

Reviews

The lowly relay, mainstay of the gadgeteer and the pinball machine, is nevertheless "the basic building block of modern dial switching systems and also of various automatic control systems and computers". Accordingly a great deal of effort has been expended by the Bell Telephone Laboratories in the improvement of the relay, some aspects of which are described in the 260 pages devoted to the design of relays in the January issue of *The Bell System Technical Journal*. The articles deal with measuring equipment for the study of relays, magnetic design of relays, analysis of measured magnetization and pull characteristics, estimation and control of the operate time of relays, principles of slow release relay design, and economics of telephone relay applications. It is interesting to note that every dial call made in a large city involves about 1000 relays. Since the faster a relay operates the more often it can be used, and hence the fewer the relays required, a useful analysis of relay speed can be made in terms of value per millisecond per relay in given applications. This quantity varies with the use of the relay, ranging from \$0.266 in one case described to \$67 in another, and forms a basis for a cost-value analysis of relay design.

Solid-state electronics was reviewed in four lectures by K. K. Darrow, delivered at the University of London last June, and these papers are being published in the English journal *Research* starting with the January 1954 issue. The first article deals mainly with electronic conduction, with the "life of frustration" of the average electron described in a detailed yet lively style.

The fundamental discovery in 1820 by Hans Christian Oersted of the magnetic properties of electric currents has been the subject of several errors by historians, and in an effort to "stake them [the errors] firmly in the grave" R. C. Stauffer has written a paper on the subject that appeared in the December 1953 issue of the quarterly *Isis*, the journal of the History of Science Society. Misconceptions demolished by Stauffer concern the actual date of the discovery, which was 1820 and not 1807 or 1819 as has been asserted, and the manner of the discovery, which is alleged by several authors to have been accidental. It appears, according to Stauffer, that Oersted proposed the study of the possible magnetic effects of currents in 1812, and the successful experiment was the result of considerable planning and effort.

The interaction potential between two nucleons has been derived in different ways by Hans Bethe and Wolfgang Pauli on the basis of a meson field, and while each approach gives the same pseudoscalar term, the scalar part of the two interactions differs in both magnitude and sign. Writing in the second issue of the *Indian Journal of Theoretical Physics*, K. C. Kar and H. Mukherjee show how both forms of the potential can be derived "from purely classical ideas" by considering each nucleon to be a magnetic dipole. Bethe's result follows if the magnetic moment of the dipole is used

in the calculations, while Pauli's result is obtained by treating each dipole as though it were composed of separate magnetic poles. Kar and Mukherjee conclude that "since in regions of nuclear dimensions the idea of separability of poles is not valid, it appears that Bethe's form of potential is preferable to Pauli's".

Laboratories

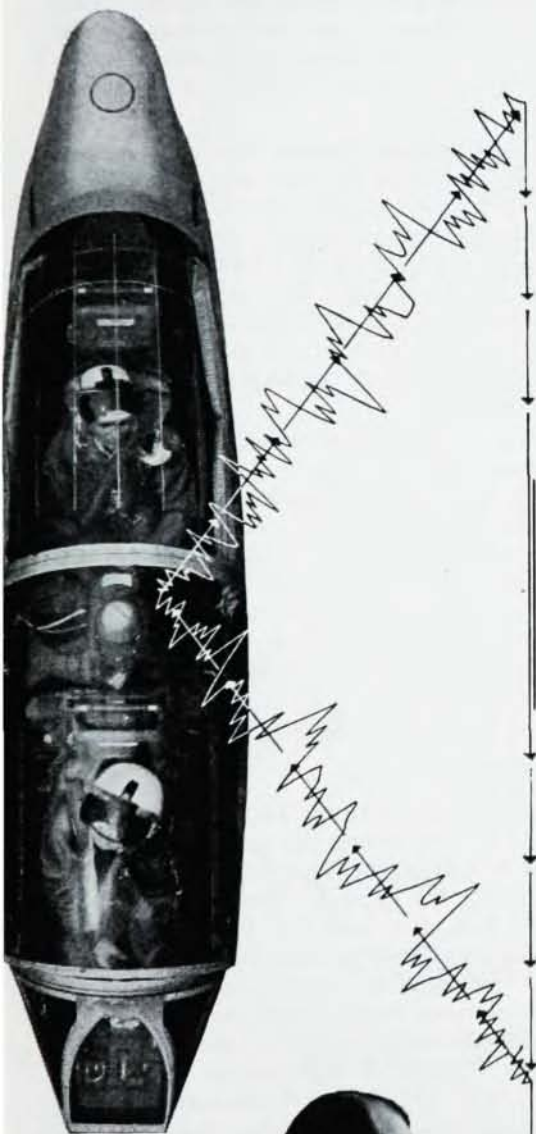
"D Building", one of the original technical area structures of the Los Alamos Scientific Laboratory and birthplace of the first readily visible chunks of plutonium metal ever to be produced, is to be demolished and its contaminated parts interred in a burial pit in one of the outlying areas of the Los Alamos project. Of temporary wood-frame construction, D Building was erected at the New Mexico site early in 1943 to serve as the chemistry and metallurgy laboratory for the Manhattan District's Project Y. It was there that the nuclear components for the Trinity, Hiroshima, and Nagasaki weapons were fabricated two years later. Some room surfaces of the building became contaminated with small quantities of radioactive materials during its occupancy. For the most part only alpha particles were involved, however, and their short range permitted satisfactory contamination control simply by painting the walls. The decision to dismantle the building, thus breaking paint layers and stirring up contaminated dust, required the adoption of safe disposal measures. Most members of the chemistry and metallurgy division staff have already moved into a new building constructed as part of the AEC's \$120 million permanent technical area program at Los Alamos.

