

Industrial Reference Cells



295

MUIRHEAD

SPECIFICATION

E.M.F.	1.0193 volts absolute, Subject to manufacturing tolerance not exceeding 0.0004V (unmounted); and 0.0002V (mounted)
Temperature coefficient	Does not exceed $5 \mu\text{V}/^\circ\text{C}$ over the range $10^\circ - 40^\circ\text{C}$
Internal resistance at 25°C	Average 800 ohms maximum 1200 ohms
Temperature hysteresis	Negligible over normal operating range of temperature

MUIRHEAD INSTRUMENTS INC. • 677 Fifth Ave. • New York 22 • N.Y. • U.S.A.
MUIRHEAD INSTRUMENTS LIMITED • STRATFORD • ONTARIO • CANADA
MUIRHEAD & CO. LIMITED • BECKENHAM • KENT • ENGLAND



Send for the
most widely used
Electronic Supply Guide

free! on request
**ALLIED'S
404-PAGE
1958 CATALOG**

Save time, effort and money—send your orders to ALLIED—the dependable, complete source for all your Electronic Supply needs. We make fast shipment from the world's largest stocks of:

- Special Purpose Electron Tubes & Transistors
- Lab Test and Measurement Instruments
- Audio Amplifiers and Associated Equipment
- Electronic Parts and Components of All Types

Let our experts fill *all* your Electronic Supply needs. Send today for your **FREE** copy of the 1958 ALLIED Catalog—the complete, up-to-date Buying Guide to *everything* in Electronics.

ALLIED RADIO

100 N. Western Ave., Dept. 62-K7
Chicago 80, Illinois

tor of specific design, the *AIP Handbook* has included a listing of the "locations and principal characteristics of operational machines throughout the world". Although the latter information may require revision and extension at regular intervals, it is beyond a doubt that the *AIP Handbook* will be of great service to the scientific community throughout the world as a source of scientific information.

Discovery of the Universe: An Outline of the History of Astronomy from the Origins to 1956. By Gérard de Vaucouleurs. 328 pp. The Macmillan Co., New York, 1957. \$6.00. Reviewed by C. C. Kiess, National Bureau of Standards.

It is only four centuries since the Ptolemaic universe, circumscribed by man's unaided vision and supported by hierarchical authority, began to give way to the ideas of Copernicus and Galileo. In this brief historical period the fixed, immobile Earth of the ancients, surrounded by the spheres of the planets and stars, all immersed in the boundless empyrean, has taken its proper place in a solar system, itself a minor member of a galactic system which, in turn, is but one among tens of thousands of similar systems. This vaster portrayal of the universe has reached its present state through the contributions of many scientists, some of them professionals, many of them amateurs, but all of them imbued with the desire to develop new aids to vision and understanding, and to use them to add new features to the picture.

The step-by-step story of how observation and analysis have united in developing this picture is the subject matter of this book. The first chapter acquaints the reader with the Ptolemaic universe. The following eight chapters cover the astronomical discoveries from the dawn of the 17th century to the present. For convenience this epoch is divided into eight eras of successively decreasing duration, but each of increasing productivity. Each era is characterized by a typical class of discoveries, beginning with the overthrow of the geocentric hypothesis and ending with the penetration of outer space by electronic techniques. Each new discovery, whether a new aid or method of observation, or a new insight into the sidereal system, is described and ascribed to its discoverer. Few if any biographical notes concerning these discoverers are given; rather, it is the impact of their discoveries on contemporary thought that is emphasized.

This book is a translation from, and an enlargement of, the French edition, which appeared in 1951 under a different title. In style and diction it apparently has lost very little in the process of translation. A set of twenty halftone plates of astronomical objects is distributed between chapters, thus giving the reader a better idea of what visual observers see only imperfectly through their telescopes. Accompanying each plate is an ample legend explaining its significance. Diagrams in clarification of the text are given where needed. Only a few typographical errors were noted; and the interchange in relationship between a well-known father-and-son team

PURE AND APPLIED PHYSICS
A SERIES OF MONOGRAPHS AND TEXTBOOKS
Consulting Editor: H. S. W. MASSEY, University College, London

VOLUME 1

Electron Impact Phenomena and the Properties of Gaseous Ions

By F. H. FIELD and J. L. FRANKLIN
Humble Oil and Refining Company, Baytown, Texas

September 1957, 349 pp., 45 tables, illus., \$8.50

This initial volume of an important new series discusses low energy electron impact phenomena and mass spectrometry from the viewpoint of chemical physics and molecular theory. Experimental techniques of measuring critical potentials are considered in some detail.

A significant aspect of the book is the exhaustive tabulation of data on critical potentials, ion energetics, bond strengths, and reactions of gaseous ions.

This timely volume delineates the rapidly growing field of low energy electron impact phenomena and should prove of value to anyone interested in the energetics and properties of ions, mass spectrometry, ionic or free radical reactions, or the chemical effects of radiation.

