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SYMPOSIUM ON INFORMATION SERVICES

General Problems . . . Services at Esso Research and Engineering Company and Du Pont Company . . . Picatinny Arsenal Technical Information Section . . . Library Automation

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● INDEXED in *Industrial Arts Index, Public Affairs Information Service,* and *Library Literature.*

Symposium on Information Services

The Chemists' Club Library, New York, April 23, 1957

• "Information Services" is a term which has acquired a broader connotation, particularly in corporations, than it had some years ago, when it was often limited to the type of service given by a Technical Library to a Research Department. While the library is still the focal point as an information source, the need today is for a greater variety of information, requested by a more diverse group of information seekers.

• An associated problem is the greater mass of technical information which has been accumulating at an ever increasing rate in recent decades, the handling of which poses a real problem for our technical libraries, if they are to efficiently classify and store this information in a way that permits of ready and reliable access.

• As a spring board for a general discussion of these and related problems facing our libraries, we will have brief papers presented by three men eminently qualified in this field.

Introduction to Program

General Problems of Information Services

DR. DWIGHT E. GRAY, Program Director for Government Research Information
Office of Scientific Information, National Science Foundation, Washington, D.C.

MY ASSIGNMENT is to discuss some general problems of information services and I am happy to note that the topic, as given to me, says nothing about suggesting solutions. That is the really difficult task; it always is much easier to hear rattles in an automobile than it is to fix them.

My basic *text du jour* is a statement that seems to me (although I'm afraid not to everyone) to be axiomatic; it is: *Research is not complete unless and until its results are available—preferably to everyone who can use them.* Any bit of scientific information exists first in the mind of the scientist or en-

gineer who discovered it, developed it or first thought of it. To be of use to mankind, information must sooner or later be communicated to one or more other individuals and combined with various items of supplementary and complementary scientific knowledge, the birthplaces of which were the brains and laboratories of other scientists and engineers. The composite of this communication of research results constitutes providing and maintaining availability of scientific information.

Ways of Exchanging Information

The over-all information exchange complex perhaps can be thought of as a broad spectrum at one end of which lies a simple, direct, producer-to-consumer flow of knowledge and, at the other, a complicated kind of producer-to-middleman-to-consumer sequence. The latter involves many and varied types of producers and consumers, with the information service the middleman.

The "ultra-simple" end of this spectrum is analogous to the situation of a farmer selling his eggs and tomatoes at a roadside stand directly to people who eat his eggs and tomatoes. In scientific information terms, this relationship probably occurs in its simplest form when the scientist who performed the research communicates his findings directly to an interested colleague. He may do this by personal letter, by telephone or in conversation at an annual or semiannual meeting of a national scientific society. It is the last-named kind of information exchange that presumably provides whatever element of truth there is in the bewhiskered cliche about scientific meetings — "I always get so much more out of talking to people in the corridors than I do from the regular meetings." The term "corridors," is usually interpreted broadly.

The other, or "infra-complex," end of this spectrum perhaps can be likened roughly to a situation in which a vast combination retail-wholesale general store, with extensive warehouse facilities, would stock merchandise of a great variety of kinds and qualities and in various stages of preservation; would issue numerous catalogs, leaflets, brochures and other literature descriptive of the goods for sale; would provide an extensive answering service to respond to all sorts of queries about the contents of its shelves and bins; and would promptly fill all orders regardless of the age, quantity or particular selection of items desired by the customer or of the vagueness of the terms in which he expressed his wishes.

The information service analogous to this hypothetical general store situation perhaps is obvious, even though the illustration clearly is inadequate in several respects. For example, the merchandise mart probably would not design and manufacture the furniture or lawnmowers it carried in stock; neither would it be expected to pull a pair of pants or a baby buggy off the shelves and make a dozen or so additional copies. A modern major information service, on the other hand, may be required both to produce many of the documents in its collections and to reproduce many others.

When scientist A communicates directly with scientist B, the process is simple and obviously no formal information service need be involved. On the other hand, this is not a highly efficient way of making information available in terms either of the number of scientists reached per unit of communication energy expended or of the time extent of the availability of the data. If scientist A reads a paper at a society meeting he reaches more people but again, if nothing further is done, the audience receiving the information is limited and there is no continuing availability. Journal publication ordinarily achieves considerably wider dissemination and, I suppose, a certain degree of extended availability by reason of the journal's own indexes and its subscribers' tendencies to save their copies.

Maximum availability and reasonably intelligent broad-scale dissemination of information only become possible, however, when some kind of separate information activity enters the picture with specific responsibilities of a bibliographic control nature. Actually, such an activity does enter before one progresses very far from the ultra-simple end of the spectrum defined above. The minute scientist A's paper or article is published, the library becomes very important to the dissemination and continuing availability pattern of that article. As the size and complexity of the research organization as a whole increases, new, and to some extent different, functions have to be added to the information activities.

Considerations In Generalizing

At this point, let me digress briefly om my main theme to say that I do not intend to involve myself here in any discussion of the difference, if any, between a library and a documentation center or in the argument as to whether the terms "documentation" and "library science" are synonymous, mutually exclusive, overlapping or totally inclusive, one of the other. It has been my impression that in any laboratory, the name applied to the major organizational unit in which information programs fall is likely to be a function either of chance or of the history of the agency.

Laboratories which began as military contract organizations frequently were receiving considerable quantities of technical reports before they had any formal collections of books and journals; consequently, when a conventional library was set up in such an establishment, it usually became one section in a larger division called by some name other than library. In many other laboratories libraries of books and periodicals existed first; in these cases it has been natural, as new and expanded information activities became desirable, to attach them to the library.

For my purposes here, it will be sufficient to use "information service" to cover the composite of information processing, storage, retrieval, dissemination and associated activities, whether in a research laboratory or a centralized information agency and regardless of the combination of books, periodicals, reports, microfilm, microcards, phonograph records, pictures, stone tablets or what-not which may be involved.

Just as the organizations that conduct or sponsor scientific research are many and varied, so are the information dissemination services associated with them. Consequently, a problem that is major in one may be minor or nonexistent in another; and something that simply has no meaning in one activity may prove an almost insurmountable hurdle for some other kind of research-connected information program. Sometimes the principal problem is what kind of information service, if any, can be supported. For example, the scientists in a major subject field can support a society and one or more journals which are important instruments for disseminating information in that field. Scientists working in a very limited subject area, however, may not be able to support a journal; consequently, they publish in a variety of journals, none of which is devoted primarily to their special discipline. They then have the problem of how to keep mutually informed on what is going on in their own field. Depending upon their numbers and professional affluence, they may ignore the problem and hope for the best; they may attempt to semi-formalize personal communications and circulation of reprints; they may set up some kind of field bibliography, perhaps with an associated microservice; or they may try some other alternative. They probably will not be able to establish an abstracting journal if they can't support a primary journal. This, obviously, is a quite different kind of problem from most of those faced by the technical information division of a laboratory.

Thus, it is difficult to generalize even about the *general* problems of information services as a whole. For the rest of this article, therefore, I shall limit myself to trying to isolate, and comment briefly upon, what appear to me to be a few of the principal general problems which confront organized "information services" as they occur either in research laboratories or as centralized or semi-centralized operations.

The fundamental task of any scientific information service is to put technical information as promptly as possible into the hands of those who need it. Its one big general problem, therefore, is to develop ways to accomplish this objective. Such procedures, it seems to me, usually are of two principal kinds —those which involve automatic dissemination of documents or of information about documents and those which involve supplying information in response to requests.

Automatic Dissemination Of Information

Automatic dissemination, in turn, has two aspects—the automatic dissemination of documents and the automatic dissemination of information about documents. In the latter, standard techniques of informing people about documents include distributing simple title lists, annotated title lists, descriptive abstracts and informative abstracts. Each member of this series costs more, takes longer to prepare and is more useful than the one that preceded it. None of the first three provides the recipient with any appreciable amount of substantive information; they simply give him clues which help him decide whether he should look at the complete document. Informative abstracts, in general, cost the most, take the longest to prepare, but are by far the most useful.

Beyond abstracts, one may distribute catalog cards that carry abstracts. If they are filed, cards have all of the above advantages plus the additional one of being a better tool for retrospective research than journals and bulletins. When catalog cards are not filed, they become at the most simply individual abstract bulletins. I believe the experience of ASTIA was that many agencies requested only one copy of each catalog card. Such agencies obviously were not maintaining effective catalogs and an abstract bulletin probably would have served them better than the cards. I think it was the fact that in ASTIA the catalog card provided the only subject approach to report contents that made its termination of catalog card distribution unfortunate.

Automatic dissemination of actual documents involves either sending everyone everything or making some predetermination of who is interested in what. The former method, of course, is heavily "shot-gun" in nature, requiring the average recipient to look at a great deal of material of little or no interest in order to isolate that which is useful. On the other hand, the selected automatic distribution of documents requires someone to make a judgment and to the extent that this judgment is poor, recipients are flooded with material they don't want, miss material they could use, or both.

A system of automatic distribution being used successfully by the U. S. Naval Electronics Laboratory, San Diego, is a panel of technical experts—senior scientists and senior engineers—which meets every Friday afternoon and goes over all the scientific reports that have come in during that week. Each man indicates the staff members in his group who should see each document and the reports are routed accordingly.* This system has the great advantage that scientists who are in a position to know the interests of their colleagues are responsible for establishing the report routing.

* EDITOR'S NOTE: For a complete description of the NEL library panel, see A Library Panel Speeds the Flow of Information by William E. Jorgensen, SPECIAL LIBRARIES, March 1957, p. 108-10.

