Fare Enough

May a government scientist who is invited to attend a scientific program of public interest accept travel and related expenses from a private non-profit organization? We are assuming that participation in the program by the government scientist will contribute to his own scientific welfare, to that of his department, and to that of the other participants. We also assume that the program is taking place during the scientist's working months. Because of decisions by the General Accounting Office which were based on a conflict of interest law put on the books in 1948, the Government's answer until recently was no. Exceptions occurred only when there was specific legislative authority for a particular department. But, now, thanks in good part to efforts by the American Geological Institute, the answer is yes. Section 19 of the Government Employees Training Act, which the President recently signed into law, provides exemptions for scientists from the 1948 law. In fact, appropriate exemptions are provided for all federal employees.

An experience in 1957 by two scientists in the U.S. Geological Survey illustrates some of the undesirable consequences of the decisions based on the earlier law by the General Accounting Office. The scientists were invited to participate in the Distinguished Lecture Tour of the American Association of Petroleum Geologists. In the course of about a month, the tour would give them the opportunity to exchange ideas in many parts of the country with members of interested affiliated societies and universities. The scientists were to be reimbursed for their travel expenses by the various groups that benefited from the tour. But, as a result of the decisions, one of the scientists was unable to go, while the other did so but at personal sacrifice, since he went on leave in order to be able to accept travel expenses.

The people in the General Accounting Office, however, are not the villains of the piece. As a matter of fact, there are no villains, only a certain amount of misunderstanding. The General Accounting Office people held that, under the law, their decisions were the only ones possible. If private organizations were to be permitted to pick up the tab for government scientists, they said, then corrective legislation was required. In testimony before the House Committee on Post Office and Civil Service, Ralph E. Ramsey, associate general counsel of the General Accounting Office, brought the need for this legislation to the attention of Congress. He said of his office, "...we would be inclined to agree that the nonprofit scientific organization which asks for the attendance of a known authority in the Government to speak to the organization should be allowed, if it wishes, to help pay his travel expenses. . . ."

Bringing the provisions of the Government Employees Training Act down to cases poses several problems that still must be worked out. The act says that payments may be made "to the extent authorized by regulation of the President." The Bureau of Programs and Standards of the Civil Service Commission is now doing staff work on these regulations. One problem the bureau faces is the situation in which modest Government funds and more generous amounts from private sources may both be available for the same trip. May the latter be used to supplement the former? A second problem is to find some formula for distinguishing between those organizations from which it is proper to accept expenses and those from which it is not. We should not be very enthusiastic about government workers' accepting funds from a foundation, however disinterested, set up by a firm that advertised a product capable of growing hair on a golf ball, especially if the funds were earmarked for personnel in the Food and Drug Administration.—J.T.
The place of the Particle Accelerator in Basic Research...

Radiation Effects in the Gaseous Phase - IX

Widespread study of the effects produced in organic and inorganic gases by high-energy particle bombardment is providing a better understanding of reaction kinetics, revealing new methods for chemical synthesis, and contributing to the new field of missile technology.

Organic Research

Complex organic molecules have been irradiated at low pressures to determine the number of dissociations per unit-energy input and to measure the lifetime of the resultant ions and free radicals. From such information, one can estimate the most probable location of the dissociation in long-chain hydrocarbons. Locating specific reactive groups at the ends of these chains permits the study of energy transfer along the chain. There is some evidence that random interactions will migrate to a weak molecular bond where chemical reaction occurs. Studies comparing ionic and free-radical mechanisms for energy transfer show that the ionic lifetimes are surprisingly long.

In addition to the gaseous phase alone, heterogeneous systems of gases or liquids and solids have been studied in relation to the catalysis of organic reactions. In such systems, these reactions occur under conditions where the reactive component is highly dispersed on a mineral support. It is believed that the products of the radiolysis of hydrocarbons may be changed under such conditions and the studies are bringing to light new methods of chemical synthesis.

Inorganic Studies

In the inorganic field, studies of plasmas and gaseous reactions have been carried out by particle bombardment at pressures ranging from thousands of atmospheres down to near vacuum. The understanding of interactions between activated gases and of plasma stability at low ion concentrations is of extreme importance in a number of fields. Recently, interest has grown in the possibility of using heavy-ion bombardment for producing moderate electron densities in gases to investigate reactions between plasmas and solid surfaces. This is of great importance in the missile field, since these missiles travel with sufficient velocity in the rarified upper atmosphere to produce a surrounding sheath of ions that can react with the missile skin to produce surface damage.

