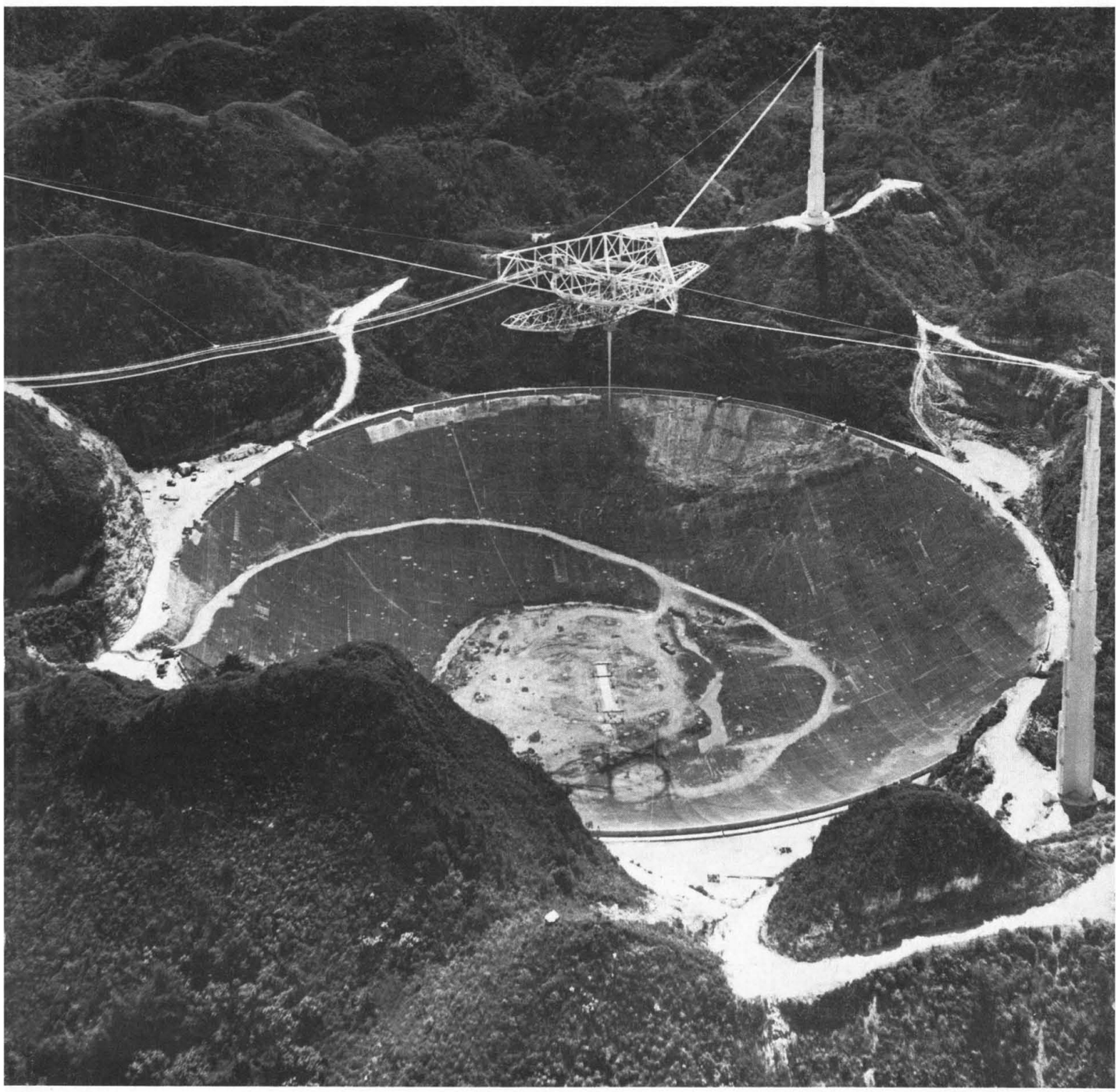
SCIENCE

2 October 1964
Vol. 146, No. 3640

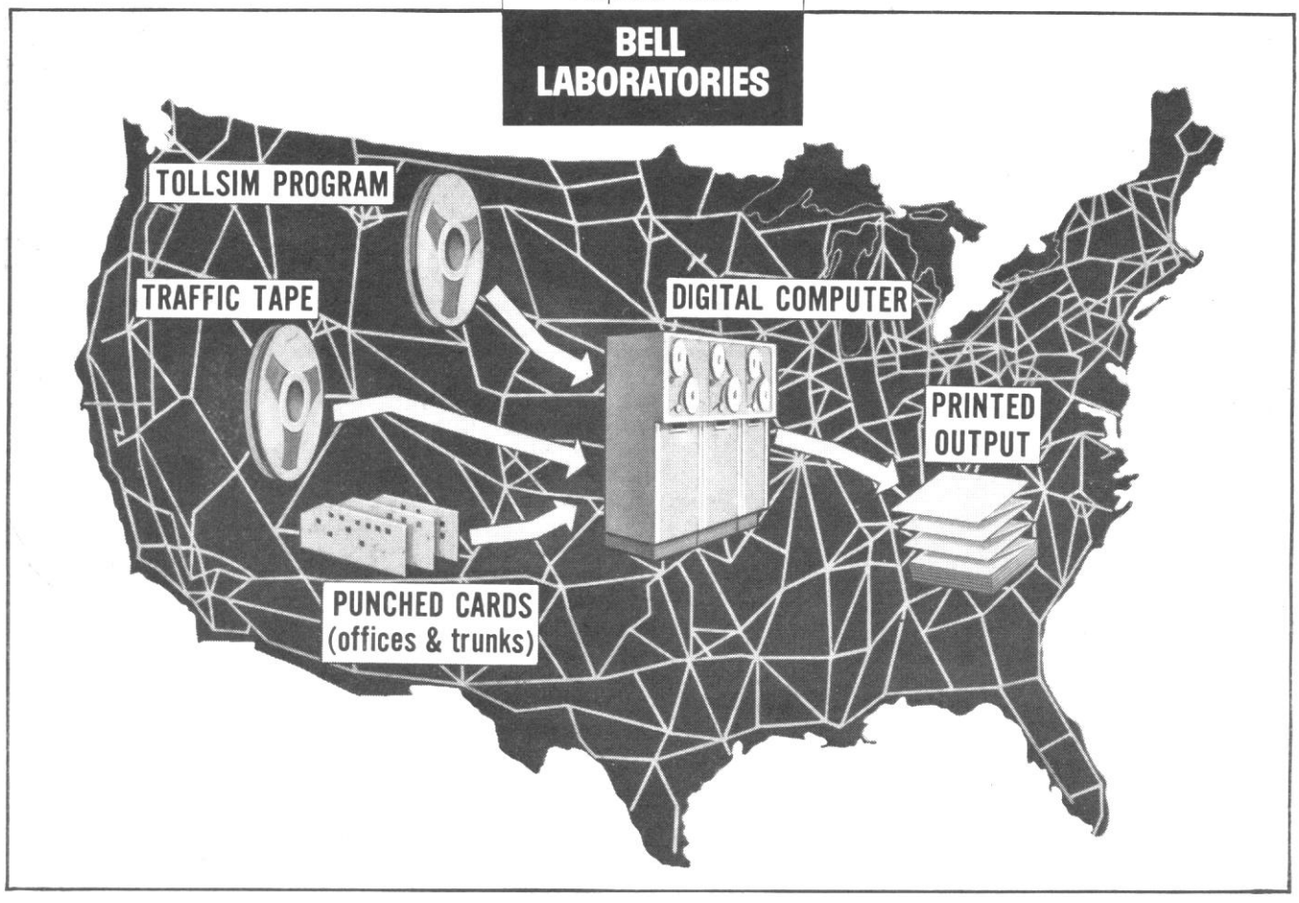
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



ANTENNA

Report from

BELL LABORATORIES



Many functions of the Bell System communications toll network are simulated by a digital computer using the TOLLSIM program along with a traffic tape and punched cards. The traffic tape, which may be used for a number of traffic studies, specifies times, originating and terminating points, numbers, and durations of simulated telephone calls. The punched cards specify characteristics of real or theoretical offices and trunks. The printed output, by recording and summarizing reattempts, abandoned calls, and other "real life" traffic data, both for the entire network and for its component parts, enables engineers to judge performance under various operating conditions. Many variations are possible. The effect of rearranging switching equipment in an office, for example, can be studied by using a different punched card for that office.

