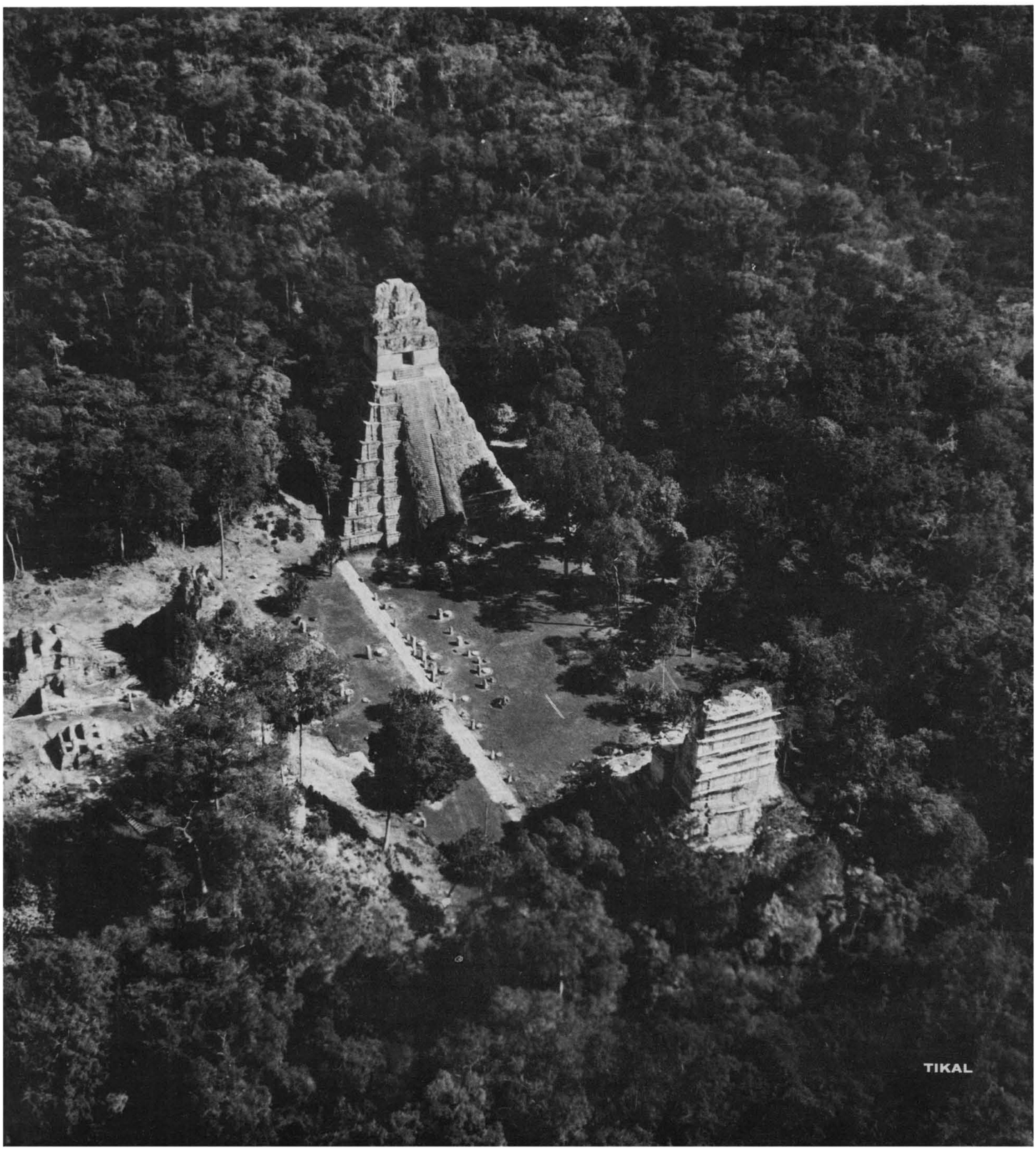
SCIENCE

19 March 1965
Vol. 147, No. 3664

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



Kodak reports on:

a new plate that will go far... encoding 2000 x 490 documents coolly... a very selective compound

The trouble with astronomers

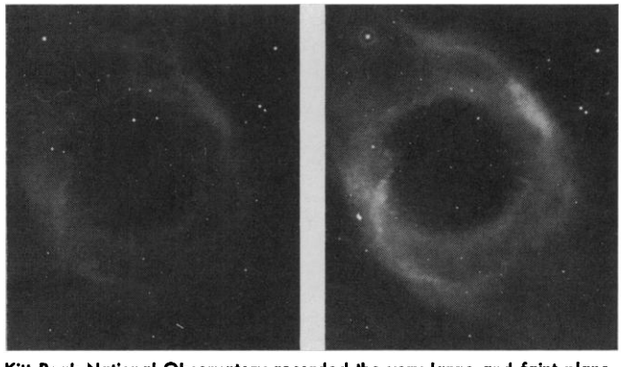
Astronomy has probably done more for us than we have done for astronomy.

Some of the deepest chemical and physical underpinnings that support us as we cheerfully manufacture $n \times 10^8$ worth of photographic materials this year were driven down to bedrock because astronomers were analytical-minded users of photographic materials, though unable to match boardwalk tintype artists for volume of consumption.

The trouble with astronomers is still their paucity. Yet here we go, proudly announcing the KODAK Special Plate, Type 080-01, that halves exposure time for the faintest of stars, nebulae, and their spectra, or alternatively, establishes new extremes in faintness. Since, in the class of observations where it is not extraneous light that imposes the limit, penetration is bought with exposure time and focal length, and since the world supply of telescope time on serious focal lengths defines a rather cozy little customer-community of astronomical frontiersmen, questions of commercial sanity might well be raised.

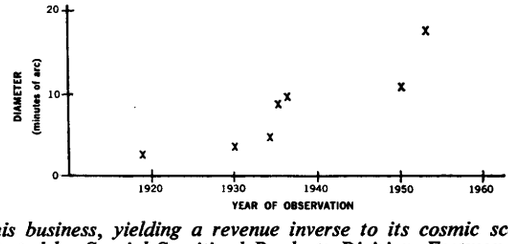
No, the explanation is not so simple as that this emulsion research will soon pay off in shooting cowboys on dimly lit saloon sets for TV. A deeper understanding now reveals weakness in conclusions drawn from studies of fast films designed for other purposes than to distinguish threshold light signals from darkness. That the earthlier applications of photography use fractional-second exposures instead of hours is only part of the difference.

With rival claims now reassessed, photographic detection has been restored to its former eminence in the astronomical observatory. How can we now possibly stand it to refrain from jumping in? To whom shall the astronomers turn if not to us?



Kitt Peak National Observatory recorded the very large and faint planetary nebula NGC 7293 in Hα light with (left) the former best choice, KODAK Spectroscopic Plate, Type 103aE, and (right) the new KODAK Special Plate, Type 081-01, an "E"-sensitized version of our new breed.

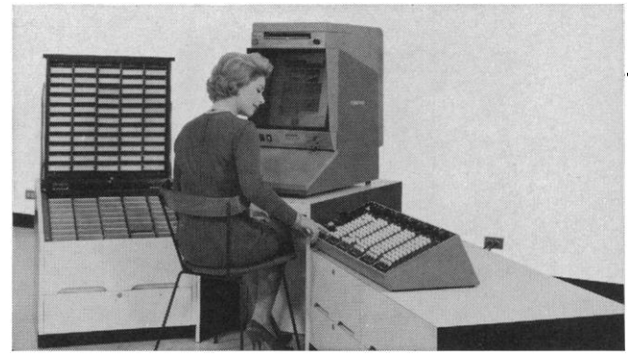
Not many men pull on their shoes in the morning with the thought, "Today I'll ship something that will probably expand the visible universe." It's fun to make a galaxy like Messier 32 grow:



This business, yielding a revenue inverse to its cosmic scope, is conducted by Special Sensitized Products Division, Eastman Kodak Company, Rochester, N.Y. 14650.

Information at the fingertips

Compared with fish, fats, fuel, or anything else you can think of, information is now the most *dignified* commodity in which to traffic—to sell, buy, gather, generate, blend, arrange, process, refine, filter, weigh, store, retrieve. We want you to think of us in association with the two last named. Better yet, think of our RECORDAK MIRACODE System. It can reward your interest by bringing your domain abreast of the age without loss of your cherished sense of financial reasonableness.



See Miss 1966, a well educated girl contributing to the soundness of society in a dignified, cool, pleasant way. The console at her left as she coolly retrieves from your RECORDAK MIRACODE System holds 490 film magazines each containing up to 2,000 documents, the proper one of which will appear on the screen (and even in the hand) within seconds in response to an interrogation punched on the keyboard.