The study of reaction kinetics in gases by means of radiation is contributing to our understanding of industrial chemical processes based on gas-phase reactions. It also appears that knowledge of gaseous reactions may contribute to our presently incomplete understanding of liquid-state phenomena.

The Van de Graaff as a Radiation Source

One of the most versatile sources of radiation used in these studies is the Van de Graaff particle accelerator. It can accelerate electrons, protons, and heavier ions, and it produces intense beams that are very homogeneous in energy and variable over a wide range of energies. Continuous or pulsed operation can also be provided, with pulses ranging in width from milliseconds to microseconds.

The beam intensities produced permit the use of these machines in studies requiring a high yield of reaction products. Because the energy and type of particle can be varied, it is possible to investigate linear energy transfer in a gas. The energy definition, considerably better than that obtainable with any other type of accelerator in the same energy range, and the applicability of pulsing techniques, make the Van de Graaff a precision instrument for the study of chemical reaction kinetics and the lifetime of the reactive components.

You are invited to visit the High Voltage Engineering exhibit at the 2nd International Exhibition on Peaceful Uses of the Atom, Geneva, Switzerland. On display: a 5.5-Mev Van de Graaff positive-ion accelerator; model of new Tandem Van de Graaff; and photomurals showing uses of High Voltage equipment.

High Voltage Engineering Corporation

Burlington Massachusetts

386
Letters

Darwin and Pandora's Box

A report on evolution by T. Dobzhansky [Science 127, 1091 (1958)] discusses the persistence of popular interest in this subject. Dobzhansky cited evidence from his own experience that, in the 100 years since Darwin announced his views, interest in evolution had spread all over the world, from Punta Arenas to the Egyptian desert. In the reference article, Dobzhansky concluded that evolution had as one of its consequences the extinction of all species. That is, for the species, the steps of evolution, existence, and extinction parallel the birth, life, and death of the individual. He states that "no biological law can be relied upon to insure that our species will continue to prosper, or indeed that it will continue to exist."

The conclusion should be considered in the light of the impact on human behavior of our knowledge of human mortality. The fact that the increased intelligence of Homo sapiens led to a knowledge of the inevitability of death is an element of anthropology. Carleton S. Coon treats this subject in terms of the myth of Pandora's box. As part of the search for knowledge, the box was opened, and knowledge of death came out. "One way, and one way only, permitted man to retain his peak efficiency with this problem on his mind—the belief in life after death" [The Story of Man (Knopf, New York, 1954), page 67].

One form that this belief has taken has been a reliance on immortality through one's descendants—through the persistence of the species. Yet one consequence of the understanding gained from our concept of evolution is the knowledge that species become extinct— not just occasional species, as an odd incident, but all species, inevitably, as part of the order of things. Dobzhansky says: "Man has gained some knowledge which is a basis for hope that the problem of the ultimate extinction of Homo sapiens is not impossible of solution." Even so the wise men of prehistory who first perceived the universality of individual mortality must have hoped to find a way to avoid its personal application.

Popular interest in the findings of astronomers since Copernicus and of biologists since Darwin has focused on the question: "Is our planet or our species, by some exceptional chance, immortal?" Isaac Asimov says, in considering the wellspring of science fiction, "There used to be the consolation that even though we, as individuals, might die, life would continue, spring would come, flowers would bud. But now we have brought ourselves to such a pass that we wonder whether the planet itself might not die with us." [R. Bretnor, Ed., Modern Science Fiction: Its Meaning and Its Future, (Coward-McCann, New York, 1953), p. 188]. And in point of fact, extinction of our species can, on probability, be expected much sooner than annihilation of our planet.

Homo sapiens has had less than a century to adjust to the concept of species mortality that came from the Pandora's box opened by Darwin. Man's search for a way "to retain his peak efficiency with this problem on his mind" continues, from Punta Arenas to the Egyptian desert.

H. K. LIVINGSTON

Wilmington, Delaware

Publication versus Communication

A recent editorial, "Journal publication in microform" [Science 127, 1145 (1958)] reminds us that science per se did not exist until communication was established among scientists. One of the most effective methods of communication was publication.

