the IGY would be continued. This program has been given the designation International Geophysical Cooperation—1959 (IGC-59). Such studies as appear practicable to the participating IGY committees will be conducted as part of an internationally coordinated effort, with interchange of data, as in the IGY, under the aegis of the International Council of Scientific Unions. The council has authorized the establishment of a Special Committee for Inter-Union Cooperation in Geophysics (SCG), which will assume responsibilities for IGC-59 similar to those that CSAGI assumed for the IGY. Moreover, those fields that particularly call for extensive and intensive studies are receiving attention. Thus, the council has established special committees dealing with oceanography, the Antarctic, and space science. Counterpart committees have been established in these areas by the National Academy of Sciences, and significant steps have been taken for planning long-range programs in the above three fields, including activities for 1959. In addition, the council has authorized the continuation of the solar patrol and related world communications services which proved so useful during the IGY both in studying solar activity and in alerting scientists everywhere to solar events that were apt to result in terrestrial effects. Finally, the council has endorsed the proposal for a world magnetic survey during a quiet solar period, some four to five years from now.

References and Notes

1. H. Odishaw, "International Geophysical Year (Part I)," *Science* 128, 1599 (1958).
2. The preparation of this summary of IGY is based entirely upon reports and descriptions of projects supplied by the scientists and institutions engaged in the IGY research program. Many of them are mentioned in the text, although in this short summary it has not been possible to refer to all of the scientists who are producing contributions through their IGY programs or to describe all of the IGY accomplishments. The United States IGY program itself has been made possible only through the great contributions of time and effort of so many individual scientists and the participation and cooperation of public and private institutions. Particular acknowledgement should be made to members of the National Academy of Sciences' IGY staff who have assisted in the collection and preparation of the material contained in this article: Pembroke J. Hart and Stanley Ruttenberg.
3. H. Odishaw, "International Geophysical Year: A report on the United States program," *Science* 127, 115 (1958).
4. Data are being accumulated, and the results will appear in the bulletin of the U.S. Naval Observatory.

Engineering Information—All Is Not Lost

Literature is being effectively used despite current lack of efficient mechanical retrieval systems.

Ralph H. Phelps

More or less continually one is confronted with statements to the effect that the recent growth of the scientific and technical literature has been so great that its use is impracticable, if not impossible. In a general sense this idea goes back to the Old Testament of the Bible, which says, "Of making many books there is no end" (*1*). In the 1890's when the Royal Society of London was contemplating the publication of "The International Catalogue of Scientific Literature" (*2*), as well as at various other times, the increasing amount of the literature and the difficulty of its use have been deplored.

Another matter about which much has been said and written since the advent of the sputniks is the extent and excellence of Soviet abstracting services, often with the implication, if not the statement, that abstracting and indexing services in the United States are inferior. I would not minimize the importance of the Soviet abstracting services; they are impressive, if for no other reason than because they have grown so rapidly since they were started in 1952. Also, because the work is centralized and many literature scientists work in one place, it is physically an impressive operation. In this country, abstracting and indexing services are generally not governmental operations and are scattered throughout the country.

If the Soviets have profited more than we have from the technical literature, I believe it is because they may have worked harder at using it. The Soviet centralized information services are not essentially better than the services available in this country. Some of the larger sections of the Soviet abstracting services have no subject indexes and are therefore very difficult to use. Incidentally, in 1957 the Soviets purchased 54 copies of the 1956 bound volume of the *Engineering Index*, which is published in the United States.

Mechanization

Mechanization is currently being studied as a means of reducing the time and cost of the handling and retrieval of literature. For small collections of literature in restricted subject fields, mechanization has sometimes proved satisfactory. For large collections in broad fields covering diverse subject material, including concepts as well as materials, mechanization is apparently many years away. Its current status and some of its many problems and difficulties have been pointed out by Warheit (*3*), Taube (*4*), Shaw (*5*), and Rabinow (*6*). The overall problems of getting the information ready for the machine and getting it from the machine are perhaps greater than those of developing the machine. Machines work best on repetitive and routine operations. Such operations are not common in literature handling and retrieval.

Like many others, I wish that the literature could be searched more quickly and at less cost. I wish that efficient mechanized systems for large collections were now available, but they are not—not even at the very high prices charged for the large computers which are now

The author is director of the Engineering Societies Library, New York.

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being promoted for literature search work, despite the fact that they were designed for other work and are not particularly efficient as literature-searching tools (*4*).

