SCIENCE
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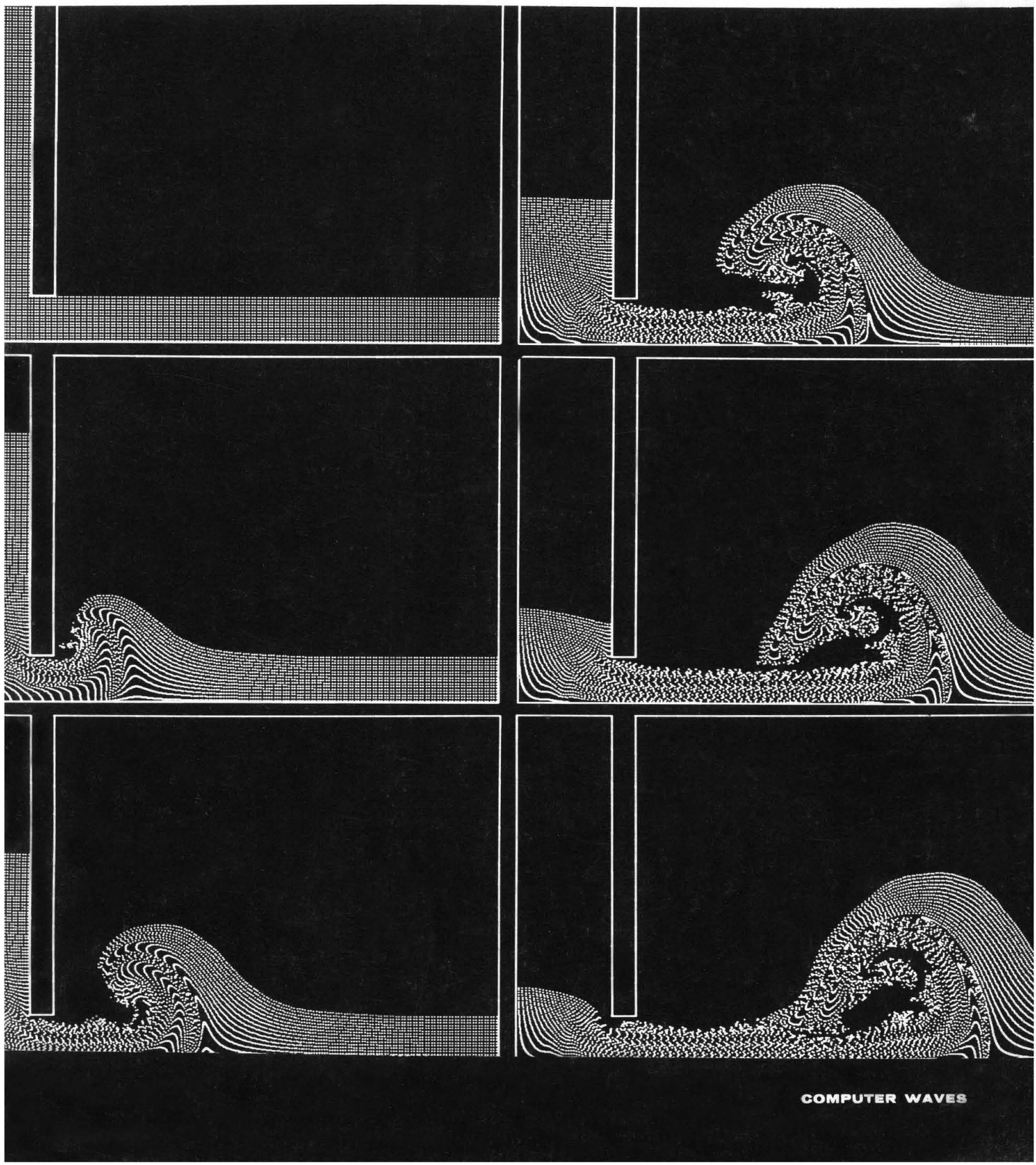


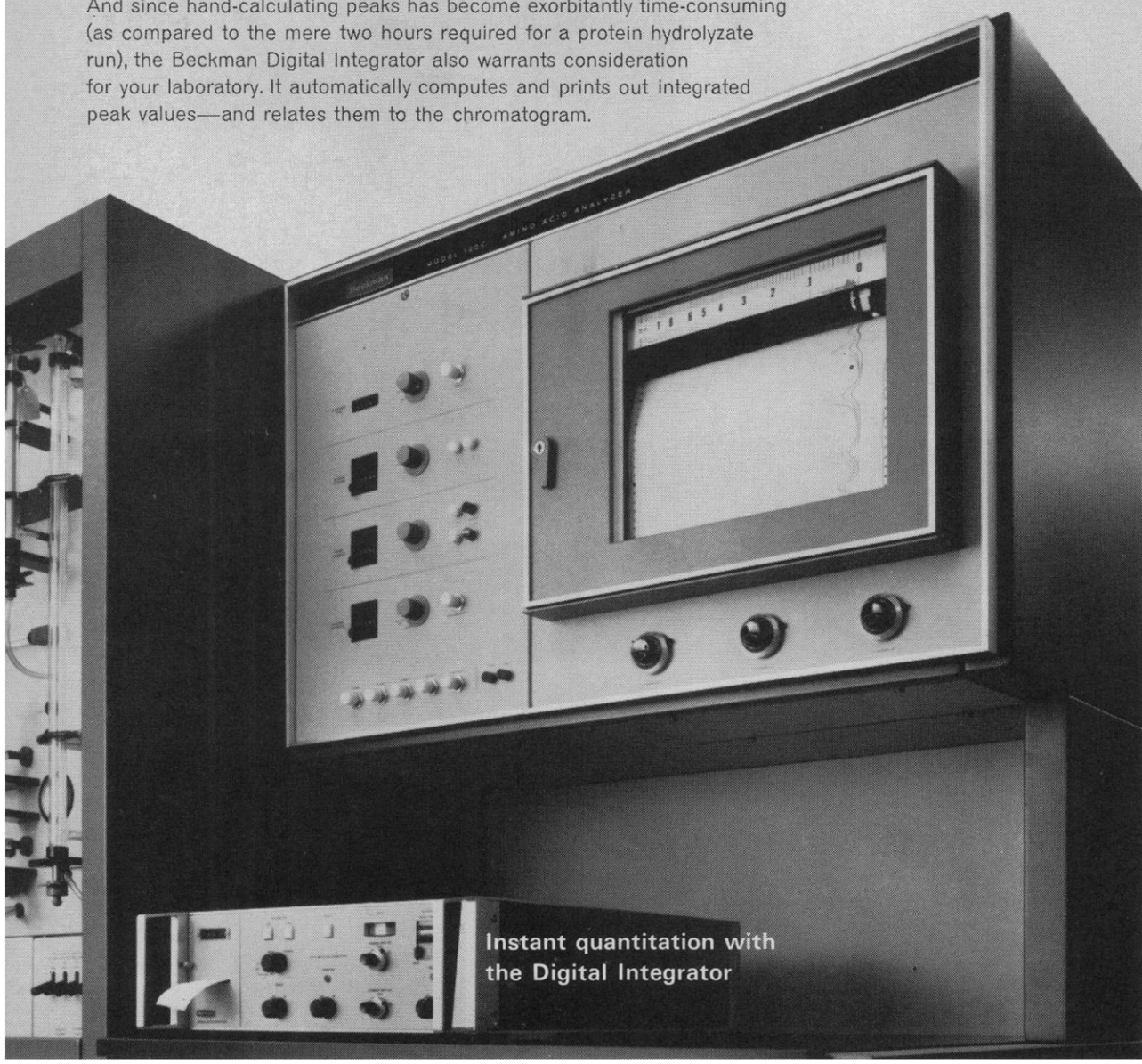
COMPUTER WAVES

The New 120C Amino Acid Analyzer

The faster pace of investigations...the increasing demands being made on instrumentation...the continuing need for precise results, excellent resolution, and dependable service—all are reflected in the new Beckman Model 120C Amino Acid Analyzer and the Digital Integrator Accessory.

With the Model 120C you get large, well-defined peaks from samples as small as 0.02 micromole. You have automatic reprogramming at the touch of a button. And timing is precise—to a tenth of a minute, with all timers precisely coordinated. The Model 120C's recorder is faster. The control panel is conveniently organized.

And since hand-calculating peaks has become exorbitantly time-consuming (as compared to the mere two hours required for a protein hydrolyzate run), the Beckman Digital Integrator also warrants consideration for your laboratory. It automatically computes and prints out integrated peak values—and relates them to the chromatogram.



If you would like more information on the Integrator and the Model 120C, write for Data File SB-120-5.