Thus, in any given laboratory someone must decide what combination of the various media for automatically disseminating information about documents is best suited to the specific budget and staff needs and which alternative to adopt for the automatic distribution of documents themselves. Perhaps one word of caution is in order. In my opinion automatic information dissemination procedures in general can very easily get out of hand and should be continually and realistically evaluated to make certain they are accomplishing the objectives hoped for them.

Specific Dissemination Of Information

Dissemination of information in response to specific requests involves, in the general case, searching some kind of bibliographic collection for some assortment of information that has been requested in some terms or other and presenting the findings in some form or other. All parameters in the preceding sentence can take a variety of specific forms. It is in this area, of course, that the highly glamorous but often vaguely defined term "machine techniques" rears its head. It may very well be that one of the principal general problems facing information services today is that of maintaining a realistic perspective on the question of machine techniques. To me, such an attitude means being willing to be shown while at the same time insisting on being shown rather than being satisfied with just being told. It involves steering a properly objective course between the two often-encountered extremes of "whatever is, is wrong" and "whatever is, is right."

The magnitude of the over-all dissemination-by-request problem is, in any given case, very much a function of factors like size, nature and organization of the collection; scope of requests; and comprehensiveness and form of the answers which are provided. These variables are so closely interrelated in their effects on information problems that one really cannot isolate and discuss them separately. Perhaps by taking them two or three at a time a few major problem areas may be pointed out.

Organization and Storage Problems

Problems involving organization perhaps are more serious in technical report holdings than in monograph and periodical collections. Of the various ways in which one can organize a collection of reports, three are most frequently given serious consideration. These are arrangements by subject, by originating agency or corporate author, and simply by sequential number.

The first of these schemes is attractive, of course, because it groups together material on the same subject. The difficulty is that subject categories never are mutually exclusive and even if they were, any given report may cover several different subjects. This problem becomes increasingly serious as the collection grows in size, and after a while the system tends to become unmanageable.

The corporate author arrangement also looks promising—in this case because it brings together all the documents from the same originating agency. Unfortunately, this plan also proves more complicated than it sounds. It becomes particularly troublesome in involved contract operations where a research program is supported by several agencies or branches and a single series of reports is issued. Here again the seriousness of the problems increases with the size of the collection.

Simple numerical sequence, obviously, is the easiest to handle mechanically. No judgment is required to assign filing locations and new reports always are added at the end. On the other hand, one is dependent upon a card catalog or other bibliographical aids for finding material. I have seen several laboratory information services go through the full sequence from subject arrangement to sequential number shelving.

For large collections covering a broad subject scope, I believe the numbered sequence almost always turns out to be the best; in any given case, however, this is a problem that must be solved.

The seriousness of the storage problem is principally a function of the size of the collection, although other factors may enter if the information is in some nonconventional form. It is possible, for example, that some of the international geophysical year data that has to be preserved on a retrievable basis may be film records of various and sundry sizes or even traces on smoked glass. In general, however, the seriousness of the storage problem is principally a function of quantity.

As a collection grows larger an obvious approach to consider is converting some portion of it into a microform. Here one must balance the advantages gained from saving space, against both the expense of the conversion and the added "cost" to the user in terms of time and inconvenience. Here, I think, is a good illustration of a trap that one can fall into very easily in the information business—that of comparing parts of two patterns or schemes and neglecting the over-all examination of the systems. In this case, one is liable to compare only the space saved and the money of which this might be the equivalent with the dollar cost of the microfilm or microcards and the mechanical readers. A realistic comparison should not neglect either the time lost by the scientists and engineers in going to the reader or the additional time and inconvenience of using a reader as compared with a conventional publication. One runs into this problem in discussions of new retrieval systems, cataloging systems and the like; here the tendency very often is to emphasize the advantages of one or two phases of the new scheme and forget about all the others. It is important to balance whole systems against whole systems.

If microforms are to provide a really long range answer to information storage problems, greater reductions than anyone has found possible to date will have to become routine; these, of course, may still further aggravate the reader-use problem. The limited storage capacity of punch cards, magnetic tape, magnetic drums and the like probably rule them out at their present state of development for the storage of complete collections of any great size. Another factor that enters into solving the storage problem is the extent to which a given collection is archival rather than reference. If it is completely archival one has fewer problems than if the material maintained has to be readily available.

Problems Of Handling Requests

Another important problem which faces most information services concerns the nature and form of the reference requests it must answer, in relation to the complexity and size of the collection. Here one has a complicated group of interdependent variables.

Questions may vary widely in degree of explicitness. For example, a request for the names of all isotopes having certain very specific properties would be roughly at one extreme. At the other is the situation in which someone asks for everything on X, or on X in relation to Y, or under certain vaguely expressed conditions, where the requestor uses his own terminology involving a considerable quantity of his own occupational jargon.

Holdings to be searched also vary widely. On one hand is the highly specific collection whose contents are limited to a narrow subject field; on the other are the very general collections—like the Library of Congress.

The basic problem of the information service, of course, is, first, to identify from the request just what the requestor really wants (and this is not always easy) and then to retrieve from the collection everything that is pertinent to this request. Small collections

present substantially no problems in this connection; the principal danger in such cases lies, I believe, in the attractiveness of things that are new, elaborate and a little mysterious. It is very easy to become so enamoured of the novel and different that one introduces complex systems and glamorous equipment which by no means are warranted by the job to be done. For example, one may be so impressed by the performance of a particular machine that he purchases it at great price only to find that because it handles but one of a series of sequential steps, it can be kept busy only a few hours a week.

However, as collections grow larger and search requirements become more extensive, information handling and dissemination problems become increasingly serious and one quite properly turns more and more toward high-speed machine techniques of various kinds for solutions. My own knowledge of the current status of the application of machine techniques in documentation is quite fragmentary and somewhat out of date. Nevertheless, I shall boldly state a few personal impressions with the hope that even if they are completely wrong, they may at least stimulate discussion.

Problems Of Using Machines

First, it seems to me that one must be particularly aware of the danger inherent in considering only one or two aspects of a proposed mechanized system. I have already referred briefly to this point. As an example, let me cite a statement made several years ago about Univac's potentialities in a particular situation and Dr. Ralph Shaw's analysis of the statement and its implications.* It was said that Univac could search the entire collections of the Library of Congress in 20 hours. This, of course, is a very impressive remark. Dr. Shaw, then librarian of the Department of Agriculture, pointed out, however, that this was not quite the whole story. Even ignoring all the labor and expense that would be involved in first adapting the present catalog to machine language and in converting Univac's replies into a form the user could read, at the end of the 20 hours Univac would have answered only one question. Based on the average number of searches made each day in the Library of Congress for staff members and readers, Shaw estimated that over 8,000 Univacs would be required to handle the reference work load now being taken care of by the Library's staff using conventional, old-fashioned techniques. Shaw draws several morals from this story which, I think, are worth summarizing:

1. If we try to apply our present methods to machines that were not designed to handle our problems, we become frustrated.
2. While it is quite possible to revise our thinking to take advantage of the potentialities of machines, our thinking will have to be revised first before we can install and use the machines economically.
3. The volumes of material with which we are faced when we talk about total sorts of knowledge contained in literature are so much greater than those involved in mathematical and business problems, for which the machines were designed, that entirely new orders of machine speeds and especially of machine outputs, will have to be developed before we can shake off our problems and let machines handle them automatically.
4. Machines may be bottlenecks. For example, 100 or more people can use the public catalog of a large research laboratory simultaneously; but if the catalog is put into a machine that has to make a complete run for each question, the change may reduce rather than increase the over-all system's potential for service.

It also is my impression that where the newer machines are being used satisfactorily in bibliographic work the searches mostly are made in response to quite specific and rather well standardized questions. In the cases I have heard and seen described, the requests which the speaker or writer used as illustrations seemed invariably to be of the "Give me everything on Z" kind—

* SHAW, RALPH R. Management, Machines and the Bibliographic Problems of the 20th Century. In *Bibliographic Organization*, University of Chicago Press, 1951.

e.g. all chemical compounds having a certain well-defined characteristic. It may be, it seems to me, that such bibliographic questions are mostly nearly like the queries in other fields for which the machines really were designed.

The general, over-all bibliographic seek-and-find situation, however, is much more complex and poses much more difficult problems. Here the collections to be searched are large and very broad in subject scope, and the questions are stated in any kind of free-wheeling terms that happen to occur to the questioner. For this kind of problem, high-speed, machine techniques undoubtedly offer great promise; I think however, much additional research and development must be carried out before this promise can be fulfilled.

I believe, other things being equal, the best information storage and retrieval system will be the one that regiments the user least. Someone pointed out in a paper at the recent American Chemical Society meetings in Miami that one cannot predicate a good information service on some idealization of how scientists ought to do research. Similarly, I think, the ideal retrieval system will not be based on how one wishes users would ask questions; it must be able to handle queries phrased in whatever manner the requestor chooses.

Additional Information Service Problems

I have not time to mention many important problems which face information services. For example, there is the matter of finding material in collections other than one's own. With increasing publication costs and the expanding quantity of information, abstracting and indexing services in many fields become more and more difficult both to maintain and to use. Is the ultimate answer here some kind of national or world-wide information service? One articulate school of thought says yes, because duplication of effort would be reduced and greater efficiency achieved. Another articulate school of thought says no, because such a service would be so gigantic that it would be cumbersome and unwieldy to administer and would not be at all efficient; those holding this viewpoint argue for a number of small information centers, specialized by subject field. To this proposal, the "one-centerers" say that one cannot define mutually exclusive subject areas and that trying to establish information services on such a basis would only compound confusion.

