

ionic crystals and formidably detailed pages of references to original papers. Included are compact sections on dislocations in crystals and on luminescence effects. There is indeed a great deal in this new section.

The book concludes with a 60-page index in which are perhaps some 6,000 items.

The only real weaknesses in the volume are connected with indexing and with accessibility of information included. One can indeed criticize several items. The indexing is woefully inadequate. For example, optical data of value are given in a table for 230 crystalline minerals, yet not a single one of the names of these minerals appears in the index, neither obscure minerals nor common minerals. One might have hoped, as just one example, to find the name mica, or at least muscovite, somewhere in the index of a reference hand-book, but this is only one of hundreds of items, possibly thousands, which are missing. Then again some real search difficulties arise through curious tabulation even of those very items just mentioned, for the minerals are arranged in order of increasing refractive index and not alphabetically. This is a pure absurdity, in that it presupposes that a searcher already knows the refractive index of a mineral fairly closely when indeed he is seeking its value. Not to have an alphabetical list of the minerals is an unforgivable oversight. In any event, the separation of minerals into different tables for biaxials and uniaxials is no help, since this also implies previous knowledge of the optical character when beginning a search; no doubt a simple matter for a distinguished mineralogist, but certainly bewildering to a young research physicist.

It is a matter for considerable regret that so magnificent a compilation of data should be marred by problems of accessibility. The index should certainly be very greatly expanded in any future editions, which I very much hope will appear in due course. As one has now come to expect from McGraw-Hill, the production of the volume is first rate both as regards format and typescript, diagrams and binding: and the cost is by no means unduly high when account is taken of the formidable mass of content. The initiative for the production of this valuable hand-book came from the American Institute of Physics, and the editor, D. E. Gray, is to be congratulated on a production which reflects a worthy sense of co-operation and team spirit. This volume should be acquired by every physics laboratory whether devoted to research, to development or to teaching.

S. TOLANSKY

AUTOMATIC CONTROL

Servomechanisms

By L. A. Stockdale. Pp. viii+295. (London: Sir Isaac Pitman and Sons, Ltd., 1962.) 35s. net.

Progress in Control Engineering

Vol. 1. Edited by R. H. Macmillan, T. J. Higgins and P. Naslin. Pp. viii+260. (London: Heywood and Co., Ltd., 1962.) 63s. net.

OF the many volumes that have appeared in the field of automatic control in recent years few have been written as, or been suitable for, student text-books. The appearance of *Servomechanisms* helps to redress the balance in this respect, having been written specifically for technical college and university students by a practising teacher in the field.

After a short introductory and non-mathematical chapter on the principles of control, three chapters are devoted to system 'hardware', including error detectors, motors and amplifiers. System analysis commences at Chapter 5 with the Laplace method applied to second-order systems, followed by an early introduction to transfer functions. These are used in the subsequent treatment of damping, phase-advance and integral compensation, and the effects of feedback and feedforward. A chapter

entitled "Transfer Function Analysis" includes the algebraic stability criteria and a brief mention of the root-locus method, making the valid point that computers and simulators are probably of greater value in designing for satisfactory response.

Two chapters dealing with harmonic response and one describing the log-modulus method include analysis of the effect of phase advance and retarding circuits and a description of test equipment for these methods. Three final chapters introduce the describing function and phase-plane methods for non-linear systems, and sampled-data systems.

The content and arrangement of this book, which includes numerous examples at the end of each chapter, seem ideally suited for its purpose and deserve that it be widely used.

Progress in Control Engineering is the first of a series of reviews of various aspects of the subject, similar to the reviews already appearing in several other fields. Of the eight subjects treated four deal with general analytical methods while the others are concerned with more specialized topics. In the first category are statistical methods (M. J. Polegrin), operational and transform techniques (B. M. Brown), time-lag systems (N. H. Chosky), and frequency response techniques applied to non-linear systems (P. E. W. Gronsted). Of the more specialized topics are "The Governing of Diesel Engines" (D. B. Welbourn), "The Human Operator in Control Instrumentation" (T. B. Shoridan), "Automatic Control by Pneumatics" (R. Molle and J. Rasquinet), and a contribution on the place of digital computers in control (M. V. Wilkos).

Each subject is developed from a point which demands very little in the way of specialized previous knowledge, and aims to bring the reader to the stage where he can "understand and appreciate both present-day work in the field and the lines along which future developments are to be expected". In the main the contributions achieve this objective, and this volume could well be the first of an interesting series.

E. M. DEELEY

CERAMICS AND THE 'HEAT BARRIER'

Special Ceramics 1962

Proceedings of a Symposium held by the British Ceramic Research Association. Edited by P. Popper. Pp. xiii+482. (London: Academic Press, Inc. (London), Ltd.; New York: Academic Press, Inc., 1963. Published for the British Ceramic Research Association.) 105s.

QUOTING from the cover to this volume: "With the rise of new technologies and the quest for higher operating efficiencies at ever higher temperatures, the engineer looks to the ceramist to supply new, high-performance materials where metals or traditional ceramics fall short". This collection of papers, like its predecessor, *Special Ceramics*, published some three years ago, includes a number by authors of international repute. There are 25 papers in all, an increase of 20 per cent compared with the previous volume, and there was also a similar increase in the attendance at the symposium, reflecting the growing interest in these new and challenging fields.

The topics fall broadly into the following groups: preparation and properties of refractory non-oxides and of beryllium oxide; pyrolytic deposits; measurements; techniques; applications. The materials covered are mostly non-oxides, but a few oxides, in particular those of beryllium, aluminium and titanium, are included. Measurements include rapid methods of determining thermal expansion and thermal conductivity. Among the techniques are powder compaction, reaction sintering, hot pressing, as well as pyrolysis. Applications include high-temperature nuclear fuels, moderators, etc., parts for rocket motors, protective coatings for refractories, oriented