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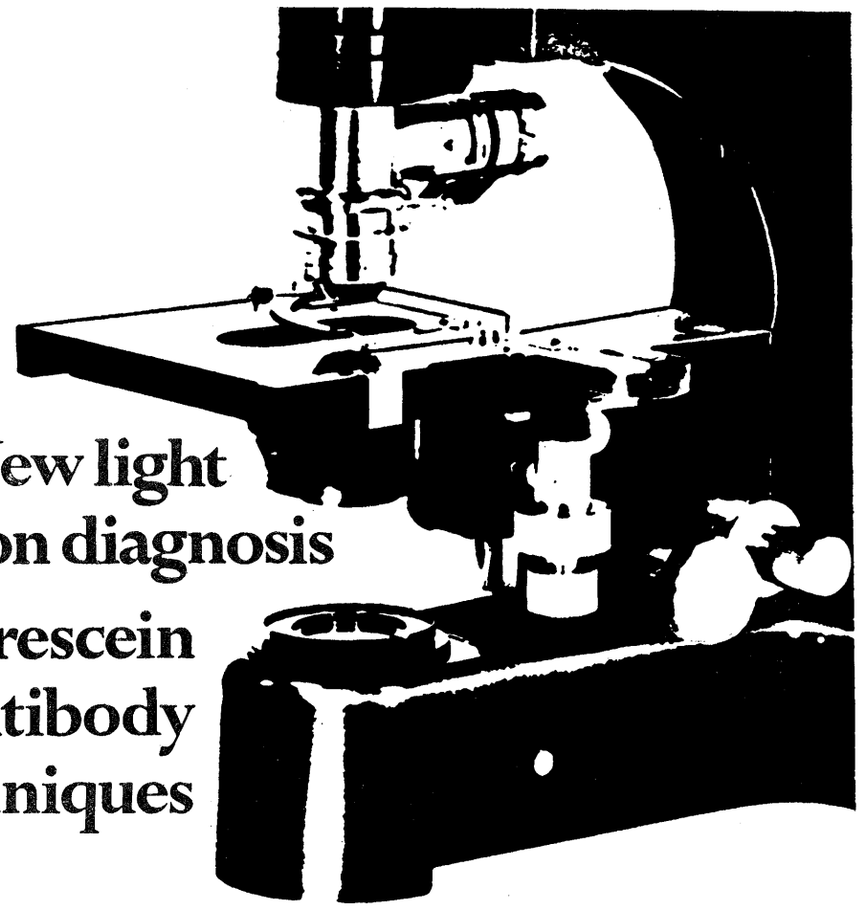

New light on diagnosis ...Fluorescein Antibody Techniques

Fluoroscein Isothiocyanate (FIC) fluorescent antibody techniques have proven valuable in the diagnosis of various communicable diseases, polio, rabies and typhoid, the identification of antigens, microorganisms and as a research tool in probing the mechanisms of antibody formation and cytochemical studies on the distribution of homologous proteins in tissues and organs.

Previously, however, investigators using the fluorescent antibody technique have been annoyed with non-specific green fluorescence of certain tissue or with non-specific uptake of fluorescein conjugate.

Recently, a counterstaining procedure for use in conjunction with FIC has been reported by Hall and Hanson (1). This method utilizes aluminum chelates of dihydroxy azo dyes.

Now, NBCo offers the entire group of azo dyes in convenient kit form: (An assortment of 5 grams each of the listed counter stains for $6.25.)

Flazo Orange
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Diamond Red ECB.— Extra Conc.
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Fluorescent Labeling

For the convenience of laboratories desiring a complete initial stock, NBCo offers an assortment of one each of the following biochemicals in 100 mg. ampuls at $12.50.

5 Dimethyl Amino-1 Napthalene Sulfonyl Chloride on Celite 10%
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(1) As reported in Chem. & Eng. News (Sept. 10, 1962). The literature references should not be interpreted as either an endorsement or disapproval of the biochemicals by the cited investigator.

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SCIENCE

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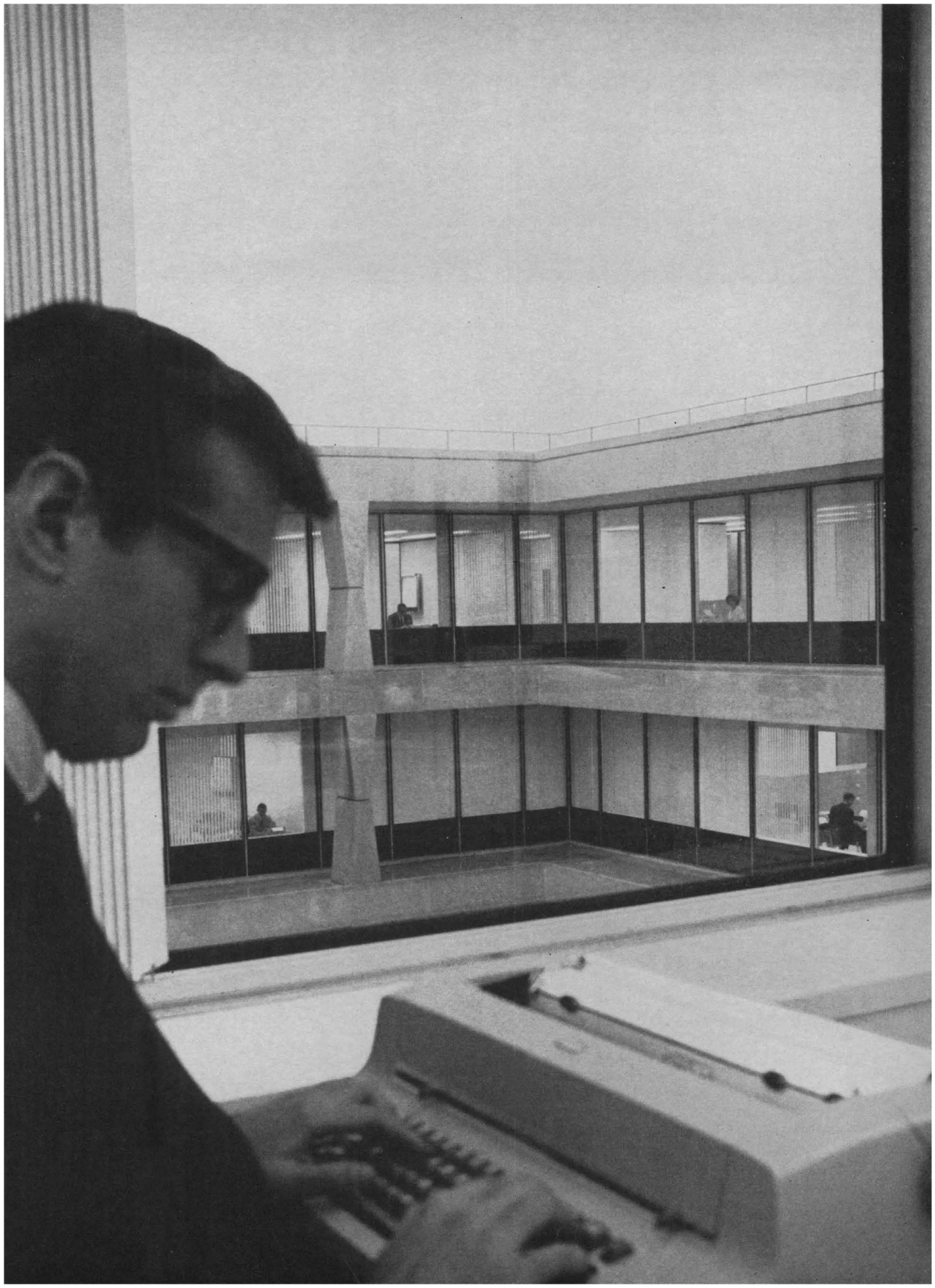
COVER

Surging water under a sluice gate is simulated by computer calculations. The sequence of figures shows unretouched computer output, illustrating early stages in the development of a hydraulic jump from a backward-breaking wave. Such numerical solutions of the full nonlinear, time-dependent Navier-Stokes equations make possible the detailed study of this and numerous other problems in fluid dynamics. See page 1092.



100 or more people can use IBM's new time-sharing computer at the same time

At many computer installations, the average problem takes less than one minute of computing time.

Why do you have to wait so long to get your answers back?

It's simply because most computers in the past could only handle one problem at a time. When you delivered your problem it got queued up with all the jobs ahead of it.

IBM SYSTEM/360 Model 67 changed all that.

It's designed for time-sharing and remote computing.

Time-sharing lets many people use the computer at the same time. Each one thinks he's the only one using it. In actual fact, the computer is so fast it simply moves from station-to-station receiving instructions and quickly returning the answers, to the appropriate inquiry station.

And, the individual user's console stations can be next door or thousands of miles away.

