to the electrical systems of Burma, he began to see what I meant.

Recently I read one of the journals and an article dealing with grounding, and one point stood out predominantly—230 volts 3-phase, 110 volts single-phase. This I understand is common practice in the States and that most of the home appliances are 110 volts.

Again your systems of distribution are different in the kilovolt ratios. We have here, and will have in the future, ratios of from 132 kv/66 kv/11 kv to 400 volts 3-phase and 230 volts for lighting. There is no 110-volt supply.

Grounding is more important for systems employing 230 or 400 volts because of the high potential to earth, and while it does not follow that a person may die from a 230-volt shock, and not from a 110-volt, yet the chances are far less. Again the conditions of an Asiatic country are so different from a Western one; humidity percentage is high, working and ambient temperature is higher than normal and the fact that many dwellings have earth or stone floors makes it essential that proper and efficient grounding is carried out.

To return to the Technical Institution —I spoke of the number of technical books; now I must also speak of the instruments and apparatus. In very few cases were the instruments or appliances fitted with 3-core flexible cables. In other words, no provision was made for grounding and one has only to look at any American or Continental publication to see illustrations of appliances in which this factor is ignored irrespective of the destination to which the appliance may go, or be used.

Again we have regulations and rules governing the grounding of equipment and no installation is passed if the earth resistance is higher than 2 ohms. One does not need to tell engineers that a bad ground is worse than no ground at all, and yet one so often comes across installations where the ground wire is carelessly wrapped around a pipe which may be the pipe from a water tank and not even a rising main or from a spike driven into the ground showing a test of 20 or more ohms. It is the fault point which is so often ignored and where the trouble really starts.

No one denies that the fundamental rules and laws are universal and may be included in any textbook but one does hope that there shall be a revision of such textbooks to meet the necessary conditions of the countries to which or in which they may be used. Though the principles may be the same, it is one thing to discuss a circuit breaker for 180 kv or switch-gear for voltages used in one country but a different one when discussing 132/66/11 kv. Protection devices, instrument transformers, and tripping devices coupled with the different manufacturers are points to be considered in writing or preparing books for the overseas scholar. Certainly protection of life and property must be treated as essential and vital.

J. A. HILL

(Senior electrical inspector, Union of Burma)

NEW BOOKS

The following new books are among those recently received at the Engineering Societies Library. Unless otherwise specified, books listed have been presented by the publishers. The Institute assumes no responsibility for statements made in the following summaries, information for which is taken from the prefaces of the books in question.

ANNUAL REVIEW OF NUCLEAR SCIENCE, 1957. Edited by J. G. Beckerley and others. Annual Reviews, Inc., Palo Alto, Calif, 1957. 496 pages, 6¼ by 9 inches, bound. $7. The present volume, 7th in the series, contains reviews of advances, and of the literature on 12 topics. Two of the papers, approximately one fourth of the volume, deal with meson physics; the remainder, with such topics as radiochemical separations by ion exchange, high level radiochemical processes, vertebrate radiobiology (lethal effects and pathology), the collective model of nuclei, scattering of high-energy electrons, and measurement of nuclear spins and static moments of radioactive isotopes.

ATOMIC POWER, AN APPRAISAL. Published by Pergamon Press, 122 E. 55th St., New York 22, N.Y., 1957. 151 pages, 5½ by 8¾ inches, bound. $3.50. Contents of this volume are based on an informal panel discussion held by the International Bank for Reconstruction and Development. The participants, all leading world figures in atomic energy development, present a picture of the present and future potentialities of nuclear power in economic terms and its probable impact upon individuals and nations. To provide an introductory framework, the volume begins with a series of chapters devoted to the atom, atomic energy, radioisotopes, and related subjects.

