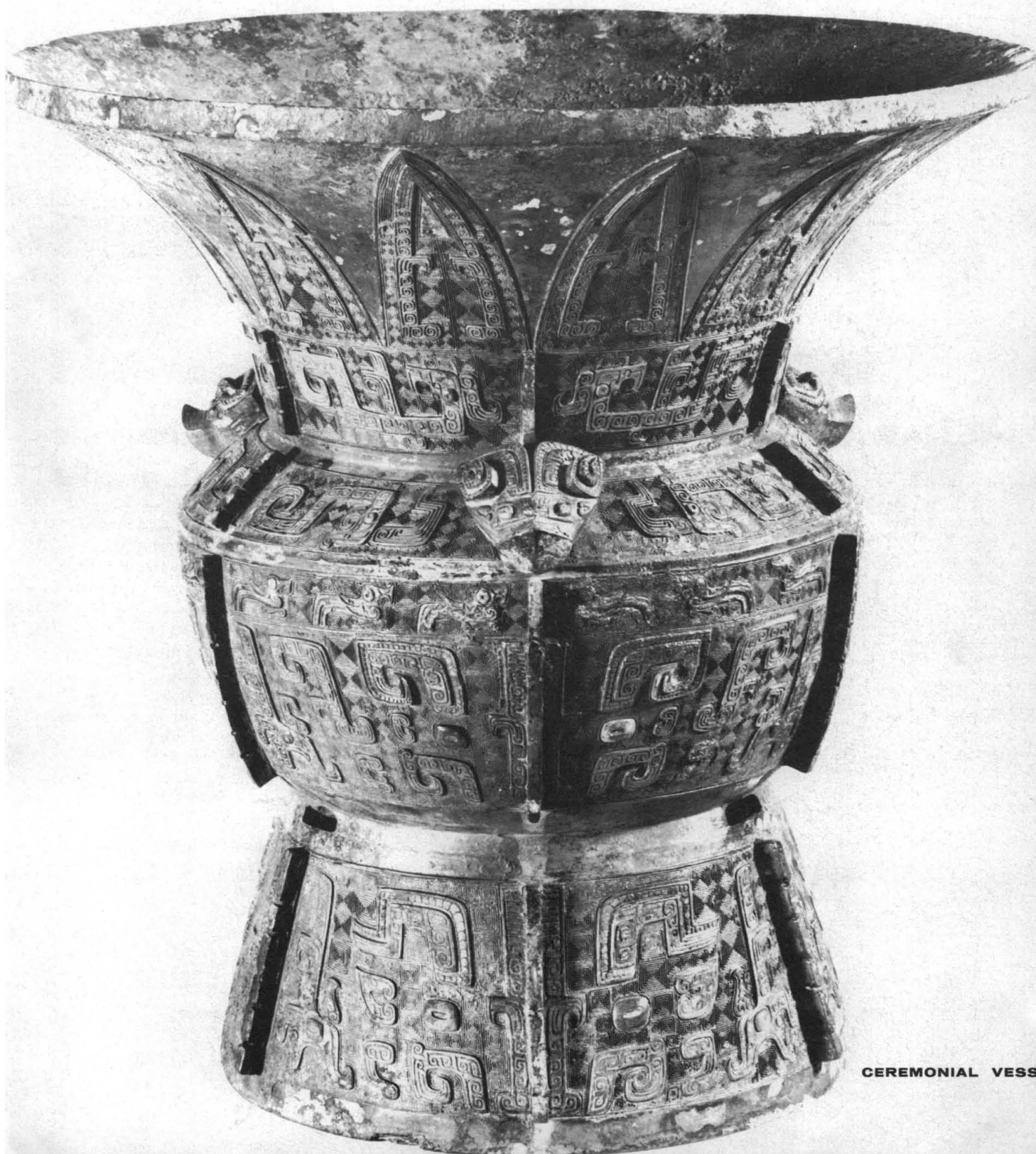


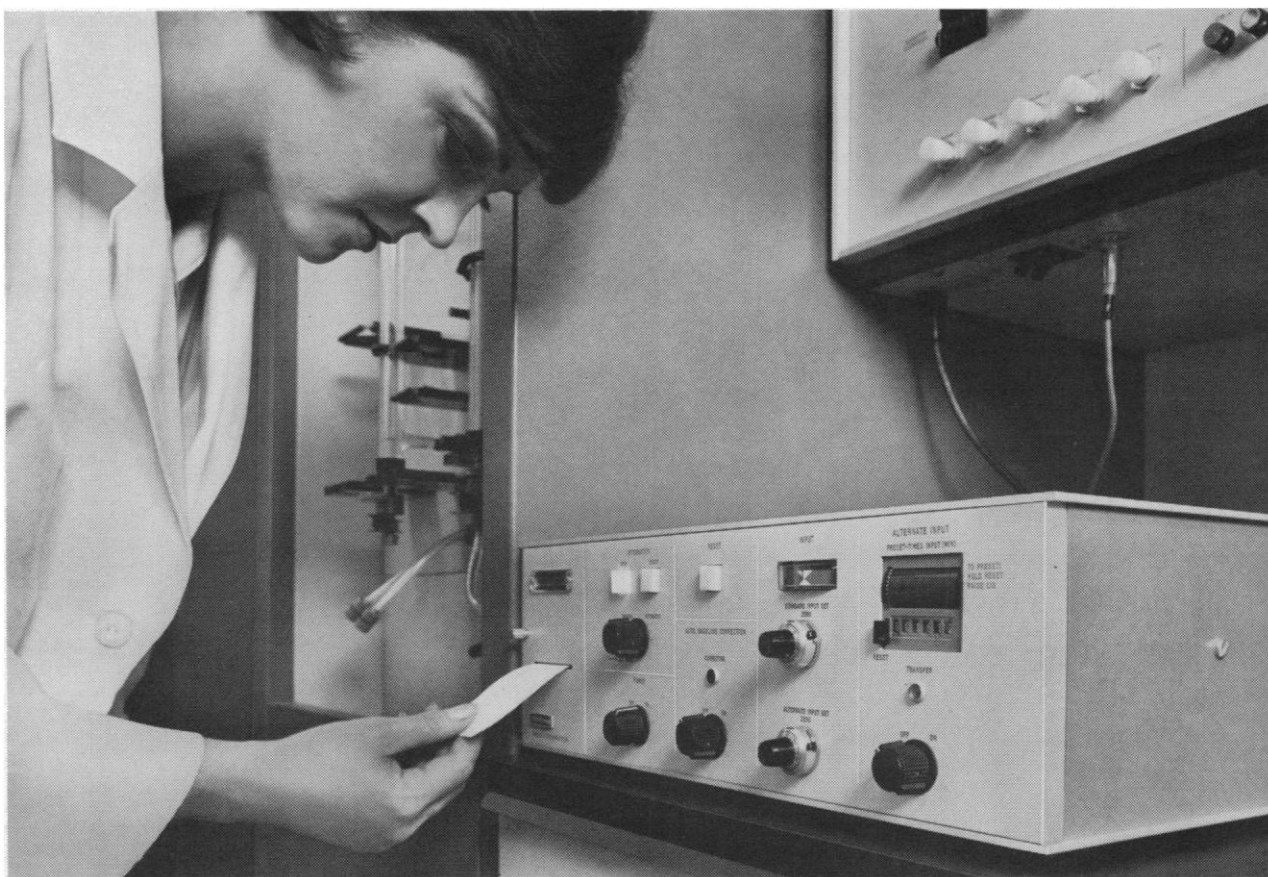
SCIENCE

14 May 1965
Vol. 148, No. 3672

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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3	0	9	0	7
2	0	3	8	0
1	0	3	6	0
0	0	3	5	5
9	1	3	3	6
8	2	1	0	8
7	0	8	6	9
6	0	2	4	8
5	0	1	5	9
4	4	5	8	7
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Vol. 148, No. 3672

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Chinese bronze vessel of the type Tsun, Shang Dynasty. Decorations are cast in high and low relief. Patination ranges from dark green to grey with patches of cuprite. Height, 37 centimeters. See page 908. [Freer Gallery, Washington, D.C.]

The American Association for the Advancement of Science was founded in 1848 and incorporated in 1974. Its objects are to further the work of scientists, to facilitate cooperation among them, to prove the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

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26 May 1965

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Morning Session: **Accomplishments**

Session Chairman: William L. Davis, *President, Emerson Electric Company*

Speakers: **Hugh L. Dryden**, *Deputy Administrator, NASA*
George E. Mueller, *Associate Administrator, NASA Office of Manned Space Flight*
Homer E. Newell, *Associate Administrator, NASA; Office of Space Science and Applications*

Luncheon: **Speaker, Edward C. Welsh**, *Executive Secretary, National Aeronautics and Space Council, Washington, D. C.*

Afternoon Session: **Goals and Future Programs**

Session Chairman: Edward A. O'Neal, Jr., *Chairman, Monsanto Company*

Speakers: **Hendrik C. van de Hulst**, *Professor, Leiden University, Holland, and President, International Council of Scientific Unions Committee on Space Research (COSPAR)*
Walter Orr Roberts, *Director, National Center for Atmospheric Research*
Gordon J. F. MacDonald, *Professor of Geology and Geophysics, University of California, Los Angeles*
Thomas Gold, *Director, Center for Radiophysics and Space Research, Cornell University*

Dinner:

Speaker

27 May 1965

Influences on Industry and the Economy

Carroll A. Hochwalt, *President, St. Louis Research Council*