Dynamic Program Relocation

What goes on inside the computer is pretty interesting too. If you've ever programmed a computer you know that ordinarily you choose the locations in memory where your instructions and data reside until the job is complete.

The new SYSTEM/360 Model 67 doesn't work that way. Instead it uses dynamic programming. It assigns memory locations. Each user's program is free to go to any part of core storage that happens to be available. Your program or job can be interrupted (without your knowing it) and be reloaded into a different set of memory locations.

Some old-timers think it's pretty frightening not to know where their program is. But then it really doesn't matter because there's a powerful control program that's keeping track of everything and making memory assignments efficiently. It releases you from the previous restraints of memory size.

All this is possible because this new addition to SYSTEM/360 can have up to four processing units which can be interconnected to permit each one to share storage with the other three.

In addition, each has access to input/output units on a maximum of 28 channels.

It's possible to take all processing units, storage units and most of the input/output control units and partition them into individual units so that units can be serviced without affecting the operation of the rest of the system.

New Advances in Data Switching and Communications

To switch the vast amounts of data and programs in and out of core so rapidly we had to build two very unique features into this new time-sharing SYSTEM/360.

First, we added eight associative registers that translate the address references in your program to actual core locations . . . at main-frame-logic switching speed . . . 150 nano-seconds per address.

Then we added special channel controllers with direct access to main memory. This allows the control program, mentioned above, to locate data directly. This prevents any interference with the activity going on in the central processor.

Since most users will want to use many console stations to take full advantage of the time-sharing power of the new SYSTEM/360, we've also designed a new, lower cost terminal—the 2741 Communications Terminal. It's easy to use. It looks and acts much like a standard typewriter. Even if you "hunt and peck" you'll be completely at ease with this terminal in only minutes.

Bell Telephone Laboratories—Naperville, Illinois, System Development Corporation, The Boeing Company—Huntsville, Alabama, MIT Lincoln Laboratory, Washington State University and others have already ordered the new time-sharing SYSTEM/360. Let us tell you why. Maybe you'll order one too.

SYSTEM/360—The Computer with a Future.

IBM®

BERKELEY • 132nd AAAS

Order Your General Program

It provides complete, detailed information about all the sessions and symposia scheduled, the Annual Exposition of Science and Industry, and the Science Theatre.

Program Highlights

Moving Frontiers of Science: F. Clark Howell on Significant Advances in Human Evolutionary Studies; Norman F. Ness on A New Look at the Earth's Magnetic Field; Jerome Y. Lettvin on Physiological Basis of Mental Activity; and William M. Fairbank on Some Aspects of Low Temperature Physics.

AAAS Distinguished Lecture: Genetics and Cultural Change by George W. Beadle, president, University of Chicago.

Interdisciplinary Symposia: Ground-level Climatology; Proteins and Nucleic Acids; Materials Science in Medicine, Dentistry, and Pharmacy; Behavior, Brain, and Biochemistry; Mathematical Bases in Economic Planning.

Special Sessions: AAAS Presidential Address on Antarctica: Continent of International Science by Laurence M. Gould; the Joint Address of Sigma Xi and Phi Beta Kappa by J. Bronowski; the George Sarton Memorial Lecture by Stillman Drake on "The Accademia dei Lincei"; and the National Geographic Society Illustrated Lecture.

AAAS Committees: Special Program of the AAAS Committee on Council Affairs on Civil Defense: Speakers: Eugene Wigner, Wolfgang Panofsky, Owen Chamberlin, Fred Payne, Barry Commoner, Bentley Glass, and Anatol Rapoport, moderator, and Henry Eyring, chairman; Committee on Desert and Arid Zones Research.

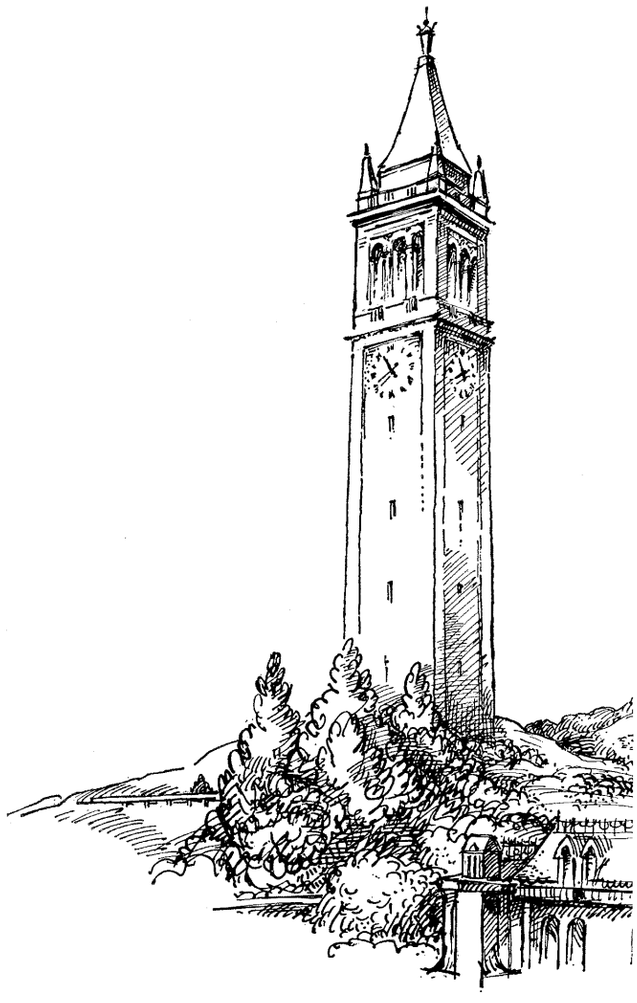
Lawrence Hall of Science: Director Harvey E. White will lecture twice on this splendid Center of Science Education, 27 and 29 December.

Sections and Societies: The 20 AAAS Sections and some 92 participating societies are scheduling specialized symposia and papers.

AAAS Science Theatre: The latest foreign and domestic films.

Exhibits: The Annual Exposition of Science and Industry is on the lower level of the ASUC Student Center, AAAS Headquarters.

Advance Registration: By registering in advance, you avoid delay at the Registration Center on arrival; you receive the **General Program** in time to plan your days at the meeting; and your name is posted in the Visible Directory when the meeting opens. Use the coupon below.



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1b. ☐—Enclosed is $3.00 for the **General Program.** (If I attend the meeting, the Badge, which I need to obtain the privileges of the meeting, will cost me $2.00 more.)

2. FULL NAME (Dr., Miss, etc.) .....
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CITY ..... STATE ..... ZIP CODE .....

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Please mail this coupon and your check or money order for the total amount to the AAAS in Washington, D.C. (address as shown)

MEETING • 26-31 DECEMBER

Make Your Reservations

Make sure you have the sleeping accommodations you prefer. Since this is a campus meeting—and the ASUC Student Center is AAAS headquarters—society headquarters will be mainly in university buildings.

Hotel and Motel Information. A deposit of $5 is required by all hotels and motels. Deposits are credited toward the final bill, and are refunded if cancellation is received not later than 10 days before the date of your reservation. Make checks payable to the AAAS Housing Bureau.

Residence Hall Information. Accommodations are available for one or two persons per room, for couples, and for children 14 years or older. Hours for room registration at the Hall are 8:00 a.m.–10:30 p.m. daily. The full amount for room, with or without meals, is collected in advance. There is a special charge for overnight 30 December (no meals December 31): $6.00 single occupancy, $5.00 per person double. Parking is 50¢ per 24-hour day. The general deadline for residence hall reservations is 10 December.

For more details on all of the above facilities and services, see the 23 July issue of Science, page 454.

The hotel, motel, and residence hall sleeping accommodations are for your convenience in making your room reservation in Berkeley. **Please use the coupon below and send it and any necessary deposit directly to the AAAS Housing Bureau in Berkeley.** Give a definite date and estimated hour of arrival, and also your probable date of departure. The Housing Bureau will make the assignment and promptly send you a confirmation.

Rates per Day

HOTELS	Single	Double	Twin	Suite	Parking
Claremont (300)	$11.00	$15.00	$15.00		Free
Durant (200)	8.50*		12.00*	$18.00-22.00	50¢, $1.00
Shattuck (250)	8.50	11.00	14.00	25.00-35.00	Public

* A few single rooms at $5.50, twins at $7.50.

MOTELS				
Berkeley House (112)	9.50	13.50	13.50	25.00-28.00
Berkeley Plaza (52)	7.00	8.50	9.50	15.00
Berkeley Travelodge (46)	8.00	10.00	11.00	
California Motel (42)	6.50	7.00	8.00	
Golden Bear (44) (and others)	7.00-8.00	8.00-10.00	10.00-12.00	18.00

RESIDENCE HALLS

Single occupancy—$7.50 without meals; $8.50 with breakfast and lunch
Two in a room—$6.50 each without meals; $7.50 each with breakfast and lunch

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Please reserve the following accommodations for the 132nd Meeting of the AAAS in Berkeley, 26-31 December 1965

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Type of room: Single ☐ Double bed ☐ Double, twin beds ☐ Suite ☐ Rate: Desired ..... Maximum rate.....