TRAFFIC ANALYSIS

Mathematics for good telephone service

At Bell Laboratories simulated telephone calls are placed through a computer programmed to represent the Bell System nationwide Direct Distance Dialing network. The computer program, known as TOLLSIM for "Toll Network Simulator," is one of many tools used by traffic specialists in studying how well traffic is handled by the network and how certain design changes might improve telephone service.

For example, a long-standing problem within the telephone industry is that of coping with heavy overload conditions during relatively short periods. These overloads can occur because of storms or other disasters that result in unusually heavy telephone calling. Such conditions also occur during the Christmas season and on Mother's Day.

In conjunction with earlier theoretical work, a TOLLSIM simulation indicated that, during overload conditions, a greater number of customers could be served if the pattern of automatic alternate routing of telephone calls were changed. The change involved making fewer attempts to route the calls over long, roundabout alternate routes when shorter direct trunks were busy. The results were then confirmed by field tests performed during the 1963 Christmas period.

This work is an example of the way Bell Laboratories people advance traffic theory and practical applications. The goal: to tailor facilities closely to the needs of telephone customers.

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2 October 1964
Vol. 146, No. 3640

SCIENCE

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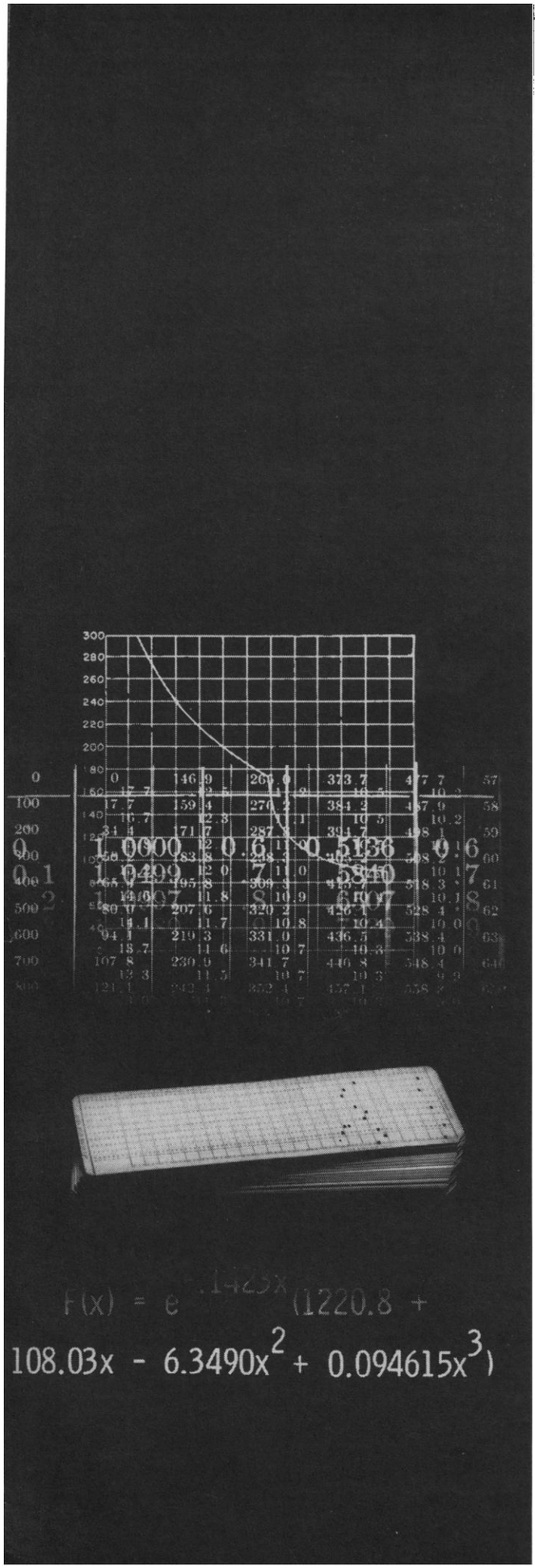
COVER

The reflector of this radio-radar telescope, located in the hilly terrain south of Arecibo, Puerto Rico, is 1000 feet in diameter and is suspended in a natural bowl. The triangular structure, held by cables from concrete towers, supports and positions the antenna feed that illuminates the reflector and steers the beam through a 40-degree cone centered overhead. See page 26.



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

From Mathematical Research: Automatic Approximations of Tables and Graphs

The search for unknown relationships is basic to science and engineering . . . and results in a steady outpouring of new tables and graphs. To store this mass of data economically and retrieve it quickly from a computer, mathematicians suggest the use of formulas that closely approximate or "fit" the data.

Here at the General Motors Research Laboratories, one of our four mathematical science departments has taken the first giant stride toward making such formulas easy to obtain. Through pioneering work in approximation theory, our mathematicians have been able to develop automatic computer procedures—"black boxes" that can crank out very efficient approximation formulas.

The formulas might be weighted polynomials . . . or the more flexible rational functions . . . or the little known, highly versatile spline functions. But in any case, their generation by delicately tuned computer programs goes well beyond standard "curve-fitting" techniques. In using these programs, for example, our scientists and engineers may ignore such mathematical subtleties as the Tchebycheff norm and unisolvence. Just feed the table in, pull a formula out.

A practical result of mathematical research, automatic approximations, we believe, well illustrate the exciting work going on in General Motors to make the computer a more efficient, more useful problem-solving tool.

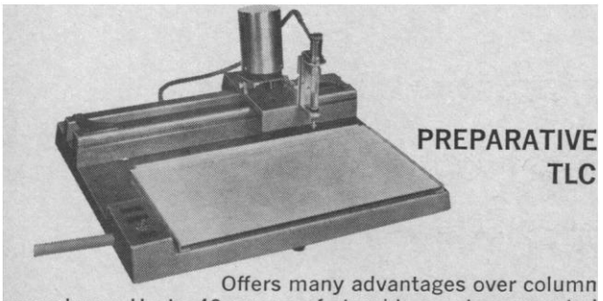
General Motors Research Laboratories

Warren, Michigan

news about DESAGA/BRINKMANN apparatus for

THIN LAYER CHROMATOGRAPHY

new Equipment . . . new Techniques . . . new Adsorbents

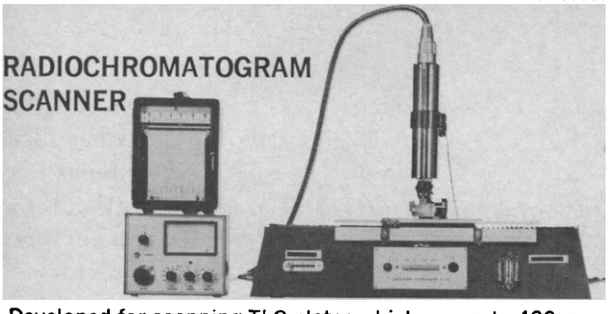


PREPARATIVE TLC

Offers many advantages over column procedures. Up to 40 grams of steroids can be separated on a single 400 x 200 mm plate. New developing tanks, drying racks, desiccators, recovery systems and an automatic sample-streaking instrument (illustrated) are now available for quantitative separations on layers up to 2 mm thick.

THIN LAYER ELECTROPHORESIS

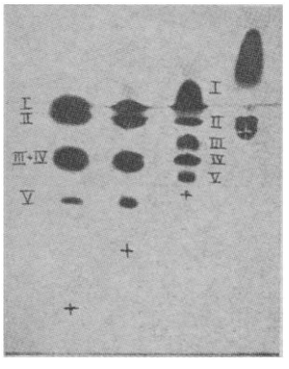
A new migration chamber developed specifically for TLE. Unique features for saturation (chamber height only 1 mm), temperature control, and buffer flow. The power supply can, of course, be used for paper chromatography also. Have you investigated the advantages of combining TLE with TLC?