S. W. Herwald, *Group Vice President, Westinghouse Electric Corporation*
Walter Isard, *Chairman, Department of Regional Science, University of Pennsylvania*
Arthur M. Weimer, *Dean, Graduate School of Business, Indiana University*

Speaker, Senator W. Stuart Symington

Impact on Science

George E. Pake, *Provost, Washington University*

Raymond L. Bisplinghoff, *Associate Administrator, NASA Office of Advanced Research and Technology*
Richard W. Porter, *General Electric Co., Acting Chairman, Space Science Board, National Academy of Sciences*
James R. Killian, *Chairman, Massachusetts Institute of Technology*

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28 May 1965

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Joseph V. Charyk, *President, Communications Satellite Corporation*
Richard R. Hough, *Vice President, American Telephone & Telegraph Co.*
Elmer W. Engstrom, *President, Radio Corporation of America*

Werner Von Braun, *Director, NASA*
George C. Marshall, *Space Flight Center, Huntsville, Alabama*

Opportunities and Implications

Thomas H. Eliot, *Chancellor, Washington University*

Charles S. Draper, *Chairman, Department of Aeronautics and Astronautics, Massachusetts Institute of Technology*
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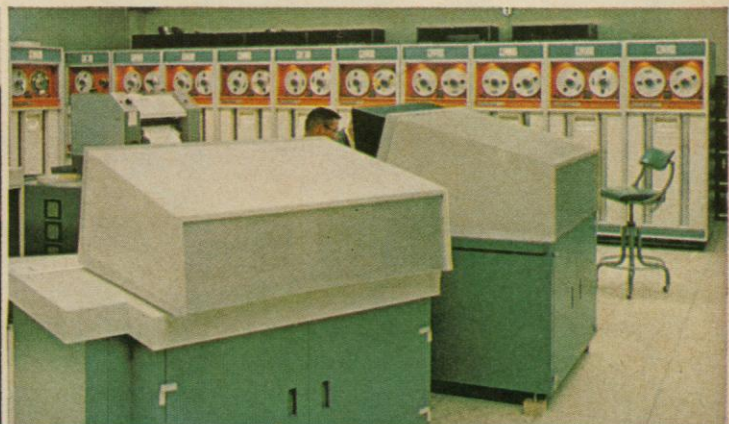
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Report from
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SUPERCONDUCTING MAGNET FOR MASERS PROVIDES UNIFORM FIELD, ADJUSTABLE BANDWIDTH

For efficient operation, a low-noise traveling-wave maser needs a very low-temperature environment such as that of liquid helium (4.2°K) and a uniform magnetic field which determines the maser's operating frequency. These requirements suggest using a superconducting magnet for providing the field.

A compact maser amplifier based on this concept has been developed at Bell Laboratories. It incorporates an 8-pound superconducting magnet immersed in liquid helium, replacing an earlier

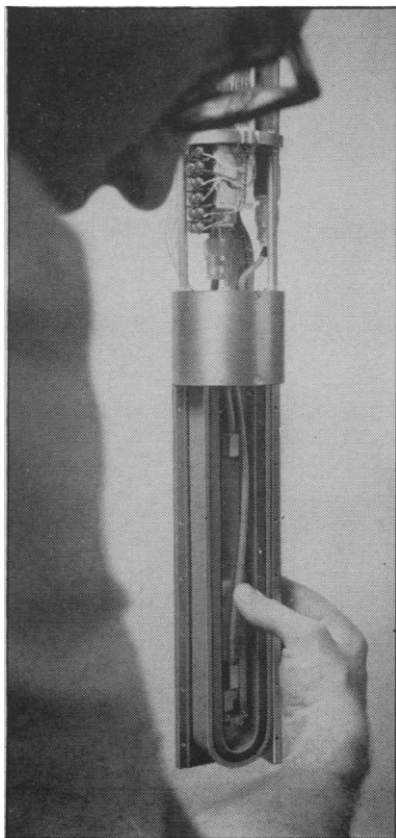
500-pound Alnico magnet mounted outside the dewar. This maser also provides the desirable feature of an adjustable bandwidth of amplification.