The news is of healthy, continuing growth at the underneath part of the iceberg. Down below, where the massive problems are found of encoding usefully and rapidly 2000 × 490 documents—that's where the coolness of the retrieval is determined.

That's where, for example, you may now install our new accessory that makes a common card punch translate Hollerith holes into the proper signals to lay down photographically on the film a code describing the document image or images it precedes. This code can, of course, extend to whatever depth is wanted for precision of response to those cool fingertips.

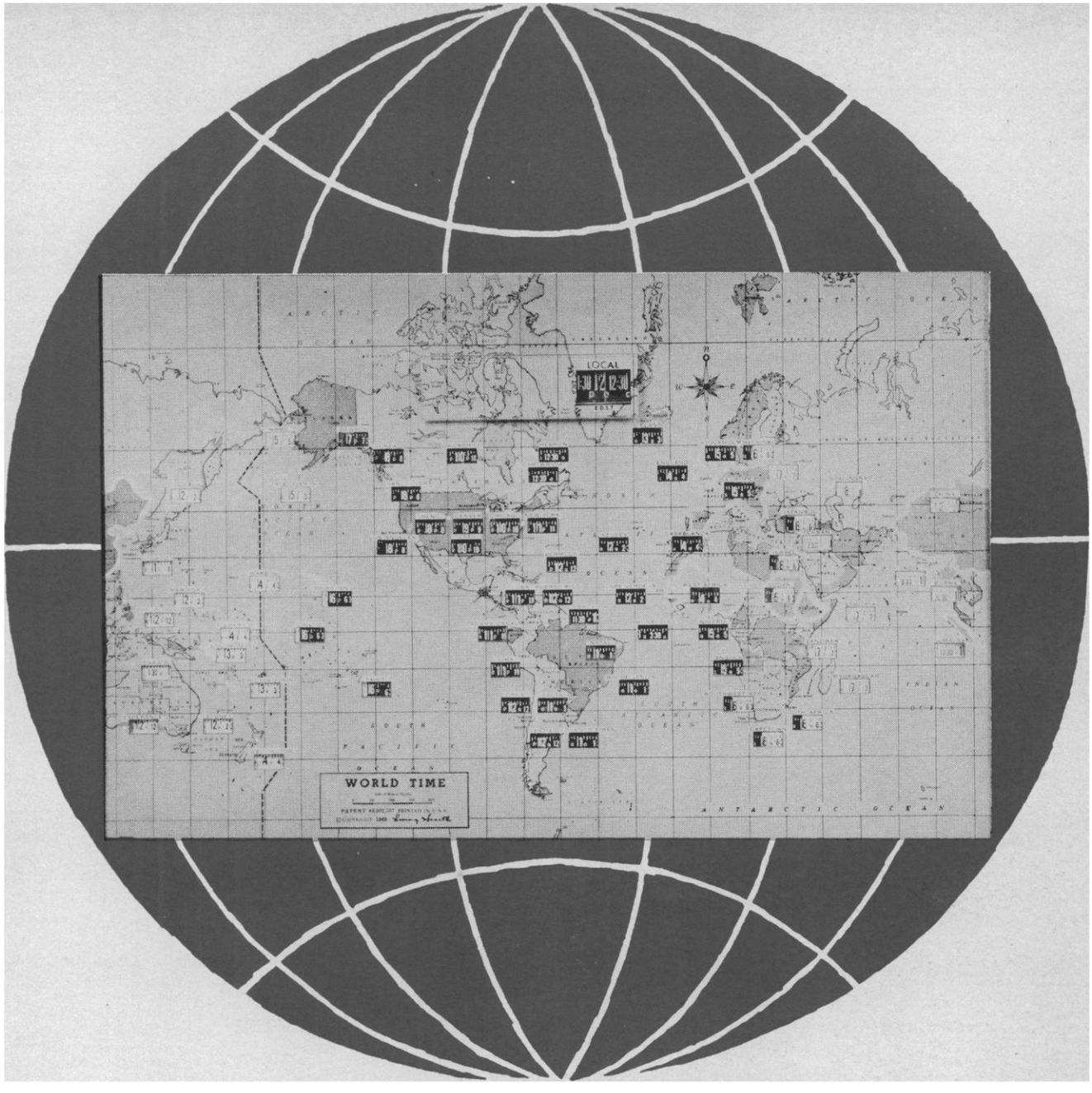
This kind of talk grows complicated all too quickly. To set up a situation where it can be better pursued in the necessary detail, address your own kind of inquiry about the RECORDAK MIRACODE *System to R. F. Beckwith, Recordak Corporation, 770 Broadway, New York 10003 (Subsidiary of Eastman Kodak Company).*

Glycine picker

Should an occasion arise where it is desired to pick the glycine out of a protein hydrolysate, attention is drawn to a 1935 paper in *J. Biol. Chem.* (*10*, 317). It reports that *Potassium Oxalatochromate* forms an insoluble complex with glycine and only glycine among all amino acids.

Sorry to have waited till now to offer the compound. It is available as EASTMAN *9256 from lab-supply dealers or from Distillation Products Industries, Rochester, N. Y. 14603 (Division of Eastman Kodak Company). So are many thousand other* EASTMAN *Organic Chemicals. Send to same address for "List No. 43."*

This is another advertisement where Eastman Kodak Company probes at random for mutual interests and occasional commerce with those whose work has something to do with science



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SCIENCE

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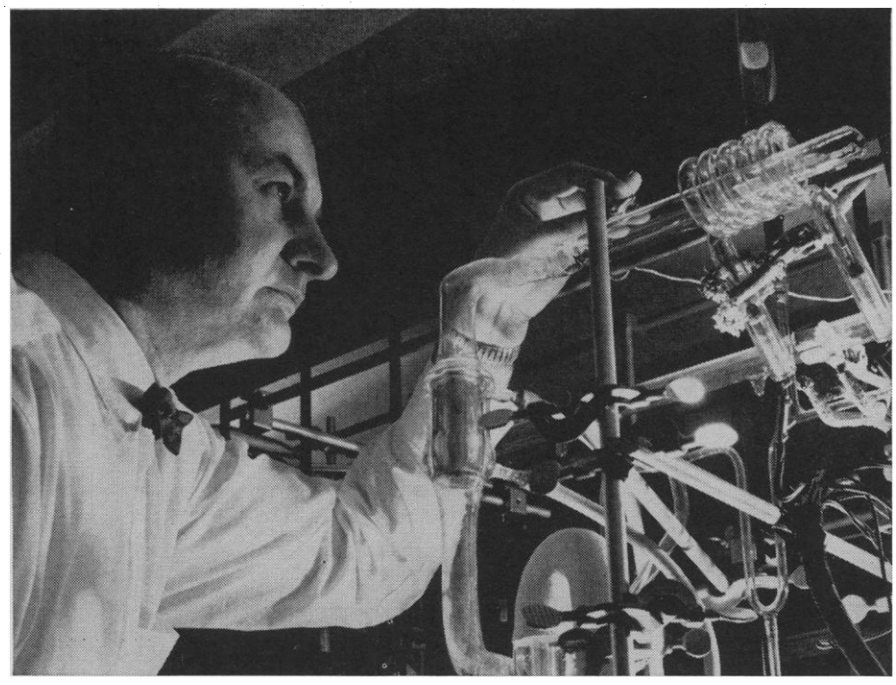
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Tikal, 320 kilometers north of Guatemala City, Guatemala, was the ceremonial center of the ancient Mayas. It reached the peak of its culture during so-called Classic times—that is, the 3rd and 4th centuries A.D. A widespread and still enigmatic cultural failure occurred around A.D. 900. See page 1401.

Report from

BELL LABORATORIES



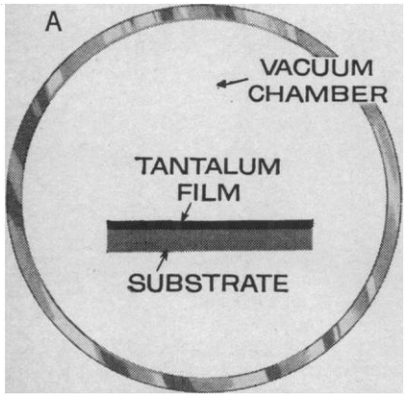
Chemist W. G. Guldner examines apparatus for "flashing" thin-film samples to remove gases for analysis. Helical tube is xenon flash surrounding vacuum chamber indicated in drawings below.

