

LABORATORY Temperature Controller



Model 5301-E

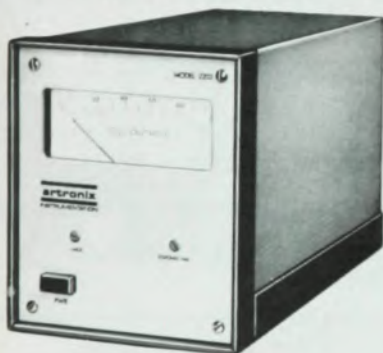
With an input circuitry designed to accept resistance or voltage generating temperature sensors such as GaS-diodes, thermocouples, Ge & Pt Sensors, Carbon Resistors and Thermistors. The 5301-E, three mode controller offers temperature regulation to better than 0.01°K (or $^{\circ}\text{C}$) in Vacuum chambers, Cryogenic dewars, Optical ovens, Tensile strength test apparatus, etc. for physics, metallurgy, chemistry and other scientific fields where the control and temperature range requirements are broad or change frequently. Set point readout is either directly in mV or Ohms (4-terminal measurement), with unlimited temperature range. Proportional, rate and reset modes are all internally adjustable, allowing to tune the controller to the thermal time constants of the process. 100 Watts, DC output or up to 5KW with Model 2202.

artronix

INSTRUMENTATION

716 Hanley Industrial Court, St. Louis, Mo. 63144
Area Code 314 Phone 644-2456

POWER MODULE



Model 2202

To regulate an AC-line connected load by means of a small DC signal from an automatic control instrument. It supplies large amounts of power for control of resistive heaters, thermo-electric elements, light sources, etc. in temperature controlled ovens, vacuum deposition equipment, infrared heat sources, temperature baths and other applications. The instrument features a pulse-width-modulated zero crossing - fires TRIAC circuit to minimize RF interference, electronic protection against current overloads and voltage transient, and provides linear control to a AC power line up to 25 Amp. (110 V or 220 V).

artronix

INSTRUMENTATION

716 Hanley Industrial Court, St. Louis, Mo. 63144
Area Code Phone 644-2456

Circle No. 40 on Reader Service Card

ic coercivity (H_c). For any particular geometry H_c must be large enough to resist demagnetizing effects. In general, for larger H_c more flexibility is available in magnet geometry.

Two methods that enhance H_c are described—one involving the presence of internal stress caused by a second phase and the other including the additional effect of fine particles. In either case domain-wall movement is impeded and coercivity increased. Rare-earth compounds clearly have much larger H_c than Alnico, but their remanent induction is somewhat smaller. Rare earth materials can have $(BH)_m$ values higher than 20×10^6 gauss oersteds.

In general, to produce a given field by a permanent magnet the higher the energy product the smaller the magnet can be. As an example the authors point out that two one-inch diameter cast buttons one-half inch thick of a mixed $(\text{Co,Fe,Cu})_5\text{Ce}$ intermetallic compound can be arranged to give fields of 2000 to 4000 gauss between the flat parts of the buttons in a gap of one-half to one-quarter of an inch. In contrast, for most other materials a horseshoe type magnet of much larger volume would be required.

Although the book is of a specialized nature it should be examined by those doing fundamental research in magnetism. Many interesting problems present themselves. Why do the rare-earth-iron compounds have much lower Curie temperatures than the corresponding cobalt compounds? Does high conduction electron polarization exist in some of these materials? What type of exchange interactions are most suitable in describing rare-earth-cobalt compounds? I believe this well written book should be of interest not only to those personally involved with permanent-magnet problems, but to those engaged in other aspects of magnetic-materials research as well.

T. R. McGUIRE

IBM Watson Research Center
Yorktown Heights, N.Y.

new books

Elementary Particles and Fields

Strongly Interacting Particles. R. L. Setti, T. Lasinski. 322 pp. Univ. of Chicago Press, Chicago, Ill., 1973. \$7.95 hardcover, \$3.95 paperback

Atoms and Molecules

An Introduction to the Theory of Atomic Spectra. I. I. Sobel'man. 609 pp. Pergamon, New York, 1973. \$40.00

*Via Air Mail
Per Avion
mit Luftpost
ABUA*

OVERSEAS SUBSCRIBERS:

please,

if at all possible,

use airmail

when returning the

PHYSICS TODAY

Reader Service

Cards; surface

mail reaches our

advertisers only

after long delays.