Then there are numerous problems associated with how to improve technical writing so that the raw material that comes to the information services will be easier both to understand and to handle bibliographically. Also, one might mention quite an array of security-related problems, such as how to have declassifiable documents considered for declassification. Today, to a considerable extent, a document is declassified only upon specific request; the trouble is, of course, that the scientist or engineer who might have the greatest use for it has no way of knowing ing the report exists, as long as it is classified and so cannot initiate the request. Even to find out what has been declassified is a chore. There appear to be degrees of unclassification—that is, some unclassified documents are more unclassified than others.

I have tried to indicate what seem to me to be the nature and importance of the role which information services can and should play in the phase of research emphasized in my text—making the data and results of scientific research readily available to those scientists and engineers who can use them. I have limited myself largely to identifying "diseases" and have proposed substantially no "cures." These I leave to my readers who wrestle daily with these problems in their libraries and technical information programs. In the process, like the man in the *New Yorker* cartoon, they may come up with a cure or two for which as yet we have no disease.

Technical and Public Information Programs of Esso Research and Engineering Company

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BEFORE DISCUSSING the specific objectives, organization and conduct of the technical and public information programs of the Esso Research and Engineering Company, I believe that an understanding of them can be given more perspective if I describe briefly the particular nature of our business.

Technical Functions Of Company

We are, first, a wholly-owned affiliate of the Standard Oil Company, New Jersey, established to conduct a wide variety of technical functions. In line with the parent company's policy of decentralized management, we have our own board of directors and our own responsibilities. These, broadly, are to: know just what technology Jersey needs; create the needed technology; help Jersey use technology effectively; carry on our own internal operations efficiently; and be an effective member of the management team.

Our customers are the Jersey Standard affiliates throughout the world. We undertake research, development and engineering studies pertinent to their requirements. The results are made available to them by underwriting contracts through which they share the cost. However, the affiliates, also under decentralized management, are under no compulsion to obtain their technology from us. Thus we are operating in a highly competitive environment.

We not only serve affiliates, but we purchase research results from a number of them which operate research laboratories. In all, this represents a technical activity involving nearly 4,000 people and an expenditure of over $60,000,000 per year. Thus, we are a relatively big business whose product is information; it is a highly complex business of its own accord; it must serve a wide variety of customers having various amounts and degrees of need for technology; and as a large and responsible corporation we have numerous public-understanding interests.

Our product is packaged, transported and sold by one means—*communication.* To assist in the communications job, we have two divisions devoting full-time to the problem. One, the Public Relations Division, is concerned with the problems of communicating to a wide variety of publics. The other, a new Technical Information Division, is concerned with the problems of certain communications within our own organization and from our research and engineering divisions to our customers—the Jersey Standard affiliates.

Public Information

In the public relations programs—the communication with groups outside the company family—it was necessary first to establish some broad objectives. These are to help Jersey and affiliates build confidence and demand for Esso products and services—by establishing a reputation for leadership in research and engineering.

The broad objectives have been narrowed further to some specific goals such as to demonstrate the company's consciousness of effects research has on social and economic conditions and to make known how the company works to meet present and future oil needs, to utilize petroleum efficiently and to help conserve an essential natural resource. We have segregated our target areas into the local community, the general public, the affiliates and other Esso research divisions.

We confine our community relations activities to the area where our main facilities are located—and where our employees live. We talk to people mainly through releases to the many papers of various types. The research laboratory reaches the local community mainly through a speakers' bureau which is manned by our technical personnel and guided by our communications experts.

When considering the general public, communications are directed to the particular needs of many audiences. Often when we issue a press release on a given subject, we issue it in three versions. One is a very popular version for the general newspapers and wire services; one a little more in detail, if they want to embellish the story; and finally, one with many of the technical details desired by the trade and professional journals. This is mentioned to point out that we have broken down target groups in public relations the same as in technical information. The Public Relations Division also prepares films and exhibits—two other effective means of mass communication.

With our affiliates we engage in another type of communication—a lateral pass, internal to our affiliates, then external to their publics. We determine how information on science and engineering can be utilized to the particular benefit of affiliates that support our work. We develop the needed information—and we help them to put it to use. Since we perform their research, it is incumbent upon us to help them by providing readily understood information. This includes adapting our press releases, booklets, speeches, films and other materials, preparing special items and helping with special events.

Our fourth area of public relations activities involves many things that communications people can do to assist in a company's day-to-day work and does not have great effect on the public. Internal services include employee communications, aids to technical recruiting, preparation of speeches and visual aids, and preparing materials for patent and licensing groups. Such activities could be conducted by employee relations, industrial relations or information services—we use the communications skills of professional public relations and journalism trained personnel for these matters.

The organization of the Public Relations Division is a blend of professional people with different educational and experience backgrounds—one is technical, the other is journalism or public relations. The technical personnel bridge the gap that usually exists between technical work or technical writing and the people expert in communicating to the public in an understandable way. This bridging-the-gap function is stressed as it also is one of the basic functions we have incorporated in our new Technical Information Division.

Survey of Technical Information Services

There are five steps in the development of new technical knowledge:

1. Examination of known knowledge.
2. Research Investigation.
3. Development stages.
4. Engineering design.
5. Commercial application.

Of course, new knowledge initiates at various rungs in this ladder and must quickly move to the others.

While these steps are rather obvious, I have found it surprising how few scientists, engineers and management people have given serious consideration

to the equal importance and stature of the role of information research and information services—compared to the role of the research laboratory, the development groups and the engineering department.

The decision of the top management of our company to make sure we are equally well geared to handle information as we are to handle the other phases of our business led to a study and reevaluation of this activity. The study involved discussions with company research people, company library and file people and eight major affiliated companies as well as visits to five outside companies and available information on six others. We found:

1. Technical literature is more than doubling each seven-ten years and is increasing in complexity.
2. Our own technical library, which until recently included the reference, searches and abstracts functions, had not expanded sufficiently to keep up, despite continued improvement in operating efficiency.
3. Valuable technical information in letters and memoranda had not been indexed in such a way that it could readily be recaptured in a subject search.
4. Our company's own information product is increasing.
5. Affiliates' technical operations are becoming larger and more complex; their needs for technical information are growing rapidly. They have expressed their belief that improved reports and publications could save them critical manpower.
6. Actual end-use of technical literature and technical reports requires continuous study in order to assure that they suit their ultimate purposes.
7. Research and development personnel are convinced that technical literature and company information are not used to the extent they should be—management agrees. This is not unique with our company and, regardless of reasons or excuses, the fact is that in the face of such a formidable literature and the press of daily work, specialized research must be met with specialized information.
8. Specialists can bridge the gap between the source of information and the point where it is needed. They assure that pertinent knowledge is taken into account in technical problems.
9. Our company is growing. We will have for some time an increasing proportion of low-experience technical personnel. They can be made more effective if they can acquire proper background quickly—a job we hope the Technical Information Division can assist in effectively.
10. Technical information work, like public relations and other highly specialized activities, requires a separate and distinct type of organization to be most effective. The organization also must be such as to offer outstanding career opportunities in order to attract the top-quality people needed to perform this important work.
11. We found that a number of companies had already made some important progress on improving information work—we could not remain competitive if we did any less!

Our first action to meet the problems posed by these findings was to establish an organization to handle technical information—an organization having the same status as our research, development and engineering divisions, an organization whose sole business is to handle the complex problems of technical information, an organization that provides career opportunities equal to those in other main divisions.

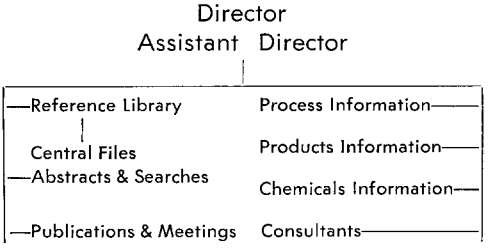
The second action has been to initiate studies of the end-uses of technical literature and company reports to assure that we can meet more effectively the technical requirements with more specific and better directed publications. This is to assure, on a continuous basis, that we suit the product to the need.

The third action has been to establish information specialists to exercise critical judgment and initiative—to see that the right information goes promptly to the people who can apply it to research, development, engineering and operating problems.

The organization chart below shows how these actions have been incorporated into the formation of our new Technical Information Division.

Technical Information Division

The Technical Information Division, as such, came into being on February 1, 1957—so there is yet much to be done. To direct this new division which is starting out with 65 people — 32 of whom are technically trained—Mr. W. T. Knox was selected. He is a chemist having 19 years of experience with the company in the field of research on new petroleum refining processes. Assisting Mr. Knox, is Mr. G. W. Duncan, a chemical engineer by training, having 20 years of experience with our company in the field of research on new petroleum products.



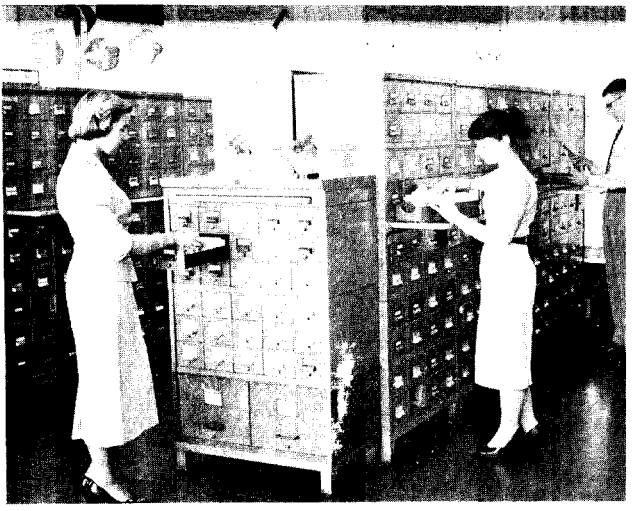
After setting up the top management of this new division, the first thing we did was to divide our technical library, with abstracting and searching now set apart as an individual unit and with the publication responsibility also transferred. Administratively, this was desirable for two reasons: (1) to permit concentration on the problems of expanding our reference library functions; and (2) to allow for the consolidation of a new central technical files unit with the library.