Number in party ..... Sharing this room will be: .....
(List name and address of each person, including yourself. Attach list if space is insufficient.)

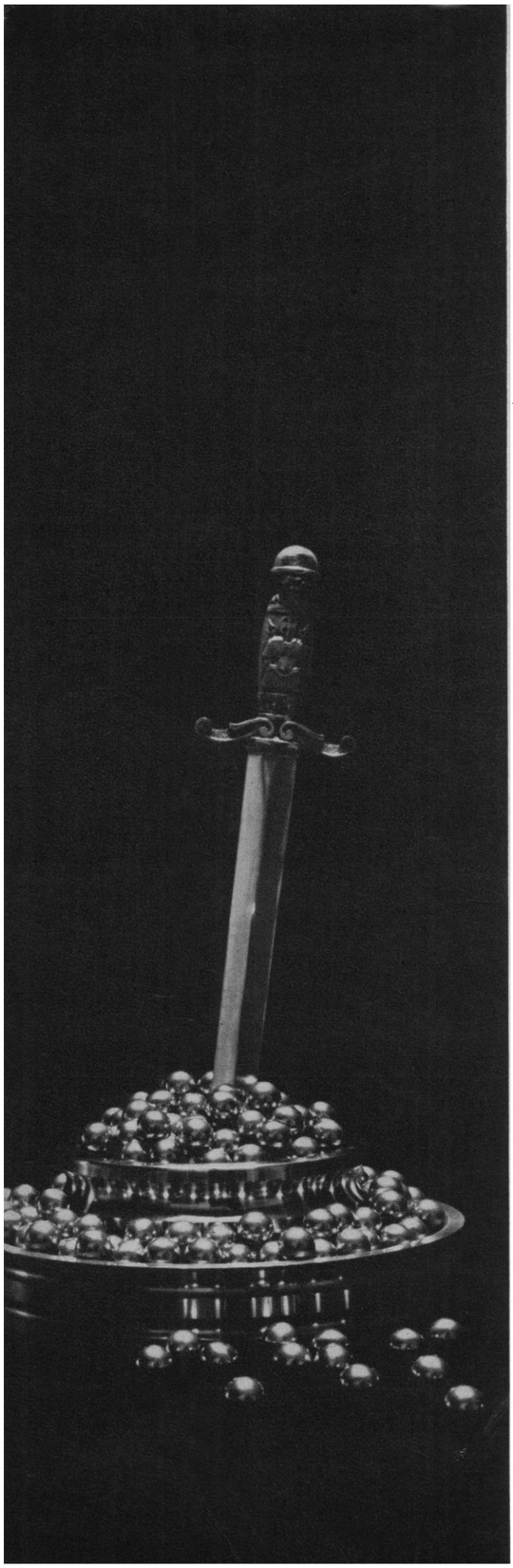
.....

DATES: ARRIVAL ..... A.M. .....P.M. ..... DEPARTURE .....
(These must be indicated—add approximate hour, A.M. or P.M.)

NAME .....
(Individual requesting reservation) (Please print or type)

ADDRESS .....
(Street) (City) (State) (ZIP Code)

Mail this coupon now to the AAAS Housing Bureau. Enclose hotel or motel room deposit if needed. Make checks payable to AAAS Housing Bureau. All rooms will be assigned and confirmed in order of receipt of reservation.



One of a series briefly describing GM's research in depth

Fighting fatigue with stress

Stress is a double-edged sword. Favorable "locked-in" stress in a material, put there to offset the effects of load stress, can dramatically extend fatigue durability.

Recently one of our physicists discovered an ingenious way to create favorable residual stresses in through-hardened steel ball bearings. Called *Marstressing*, it involves diffusing foreign atoms into the metal surface to lower the temperature at which austenite transforms to martensite during quenching. Transformation then begins *beneath* the diffused layer and proceeds outward—the reverse of what normally takes place. When the surface region finally transforms, normal expansion is opposed by the already hardened interior. Surface material is caught in a squeeze. Result: high residual stress near the surface where failures normally originate.

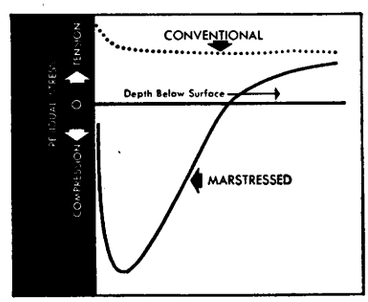
Marstressing is one of the key features of New Departure—Hyatt Division's new NDur line of bearings which boasts life at least three times the former rating when run on standard New Departure fatigue life tests.

Back of *Marstressing* are decades of GMR research in metal physics and residual stress.

The principle behind *Marstressing* is remarkably simple; but simple answers have a way of occurring most frequently where careful, persistent research has prepared the way.

General Motors Research Laboratories

Warren, Michigan



Comparison of subsurface stress patterns in conventionally hardened and *Marstressed* parts

mathematics, as the "science of structure," provides the syntactical rules permitting the formation of "grammatical" scientific sentences (and the rejection of ungrammatical ones). From this point of view it is a matter of historical accident whether a particular mathematical concept arises in response to needs of scientists or develops from within pure mathematics and is later applied in science. The "crucial sentence" of Hamming in which the lack of need for *empirical* verification of mathematical concepts leads to the conclusion that much of modern mathematics is more closely related to medieval scholastic arguments than to science seems quite irrelevant to the main point at issue. *All* mathematics has that characteristic; science makes extensive use of those branches of mathematics whose postulates are in fact verified (often in such an extremely indirect manner, however, that using a strong word like "verify" may not be appropriate). In the growth of theoretical science one is continually presented with new situations in which new kinds of postulational systems must be employed.

The mathematicians, by providing the scientists with the fruit of their labors, permit a wide choice of new formal tools with which new attempts to organize experience can be made. The symbiotic relationship between science and mathematics, in which science uncovers problems that can inspire new developments in mathematics, and mathematics develops formal systems which accelerate the progress of science, is so well appreciated and so fantastically fruitful that it is hard to imagine anyone trying to "legislate" away any of the essential freedoms so helpful in the past.

The real issue in the dispute, I believe, is the nature of numerical analysis. Is it pure mathematics, or is it a field of applied mathematics close in spirit to the sciences? Numerical analysis generates desired arithmetical or other mathematical data in a well-defined mathematical system (for example, a set of partial differential equations with given boundary conditions) by mathematical methods. It is thus "all mathematics," in contrast to theoretical physics, where the nub of the problem is the discovery of a formal system which adequately describes experience. Introduction of constraints (such as minimum cost or errors) does not change the fact that the problem is fundamentally mathematical.

Whenever a sphere of applications develops which makes demands on a particular mathematical discipline which go beyond the state of development of the field at the time, the "customers" frequently proceed to remedy the deficiency from the point of view of their application rather than from the point of view of pure mathematics. If these "customers" are scientists or engineers, for whom the empirical has much importance, they will tend to neglect rigor, elegance, generality, and even consistency, in their attempts to get their main jobs done. From Hamming's article it would appear that this has occurred in numerical analysis, and that the "customers" may have tended to dominate the field in recent years because the pure mathematicians were otherwise occupied. It may be that because of history and tradition this will continue for some time (or even permanently). If I may venture to prophesy, however, I predict that the challenge of developing the mathematics of numerical analysis on a rigorous basis in keeping with the standards of pure mathematics will eventually be taken up. The subtle logical and combinatorial problems associated with computers, switching networks, systems design, and numerical analysis have so many interesting and important facets both from the viewpoint of applications and from that of pure mathematics that I cannot see the pure mathematician forever ignoring these fields. I also do not see how the "customers" will make much headway on many important problems unless some of them become, in effect, highly competent pure mathematicians. This kind of thing has often occurred in the past, and will probably happen many times in the future. Ultimately the development of numerical analysis as a "science" can be expected to encompass construction of a solid basis, in the sense of pure mathematics, similar to what has occurred in statistics. Modern probability and statistics, with their rigorous measure-theoretical basis, are a far cry from the simple data collection and reduction of the past. Along with the development of the "pure" basis has come a tremendous increase in the power and scope of statistical methodology and of its usefulness in applications. We expect to see a similar evolution in numerical analysis.

JEROME ROTHSTEIN
Laboratory Electronics, Inc.,
1075 Commonwealth Avenue,
Boston, Massachusetts

Recommended Reading in Science and Technology

Watch for These New Books Now in Press . . .