Optics

Modulation Spectroscopy. (Conf. Proc. 1st International Conf. on Modulation Spectroscopy, Tucson, Arizona, 22-26 November 1972). B. O. Seraphin, Ed. 1031 pp. North-Holland, Amsterdam, 1973. \$87.70

Quantum Electronics and Lasers

Physical Processes in Lasers. D. V. Skobel'tsyn. 181 pp. Consultants Bureau, New York, 1973. \$29.50

Fluids and Plasmas

Lectures in Fluid Mechanics. M. Shinbrot. 222 pp. Gordon and Breach, New York, 1973. \$14.25

Electricity and Magnetism

Elementary Electromagnetic Theory Vol. 3: Maxwell's Equations and Their Consequences. B. H. Chirgwin, C. Plumpton, C. W. Kilmister. 161 pp. Pergamon, New York, 1973. \$9.75 hardcover, \$6.00 paperback

Macroscopic Electromagnetism. F. N. H. Robinson. 246 pp. Pergamon, New York, 1973. \$18.00

Materials Science

Catalysis. (Proc. 5th Int. Cong. on Catalysis, Miami Beach, Fla., 20-26 August 1972). J. H. Hightower, ed. 1483 pp. Elsevier, New York, 1973. \$79.00

The Crystal Structure of Solids. P. J. Brown, J. B. Forsyth. 172 pp. Crane, Russak, New York, 1973. \$15.50 hardcover, \$6.95 paperback

Encyclopedia of Physics, Vol. VIa/3: Mechanics of Solids III. C. Truesdell, ed. 647 pp. Springer-Verlag, New York, 1973. \$104.40

The Fermi Surface. A. P. Cracknell, K. C. Wong. 565 pp. Oxford, U. P., New York, 1973. \$48.00

Growth of Crystals from Liquids. J. C. Brice. 379 pp. Elsevier, New York, 1973. \$31.00

Infra-red Studies of Crystal Defects. R. C. Newman. 187 pp. Barnes and Noble, New York, 1973. \$12.00

Photochemical Processes in Polymer Chemistry. (Plenary and main lectures presented at the Int. Symp., Leuven, Belgium, 12-15 June 1972.) F. C. De Schryver, G. Smets, eds. 352 pp. Crane, Russak, New York, 1973. \$16.20

Physical Metallurgy, Techniques and Applications, Vol 2. K. W. Andrews, 347 pp. Halsted, New York, 1973. \$24.00

The Physics and Technology of Semiconductor Light Emitters and Detectors, (Conf. Proc. Int. Symp., Pugnochiuso, Italy, 4-10 September 1972). A. Frova, ed. 571 pp. North-Holland, Amsterdam, 1973. \$49.10

Proceedings of the 11th Int. Conf. on the Physics of Semiconductors, Warsaw, 25-29 July 1972. 1513 pp. Elsevier, New York, 1973. \$72.00

Solid State Chemistry and Physics, An Introduction, Vol. 1. P. F. Weller, ed. 500 pp. Marcel Dekker, New York, 1973. \$26.50

Springer-Verlag New York Heidelberg Berlin

introduces

**New
Series**

Topics in Applied Physics

A new monograph series devoted to research achievements of current interest. Each volume will deal with a different topic under the editorship of a recognized authority in the field. It will cover application-oriented aspects of the topic under consideration. The contributors to each volume are internationally known experts.

**Nov
1973**

**Volume 1
Dye Lasers**
Edited by *F. P. Schäfer*

F. P. Schäfer—Principles of Dye Laser Operation
B. B. Snavely—Continuous-Wave Dye Lasers
C. V. Shank and E. P. Ippen—Mode Locking of Dye Lasers
K. H. Drexhage—Structure and Properties of Laser Dyes
T. W. Hänsch—Application of Dye Lasers
1973. approx. 300p. approx. 500 refs. cloth \$26.70

Forthcoming Titles

1974

**Volume 2
Laser Spectroscopy
of Atoms and Molecules**
Edited by *H. Walther*

H. Walther—Spectroscopic Application of Lasers
T. W. Hänsch—High Resolution Spectroscopy
E. D. Hinkley, F. A. Blum, K. W. Nill—Infrared Spectroscopy
K. Shimoda—Double Resonance Spectroscopy
B. Decomps, M. Ducloy, M. Dumont—Coherence Phenomenon
J. L. Hall—Optical Heterodyne Spectroscopy
K. M. Evenson, R. Petersen—Light Frequency Measurements
F. Porto, J. N. Cherlow—Raman Spectroscopy of Gases

1974

Mössbauer Spectroscopy

1974

Raman Scattering in Solids



Order from
Springer-Verlag New York Inc.
175 Fifth Avenue
New York, NY 10010
Circle No. 41 on Reader Service Card

AUTHORITATIVE TITLES IN THE

Materials Science

SERIES

□
SYSTEMATIC MATERIALS ANALYSIS
Volumes 1 and 2

edited by
JAMES H. RICHARDSON and RONALD V. PETERSON
Volumes 1 and 2/1974, in preparation