Our reference library has 35,000 cataloged items, exclusive of a large patent file, and is being expanded with 1,000 acquisitions and over 20,000 patents each year. In space this involves currently one and one-half miles of shelves. It handles some 10,000 requests yearly. The reference library now has one branch and at least one more is planned.

The new central files unit is presently incorporating the files of our research and development divisions located at our main facility—the Esso Research Center at Linden, New Jersey. This unit will take on similar responsibilities for other company units in the future and it will operate several branches. The unit's functions are to code and store the technical materials of the research and development divisions so that (1) a more efficient operation is attained and (2) the material can be readily captured in a search. The Uniterm system for retrieval is being employed here on an experimental basis.

The separate abstracts and searches unit will now work closely with the information research specialists. This is one important reason for separating it from the library—again, to narrow the focus of study and improvement of this function. This unit is composed entirely of technical personnel, expert in various areas of scientific literature as well as in a wide variety of languages. This unit is particularly concerned with the problems of rapid retrieving of information. Last year over 25,000 abstracts and over 200 searches were made.

Frankly, we are not at all sure yet where we will go with the use of machines. There are several important and large areas of our business that appear amenable to treatment by machine methods; but the machine is no better than the encoding, which represents a large investment in time. We have at least developed a coding for one area, and we have tested this, with favorable results, on an IBM 101 used in one of the company divisions. We have ordered a "101" for our abstracts and



Technical personnel in the abstracts and searches unit of the Technical Information Division, Esso Research and Engineering Company, use the new central card index file. The unit prepares abstracts from 500 titles each year.

searches unit and shall intensify our studies. Meanwhile, we have retained consultant experts and have formed a committee, which includes our company experts on machine methods, to make a comprehensive study to help cope with the growing pressure of today's mounting literature. Logistically, we must bring to bear on our research the findings available from the 99+ per cent of industrial research done by others. Our abstracts and searches unit is the focal point of our work in this area.

The second basic action, that of keying our technical publications to the end-use requirements, has been started by the formation of the publication and meetings unit. It is to this unit that we have transferred the functions of a small information staff that had responsibility for seeing that our "product" went to the right customer. And, it is to this unit that the publications formerly issued by the library (mainly literature abstracts) also have been transferred. The functions of this unit are to publish bulletins, reviews, newsletters; determine end-use of publications; conduct technical meetings; coordinate requests for technical reports; and distribute reports according to agreements.

The third basic action is also underway. It is that of establishing specialists to relate effectively all pertinent information to technical work throughout the company. Here again, as in the public relations functions, is the means to bridge the gap. This gap exists in most organizations. The research groups, for example, do not draw upon the literature to the extent desired; in turn, the library, abstracts or searching groups are busy with their problems and cannot maintain contact with research in progress. The setting-up of information research specialists is considered by us a key step in technical communications.

Initially, we have established three units of information research specialists to cover the fields of petroleum processes, petroleum products and chemical processes and products. The responsibilities of the information research specialists are to: be expert in assigned field and know information needs; obtain and coordinate unpublished information from outside sources; evaluate technical literature in light of company interests; direct pertinent information to right people; keep abstracters aware of company information needs; supervise all searches; advise on material for information publications; serve as focal point for all information requests in Technical Information Division.

In summary, what we have done is: first, organized our communications activities in such a manner as to separate clearly the various specialized functions; second, instituted liaison between the communications experts and the other company functions; and, third, recognized the importance of communications as being equal to other company operations and so organized the communications functions with sufficient stature to attract the best possible personnel to this type of work.

The Chemical Department Of The Intelligence Division Of The Du Pont Company

L. G. WISE, Supervisor, Intelligent Division, Chemical Department
E. I. Du Pont de Nemours and Company, Wilmington, Delaware

ANY TECHNICAL information service is of necessity a compromise between the ideal and the practical. Such information units vary greatly in accordance with the type of organization and the type of technical work that they serve.

The Intelligence Division of the Chemical Department of du Pont is not a centralized over-all information service, and other information facilities are operated by other departments. The Intelligence Division, in addition to serving its own department, which is engaged in fundamental long-range research, does render conventional library service to all laboratories at the du Pont Experimental Station and does supply weekly abstract bulletins to all interested du Pont personnel regardless of location. The information dealt with is almost exclusively of a scientific and technical nature.

The activities are carried out on three levels—library function, information function and intelligence function. The library, in the charge of librarians, is operated as a distinct unit, separate from the technical staff of 20 chemists. The technical staff performs the information and intelligence functions. The division has a total staff of 60 people.

The chief tools for disseminating current information are two weekly abstract bulletins—a *Current Journal Bulletin* containing about 800 abstracts each week and a *Patent Bulletin* containing about 600 abstracts each week. The patents so abstracted are subject-headed for a permanent card index. The journal abstracts are not indexed. Literature and patent searches are made on request, but laboratory chemists do a great deal of their own literature searching.

Internal company reports from other departments and incoming reports of government-sponsored research are guided to interested people in the Chemical Department with little or no permanent indexing. The Chemical Department's own research progress reports are thoroughly indexed with a specially devised system using machine-sorted punched cards.

Intelligence activities involve attempts to select, evluate and interpret available data. Selected current items considered of most interest are stressed in editorial notes in the weekly abstract bulletins. Several men in the division are permanently assigned to scouting the literature for research ideas and to making critical surveys for assessment of potential research fields. The possibilities for use of the scientific literature to stimulate and promote creativity are emphasized.

In addition to the present widespread attention being given to mechanized methods for retrieving all information on a subject, consideration also needs to be given to improved means of organizing, correlating, summarizing and evaluating information for scientific and technical research.

Summary of a talk given on April 23, 1957 at the Chemists' Club Library, New York City.

The Role of a Technical Information Section in a Governmental Research And Development Organization

HENRY VOOS and MICHAEL A. COSTELLO, Supervisory Librarians
Ordnance Corps, Picatinny Arsenal, Dover, New Jersey

PICATINNY ARSENAL is an important Army ordnance technical center engaged in research, development and experimental production of ammunition and missiles. The Technical Information Section (library) is a link between information and the scientist. Organizationally it is part of the laboratories rather than of the Arsenal administrative branch. It has approximately 13,000 books and pamphlets, 75,000 technical reports and 600 periodicals. This collection is in three parts: books and pamphlets, report and patent collection and periodicals. About 500 obsolescent books and over 2000 reports are discarded annually.

The library employs five professional librarians, one translator, one chemist and 15 nonprofessionals. It serves almost 1,000 engineers, chemists, physicists and mathematicians in 1200 buildings dispersed over 5000 acres. Because its users are so scattered, the library serves many of them by telephone or through the Arsenal mail. Yet the library averages over 50 visitors a day in its two buildings.

To adequately serve our users we have been forced to overcome many obstacles to fulfill our role, which may be defined as (1) rendering of more extensive and rapid information retrieval service than is usually expected of libraries, (2) maintaining a tight collection and (3) maintaining strict security controls.

Paper presented on December 29, 1956 before the American Documentation Institute in New York City.

Two problems, which can be considered a constant in all government research libraries and therefore need be only touched upon, are procurement and security. We cannot do much to correct the former since it is governed by federal regulations both as to suppliers and methods. A more detailed explanation can be found in Mr. Payne's article in the April 1956 issue of *Serial Slants*. We have been able to short-cut our procurement problem somewhat by adopting a multi-slip order form.

The security problem is one that must always be foremost in our minds. All personnel using the library must be checked for their security clearance so that we do not circulate documents to those who do not have a "need to know." This in itself slows up the circulation process, but because regulations require a receipt for all classified documents borrowed, we have had to set up a three-card system.

This means that not only must a card file be maintained by accession number or class mark and by due date and borrower, but also a third suspense card must be set up as a receipt card. This third card is removed when the signed receipt "borrower's card" is returned. This circulation process is thus further retarded since it prevents our use of any photographic, addressographic or other speedy charging system.

Despite these difficulties we circulate an average of 6800 items each month. The only areas where we can speed up and thus more efficiently disseminate

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

——— Do Not List

Routing:

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1. Accession no. —————— 1a. Class Mark ——————

2. ——— Author as marked in publication.
   ——— Author as follows:

3. ——— Report no.:

4. ——— Title as in publication.
   ——— Title as follows:

5. ——— Personal authors:

6. ——— Date: 6a. ———Place: 6b. Publisher: 6c. Series:

7. ——— Project:

8. ——— Contract:

9. Tracings:

Subjects *Added entries*

10. ——— Other:
    Cat.——— Rev.——— Typed——— Routed———

SAMPLE

1——
2——
3, 4——
5, 6——
7——
8——

U39512

Johns Hopkins University. Tech. rpt. 7-APPLIED AND THEORETICAL PHYSICS, by J. S. Sake. 5 May 1956.

Project TA1-1501
Contract 501-ORD-33.

1. Physics
2. Heat
I. Sake, J. S.
II. Project TA1-1501
III. Contract 501-ORD-33.

——9

Adaptation of the U. S. Department of Agriculture Library Cataloging Slip

information are in cataloging and in the circulation of library bulletins.