Publishing, or making public, brought with it a variety of problems. One of these, the productivity of scholars, is old (1); the other, editorial reduction of manuscripts, is relatively new (2). In fact, the editor was originally the publisher. The word is derived from editus, past participle of edere, to give out, put forth, publish. (Editeur, appearing as part of the title page in French books, still is used to designate the publisher). Originally, scholars wrote their manuscripts, and brought them to printers, and the printers then published and sold them. The role of the editor of today is a refinement of this earlier and simpler process.

As a result of editorial selectivity, communication, "the blood-stream of science," is, in many cases, being slowed so greatly that cyanosis is apparent. In my own field, that of psychology, the overcrowding of journals with manuscripts suitable for publication has resulted in (i) a two-year publication lag; (ii) requests to condense manuscripts to a single page for publication; (iii) an elimination of all historical or theoretical material from papers intended for publication even as monographs; (iv) editorial fiat regarding the reduction of reference lists by 90 per cent. I have experienced all these restrictions.

Indeed, the situation has become so serious that communication often seems to actually be impaired by publication. The patient (science) can see one of his members (psychology) turning blue now if he looks. Possibly other parts are similarly affected.

A substantiating complaint comes
from a theorist who ascribed much of the criticism directed against his theoretical framework to a serious lack of understanding, "The major difficulty is that the studies have appeared only in experimental [psychology] journals in which space limitations have required that theoretical discussions be kept to a minimum" (3). Result? The theory has received only piecemeal presentation, and communication seems to have been hindered by publication.

In psychology a rule of thumb in regard to preparing manuscripts for publication has arisen: a journal article should be so written (because of rigid space requirements) that any problems another scientist may have in repeating the experiment should be capable of removal by the exchange of a maximum of two letters.

The Science editorial recognizes the need for restoring detail to scientific publication and suggests it be accomplished by microphotographic reduction of journals. Details eschewed in publication are needed for communication. True. But, I do not know whether microform journal publication is the best solution. As the editorial itself points out, such a method "has not as yet achieved success" despite demonstrated merits. I would suggest that consideration be given to auxiliary publication. At least two methods of auxiliary publication—that is, the guaranteed availability of materials that cannot achieve journal publication—exist and have been used successfully. These are: (i) library deposit; libraries that have interlibrary loan policies or that, for a fee, can make microfilm or photostatic reproductions are excellent auxiliary outlets; and (ii) the method used by the American Documentation Institute of the Library of Congress; the institute freely accepts, for reproduction, materials cited in published articles and prepares 35-millimeter film or 6-by-8-inch photocopies. In both cases, specific citations are necessary so that requests from communicants can be fulfilled.

Both methods of auxiliary publication would seem to help restore the function of communication to publication. Microform publication of journals may be too drastic a step. Reducing the blood-stream may be more damaging than diverting part of its flow. Other methods of restoring a healthy color, less experimental and already available, may serve as well.

Dell Lebo
Richmond Professional Institute,
Richmond, Virginia

References
Meetings

Symposium on Fodder Plants, Poland

An International Symposium on Fodder Plants was held in Poznan, Poland, 25-28 June, under the sponsorship of the Institute of Plant Breeding of the Polish Academy of Sciences. S. Barbacki of the University of Poznan was the program chairman and presided at the symposium. The program was devoted to the genetic and other scientific factors, including chemistry, involved in the improvement by breeding of such forage crops as lupines, alfalfa, clovers of various kinds, and grasses. Fifty papers were delivered. These are being printed, with English summaries, in the Polish annual periodical Roczniki Nauk Rolniczych.

Attendance at the symposium totaled 160. Most of these were research workers in the various Polish universities and experiment stations. There were 17 participants from other countries, including two from the U.S.S.R., one from Great Britain, one from Hungary, two from Czechoslovakia, seven from East Germany, one from West Germany, two from Sweden, and one from the United States—Noble Clark of the University of Wisconsin. After the symposium, some of the visitors made a 6-day tour of research centers in Poland where laboratory studies and field experiments with forage crops are under way.

Rocket Society

Missile and rocket technology in the various armed services and in industry will be explored in Detroit, 13-18 September, at the national fall meeting of the American Rocket Society. Twenty-nine papers and a 6-member panel discussion are scheduled for presentation at eight technical sessions. There is one "secret" and one "confidential" session.