As shown in the illustrations, the uniform field is obtained with a superconducting solenoid enclosed in a close-fitting box of high-permeability iron. Adjustable bandwidth is obtained with an auxiliary superconducting trimmer coil which overlays one half the solenoid cross section. This coil modifies the main field, creating two discrete and individually uni-

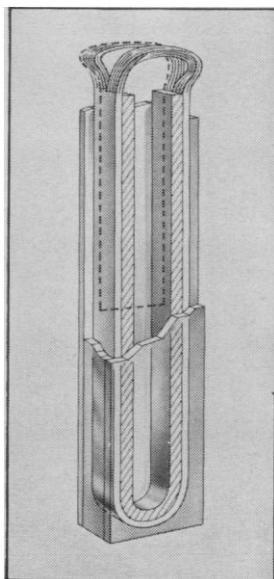
form field regions. Changing the current in the coil adjusts the "step" between the two fields and thereby changes the bandwidth.

The two fields are each uniform to one part per thousand near 3300 gauss, and the maser bandwidth can be adjusted smoothly from 14 to 55mc centered at an operating frequency near 4170mc.

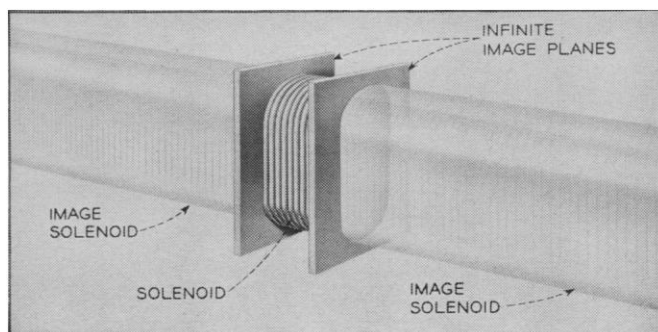
At the broadest band, its gain is 34db with an effective noise temperature of 5°K . The maser has demonstrated stable low-noise performance in a variety of satellite communications experiments.



New maser magnet (left) has front and left side of enclosure removed to expose superconducting solenoid. Drawing (center) corresponds to photograph and shows solenoid inside box enclosure. Solenoid is wound on U-shaped nonmagnetic form and is spread apart at top to permit insertion of the maser. Dotted line indicates position of trimmer coil. Drawing at right indicates how front and rear plates of enclosure act as "image planes." These high-permeability plates are made to appear very large by the magnetic return paths provided by the sides of the box. The resulting magnetic field approximates the ideal uniform field of a solenoid of infinite length.



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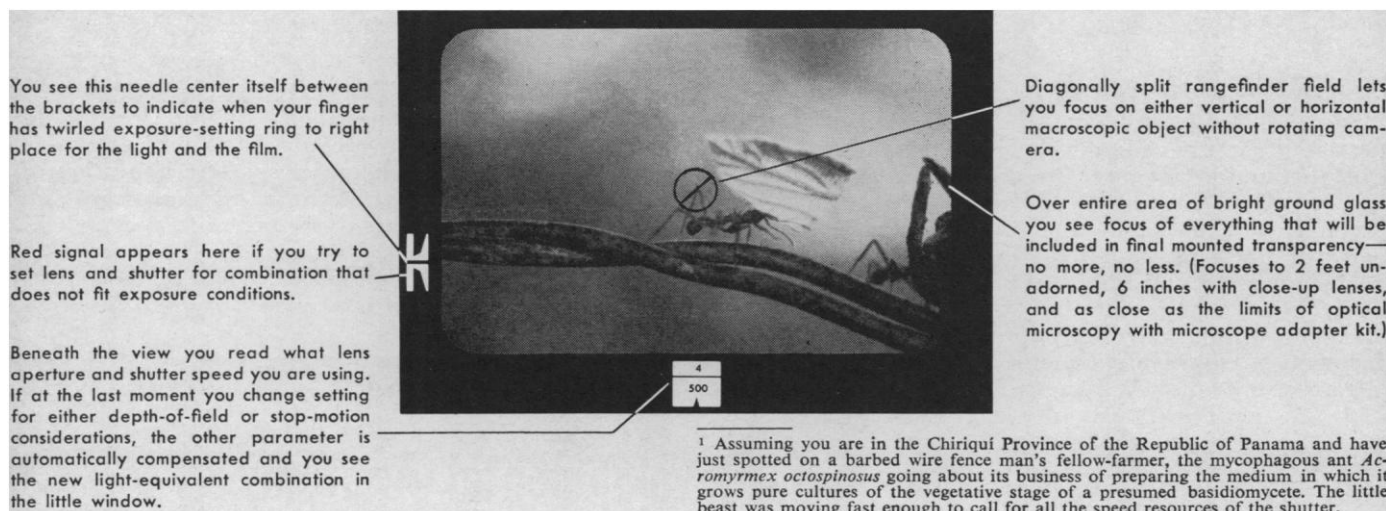
Kodak reports on:

an informative view in the viewfinder... optimism about fine temperature differences

For communication by color slides

There are many millions of amateur photographers, many thousands of professional photographers, and ever-growing numbers of other persons who need to use a camera professionally for communication with assemblies of colleagues. Best current choice for the latter category is the KODAK

RETINA Reflex IV Camera. It's a pretty camera, but since you are not likely to admit even to yourself that you could be interested in it for its looks, we shall let you wait to see it and manipulate it at your camera shop. Instead we devote the illustration here to what is seen through the viewfinder.¹



The possible dawn of the cholesterol age

D.C.B., a chemist of ours and an extremely busy man, took a day off. Mrs. B., a clever girl enjoying a fine run of good fortune on a nationally televised contest, had reached the stage of competing for a substantial prize in Florida real estate. He kept her company to New York for the shot at the big one. But to make good use of his hour aloft, he took along *Scientific American* to catch up on science as an aspect of modern culture. There, in the August 1964 issue, he found an article on the cholesteric state of matter. Suddenly a question answered itself. Suddenly he understood why our Eastman Organic Chemicals Department had been getting inquiries lately for the esters of cholesterol.

A corporation no less respected than Kodak was permitting one of its scientists to disclose in the magazine certain exciting physical properties of the esters of that greasy stuff which has lately become familiar by name to middle-aged males who live well. The new-found properties offer little apparent cause for worry. On the contrary, the author winds up on a broadly optimistic note hinting at forthcoming discoveries that might assign cholesterol a central role in the sensory mechanism of the vertebrates. The optimism is generated by a remarkable sensitivity to fine temperature differences and to traces of various vapors that is seen in the color of the light reflected by layers of the esters. Though cholesteryl esters are old stuff, as are the nematic, smectic, and cholesteric interregna between the liquid and solid states of matter, new visions arise of salves that show the physician epidermal temperature anomalies difficult at best to find with complex instruments,² of simple nondestructive test methods that reveal structural unsoundness through singularities in heat flow.