Despite all of the foregoing, the technical literature can be, and is being, effectively used. Our present abstracting and indexing systems are not as bad as they are made out to be—not nearly that bad. While they may not all be as up-to-date as their publishers or users wish them to be, none of the many abstracting and indexing services available in the Engineering Societies Library is *even close* to being 6, 7 or 8 years behind, as such services were said to be by a witness at a recent Senate committee hearing (*7*).

The same witness also gave the impression that literature searches generally take a great amount of time (he mentioned six months as one example) and that searches cost from $1000 to $100,000 and even more. He also stated that "the little man is out." The Engineering Societies Library makes many literature searches each year for from under $100 to under $1000. These are not complete literature searches, and they may not deal with the largest and the most complex problems, but how often does "the little man" or anyone else deal with these? Letters of commendation and additional orders from those who have used the services of the Engineering Societies Library attest to the value of these inexpensive literature searches.

Up to 31 July 1958, income from the services of both the Engineering Societies Library and the Engineering Index, Inc., had increased over that of the same period last year—this despite the 1958 recession.

Through the activities of the Engineering Societies Library and the Engineering Index, Inc., engineers have a unique documentation center and coordinated services unmatched elsewhere in the world.

Engineering Societies Library

The Engineering Societies Library (now located in the Engineering Societies Building, 29 West 39th Street, New York) was established in 1913 through the merging of the long-established libraries of the American Society of Civil Engineers, the American Institute of Mining, Metallurgical and Petroleum Engineers, the American Society of Mechanical Engineers, and the American Institute of Electrical Engineers.

The Engineering Societies Library is outstanding in its coverage of the fields of civil, electrical, mechanical, mining, metallurgical, and petroleum engineering. It also extensively covers chemical engineering and all other branches of engineering, primarily on the level of the graduate and practicing engineer. The library contains over 175,000 volumes, 20,000 maps, 5000 translations, and 10,000 bibliographies and indexes. Some 1500 periodicals are currently received from all parts of the world; about one-third of these are in foreign languages. The coverage of Russian and other Eastern European scientific and technical publications has been considerably expanded recently, and important publications are continually added.

In addition to collecting extensively, but selectively, engineering publications of all types on a world-wide basis, the Engineering Societies Library maintains extraordinarily complete files of all technical publications and papers of the American Society of Mechanical Engineers and of the other founder societies. Its collection of these unpublished papers is particularly important, for most of them are manuscript copies not elsewhere available, not even in the societies' own files. The library has special card indexes to some sets of the societies' publications. It also, in some instances, cooperates with the editorial staffs of the founder societies in the preparation of published indexes.

After preprint and published stocks of their publications are exhausted, the founder societies refer inquirers to the Engineering Societies Library for photoprint or microfilm copies. Often this is done simply by transferring the inquirer's letter or order directly to the library. Sometimes the inquirer may be temporarily confused by receiving a reply from the library rather than from the organization addressed, despite the care that is taken by the library to identify the parties involved. Nevertheless, it is felt that the practice of direct transfer of requests is the best way to serve with the least possible delay.

Each issue of *Mechanical Engineering* contains a list of "Books received in the library." These are some of the more than 600 brief book reviews prepared during each recent year for the journal of the founder societies, so that members may learn about new books in their field. Most of these books, as well as others in the library, may be borrowed by members of the American Society of Mechanical Engineers and the other founder societies.

The services of the Engineering Societies Library also include a reading room open six days and five nights a week for most of the year. It is staffed by persons having library and technical training.

Thousands of requests from members for brief information which can readily be located are answered without a charge. For members and others requiring extensive information, literature searches and bibliographies are made, for a fee, to the specific requirements of the inquirer. The service ranges from recommending some books on a specific subject to the preparation of comprehensive annotated bibliographies of books, articles, and reports. Searches are also made for disclosures related to patents. All search work is kept confidential. The library's staff also prepares bibliographies on subjects of general engineering interest. These may be purchased by anyone. A list is available on request.

Translations of engineering and technical articles are made from all languages into good English by "consultant" translators who are familiar with engineering. All translations are reviewed by a member of the staff of the library to assure accuracy of translation and the quality of the English.

Photoprint and microfilm copies of the material in the library are made on request.

All of the afore-mentioned services, except loans of books to members, are available to anyone. They are used by engineers, scientists, technologists, and industry in this country and throughout the world. More than half of the users of the Engineering Societies Library do not come to the library but use its services by mail, telephone, and telegraph.

Joint ownership and support of the Engineering Societies Library by the founder societies is achieved through the United Engineering Trustees, Inc., an organization established by the founder societies to own and operate the Engineering Societies building. The Engineering Societies Library is a department of the United Engineering Trustees, Inc., as is also the Engineering Foundation.