Among topics to be considered are both long- and short-range missiles; the impact of space flight on industry; controls for supersonic air-breathing engines, including ramjets; latest developments in monopropellants (confidential) and in auxiliary power supplies (secret); production methods for complete missiles and various components; and operational service problems. Participants from the armed services include Lieutenant General A. G. Trudeau, chief of research and development, Department of the Army; Major General J. H. Hinrichs, chief of ordnance, Department of the Army; George Valley, chief scientist, U.S. Air Force; and Major General John B. Medaris, commanding officer at the Army's Redstone Arsenal.

Planetary Symposium

A symposium on planetaria and their educational uses will be held at Cranbrook Institute of Science, Bloomfield Hills, Mich., under the auspices of the National Science Foundation, 7-10 September. The discussions will be concerned with the broader objectives of astronomical instruction as well as with teaching techniques and equipment. Registration will be limited to 95 persons. For additional information address: Mr. James A. Fowler, Cranbrook Institute of Science, Bloomfield Hills, Mich.

Nuclear Congress

Preliminary plans for the Fifth Nuclear Congress, to be held in Cleveland, Ohio, 5-10 April 1959, have been announced by the Engineers Joint Council. As in the past, the congress will be composed of four parts: the Nuclear Engineering and Science Conference; the Hot Laboratories and Equipment Conference; the Atomic Energy Management Conference; and the Atomfair, at which nuclear equipment will be on display.

Clarke Williams of Brookhaven National Laboratory, chairman of the Nu-

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nuclear Engineering and Science Conference, has announced that papers will be considered for inclusion in the 1959 program if summaries are submitted before 1 October 1958. Prospective authors should submit 300- to 500-word summaries of proposed papers to the secretary of any one of the sponsoring societies. A list of sponsoring groups is available from Engineers Joint Council, 29 W. 39 St., New York, N.Y.

Forthcoming Events

September
22-25. Scientific Instruments of the 16th to the 19th Century, symp., Frankfurt/Main, Germany. (International Union for the History and Philosophy of Science, 4, rue Thenard, Paris 5e, France.)
23-25. Fat Research, 3rd intern. cong., Seville, Spain. (J. M. Martínez, Instituto de la Grasa, Avenida de Helipolis, Seville.)
24-28. Angiology and Histopathology, 3rd intern. cong., Venice, Italy. (L. Ger son, Intern. Committee on Angiology and Histopathology, 4, rue Pasquier, Paris, France.)

October
1-8. Spelology, 2nd intern. cong., Bari, Lecce, and Salerno, Italy. (F. Anelli, Castellana-Grotte (Bari), Italy.)
2-5. International Soc. of Audiology, 4th cong., Padua, Italy. (M. Arslan, 37, via Olinate, Padua.)

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One research group led by Dr. Bert M. Tolbert has had considerable success in applying these procedures to a wide variety of samples and research problems, including studies of animals.

NEW REVIEW PAPER
Dr. Tolbert, now at the University of Colorado, has authored a 40-page paper covering detailed procedures for C14 and Tritium assays, ion-chamber theory, samples and sample preparations, elimination of organic compounds to CO2 and design and construction of ion chambers and measurement of ion chamber currents and approximate calibration data. Copies of the paper are available from Technical Reports Section, Department of Commerce, Office of Technical Services, Washington 25, D.C., for $1.25 each. When requesting a copy, please ask for Bulletin UCRL-3499.

OTHER USEFUL APPLICATIONS
Measurement of radioactivity is only one of many applications where the Model 31 can be used advantageously. For example, amplification and measurement of ion currents in mass spectrometry, pH determinations, precise measurements of small charges, currents, or voltages from a high impedance source can all be made faster, simpler, less expensive and far more accurately using the Model 31.

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10 standard ranges—Ranges provided on the Model 31 are 1, 3, 10, 30, 100, 300, 1,000 mv, and 3, 10, 30 volts. The output of the Model 31 will operate a 1 mA recording milliammeter or a standard recording potentiometer.
Accessories—Ionization chambers, recorders and various special modifications and accessories are available for all types of electrometer uses.

