Library Science and Documentation

A Series of Texts and Monographs

JESSE H. SHERA, General Editor

VOLUME I
Tools for Machine Literature Searching
edited by J. W. Perry and Allen Kent

VOLUME II
Punch-Card Methods in Research and Documentation
with Special Reference to Biology
by Martin Scheele

VOLUME III
Textbook on Mechanized Information Retrieval
by Allen Kent

VOLUME IV
Scientific and Technical Libraries
Their Organization and Administration
by Lucille J. Strauss, Irene M. Strieby, and Alberta L. Brown
Library Science and Documentation

A Series of Texts and Monographs

JESSE H. SHERA, General Editor
Dean, School of Library Science, Western Reserve University,
Cleveland, Ohio

Editorial Advisory Board

JOHN MAKENZIE CORY
Chief, Circulating Department, The New York Public Library,
New York, New York

LUCILE L. KECK
Librarian, Joint Reference Library, Chicago, Illinois

JAMES W. PERRY
Numerical Analysis Laboratory, University of Arizona,
Tucson, Arizona

IRENE M. STRIEBY
Library Consultant, formerly Chief Librarian, Eli Lilly and
Company, Indianapolis, Indiana

MAURICE F. TAUBER
School of Library Service, Columbia University,
New York, New York

EILEEN THORNTON
Oberlin College Library, Oberlin, Ohio

Volume IV
Scientific and Technical Libraries

Their Organization and Administration

Lucille J. Strauss
CHEMISTRY AND PHYSICS LIBRARIAN
THE PENNSYLVANIA STATE UNIVERSITY
UNIVERSITY PARK, PENNSYLVANIA

Irene M. Strieby
CONSULTANT IN ORGANIZATION OF
SPECIAL LIBRARIES AND COMPANY ARCHIVES
INDIANAPOLIS, INDIANA

Alberta L. Brown
ASSOCIATE PROFESSOR
WESTERN MICHIGAN UNIVERSITY
KALAMAZOO, MICHIGAN

Interscience Publishers
a division of John Wiley and Sons, New York · London · Sydney
To our colleagues in the
Science-Technology Division of
Special Libraries Association
Foreword

In the period covering World War II, which witnessed the rapid growth of libraries in the fields of science and related technologies, an urgent need developed for a manual of library practice applicable to these important areas. As a result, the Science-Technology Division of the Special Libraries Association sponsored the publication of the book Technical Libraries: Their Organization and Management which appeared in 1951 under the editorship of the first author, with the assistance of the co-authors of the volume in hand.

Technical Libraries, a timely and unique book, was the subject of many favorable reviews at the time of its publication. Subsequently it has been cited from time to time in professional books and journal articles. It was reprinted several times in the course of a decade to meet the continuous demand for it by students and practicing librarians.

In the period since 1951 the material in the twelve chapters of the book has been kept under review with a view toward eventual revision. Likewise, the bibliographies comprising the Appendix have been revised, in most instances by the original compilers whose names accompany their work. A diligent effort has been made to bring the information in the 1951 publication up to date as well as to add to it. These several activities have resulted in the publication of Scientific and Technical Libraries: Their Organization and Administration.

January, 1964

Lucille J. Strauss
Irene M. Strieby
Alberta L. Brown
Preface

The purpose of this book is to provide an introduction to the organizational procedures and essential functions of a special library or information service in the subject fields of the sciences and their related technologies; hence the use of the term "science-technology" in the text. The book is primarily a guide to present practices. The main activities usually undertaken in such libraries are outlined in logical sequence from the first stages of their establishment through the several broad areas of operation.

The intention, however, is not to present a complete review of all of the literature pertaining to these functions, though it is believed that most of the major publications have been read in the course of preparing the manuscript. Many are cited in the text; additional ones pertinent to the subject are listed in the Supplementary References appended to each chapter. It will be noted that the greater number of citations are to publications originating in the United States. The reason for this selection is that, where choice was possible, sources were used that are readily available to those who will make most use of this book. Because the details of general library administration are accessible from the index Library Literature and other sources, there is but brief mention of these aspects.