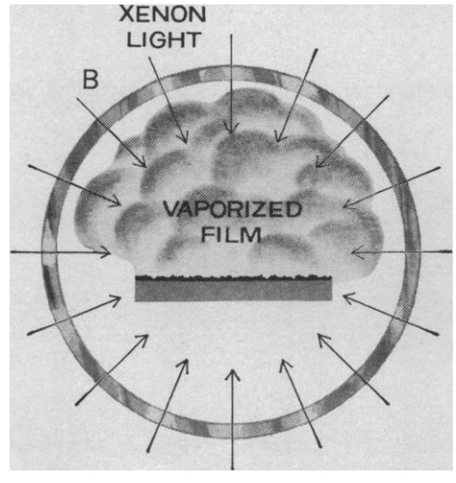
"FLASHING" THIN FILMS FOR QUANTITATIVE ANALYSIS

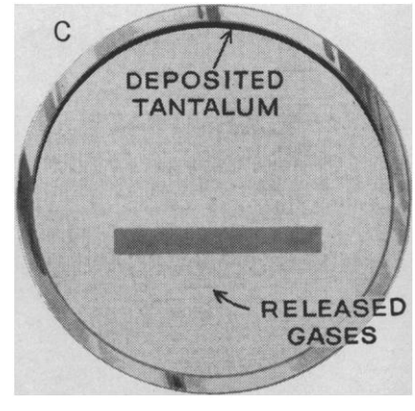
In making tantalum thin-film circuits, the tantalum is deposited on a substrate. Nitrogen is added during the deposition to form tantalum nitride, which helps stabilize resistance and capacitance values. After a film is formed, one then needs a quantitative analysis of the amount of nitrogen and other gaseous elements it contains.

A new technique has been developed at Bell Laboratories to perform this analysis quickly and accurately. As shown in the photograph above and in highly simplified form in drawing A, a sample of a film on its substrate is placed in a glass vacuum chamber. This chamber, surrounded by a xenon flash tube, is then subjected to a one-millisecond flash of light. As indicated in drawing B, the light energy is selectively absorbed by the film and has little effect on the substrate or on the walls of the glass chamber. The film is vaporized, and the temperature is high enough to dissociate the tantalum nitride.

Drawing C illustrates the chamber after the flash. Tantalum atoms have been driven to the inside walls of the chamber and are there condensed. Most of the released nitrogen and other elements are now in gaseous form within the chamber. These are pumped out for analysis by gas chromatography or other means.







Bell Telephone Laboratories
Research and Development Unit of the Bell System

Break the Red Tape Habit

You can sum up the difference between new Celanar polyester film and the other product in two words: *meaningful service.* Which means you get answers—and action—fast. There's no red tape with Celanar film.

That's why so many manufacturers are now switching to Celanar polyester film by Celanese. For magnetic tape. Packaging. Engineering reproduction. Metalizing. Stationery and office supplies. And electrical applications.

Case in point: The cleaner the polyester film, the better it processes. To ensure maximum cleanliness, Celanese produces Celanar film in a sealed-off "White Room" clean enough for surgery. It's by far the most modern in the industry.

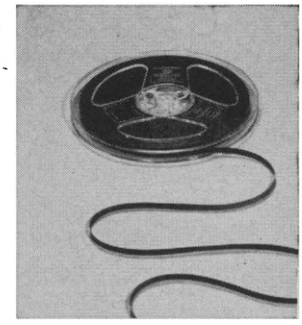
Another case in point: When essential, Celanar polyester film is shipped with temperature recording flags, to alert you to any harmful environmental changes suffered in shipment—before you put it on the processing line.

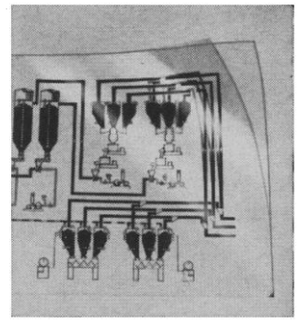
Other unique advantages that make Celanar polyester film your best buy include the fact that Celanar film is *protected against dust contamination* by use of non-fibrous plastic cores. That for critical applications it may be *shipped with Impact Recorders* to protect you against accepting film jolted and damaged in transit. That its splice-free roll lengths are *tailored to its customers' specifications.*

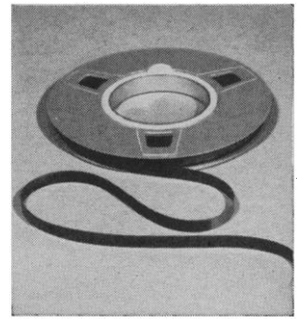
This is the kind of meaningful service you would expect from Celanese Plastics—whose operating philosophy is that the customer, not the supplier, is always right. Celanese Plastics Company, 744 Broad Street, Newark 2, N. J.