A new catalog on the Cary Model 31 is available. Write for your copy today to Applied Physics Corporation, 932 West Colorado St., Pasadena 1, California. Ask for Data File E9-88.
6–11. Electroencephalographic Study of the Higher Nervous Activity Processes in Animals and Man, colloquium (by invitation), Moscow, U.S.S.R. (Miss Mary A. B. Brazier, Massachusetts Neurophysiological Laboratory, Massachusetts General Hospital, Boston 14.)

7–9. International Soc. for the History of Pharmacy, cong., Venice, Italy. (A. F. Vitolo, Piazza Carrara 10, Pisa, Italy.)

8–12. Nutrition and Vital Substances, 4th intern. conv., Essen, Germany (Secretary General, Bemeroder Strasse 61, Hannover-Kirchrode, Germany.)

11–15. Salinity Problems in the Arid Zones, UNESCO symp., Tehran, Iran. (UNESCO, 19, avenue Kleber, Paris 16, France.)


13–16. Society of Exploration Geophysicists, 28th annual intern., San Antonio, Tex. (C. C. Campbell, Box 1536, Tulsa 1, Okla.)


19–26. Medical Hydrology, 21st intern. cong., Madrid, Spain. (Dr. Francon, 55, rue des Mathurins, Paris 8e, France.)


22–24. Aviation Medicine, 4th annual symp., Santa Monica, Calif. (T. H. Sternberg, UCLA Medical Center, Los Angeles 24, Calif.)

22–26. American Soc. for the Study of Arteriosclerosis, annual, San Francisco, Calif. (O. J. Pollak, P.O. Box 228, Dover, Del.)


23–25. Rocket Technology and Astronautics, intern., Essen, Germany. (Deutsche Gesellschaft fuer Raketentechnik und Raunfahr, e.V., Neunseinnerstrasse 19, Stuttgart, Zuffenhausen.)


24–25. Taxonomic Consequences of Man’s Activities, symp., Mexico, D.F. (H. C. Cutler, Missouri Botanical Garden, St. Louis.)


27–28. Plant Physiology, 9th annual research cong., Saskatoon, Saskatchewan, Canada. (D. T. Coupland, Plant Ecology College of Agriculture, Univ. of Saskatchewan, Saskatoon.)

27–29. Radio, Institute of Radio Engineers, fall meeting, Rochester, N.Y. (V. M. Graham, EIA, 11 W. 42 St., N.Y.)

(See issue of 15 August for comprehensive list)
Equipment

The information reported here is obtained from manufacturers and from other sources considered to be reliable. Science does not assume responsibility for the accuracy of the information. A coupon for use in making inquiries concerning the items listed appears on page 434.

- **Delay Relays** use transistor circuitry and RC networks to provide delay intervals from 50 msec to several hours. Accuracy of all types is ± 10 percent. Voltage ranges are from 14 to 32 v d-c or 24 to 220 v a-c. Temperature range is - 55° to + 71°C or - 55° to + 125°C. (Jordan Electronics, Dept. 253)

- **Temperature Transducer** provides response as fast as 10 msec. With an amplifier, response of 1 msec can be achieved. Accuracy is said to be better than 0.1°F. The amplifier provides output of ± 5 v per 100°F with maximum output of ±20 v available. The unit will withstand accelerations to ± 25 g at 0 to 200 cy/sec. (Astra Technical Instrument Corp., Dept. 254)

- **Proportional - Counter Converter** connects to the input of a scaler to convert it to a proportional counter. The instrument incorporates a transistorized amplifier-discriminator. A standard chamber accepts samples up to 2.25 in. in diameter by 7/16 in. Conversion to chambers for larger or smaller samples may be made readily. (Nuclear Measurements Corp., Dept. 260)

- **Support Towers** for supporting and positioning antennas, reflectors, and scale-model airframes are constructed entirely of low-dielectric-constant materials above the base unit. The load capacity is 200 lb, and the height is 8 or 16 ft. Positioning drive speed is variable. Two-axis position information is provided. (Scientific Atlanta Inc., Dept. 262)

- **Portable Voltmeter** provides ranges for a-c voltage from 1 mv to 1000 v full scale; d-c voltages from 1 to 1000 v full scale; and resistance from 10 ohm to 10 megohm at half-scale. Over-all accuracy is 3 percent. An electrometer input has an input impedance greater than 10,000 megohm for the 0-to-1-v d-c range. Transistor circuitry is used. (Southwestern Industrial Electronics Co., Dept. 263)