RADIOCHROMATOGRAM SCANNER

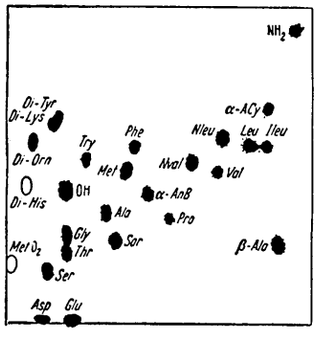
Developed for scanning TLC plates which are up to 400 mm long. The plate is automatically advanced on a motor-driven sled. Mechanical adjustments permit perfect alignment under detector head. Usable with ratemeters, scalers and recorder for paper or thin layer chromatography.

POLYZONAL TLC



Polyzonal TLC is a new technique which utilizes the solvent de-mixing phenomenon for a rapid determination of ideal developing conditions; a single solvent mixture provides varied results (on the same plate), which would otherwise require testing of numerous plates in different solvent systems. Illustrated are separations of the same compound (2, 4-Dinitrophenyl (I), DNP-Valine (II), DNP-Alanine (III), DNP-Glycine (IV), and DI-DNP Histidine (V).

CONTINUOUS SOLVENT FLOW TLC



Another technique which utilizes the B-N Chamber to obtain separations not possible with standard developing procedures. Illustrated is a chromatogram of the most important 2, 4 Dinitrophenyl amino acids. Continuous solvent flow has also been applied with great success for amino acids in urine and blood; for leucine and isoleucine; and for various sugars (saccharose, galactose, fructose, ribose, etc.).

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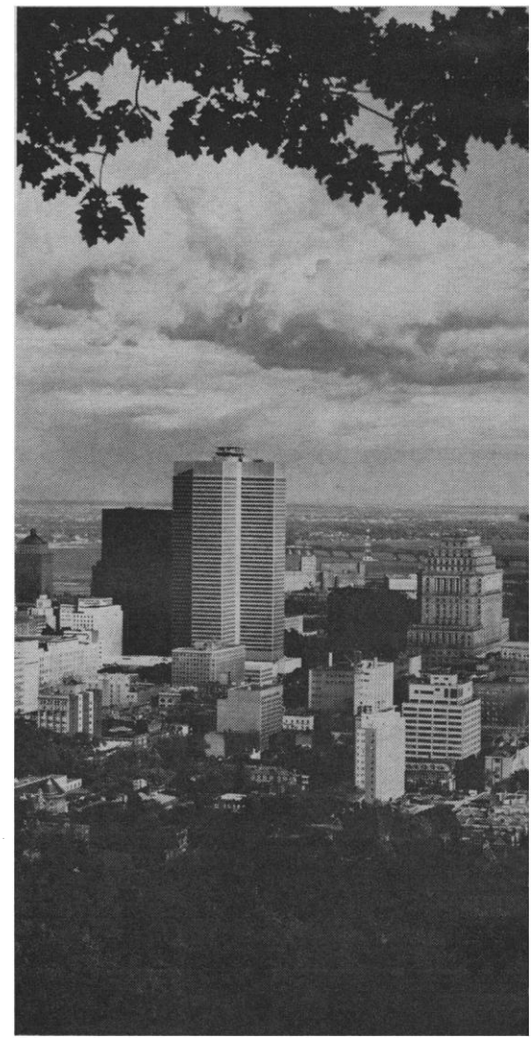
Order Your General Program

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 V. C. Wynne-Edwards on self-regulating systems in animal populations; J. M. Harrison on nonrenewable world resources; Philip Morrison, "New Channels in Astronomy"; and Clement L. Markert on role of genes in embryonic development.

Interdisciplinary Symposia Possible meteoric or lunar influences on meteorological phenomena; basic concepts of biochemical differentiation; medical geology and geography; history of the popularization of science.

Special Sessions AAAS Presidential Address by Alan T. Waterman; the Joint Address of Sigma Xi and Phi Beta Kappa by René Dubos; the George Sarton Memorial Address by Lloyd G. Stevenson; the National Geographic Society Illustrated Lecture; and the AAAS Distinguished Lecture by Lord Brain, retiring president, British AAS.

International Conference on Primate Behavior Three AAAS sections and the combined ESA and ASZ Section on Animal Behavior and Sociobiology are sponsors. Six sessions, open to the public, will include 37 speakers from four continents.

AAAS Committees Sessions of the AAAS Committee on Meetings, including two sessions on the sociology of science arranged and chaired by Robert K. Merton; and the Commission on Science Education.

Sections and Societies The 20 AAAS Sections and some 76 participating societies are scheduling specialized symposia; some have sessions for contributed papers.

AAAS Science Theatre The latest foreign and domestic films.

Exposition The Annual Exposition of Science and Industry is adjacent to all session rooms on the convention floor of the Queen Elizabeth Hotel.

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 of Registrants when the meeting opens. Use the coupon below.

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1a. ☐—Enclosed is $5.00 Advance Registration Fee. This brings me the **General Program** and a **Convention Badge.**

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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5. FIELD OF INTEREST .....

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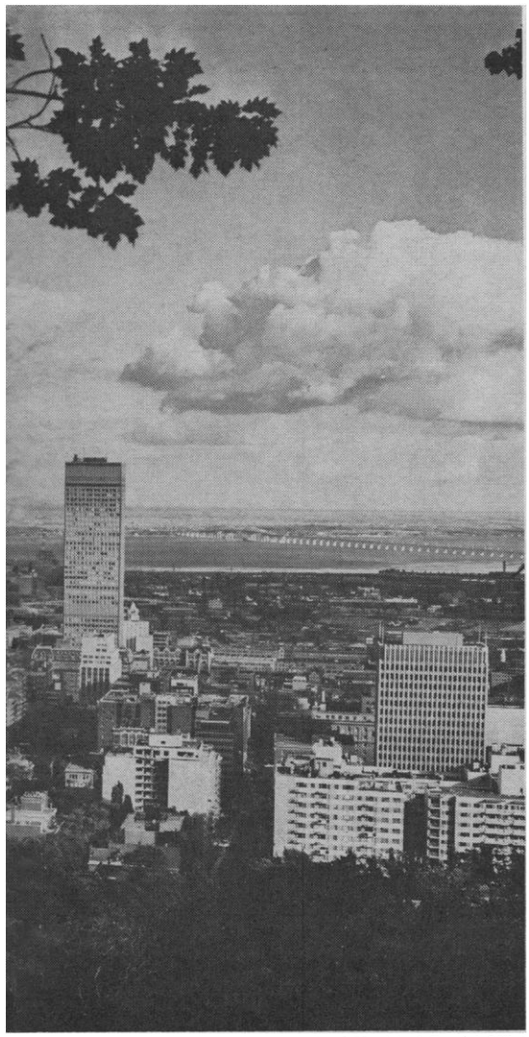
Please mail this coupon and your check or money order for the total amount to the AAAS in Washington, D.C. (address as shown)

MEETING • 26-31 DECEMBER

Reserve Your Hotel Room



Montreal Municipal Tourist Office

Make sure you have the accommodations you prefer. A list of headquarters hotels of participating societies appears on page 299, 17 July, SCIENCE. The AAAS headquarters is the Queen Elizabeth.

The hotels for the AAAS Montreal meeting have established special, low rates and have reserved large blocks of rooms for the meeting.

Use the coupon below to make your hotel reservation in Montreal. **Send your application to the AAAS Housing Bureau in Montreal, not to any hotel.** Give a definite date and estimated hour of arrival, and also probable date of departure. The Housing Bureau will make the assignment and send you a confirmation promptly.

A rollaway bed can be added to any room at $3.00 per night. Mail your application now to secure your first choice of accommodations.

Hotels with asterisks have unlimited free parking for guests. The Windsor has overnight free parking for guests, but not between the hours of 9 A.M. and 4 P.M.

HOTEL RATES

For a list of the headquarters of each participating society and section, see page 299, 17 July, SCIENCE.