Celanese® Celanar®

Celanar® Polyester Film



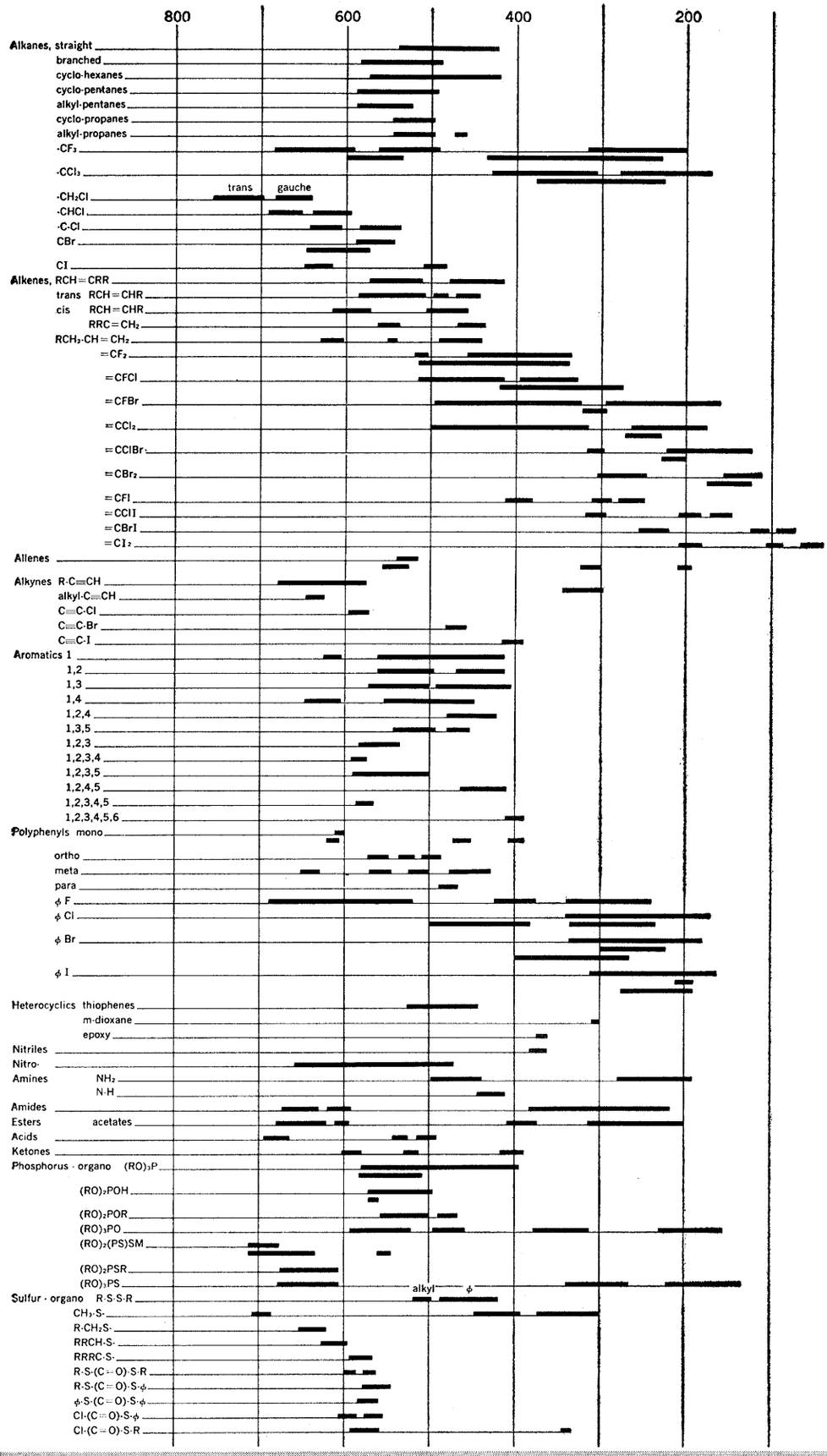


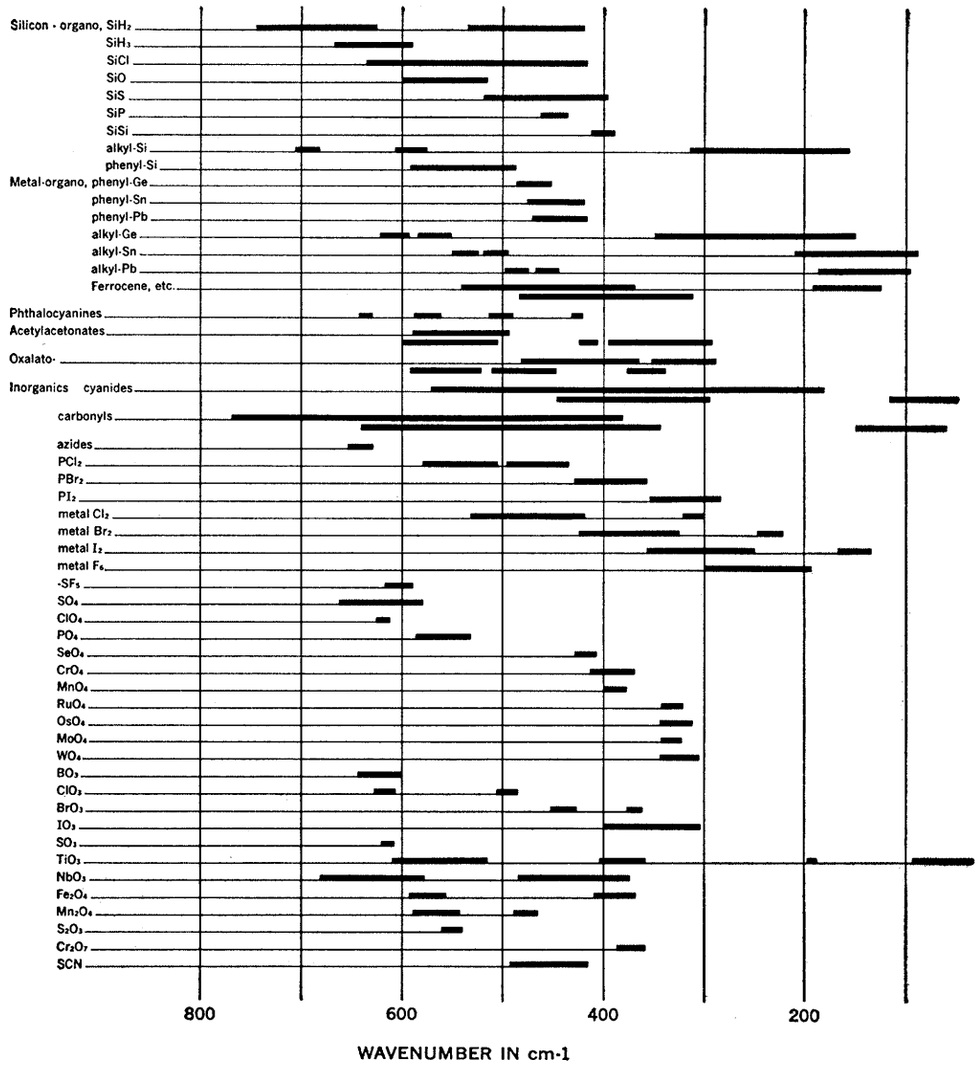


Celanese

Cutting through red tape to bring you answers and action *fast* is a specialty at Celanese. And it's just one of six meaningful service advantages you get when you switch to new Celanar polyester film.

FAR INFRARED VIBRATIONAL FREQUENCY CORRELATION CHART(1)





IR-10

IR-11

IR-12

These vibrational frequency correlations result from recent studies in the far infrared. While this data is based on factual evidence, it should not be accepted indiscriminately. Each day refined data is obtained on Beckman Infrared Spectrophotometers. For continuing studies in the far infrared region, the significance of the greater frequency ranges provided by the Beckman instruments is clear.

Many of these determinations are beyond the range of competitively priced instruments. For example, the IR-10, with a range of 2.5 to 33.3 microns, at only $6,800, gives an added range of 8.3 microns. The IR-11, with a range of 12.5 to 300 microns, is $34,650 and gives over 100 additional microns in the far infrared with double beam performance. The IR-12, with a range of 2.5 to 50 microns, is $21,000 and provides an additional 10 microns.

For more information on these Beckman Infrared Spectrophotometers, or for a full-size reproduction of the chart, contact your local Beckman Sales Engineer. Or, write for Data File LIR-265.

(1) Prepared by James E. Stewart, Beckman Instruments, Inc., to be published by Reinhold Press.

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SCIENCE AND ENGINEERING TELEVISION JOURNAL

A broadcast television program for communication among scientists and engineers.

The "TV Journal" is produced cooperatively by 20 scientific and engineering societies, and will consist of 20 half-hour telecasts. The series is coordinated by the AAAS, and is underwritten by grants from the National Science Foundation and The Timken Roller Bearing Company.

PROGRAM NO.	PROGRAM TOPIC	PARTICIPATING SOCIETY
1	**Air Pollution Control**	American Chemical Society
2	**Supersonic Air Travel**	American Institute of Aeronautics and Astronautics
3	**Lunar Surface Controversy**	New York Academy of Sciences
4	**Environmental Control**	American Society of Heating, Refrigerating and Air-conditioning Engineers
5	**Observatories in Space**	American Astronomical Society
6	**Seeing Inside Metals**	American Society for Metals
7	**Fiber Optics**	Optical Society of America
8	**Metropolitan Planning and Design**	American Society of Civil Engineers
9	**The Particle Jungle**	American Institute of Physics
10	**Operations Research Techniques**	American Institute of Industrial Engineers
11	**Topology**	Conference Board of the Mathematical Sciences
12	**Traffic Control Techniques**	Institute of Electrical and Electronics Engineers
13	**Conflict Resolution Research**	American Psychological Association
14	**Pursuit of Perfection**	American Society for Quality Control
15	**Bio-Medical Engineering**	International Federation for Medical Electronics and Biological Engineering
16	**How To Succeed without Re-Inventing the Wheel**	Engineers Joint Council
17	**Animal Communication**	American Institute of Biological Sciences
18	**Cryogenics**	American Institute of Chemical Engineers
19	**Man-made Weather Modification**	American Meteorological Society
20	**Pest Control**	American Association for the Advancement of Science

PROGRAM SCHEDULE

The "TV Journal" will be seen on most of the nation's educational TV stations on a staggered basis. The series started on the first group of stations during the week of 28 February and on another group of stations during the week of 14 March. Check your local program guide for day and time of broadcast.

Starts week of 28 March

Arizona	Phoenix
	Tucson
Colorado	Denver
Illinois	Urbana
Maine	Augusta
	Calais
	Orono
	Presque Isle
North Carolina	Chapel Hill
Nebraska	Lincoln
Tennessee	Memphis
Texas	Austin
Wisconsin	Madison

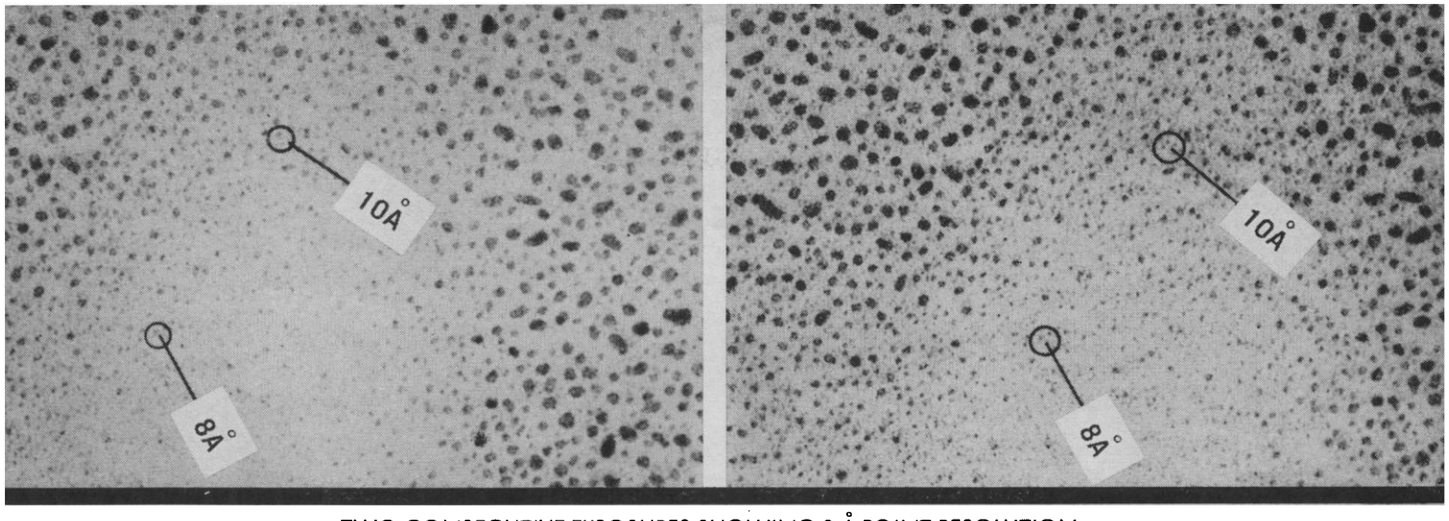
Starts week of 11 April

Georgia	Athens
	Atlanta
Kansas	Kansas City
Ohio	Cincinnati
	Oxford*
New Hampshire	Durham
New Mexico	Albuquerque
Tennessee	Nashville
Utah	Salt Lake City