Several specific objectives have been kept in view in planning the scope of Scientific and Technical Libraries. First, since there are in the United States and Canada more than 3000 practicing librarians in the fields covered, their requirements have been kept uppermost. Second, the new members of the profession entering the field who have even greater need for such a source of operational and bibliographical information have been considered. Third, the book is suggested as a text for library school and other advanced students whose interests are oriented toward the literature of the physical and life sciences. Finally, for the management of an organization considering the establishment of a library, an over-all perspective of what is involved is provided. The requirements of these four groups have been
studied, and an endeavor made to meet their multiple needs. Furthermore, in some situations where knowledge is required only of specific procedures, such as the organization of a trade catalog file, scientists and engineers may find certain parts of the book helpful.

It is recognized that in some areas library procedures are being subjected to intense investigation and new methods for handling some problem situations are already finding application, particularly in large scale operations. However, though some nonconventional methods may find extensive adoption, it will continue to be necessary to plan libraries, to select and acquire publications, to place them in such order that they can be located quickly, and to provide specific information from them. It is within this framework of operation that the book deals.

The names of suppliers of services and equipment have been cited throughout the text as a special help to those who are seeking such information. These specific names are to be regarded chiefly as representative examples although their inclusion does indicate that they have made their wares known either by merit or good advertising. In most instances attention is also directed to inclusive published listings.

We want to acknowledge our debt to Technical Libraries and to the individuals who contributed to its success. We also wish to express appreciation for the support of our many associates, some of whom have contributed information and bibliographical items during the preparation of the present book. Deserving of special mention are: Jesse H. Shera, Dean, School of Library Science, Western Reserve University, for his encouragement in publishing the book; Daniel R. Pfoutz, Head Librarian, Technology Department, Carnegie Library of Pittsburgh, for his careful reading and suggestions for the improvement of the manuscript in its almost completed state; and Ralph H. Phelps, Director, Engineering Societies Library, for his review of the final manuscript.

L. S., I. S., and A. B.
# Table of Contents

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword</td>
<td></td>
<td>vii</td>
</tr>
<tr>
<td>Preface</td>
<td></td>
<td>ix</td>
</tr>
<tr>
<td>Chapter 1</td>
<td>SCIENTIFIC AND TECHNICAL LIBRARIES: What and Where They Are</td>
<td>1</td>
</tr>
<tr>
<td>Chapter 2</td>
<td>STAFF: Duties and Qualifications</td>
<td>22</td>
</tr>
<tr>
<td>Chapter 3</td>
<td>BUDGET: Cost of Operating a Library Service</td>
<td>43</td>
</tr>
<tr>
<td>Chapter 4</td>
<td>PHYSICAL LAYOUT AND EQUIPMENT</td>
<td>55</td>
</tr>
<tr>
<td>Chapter 5</td>
<td>BOOKS AND OTHER PUBLICATIONS: Selection and Acquisition</td>
<td>90</td>
</tr>
<tr>
<td>Chapter 6</td>
<td>PERIODICALS: Selection, Acquisition, Handling</td>
<td>124</td>
</tr>
<tr>
<td>Chapter 7</td>
<td>TECHNICAL PROCESSES: Cataloging, Classification and Subject Headings</td>
<td>145</td>
</tr>
<tr>
<td>Chapter 8</td>
<td>INDEXING AND FILING OF NON-BOOK MATERIALS</td>
<td>171</td>
</tr>
<tr>
<td>Chapter 9</td>
<td>ADMINISTRATION OF READERS' SERVICES</td>
<td>203</td>
</tr>
<tr>
<td>Chapter 10</td>
<td>DISSEMINATION OF CURRENTLY PUBLISHED INFORMATION: Library Bulletins—Other Methods</td>
<td>218</td>
</tr>
<tr>
<td>Chapter 11</td>
<td>REFERENCE PROCEDURES AND LITERATURE SEARCHES</td>
<td>238</td>
</tr>
<tr>
<td>Chapter 12</td>
<td>INTERPRETING LIBRARY SERVICE</td>
<td>280</td>
</tr>
<tr>
<td>Appendix</td>
<td>BASIC REFERENCE PUBLICATIONS; BIBLIOGRAPHIES FOR SOME SPECIFIC SUBJECT FIELDS</td>
<td>305</td>
</tr>
<tr>
<td>Index</td>
<td></td>
<td>389</td>
</tr>
</tbody>
</table>
Scientific and Technical Libraries