² The Journal of Investigative Dermatology, 43, 89.



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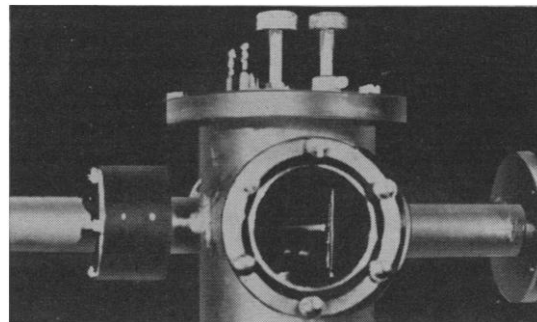
Components are now available for converting 3, 4 and 5 MeV machines to produce He^{++} ions at higher energies. Specifications: 30 μA at 5.0 MeV; 10 μA at 7.0 MeV; 5 μA at 10.3 MeV. More than double this current performance has been demonstrated but with some loss in stability and reliability. Multiple-charge states (2, 3 and 4) of neon, oxygen

and nitrogen have also been produced with the new kit installed in a 3 MeV Van de Graaff. Beam energies from 50.4 MeV to 9.8 MeV and beam currents from 0.1 to 10 μA were observed. For details on the new He^{++} kit and experimental results, write for Technical Note #13.

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The refinement and application of this technique promises to be of major importance in the theory of atomic structure, in measuring hot plasma temperatures, and in acting for the means of energy loss in fast fission fragments in an absorber. Perhaps most importantly, it will help determine the relative abundance of the elements in the sun and other stars, which is the basis for theory of stellar evolution, the origin of the chemical elements, the age

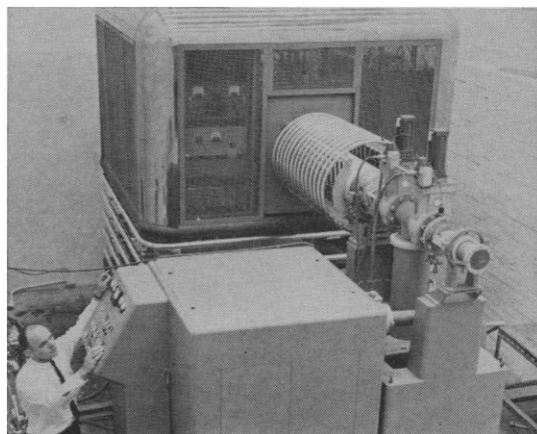


A nitrogen beam, 0.8 μA at 2 MeV, passes from right to left through a carbon foil approximately $9\mu\text{g}/\text{cm}^2$ thick, of astronomical objects and the nature of the stellar energy. For further details, ask for Technical Note #10.

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14 MAY 1965

Basic Research and National Goals

During the past 2 years the National Academy of Sciences has been increasingly active in exploring policy questions relevant to science. A major instrument for this effort has been a Committee on Science and Public Policy, of which the chairman is George B. Kistiakowsky. This committee in 1964 issued a useful report entitled, "Federal Support of Basic Research in Institutions of Higher Learning." Panels appointed by the committee have studied opportunities and needs in several subjects. An excellent report on ground-based astronomy already has been issued. Another group, a panel on Basic Research and National Goals, has issued its report recently (*Science*, 30 April). This was prepared in response to two extremely difficult questions posed by the Committee on Science and Astronautics of the House of Representatives.

1) What level of Federal support is needed to maintain for the United States a position of leadership through basic research in the advancement of science and technology and their economic, cultural, and military applications?

2) What judgment can be reached on the balance of support now being given by the Federal Government to various fields of scientific endeavor, and on adjustments that should be considered, either within existing levels of overall support or under conditions of increased or decreased overall support?

Most scientists faced with two such riddles are reminded of the good old days when problems were simpler; for example, "How many angels can dance on the head of a pin?" Nevertheless, the two questions are of a kind that Congress frequently faces.

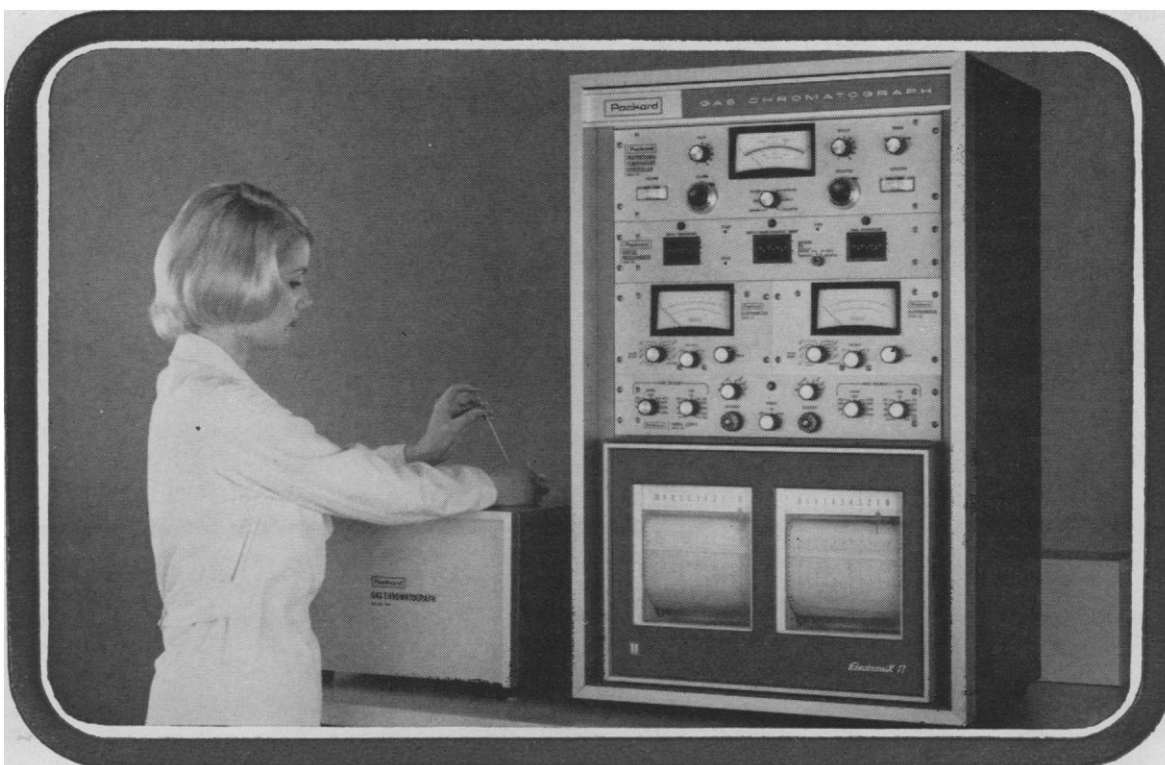
The panel responded to the questions in a manner which was almost unprecedented in Washington. Usually when scientists address themselves to political problems their performance is that of inexperienced politicians. They place a higher value on a consensus than on unearthing the facts, and their report represents only a fraction of the ideas of the group.