CONTENTS: Introduction. Apparatus and Methods. Theoretical. Energetic Considerations. Mass Spectral Considerations. Implications for Chemical Reactions. Appendix: Compilation of Critical Potential Values. Part I. Positive Ions. Part II. Negative Ions. References. Author Index—Subject Index.



ACADEMIC PRESS INC., Publishers

111 Fifth Avenue, New York 3, New York

PHYSICAL CHEMIST

Ph.D. level in physical chemistry or Solid State Physics. To direct a program of basic research on Semiconductor surface problems.

PHYSICIST

M.S. in Solid State Physics or Physical Chemistry with experience in semiconductor devices. For development programs on transistors.

RESEARCH PHYSICIST

Ph.D. in Solid State Physics or Metallurgy. To set up and administer a program in Crystal growing techniques.

Above assignments are Senior Technical Staff positions in the Semiconductor Division's Research Laboratory in suburban Los Angeles. Liberal benefits include relocation allowances. Direct inquiries to Dr. D. M. Van Winkle, Manager Semiconductor Laboratory.

Creating a
new world
with
ELECTRONICS

HUGHES PRODUCTS

INTERNATIONAL AIRPORT STATION, LOS ANGELES 45, CALIF.

Pressures to 30,000 atmospheres

in a chamber $\frac{1}{2}$ " diameter by 10" high
are available with the Nucor Parabar.

This new, standard research tool provides an environment in which to determine the electrical resistance, reduction in area at tensile fracture, and other physical properties of solids at pressures to 30,000 kg./cm.² (approximately 450,000 p.s.i.)—and selected properties of liquids in the same pressure range. It's compact, easy to use, and available on early delivery.

Illustrated bulletin gives details. May we send you a copy?

NUCOR RESEARCH, INC.

Subsidiary of Nuclear Corporation of America

2421 WOLCOTT — FERNDAL 20, MICHIGAN

Opportunities for varied and creative work in nuclear physics, electronics, and operations research.

Small informal organization administered by scientists, where

PHYSICISTS MATHEMATICIANS ASTROPHYSICISTS

scientific excellence, energy and creative ability are encouraged

and rewarded.

Possibility of part time arrangements in New York City while studying.

Please write or call

G. C. DEWEY & CO., INC.
19 W. 44th St., N.Y.C. — MU 2-7369

PHYSICISTS ALLIS-CHALMERS RESEARCH LABORATORIES

Ph.D. or M.S. scientists for theoretical and applied experimental research. Programs include the release or control of nuclear (fission, fusion) or electrical energy; the structure of matter and its properties, including solid state, magnetism, semiconductors, dielectrics; and the action of electric, magnetic, electromagnetic, thermal and mechanical energy on matter. All the above research on civilian projects.

For further details write to:

M. C. Rohm
Employment Section
ALLIS-CHALMERS MFG. CO.
Milwaukee 1, Wisconsin

of astronomers will cause no dismay either to them or to the knowing reader. This is a splendid book for the general reader and also the specialist, and in the author's words portrays "the slow strengthening of Man's intellectual grasp on the Universe in which he lives, the philosophical implications of the main discoveries".

Acoustical Engineering. By Harry F. Olson. 718 pp. D. Van Nostrand Co., Inc., Princeton, N. J., 1957. \$13.50. *Reviewed by Robert T. Beyer, Brown University.*

To review an edition of any book of higher order than the first presents its special problems, especially when the book has been altered mainly by the addition of sections of new material, rather than by a complete revision. All the good points have already been praised, and the bad points have been damned, and the reviewer is tempted to limit his comments to the additional material, rather than to the work as a whole.

While the present volume does not bear the caption of a third edition, it is in fact, as pointed out by the author in the preface, the expanded follow-up of *Elements of Acoustical Engineering* which Dr. Olson published in 1940 and 1947, and which has been a standard work on the subject since it first appeared.

The contributions of Dr. Olson to the field of acoustical engineering have given him a vantage point from which to survey the field, and that he has done. However, the area of his contributions is also reflected in the choice of subject matter. One half the book is devoted to microphones, loudspeakers, and other airborne transducers, and to testing procedures involving them. In this field, the wealth of subject matter, sectional views of instruments, graphs, and equivalent circuits, make the book an invaluable tool.

The same is true for the sections on sound recording and reproduction, and on the use of dynamical analogies.

On the other hand, the amount of material on the ever-growing field of noise and noise control is very slight, while the chapter devoted to ultrasonics is little more than a list of ultrasonic engineering topics with nearly 100 references to bolster the section.

So far as the third edition is concerned, there is some new material in virtually every chapter, but the chief additions have been in the chapters on loudspeakers, microphones, and sound reproducing systems.

To the extent that acoustical engineering is a study of sound reproducing systems in air, with all the associated problems, this book is a complete text of acoustical engineering.

Theories of Nuclear Moments. By R. J. Blin-Stoyle. 89 pp. Oxford U. Press, New York, 1957. Paperbound \$1.40. *Reviewed by M. E. Rose, Oak Ridge National Laboratory.*

With the exception of minor additions this book is identical with the very fine *Reviews of Modern Physics* article on nuclear moments by the author which ap-