What and Where They Are

Any organization in which activities are centered in the physical and life sciences with their related technologies must be cognizant of the great body of published information that comprises the scientific literature. This vast recording of the continuous investigation of scientific problems constitutes a store of already determined facts and, if its existence is recognized, can be of inestimable value. To take full advantage of this important resource it is imperative that there be a unit in the organizational structure that is charged with the responsibility of locating and making available "whatever knowledge and experience that may advance its activities" according to Morley's original definition. This unit is commonly called a "special" library because of its unique functions. A broader implication is sometimes achieved by use of the word "information" as a descriptive term, i.e., "Information Service" instead of "Library" though the over-all purpose may be identical. The concomitant activity, developing strongly since World War II and known as "documentation," has aims similar to those of the special library or information service, differing principally in emphasis of certain areas of activity. Proponents of documentation deal more actively with the philosophy and problems of subject analysis than with the administration of services. The mutual intent of all professional workers in the field, be they special librarians, information specialists, or documentalists, is to promote the knowledge and application of scientific information no matter what its source.
The library services with which this book is concerned may be located in any of the subject areas suggested in the accompanying chart (Figure 1) compiled by Ellingham in 1948 and reproduced on the facing page by permission of the Royal Society. In the years since this delineation was prepared, additional areas have come into being or have evolved from the fundamental ones; for example, the several aspects of the nuclear field in relation to chemistry, physics, and engineering. The details of such developments are recorded in the literature of the sciences, and it is with this kind of information that these particular special library services are concerned. Their broad purpose is to secure, assemble, and present in useable form all information that relates in any way to specific subject areas, finding it not only in the obvious standard publications but also in the less readily available and sometimes ephemeral presentations such as progress reports. Thus, unique files for the particular benefit of the organization they are designed to serve are compiled. In order to execute this function effectively the members of the special library staff must have knowledge of the sciences involved as well as competence in the practices and techniques of library science. Henkle (2) has observed that an identifying feature of a special library service is that "it involves participation by the librarian in the seeking and organizing of information for specific purposes."

It is apparent that there is a major difference between a general library and a special one. The distinction has been expressed by Kyle (3) who pointed out that the chief dissimilarity lies in the fundamental unit comprising them. In the general library the unit is the book, pamphlet, or other gross item, whereas in the special situation it is the particular bit of information contained in the book or other publication. The general library is designed to serve the general public whose members usually must find for themselves what they need to know. The special library is prepared to provide specific information upon request from its clientele. Dr. Kyle further pointed out the special library's obligation to produce information which may not even be published and that can be discovered only by knowing how and where to direct inquiry. Requirements may even be anticipated and be provided before a specific request is made.

The special library in the sciences customarily maintains a regular and systematic information service covering the immediate and foreseeable future interests of the enterprise of which it is a part. This necessitates the acquisition and maintenance of
Fig. 1—A chart illustrating some of the relations between the branches of natural science and technology—H.J.T. Ellingham. 1948.
an adequate collection of books, periodicals, pamphlets, government publications, patents, and reports issuing from the multitude of publishing bodies that provide this literature. Written materials prepared internally, research reports, market surveys, and technical correspondence must also be brought together, and all of these items made available for immediate consultation by being adequately classified or indexed, and filed accurately. The procedures for organizing information are usually derived from standard methods developed for nonspecialized libraries, as modified to suit the requirements of a particular situation. The classification scheme for books may have to be expanded, and the books' contents analyzed, sometimes chapter by chapter. Periodical articles of importance are carefully indexed, as are all other items including maps, drawings, even photographs and pictures in whatever form they appear. In time, as a collection grows, it becomes an invaluable resource.

In recent years the scientific literature has increased in volume at such a rate that improvements over the conventional methods of coping with it have been sought. This has been the particular realm of the documentalists. Traditional methods of filing and indexing are too slow to be satisfactory when large numbers of items must be handled, and answers to this problem have been in a ferment of development since the early 1950's. Most of the newer systems employ mechanical devices, principally notched or punched cards sorted by electronic computing machines, with certain apparent success thus far, and to judge from the twice-yearly reports (4) prepared by the National Science Foundation, the problems relating to this documentation situation will continue to receive lively attention until fully satisfactory solutions are achieved. However, these are only more sophisticated methods for doing the same things that are done on a lesser scale in the indexing procedures followed in all scientific and technical libraries. It is likely that there will continue to be a place for both types of activity.