Library Publications

Our main vehicles for disseminating information are various lists prepared by the library staff:

1. The *Weekly Bulletin* which includes: all new technical reports that are pertinent, patent section consisting of pertinent patents, table of contents section and calendar of meetings and events.
2. The monthly *Bulletin of Books and Pamphlets,* which is a selective listing of all books and pamphlets newly acquired.
3. The *Translation Bulletin,* which is issued irregularly and contains: abstracts of important articles, translations of titles of lesser interest, listing of translations obtainable elsewhere and tables of contents of translated periodicals which we receive.
4. A bibliography series.
5. A translation series, which consists of complete translations of articles of importance.
6. The *Management Bulletin* which has the following sections: abstracts of books and pamphlets of interest in the field, abstracted articles from journals, bibliographies we prepare on facets of this subject, calendar of meetings and events in this field and tables of contents from journals in this field.

Cataloging Procedures

Our cataloging procedure is speeded up by the adaptation of a cataloging slip like that of the Department of Agriculture Library. Each slip has a "sample card" which helps teach typists the format of the catalog card. It speeds up cataloging by eliminating manual writing of the catalog slips and allows us to quickly give our reports the general classification they need for inclusion in our bulletin. It is our boast that no current report remains uncataloged for more than eight hours. This is no small feat if you consider that we receive approximately 200 new reports a week and have only two catalogers at work on this function.

All catalog cards as well as the *Weekly Bulletin* are typed in one operation. This saves much typing and makes certain that our catalog is on a current basis. The information is typed on vellum divided into 3x5 rectangles resembling a catalog card. It is reproduced by offset in slightly reduced format.

The scientist can thus collect the references he wants without having to recopy them. He simply removes the perforated slips of interest to him. By writing his name on the slips and forwarding them to the library he can also order the reports he wants. In the library we file the slips by accession number and circulate the pertinent reports in order of receipt and priority. This procedure saves time and routes information quickly to the scientist.

The same vellum is then sent to another part of the reproduction section, where it is printed by Ozalid on stock for catalog cards, cut and returned to the library. They are then filed in the catalog. The *Book List* is also issued in perforated form.

Special Catalogs Evaluated

The card catalog of reports is divided into a corporate author part, a subject part, a contract part and a project part. This kind of catalog has been found more useful than a dictionary type of catalog.

Our own Picatinny Arsenal Technical Reports and Notes on Development Type Material are cataloged by the Uniterm System of Coordinate Indexing. The first two thousand reports were unitermed by Documentation Inc. and published in book form in three parts: the coordinate index itself, a volume of abstracts of the reports in numerical order and the vocabulary. In evaluating this catalog we can state the following:

1. It is used frequently.

2. We have found the index, in book form, extremely practical since, having more than 100 copies, we can give it wider circulation and increase dissemination. Furthermore it enables engineers to immediately consult an abstract.
3. There have been no false dropouts reported to date, and any errors in the uniterm index are quickly corrected when found.
4. The current flow of technical reports is being unitermed on 5x8 cards. The usefulness of the uniterm index in card form is limited since only one person at a time can consult it.

We had considered the possibility of uniterming the entire collection because of the usefulness of the index and because of the ease with which nonprofessionals are able to catalog with this system, but we have found it impractical because:
1. The amount of data on one card would be so great that it would consume too much time to correlate it unless a mechanized system were adopted.
2. The vocabulary would be too great because of our diversified interests.
3. It would be almost impossible to weed the collection because of the time it would take to locate each uniterm and eliminate the numbers. Each report has an average of 15 uniterms. Eliminating approximately 2,000 unitermed reports a year would mean cancellation of 30,000 numbers.

We have a catalog, punch card recording of data on explosives, which is actually a bibliography on the properties of explosives. It now consists of over 75,000 IBM cards. Our conclusions on the value of such a bibliography are:
1. Although the cards are separated by broad categories, it still has been found too expensive to set up the computer to answer simple questions.
2. The time it takes to program the computer and run the card sets through is not fast enough to make it as useful as desired. To solve this, we have had the card sets printed and placed in a volume. With instructions it is quite simple to find data for any explosive. We now use the computer only when the question is complex or requires a range of answers.

We also prepare on edge-punched cards bibliographies which will be of continued interest to Arsenal scientists. This permits us to publish a bibliography simply by photographing the cards in the order in which we wish to place them. It permits us to publish supplements so that the bibliographies may be kept up to date with a minimum of checking and revision.

Table of Contents Service

Our third major service is our table of contents program. We obtained permission from publishers to reproduce the tables of contents of their periodicals. Enough copies of these periodicals are purchased to be able to service requests that are forthcoming. Only those tables of contents containing pertinent information are printed. They are arranged in alphabetical order, but it is felt that as soon as more personnel can be added to our staff we will publish them by subject.

Originally this program was set up so that the scientists would see only the table of contents of those periodicals they desired, which meant that each periodical's table of contents had its own routing. This involved much clerical time and cost. We finally decided that it would reduce costs considerably without curtailing the dissemination of information if we published them all as part of the *Weekly Bulletin*. This eliminated the clerical operation entirely since the tables of contents were collated directly into the *Weekly Bulletin*. The scientists might have to read slightly more than they would with the previous method, but the information they glean from peripheral journals has made this worthwhile.

Since inception of the table of contents program our circulation of peri-

odicals has increased 300 per cent. To further implement this program we publish an annual classified list of periodicals received by the library. This can be done quickly because our records are coded into edge-punched cards from which a typist can copy directly for the list, eliminating the time of a professional which had been necessary heretofore to prepare this list for typing.

Success of Library

Considering the foregoing, one may well ask, "How is the Technical Information Section fulfilling its role in support of the research and development program?" We can tabulate some tangible results in answering this question.

Management, realizing the importance of the role of the library, has given support to our program in allocating more space, providing competent technical personnel where needed and supporting our recruitment program (although it is as difficult to recruit librarians as it is to recruit engineers).

From our own statistics it is obvious that we are fulfilling our role. Our circulation has increased from a monthly average of 1084 in 1951 to 6800 in 1956, an increase of 627 per cent. Our periodical circulation has increased 300 per cent since the inception of our table of contents program. And finally, requests for aid in the preparation of bibliographies, translations and literature searches have increased during the past year, showing the awareness of the library's usefulness in saving the scientist and the government time and money.

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New Loan Policy of The National Library of Medicine

In an effort to modernize and make more efficient its loan and photocopying services, the National Library of Medicine (formerly the Armed Forces Medical Library) has recently combined both its photoduplication and interlibrary loan policies into one unified system. Beginning in September 1957 the Library will:

1. Loan materials on an interlibrary basis only.

2. Determine whether to loan the material in the original form or as photoduplicates (microfilm or photoprints).

3. Allow borrowing libraries to retain loans furnished in the form of photoduplicates.

4. Furnish all such service free of charge but will expect the borrowing library to absorb postage charges for the return of borrowed books.

The National Library will not:

1. Loan material to individuals; these are expected to direct their requests to their local libraries for transmittal.

2. Sell photoduplicates, except by special arrangement, usually in the case of material in the history of medicine division or art collections.

3. Furnish photocopy loans where the material is available to borrowers locally.

Detailed rules may be obtained from the Loan Librarian, National Library of Medicine, Seventh and Independence Avenue, S.W., Washington 25, D.C.

Automation In The Library

MRS. RUTH TRESCHER GUNNING, Librarian
Commercial Research Library, United States Steel Corporation, Pittsburgh, Penna.

THE WORD automation is not a new one. Its influence on the library profession has been discussed by experts and professional publications are constantly stressing the idea. Automation is a subject vital as the weather and as challenging to the library profession as to all industry.

Remember that automation is the theory, art and technique of making a device, machine or process more fully self-moving. For discussion purposes the topic can be most logically divided into three sections. They are graphic arts, material handling and digital systems.

Graphic Arts

The storage of recorded information has created difficult problems as the amount of material has continued to increase. The space requirements to merely store books, papers and similar records have become a major item of expense and of concern. These problems have provided impetus to developing new methods. A discussion of the so-called graphic arts should include the use of microfilm and microcards, teletype, new photoprocessing systems and television. A variety of devices and methods for providing copies in various formats have been reviewed in a book edited by M. P. Doss.[1] The uses being made by various special libraries give only a brief insight into the practical applications which will be forthcoming in many fields.

Some libraries have installed copying machines and can furnish on-the-spot copies of material as requested. Many libraries have stopped circulating periodicals. Instead, photocopies of the tables of contents are run off in volume and distributed each morning with the mail. The men who see articles of interest listed come to the library and read them.

Microfilm and microcards are familiar sights in many special libraries, but scientists believe that the "microcard libraries might ultimately be mechanized so that 'dialing' the citation symbols on a modified telephone dial would cause the desired page or pages to be projected on a screen."[2] Progress being made by Dr. W. N. Locke at MIT in the field of machine translating[3] may eventually permit the "dialer" to indicate the language of his choice.

The idea of closed television circuit is not a new one in library circles. The Oak Ridge, Tennessee, library has been using one for several years. Various government agencies have experimented with such techniques, but reports on their effectiveness have not been published. Improved charging equipment simplifies this task by charging photographically or by dictaphone. International Business Machine equipment can be used for circulation, ordering and other procedures. At the main DuPont library in Wilmington, revised routing slips are prepared periodically with IBM equipment.

The extent of all the so-called "graphic arts" is vast. To discuss all types at length would require several programs. Automation for libraries has many more fascinating angles.