Engineering Index

The *Engineering Index,* now in its 74th year, is an internationally accepted digest of technological literature prepared for engineers, research workers, and students. The Engineering Index, Inc., and the Engineering Societies Library, although separate organizations,

cooperate closely. All publications received by the Engineering Societies Library are made available to the Engineering Index, Inc., which is housed in the same building. In the *Engineering Index* the Engineering Societies Library has a ready-made published index to articles in periodicals and other publications in the library. This unique arrangement is of great value to engineers and industry.

The *Engineering Index* reviews 1400 leading periodicals and society transactions, as well as a substantial number of bulletins and reports of government bureaus, research laboratories, technological institutes and colleges, and other agencies. Last year it provided annotated references to 27,000 articles. It provides a weekly card service in 255 subject divisions. Subscriptions may be placed for single subject divisions, for groups of divisions, or for the entire card service. The cost of the divisions ranges from $12 to $45 each, with a total cost of $1500 for the complete card service. Educational institutions receive a discount. The *Index* subsequently appears as a bound volume, cumulating all of the references for the year. The charge for this bound volume is $70.

This is an up-to-date indexing service, complete with descriptive annotations of the material indexed. Inasmuch as all indexed material is retained by the Engineering Societies Library, there need be no question about where to find the original of any articles indexed in the *Engineering Index*. The articles may be read at the Engineering Societies Library, which is open to anyone, or a photoprint or microfilm copy may be ordered.

In looking to the future, it appears that the cooperative information activities of the engineering societies, the library, and the *Index* will continue to grow. The American Institute of Chemical Engineers has recently become the fifth founder society. The United Engineering Trustees have acquired land for a new building near the United Nations in New York City. It is expected that other societies will join in the support of the Engineering Societies Library when the engineering societies move into the new United Engineering Center. The better facilities to be provided and the broader base of support and interest should lead to expanded and better information services for the engineering profession.

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Bergen Davis, Experimental Physicist

Few of the many acquaintances of Bergen Davis, who died on 30 June 1958, ever realized the continual fight for health which he had to make, almost from the time of his birth in 1869. Too sickly to attend school regularly, he would have acquired a limited and haphazard education if, along with unusual will power, he had not also possessed a great fondness for reading. His remarkable memory for what he had read and observed, and a native curiosity to know what made things go, both served him in organizing his efforts to acquire a suitable education.

He was born near Whitehouse, New Jersey, on the farm which his Holland-Dutch ancestors had acquired from the Carteret grant in the 1730's. As a boy he was too frail to do more than the lightest of farm work. He attended a nearby district school, which contained the county library—for him a most fortunate arrangement.

During his teens he was compelled to be inactive while he strove to conquer tuberculosis. In this period he had access to good books, which he read so thoroughly that he thereby gained much that today is considered the basis of a liberal education. Few scientists of his day were as familiar as he was with the authoritative scientific articles in the family encyclopedia; even fewer maintained throughout life so wide and thorough a knowledge of Shakespeare and Gibbon.

The adequacy of his reading is shown by the fact that by 1891 he was able to enter Rutgers College, from which he graduated in 1896, after losing a year because he had to teach school to obtain funds to finish. His first position was with the School for the Deaf in New York City, where he taught a class of teen-age boys. However, his leisure time was spent in the physics laboratory of Columbia University, where he won the favorable attention of Ogden N. Rood and R. S. Woodward. This led to a fellowship at Columbia, where his dissertation on sound waves brought him a Ph.D. in 1901. The Tyndall Fellowship enabled him to study abroad for two years, first at Göttingen and then under J. J. Thomson in the Cavendish Laboratory in Cambridge. The second year was especially stimulating, for it was spent in the company of an unusual group of scholars, Rutherford among them.

Davis returned to Columbia in 1903, initiating a new era in research in physics there. The laboratory in which he worked was referred to by the graduate students as "the little Cavendish." Here he began his investigations on electrical discharges *in vacuo,* a field which naturally led to the series of papers on x-rays which distinguished his career. His studies of the energy in the x-ray spectrum and his development of the double x-ray spectrometer were outstanding achievements.

Yet his entire academic life, from the time he entered college until his retirement from his Columbia professorship, was interrupted at numerous intervals by the need to fight disease and regain strength. That he was able to win many honors, among them the chairmanship of Section B of the American Association for the Advancement of Science in 1932, the award of the medal of the Research Corporation in 1929, and election