In the present instance the approach was different. A panel was constructed whose members held diverse views. Instead of a single report, there were in effect 15. As a consequence, there was much good thinking on the broad problems of basic research and national goals. Scientists generally will find the report interesting and thought-provoking. Congressmen may not find it so valuable; only by interpreting the contents of the 336 pages will they obtain advice.

Nevertheless, a politician can find an answer to the first question. Some panelists advocate an increase of 15 percent per year in the support of basic research. Others do not call for an increase. Few of the panelists make a convincing case that major opportunities are being neglected. A politician may well conclude that an increase of no more than 0 to 15 percent is justifiable.

The report is weak in dealing with question 2. Yet it is in the area of allocation of funds among fields that Congress most needs advice. The report points out that of \$1.6 billion devoted to basic research, half goes to space research. We know that another sizable chunk goes to high-energy physics. Not much over \$600 million a year goes to areas that are likely to produce substantial benefits for society. In the disposition of the sum remaining there are further inequities. Chemistry, a major source of our industrial strength, gets a tiny fraction. Ultimately we must find better means of allocating research funds.

The report, though uneven, is an important contribution to what is likely to be a continuing dialogue. The panel and its chairman merit our gratitude.—PHILIP H. ABELSON



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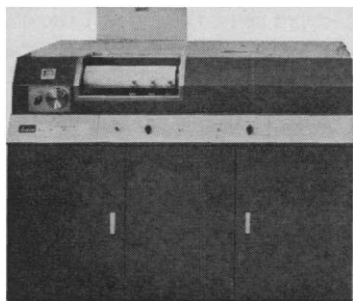
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stressed the unique qualifications of the light microscopist in the interpretation of problems, since, as McCrone stated, "the microscope is the only research tool not adaptable to routine operation by a technician, and the experience of the microscopist is a necessity in sample preparation and interpretation of results." He also proposed a new definition of the term microscopy—as the "study of the composition and behavior of matter on a small scale"—to cover the broad application of the essential tools of the skilled microscopist.

In the session on fibers and polymers, three of the speakers discussed various approaches to the study of the internal structure of fibers. The nature of voids and variations in fiber density was demonstrated by Frederick Morehead (American Viscose) using a double sectioning and embedding technique, involving longitudinal sectioning of viscose rayon. Robert Scott (DuPont), after a brief review of the fundamentals of interferometry, described the combination of this technique with x-ray diffraction and density studies to obtain information about the nature of microvoids and the uniformity of density. Both speakers emphasized the value of birefringence measurements, made with the polarizing microscope, in understanding orientation and density of fibers. Marion Rhodes (University of Massachusetts) described a method of obtaining structural information by mathematical evaluation of low-angle light-scattering patterns of polymers. A polarizing microscope equipped with a Bertrand lens was found most convenient when correlating such patterns with the morphology of the polymers. The size of the lobes of the scattering patterns was related to the average dimension of the spherulites, and this average value gave a more accurate representation of the polymer morphology than could be obtained by direct measurement, which would have been hampered by the presence of background spherulites as well as intergrown material which would be difficult or impossible to measure directly.

Illustrations were presented of these applications and of the changes occurring in polymers during thermal treatment. The surface topography of fibers was explored by Joseph Bloxson, who described how the Tolansky light-profile technique could be used to make quantitative measurements of height-depth variations. This method involves

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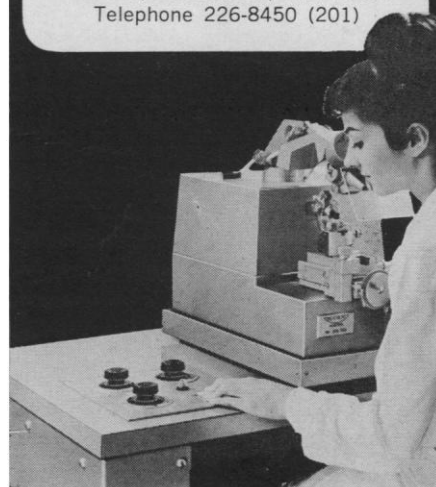
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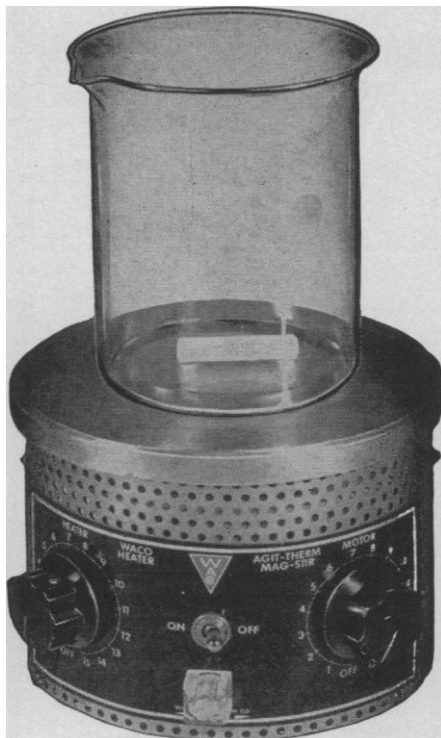
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The proceedings of this meeting will be published and are expected to be available next fall at \$5 per copy through the New York Microscopical Society, located at the Museum of Natural History, 79th Street and Central Park West, New York, N.Y.

MARIE JONES

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The Electron Microscope and Its Future Development

The first successful operation of an electron microscope in North America was announced in 1939 (1). Many of the formidable technical obstacles that lay in the way of obtaining electron optical images at high magnification were overcome in the encouraging atmosphere of E. F. Burton's laboratory at the University of Toronto. Accordingly, to commemorate the anniversary of the announcement, the Burton Society of Electron Microscopists held a special meeting at the university on 16 January 1965. The work of Burton's talented group of students (which included Cecil Hall, J. Hillier, W. A. Ladd, and A. F. Prebus) was described by Hillier (now at RCA, Princeton). The achievement of Hillier and co-workers in rapidly making a modified version of the Toronto microscope commercially available to biologists and physicists considerably influenced the pace of development of ultrastructural investigations.