□
**BONDS AND BANDS
IN SEMICONDUCTORS**

by J. C. PHILLIPS
1973, 300 pp., \$18.50

□
RARE EARTH PERMANENT MAGNETS

by E. A. NESBITT and J. H. WERNICK
1973, 208 pp., \$12.50

□
RARE EARTH INTERMETALLICS

by W. E. WALLACE
1973, 284 pp., \$22.50

□
**ANELASTIC RELAXATION
IN CRYSTALLINE SOLIDS**

by A. S. NOWICK and B. S. BERRY
1972, 691 pp., \$27.50

□
Complete in Three Volumes

**THE USE OF PHASE DIAGRAMS
IN ELECTRONIC MATERIALS
AND GLASS TECHNOLOGY**

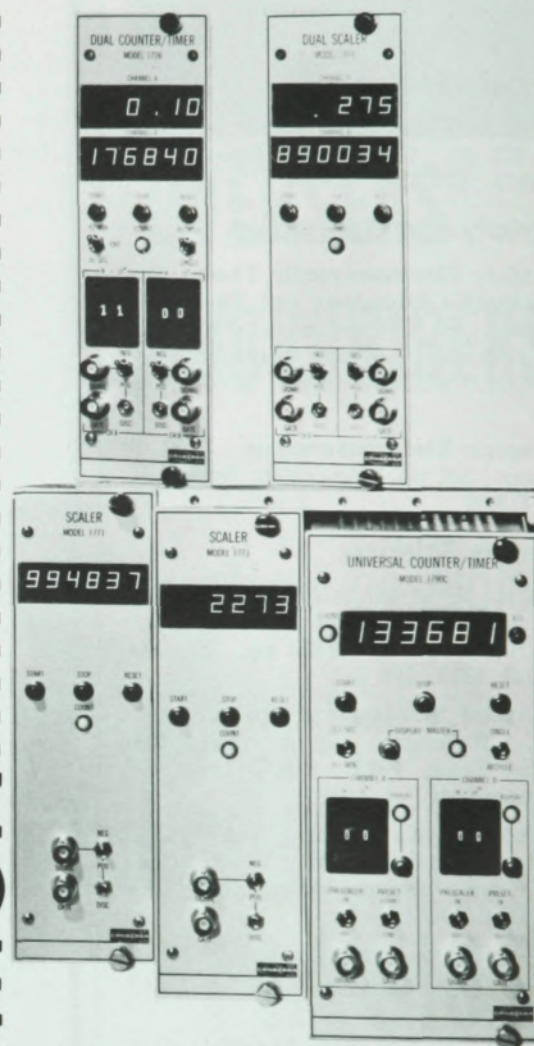
edited by ALLEN M. ALPER
Volume 1/1970, 358 pp., \$19.50
Volume 2/1970, 354 pp., \$19.50
Volume 3/1970, 325 pp., \$19.50



prices subject to change without notice
Circle No. 42 on Reader Service Card

by
CANBERRA

DATA ACQUISITION



Send today for Canberra's *new, free*
Data Acquisition Handbook, featuring:

- *New* LED Scalers
- *New* System Buffer
- *New* Daisy Chain to Computer Interface
- *New* Punch Tape Scanner



CANBERRA INDUSTRIES, INC.
45 Gracey Avenue
Meriden, Connecticut 06450

Circle No. 43 on Reader Service Card

Thin Film Physics. O. S. Heavens. 152 pp. Halsted, New York, 1973. \$5.50

Geophysics

Methoden und Probleme der dynamischen Meteorologie. (Reprint of 1938 edition) H. Ertel. 122 pp. Springer-Verlag, New York, 1972. \$8.50

Biophysics

Physico-Chemical Properties of Nucleic Acids, Vol. 2: Structural Studies on Nucleic Acids and Other Biopolymers. J. Duchesne, ed. 374 pp. Academic, London, 1973. £7.50

Theory and Mathematical Physics

Introduction to the Special Theory of Relativity. C. M. Srivastava. 225 pp. Orient Longman, New Delhi, 1972. Rs 20.00

Invariant Imbedding and its Applications to Ordinary Differential Equations, An Introduction. M. R. Scott. 215 pp. Addison-Wesley, Reading, Mass., 1973. \$19.50 hardcover, \$11.50 paperback

Quantum Mechanics: Principles and Applications. M. Alonso, H. Valk. 641 pp. Addison-Wesley, Reading, Mass., 1973. \$16.95 hardcover, \$9.95 paperback

Instruments and Techniques

Air Filtration. C. N. Davies. 171 pp. Academic, London, 1973. £4.00

Environmental Systems Engineering. L. G. Rich. 448 pp. McGraw-Hill, New York, 1973. \$16.50