Hotel	Single	Double	Twin	Suite
*Queen Elizabeth	$ 8.50, 10.00	$15.00	$15.00	$30.00–$50.00
*Sheraton-Mount Royal	8.50, 10.00	15.00	15.00	25.00– 45.00
Windsor	8.50	15.00	15.00	25.00– 45.00
*Laurentien (Sheraton)	7.50	12.00	12.00	21.00– 30.00
Ritz Carlton	10.00	15.00	15.00	35.00
Berkeley	7.00	10.00	10.00	17.50

AAAS Housing Bureau
2055 Peel St., Suite 525
Montreal 2, Que., Canada

Date of Application .....

Please reserve the following accommodations for the 131st Meeting of the AAAS in Montreal, 26–31 December 1964

First Choice Hotel ..... **Second Choice Hotel** ..... **Third Choice Hotel** .....

Type of room: Single ☐ Double ☐ Double, twin beds ☐ Suite ☐ Rates: Desired ..... Maximum .....

Number in party .....Sharing this room will be: .....

(List name and address of each person, including yourself. Attach list if space is insufficient.)

.....

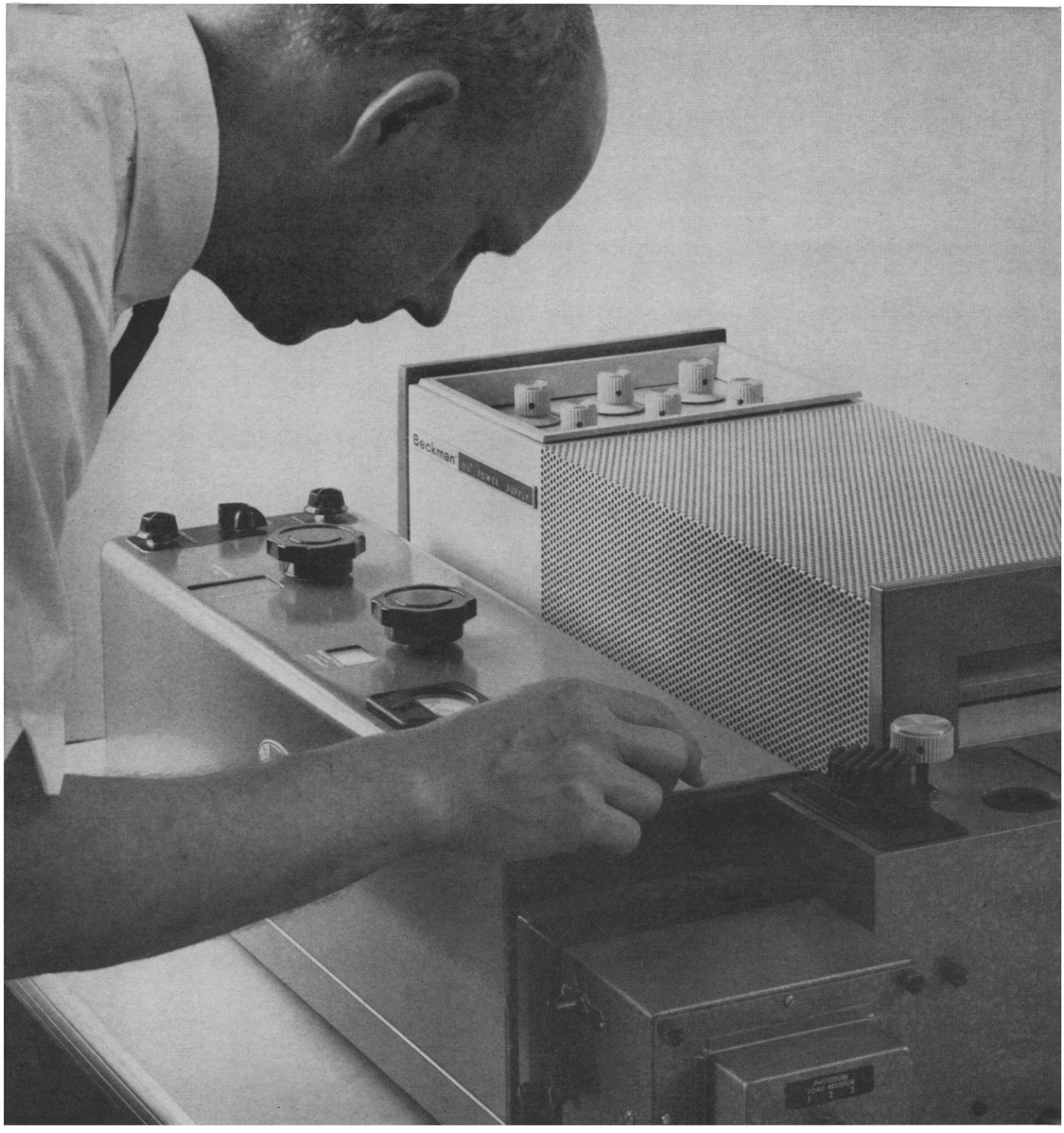
.....

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

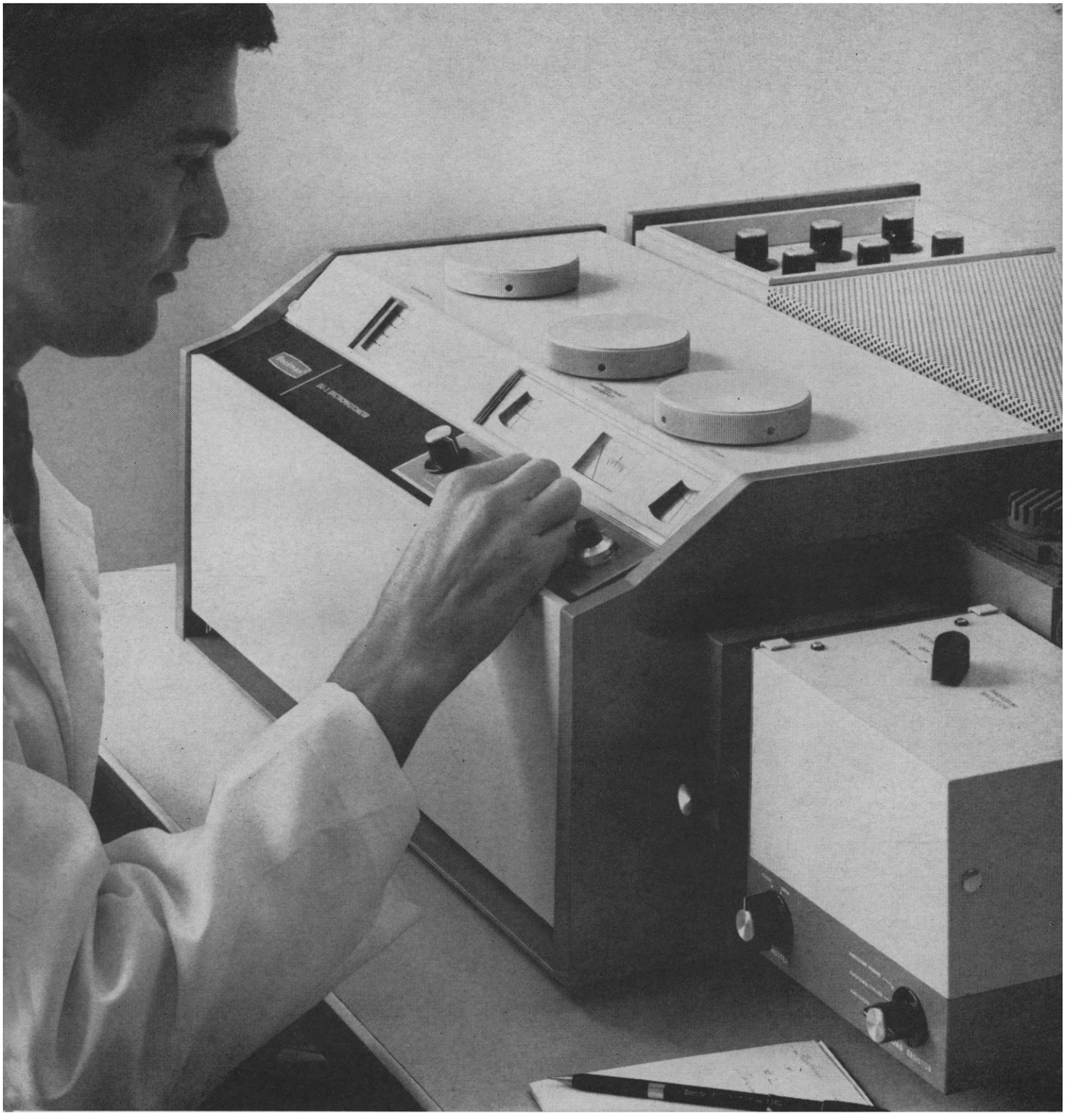
NAME .....
(Individual requesting reservation) (Please print or type)

ADDRESS .....
(Street) (City) (State/Province) (ZIP Code/Zone)

Mail this coupon now to the Housing Bureau. Rooms will be assigned and confirmed in order of receipt of reservation.