Material Handling

One of the simplest innovations in material handling or warehousing is

Paper presented before the Pittsburgh Chapter of SLA on January 16, 1957.

the use of belt stairs in stack units. Modern warehouses are monuments to system and space economy. The theory of standard package size, a unit which can be handle automatically from an indexed position, is now basic to warehouse layout. Why not adopt a similar scheme to library collections?

Boxes of two or three standard sizes could be used to hold books. Incurred wasted space would be more than compensated for by saved time. Endless vertical shelving with an automatic selector moving above would facilitate selection and later return of boxes requested. New developments would involve the use of improved automatic control devices for such operations as sensing, measuring, comparing and remembering. Control of machines by other machines or in response to instructions recorded on such media as cards, tape or film would then become possible.

Automobile storage methods are equally feasible—an adaptation of a scheme recently publicized by a foreign parking garage produces an additional theory. The idea utilizes a rotating belt with cars (or boxes with books inside) attached moving to an indexed position.

Either of these schemes would drastically change the appearance of library stacks. There would be advantages and disadvantages. Browsing would be eliminated. Any greatly increased use of such mechanical aid in libraries is a far distant vision. Both the demand and cost of such equipment must be justified. Remember, however, that in 1945 Vannevar Bush's description of the Memex was much more fantastic than it is today.[4]

Digital Systems (Computers)

The third aspect of automation—digital systems (computers)—deals with machines designed for information retrieval. This is by far the most fascinating part of the entire subject. Although many of the retrieval systems in use at the present time do not fall into the computer class, the newest equipment, which eventually will be adapted for bibliographic search, does.

The functions of various literature searching devices are reviewed briefly as follows:

Photographic Film Devices

Rapid Selector—Film transferred from reel to reel as scanned (6 entries per document).

Filmorex—Film pieces moved and scanned mechanically (20 entries per document).

Minicard—Photoscopic film is scanned in sequence for encoded information (unlimited entries per document).

All three types are limited by time required for search. Entries include coded information as well as microcopy of part or all of document.

Hand-sorted Punched Cards

A familiar device employing cards such as those designed by *McBee, E-Z Sort,* and *Flexisort.* Card holes are coded, then notched to interpret pertinent information. Manual manipulation is by use of needles. Coding can be direct, superimposed or by relationtionships.

The number of documents covered is limited to patience of users who must perform needling operation (100-10,000). Cards give bibliographic data and/or an abstract.

Hand-manipulated Aspect Cards

Uniterm Cards—Columns of document numbers are compared for matching items.

Batten Cards—Cards superimposed; desired document numbers are visible through punched holes in top card.

These systems lead to false combinations and are limited by number of documents which can be recorded on one card. The search merely leads back to a document file which is arranged numerically.

Machine-sorted Punched Cards

Fixed field—"Standard" sorters, limited to sorting in fixed fields.

Intermediate—IBM "101," very simple relationships among index entries.

"Free" field—IBM Luhn Scanner; experimental IBM X794; census "100," unlimited index entries, wide relationships.

All types use punched cards filed in drawers and fed to machine in stacks. Various types vary in number of documents according to convenience and tolerance of user (up to about 75,000 documents for X794). Cards give bibliographic data, document number and sometimes a microfilm insert.

Machine-manipulated Aspect Cards

Experimental machines—Developed on Office of Naval Research funds, number matching as in Uniterm.

Peek-a-boo method—Developed by National Bureau of Standards, pattern coincidence, similar to Batten.

These are the same as hand-manipulated aspect cards except that detection is made mechanically or by use of a light sensitive cell.

Tape-reading Devices

Magnetic Tape—IBM "700" series; Remington-Rand Univac, Punched Paper Tape; Western Reserve Selector.

Tapes on reels are scanned by mechanical or electronic "feelers." Pertinent entries are transferred automatically. The number of entries per document is unlimited and there is unlimited complexity of relationships among entries. Entries include document number and encoded bibliographic reference or abstract.

Evaluating Systems

Before indulging in this automatic whirl of "card or tape tricks," there are items to consider in judging a system:

1. Cost of establishing the system—Planning; adapting; equipment.
2. Cost of running or operating the system—Maintaining and operating equipment; personnel to operate it.
3. Cost of using material provided to customer—Discarding unwanted material; time taken using useful material.

Machines are not human! An information retrieval system—index, catalog or Univac—is only as good as the person processing the input can make it. There must be an area of cooperation between indexer or coder and the user. The indexer must:

1. Understand the subject contents.
2. Decide what is important.
3. Record what is important.
4. Interpret what is important.

Inconsistent indexing, classification or cataloging produces "noise" in our communication system. The information theory concerns itself with methods of communicating knowledge or intelligence of some sort without regard to the meanings of such communications. A 16mm film, COMMUNICATIONS PRIMER, describes this theory.[5] Although information theory has been expanded in some fields since this film was produced, the interpretation given in it is good.

Machines will continue to be built but the widespread application of Univacs, Memexes, Rapid Selectors and electronic punched card installations to the average special library is far in the future, unless technological change simplifies and cheapens them.

The world is suddenly aware that rapid social and scientific advancement depends on the care, control and utilization of its recorded knowledge. The library profession is offered a worthy, stimulating challenge. Automation in a library will help us accept it.

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Elections Committee

Supplementary Report, August 16, 1957

Of the 2333 ballots received by the Elections Committee, 20 were eliminated as invalid, leaving a total of 2313 ballots valid and counted.

The number of votes cast for each candidate was as follows:

DIRECTOR FOR ONE YEAR: Helen E. Loftus, 1327
Constance A. Pfaff, 971

The vote on the amendment to the Constitution adding Section 4 (Dissolution) to Article VI (Meetings) was as follows:

IN FAVOR: 1933
OPPOSED: 66

SYBIL KENT GREEN, Chairman

This Works For Us . . .

Making Enlarged Positive Prints Of Clippings On Microfilm

Some time ago the library staff of the *Courier-Journal* and *Louisville Times* realized it would have to establish a microfilm program to preserve and make more readily available the thousands of historical items in the clipping files. The clippings of the 1920's and 1930's had turned dark brown, those of the 1940's had become a light brown and those of the early 1950's were beginning to brown at the edges. We had learned of the microfilming activities of the *Minneapolis Tribune* and *New York Times* but we did not want to proceed with our project until we had worked out a method for making enlarged positive prints from the microfilmed data quickly in the library. Although it is possible to do this with machines already on the market, none of them were appropriate for us for various reasons.

With assistance from men of the Haloid Company, MicroPhoto, Inc., and our research engineering department, a new method of making dry paper prints was worked out by utilizing the facilities of a Griscombe Microfilm Reader and Xerography equipment. Stated simply, the reader enlarges microfilmed clippings to a readable size and then directs the image onto an electrically charged plate which in turn produces a positive dry print. The entire process takes about two minutes at present but if some manufacturer perfects the device, the time should be cut down to a matter of seconds.

The first step was to modify the microfilm reader. It was mounted on a light-tight box into which a sensitized Xerography plate could be placed. To produce the reverse image necessary for Xerography printing, the mirror at the base of the reader was raised so that the image was reproduced on the bottom of the box (or on the plate laying in it) instead of being reversed in the mirror and projected onto the reading screen. Thus the reader is first used in the normal way to locate and enlarge a desired clipping and then it is converted into a copying machine by merely covering the reading screen, raising the mirror at the base of the reader, sliding a charged Xerography plate into the light-tight box and flicking on and off the light switch.

The second step was to install Xerography equipment in the library to print dry copies of clippings quickly. A metal plate is given a positive electric charge, placed in the box under the reader, exposed to the image and sprinkled with black powder which carries a negative charge. This plate then forms a master from which prints an ordinary white paper may be produced with the application of a positive charge and heat.

The library and its users are both pleased with this simple copying system and have found many features to recommend it: not many readers are needed; out-charge records are not necessary; clippings are not lost since the microfilm never leaves the library; writers make fewer mistakes and save time because they no longer have to copy information in longhand; prints are made on plain, cheap copypaper; writers do not have to spend hours reading from a reader and good readable prints can be produced without using photographic chemicals and special plumbing.

It is, of course, a temporary system until a time when a manufacturer produces the ideal set-up. Meanwhile, our system works!

RALPH J. SHOEMAKER, Librarian
Courier-Journal and *Louisville Times*
Louisville, Kentucky

Have You Heard . . .

SLA Convention Sessions on Professional Standards

In addition to the scheduled general meeting on Tuesday, May 28, a special meeting dealing with professional standards was held Thursday, May 30. Ruth Savord, Chairman of the Committee, presided at this special meeting as she did at the first one. There was a very large membership attendance; good, lively, constructive discussion produced the following results:

CONCLUSIONS

1. Almost unanimous approval in principle of the adoption of professional standards in the form of stricter membership requirements.
2. Wherever "5th year degree from a library school" has been used in the proposed requirements, substitute "degree from an approved school of library science." A statement will be added to the effect that "approved" will include all ALA accredited schools and others to be chosen by the Professional Standards Committee, such as Simmons, St. Catherine, Marywood and others.
3. "A degree in a field other than library science" should be revised to read "A degree in the field of specialization in which he is working." Some suggested an advanced degree for Active and a bachelor's for Associate memberships.
4. "Documentation and information service in a special field" should be added as item 5 under the definitions of Professional Experience.