☐ **MIRACLES OF THE MIND: An Introduction to Parapsychology** *by* **Simeon Edmunds,** *London, England.* About 248 pp., about 6 il. In Press

☐ **SURGICAL APPLICATIONS OF LASER** *by* **Paul Edward McGuff,** *Laser Medical Research Foundation, Boston, Mass.* About 224 pp., about 70 il., 56 tables. In Press

☐ **LIST OF FUNGAL PRODUCTS** *by* **Shoji Shibata,** *University of Tokyo; and* **Shinsaku Natori** *and* **Shun-ichi Udagawa,** *both of National Institute of Hygienic Sciences. All of Tokyo, Japan.* '64, 178 pp. (7 x 10), $7.75

☐ **CELLULAR CONCEPTS IN RHEUMATOID ARTHRITIS.** *Holbrook Memorial Symposium. Compiled and edited by* **C. A. Stephens, Jr.,** *Southwestern Clinic and Research Institute, Inc., and* **A. B. Stanfield,** *Univ. of Arizona. Both of Tucson, Ariz. With the assistance of* **Margaret L. Doorly.** *(With 10 Contributors)* About 344 pp. (7 x 10), about 78 il., 4 tables. In Press

☐ **VISION: Biophysics and Biochemistry of the Retinal Photoreceptors** *by* **Jerome J. Wolken,** *Carnegie Institute of Technology, Pittsburgh, Pa.* About 232 pp., about 154 il., 9 tables, (Amer. Lec. Living Chemistry edited by I. Newton Kugelmass). In Press

15 Outstanding New Books That Belong in a Science Library

☐ **PAVLOVIAN PSYCHIATRY: A New Synthesis** *by* **Christian Astrup,** *Gaustad Hospital, Oslo, Norway.* '65, 180 pp., (Amer. Lec. Objective Psychiatry edited by William Horsley Gantt), $6.75

☐ **RESEARCH METHODOLOGY AND NEEDS IN PERINATAL STUDIES** *by* **Sidney S. Chipman,** *Univ. of North Carolina, Chapel Hill, N. C.;* **Abraham M. Lilienfeld,** *The Johns Hopkins Univ., Baltimore, Md.;* **Bernard G. Greenberg,** *Univ. of North Carolina; and* **James F. Donnelly,** *North Carolina State Board of Health, Raleigh, N. C. (With 67 Participants)* '65, 392 pp., 16 il., 33 tables, $16.50

☐ **HUMAN RACES** *(2nd Ed.) by* **Stanley M. Garn,** *Antioch College, Yellow Springs, Ohio.* '65, 172 pp., 26 il., $5.50

☐ **DEPRESSIVE STATES: A Pharmacotherapeutic Study** *by* ***Anthony Hordern,*** *King's College Hosp., London, England. In collaboration with* **C. G. Burt,** *Beechworth Hosp., and* **N. F. Holt,** *Mental Health Research Institute. Both of Victoria, Australia.* '65, 184 pp., 25 il., 25 tables, $7.50

☐ **ANTICOAGULANT THERAPY: Pharmacological Principles** *by* **Louis B. Jacques,** *University of Saskatchewan, Saskatoon, Canada.* '65, 174 pp., 66 il. (1 color plate), 18 tables, (Amer. Lec. Hematology edited by Walter H. Seegers), $7.50

☐ **MICROHEMOCIRCULATION: Observable Variables and Their Biologic Control** *by* **Elio Maggio,** *Univ. of Illinois, Chicago, Ill.* '65, 208 pp. (6¾ x 9¾), 124 il. (23 in color), 6 tables, $16.50

☐ **RADIOACTIVITY IN MAN: Whole Body Counting and Effects of Internal Gamma Ray-Emitting Radioisotopes.** *Second Symposium Sponsored by Northwestern University Medical School and the American Medical Association. Edited by* **George R. Meneely,** *Univ. of Texas Medical Center, Houston, Texas, and* **Shirley Motter Linde,** *Northwestern Univ., Chicago, Ill. (With 118 Contributors)* '65, 672 pp., 208 il., 97 tables, $24.50

☐ **CYBERNETIC MEDICINE** *by* **Aldo Masturzo,** *University of Naples, Naples, Italy.* '65, 160 pp., 19 il., (Amer. Lec. Living Chemistry), $6.50

☐ **INTRODUCTION TO AGING AND PATHOLOGY OF THE RETINA** *by* **Jack H. Prince,** *Ohio State Univ., Columbus, Ohio.* '65, 144 pp. (7 x 10), 67 il. (26 in color), 11 tables, $10.50

☐ **THE PATHOLOGY OF LABORATORY ANIMALS.** *A Conference Sponsored by the Section on Microbiology of The New York Academy of Medicine and The New York Pathological Society. Compiled and edited by* **William E. Ribelin,** *American Cyanamid Company, Princeton, N. J., and* **John R. McCoy,** *Rutgers Univ., New Brunswick, N. J. (With 22 Contributors)* '65, 448 pp., 292 il., 36 tables, $14.75

☐ **STUDIES IN PHYSIOLOGICAL OPTICS** *by* **Melvin L. Rubin,** *Univ. of Florida, Gainesville, Fla., and* **Gordon L. Walls,** *Univ. of California, Berkeley, Calif.* '65, 144 pp., 89 il., $6.50

☐ **BRAIN DAMAGE AND BEHAVIOR: A Clinical-Experimental Study** *by* **Jerome L. Schulman** *and* **Joseph C. Kaspar,** *both of Northwestern Univ., and* **Frances M. Throne,** *Children's Memorial Hosp. All of Chicago, Ill. (With 4 Assistants)* '65, 176 pp., 25 tables, $7.00

☐ **AMEBIASIS: A BIOMEDICAL PROBLEM** *by* **James G. Shaffer,** *The Lutheran General Hosp., Park Ridge, Ill.;* **William H. Shlaes,** *The Chicago Medical School, Chicago, Ill.; and* **Ryle A. Radke,** *Univ. of Washington, Seattle, Wash.* '65, 192 pp., 86 il. (15 in full color), 12 tables, $8.50

☐ **BOUND WATER IN BIOLOGICAL INTEGRITY** *by* **S. J. Webb,** *University of Saskatchewan, Saskatoon, Canada.* '65, 200 pp., 42 il., 30 tables, $7.75

☐ **A NEW PROTOZOON: Its Relation to Malignant and Other Diseases** *by* **Roger Wyburn-Mason,** *Hounslow, Hosp., Hounslow, England.* '64, 142 pp. (7 x 10), 40 il., $6.75

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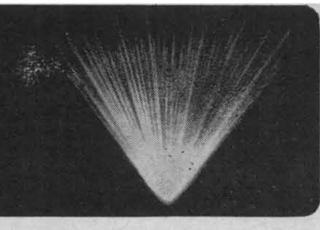
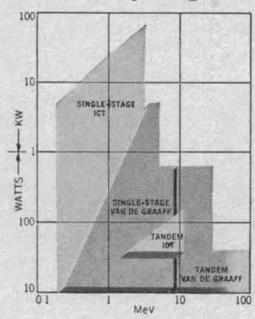
CHARGED PARTICLES



THE ICT CONCEPT:
new high-current machines emerging from HVEC research

Development of higher energy Van de Graaff particle accelerators which retain high beam precision, stability, and homogeneity, remains a continuing contribution by HVEC to "energy-oriented" research.

To provide even greater freedom of experimentation, HVEC is also anticipating the need for the higher beam intensities required in *power*-oriented research projects. Invented by Dr. R. J. Van de Graaff, the new Insulating Core Transformer (ICT) accelerator now provides high beam currents with all the desirable beam characteristics of Van de Graaff machines. As the graph shows, the high power levels available from the ICT accelerator now make possible a new realm of precision experimentation.



The Insulating Core Transformer

The ICT is essentially a three-phase power transformer with multiple secondaries, each of which is insulated from the other. Rectified current from the secondaries is series-connected to achieve total voltage. In the ICT, electrostatic and electromagnetic fields exist in the same space, as contrasted to the conditions in a coventional transformer. The result is a highly efficient dc power source capable of stable operation at elevated potentials *and* power levels.

A number of ICT accelerators and power generation systems are now available.

Single-Stage ICT Accelerators

Two types of single stage ICT accelerators have been developed for research use. The first incorporates an ICT power source coupled to the acceleration assembly through a coaxial cable.

	PROTON ENERGY (KeV)	CURRENT (MAX.) (Analyzed)	TANK HEIGHT Feet	TANK HEIGHT Meters	TANK DIAMETER Feet	TANK DIAMETER Meters
ICT 300	300	15 mA	4'4"	1.32	4	1.2
ICT 500	500	10 mA	5'3"	1.60	4	1.2

The second system utilizes a rigid transmission line to transmit electrical power to the accelerator terminal.