A "hot canyon" area located on the two lower floors of the Research Building at Ames Laboratory, the AEC's installation at Iowa State College, has been constructed to permit handling of fissionable materials and high-level radioactivity. Equipped with elaborate shielding, ventilating, and remote-control systems, the area is to be the scene of experiments in the reprocessing of atomic fuel for re-use in power reactors. While some of the features of the canyon are similar to those found at other AEC installations where work with high-level radioactivity is in progress, much of the equipment is specialized and was specifically designed or adapted for Ames Laboratory by Gordon Winders, a mechanical engineer on the Laboratory staff. General design of the area was directed by Ray Fisher, group leader in charge of building and engineering services. The radiochemical part of the experimental program is directed by Adolph Voigt; work in metallurgy is supervised by Adrian Daane.

Cenco Corporation has announced completion of its new \$100 000 research, development, and engineering laboratory which was started last year in Chicago at the firm's principal subsidiary, Central Scientific Company, producers of scientific instruments and apparatus. According to John T. Gossett, chairman, the new laboratory enables the company to amplify its operations in the fields of physics, chemistry, electronics,

The special character of the application of an electronic digital computer for airborne automatic controls is reflected principally in the input-output units.

MORE THAN 100 TIMES FASTER THAN THE HUMAN BRAIN



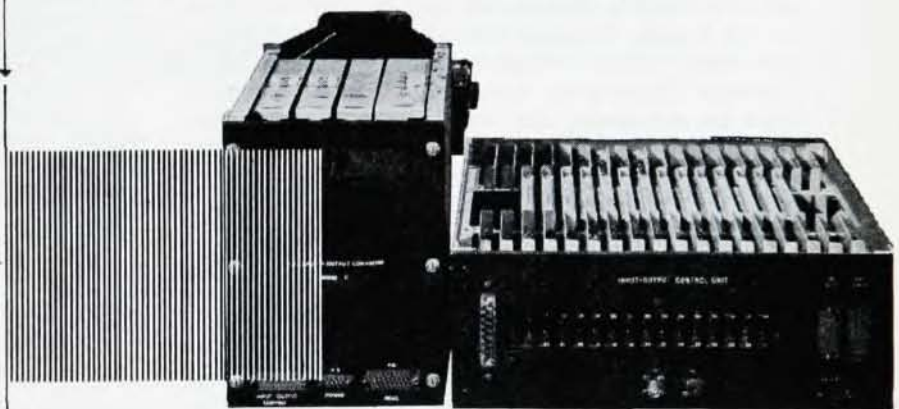
The physical quantities defining the state of the system—such as altitude, rate of climb, heading, and other vital information—are measured by instruments whose outputs are usually in the form of mechanical displacements or voltages. These analog quantities are converted into digital numbers that are processed by the computer; it performs in "real" time the computations corresponding to the mathematical representation of the control problem. The results of these calculations are numbers representing the signals used to control the system. These output numbers are converted into the analog-type signals used in the control operations.

At Hughes Research and Development Laboratories, where the subminiature airborne digital computer was pioneered, analog-digital input-output systems have been developed for several applications.

For example, in the conversion of direct-current voltages to binary numbers, the many input voltages

are digitalized in sequence by a comparison with a precisely linear saw-tooth waveform, gated once per revolution of the drum to successive inputs. Time intervals are produced which are used to control a gated binary counter. Resulting binary numbers are stored in the memory for subsequent use by the computer. Output binary numbers each control the symmetry of a square wave recorded on a drum channel during the output sampling periods. Reading heads continuously present the waveforms to the respective output channels where they are standardized by regulated-current switch tubes and are filtered to establish the direct-current components. Several such waveforms may be time-shared on a single drum channel by encoding.

A major effort at Hughes is also devoted to adapting electronic digital computer techniques to business data processing and related applications—uses destined for far-reaching peacetime application.