- **Training Reactor** of pool type is designed for use by universities and engineering schools. The reactor, which may be operated at power levels up to 10 kw, is prefabricated except for the concrete shielding, and can be installed in existing buildings. The pool tank is 7 ft in diameter. Standard equipment includes a thermal column, two beam tubes, and

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A circular walkway permits viewing of the internal workings of the reactor. (Nuclear Products, Dept. 274)

**FREQUENCY CONVERTER** accepts inputs from an impeller-type flow pick-up and converts the input frequency to a proportional d-c voltage. Time constants are selectable from 1 msec to 2 sec. Full-scale frequencies are 500, 2500, and 10,000 cy/sec. Accuracy and stability are said to be better than ±0.1 percent. (Systron Corporation, Dept. 261)

**HEATING BLOCK** is equipped with 13 compartments to accommodate 38-by-300-mm test tubes for aging tests. The temperature is controlled over the range of 100° to 600°F. A temperature controller is provided to prevent override of the master control unit. The block body is made of aluminum and it weighs approximately 169 lb. (Product Packaging Engineering, Dept. 264)

**OSCILLOGRAPHIC CHART VIEWER** provides variable chart-drive speeds from 15 in./min to 100 ft/min. Charts up to 16 in. wide and 200 ft long are accommodated. A direction-reversing switch allows rewinding at any time, and an automatic brake prevents supply-roll overrun upon reduction of speed. A sliding cursor has provision for angular adjustment. (Sanborn Co., Dept. 265)

**RELAY TESTER** permits measurement of pull-in and drop-out voltages, contact make-and-break time, contact bounce, overlap time on make-before-break and break-before-make contacts, and contact resistance. Display is provided on a meter and oscilloscope. Adapters for a variety of relays are available. (Schmelten Electronics, Dept. 267)

**SAMPLE APPLICATOR** for chromatography holds up to seven pipettes, rocking them so that their tips are applied 6, 12, or 18 times per minute to the paper surface. The distance between the points of application is 1 in. Warm air from a blower flows continuously to dry the sample between successive applications. Air flow is regulated by individual valves for each sample. Provision is made for connection of a vacuum line to increase drying efficiency. (Scientific Products, Dept. 276)

**RESISTANCE CALIBRATOR** operating on methods developed at the National Bureau of Standards, permits calibrations up to 100 megohm, with accuracy of ±0.01 percent. The instrument consists of 10 precision resistor steps made with encapsulated wire-wound resistors. Each step is adjusted within ±0.01 percent of nominal. (International Resistance Co., Dept. 277)

**LOW - DIELECTRIC - CONSTANT MATERIAL** consists of thin-walled hollow glass spheres ranging in size from 30 to 300 µ in diameter. The bulk appearance resembles sand. Some grades of material are stable at 1500°F. The dielectric constant is 1.15; dissipation factor, 0.002; and bulk density, 10 lb/ft³. (Emerson & Cum- ing, Inc., Dept. 268)

**FORCE TRANSUDER** is operated on the differential-transformer principle, and provides an output of 1.68 v full-scale into a 5000-ohm resistive load with 115 v, 60 cy/sec excitation. The range is 75 or 240 lb. Linearity is ±0.5 percent, with hysteresis less than 0.09 percent. Temperature drift and sensitivity at zero are within 2 percent of full scale per 100°F. (Edcliff Instruments, Dept. 270)

**THREE-PHASE OSCILLATOR** covers frequencies from 1 to 1000 cy/sec in three decade bands. Output is 7 v line-to-line and 4 v line-to-neutral at no load. The phase shift between any two phases is 120 ± 1 deg. Total harmonic distortion is less than 3 percent. Output impedance is approximately 30 kohm line-to-line, or 10 kohm line-to-neutral. Input is 70 w, 115 v a-c 60 cy/sec. (Genisco Inc., Dept. 275)

**SEGMENTAL RECORDER** is a multichannel plotter that features a separate graph on a strip chart of data as a function of time for each input. Up to 192 channels can be plotted; 24-, 32-, 48-, or 96-channel instruments are also available. The individual graphs measure 5½ by 6 in. (Gilmore Industries, Inc., Dept. 280)

