washington office he was able

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