AUTOMATION IN PRACTICE. By S. E. Rusinoff. American Technical Society, 848 E. 58th St., Chicago 37, Ill, 1957. 261 pages, 5¾ by 8½ inches, bound. $6.50. The treatment in this integrated survey is primarily in terms of particular processes rather than particular industries or products. Basic principles are discussed first: self-regulation, negative feedback, the theory of closed loop control systems, and other aspects. These principles are then given concrete application in the major types of control devices employed in the automated and semi-automated plant with emphasis on metal production.

EDUCATION FOR PLANNING: CITY, STATE, AND REGIONAL. By H. S. Perloff. The Johns Hopkins Press, Homewood, Baltimore 18, Md., 1957. 189 pages, 5¾ by 8½ inches, bound. $3.50. With rapid urbanization, the spread of industry, and pressures on water, land, and energy resources in various parts of the country there has come about an increased need for formal planning activities. The question of what constitutes an appropriate basis for the education of city and regional planners is raised in this book and an attempt is made at some tentative answers. The three essays included with these topics and, in addition, review University of Chicago experiments in these areas.

ELECTRICAL CONSTRUCTION COST MANUAL. By R. E. Johnson. McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York 36, N.Y., 1957. 431 pages, 6½ by 9½ inches, bound. $10. To reduce time necessary to prepare cost estimates for electrical installations, the author proposes a complete system built around the concept of unit assemblies. He establishes fundamental methods for installing electrical work in various types of construction, develops standard assemblies, sets up unit costs covering the material and labor for each assembly, and gives a detailed estimating procedure for applying the unit costs. A coding system is devised to simplify the application of this concept.

ELECTROMAGNETISM AND RELATIVITY. By E. G. Cullwick. Longmans Green and Co., 55 Fifth Ave., New York 3, N.Y., 1957. 299 pages, 5¾ by 8¾ inches, bound. $12.50. A book for advanced students dealing with various aspects of electromagnetism which have received little attention in existing texts; for example: the electrical effect of a rotating cylindrical magnet, if a conductor, and if a dielectric; the calculation of a second order emf in a moving circuit; magnetohydrodynamic waves; the laws governing the induction of currents in superconductors; etc. In the last chapters, the author proposes a new fundamental law concerning magnetic energy that corrects a well-known disharmony between accepted theory and the experimental verification of electron inertia in current circuits.

ELECTRONIC DESIGNERS' HANDBOOK. By R. W. Landee, D. C. Davis, and A. P. Albrecht. McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York 36, N.Y., 1957. Various paging, 6 by 9¼ inches, bound. $16.50. Design data and fundamental information on electronics is presented in this handbook with somewhat more than usual attention to theoretical explanations, which are supplemented by design examples. Areas covered include vacuum tube fundamentals, computer and servomechanism techniques, and waveform and network analysis. In addition, attention is given to such rapidly developing fields as transistor fundamentals and circuit design, design of stabilized d-c amplifiers, and advanced regulated power supply design. There is an unusually thorough section devoted to receivers.

ELECTROSTATICS IN THE PETROLEUM INDUSTRY. Edited by A. Klinkenberg and J. L. Van Der Minne. Elsevier Publishing Company, Amsterdam, Holland, 1958, distributed by D. Van Nostrand Company, Inc., 120 Alexander St., Princeton, N.J. 191 pages, 8½ by 12 inches, bound. $7. Static electricity is a recognized hazard in the petroleum industry. This book discusses the ways in which static electricity is produced, explains the causes of explosions and fires, and describes the methods and results of research on the subject. Preventive methods are indicated; in particular, the use of antistatic additives.

ELEMENTS OF MAGNETIC TAPE RECORDING. By N. M. Haynes. Prentice-Hall, Inc., Englewood Cliffs, N.J., 1957. 392 pages, 6¼ by 9¼ inches, bound. $7.95. A comprehensive treatment of the subject. Part 1 begins with the theory of magnetism and electroacoustic fundamentals. Part 2 covers the recording, playback, and erasing processes, tape editing; and single, dual, and multitrack recording. Part 3 describes the apparatus, including basic maintenance and repair. Part 4 provides a systematic review of the circuits involved, arranged functionally, with full explanations and diagrams.