The Beckman DU® Spectrophotometer is the standard throughout the world for reliable and accurate photometric measurements in the ultraviolet range. Over 25,000 of these durable instruments are presently in use. Its null-balance precision, its optical and electrical qualities, and its flexibility are well known and trusted in analytical and research laboratories in almost every field.



The New Beckman DU®-2 Spectrophotometer is the successor to the renowned Beckman DU. The new, more convenient DU-2 has a sloped front panel and large easy-to-read controls. It has increased range: 190 to 1000 mμ. Its photometric scale is expanded at both ends. It uses micro cells without attachments. It retains all the reliable DU principles, and it uses every time-tested DU accessory.

It's available at the same low DU price.
Ask your local Beckman Sales Engineer about the new DU-2 or write for Data File LUV- **38-265.**

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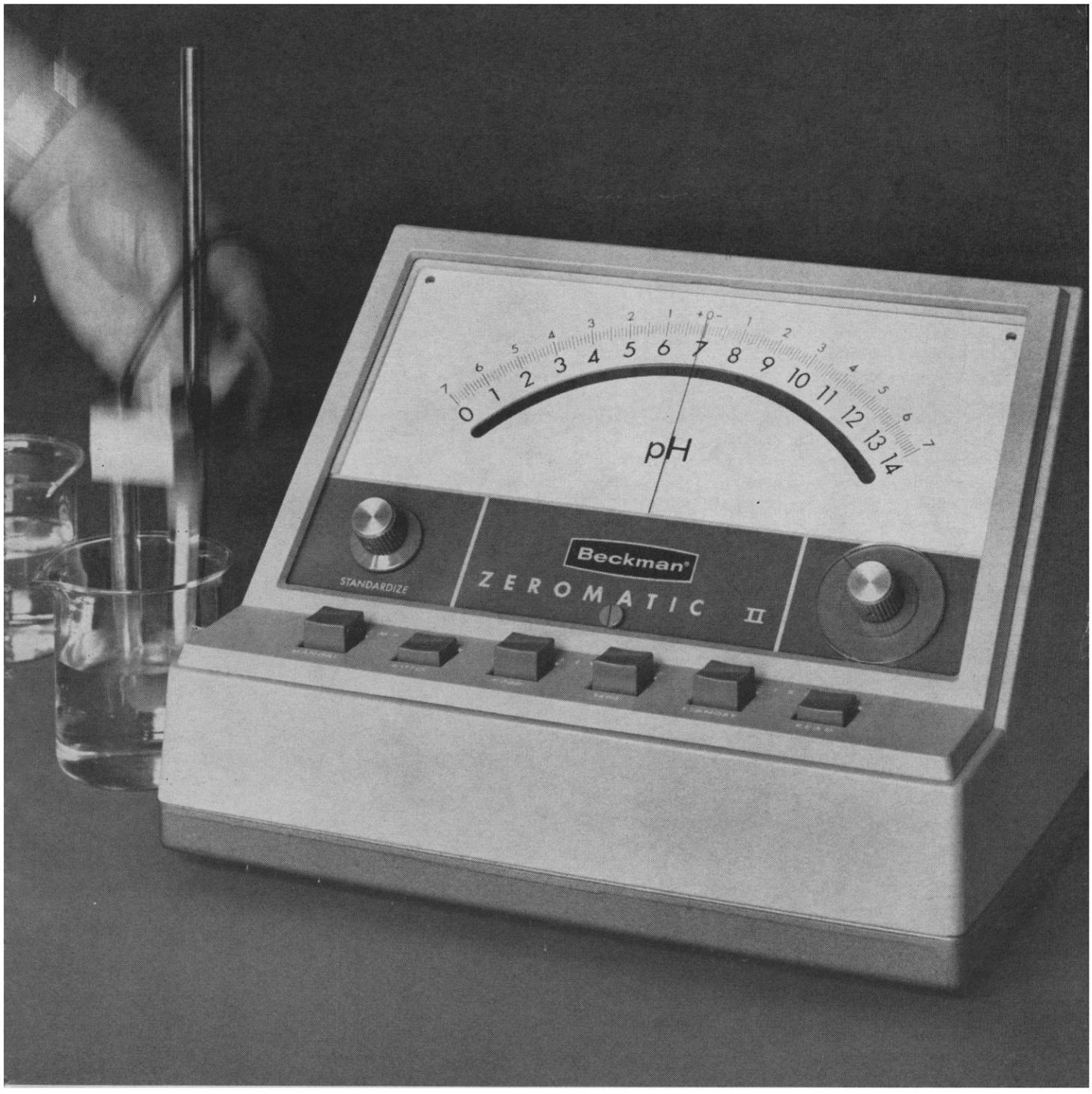

The New Beckman Zeromatic® II pH Meter is an improved version of the time-tested Zeromatic. This new instrument has an easily-read 8.2" meter covering the full 0-14 pH range. It gives you relative accuracy of ±0.05 pH and repeatability to ±0.015 pH. It has push button convenience and is splash proofed in a die-cast aluminum case with reagent resistant finish. For more information or a demonstration of the Zeromatic II contact your local Beckman Sales Engineer or write for Data File LpH-38-165.

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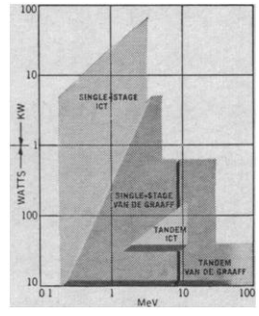
CHARGED PARTICLES

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.

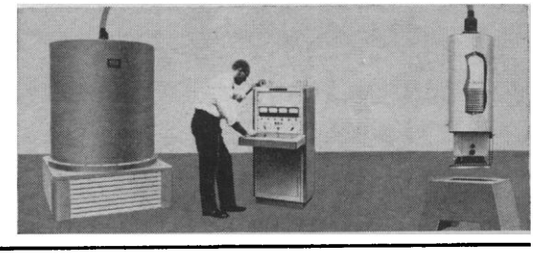
4 MeV ICT	ENERGY (MeV)	CURRENT	DIMENSIONS Length Feet	DIMENSIONS Length Meters
Positive Ions	1.5-4	3 mA	26'6"	8.08
Electron Conversion	1.5-3	10 mA	26'6"	8.08
3 MeV ICT Electrons	1.5-3	20 mA	29'	8.84

8 MeV ICT Tandem Accelerator

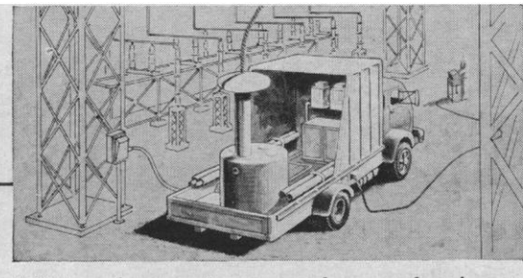
The 8 MeV ICT Tandem provides proton energies continuously variable from 3 to 8 MeV at a maximum guaranteed beam current of 2μA. The ICT power source is capable of providing 12 mA at 4 mv which, in combination with newly developed components emerging from HVEC, will enable the accelerator to keep pace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

HIGH VOLTAGE ENGINEERING

2 October 1964, Volume 146, Number 3640

SCIENCE

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Science and the 1964 Election

A review of the Democratic and Republican party platforms of 1964 suggests that science is now not considered very important by either party. With respect to science, both platforms are inferior to the Republican platform of 1960. This document devoted a special section to science and technology and made many excellent statements, including: "Our continuing and great national need is for basic research . . . a well-spring of knowledge and progress." References to science in the Republican platform of 1964 are woven into the text, and a minimum of space is allotted to them. The Democratic platform devotes more words to "science," but the text reflects the writers' concern with gadgets rather than basic concepts. As in 1960, comments on "science" concentrate on space, atomic energy, and oceanography, but this time a score of examples of construction of hardware are cited. The opportunities and progress in biology and medicine go virtually unrecognized. Neither party mentions the population explosion, one of the gravest sociologic and scientific problems of today's world.