DESIGNATION OF SCIENTIFIC AND TECHNICAL LIBRARIES

The special libraries or information services in the subject areas under consideration are individually designated in the organization where they are located by any one of several
names. In some instances the name reflects placement of the
unit in the organization plan; in others it indicates a specific
area of activity. The word "library" is sometimes not used be-
cause it is thought that its connotation is not sufficiently broad.
Some of the designations known to be in use are:

Technical Library
Technical Information Service
Technical Information Division
Research Library
Research Laboratories Library
Technical Information Group
Technical Literature Research Department
Research & Development Library
Intelligence Service
Science Information Service

The name does not always reflect accurately the activities
encompassed by the service. In some cases a library only is
indicated; in other situations a library may be included as one of
several distinctive units in a department or division, in alignment
with others in which the pursuits are related but of such magni-
tude as to warrant separation. For example, a report and techni-
cal writing group, a reports indexing group, a patent and files
group, and the library might comprise the components of a
Technical Information Division. Obviously, such an elaboration
would be necessary only where the scale of operations is very
large; in a smaller enterprise all four functions might be han-
dled by one staff. A pertinent publication in which information-
service planning was discussed is the excellent survey of the
various operations of an information division in the book edited
by Singer titled Information and Communication Practice in
Industry (5). The distinctions among the possible types of serv-
ces would not be evident from their names because the designa-
tion could be the same for one that was limited to library
operations or to a diversified information division.

The term "library" is used in the present book for desig-
nating the scientific and technical information services under
consideration, and emphasis is on those functions that are ordi-
narily included as pertinent to a library program. Each chapter
is devoted to one of these comprehensive areas of performance.
ORGANIZATIONAL STATUS OF SCIENTIFIC AND TECHNICAL LIBRARIES

Libraries in which activities are centered in scientific and technical areas are located in a variety of situations. In the United States the greatest number are associated with industrial companies. Others are with government agencies, independent research institutes, professional societies, trade associations, and institutions such as hospitals, all of which find it necessary to maintain their own information sources. Major academic institutions usually provide branch libraries for their individual schools and colleges in which the sciences are taught and research pursued. Public libraries have departments devoted to special subjects and services that qualify them as belonging in the category herein considered. The subject fields represented in all of these locations embrace the whole range of the sciences, theoretical and applied. Some of these libraries cover a specific, well-defined subject field; others must encompass several.

1. Industrial Organization
   A. As a department at the company's central location
      (1) Serving centralized units only
      (2) Serving both headquarters and all other divisions of the company
   B. As a department at each division or plant either in one geographic area or in widely separated locales
   C. As a unit of a main research and development department
      (1) Serving research and development department only
      (2) Serving research and development plus other units
   D. As a unit of information division or other organizational departments such as patent, engineering, experimental station, business

2. Academic Institution
   A. A branch of a central library to serve individual school or college
   B. As adjunct to a single department
   C. As single library serving whole institution, i.e., a technological institute
3. Public Library
   A. As science or technology division
   B. As independent library
4. Professional Association
   As division in headquarters office serving members
   of one or more societies represented
5. Research Institute
   As division serving all projects
6. Government Bureau or Other Division
   A. As department serving individual bureau or other
      unit
   B. As centralized organization serving several di-
      visions
7. Hospital
   A. As a department in a hospital to serve doctors
   B. As a service to patients

In a majority of situations the library is closely associated
with the larger body or organization which it serves; for example,
a division of the research and development department of a com-
pany. However, there are also such self-containing services as
the John Crerar Library in Chicago which Henkle (2) has called
a "public special library," though it does function somewhat
differently from a library serving a clientele whose work is
carried on in most cases in the same building. A somewhat
similar operation is the Engineering Societies Library in New
York which is sponsored by a group of the major engineering
societies for the primary purpose of providing information to
their members, but which can be used by others having need to
consult its excellent collection. There is also the outstanding
chemical library maintained by the Chemists’ Club in New York
for members and others whose purposes are serious. The extra-
ordinary services provided by departments of certain of the
public libraries such as the Technology Department of the
Carnegie Library of Pittsburgh and the New York Public Library
qualify these libraries as belonging to and augmenting signifi-
cantly the resources of the special libraries devoted to the
sciences. The scientific or technical library, therefore, is shown
to exist in several kinds of environments.