*Programs 1-6 only

For more information, write **Science and Engineering Television Journal**

or call your local educational TV station. **225 West 57 Street, New York 10019**

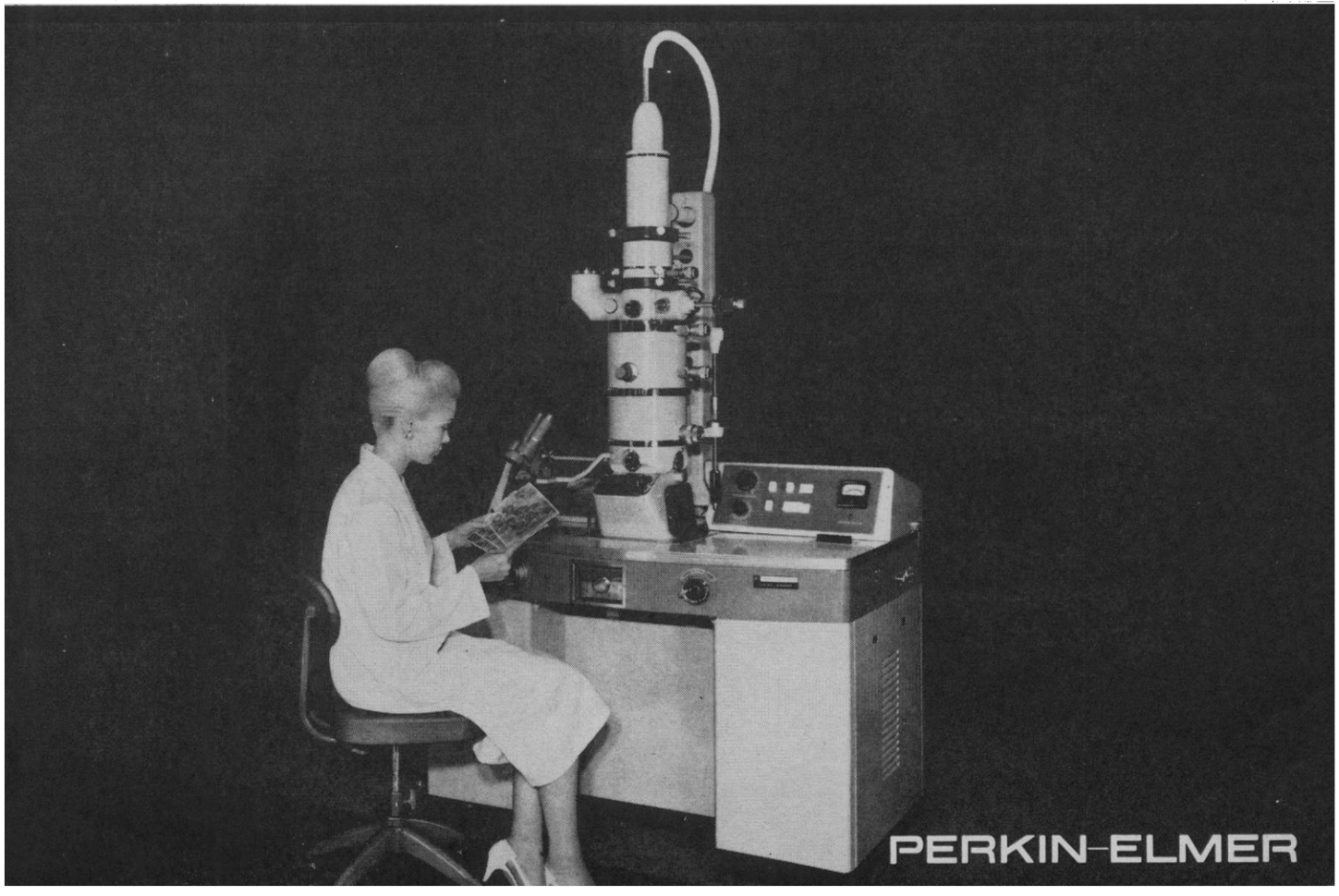


TWO CONSECUTIVE EXPOSURES SHOWING 8 Å POINT RESOLUTION.

NEW FROM HITACHI: THE HS-7S-- THE FIRST HIGH RESOLUTION COMPACT ELECTRON MICROSCOPE

Here are some of the important features of the HS-7S: High resolution: 8 Å guaranteed. Direct magnification 1000X to more than 80,000X, permitting final magnification to 1,000,000X. Binocular viewer (7X). Simple, fast and reliable operation. Click stop positioning of interchangeable condenser and objective apertures (four apertures each). Push button vacuum system including vacuum locked specimen and camera chambers. Takes 18 lantern slides (3¼"x4") per magazine load with additional 18 in prepump chamber. Double condenser lens for improved contrast (four micron spot diameter). Stigmator for objective lens. Step focusing. Built-in anticontamination device for specimen chamber. Built-in exposure meter. Full range of accessories available including the new TV image intensifier system. Compact: 49x32 inches floor space. Price $24,000 duty free. For further information contact Distributor Products Department, 723 Main Avenue, Norwalk, Conn.

(Prices subject to change without notice.)

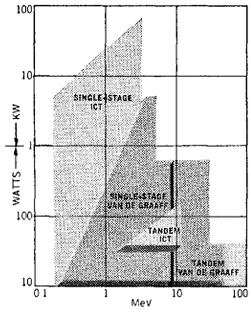


CHARGED PARTICLES

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.

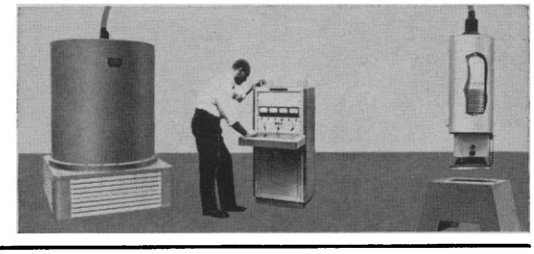
4 MeV ICT	ENERGY (MeV)	CURRENT	DIMENSIONS Length Feet	DIMENSIONS Length Meters
Positive Ions	1.5-4	3 mA	26'6"	8.08
Electron Conversion	1.5-3	10 mA	26'6"	8.08
3 MeV ICT Electrons	1.5-3	20 mA	29'	8.84

8 MeV ICT Tandem Accelerator

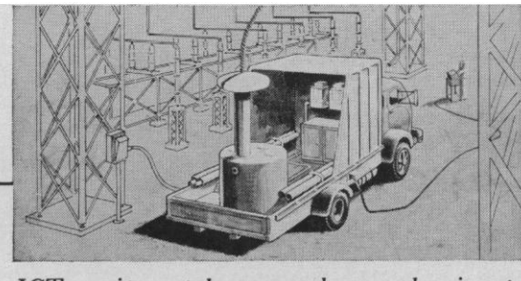
The 8 MeV ICT Tandem provides proton energies continuously variable from 3 to 8 MeV at a maximum guaranteed beam current of 2μA. The ICT power source is capable of providing 12 mA at 4 mv which, in combination with newly developed components emerging from HVEC, will enable the accelerator to keep pace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

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EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phone: 202-387-7171. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. ADVERTISING CORRESPONDENCE: Rm. 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE 6-1858.

An Adequate Rate of Growth

In the federal budget that is now under review by Congress, the President has asked that $191 million be appropriated to the National Science Foundation for basic research project grants, an increase of $70 million above the level of fiscal year 1965. Behind this substantial increase lies an important policy decision: federal funds to support research in academic institutions should continue to increase at a fairly steady rate. There is a corollary decision: if the budgets of other agencies do not provide the desired growth rate, the National Science Foundation budget should be increased to do so.