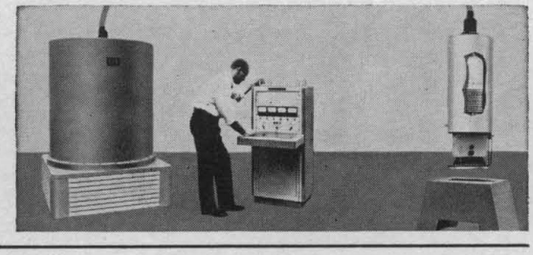
4 MeV ICT	ENERGY (MeV)	CURRENT	DIMENSIONS Length Feet	DIMENSIONS Length Meters
Positive Ions	1.5-4	3 mA	26'6"	8.08
Electron Conversion	1.5-3	10 mA	26'6"	8.08
3 MeV ICT Electrons	1.5-3	20 mA	29'	8.84

8 MeV ICT Tandem Accelerator

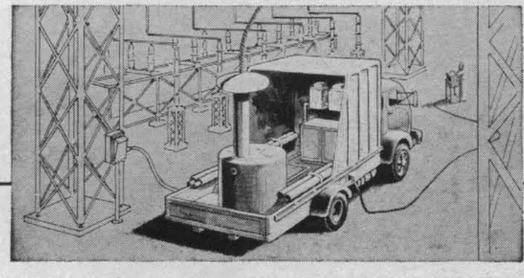
The 8 MeV ICT Tandem provides proton energies continuously variable from 3 to 8 MeV at a maximum guaranteed beam current of 2μA. The ICT power source is capable of providing 12 mA at 4 mv which, in combination with newly developed components emerging from HVEC, will enable the accelerator to keep pace with future research requirements. The 8 MeV Tandem is convertible to single-stage ion or electron operation.

ICT Electron Processing Systems

Developed primarily as high-current sources of electrons for industrial processing applications, these systems allow extreme flexibility of operation. Two models are available: 300 kv at 30 mA maximum beam current and 500 kv at 20 mA maximum beam current.



Series 7 ICT Power Supplies



ICT equipment has crossed many barriers to dc operation at high particle energies and currents. There is no indication that a ceiling exists to further advances of similar importance.

Available with output ratings ranging from 240 kv at 80 mA to 600 kv at 20 mA, these highly stable power sources are suitable for use in high energy beam separator systems, r.f. transmission systems, plasma research and high voltage testing programs.

For detailed information, please write to Technical Sales, High Voltage Engineering Corporation, Burlington, Massachusetts.

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SCIENCE

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International Technical Assistance

The more immediate technical and scientific need of the developing countries is not for knowledge that lies close to the scientific frontiers, but for technical information to meet their own particular needs. Caryl P. Haskins has described the problem (*Foreign Affairs*, January 1962) as one "of discovery, of sensible and sensitive selection, and, above all, of adaptation to the peculiar and individual requirements of each nation, people, and region."

One effort to meet these needs is being made by Volunteers for International Technical Assistance (VITA), a nonprofit organization started in 1959 by Robert Walker and 13 colleagues from the General Electric Company and Union College in Schenectady. VITA now has nine active chapters, over 1000 members, and an advisory committee that includes Harvey Brooks, Harrison Brown, Owen Chamberlain, Walker Cisler, Augustus Kinzel, Frederick Seitz, and others. VITA's program is one of immediate, practical action to solve locally perceived problems that are submitted by members of the Peace Corps, other U.S. citizens on overseas assignments, the United Nations, and foreign individuals and organizations. Over 1100 requests have been received, and the current rate is about 50 a month. Examples cover a wide range and have included requests for nutritional analyses of foods indigenous to Laos; advice on the methods of canning orange and lemon juice that best preserve vitamin content; instructions on building a rugged and inexpensive cement mixer, a high-flow pump for irrigation, a flashlight-powered slide projector, a simple gristmill, and a poultry incubator; and methods of rodent control. VITA members wrote the *Village Technology Handbook*, which is widely used by AID technicians and Peace Corpsmen. Perhaps the biggest success was the development of a sturdy and effective solar cooker, built on Fresnel lines, that costs less than $3 and that can be constructed by an unskilled worker.

With a rapidly growing number of requests coming from over the world, more money and more members are needed. As a spontaneous creation of industrial scientists and engineers, VITA is looking primarily to the industrial and business community for the $100,000 that it needs this year, and it is well on its way to achieving this goal. VITA also wants more members who are interested in devoting part of their skill and spare time to helping with the myriad problems of agriculture, construction, health, nutrition, education, and communication that beset a nation which is trying to move rapidly ahead but which lacks an extensive technological background of its own. Contributions and offers to help will be welcome at VITA headquarters, 230 State Street, Schenectady, New York 12305.

In the long run, probably nothing is so important to the emerging nations as an increase in yield per acre, for most of them are still basically agricultural nations and most of them lie in the comparatively unfertile tropic regions. Research and demonstration programs to improve farm products and to train agricultural workers, of the kind pioneered in Latin America by the Rockefeller Foundation, or institutions of the kind exemplified by the Rice Institute in the Philippines may provide the best long-range hope. Such ventures are essential, but they require substantial financing and extended time. For immediate usefulness, and on a scale that encourages individual effort, VITA has demonstrated the effectiveness of another method of aiding developing countries to solve some of their technical problems.—DAEL WOLFLE

Ontario, Canada. (E. South, Jr., Dept. of Physiology, Colorado State Univ., Fort Collins)

13–17. **Environmental Physiology**, symp., Tokyo, Japan. (A. Nixon, Fed. of American Societies for Experimental Biology, 9650 Wisconsin Ave., Bethesda, Md.)

13–17. Microwave Behavior of **Ferrimagnetics and Plasmas**, intern. conf., London, England. (P. J. B. Clarricoats, IEE, Savoy Pl., London W.C.2)

13–17. **Mother-Infant Interaction**, symp., CIBA Foundation, London, England. (CIBA, 41 Portland Pl., London W.1)

13–18. Society of German **Chemists**, general assembly, Bonn, Germany. (The Society, Postfach 9075, 6 Frankfurt am Main, Germany)

13–18. International **Gravimetric Commission**, mtg., Paris, France. (P. Tardi, Intern. Assoc. of Geodesy, 19 rue Auber, Paris 93)

13–18. Electroanalysis of **Organic and Inorganic Substances**, German Chemical Soc., Bonn, Germany. (W. Pfab, Homburg str. 10, 67 Ludwigshafen, Germany)

13–18. French Speaking **Psychiatrists and Neurologists**, 63rd congr., Lausanne, Switzerland. (P. Warot, 10 rue d'Esquermes, Lille, France)

14–16. **Faraday Soc.**, mtg., Bristol, England. (The Society, 6 Gray's Inn Sq., London W.C.1)

14–17. Theory of **Self-adaptive Control Systems**, intern. symp., Teddington, England. (R. W. Wilde, Dept. of Electrical Engineering, Imperial College of Science and Technology, Exhibition Rd., London S.W.7)

14–20. **Hydrogeologists**, intern. congr., Hanover, Germany. (G. Castany, Intern. Assoc. of Hydrogeologists, 74, rue de la Federation, Paris 15e, France)

14–20. International **Statistical** Inst., 35th session, Belgrade, Yugoslavia. (The Institute, 2 Oostdiunlann, The Hague, Netherlands)

15–17. **Nuclear and Particle Physics**, conf., Univ. of Liverpool, England. (Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London S.W.1)

15–17. **Regional Science** Assoc., 2nd Far East congr., Tokyo, Japan. (G. Konno, Faculty of Economics, Univ. of Tokyo)

15–17. **Urban Planning** Information Systems and Programs, Chicago, Ill. (American Soc. of Planning Officials, 1313 E. 60 St., Chicago 60637)

15–18. **Bacteriophagy**, 2nd intern. symp., Bucharest, Rumania. (Secretariat, Str. Progresului 10, Bucharest)

16–17. **Astrodynamics** Specialist conf., Monterey, Calif. (V. Szebehely, Celestial Mechanics Research Center, Box 2034 Yale Station, New Haven, Conn. 06520)

16–17. Production of **Automation Elements**, conf., Esztergom, Hungary. (L. Prockl, Scientific Soc. of Mechanical Engineers, Szabadsag ter 17, Budapest 5)

16–18. **Marine Microbiology**, symp., Soc. for General Microbiology, Aberdeen, Scotland. (J. Shewan, Torry Research Station, Dept. of Scientific and Industrial Research, 135 Abbey Rd., Aberdeen)