**VIBRATION TESTER** permits observation of displacement, velocity, or acceleration by choice of switch setting. Six decade ranges cover full-scale displacements from 0.001 to 100 in. Velocity is indi- cated from 0.01 to 1000 in./sec full-scale, and acceleration scales range from 0.1 to 1000 g. The frequency range is from 5 to 5000 cy/sec. The transducer used is a velocity pick-up. (Ling Electronics, Inc., Dept. 272)

**THERMOREGULATOR** is sensitive to a few thousandths of a degree and is adjustable with an accuracy better than 0.1°C. Adjustment is accomplished by micrometer displacement of a plunger in an exact mass of mercury. Temperature is read on a mechanical counter coupled to the micrometer. Range is set by a second, larger plunger. Counter range is 100°C. (Emil Greiner Co., Dept. 278)

**OVEN** for accelerated-aging tests is equipped with a rotating sample holder positioned so that samples can be suspended and rotated at approximately 1 rev/min. The rotating shelf is 14 in. in diameter and has 37 1-in. openings.

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Temperature range is 35° to 180°C. Modification may be made for conventional operation with standard shelves. (Electric Hotpack Co., Inc., Dept. 279)

- **OHMMETER** for transistor circuitry features loading of less than 30 mV to 300 ohm. The instrument is direct-reading from 10 mohm to 10 megohm in eight ranges. Accuracy is ±2 percent. Dimensions are 8½ by 6 by 4½ in. (Electronic Applications, Dept. 281)

- **POTENTIOMETER, SIGNAL SOURCE, and MILLIAMMETER** are combined into one instrument designed for testing, calibrating, or servicing controllers and amplifiers. The potentiometer ranges are 0- to 60 and 95-to-105 mV. Voltage taps are provided at 10, 20, 30, 40, 50 and 95 mV, with 0 to 10 mV available from a multiturn slidewire in 2.5 μV increments. An indicating meter is scaled at 0 to 5 ma d-c. (Technique Associates, Inc., Dept. 287)

- **THREE-AXIS FLIGHT SIMULATORS** duplicate the forces of flight or vessel motion in yaw, pitch, and roll. Speeds up to 50 cy/sec are possible. The units are hydraulically actuated, and the oscillation frequency between axes may be adjusted independently. (J. W. Fecker, Inc., Dept. 282)

- **OSCILLOGRAPH RECORDER** writes by the heated-stylus method on rectangular coordinates. Models are available with two to six channels. The frequency response is flat to 70 cy/sec. Eight chart-drive speeds, from 1 to 250 mm/sec, can be selected. The unit is constructed for 19-in. rack mounting. (Edin Co., Inc., Dept. 266)

- **DIGITAL VOLTMETER** is a two-module unit consisting of a switch module and a power module. A five-digit display, with automatic ranging and polarity, covers the range from 0.0001 to 999.99 V. Accuracy is 0.01 percent ±1 digit. Stability is better than ±0.01 percent. (Electro Instruments Inc., Dept. 269)

- **DROP-COUNTER ACCESSORY** extends the range of the manufacturer’s fraction collector from 400 to 800 drops per fraction. In addition, the device may be used to count and register the total number of fractions collected, or the total number of drops. Totals are recorded on a six-digit mechanical register. (Research Specialties Co., Dept. 283)

- **TAPE PERFORATOR** accepts fixed data from tabulating or edge-punched cards and variable data through its keyboard, and combines the information in its punched-tape output. The equipment is comprised of a separate input console and tape punch, so that a number of remotely located input stations may feed on a single punch. (Taller and Cooper Inc., Dept. 285)

- **AUTOMATIC STOPPERING DEVICE** permits sealing of bottles or vials, in which material has been freeze-dried, while they are still in the vacuum chamber. Stoppers are held above the bottle necks in special holders to permit unobstructed drying. At the end of the drying period, the stoppers are forced into place by a pneumatically operated pressure plate. (F. J. Stokes Corp., Dept. 295)

- **CANNULAS** for extracorporeal circulation are fabricated of flexible nontoxic vinyl plastic, and may be autoclaved. A double-lumen cannula and an intraperitoneal cannula are available. The latter is transversely ridged to assure continuous return flow, even when it is surrounded by omentum. (Medical Development Corp., Dept. 296)

**Joshua Stern**

National Bureau of Standards