Temperature, Its Measurement and Control in Science and Industry, Vol. 4. H. H. Plumb, ed. 2383 pp. in 3 parts: **Part 1: Basic Methods, Scales and Fixed Points, Radiation.** H. Preston-Thomas, T. P. Murray, R. L. Shephard, eds.; **Part 2: Resistance, Electronic and Magnetic Thermometry, Controls and Calibration, Bridges.** L. G. Rubin, A. C. Anderson, J. E. Janssen, R. D. Cutkowsky, eds.; **Part 3: Thermocouples, Biology and Medicine, Geophysics and Space.** D. I. Finch, G. W. Burns, R. L. Berger, T. E. VanZandt, eds. Instrument Society of America, Pittsburgh, Pa., 1972. \$40 each part, \$110 for three-volume set

Treatise on Adhesion and Adhesives, Vol. 3. R. L. Patrick, ed. 240 pp. Marcel Dekker, New York, 1973. \$21.75

Uranium Enrichment by Gas Centrifuge. D. G. Avery and E. Davies. 96 pp. Crane, Russak, New York, 1973. \$7.50

History and Philosophy

Pour une Theorie Mécaniste Renouvelée. T. Vogel. 128 pp. Gauthier-Villars, Paris, 1973

Miscellaneous

Physics in Perspective, Vol. II, Part B: The Interfaces. Committee on Science and Public Policy. 714 pp. National Academy of Sciences, 1973. \$13.50

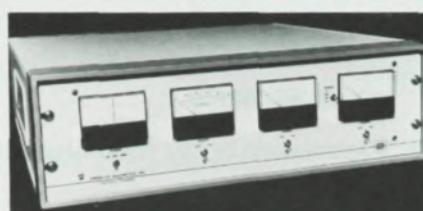
Science Year, The World Book Science Annual, 1974. 433 pp. Field Enterprises, Chicago, Ill., 1973. \$7.95 □

Superconducting Magnets

YOUR FIRST CHOICE FOR MAGNETS OR MAGNET SYSTEMS, 1-100 KILOGAUSS.

SOLENOIDS, SPLIT PAIRS, HIGH HOMOGENEITY, DIPOLES AND SPECIAL FIELD SHAPES.

APPLICATIONS INCLUDE NMR, MAGNETIZATION, MATERIAL RESEARCH, FARADAY ROTATION AND OTHER MAGNETO-OPTICAL EFFECTS, PLASMA PHYSICS, ETC. 0.4-200KS.



Cryogenic Accessories

- VAPOR COOLED CURRENT LEADS
- CONTINUOUS HELIUM LEVEL METERS
- CRYOGENIC TEMPERATURE METERS
- MAGNET CONSOLES
- MAGNETORESISTIVE GAUSSMETERS

AMERICAN MAGNETICS, INC.

P.O. BOX R, OAK RIDGE, TN 37830 615-482-4220

Circle No. 44 on Reader Service Card

Available December 1973:

THE PHYSICIST'S CONCEPTION OF NATURE

Edited by JAGDISH MEHRA

Accounts of the principal conceptions of modern physics, in historical perspective, by some of their most distinguished creators and exponents — an international symposium on "The Development of the Physicist's Conception of Nature in the Twentieth Century", held in Miramare, Trieste, Italy, 18-25 September 1972.

Contents: **Space, Time and Geometry:** Contributions by D. W. Sciama, S. Chandrasekhar, P. A. M. Dirac, P. Jordan, J. Ehlers, J. Mehra, A. Trautman, J. A. Wheeler. - **Quantum Theory:** Contributions by L. Rosenfeld, W. Heisenberg, B. L. van der Waerden, P. Jordan, J. M. Jauch, E. P. Wigner, F. Rohrlich, R. E. Peierls, G. Wentzel, S. Tomonaga, J. Schwinger, A. Salam, C. N. Yang, V. L. Telegdi, H. B. G. Casimir. - **Statistical Description of Nature:** Contributions by G. E. Uhlenbeck, M. Kac, W. E. Lamb, Jr., E. G. D. Cohen, I. Prigogine, M. Eigen. - **Physical Description, Epistemology and Philosophy:** Contributions by C. F. von Weizsäcker, L. N. Cooper, J. M. Jauch, J. S. Bell, R. Haag, I. Prigogine, G. Ludwig, D. Finkelstein, B. d'Espagnat, C. F. von Weizsäcker.

Cloth, approx. 820 pages Price: Dfl. 200,—/US\$ 75.00 (approx.)

"It took initiative, imagination, and historical insight to organize this unique and wonderful symposium, truly an enormous concourse of the conceptual intelligence." C. P. Snow



D. REIDEL PUBLISHING COMPANY
Dordrecht-Holland/Boston-U.S.A.

Circle No. 45 on Reader Service Card