16–19. **General Practice**, 7th intern. congr., Salzburg, Austria. (K. Englemeier, Intern. College of General Practice, Lange Str. 21a, 4740 Oelde, Westphalia, Germany)

16–19. American **Medical Writers** Assoc., Detroit, Mich. (J. E. Bryan, 2000 P St., NW, Washington, D.C. 20036)

17. Southern **California** Acad. of Science, Los Angeles County Museum, Los Angeles. (C. Rozaire, Los Angeles County Museum, 900 Exposition Blvd., Los Angeles 90007)

17–18. **Dialysis and Transplant**, 2nd intern. conf., Newcastle, England. (W. Drukker, Dept. of Medicine, Queen Wilhelmina Hospital, Amsterdam W., Netherlands)

17–18. British **Tissue Culture** Assoc., Manchester, England. (L. M. Franks, Imperial Cancer Research Fund, Lincoln's Inn Fields, London W.C.2)

18–19. **Minnesota** Acad. of Science, Grand Rapids. (V. E. Anderson, 6 Zoology, Univ. of Minnesota, Minneapolis 55455)

18–21. International Soc. of **Radiographers and Radiological Technicians**, 3rd world congr., Rome, Italy. (E. R. Hutchinson, 159 Gabalfa Ave., Cardiff, Wales)

19–22. **Odontology**, 5th Latin American congr., Buenos Aires, Argentina. (A. F. Alvarez, Argentine Odontological Assoc., Junin 959, Buenos Aires)

19–22. **Power**, natl. conf., Albany, N.Y. (Inst. of Electrical and Electronics Engineers, Box A, Lenox Hill Station, New York 10021)

19–23. **Cerebral Palsy**, Mediterranean symp., Rome, Italy. (Intern. Soc. for Rehabilitation of the Disabled, 701 First Ave., New York 10017)

19–25. Greek **Chemists** Assoc., 3rd intern meeting, Athens. (Dr. Parissakis, Technical Univ. of Athens, 42 Patission St., Athens)

19–25. **Elementary Particles**, 3rd intern. conf., Oxford, England. (R. C. Pepperell, Rutherford High Energy Laboratory, Chilton, Didcot, England)

19–25. **Immediate Separation and Chromatography**, intern., Athens, Greece. (G. Parissakis, Technical Univ. of Athens, Odos 28 Octovriou 42, Athens)

19–25. World **Medical** Assoc., 19th general assembly, London, England. (H. S. Gear, 10 Columbus Circle, New York 10019)

20. **Organic Solid State**, 3rd annual symp., Franklin Inst., Philadelphia, Pa. (M. M. Labes, Franklin Inst. Research Laboratories, Philadelphia 19103)

20. **Photo-Electronic Image Devices** as Aids to Scientific Observation, symp., London, England. (G. V. McGee, Dept. of Physics, Imperial College of Science and Technology, South Kensington, London S.W.7)

20–22. **Glacier Mapping**, symp., Ottawa, Ont., Canada. (Intern. Assoc. of Scientific Hydrology, 61 rue des Ronces, Gentbrugge, Belgium)

20–24. **Biochemistry**, 8th Latin meeting, Lisbon, Portugal. (S. F. Gomes da Costa, Laboratorio de Quimica Fisiologica, Faculdade de Medicina, Hospital de Santa Maria, Lisbon)

20–24. **Burn Research**, intern. congr., Edinburgh, Scotland. (A. Sutherland, Royal Hospital for Sick Children, Sciennes Rd., Edinburgh 9)

20–24. **Fundamental Research**, 3rd intern. symp., Cambridge, England. (H. W. Emerton, Reed Paper Group Ltd., Re-

search and Development Centre, Aylesford, Maidstone, Kent, England)

20–24. International Council of Societies of **Industrial Design**, 4th general assembly and congr., Vienna, Austria. (Mrs. D. des Cressonieres, 70 Coudenberg, Brussels, Belgium)

20–24. **Thermionic Electrical Power Generation**, intern. conf., London, England. (Inst. of Electrical Engineers, Savoy Pl., London W.C.2)

20–27. Comparative and Cellular **Pathology of Epilepsy**, symp., Liblice, Czechoslovakia. (F. Hrabal, Foreign Relations Dept., Czechoslovak Academy of Sciences, Narodni tr. 3, Prague 1)

21–23. **Chemurgic** conf., Columbus, Ohio. (J. Ticknor, Chemurgic Council, 350 Fifth Ave., New York, N.Y.)

21–23. **Fiber** Soc., 25th mtg., Boston, Mass. (Box 625, Princeton, N.J.)

21–23. **Magnetism**, European conf., Vienna, Austria. (Verein Deutscher Eisenhüttenleute, Breit Str. 27, Düsseldorf, Germany)

21–23. **Plasma Electromagnetics of Hypersonic Flight**. 3rd symp., Boston and Bedford, Mass. (A. Cahill, Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Bedford, Mass. 01731)

21–23. **Touch, Heat, and Pain**, CIBA symp., London, England. (CIBA, 41 Portland Pl., London W.1)

21–25. Propagation Factors in **Space Communication**, symp., Rome, Italy, (Lt. Col. E. F. Dukes, Advisory Group for Aeronautical Research and Development, 64 rue de Varenne, Paris 7, France)

22–24. Practice of **Gas Chromatography**, 4th annual mtg., St. Louis, Mo. (N. Brenner, Perkin-Elmer Corp., Main Ave., Norwalk, Conn.)

22–24. Canadian **High Polymer Forum**. 13th, Ottawa, Ont. (D. M. Wiles, Div. of Applied Chemistry, National Research Council, Ottawa)

22–24. **Military Electronics**, conf. (MIL-E-CON 9), Washington, D.C. (L. H. King, Atlantic Research Corp., Shirley Hwy. at Edsall Rd., Alexandria, Va.)

22–24. American Soc. of **Photogrammetry**, 30th semiannual conv., Wright-Patterson AFB, Ohio. (A. J. Cannon, Research and Technology Div., Wright-Patterson AFB)

22–25. Committee of European **Acarologists**, symp., Milan, Italy. (G. Mathys, Stations Federales d'Essais Agricoles, Lausanne, Switzerland)

22–25. **Amblyopia Exanopsia**, intern. symp., Liége, Belgium. (R. Weekers, Clinique Opthalmologique, Universite de Liége, 66 blvd. de la Constitution, Liege)

22–25. British Assoc. for **Cancer Research**, annual, Dublin, Ireland. (J. G. Bennerre, Courtauld Inst., Middlesex Hospital, London W.1, England)

22–26. **Paläontologische Gesellschaft**, mtg., Zurich, Switzerland. (E. Kuhn-Schnyder, Paläontologisches Institut d. Univ. Zurich, Künstlergasse 16, 8006, Zurich)

22–28. **Radiology**, 11th intern. congr., Rome, Italy. (Secretariat, Via Reno 21, Rome)

23–25. French **Medical** Congr., Paris. France. (M. Bricaire, 40 rue Scheffer, Paris 16)

23–25. Society of the **Plastics** Industry, New England sect., 21st annual, Groton, Conn. (The Society, 250 Park Ave., New York 10017)

23–26. **Mycology**, tripartite conf., Germany, Austria, Switzerland; Klagenfurt, Austria. (Ostrian Mycology Soc., Postfach 200, Vienna 1)

23–28. **Electronics and Vacuum Physics**, 3rd Czechoslovak conf., Prague, Czechoslovakia. (Organizing Committee, Ke Karlovu 5, Dept. of Electronics and Vacuum Physics, Prague 2)

24–25. **Communications**, 13th conf., Cedar Rapids, Iowa. (Inst. of Electrical and Electronics Engineers, Box A, Lenox Hill Station, New York 21)

25–30. International Soc. of **Nephrology**, 3rd intern. congr., Washington, D.C. (Secretariat, 9650 Wisconsin Ave., Washington, D.C. 20014)

26–29. American Inst. of **Chemical Engineers**, 57th natl., Minneapolis, Minn. (AIChE, 345 E. 47 St., New York 10017)

27. Society for **Pediatric Radiology**, Washington, D.C. (J. L. Gwinn, Children's Hospital, 4614 Sunset Blvd., Los Angeles, Calif.)