An extensive survey of Library Systems in Large Industrial
Organizations was completed by Bedsole (6) in 1961 and the re-
sults made available thus far (to 1963) only as a Ph.D. disserta-
tion. This exhaustive review of 117 corporations revealed that
there are several organization patterns extant with respect to the manner in which library services are provided, an observation in accord with the outline presented earlier in this chapter. From Bedsole’s findings they fall into four broad categories: (1) One library service for the whole corporation; (2) Several libraries operating independently in various plant locations; (3) One central library with branches administered under its control; and (4) Mixed combinations of the first three. A clear conclusion resulting from this study was that there is no one system that can be recommended as being universally effective or desirable for an industrial corporation.

In working relationships with the clientele, library service often cuts across many department lines although the physical placement of the library is determined by the parent organization. This is obvious from a study of corporate organization charts designed to show supervisory relationships among all segments of the enterprise. A survey made by Strieby (7) in 1952 on Organizational Relations of Special Libraries, preceding Bedsole’s similar study, also provided no evidence for a single uniform placement of the library. That this situation “is but a reflection of the fact that there is no mutually exclusive field for the operation of an industrial library” is still a valid conclusion as indicated by information brought together by the same author some years later (8).

An example of a system that worked well for Eli Lilly and Company has been described in detail by Maurice and co-workers (9). At the time this report was made the library service was separated into three distinct units: (1) Scientific Information Service; (2) Business Information Service; and (3) Library Extension Service. After this article appeared in print a fourth unit was added to provide for expansion of company interests; namely, (4) Agricultural Library Service. These libraries operated independently insofar as reference service was concerned, but such operations as cataloging, purchasing, and interlibrary loans were centralized in the main library under the supervision of the chief librarian who functioned as a department head in the Lilly organization.

Another study of the operations of scientific library services, somewhat similar to that performed by Bedsole but narrower in scope, was undertaken by the Division of Chemical Literature of the American Chemical Society in 1958 (10). A report titled Administration of Technical Information Groups, giving the findings of the investigation of 300 companies in the chemical or
closely related industries, was published as a result. It indi-
cated that there was evidence of a pattern of organization in
this group since 80% of the information services were integral
parts of research and development divisions.

A library can serve effectively only if its role and functions
are definitely delegated and recognized. It should be a distinctive
unit in an organization, and should operate at the same adminis-
trative level as other departments with comparable responsibili-
ties. The head of the service should be directly subordinate to an
administrative officer high enough in the echelon of management
for easy communication with those who determine policies.
Strieby (7) found that among these officers in several industrial
organizations were the Secretary, Vice President of Industrial
Relations, or, in one isolated instance, the Office Manager. In
research areas, the officer is usually the Director of Research.
In the Aluminum Research Laboratories of the Aluminum Cor-
poration of America, for example, the library is a department
of the laboratory, and the librarian has department head status.

Several organization charts showing the place of the library
in some representative companies are provided here to illustrate
situations now in effect in industrial organizations. These are
indicated as Figures 2-5.

ORIGINS OF SCIENTIFIC AND TECHNICAL LIBRARIES

Libraries concerned with the sciences and technologies
originate because of specific, localized needs for organized in-
formation services. Ideally, a library is planned as an integral
department at the inception of an organization, and this does
sometimes happen. However, books and periodicals are more
often haphazardly acquired and accumulated in laboratories and
offices while an enterprise is in its beginning stages. They are
scattered and unrecorded so that effective use cannot be made
of potentially valuable material, even though it may be some-
where close at hand. Eventually, as the activity grows, it is
recognized that these publications must be brought together and
put in the charge of a competent staff. In the more favored situ-
ation, plans for the library service are made at the same time
as those for offices and laboratories.