DISAGREEMENTS

1. Length of experience required for membership, particularly for those without degrees in library science. A vote taken showed 98 in favor of experience before individuals could become Association members and 60 voted against this. The vote for included at least three teachers of library science.
2. Student membership requirements should provide for part-time students. Two suggestions were made: a) Insert after "full-time student" in the present requirements, "Or a part-time student in the year that an individual receives a degree" and b) Add "or be a senior in a department credited in the field of specialization." Everyone seemed to think these changes would create fertile recruiting possibilities.

SUGGESTIONS

After "teacher of special library courses," item (c) in the requirements for Active members, add "or of courses related to special library needs or serving as a director or dean of library schools which offer special library courses."

CORRECTIONS

1. Under privileges of Active members, change item 2 to "Hold office in Association, Chapter and Division."
2. To the requirements for Associate membership add a fourth item, "(d) This type of membership can only be held until candidate qualifies for Active membership."

The Committee is studying the suggestions which were received with sincere appreciation. The whole atmosphere and tenor of the meeting were most favorable and encouraging. The new Committee Chairman, Mrs. Marie S. Goff, Technical Library, E. I. Du Pont de Nemours & Company, Wilmington, Delaware, will be glad to receive further suggestions and comments from members.

COMMITTEE ON PROFESSIONAL STANDARDS

Librarian Testifies At Senate Hearing

Phillips Temple, librarian of Page Communications Engineers, Inc. of Washington, D.C. testified at a hearing of a subcommittee of the Committee on Post Office and Civil Service, U. S. Senate, 85th Congress, First Session, on May 27, 1957, to consider bill S.1326. This bill deals with the increase of compensation schedules for

professional personnel in the Civil Service. Mr. Temple stated:

"It is my desire to register the interest and concern of librarians with the bill under discussion (S. 1326) and to express the wish that librarians (GS-1410) be added to the classifications set forth and covered in this bill. The criteria used in the coverage of professions specified in the bill would admit the profession of librarians to the provisions of the bill Librarians under current civil service regulations are required to possess high standards of formal professional training and experience.

"The rapid development of technology, the newly developed nuclear engineering activities and similar factors are creating a great demand for librarians. Scientific research and development have been growing at an expotential rate for the past 35 years. We now spend about 4 billion research dollars each year, an increase of almost 1,700 percent over 1940.

"This prodigious rate of growth in our technology has been accompanied by a mushrooming of our technical literature. At the present time there are over 30,000 technical and scientific journals being published. Technical reports covering work sponsored by the Federal Government number more than 75,000 per year. In addition, more than 60,000 technical and scientific books are published each year.

"To bring this vast area of technical material under bibliographical control, to organize, catalog, and disseminate it in an effective and efficient manner, a highly skilled and professionally trained type of worker is necessary, namely, the librarian. Without his mediation between the raw data of research, and the scientist who must have that material in usable form, the fruits of our $4 billion investment in research and development would be largely wasted . . .

"Moreover, the current shortage of trained librarians makes it imperative that adequate compensation be provided to attract such personnel as are available to the Government service. This shortage was forcibly shown by a recent survey made by the University of Illinois Library School. It stated that the entire field of librarianship is confronted with a critically short supply of properly trained professional personnel, not only in initial positions but in advanced positions as well. The fact that notices of vacancies received by individual library schools outrun available candidates by 10, 20 and even 30 to 1, is, in itself, mute evidence of this.

"This survey stressed that is is a continuing situation—not a phenomenon of any one year. There are certain areas where the supply of available library personnel continued to be so limited that they became 'disaster' areas, particularly in cataloging and special libraries, notably in the field of science.

"Consequently, both in terms of the shortage of librarians, as well as their direct relevance to the purposes of this bill, the classifications set forth therein should include librarians (GS-1410)."

Members In The News

REGINALD R. HAWKINS has retired from the Science and Technology Division of the New York Public Library where he served for 31 years, recently as chief of the division. Mr. Hawkins is the author of several do-it-yourself books as well as being a science bibliographer.

The Margaret Mann citation, awarded annually at the ALA Convention, was presented this year to DAVID JUDSON HAYKIN of the Library of Congress "for nationally distinguished leadership in the systematic development of subject cataloging and classification."

JERROLD ORNE assumed his new duties as librarian at the University of North Carolina on August 1. For the past six years he has been the director of libraries of the Air University, Maxwell Air Force Base, Alabama. ROBERT W. SEVERANCE, currently special assistant to the director of the National Library of

Medicine, has been appointed the new director of the Air University Library.

In Memoriam

RUTH M. CRAWFORD, librarian at the American Broadcasting Company since October 1945, died August 10 in New York City. She was Chairman of the 43rd Annual SLA Convention, held in New York in 1952, served as Vice-President of the New York Chapter, Vice-Chairman of the Geography and Map Division and recently was a member of the Combined Committees on the Wilson Index.

MARGARET P. HILLIGAN, Research Library, General Mills, Inc., Minneapolis, Minnesota, passed away on July 27. Miss Hilligan edited SLA's Monograph No. 1, *Libraries for Research and Industry: Planning and Equipment,* served as Chapter Liaison Officer and was a past chairman of the Science Technology Division.

RUTH G. NICHOLS, who retired from the Federal Reserve Bank of Chicago a number of years ago, died in her native state of Ohio in May 1957. An active, energetic SLA member in the 1920's and 1930's, Miss Nichols served as Chairman of the Methods Committee, which did such pioneer work in this field, Chairman of the Financial Group and editor of the Financial Group page in SPECIAL LIBRARIES.

New GPO Subscription Policy

Carper W. Buckley, Superintendent of Documents, the Government Printing Office, has announced that effective immediately his office can accept subscriptions to many United States Government periodicals on a two or three year basis, in addition to a single year, as heretofore. Although no reduction in rates can be made for the longer term subscriptions, Mr. Buckley expressed the hope that the new policy will prove a convenience to librarians and others whose subscriptions to Government periodicals can now conform more nearly to the prevailing commercial practices.

THE LIBRARY ZOO

Mr. O. U. Gremlin
I returned those reports. Why don't you keep your records straight (He finds them a year later.)

Courtesy of Dr. Margaret Holtman, Stan Hasse and Machine Design.

Soviet Translating Institute

The Pergamon Institute, a nonprofit organization supported by the United States and British governments, is expanding its activities of translating Russian scientific and technical literature for English-speaking scholars, industrialists and businessmen. In addition to translating about a dozen Russian journals on a regular basis, the institute also encourages the teaching of Russian, publishes monographs surveying Soviet progress in different areas, compiles scientific dictionaries from and into Slavonic languages and is working out means of permanently filing data. Offices are maintained at 122 East 55 Street in New York City and at 4 and 5 Fitzroy Square in London.

Coming Events

SOCIETY OF AMERICAN ARCHIVISTS will have its annual meeting in Columbus, Ohio, on Thursday and Friday, October 3 and 4, 1957, at the Deshler-Hilton Hotel. Erwin Zepp, Director of the Ohio Historical Society, Ohio State Museum is making local arrangements.

Letters To The Editor

As a former special librarian in the chemical field, may I add my voice to those criticizing the growing practice on the part of university libraries of substituting microfilms for printed copies of published theses in interlibrary loans. This does not even mention the practice of merely referring prospective borrowers to the fact that a copy of the thesis can be purchased from University Microfilms. This organization certainly deserves every

credit for making copies of many theses available from a single source at modest cost, but it does not eliminate the need for interlibrary loans.

In their zest to find economies, I believe the university libraries forget that one of their most important functions is promoting the dissemination of the work of their graduates. I do not believe that this end is attained with microfilm. My observation in ten years of supplying literature for scientists and technicians has been that these men would go to most any end to avoid the messy and inconvenient reading of microfilms, unless information absolutely essential to their work is available in no other form.

As for economy, it is difficult to see the advantage of sending a microfilm on loan rather than a printed copy, since industrial libraries are willing to pay transportation charges both ways. Even if one were to concede that interlibrary loans are unsatisfactory, a better solution to reproduction problems lies, I believe, between the inconvenience of microfilm and the prohibitive cost of photocopying. Such progressive libraries as those of Purdue University, for example, require that theses be typed on paper suitable for Ozalid reproduction, which means that they can supply an Ozalid copy for about four cents a page or $4 for a hefty thesis, barely more than the cost of a microfilm. The result is a permanent, easily readable, book-form copy which can be used anywhere.

The maintenance of interlibrary loans for the cursory inspection of theses coupled with such an economical reproduction method as Ozalid where permanent copies are desired would do much to promote the use of this much-neglected means of scientific communication.

RICHARD LIEWALD, Librarian
Velsicol Chemical Corporation, Chicago

Micro Methods Limited manufactures and sells portable microfilm and microcard readers which are particularly suitable for library use. In addition, we undertake both microfilming and microcarding and supply material already recorded by most available sources. We have in hand a programme of publications in microform and would be very interested to hear from anyone who wishes to obtain material from this country.

We are also very interested in any aspect of microrecording and should be delighted to hear from any of your readers on any aspect of the subject. Naturally I should be pleased to give anyone interested, any further information concerning our activities.