In the past decade, federal grant and contract funds to academic institutions have grown substantially, but sometimes irregularly. Annual increases have been as small as 7 percent and as large as 28 percent, with some years bringing larger and others bringing smaller increases than the year before. The administration hopes that future growth can be more regular, and, at least for the present, has selected the National Science Foundation as the regulator. When the funds likely to be used by other agencies to support academic research in fiscal year 1966 were found not sufficient to provide a satisfactory growth rate, the NSF budget was raised sufficiently to bring the total expected federal support of academic research up about 15 percent above the level of fiscal year 1965.

Note that these decisions, which were made at top government levels, do not apply to the whole research and development budget. They express a specific and special concern for research, either basic or applied, that is conducted in universities and colleges. Because most NSF research grants go to institutions of higher education, increasing its research funds provides a quite direct way of assuring greater support for academic research.

Annual increases are necessary to keep pace with the growth of the academic scientific base and with the increasing costs of doing research. Enrollment and faculty size have been increasing and will continue to do so for a number of years; birth-rate and educational statistics leave no room for doubt on this point. Thus the number of faculty members and advanced students qualified and eager to carry out research studies will continue to increase. Moreover, research costs go up. Instruments necessary for work at the advancing frontiers become more expensive as they become more powerful. Each time a major new laboratory, observatory, research vessel, accelerator, or other research facility is constructed, there is a lasting commitment to support the research for which it was designed. These built-in cost increases could be avoided only by reducing the amount of research done elsewhere.

The most important meaning of these decisions is that they constitute a step toward the solution of a policy issue. The primary, immediate objective of most of the federal agencies has been—and will continue to be—the accomplishment of their own missions rather than the welfare of the universities. But while this point has been clear, government officials have been bedeviled by the knowledge that they should be giving more attention to the longer-range growth and welfare of the universities upon which the government depends for much research. These new budgetary decisions express the conviction that it is necessary "to maintain an adequate rate of growth in Federal support for research in colleges and universities."—DAEL WOLFLE

Forthcoming Events

March

24–27. American **Physical** Soc., Kansas City, Mo. (R. G. Sachs, P.O. Box 344, Argonne, Ill. 60440)

24–27. Society for Research in **Child Development**, biennial, Minneapolis, Minn. (W. Hartup, Inst. for Child Development, Univ. of Minnesota, Minneapolis 55455)

25–26. Advances in **Tracer Methodology**, 10th symp., Zurich, Switzerland. (E. Landegren, New England Nuclear Corp., Ave. de Chailly 28 c, P.O. Box 31, Lausanne 12, Switzerland)

25–27. **Heart and Circulation in the Newborn and Infant**, Chicago, Ill. (D. E. Cassels, Chicago Heart Assoc., 22 W. Madison St., Chicago 60602)

25–27. Mid-Central States **Orthopaedic** Soc., 12th annual, Hot Springs, Ark. (Mrs. P. Lovan, 4101 Westport Lane, Wichita, Kan.)

26. **Marine Environment**, symp. and NDEA workshop, Fullerton, Calif. (M. D. Brown, Fullerton Junior College, Fullerton)

26–27. Association of **Industrial Medical Officers**, spring meeting, London, England. (Joint Secretariat, 47 Lincoln's Inn Fields, London, W.C.2)

26–27. **Louisiana Acad.** of Sciences, Natchitoches. (S. M. Weathersby, Dept. of Zoology, Louisiana Polytechnic Inst., Ruston)

26–27. **Rural Health**, 18th natl. conf., Miami Beach, Fla. (B. L. Bible, 535 N. Dearborn St., Chicago, Ill. 60610)

26–2. **Rehabilitation**, natl. conf., Melbourne, Australia. (Intern. Soc. of Rehabilitation of the Disabled, 701 First Ave., New York, N.Y. 10017)

27–31. National **Science Teachers** Assoc., natl. convention, Denver, Colo. (NSTA, 1201 16th St., Washington, D.C. 20036)

27–3. **Developmental Biology**, U.S.–Japan Cooperative Science Program seminar, Tokyo, Japan. (Office of International Science Activities, National Science Foundation, 1951 Constitution Ave., NW, Washington, D.C.)

28. American College of **Apothecaries**, Inc., Detroit, Mich. (R. E. Abrams, Hamilton Court Hotel, 39th and Chestnut Sts., Philadelphia, Pa. 19104)

28–30. American Assoc. of **Colleges of Pharmacy**, Detroit, Mich. (C. W. Bliven, AACP, 1507 M St., NW, Washington, D.C. 20005)

28–30. **Experimental Dermatology**, 4th symp., Palermo, Italy. (A. Tosti, Intern. College of Experimental Dermatology, Ist Dermatologico dell'Universita, Via del Vespro 131, Palermo)

28–31. American Soc. of **Abdominal Surgeons**, Washington, D.C. (B. F. Alfano, 663 Main St., Melrose 76, Mass.)

28–31. Canadian Inst. of **Mining and Metallurgy**, annual, Toronto, Ontario. (E. G. Tapp, CIMM, 906-117 St. Catherine St., W., Montreal 2, Quebec)

28–1. International **Anesthesia Research** Soc., Washington, D.C. (A. W. Friend, 227 Wade Park Manor, Cleveland, Ohio 44106)

28–2. American Soc. of **Hospital Pharmacists**, Detroit, Mich. (J. A. Oddis, 2215 Constitution Ave., NW, Washington, D.C.)

28–2. Society of **Motion Picture and Television Engineers**, 97th annual, Los Angeles, Calif. (R. J. Goldberg, Technicolor Corp., Research and Development Div., 2800 West Olive Ave., Burbank, Calif. 91505)

28–2. Chemical Aspects of **Electron Spin Resonance**, intern. conf., Cirencester, England. (D. H. Whiffen, Basic Physics Div., Natl. Physical Laboratory, Teddington, England)

28–3. American Soc. of **Photogrammetry**/American Congress on **Surveying and Mapping**, convention, Washington, D.C. (ASP, 44 Leesburg Pike, Falls Church, Va. 22044)

28–4. North American **Clinical Dermatologic** Soc., Las Vegas, Nev. (E. F. Finnerty, 177 E. 75 St., New York, N.Y. 10021)

29–31. American Assoc. for **Thoracic Surgery**, 45th annual, New Orleans, La. (Miss A. Hanvey, 7730 Carondelet Ave., St. Louis, Mo. 63105)

29–2. American Soc. of **Tool and Manufacturing Engineers**, annual conf., Cleveland, Ohio. (ASTM, 20501 Ford Rd., Dearborn, Mich. 48128)

29–30. **Great Lakes Research**, 8th conf., Ann Arbor, Mich. (J. L. Hough, Great Lakes Research Div., 1077 North Univ. Bldg., Ann Arbor, Mich.)

29–29 Apr. **Genito-Urinary Diseases**, symp., Univ. of Kentucky, Lexington. (N. J. Pisacano, Continuation Medical Education, Univ. of Kentucky, Lexington)

30–31. **Formulation of Pesticides**, symp., London, England. (Assistant Secretary, Soc. of Chemical Industry, 14 Belgrave Sq., London, S.W.1)

30–1. Non-conventional **Electron Microscopy**, Cambridge, England. (Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

31–2. **Corrosion** by Hot Gases and Combustion Products, symp., European Federation of Corrosion, Frankfurt am Main, Germany. [DECHEMA, 6 Frankfurt (Main) 7, Postfach 7746, Germany]

31–2. **Optical** Soc. of America, Dallas, Tex. (M. E. Warga, 1155 16th St., NW, Washington, D.C. 20036)

31–2. **Textile Research** Inst., annual, New York, N.Y. (TRI, Princeton, N.J.)

31–2. Recent Developments in **Heat Treatment of Food**, 2nd European symp., Frankfurt am Main, Germany. [Gesellschaft Deutscher Chemiker, Dr.rer. nat. Wolfgang Fritsche, 6000 Frankfurt (Main), Postfach 9075, Warrentrappstr. 40-42, Germany]

31–2. **Electron Beam**, 7th annual symp., University Park, Pa. (A. B. El-Kareh, Dept. of Electrical Engineering, Pennsylvania State Univ., University Park)

April

1–3. Association of **Surgeons** of Great Britain and Ireland, annual, London, England. (Joint Secretariat, 47 Lincoln's Inn Fields, London, W.C.2)

1–3. **Dermovenereology**, 7th meeting Univ. of Catania, Italy. (Direzione della Clinica Dermosfilopatica, Piazza S. Agata La Vetere 5, Catania, Sicily, Italy)

1–4. **British Medical** Assoc., annual clinical meeting, Dundee, Scotland. (D. Gul-

lick, BMA, Tavistock Square, London, W.C.1, England)

1–15. **Theoretical Chemistry**, NATO Advanced Study Inst., Frascati, Italy. (C. A. Coulson, Mathematical Inst., 10 Parks Rd., Oxford, England)

2–3. **Alabama** Acad. of Science, Florence State College, Florence. (W. B. DeVall, Forestry Dept., Auburn Univ., Auburn, Ala.)