J. H. Reisner (RCA, Camden) discussed the possibilities of viewing the electron optical image by an image intensifier-television system. It was pointed out that image intensifiers allow electron microscope images to be seen comfortably in a bright room, while the illuminating beam is actually reduced below normal operating intensity. Methods of recording images on video tape and of analyzing the image were discussed. A method of

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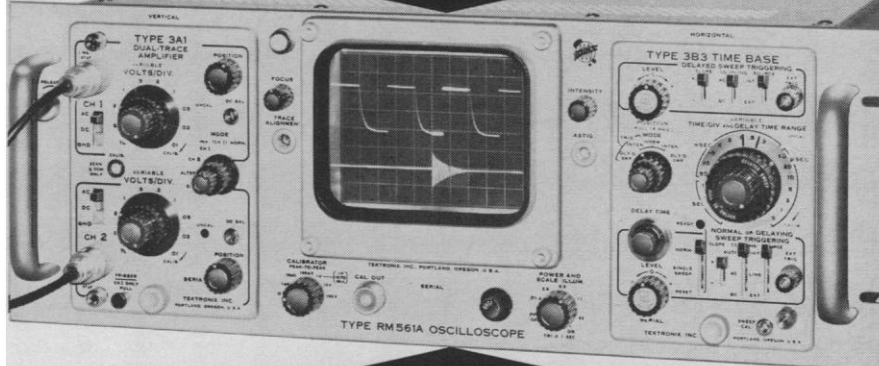
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analyzing the final image by means of a pulse-height analyzer system was described. Each line of the TV scan can be separately analyzed to show the number and density of objects in this part of the image. R. K. Ham (McMaster University) reviewed some recent developments in the transmission electron microscopy of thin crystalline films, especially metals, and gave an outline of the principles of diffraction contrast and the use of selected area electron diffraction. R. D. Heidenreich (Bell Telephone Laboratories) discussed the resolution and contrast limitations in imaging single atoms. He used a wave optical approach, based on reconstruction of the diffraction image present in the back focal plane of the objective lens, to show the limitation in resolution due to the spherical aberration of the objective lens. Deterioration of the image due to inclusion of inelastically scattered electrons was also discussed. D. F. Parsons (University of Toronto) discussed biological applications of electron diffraction and, in particular, recent work on the configuration of polyamino acids in very thin, oriented films.

These lectures were followed by a panel discussion about future development of the electron microscope. Possible ways of enhancing electron optical contrast in order to avoid the use of heavy metal stains for biological materials were discussed. J. H. Reisner indicated that most microscopes in present use are not adjusted for maximum contrast. It is possible to find, for a given microscope, accelerating voltage, focal length for the objective lens, and size and position for the objective aperture which will give optimum contrast. Reisner pointed out that all the information necessary for making these adjustments has been published but has never been summarized in a convenient form for the electron microscopist.

Members of the panel agreed that the best approach to increased electron optical contrast was by use of in-focus phase contrast. This appeared more satisfactory than the low accelerating voltage approach, since there would be less damage to the specimen being examined. In fact, it appears desirable to increase the accelerating voltage above present levels (40 to 100 kv) in order to reduce such damage. Ham indicated that an extra-high-voltage electron microscope would enable thicker and more representative metal specimens to be examined with less loss of

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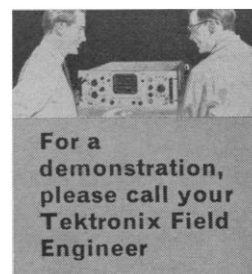
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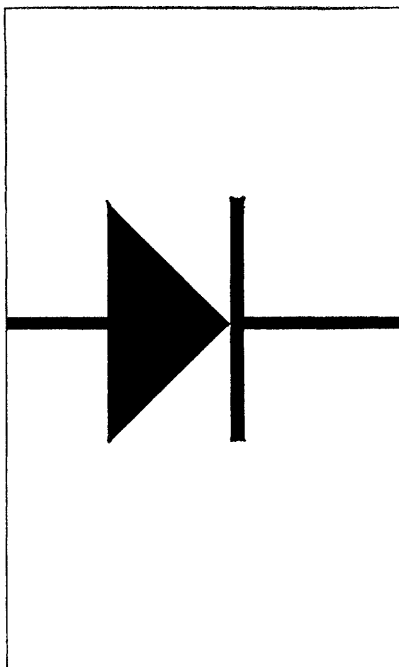
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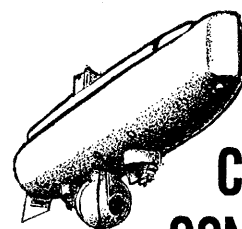
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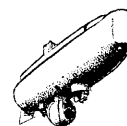
contrast due to inelastically scattered electrons. Possible methods of achieving phase contrast were discussed by Heidenreich, Hillier, A. F. Howatson (University of Toronto), and Reisner. Reisner considered that since the deposition of contamination (a layer of carbon formed by breakdown of hydrocarbon vapor) on objects in the beam can be minimized by surrounding them with a cooled metal surface, it is now more feasible to maintain a quarter wavelength phase plate in operating condition for a practical length of time. However, considerable technical difficulties in the manufacture of phase plates and in protecting them from damage by the electron beam have to be faced. F. W. C. Boswell (Waterloo University) considered that an improvement in contrast would be useful also, for inorganic specimens, in detecting vacancies and small dislocations in crystalline substances.

Hillier prefaced a discussion on improving the resolution beyond the present 5 Å for nonperiodic structures by asking whether such an improvement could be justified in terms of available specimens. At this level of resolution, the specimen would need to be very much thinner than the present minimum 50- to 200-Å thickness. A clear picture of molecular structure or individual atoms can only be obtained if the film is a few atoms or molecules thick. This would preclude the use of the relatively thick conventional Formvar or carbon support films and would require a different way of mounting the specimen. At present there appear to be more possibilities for improving the resolution of the microscope than for improving techniques for the preparation of specimens. Improvements in the objective lens design were discussed by Boswell, Heidenreich, Hillier, Reisner, and B. W. Schumacher (Ontario Research Foundation). The advantages of superconducting magnet lenses were described. With the use of such a lens, using a few turns of wire, it should be possible to make a dimensionally "thin lens" with the spherical aberration reduced to one-half or one-third of usual values. The high magnetic stability of such lenses was emphasized. Schumacher asked whether a mathematical analysis of strong magnetic and electrostatic lenses with intercombined fields should not be made in the hope of finding systems of smaller overall spherical aberration but still having rotational symmetry.