E. P. DANGER
Micro Methods Limited
17 Denbigh St., London S.W.1

SPOTTED

● The Science and Industry Division of the Brooklyn Public Library recently opened a unique specialized collection consisting of more than 4,000 bulletins, brochures and pamphlets relating to all aspects of fire prevention. A destructive blaze gave the impetus to the creation of this library, the first of its kind available to the general public. A member of the Brooklyn Fire Department who was recuperating from an injury incurred while fighting a flaming building began to collect material from equipment manufacturers, fire underwriters, insurance companies, fire departments, civil defense groups, and from books and magazines. Lieutenant Chayette hopes that the library will provide architects, industrialists, engineers, installers, fire fighters and others with information that will help prevent fire damage and injuries. Contributions to the collection will be appreciated . . . ● Another unusual library which was started and has expanded through the efforts of civic minded persons is that of the Garden Center in Cleveland. Organized a quarter of a century ago to promote civic landscaping, home gardens and conservation measures in the area, the Garden Center carries on a variety of year round activities which help make Cleveland a more beautiful place in which to live. The horticultural library plays an important part in the programs by serving as an information center for gardeners of all ages, abilities and interests . . . ● An article in *Industrial Photography*, March 1957, describes how the photographic services section of Columbia University Library supplies source material on microfilm for students, scholars and research, commercial or industrial libraries . . . ● An attractive 16 page reprint of *The Engineer's Bookshelf* may be purchased for 25 cents from the Readers' Service Dept., *Product Engineering*, 330 West 42 St., New York 36, N. Y.

Off The Press . . .

BOOK REVIEWS

INFORMATION INDEXING AND SUBJECT CATALOGING; ALPHABETICAL: CLASSIFIED, COORDINATE: MECHANICAL. *John Metcalfe.* New York: Scarecrow Press, 1957. 338 p., $6.75.

The author assigns himself the large and much-needed task of surveying the history of cataloging and indexing from the latter part of the past century to the present time and evaluating the contributions made by various members of the library profession. He is outspoken in his admiration of Dewey, Cutter, Hulme and Kaiser, and the praise he gives them is well deserved. Just as outspoken is his criticism of his own contemporaries; well deserved too, if often intemperate.

Mr. Metcalfe does American librarians a great service by describing at some length the difference between British and American library practice, a difference that stems from divergent concepts of librarianship.

Mr. Metcalfe seems eminently qualified to write about his subject, both from the standpoint of experience (as shown in the biographical sketch he gives the reader) and from the standpoint of the study that preceded the writing of the book, as shown by the bibliography. But in the opinion of this reviewer, *Information Indexing and Subject Cataloging,* although satisfying the objective of author, is ineffectual because it is difficult to read. The opening sentence of the second paragraph on page 15 is an example of the complicated style. Speaking of the scope of the book, the author says:

"Of questions put and in some way answered, those finally considered fundamental to almost everything else are those of what we are classifying and indexing, subjects or information on them, of differences, between 'simple' subjects as represented by names or class numbers and the 'complex' subjects or concepts or subject relations of some documents, between subject specification and subject qualification, between the classification of information for its generic survey and its indication for specific reference, and the questions of the comparative use and usefulness of generic survey of literature and specific reference to literature, of the possibility or practicability of general classifications for general and special bibliography, of universal bibliography and of central or common cataloging for different purposes and methods of indexing."

Important relationships are mentioned but the entire picture of the survey is very difficult to perceive because the style of writing and the over-extensive cross referencing. This reviewer feels that the book is not written for the practical overworked special librarian but rather for the student philosopher with time and background for detailed study.

Despite its faults, *Information Indexing and Subject Cataloging* is a timely book as it deals with the application of machine techniques to documentation and various methods of subject classifying which, of course, are basic to preparation of codes. Any one interested in this phase of librarianship will find the book required reading.

ROBERT W. GIBSON, JR., Assistant Chief
Information Management Division
Battelle Memorial Institute, Columbus, Ohio

DOCUMENTATION IN ACTION. *Jesse H. Shera, Allen Kent* and *James W. Perry,* editors. New York: Reinhold Publishing Corporation, 1956, 488 p. $10.

This book covers the Proceedings of the 1956 Western Reserve Conference on the Practical Utilization of Recorded Knowledge and is presented in five main parts: 1) the papers of the original planning group covering the basic problems of the conference; 2) papers given during the conference; 3) summaries of the panel discussions; 4) the conclusions reached during the closed meetings; and 5) conclusions regarding areas for future research.

As indicated by the title, the book covers all the facets of documentation and presents many fascinating vistas of the future when all that the hard-working librarian or documentalist need do is press a button to find an answer to a difficult problem.

The theory is splendid, and, no doubt, the dream will materialize; but, unfortunately, it will not solve the present problems of the librarian, documentalist or information specialist who must cope with too few personnel, too little space and too much material. However, the book should be read by all who are concerned with the effective use of recorded knowledge as it emphasizes the fact that the problem is universal and that it is only through cooperative effort that a solution acceptable to all will be reached.

Information services are becoming increasingly important to all organizations concerned with technical and scientific research. The efficient retrieval of recorded knowledge can aid in decision making, preclude duplication of effort and assist in scientific research. The book brings together the combined knowledge

of numerous individuals who are recognized as leaders in the field of documentation. The progression, as visualized by the particip... can only be achieved through such conferenc and the publication of the combined thinki of informed personnel. Recognition of the problems by such authorities and the leadership of Dean Shera, assure the necessary advances for the full utilization of recorded knowledge.

MRS. MARTHA FITZGERALD
Armed Services Technical Information Agency
Document Service Center, Dayton, Ohio

New Serials

THE EXECUTIVE is a guide to reading for top management, which is published monthly by Baker Library, Harvard University Graduate School of Business Administration. It screens and selects books, pamphlets, speeches and periodical articles which appear to be most significant for the busy executive. Subscription rates are $5 yearly or $.50 a copy. Address all communications to Room 324, Baker Library, Soldiers Field, Boston 63, Massachusetts.

JOURNAL OF ULTRASTRUCTURE RESEARCH will be published by Academic Press Inc., beginning in August. The purpose of the new journal is to assemble in one medium papers dealing with the ultrastructure of the elementary structural as well as functional components of cells and tissues. The first volume, priced at $15, will consist of four issues. Manuscripts, queries concerning details of editorial policy and rules regarding the preparation of papers should be sent to the Editorial Office, Department of Anatomy, Karolinska Institutet, Stockholm 60, Sweden. Subscription orders should be sent to the publishers at 111 Fifth Avenue, New York 3, New York.

MANUSCRIPTA. The Saint Louis University Library, Saint Louis 3, is publishing a new serial devoted to scholarly articles, featuring information on the Vatican Library manuscripts and codices. Editors are Lowrie J. Daly, Edward R. Vollmar and Charles J. Ermatinger. Subscriptions are available from the library at $4 a year.

SRI JOURNAL is a new quarterly publication that will present scientific and economic subjects in comparatively nontechnical language. It is designed primarily for research directors and key executives in business, industry and government. The journal features articles by staff members and guest contributors, as well as selected papers presented at SRI-sponsored meetings. Interpretive summaries of research projects are also included. Copies may be obtained from the Editor, Stanford Research Institute, Menlo Park, Calif., for $1 a single copy or $4 yearly.

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AMERICAN BUSINESS DICTIONARY. *Harold Lazarus.* New York: Philosophical Library, 1957. 540 p. $10.

Terms, institutions, procedures, job titles, monetary units, laws and abbreviations most commonly referred to in modern American business.

A DICTIONARY OF AMERICAN-ENGLISH USAGE. *Margaret Nicholson.* New York: Oxord University Press, 1957, 671 p. $5.

Based on Fowler's *Modern English Usage,* this new volume is concise and current. Included are examples of differences in spelling, pronunciation and idiomatic usage. Many of Fowler's classical references have been deleted.

DICTIONARY OF ANTHROPOLOGY. *Charles Winick.* New York: Philosophical Library, 1956. 588 p. $10.

About 10,000 entries. Non-English terms in common usage are included.

DICTIONARY OF RUSSIAN LITERATURE. *William E. Harkins.* New York: Philosophical Library, 1956. 446 p. $10.

AN ENCYCLOPEDIA OF THE IRON & STEEL INDUSTRY. *A. K. Osborne,* comp. New York: Philosophical Library, 1956. 570 p. illus. $25.

An alphabetical reference work describing in concise form the materials, plant, tools and processes of the industry.

RUSSIAN-ENGLISH DICTIONARY OF NUCLEAR PHYSICS AND ENGINEERING. *N. N. Ershov* and others, *D. I. Voskoboinik,* ed. Moscow: Academy of Sciences of the USSR, Institute of Scientific Information, 1955; East Orange, N. J.: Associated Technical Services, P. O. Box 271, 1956. 350 p. pap. $9 in U. S. A.; $10, elsewhere.

Over 8,000 entries provide idiomatic English equivalents for Russian words, phrases, terms and concepts. Covers many related disciplines.

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DIRECTORY OF REFERENCE WORKS PUBLISHED IN ASIA. (UNESCO Bibliographical Handbooks no. 5). *P. K. Garde.* Paris: UNESCO; New York: UNESCO Publications Center, 1956. 139 p. pap. $2.

Listing over 1,600 works, this is the first such directory.

HOW TO USE A TAPE RECORDER IN YOUR BUSINESS IN YOUR HOME. (Communication Art Books). *Dick Hodgson* and *H. Jay Bullen.* New York: Hastings House, 1957. 216 p. illus. $4.95.

ILLUSTRATION INDEX. *Lucile E. Vance.* New York: The Scarecrow Press, 1957. 192 p. $4.

Indexes illustrations, charts, diagrams, maps and symbols in a variety of fields from a number of books and periodicals.

THE LAW OF LITERARY PROPERTY. *Philip Wittenberg.* Cleveland: World, 1957. 284 p. $5.

The history and present status of the laws of libel, copyright, plagiarism and related subjects. Discusses the new international copyright convention.

THE PRESS IN AFRICA. (African Survey Series, vol. 1) *Helen Kitchen,* ed. Washington, D.C.: Ruth Sloan Associates, Inc., 4200 Cathedral Avenue, 1956. 96 p. charts. $7.50.

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