2–3. **Arkansas** Acad. of Science, Univ. of Arkansas, Fayetteville. (G. E. Templeton, Dept. of Plant Pathology, Univ. of Arkansas, Fayetteville)

2–3. **Chemistry Facilities for the Two-Year College**, Junior College Chemistry Roundtable, conf., Dearborn, Mich. (W. T. Mooney, Jr., El Camino College, Via Torrance, Calif. 90506)

2–3. Alexander Graham Bell Assoc. for the **Deaf**, Southeastern regional meeting, New Orleans, La. (G. W. Fellendorf, 1537 35th St., Washington 20007)

2–3. **Pennsylvania** Acad. of Science, 41st annual, Villanova Univ., Villanova. (G. E. Grube, Lock Haven State College, Lock Haven, Pa.)

2–4. Society for Applied **Anthropology**, annual, Lexington, Ky. (SAA, Rand Hall, Cornell Univ., Ithaca, N.Y.)

2–4. American Soc. for the Study of **Sterility**, San Francisco, Calif. (H. H. Thomas, 944 S. 18th St., Birmingham, Ala.)

2–7. **West African Science** Assoc., 5th biennial conf., Freetown, Sierra Leone. (M. M. Anderson, Geology Dept., Fourah Bay College, Freetown)

4. **Chest Disease**, symp., Arizona Acad. of General Practice. (Cardiopulmonary Section, Tucson Medical Center, P.O. Box 6067, Tucson, Ariz. 85716)

4–7. American College of **Obstetricians and Gynecologists**, annual, San Francisco, Calif. (ACOG, 79 W. Monroe St., Chicago, Ill. 60603)

4–9. Division of **Chemical Literature**, American Chemical Soc., Detroit, Mich. (B. M. Davis, Cabot Corp., Concord Rd., Billerica, Mass.)

4–9. American **Chemical** Soc., spring natl. meeting, Detroit, Mich. (ACS, 1155 16th St., NW, Washington, D.C. 20036)

5–7. **Atomic Energy** Soc. of Japan, annual, Kyoto, Japan. (M. Masamoto, Atomic Energy Soc. of Japan, c/o Japan Atomic Energy Research Inst., 1, 1-chome, Shibatamura-cho, Minato-ku, Tokyo, Japan)

5–7. Hormonal Effects of **Cutaneous Structure and Function**, New York Univ., New York, N.Y. (Office of the Recorder, New York Univ. Post-Graduate Medical School, 550 First Ave., New York 10016)

5–7. **Elementary Particles**, conf., Birmingham, England. (Administration Asst., Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

5–7. **Fission Product Release and Transport** under Accident Conditions, intern. symp., Oak Ridge, Tenn. (C. J. Barton, Oak Ridge Natl. Laboratory, P.O. Box X, Oak Ridge 37831)

5–7. New Dimensions in **Space Technology**, 2nd space congr., Cocoa Beach, Fla. (L. E. Mertens, RCA Missile Test Project, M.U. 741 Bldg. 423, Patrick AFB, Fla.)

5–7. **Structures and Materials**, AIAA 6th natl. conf., Palm Springs, Calif. (J. E.

Hove, Materials Sciences Laboratory-F/2323, Aerospace Corp., Box 95805, Los Angeles, Calif.)

5–8. American Acad. of **General Practice**, annual, Seattle, Wash. (M. F. Cahal, AAGP, Volker Blvd. at Brookside, Kansas City, Mo.)

5–8. **High Energy Physics**, symp., Birmingham, England. (Administration Asst., Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

5–8. **Industrial Health**, American conf., Miami Beach, Fla. (American Industrial Health Conf., 55 East Washington St., Chicago, Ill.)

5–9. American College of **Allergists**, seminar and 21st annual congr., Las Vegas, Nev. (Administrative Office, 2141 14th St., Boulder, Colo.)

5–9. **Clean Air**, congr. and exhibition, Dusseldorf, Germany. (Nordwestdeutsche Ausstelungs-und Messe-Gesellschaft mbH, Nowea 5, Dusseldorf, Messegelande, Germany)

5–9. Phenomena in the Neighborhood of **Critical Points**, Washington, D.C. (M. S. Green, Statistical Physics Section, Natl. Bureau of Standards, Washington, D.C. 20234)

5–10. **Nuclear Developments**, 1st intern. congr., Brighton, England. (J. B. Pinkerton, Inst. of Nuclear Engineers, 147 Victoria St., London, S.W.1, England)

5–12. **Large Telescopes**, symp., Pasadena and San José, Calif. (I. S. Bowen, c/o Mt. Wilson Observatory, 813 Santa Barbara St., Pasadena)

5–24. **World Meteorological Organization**, Regional Assoc. VI (Europe), 4th session, Paris, France. (WMO, 41 Avenue Giuseppe Motta, Geneva, Switzerland)

6–8. **Biomathematics and Computer Science** in the Life Sciences, 3rd annual symp., Houston, Tex. (Office of the Dean, Div. of Continuing Education, Univ. of Texas Graduate School of Biomedical Sciences, 102 Jesse Jones Library Bldg., Texas Medical Center, Houston 77025)

6–9. Royal **Aeronautical** Soc., conf., Nottingham, England. (H. Umpleby, Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London, S.W.1, England)

6–9. **Automatic Control**, conv., Nottingham, England. (H. Umpleby, Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London, S.W.1, England)

7–9. American Assoc. for **Cancer Research**, 56th annual, Philadelphia, Pa. (AACR, 7701 Burholme Ave., Fox Chase, Philadelphia 19111)

7–9. The **Chemical** Soc., anniversary meetings, Glasgow, Scotland. (CS, Burlington House, London, W.1, England)

7–9. **Nucleation Phenomena**, intern. symp., Cleveland, Ohio. (A. G. Walton, Dept. of Chemistry, Case Inst. of Technology, University Circle, Cleveland 6)

7–9. **Stress Analysis**, conf., Bristol, England. (Administration Asst., Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

8–9. **Histochemical** Soc., 16th annual, Philadelphia, Pa. (S. S. Spicer, Natl. Inst. of Health, Bethesda, Md. 20014)

8–9. **Microbiological Deterioration in the Tropics**, symp., London, England. (Secretary, Soc. of Chemical Industry, 14 Belgrave Sq., London, S.W.1, England)

8–9. British Inst. of **Radiology**, annual congr., London, England. (BIR, 32 Welbeck St., London, W.1)

8–9. **X-ray Analysis**, Conf., Inst. of Physics and the Physical Soc., Edinburgh, Scotland. (Administration Asst., Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

8–10. North Pacific Soc. of **Neurology and Psychiatry**, Portland, Ore. (W. W. Thompson, 3300 S.W. Dosch Rd., Portland)

8–10. American **Radium** Soc., New Orleans, La. (J. L. Pool, 444 E. 68 St., New York 10021)

8–14. American Soc. for **Biological Chemists**, annual, Atlantic City, N.J. (K. Bloch, Harvard Univ., Cambridge 38, Mass.)

9–10. American Soc. for **Artificial Internal Organs**, Atlantic City, N.J. (B. K. Kusserow, Dept. of Pathology, Univ. of Vermont College of Medicine, Burlington)

9–10. American Assoc. of **University Professors**, Washington, D.C. (W. P. Fidler, AAUP, 1785 Massachusetts Ave., NW, Washington, D.C.)

9–11. Southwestern **Psychological** Assoc., annual, Oklahoma City, Okla. (O. Parsons, Dept. of Psychiatry, Neurology, and Psychology, Oklahoma Medical Center, Oklahoma City)

9–13. Mediterranean Cooperation for **Solar Energy**, Istanbul, Turkey. (M. Perrot, c/o Faculte des Sciences, Pl. Victor Hugo, Marseilles, France)

9–14. Federation of American Societies for **Experimental Biology**, 46th annual, Atlantic City, N.J. (Mrs. T. C. Heatwole, FASEB, 9650 Wisconsin Ave., Washington, D.C. 20014)

10. **New Mexico** Acad. of Sciences, Socorro. (K. S. Bergstresser, 739 42nd St., Los Alamos, N.M.)