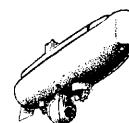
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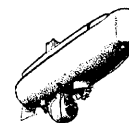


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The early studies of Gabor along these lines were restricted to weak lenses and limited by the fact that computers were not then available. Hillier then brought up the possibility of obtaining a negative spherical aberration lens, suggesting that one type of negative correcting lens (having a very thin charged membrane across the aperture) should be reconsidered now that contamination can be reduced to small proportions. Heidenreich pointed out the necessity for filtering out inelastically scattered electrons. These electrons contain no determinate information about the structure of the object and only cause deterioration in resolution and contrast. However, Schumacher suggested that energy loss contrast is worth investigation where contrast, rather than the resolution, is the limiting factor. The intermediate or final image can be subjected to energy loss analysis in order to accentuate this type of contrast. Reisner pointed out that loss of resolution may also occur due to charging of the specimen. He suggested that a conducting type of resin might be advantageous for reducing charging over thin sections of tissue. More use might be made of thin carbon films evaporated over the specimen. Reisner considered that it would be difficult to neutralize the charges on the specimen with a low-voltage electron gun since the gun itself might cause the specimen to charge up. R. G. E. Murray (University of Western Ontario) indicated that a number of features of present-day microscopes could be improved; for instance, a more efficient phosphor for the viewing screen might be found and a better method of comparing exactly the dimensions of two specimens (or one specimen and a magnification standard) might be devised. There was also some discussion of the difficulties currently experienced by some electron microscopists in preventing significant etching of biological specimens while using cooled-surface, anticontamination devices.

The meeting was adjourned with the resolve to hold further discussions in the near future in Toronto on electron microscope development.

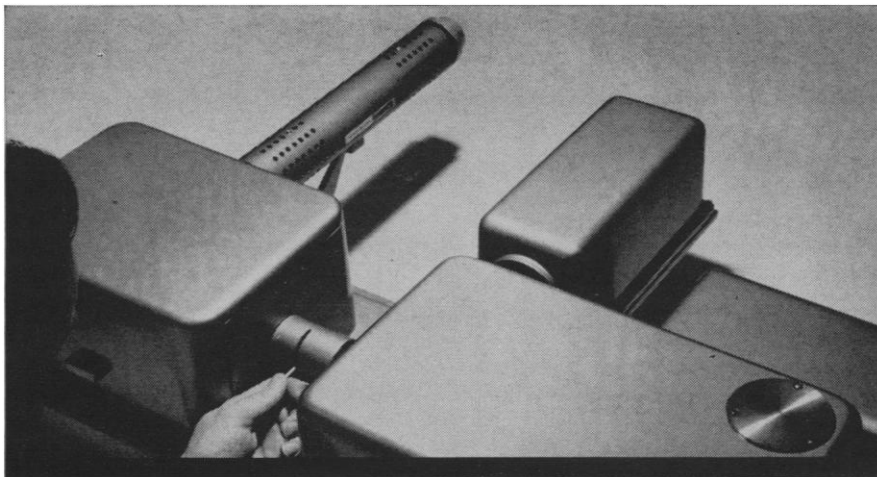
D. F. PARSONS

*Department of Medical Biophysics,
University of Toronto, Toronto 5,
Canada*

Reference

1. A. Prebus and J. Hillier, *Can. J. Research* **A17**, 49 (1939); E. F. Burton, J. Hillier, A. Prebus, *Phys. Rev.* **56**, 1171 (1939).

14 MAY 1965



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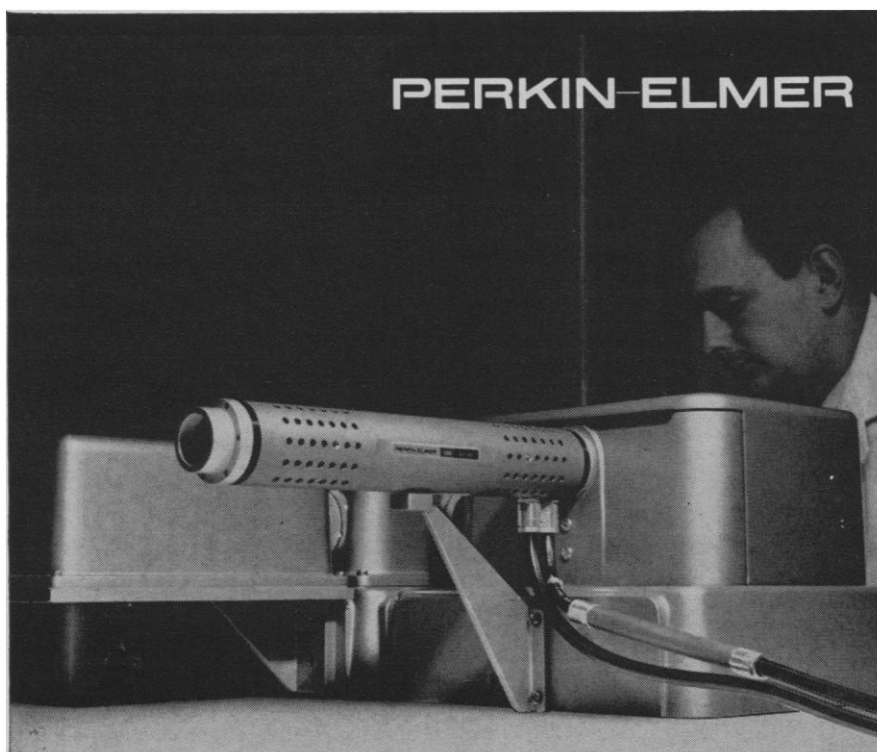
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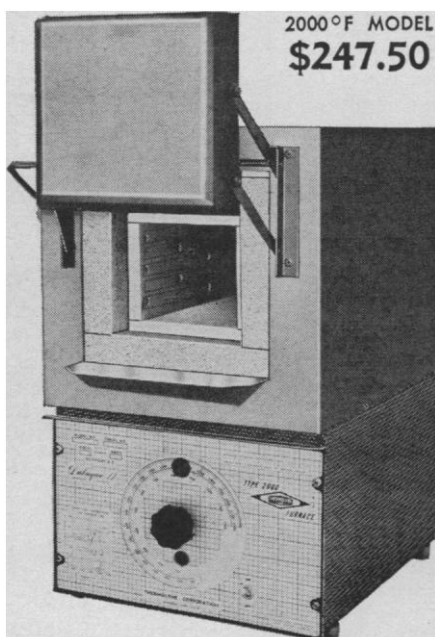




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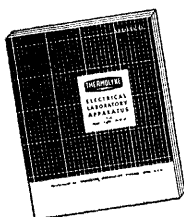
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Forthcoming Events