ENGINEERING PRECISION MEASUREMENTS. By A. W. Judge. Chapman & Hall. Ltd., London, England, fourth edition, 1957. 447 pages, 5½ by 8¾ inches, bound. 65s. This book provides a general survey of the more important methods of precision measurements employed in engineering workshops, and describes in detail some of the more widely used ones from the viewpoint of the user in the gauge room, inspection department, toolroom, and machine shop. For some cases, the principles upon which the instrument is based are given, and typical examples are described. New chapters in this edition cover slip gauges, surface finish, straightness and flatness measurements, interferometive methods, and advances in automatic gauging and work sizing.

GRAIN BOUNDARIES IN METALS. By D. McLean. Oxford University Press, 114 Fifth Ave., New York 11, N.Y., 1957. 346 pages, 5¾ by 8¾ inches, bound. $8. A study of grain boundaries in metals that attempts to correlate and classify the basic problems involved. It includes a great deal of numerical data useful in approaching the subject. Starting with theories about the structure of grain boundaries and their influence on microstructure, diffusion, fracture and behavior during plastic deformation, the book then continues with energies of grain boundaries, migration of boundaries, and special features of low angle boundaries.

A GUIDE TO GRADUATE STUDY. Edited by F. W. Ness. Association of American Colleges, Washington, D.C., 1957; distributed by the American Council on Education, 1785 Mas-

sachusetts Ave., N.W., Washington 6, D.C. 335 pages, 7 by 10¼ inches, bound. $5. A survey of facilities including schools of engineering, available to the person interested in securing a doctorate. Preliminary material touches on various aspects of graduate study such as choice of vocation, selection of graduate school, and costs. The main portion of the volume consists of a directory of graduate schools and pertinent information on admission requirements, fees, tests and averages, financial assistance, fields of study, and faculty and enrollment. The subject index includes entries under all branches of engineering.

HANDBOOK FOR WELDING DESIGN, VOLUME I. Edited by C. R. Harman. Published for the Institute of Welding by Sir Isaac Pitman & Sons, Ltd., London, England, 1956. 305 pages, 5½ by 8¾ inches, bound. 45s. A handbook devoted to the design of products fabricated in mild or low-alloy steels by the metal-arc welding process. Wherever possible, this information is based on the relevant British standards or other recognized equivalent. The first volume is intended to provide the designer of a welded assembly with the data necessary to design a product both economical and of standard quality. Included are choice of materials, properties of sections, classification of electrodes, types of welded joints, design of welds, typical assemblies, and welding costs.

HANDBOOK OF ELECTRONIC MEASUREMENTS. Edited by Moe Wind. Published by the Polytechnic Institute of Brooklyn, 1956; distributed by Interscience Publishers, 250 Fifth Ave., New York 1, N.Y. 2 vols., 8½ by 11¼ inches, bound. $15. This handbook presents a compilation of measurement methods, categorized according to frequency, from d-c to the microwave region. Complete descriptions and illustrations of necessary equipment are given, and orders of accuracy and physical magnitudes are indicated. The measurement of fundamental parameters is presented first: voltage and current, power, impedance, frequency, time interval, phase and field intensity. Subsequent chapters deal with specific techniques for the measurement of the characteristics of electronic devices: gain, bandwidth, noise figure, transient response, distortion, waveform, stability, modulation, spectrum analysis, and attenuation.

IDEAS, INVENTIONS, AND PATENTS. By R. A. Buckles. John Wiley and Sons, Inc., 440 Fourth Ave., New York 3, N.Y., 1957. 270 pages, 6 by 9¼ in., bound. $5.95. The fundamental principles and philosophy of patent and trademark protection are presented with a view to providing more effective protection and exploitation of ideas and inventions. It is primarily directed at the engineer and scientists engaged in research and development activities. The author discusses the principles underlying patents in all fields of technology and then gives specific applications in each area. There is a complete case history of a simple invention providing a guide for readers who have had no previous experience with the Patent Office or with patent attorneys.