One area in which the Democrats have virtually unchallenged superiority is in the recruitment of scientific and engineering personnel. In this nation there are about 1,850,000 scientists and engineers. With associated families a voter potential of more than 3 million is indicated. An effective group, Scientists and Engineers for Johnson, has been organized and will surely enhance the number of Democratic votes.

Organizers of Scientists and Engineers for Johnson include a distinguished bipartisan group capable of great things. In the intellectual sphere their product so far has not been impressive. The principal initial offering was testimony to the Democratic platform committee. This was a special opportunity to influence constructively the Democratic party's attitudes toward matters deeply involving science. This opportunity was not fully exploited. Instead of discussing problems in the relation of government and science, they talked of such matters as extremism, poverty, and distribution of wealth. The most striking passage of their presentation was: "We maintain further that the nation must no longer deprive itself of talent by reason of discrimination based on race, creed, or sex. We reject discrimination as immoral, undemocratic, and savagely wasteful of the nation's human resources." No special scientific training was required to formulate these sentiments. Politicians need no help in such matters. Who is to serve as advocate for science?

While the scientists have been talking politics, at least two politicians, Congressmen Daddario and Price (both Democrats), have been talking science. For instance, Price, who is a key figure on committees dealing with research, recently outlined some of the matters Congress will be concerned with during the next session.

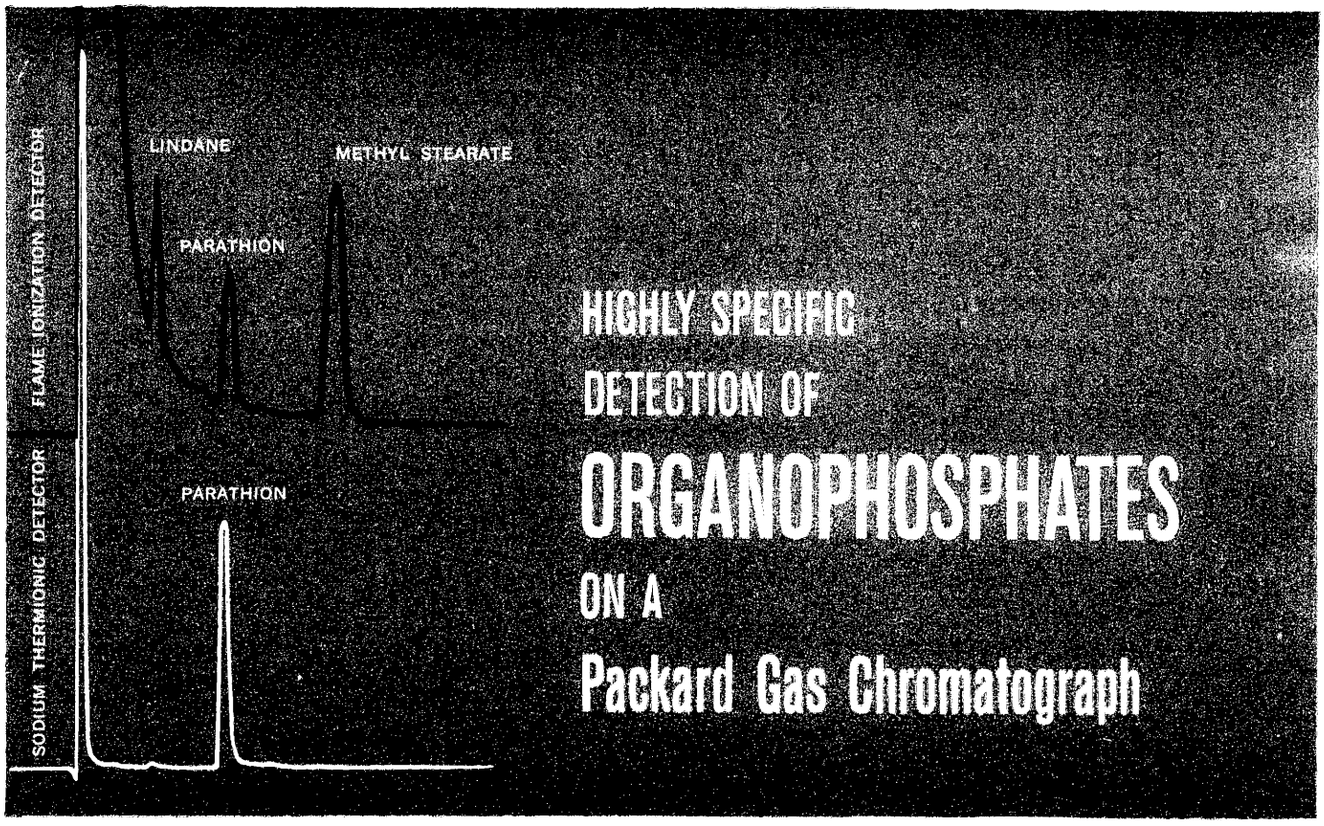
First, establishment of clear-cut objectives for research and development projects.

Second, a realistic cost estimate for the entire project: not just the immediate year.

Third, centralized responsibility and continuity of management.

Fourth, a plan to follow through; to put the results of research and development to actual use.

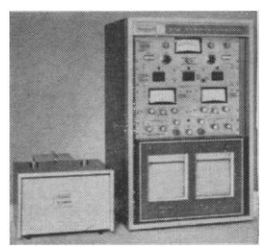
It will be interesting to note how widely these principles will be applied. Price has stated that high-energy physics is on the agenda. When the election is over, the complex problems of the interrelation of science and government will remain and indeed may become even more controversial.—PHILIP H. ABELSON



HIGHLY SPECIFIC DETECTION OF ORGANOPHOSPHATES ON A Packard Gas Chromatograph

Phosphorous-containing compounds are one of the most recent groups to yield to a Packard Gas Chromatograph. The chromatogram which is shown above was made on a Packard Model 7611 dual system (dual column oven, dual detectors, dual electronics and dual recorders) and represents an important achievement in simultaneous determination of compounds of widely separated concentration.

A modified flame ionization detector with a sodium emission grid and termed a SODIUM THERMIONIC DETECTOR (STD) has been found to be nearly 1000 times more sensitive to phosphorous-containing pesticides than the standard flame ionization detector (FID). The sample was separated on a single column and passed through a 1:1 ratio stream splitter before simultaneous detection in the normally sensitive FID and the highly sensitive STD. In this manner, all the organic materials were detected in the FID (upper curve) while the trace amount of phosphorous compounds was readily detected in the STD unit (lower curve).



Packard Gas Chromatographs offer many significant advantages to research workers in the biochemical and biomedical disciplines. Fast, stable, highly sensitive determination, versatility and convenience of operation are some of the reasons why you should know more about these superb instruments. Your Packard Sales Engineer can provide complete details and performance criteria. Write for Bulletins and Specifications.

EXPERIMENTAL CONDITIONS*

1 μg lindane
1 μg parathion
2 μg methyl stearate

COLUMN: 5 ft. x 4 mm all glass

LIQUID PHASE: 10% Dow Corning Silicone Fluid (DC200)

SUBSTRATE: 80-90 mesh Anacrom ABS (acid and base washed, and silanized)

CARRIER GAS FLOW RATES:
Nitrogen 60 cc/min
Hydrogen FID 40 cc/min; STD 60 cc/min
Air 300 cc/min

TEMPERATURES:
Inlet Heater 225°C
Column 205°C
Detectors 200°C
Outlet 200°C

DETECTORS: Standard Packard Hydrogen Flame Ionization (FID); Modified Packard Ionization Detector with sodium emission grid (STD).