ENGINEERS AND PHYSICISTS

Activities at Hughes in the computer field are creating positions in the Laboratories. Experience in the design and application of electronic digital computers is desirable, but not essential. Engineers and physicists with backgrounds of component development or system engineering are invited to apply.

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HUGHES
RESEARCH
AND DEVELOPMENT
LABORATORIES

Culver City, Los Angeles County
California

Input-output units (above) of the Hughes airborne electronic digital computer. (Left) Operation of the pilot's direction indicator is discussed by W. S. Shockency (left), Radar Laboratory, and M. L. MacKnight of the Advanced Electronics

Assurance is required that relocation of the applicant will not cause disruption of an urgent military project.



and atomic energy. Previously, he said, the company's development of new products was largely confined to the field of physics.

Education

The Astronomy Department of the University of California in Berkeley will arrange an astronomy conference between August 16 and September 15 for college and university instructors and other qualified persons. This conference will be held under the auspices of the National Science Foundation and the Extension Division of the University of California. The purpose is to acquaint instructors with modern developments in the fields of astronomy and astrophysics. Membership will be limited to about twenty. The National Science Foundation will pay travel and subsistence expenses. The principal lecturer will be Professor Bart J. Bok of Harvard University who will discuss the structure of our galaxy. A half-time lecturer will speak on problems of the sun and physics of the stars. The participants will be encouraged to take an active part in all discussions. Applications should be addressed to the Department of Astronomy of the University of California at Berkeley, before June 15.

The University of Pennsylvania has announced the reorganization of its administration of teaching and research in engineering. Under the new plan, the University's Towne Scientific School has been divided into four separate Schools of Chemical, Civil, Mechanical, and Metallurgical Engineering, each of which will have its own faculty. Directors have been named to head the four newly created schools and the Moore School of Electrical Engineering, while two assistant vice-presidents for engineering also have been appointed. In addition, provision has been made for the establishment of an Institute for Cooperative Research to stimulate, coordinate, and manage investigative activities in the engineering field for industry, foundations, and government. All of these various engineering units will function under the University's vice-president in charge of engineering affairs, Carl C. Chambers.

Boston College has announced a special two weeks intensive course in modern industrial spectroscopy at Chestnut Hill, Boston, Massachusetts, from July 12 to July 23. The course is particularly designed for chemists and physicists from industries in the process of installing spectrographic equipment. Information on the course can be obtained from Professor James J. Devlin, S. J., Physics Department, Boston College, Chestnut Hill 67, Boston, Massachusetts.

Publications

A new journal in the field of noise control is to be published within the year by the Acoustical Society of America, according to a decision made at the meeting of the Society's Council on February 13th. Designed to meet the growing needs of diverse groups of noise control specialists, the journal is expected to be issued

four times each year beginning next October. The quarterly is not intended to be archival in character and will not compete with the *Journal of the Acoustical Society of America*, the organization's official publication. The contents will include recitations of case histories and regular columns on technical, medical, and legal aspects of noise control.

The Library of Congress is offering for sale to the general public a continuing bibliography with abstracts prepared under an agreement with the Snow, Ice, and Permafrost Research Establishment. Abstracts on the basic properties and applications of snow, ice, and perennially and seasonally frozen ground are printed on conventional three-by-five-inch cards. Each item is completely cataloged and the location of the original publication is included. Any number of cards may be ordered at a price of 3 cents each. Payment may be made either by enclosing the exact amount with the order or by having the cost charged against a pre-purchase deposit. However, no cash refunds can be made. Orders or inquiries should be directed to the SIPRE Bibliographic Project, Library of Congress, Washington 25, D. C.

The British Chemical Society has announced a new publication which is to list titles, authors, and journals of published papers in pure chemistry throughout the world. Since it is not an abstract journal, *Current Chemical Papers* is able to list all relevant papers that appear in the month previous to its publication dates. The subscription rate for U. S. subscribers (copies sent by air mail) is \$12.75. Information may be obtained from The Chemical Society, Burlington House, London, W. 1, England.

In Japan, a monthly, English-language periodical entitled *Reports of the Electrical Communication Laboratory*, is now being published by the Nippon Telegraph and Telephone Public Corporation, 1551 Kichijoji Musashino-shi, Tokyo. A condensed version of two existing publications of the Laboratory, the journal describes various aspects of the program of the parent company. The first issue includes articles on telegraph transmission, magnetic dialing apparatus, and power supply equipment.

Organizations

The Committee on Vacuum Techniques, a non-profit corporation representing the vacuum equipment industry and institutions and industries employing vacuum processes, has recently been established in Massachusetts. Indicating that the functions of the new organization will be in the direction of the standardization of nomenclature, testing techniques, and equipment performance ratings, the Committee says it will welcome membership applications from individuals and companies involved in high-vacuum technology. The address is Box 1282, Boston 9, Massachusetts.

The American Physical Society has Hans A. Bethe of Cornell University as its 1954 president, succeeding