May

- 20-21. **Fiber Soc.**, Atlanta, Ga. (L. Rebenfeld, Box 625, Princeton, N.J.)
- 20-21. **Medical Diagnostic Applications of Ultrasound**, conf., Pittsburgh, Pa. (C. Moses, Univ. of Pittsburgh School of Medicine, Pittsburgh 15213)
- 20-22. **American Cleft Palate Assoc.**, annual, New York, N.Y. (C. O. Wells, Parker Hall, Columbia, Mo.)
- 20-22. **Diabetology**, Paris, France. (M. Rathery, Hôtel-Dieu, 1, Pl. du Parvis Notre-Dame, Paris 4^e)
- 20-22. **American Gynecological Soc.**, New York, N.Y. (C. J. Lund, 260 Crittenden Blvd., Rochester 20, N.Y.)
- 20-25. **Intersexuality in Fishes**, Sarasota, Fla. (E. Clark, Cape Haze Marine Laboratory, 9501 Blind Pass Rd., Sarasota)
- 21-22. **Surface Physics**, 3rd annual symp., Pullman, Wash. (E. E. Donaldson, Dept. of Physics, Washington State Univ., Pullman)
- 21-22. **Women of Science**, symp., Bennington, Vt. (H. W. Toolan, Putnam Memorial Hospital Inst. for Medical Research, Bennington)
- 21-23. **Exfoliative Cytology**, 2nd intern. congr., Paris, France. (Intern. Acad. of Cytology, 5841 Maryland Ave., Chicago, Ill. 60637)
- 23-24. **American Laryngological Assoc.**, annual, Colorado Springs, Colo. (L. G. Richards, 12 Clovelly Rd., Wellesley Hills 82, Mass.)
- 23-26. **Administrative Management Soc.**, 46th intern. conf., Minneapolis, Minn. (R. C. Walter, 32 W. 40 St., New York 10018)
- 23-26. **Radiation Research**, 13th annual, Philadelphia, Pa. (A. C. Upton, Biology Div., Oak Ridge Natl. Laboratory, Oak Ridge, Tenn.)
- 23-26. **Social Medicine**, intern. conf., Berlin, Germany. (Secretariat, Deutsche Gesellschaft für Sozialmedizin, Alsterglacis 3, Hamburg 13, Germany)
- 24-26. **Hygiene and Preventive Medicine**, 4th intern. congr., Vienna, Austria. (Vienna Acad. of Medicine, Alserstr. 4, Vienna 9)
- 24-26. **Standardization of Pharmaceutical Preparations**, 2nd intern. congr., Leipzig, East Germany. (J. Richter, Deutsches Inst. für Arzneimittelwesen, Grosse Seestr. 4, Berlin-Weissensee, East Germany)
- 24-27. **Thyroid**, 5th intern. conf., Rome, Italy. (T. Winship, American Thyroid Assoc., 110 Irving St., NW, Washington, D.C. 20010)
- 24-28. **Australian Inst. of Metals**, annual conf., Brisbane. (Secretary, AIM, P.O. Box 107, North Quay, Brisbane)
- 24-28. **International Planned Parenthood Federation**, Western Pacific regional conf., Seoul, Korea. (T. Katagiri, IPPF Western Pacific Regional Office, No. 2, 1-chome, Sadohara-cho, Ichigaya, Shinjuku, Tokyo, Japan)
- 24-28. **Radioisotope Sample Measurement Techniques in Medicine and Biology**, intern. symp., Vienna, Austria. (J. H. Kane, Intern. Conferences Branch, Div. of Special Projects, U.S. Atomic Energy

Commission, Washington, D.C. 20545)

24-29. **International Federation for Information Processing**, congr., New York, N.Y. (AFIP, 345 E. 47 St., New York 10017)

24-1. **Cloud Physics**, intern. conf., Tokyo and Sapporo, Japan. (H. Hatakeyama, Japan Meteorological Agency, Otemachi Chiyoda-ku, Tokyo)

25. **American Iron and Steel Inst.**, annual, New York, N.Y. (G. S. Rose, 150 E. 42 St., New York 10017)

25-26. **American Otological Soc.**, Colorado Springs, Colo. (J. A. Moore, 525 E. 68 St., New York 10021)

25-27. **Armed Forces Communications and Electronics Assoc.**, 19th annual conv., Washington, D.C. (AFCEA, 1725 Eye St., NW, Washington 20006)

25-27. **American Astronautical Soc./Aerospace Electrical Soc., Space Electronics symp.**, Los Angeles, Calif. (L. T. Isaacs, Douglas Aircraft Corp., Long Beach, Calif.)

25-28. **American Assoc. for Contamination Control**, 4th annual, Miami Beach, Fla. (W. T. Maloney, AACC, 6 Beacon St., Boston, Mass. 02108)

25-29. **Structure and Control of the Melanocyte**, conf., Sofia, Bulgaria. (N. Anchev, c/o Oncological Inst., Sofia)

25-29. **American Assoc. on Mental Deficiency**, 89th annual, Miami Beach, Fla. (J. E. Horner, AAMD, Oregon Fairview Home, 2250 Strong Rd., SE Salem)

26-28. **Canadian Botanical Assoc.**, Carleton University, Ottawa, Ont. (R. L. Taylor, Plant Research Inst., C.E.F., Ottawa, Canada)

26-28. **Cineradiography**, 3rd symp., Antwerp, Belgium. (S. Masy, Steenweg op Waver 256, Heverle, Belgium)

26-28. **Peaceful Uses of Space**, 5th natl. conf., St. Louis, Mo. (G. W. Ferguson, Fleishman-Hillard, Inc., 407 N. 8 St., St. Louis 63101)

26-28. **Analysis Instrumentation and Chemical and Petroleum Instrumentation**, 1st ISA intern. symp., Montreal, Quebec, Canada. (E. J. Minnar, ISA, 530 William Penn Pl., Pittsburgh, Pa. 16219)

26-29. **Biological Characterization of Human Tumors**, intern. symp., Abbaye de Royaumont, France. (W. Davis, c/o Chester Beatty Research Inst., Fulham Rd., London, S.W.3, England)

26-29. **Electrochemical Aspects of Molecular Biology**, symp., Jena, East Germany. (H. Berg, Inst. für Mikrobiologie und Experimentelle Therapie, Deutsche Akademie der Wissenschaften zu Berlin, Beuthenbergstr. 11, Jena)

27-29. **American Gastroenterological Assoc.**, Montreal, Quebec, Canada. (D. Cayer, 2240 Cloverdale Ave., Winston-Salem, N.C.)

27-29. **American Ophthalmological Soc.**, Hot Springs, Va. (S. D. McPherson, Jr., 1110 W. Main St., Durham, N.C.)

27-29. **American Assoc. of Physical Anthropologists**, annual, Pennsylvania State Univ., University Park. (F. E. Johnston, Dept. of Anthropology, Univ. of Pennsylvania, Philadelphia 4)

27-30. **Neuro-Ophthalmology and Neurogenetics**, intern. congr., Albi, France. (M. Amalric, Congrès Intern. de Neuro-Ophthalmologie et Neuro-Génétique, B.P. 79, Albi, Tarn, France)