ELECTROMETER RANGES:
FID 1 x 10^{-9} amperes full scale
STD 3 x 10^{-7} amperes full scale

DETECTOR VOLTAGE: 300 volts

NOISE LEVEL: 1 x 10^{-11} amperes full scale

CHART SPEED: 30 inches/hour

*L. Giuffrida, J.A.O.A.C., 47, No. 2, 293 (1964)

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under the direction of P. R. Gorham and D. C. Mortimer, and from the laboratory of G. Krotov and C. D. Nelson (Queen's University). Mortimer's results showed that downward translocation of products of photosynthesis takes place at greatly varying rates and intensities in different vascular bundles of a leaf. Thus each bundle has to be analyzed separately. The Queen's group showed that translocation is under hormonal control and that there is selective and preferential translocation of certain sugars.

The session on nitrogen included two papers from the laboratory of W. G. Boll (McGill University) on the ability of ethanolamine to replace vitamin B_6 in the nutrition of excised tomato roots, and on the biochemical mechanisms associated with this ability. C. L. Mer (now visiting at Harvard from Imperial College, London) provided a nutrition hypothesis for growth responses in oat seedlings. The hypothesis precludes the necessity to postulate changes in auxin metabolism to account for various growth responses to changed environment.

A session on regulators was of general interest and included papers on light quality and periodicity, on the regulation of enzyme synthesis, photosynthesis, and nuclear activity by hormones, and on the mode of action of herbicides.

The sessions on metabolism covered a wide range of research interests. A growing interest in the phenolic substances in plants was evidenced by a group of papers from the Halifax, Nova Scotia, laboratories of the National Research Council. These included very interesting work on the pathways of lignin biosynthesis and the interrelations of soluble and insoluble derivatives of the many C_6–C_1 and C_6–C_3 phenolic acids in plants. Other papers included biosynthetic studies on indoles, carbohydrates, phosphatides, alkaloids, and chlorophylls. Various problems in plant metabolism, including organic acid metabolism, respiration, frost hardiness, and the influence of seasonal or environmental factors on plant metabolism were also discussed.

A report was made on the cytological and cytophysiological studies of tissue cultures of Jerusalem artichoke and oat coleoptiles. (G. Setterfield and F. Wightman, Carleton University, Ottawa). A number of synthetic auxins which promote cell expansion also promote cell division. Papers were presented on control mechanisms of amino acid synthesis, on chloroplast bleaching in *Euglena*, and on histochemical tests. Nelson's group from Queen's University presented work on the effect of auxin in controlling cellular permeability and on the electroosmotic transport of C^{14}-labeled sugars in *Nitella* cells.

The nonscientific event at the meetings was a banquet in honor of D. L. Bailey (University of Toronto). Bailey is retiring from the editorship of the *Canadian Journal of Botany*, the official journal of the society, after a number of years of outstanding service. Special guests included Leo Marion, editor-in-chief of the *Canadian Research Journals*, and Pauline Snure, manager of the editorial office.

At the business meeting it was decided that next year's annual meeting will take place in early June at the University of New Brunswick, Fredericton. G. Setterfield was elected president of the society and A. R. A. Taylor (University of New Brunswick) was elected vice president. Other officers of the society are M. Shaw (University of Saskatchewan), past president; M. Cailloux (Université de Montréal), eastern director; and Mary Spencer (University of Alberta), western director.

R. G. S. BIDWELL
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Forthcoming Events

October

10. **Paleontological Research Inst.**, annual, Ithaca, N.Y. (R. S. Harris, 109 Dearborn Pl., Ithaca 14850)

11–14. American **Oil Chemists** Soc., Chicago, Ill. (C. H. Hauber, AOCS, 35 E. Wacker Dr., Chicago 60601)

11–14. International **Scientific Radio Union**/Inst. of **Electrical and Electronics Engineers**, joint meeting, Univ. of Illinois, Urbana. (E. C. Jordan, Dept. of Electrical Engineering, Univ. of Illinois, Urbana)

11–15. **Diseases of the Chest**, 8th intern. congr., Mexico City, D.F. (M. Kornfeld, American College of Chest Physicians, 112 E. Chestnut St., Chicago 11, Ill.)

11–15. **Electrochemical** Soc., Washington, D.C. (ES, 30 E. 42 St., New York, N.Y. 10017)

11–16. American Assoc. of **Medical Record Librarians**, annual, Miami Beach, Fla. (M. J. Waterstraat, RRL, 840 North Lake Shore Dr., Chicago, Ill. 60611)

11–16. Pan American Assoc. of **Ophthalmology**, 7th, Montreal, Canada. (J. W. McKinney, PAAO, 921 Exchange Bldg., Memphis, Tenn.)

11–16. American Soc. of **Plastic and Reconstructive Surgery**, annual, San Francisco, Calif. (P. P. Pickering, 2850 Sixth Ave., Suite B, San Diego, Calif.)

12–14. **Aviation Pathology**, 5th scientific session, Washington, D.C. (Secretary, Joint Committee on Aviation Pathology, Armed Forces Inst. of Pathology, Washington, D.C. 20305)

12–14. **Entry Technology**, American Inst. of Aeronautics and Astronautics conf., Williamsburg, and NASA-Langley Research Center, Va. (S. P. Johnston, AIAA, 1290 Sixth Ave., New York, N.Y.)

12–14. **National Acad. of Sciences**, fall meeting, Univ. of Wisconsin, Madison. (Office of the Home Secretary, NAS, 2101 Constitution Ave., Washington, D.C.)

12–14. Protection Against **Radiations** in Space, 2nd symp., Gatlinburg, Tenn. (F. C. Maienschein, Oak Ridge Natl. Laboratory, P.O. Box X, Oak Ridge, Tenn.)

12–15. Instrument Soc. of America, 19th **Instrument-Automation** conf., New York, N.Y. (ISA, 530 William Penn Pl., Pittsburgh, Pa. 15219)

13–15. Air Force **Science and Engineering**, 11th symp., Brooks Air Force Base, Tex. (G. E. Schafer, Headquarters Aerospace Medical Div., Brooks AFB)

13–16. **Calorimetry**, 19th conf., Washington, D.C. (W. N. Hubbard, Argonne Natl. Laboratory, 9700 S. Cass Ave., Argonne, Ill.)

13–16. **Lubrication**, 1st intern. conf., American Soc. of Mechanical Engineers/American Soc. of Lubrication Engineers, Washington, D.C. (W. J. Anderson, MS 6-1, NASA-Lewis Research Center, 21000 Brookpark Rd., Cleveland, Ohio)

13–17. **Electron Microscopy** Soc. of America, 22nd annual, Detroit, Mich. (A. R. Taylor, Virus Div., Parke, Davis & Co., Detroit 32)

14–15. American Soc. of **Tool and Manufacturing Engineers**, Minneapolis, Minn. (R. E. Gariss, 6523 El Pulcro St., Long Beach, Calif.)

14–16. **Gaseous Electronics**, 7th conf., Atlantic City, N.J. (S. Schneider, U.S. Army Electronics R&D Laboratories, Fort Monmouth, N.J. 07703)

14–16. **Parenteral Drug** Assoc., annual conv., New York, N.Y. (PDA, Broad and Chestnut Sts., Philadelphia 7, Pa.)

14–16. **Remote Sensing of Environment**, 3rd symp., Ann Arbor, Mich. (D. C. Parker, Univ. of Michigan, Box 618, Ann Arbor 48107)

14–16. **Sonics and Ultrasonics**, symp., Santa Monica, Calif. (A. H. Meitzler, Bell Telephone Labs., Inc., Murray Hill, N.J.)