INDUSTRIAL ELECTRONICS CIRCUITS. By R. Kretzmann. Philosophical Library, 15 E. 40th St., New York 16, N.Y., 1957. 192 pages, 6 by 9 inches, bound. $10. Typical examples of the circuitry of industrial electronic apparatus are described in the following areas: photoelectric control devices, counting circuits for various purposes, stabilizing circuits, switching and control circuits, amplifiers and oscillators, rectifying circuits and motor controls. Functions of the various circuit elements are described along with detailed information on actual component values. The present volume is a sequel to the "Industrial Electronics Handbook" by the same author.

INFORMATION SYSTEMS IN DOCUMENTATION. Advances in Documentation and Library Science. Volume 2. Edited by J. H. Shera and others. Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N.Y., 1957. 639 pages, 6 by 9¼ inches, bound. $12. This is a useful compilation of symposium papers covering most of the major systems of information retrieval now in use, and in many instances these systems are represented by case histories and specific applications which may be extended and adapted to other uses. The papers are divided into six major divisions: fundamentals in systems design, documentation problems in specialized fields, semiautomatic systems, systems using accounting or statistical machines, systems using computers or computer-like devices, co-operative information processing.

DER KONTAKTUMFORMER. By Erich Rolf. Springer Verlag, Berlin, Germany, 1957. 549 pages, 6¾ by 10 inches, bound. DM $67.50. The Electrical and magnetic aspects of the mechanical rectifier are treated in detail, covering principles, characteristics, and operation. Specific topics dealt with are switching, voltage regulation, shunts and base loads, short circuits and protection, losses and efficiency, installation, and testing. Calculations are fully explained with numerical examples, and a considerable bibliography is provided.

PRINCIPLES OF ELECTRICAL MEASUREMENTS. By H. Buckingham and E. M. Price. Philosophical Library Inc., 15 E. 40th St., New York 16, N.Y., 1957. 600 pages, 5¾ by 8¾ inches, bound. $15. Beginning with standard deflectional instruments, this comprehensive work continues with sections on potentiometer and bridge methods, instrument transformers, integrating meters, and power system measurements. In the electronic field appear methods using thermionic tubes, resonance and heterodyne methods, and the cathode-ray oscillograph. Space is also given to magnetic measurements, to measurement of some nonelectrical quantities, and to systems, dimensions, and standards. Both theory and practice are covered.

PROCESS INSTRUMENTS AND CONTROLS HANDBOOK. Edited by D. M. Considine. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N.Y., 1957. Various pagings, 6¼ by 9¼ inches, bound. $19.50. A thorough and systematic treatment of the operating and design fundamentals of measurement and automatic control systems used in the process fields. Although specifically slanted toward the process industries, the fundamental techniques described are applicable to nonprocess fields such as medical, military, and aircraft instrumentation. Among areas covered are measurement standards, primary elements, measurement systems, indicators and recorders, automatic controllers, electric and pneumatic telemetering, fundamental principles of process control, and mathematical techniques for solving automatic control problems.

PUBLIC ADDRESS AND SOUND DISTRIBUTION HANDBOOK. Edited by A. J. Walker. George Newnes, Ltd., London, England, 1956; Transatlantic Arts Inc., Hollywood, Fla. 160 pages, 5½ by 8¾ inches, bound. $5. A practical guide to the planning, installation, and maintenance of electronic sound amplification equipment. Beginning with the theory of the amplifying tube and the factors which govern the power output of an amplifier, the author proceeds logically through amplifier circuits, microphones, loudspeaker equipment, etc., to detailed planning of sound systems, long-distance telephonic relays, and a variety of typical installations, including sterophonic sound.