The necessity for an efficient means for taking advantage of
recorded information is familiar in an industrial organization,
particularly in a research and development department. Similar
Fig. 2—Organization chart of the Esso Research and Engineering Company.
requirements develop also in areas other than industry. For instance, in academic institutions programs frequently become so diverse and are of such magnitude that a centrally located library cannot render the service essential for research projects in individual colleges and departments. Here separate collections or branch libraries covering relevant subjects must be established within reasonable reach of the academic research worker, both academic staff member and student. In any situation where inquiry into the sciences is in progress the need for a literature service becomes evident eventually, if it is not apparent at its beginning.

PLANNING FOR THE ESTABLISHMENT OF A SCIENTIFIC-TECHNICAL LIBRARY

The first step in planning for an information service is to analyze all aspects of the situation to be served by it. If there are several directions of interest it will be necessary to determine the subject fields to be covered and their relative extent. Will it be necessary to procure all publications in certain of the theoretical sciences or should the emphasis be on the technical aspects with some business and economic coverage? Who will be
the clientele and what kind of work will they be doing? Research in the sciences will require one kind of source material, the solving of technological problems another. Will marketing and sales personnel also have to be served? It will be profitable to make as extensive a survey as possible at this point, discussing tentative conclusions with executive officers and any other persons whose opinions may be helpful, before plans become definite.

Advice may be sought also from persons outside the organization, particularly from those who are in charge of libraries similar to the one being planned. Visits to such libraries are
certain to be profitable because advantage can be taken of both the successful and unsuccessful experiences of others who have faced the same kind of task.

At some point in the planning stage the head of the projected service will have been employed. Once this appointment has been made the character of the library will begin to take shape, though the individual should not impress his own personality on the service too strongly. It is vital that this administrator be able to comprehend what is needed. He must then be given strong support to accomplish the envisioned purpose.
Fig. 5A—Chart of the Research Center of the Hercules Powder Company.

Fig. 5B.
MAIN FUNCTIONS OF A SCIENTIFIC-TECHNICAL LIBRARY

In the book Research in Industry edited by Furnas (11) the statement was made that the primary function of an industrial library is "to pass on to the users important information necessary to their work." This is a valid generalization that is applicable to a scientific or technical library no matter what its location. Royer (12) has advised that the "librarian could expand his job to cover many parts of the great area of communication," thereby challenging those who practice the profession seriously to exercise imagination in determining what relevant responsibilities might reasonably be undertaken. When the resources at hand are adequate, and administrative procedures efficient, the process of passing on information to those who need it can be accomplished in various ways.

It is pertinent here to outline the broad functions of a library of the type under discussion. The more common of these include the following:

1. Development of the collection of books, periodicals, and other publications
2. Maintenance of special subject references, files, and indexes
3. Dissemination of currently published information by means of personal notifications, preparation and distribution of library bulletins, and provision of special service publications
4. Circulation of books, routing of periodicals
5. Filing and indexing of internal reports, technical correspondence
6. Maintenance of reference service
7. Compilation of bibliographies and organization of reports
8. Editorial assistance with publications
9. Translation of foreign language publications
10. Personalized service of various types

The aforementioned activities are the main ones in the majority of scientific-technical libraries. There are others that are unique to particular situations where the library staff is alert to recognize their appropriateness. Royer (12) has inferred that management is likely to appreciate an enterprising approach.

After careful study of the situation for which a library is being planned and agreement reached as to the functions to be ad-
ministered, it may become evident that more than one library unit should be established. This may be advisable because of the locations of various operations of the organization or because of the divisional breakdown. The most economic and generally satisfactory solution is to establish a central library with subordinate units in other locations. If such operations as book and periodical ordering and cataloging are done at the central location the costs will be less than if they are done at each library. Moreover, it is easier to develop a purchasing policy that avoids unnecessary duplication. In general, the size of the operation served will be the chief influence in determining how many libraries there should be.

In some situations a library committee, consisting of appointed members from departments or divisions for which the service is designed is often helpful. Such an advisory group can aid in determining policies and can be an important liaison between the library and its clientele. Its usefulness in this respect is discussed in Chapter 12. There must be free communication and mutual understanding if the most satisfactory working climate is to be achieved. There are, however, opposing opinions with respect to the advantages of a library committee; Greear (13) and Birdwell (14) approved of a committee, whereas White (15) preferred to operate without one. In any event, this possibility of aid and support should be considered.