15–16. **Bioenergetics**, symp., Univ. of Western Ontario, London, Ontario, Canada. (K. P. Strickland, Dept. of Biochemistry, Faculty of Medicine, Univ. of Western Ontario, London)

15–16. **Systems Science**, first annual conf., Inst. of Electrical and Electronics Engineers, Univ. of Pennsylvania, Philadelphia. (H. G. Sparks, Moore School of Engineering, Univ. of Pennsylvania, Philadelphia)

15–17. **Correlation of Particles** Emitted in Nuclear Reactions, intern. conf., Gatlinburg, Tenn. (A. Zucker, Oak Ridge Natl. Laboratory, P.O. Box X, Oak Ridge, Tenn. 37830)

15–17. Central **Neuropsychiatric** Assoc.,

Denver, Colo. (W. P. Shelton, 8215 Westchester Dr., Dallas 25, Tex.)

15–22. Association of **American Medical Colleges**, 75th annual, Denver, Colo. (P. J. Sanazaro, Div. of Education, Assoc. of American Medical Colleges, 2530 Ridge Ave., Evanston, Ill. 60201)

16–17. Western **Industrial Medical** Assoc., Los Angeles, Calif. (C. Einert, 2151 Berkeley Way, Berkeley 4, Calif.)

16–17. **Systemics**, 11th annual symp., St. Louis, Mo. (H. C. Cutler, Missouri Botanical Garden, St. Louis)

16–20. American **Medical Women's** Assoc., New York, N.Y. (M. A. Sears, Anderson Hospital, Houston 25, Tex.)

16–24. American Soc. of **Clinical Pathologists**, annual, Bal Harbor, Fla. (ASCP, 445 N. Lake Shore Dr., Chicago, Ill.)

17–18. Society for **Psychophysiological Research**, 4th annual, Washington, D.C. (L. A. Gustafson, SPR, 74 Fenwood Rd., Boston, Mass. 02115)

17–20. College of American **Pathologists**, Bal Harbor, Fla. (E. E. Simard, Box 136, Salinas, Calif.)

17–25. International **Aeronautic** Federation, general conf., Tel Aviv, Israel. (M. J. Randleman, Natl. Aeronautic Assoc., 1025 Connecticut Ave., NW, Washington, D.C. 20036)

18–21. Association of **Military Surgeons** of the U.S., Washington, D.C. (Brig. Gen. F. E. Wilson, Suite 132, 1500 Massachusetts Ave., NW, Washington, D.C. 20005)

18–22. **Metallurgical** Soc., fall meeting, Philadelphia, Pa. (D. A. Parks, Inst. of Metals Div., Metallurgical Soc. of AIME, 345 E. 47 St., New York, N.Y. 10017)

18–23. American Acad. of **Ophthalmology and Otolaryngology**, Chicago, Ill. (W. L. Benedict 15 Second St., SW, Rochester, Minn. 55901)

18–24. **Dental Education**, 2nd Latin American seminar, Mexico City. (D. Restrepo, Pan American Sanitary Bureau, 1501 New Hampshire Ave., NW, Washington, D.C. 20036)

19–20. **Unconventional Inertial Sensors**, symp. (secret), Farmingdale, N.Y. (R. E. McIntyre, RMG-8, Bureau of Naval Weapons, Washington 25, D.C.)

19–21. **Mechanisms**, conf., American Soc. of Mechanical Engineers, Lafayette, Ind. (T. P. Goodman, Technological Inst., Northwestern Univ., Evanston, Ill.)

19–21. Academy of **Psychosomatic Medicine**, New York, N.Y. (R. N. Rutherford, 200 Broadway, Seattle, Wash.)

19–21. Technical Assoc. of the **Pulp and Paper Industry**, plastics-paper conf., Washington, D.C. (TAPPI, 360 Lexington Ave., New York 10017)

19–22. Association of Official **Agricultural Chemists**, 78th annual, Washington, D.C. (L. G. Ensminger, AOAC, Box 540, Benjamin Franklin Station, Washington, D.C. 20044)

19–23. American Soc. of **Civil Engineers**, New York, N.Y. (W. H. Wisely, ASCE, 345 E. 47 St., New York, N.Y. 10017)

19–23. American Soc. for **Metals**, Philadelphia, Pa. (A. R. Putnam, ASM, Metals Park, Ohio)

19–23. **Radiochemical Methods of Analysis**, symp., Salzburg, Austria. (Intern. Atomic Energy Agency, 11 Karntnerring, Vienna 1, Austria)

20–30. Nov. **UNESCO**, 13th session, general conf., Paris, France. (UNESCO, Place de Fontenoy, Paris 7e)

21. **Animal Nutrition Research** Council, annual, Washington, D.C. (K. Maddy, Agricultural Chemicals Div., Monsanto Chemical Co., 800 N. Lindbergh Blvd., St. Louis 66, Mo.)

21–22. American Heart Assoc., Council on **Arteriosclerosis**, annual, Atlantic City, N.J. (D. M. Smith, AHA, 44 E. 23 St., New York, N.Y. 10010)

21–22. **Industrial Hygiene Foundation**, annual, Pittsburgh, Pa. (R. T. P. deTreville, IHF, 4400 Fifth Ave., Pittsburgh 15213)

21–23. **Aerospace and Navigational Electronics**, 11th East Coast conf., Baltimore, Md. (M. Hastings, Mail No. 1281 A, Baltimore Space and Defense Center, Westinghouse Electric Corp., P.O. Box 1693, Baltimore 21203)

21–23. **Pain**, intern. symp., Detroit, Mich. (R. S. Knighton, 2799 W. Grand Blvd., Detroit)

21–23. **Spectroscopy, Instrumentation and Chemistry**, 3rd Pacific meeting, San Francisco, Calif. (J. G. Conway, Lawrence Radiation Laboratory, Univ. of California, Berkeley 4)

21–24. **Acoustical** Soc. of America, 68th, Austin, Tex. (W. Waterfall, ASA, 335 E. 45 St., New York, N.Y. 10017)

21–25. **Cybernetics**, 4th intern. congr., Namur, Belgium. (Intern. Assoc. for Cybernetics, 13 rue Basse-Marcelle, Namur)

22–23. **New Mexico** Acad. of Science, Albuquerque. (K. S. Bergstresser, 739 42 St., Los Alamos, N.M.)

23–24. **Kentucky** Acad. of Science, Morehead. (G. Levey, College Box 2325, Berea, Ky.)

23–24. American **Physical** Soc., Chicago, Ill. (R. G. Sachs, Argonne National Laboratory, Argonne, Ill. 60440)

23–25. Association of **Clinical Scientists**, Washington, D.C. (R. P. MacFate, 300 N. State St., No. 5422, Chicago, Ill. 60610)

23–25. Experimental **Gerontology**, symp., Basel, Switzerland. (Prof. Verzar, Inst. de Gerontologie Experimentale, Nonnenweg 7, Basel, Switzerland)

24–29. American Acad. of **Pediatrics**, annual, New York, N.Y. (AAP, 1801 Hinman Ave., Evanston, Ill.)

25–31. American Soc. for **Horticultural Science**, Caribbean Region, 12th annual, Maracay, Venezuela. (E. H. Casseres, Londres 40, México 6, D.F.)

26–27. American Inst. of **Aeronautics and Astronautics**/Canadian Aeronautics and Space Inst., joint meeting, Ottawa, Ont., Canada. (P. J. Burr, AIAA, 1290 Sixth Ave., New York, N.Y. 10019)

26–27. **Combustion** Inst., western states section, fall meeting, Univ. of Utah, Salt Lake City. (Secretary, CI, 16902 Bollinger Dr., Pacific Palisades, Calif. 90272)

26–28. **Antimicrobial Agents and Chemotherapy**, 4th conf., American Soc. for Microbiology, New York, N.Y. (ASM, 115 Huron View Blvd., Ann Arbor, Mich.)

26–28. Chemical Inst. of Canada, 14th **Chemical Engineering** meeting, Hamilton, Ont. (CIC, 48 Rideau St., Ottawa 2)

26–28. Society of **Rheology**, 35th annual, Pittsburgh, Pa. (H. Markovitz, Mellon Institute, 4400 Fifth Ave., Pittsburgh 13)