27–29. Chemistry of the **Solvent Extraction of Metals**, intern. conf., Atomic Energy Research Establishment, Harwell, England. (F. K. Pyne, B. 329, Harwell)

27–1. **Community Oral Health**, hemispheric conf., San Juan, P.R. (N. O. Harris, School of Dentistry, Univ. of Puerto Rico, San Juan 00905)

27–1. **Urology**, French congr., Paris, France. (J. Michon, French Assoc. of Urology, 47, boul. des Invalides, Paris 7)

28. Society of Austrian **Chemists**, general assembly, Graz, Austria. (The Society, Eschenbachgasse 9, Vienna 1)

28–29. **Electric Heating**, 7th biennial conf., Cleveland, Ohio. (A. F. Leatherman, Battelle Memorial Inst., 505 King Ave., Columbus, Ohio 43201)

28–30. German Soc. for **Documentation**, 17th annual, Constance, Germany. (The Society, Schubertstr. 1, Frankfurt am Main, Germany)

28–30. Physics and **Nondestructive Testing**, symp., Dayton, Ohio. (D. W. J. McGonnagle, IIT Research Inst., 10 W. 35 St., Chicago, Ill. 60616)

28–30. Industrial and Commercial **Power Systems**, conf., Buffalo, N.Y. (J. A. Hart, Allison Div., General Motors Corp., Box 894, Indianapolis 6, Ind.)

28–1. **Experimental Mechanics**, 2nd intern. congr., Washington, D.C. (J. L. Jones, Soc. for Experimental Stress Analysis, 21 Bridge Sq., Westport, Conn. 06880)

28–1. Society for **Experimental Stress Analysis**, Washington, D.C. (B. E. Rossi, 21 Bridge Sq., Westport, Conn.)

28–1. **Inhaled Particles and Vapors**, Cambridge, England. (J. S. McLintock, Medical Service, Natl. Coal Board, Hobart House, Grosvenor Pl., London S.W.1)

28–1. **Medical Electronics**, European symp., Brighton, England. (J. Pearce, 4 Mill St., London W.1)

28–2. **Hyperpure Materials** in Science and Technology, Inst. for Applied Physics of Hyperpure Materials, Dresden, Germany. (The Institute, Dresden A 20, Winterbergstr. 28, East Germany)

29–1. German Soc. for **Aviation and Space Medicine**, intern. congr., Munich, Germany. (H. von Diringshofen, German Soc. for Aviation and Space Medicine, Silcherstr. 6, Munich 13)

29–1. **Analytical Chemistry**, symp., Graz, Austria. (Prof. Gutmann, Austrian Assoc. for Microchemistry and Analytical Chemistry, Eschenbachgasse 9, Vienna 1)

29–1. European **Atomic Forum**, 2nd congr., Frankfurt am Main, Germany. (European Atomic Energy Forum, 26, rue de Clichy, Paris 9)

29–1. American **Vacuum** Soc., 12th annual symp., New York, N.Y. (R. L. Jepsen, Varian Associates, 611 Hansen Way, Palo Alto, Calif.)

October

1–3. French-Language Assoc. of **Scientific Psychology**, 10th study sessions, Marseilles, France. (P. Fraisse, The Association, Inst. de Psychologie, 28, rue Serpente, Paris 6e)

1–11. International **Scientific Film** Assoc., 19th annual congr., Bucharest, Rumania. (ISFA, 38, avenue des Termes, Paris 17e, France)

2. Association of **Clinical Biochemists**, annual, London, England. (D. W. Moss, Postgraduate Medical School, Ducane Rd., London, W.12)

3–5. **Refractory Metals**, 4th symp., French Lick, Ind. (J. Maltz, Materials Research Div., NASA, 600 Independence Ave., SW, Washington, D.C. 20546)

3–7. American **Phytopathological** Soc., Miami Beach, Fla. (J. R. Shay, Dept. of Botany and Plant Pathology, Purdue Univ., Lafayette, Ind.)

3–8. **Clinical Pathology**, 6th intern. congr., Rome, Italy. (B. L. Della Vida, Via de'Penitenzieri 13, Rome)

3–9. **Water Desalination**, 1st intern. symp., Washington, D.C. (Atomic Industrial Forum, 850 Third Ave., New York 10022)

4–5. **Enzyme Regulation**, 4th intern. symp., Indiana Univ., Indianapolis. (G. Weber, Indiana Univ. School of Medicine, Indianapolis 46207)

4–5. **Physical Metallurgy of Refractory Metals**, conf., American Inst. of Mining, Metallurgical, and Petroleum Engineers, French Lick, Ind. (AIME, 345 E. 47 St., New York 10017)

4–6. **Electronics**, Canadian conf., Toronto, Ont. (W. M. Lower, 1819 Yonge St., Toronto)

4–6. **Industrial Organic Analysis**, Analytical Chemistry Div., Chemical Inst. of Canada, Sarnia, Ont. (R. M. Small, Research Dept., Polymer Corp, Sarnia)

4–6. International **Scientific Radio Union**/Inst. of **Electrical and Electronics Engineers**, fall meeting, Dartmouth College, Hanover, N.H. (IEEE, Box A, Lenox Hill Station, New York, N.Y.)

4–7. **Instrument-Automation** Conf., Los Angeles, Calif. (E. M. Grabbe, Instrument Soc. of America, 530 William Penn Pl., Pittsburgh, Pa. 15219)

4–7. **Otorhinolaryngology**, 62nd French congr., Paris, France. (H. Guillon, 6, avenue Mac-Mahon, Paris 16e)

4–7. **Research Equipment**, exhibit and instrument symp., 15th annual, Bethesda, Md. (J. B. Davis, Natl. Institutes of Health, Bethesda, Md. 20014)

4–7. International Committee for **Social Sciences Documentation**, annual plenary assembly, Budapest, Hungary. (J. Meyriat, 27, rue St. Guillaume, Paris 7)

4–8. **Aeronautic and Space Engineering**, Soc. of Automotive Engineers, Los Angeles, Calif. (C. C. King, SAE Western Branch, 999 North Sepulveda Blvd., El Segundo, Calif. 90245)

4–8. Ciba Foundation **Clinical Research** Guest Conf., London, England. (Ciba, 41 Portland Pl., London W.1)

4–10. **Physicists**, conf., Frankfurt am Main, Germany. (G. Schubert, Inst. für Theoretische Physik, Universität, Mainz, Germany)

4–13. International Council for the **Exploration of the Sea**, 53rd annual meeting, Rome, Italy. (The Council, Charlottenlund Slot, Charlottenlund, Denmark)

4–13. **Commonwealth Medical** Conf., Edinburgh, Scotland. (Mrs. J. Hotchkiss, Ministry of Overseas Development, Eland House, Stag Place, London, S.W.1, England)

5–7. Industrial and Commercial **Power Systems**, conf., Buffalo, N.Y. (T. O. Zittel, Bethlehem Steel Co., 3555 Lake Shore Rd., Buffalo 14219)

5–8. International Committee of **Weights and Measures**, session, Sèvres, France. (Intern. Bureau of Weights and Measures, Pavillon de Breteuil, Sèvres, Sein-et-Oise, France)

5–9. **Infectious Pathology**, 4th intern. congr., Freiburg im Breisgau, Germany. (G. Mossner, Hugerterstr. 55, Freiburg im Breisgau)

5–9. **Tuberculosis**, 18th intern. conf., Munich, Germany. (Intern. Union Against Tuberculosis, 15, rue Pomereu, Paris 16e, France)

6–8. **Dynamics of Fluids and Plasmas**, symp., Univ. of Maryland, College Park. (S. I. Pai, Inst. for Fluid Dynamics and Applied Mathematics, Univ. of Maryland, College Park 20742)

6–8. **Optical** Soc. of America, annual meeting, Philadelphia, Pa. (M. E. Warga, OSA, 1155 16th St., NW, Washington, D.C. 20036)

6–8. Royal Inst. of **Public Health and Hygiene**, annual conf., Weymouth, England. (Secretary, RIPHH, 28 Portland Place, London, W.1, England)

6–10. **Wood and Organisms**, intern. symp., Berlin, Germany. (German Soc. for Wood Research, Danneckerstr. 37, Stuttgart S, Germany)

7–9. **Seismological** Soc. of America, eastern sec. 37th annual, Lamont Geological Observatory, Palisades, N.Y. (J. Dorman, Lamont Geological Observatory, Palisades 10964)

8–9. **Atlantic Coastal Plain Geological** Assoc., field trip, South Carolina. (D. J. Colquhoun, Dept. of Geology, Univ. of South Carolina, Columbia)

8–9. Association of Midwestern **College Biology Teachers**, 9th annual conf., Northern Illinois Univ., DeKalb)

8–9. **Indiana** Acad. of Science, fall meeting, Notre Dame. (C. F. Dineen, St. Mary's College, Notre Dame)

9. **Paleontological Research** Inst., Ithaca, N.Y. (K. V. W. Palmer, Paleontological Research Inst., 109 Dearborn Pl., Ithaca)

9–10. **Gastroenterology**, French conf., Paris, France. (R. Biguie, 79, Boulevard Malesherbes, Paris 8e)

9–13. American Soc. of **Clinical Hypnosis**, Chicago, Ill. (F. D. Nowlin, ASCH, 800 Washington Ave., SE, Minneapolis, Minn. 55414)