PROFESSIONAL SOCIETIES

The role of the specialized information service is by no means static. Developments of the ways in which its functions are executed are as continuous as the ever-changing sciences and technologies comprising the field of operations. Means exist for keeping abreast of these advances. Several professional societies provide regular meetings and conferences as well as publishing programs that enable those practitioners who are enterprising and able to contribute to the growth of the profession. Others can benefit from their ideas and shared experience.

There are several types of associations in the areas of library science and documentation to which membership is open to persons who meet specific qualifications. The societies whose activities are most directly concerned with the aims and purposes of this book are the following:
American Documentation Institute. 1025 Connecticut Avenue, N.W., Washington 6, D.C.
Special Libraries Association. 31 East 10th St., New York 3, N.Y.
Aslib. 3 Belgrave Square, London SW1, England.
Division of Chemical Literature, American Chemical Society. 1155 16th St., N.W., Washington, D.C.

Other organizations, both national and international, promote activities that relate to the purposes of special information services. In the United States there is the American Library Association; in Great Britain, The Library Association. Internationally, Unesco has a Division of Libraries, Documentation, and Archives. The International Federation for Documentation (FID) has supported many information projects since 1895. IFLA stands for International Federation of Library Associations, through which all of the major library organizations cooperate.

CONCLUSION

It is an accepted fact that any scientific enterprise must keep in touch with current developments in its field, and must also be prepared to review what has been done in the past. In order to do this effectively a library, as either an information service in itself or as an adjunct of such a department, is vitally necessary. The importance of preceding laboratory research by adequate library research should be obvious. If the results of investigative work have been published, they can almost certainly be found much more quickly by using the indexing and abstracting services that are now available than they can be determined in the laboratory. Despite the growing volume and complexity of the scientific literature, diligent effort in approaching it produces information if the original publication has been written in a style that is amenable to ready indexing, and this is generally a requirement for publication. Phelps (6) has expressed a reassuring opinion in this respect in an article on Engineering Information – All is not lost.

Finally, Loeb’s observation concerning the role of the library in promoting the advance of science has yet to be better expressed (17):
Real discoveries are actually made in the library and subsequently tested out in the laboratory. A new discovery is a new combination of old ideas and those combinations are most likely to occur to the mind of the scientist, not when he is handling material things, but when he is brooding over the thoughts of other men and rethinking them himself. In those hours of profound reflection, the new combination may occur to him, and then he goes to the laboratory to verify or disprove. The library remains the great essential to discovery.

BIBLIOGRAPHY

17. Loeb, J. Library's place in research. Ex Libris 1, 74 (Sept. 1923); abst. in Spec. Lib 14, 179 (1923).

SUPPLEMENTARY REFERENCES

Books

Wright, J. E. Manual of special library technique, with particular reference to the technical special libraries of commercial and government establishments. 3d ed. London, Aslib (1956).

Periodical Articles


Asmonas, V. Information service, scientific and technical, systems of scientific and technical information service, long range planning. FID Rev. Documentation 27, 81-85 (May 1960).


Staff

Duties and Qualifications

GENERAL REQUIREMENTS

Those who administer the services in a scientific and/or technical library must be well suited both by temperament and training to the work, because the degree of success is directly dependent upon staff abilities and attitudes. Good service must be efficient and flexible, rendered in a dignified and pleasant manner, it being recognized that all of these factors are interdependent and to be kept in balanced relationship. Efficiency loses effect if procedures cannot be modified or if requests are not accepted amiably. Therefore, the importance of choosing staff members who are personally well-qualified and whose intellectual capacities are adequate cannot be overemphasized. The administrator of the service is the most influential member in determining the character of the library, but all assistants share the responsibility. In this chapter the qualifications for the duties involved in a library devoted to the physical or life sciences and their related technologies are reviewed and accompanied by a discussion of the requisite education and training.