10–12. **Aerospace Electronics**, natl. conf., Dayton, Ohio. (Inst. of Electrical and Electronics Engineers, Dayton Office, 1414 E. 3 St., Dayton)

10–14. American Soc. for **Experimental Pathology**, Atlantic City, N.J. (H. D. Moon, Univ. of California School of Medicine, San Francisco 94122)

10–14. American Inst. of **Nutrition**, annual, Atlantic City, N.J. (O. Mickelsen, Dept. of Foods and Nutrition, Michigan State Univ., East Lansing)

10–14. American **Physiological** Soc., Atlantic City, N.J. (R. G. Daggs, 9650 Wisconsin Ave., Washington, D.C.)

10–16. American Assoc. of **Immunologists**, Atlantic City, N.J. (B. H. Waksman, Massachusetts General Hospital, Boston 14)

11–15. **Calcified Tissues**, 3rd European symp., Davos, Switzerland. (H. Fleisch, Laboratorium für Experimentelle Chirurgie, Schweizerisches Forschungsinstitut, Davos)

12–13. **Inorganic Single Crystals**, symp., London, England. (Asst. Secretary, Soc. of Chemical Industry, 14 Belgrave Sq., London, S.W.1)

12–13. **Seismological** Soc. of America, annual, St. Louis, Mo. (C. Kisslinger, Dept. of Geophysics and Geophysical Engineering, St. Louis Univ., 3621 Olive St., St. Louis 63108)

12–14. **Atomic Spectra and Radiation**

Processes, conf., Oxford, England. (Administration Asst., Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

12–14. **Ballistocardiography and Cardiovascular Dynamics**, 1st world congr., Amsterdam, Netherlands. (A. A. Knoop, Physiological Laboratory, Free Univ., Valeriusplein 11, Amsterdam)

12–15. American **College Personnel** Assoc., Minneapolis, Minn. (A. H. Hitchcock, 1605 New Hampshire Ave., NW, Washington, D.C. 20009)

13–14. Kinetics of **Proton Transfer Processes**, Faraday Soc., Univ. of Newcastle-upon-Tyne, England. (FS, 6 Gray's Inn Square, London, W.C.1, England)

13–14. **Thermal Analysis**, symp., London, England. (B. R. Currell, Dept. of Chemistry, Mathematics, Biology, and Geology, Northern Polytechnic, Holloway Rd., London, N.7)

13–15. **Telemetering**, natl. conf., Houston, Tex. (R. W. Towle, Advanced Technology Laboratories, 369 Winsman Ave., Mountain View, Calif.)

13–17. American Soc. of **Parasitologists**, 40th annual, Atlanta, Ga. (F. J. Kruidenier, Dept. of Zoology, Univ. of Illinois, Urbana)

13–17. **Rehabilitation**, Pan Pacific conf., Tokyo, Japan. (Intern. Soc. for Rehabilitation of the Disabled, 701 First Ave., New York 10017)

14. **Programmed Instruction in Medical Education**, symp., Newark, N.J. (A. Krosnick, Div. of Chronic Illness Control, New Jersey State Dept. of Health, Box 1540, Trenton 25)

14–16. **Water Resources and Pollution Control**, 14th southern conf., Raleigh, N.C. (C. M. Weiss, Box 899, Chapel Hill, N.C.)

15–16. **Heat Transfer** at Cryogenic Temperatures, Oklahoma State Univ., Stillwater. (J. D. Parker, Dept. of Mechanical Engineering, Oklahoma State Univ., Stillwater 74075)

15–16. **Programming and Control**, intern. conf., U.S. Air Force Academy, Colorado Springs, Colo. (O. J. Manci, G. B. Dantzig Operations Research Center, Univ. of California, Berkeley)

15–17. American **Ethnological** Soc., Lexington, Ky. (N. F. S. Woodbury, Office of Anthropology, U.S. Natl. Museum, Washington, D.C.)

15–17. Southern Soc. for **Philosophy and Psychology**, Atlanta, Ga. (E. A. Alluisi, Psychology Dept., Univ. of Texas, Austin 78712)

16–17. **Montana** Acad. of Sciences, Montana State College, Bozeman. (L. H. Harvey, Dept. of Botany and Microbiology, Montana State Univ., Missoula)

16–18. Association of **Southeastern Biologists**, annual, Charlottesville, Va. (J. N. Dent, Room 270, Gilmer Hall, McCormick Rd., Charlottesville 22903)

18–22. Association of American **Geographers**, annual, Columbus, Ohio. (E. Taafee, Dept. of Geography, Ohio State Univ., Columbus)

19–21. Nondestructive Evaluation of **Aerospace and Weapons System Components and Materials** (unclassified), San Antonio, Tex. (J. R. Barton, Southwest Research Inst., 8500 Culebra Rd., San Antonio 6)

19–21. **Biomedical Sciences Instrumentation,** 3rd natl. symp., Instrument Soc. of America, Dallas, Tex. (D. R. Stearn, ISA, 530 William Penn Place, Pittsburgh, Pa. 15219)

19–21. Mechanics, Physics, and Chemistry of **Solid Propellants,** Purdue Univ., Lafayette, Ind. (A. C. Eringen, School of Aeronautics, Astronautics and Engineering Sciences, Purdue Univ., Lafayette)

19–22. Modern Trends in **Activation Analysis,** intern. conf., Texas A&M Univ., College Station. (R. E. Wainerdi, Texas A&M Univ., College Station)

19–22. American **Geophysical** Union, annual, Washington, D.C. (W. E. Smith, AGU, 1145 19th St., NW, Washington, D.C. 20036)

19–22. **Nuclear Magnetic Resonance,** 2nd annual workshop, Washington, D.C. (A. J. Rosen, Dept. of Chemistry, Georgetown Univ., Washington, D.C.)

20–22. **Frequency Control,** 19th annual symp., Atlantic City, N.J. (Director, U.S. Army Electronics Laboratories, Headquarters, U.S. Army Electronics Command, Attn: AMSEL-RD-PF, Fort Monmouth, N.J. 07703)

20–22. **Great Plains,** symp., North Dakota State Univ., Fargo. (S. W. Russell, North Dakota State Univ., Fargo)

20–22. **Physics of Solids at High Pressures,** 1st intern. conf., Tucson, Ariz. (C. T. Tomizuka, Dept. of Physics, Univ. of Arizona, Tucson 85721)

20–22. Photochemical Aspects of **Air Pollution,** symp., Cincinnati, Ohio. (A. P. Altshuller, Taft Sanitary Engineering Center, 4676 Columbia Parkway, Cincinnati 45226)

20–22. **System Theory,** symp., Polytechnic Inst. of Brooklyn, Brooklyn, N.Y. (J. Fox, Polytechnic Inst. of Brooklyn, 333 Jay St., Brooklyn 1)

20–23. American Assoc. of **Anatomists,** annual, Miami, Fla. (R. T. Woodburne, Dept. of Anatomy, Univ. of Michigan, Ann Arbor 48104)

20–23. American **Meteorological** Soc., spring meeting, Washington, D.C. (K. C. Spengler, 45 Beacon St., Boston 8, Mass.)

20–23. U.S. Natl. Committee, Intern. **Scientific Radio Union**/Inst. of **Electrical and Electronics Engineers,** spring meeting, Washington, D.C. (A. T. Waterman, Stanford Electronics Laboratories, Stanford Univ., Stanford, Calif.)

21. **Oral Cancer,** 3rd annual symp., Poughkeepsie, N.Y. (M. A. Engelman, 1 East Academy St., Wappingers Falls, N.Y. 12590)

21–22. **Mathematical Geodesy,** symp., Turin, Italy. (A. Marussi, Univ. of Trieste, Trieste, Italy)

21–23. American Inst. of **Chemists,** 42nd annual, Richmond, Va. (R. E. Anderson, Albemarle Paper Manufacturing Co., Richmond 23217)

21–23. **Cognitive Processes and Clinical Psychology,** 3rd symp., Univ. of Colorado, Boulder. (R. Jessor, Dept. of Psychology, Univ. of Colorado, Boulder)

21–23. **Combustion** Inst., western states section, spring meeting, Hollywood, Calif. (A. S. Gordon, Forrestal Research Center, Princeton Univ., Princeton, N.J.)

21–23. Instititute of **Environmental Sciences,** 11th annual, Chicago, Ill. (IES, 34 Main St., Mount Prospect, Ill. 60057)