RADIATION EFFECTS IN SOLIDS. By G. J. Dienes and G. H. Vineyard. Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N.Y., 1957. 226 pages 6¼ by 9¼ inches, bound. $6.50. The study of radiation effects in solids, particularly metals, is currently being extensively pursued. The authors here survey the present state of knowledge dealing, however, mainly with the physics of the subject, and considering only x-ray energies and higher. A fundamental treatment, the book discusses the interaction of radiation with matter, reviews basic experiments, describes the nature, properties, and annealing (diffusion) of the defects, and various special topics.

SAFETY ASPECTS OF NUCLEAR REACTORS. Edited by C. R. McCullough. D. Van Nostrand Company, Inc., 120 Alexander St., Princeton, N.J., 1957. 237 pages 6 by 9¼ inches, bound. $8.50. Composed of key papers from the Geneva Conference on the Peaceful Uses of Atomic Energy, the material has been carefully selected, edited, and grouped under the following headings: normal reactor and chemical plant operation, development of radiation safety criteria, reactor accidents and their consequences, supercritical reactor experience. Because little has been available on the subject, this is a useful contribution in an area that will assume more importance as the power reactor program is developed.

SOLID-STATE PHYSICAL ELECTRONICS. By Aldert van der Ziel. Prentice-Hall, Inc., Englewood Cliffs, N.J., 1957. 604 pages, 5¾ by 8¾ inches, bound. $13. This volume presents a comprehensive introduction to the physics of solid-state devices now being used or developed in the electronics industry. The operation of metal-semiconductor diodes, p-n junction diodes, transistors, piezoelectric and ferromagnetic devices, etc., is presented in terms of the physical phenomena which make them possible. Little emphasis is placed on circuitry except where required to clarify the operation of the solid-state device.

SOVIET EDUCATION FOR SCIENCE AND TECHNOLOGY. By A. G. Korol. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N.Y., 1957. 513 pages, 6 by 9¼ inches, bound. $8.50. A general outline of the educational system of the Soviet Union from elementary through graduate school. A considerable portion of the book is devoted to the Technicum and other specialized schools which train students for work at the subprofessional level, and there is an extensive study of Soviet undergraduate higher education, with curricula in physics and a typical major in mechanical engineering shown in detail. The author's conclusions are at variance with some of the accepted generalizations concerning Soviet education.

TECHNICAL LITERATURE

The following recently issued technical literature may be of interest to readers of *Electrical Engineering*. All inquiries should be addressed to the issuers.

HOW TO READ SCHEMATIC DIAGRAMS. This 160-page book by David Mark is intended for elementary and high school students becoming interested in electronics, experimenters, hobbyists, beginning technicians, and industrial upgrading programs designed to acquaint personnel with electronic symbols and diagrams. The book presupposes no prior knowledge of electricity or electronics. It explains the basic theory appropriate to the subject, symbolism, technical notations, and organization of schematics in pictorial diagrammatic form. The reader is carried through the text on a progressive basis, being taught how to recognize symbolized as well as pictorial and schematic representations of electronic components. Standard Institute of Radio Engineers and industry accepted symbols are used throughout. Items such as batteries, lamps, switches, relays, fuses, transformers, capacitors, motors, generators and resistor vacuum tubes, metallic rectifiers, and a host of other electronic components are explained. Available from John F. Rider Publisher, Inc., 116 W. 14th St., New York 11, N. Y., price $3.50.

HUMAN RELATIONS IN INDUSTRIAL RESEARCH MANAGEMENT. Edited by R. T. Livingston and S. H. Milberg. Based primarily on the proceedings of the Sixth and Seventh Annual Industrial Research Conferences, this volume brings together—with integrating introductions—27 papers on the human aspects of organized research. Among other things, the papers analyze the nature of research management jobs, the role of the manager, and the individual, social and cultural factors that affect the processes of organization and management in industrial research. In Part I, the papers explore the basic concept of a job in an attempt to see the jobs of research organizations from all sides. In Part II, they examine the elemental system of man and job in industrial research, and they describe the expectations of the organization. In Part III, they consider the social properties of research groups, and they analyze the job of managing in research. In Part IV—together with the transcript of a