SIZE OF STAFF

One of the first decisions to be made is the number of staff members required to achieve the level of service that is contemplated. The situation under consideration may be either a new library or a review of an already established one with the inten-
tion of increasing its effectiveness. There are some circumstances where, if the volume of work to be done is not large, possibly because activity is in the beginning stages, it can be accomplished by one professionally trained person aided by a clerical assistant. If the full potential of this part of the information service is to be realized, however, so small a staff should not be considered adequate for a very long period of time. As the use made of published information grows, and the size of the collection of materials expands, one person cannot be expected to do everything that is required. Consequently, other staff members, both clerical and professional, must be added to take over certain areas of the operation.

There are several ways of approaching the answer to the question of how many staff members the library of an organization should have. One method is to study the results of surveys of what is being done in organizations of similar kind. A number of investigations appropriate to the present inquiry were made in the late 1950s and their findings are given in the following discussion.

An examination of the practices in effect in certain types of libraries, principally in industrial corporations, was undertaken as a research project by Bedsole (1) who published his findings as a Ph.D. dissertation. He investigated the libraries of 117 large corporations representing a total of 350 libraries, all of them revealing the sizes of staff employed. Another study by Gibson (2) using 27 corporations as a sample, produced results that anticipated those of Bedsole. Sharp's (3) survey was of a group of 25 libraries of companies in the field of electronics. What was revealed with respect to the size of library staffs by these three investigators is summarized in Table 1 in which are included some figures reported by Nicholson (4) using data published in 1940.

It is evident that most of the figures cited in the table are in essential agreement except for the column giving ratios of the number of library staff members to the numbers of engineer/scientists served. Bedsole's findings indicate a very high average number of organization staff for each library staff member, whereas the earlier report by Nicholson showed a remarkably small number. No doubt this reflects the sharp increase in the size of research staffs and the fact that library expansion has not kept pace with it.

Another survey of recent date was directed specifically toward the personnel situation in special libraries. It was com-
missioned in 1959 by Special Libraries Association and the results published in the March 1960 issue of Special Libraries. For the scientific libraries participating, the average size staff consisted of two professional and two clerical members. Libraries in nuclear and atomic energy, and aircraft and missile industries were shown to have significantly larger staffs. However, in the whole group of 1137 libraries in all fields of activity, 63% were staffed by one professional librarian and one clerical assistant. No clear relationship among the several factors of corporation sales, research staff served, and research budget with respect to size of library staff have been revealed by the several surveys cited.

A second effective method for determining the size of library staff needed is to analyze the essential functions from the standpoint of time required to perform them. Each operation can be listed and the steps required to execute it outlined. By timing these performances, a reasonable average time necessary for accomplishing the routines can be determined. Professional duties can also be estimated with fair accuracy. An excellent example of such a procedure is given in the monograph by Herner and Heatwole (5) titled The Establishment of Staff Requirements in a Small Research Library. The validity of their findings is attested by the fact that they used as illustration an actual situation where an organization's scientific staff of 400 was to be provided with good library service. Herner and Heatwole found that the library staff should include 3.2 professional members and 3 clerical assistants.

Consideration of the growing necessity for research organ-
izations to take full advantage of the accumulating literature indicates that the library staff should be larger than those reported in Bedsole's survey. In every situation certain specific factors such as the amount of routine work that must be done because of unique responsibilities assigned to the library will influence the size of staff required and the proportion of professional personnel to clerical assistants.

POSITION EVALUATION

Before discussing the individual staff positions, certain general matters concerning the staff as a whole should be considered. If the previously mentioned procedure of analyzing the tasks pertaining to each position has not been done, it should be performed and an evaluation made for the purpose of determining salary rates. These should be on a par with those in other departments where educational requirements and duties are comparable.

Since the majority of libraries in the categories with which this book is concerned are operating units in larger organizations, the personnel policies will necessarily follow those already in effect. An example of a scheme of classification of personnel in an industrial research body was shown in the book Research in Industry (6) in which the head of the library service was indicated with relation to other positions on the research staff. The rating was professional, the status that of department head. In working out the detailed classification for the other members of the staff, appropriate subordinate rank equivalent to similar positions in other departments should be assigned.

As was stated in Chapter 1, in discussing the place of the library in over-all organization plans, the library may be fitted into the scheme in several ways. This means that the librarian may report to different officers in various organizations. It actually matters little whether this is the vice-president in a small industrial research laboratory or the assistant to the vice-president in a larger one, as long as both are alert to the significance of the library service. Strieby (7) has discussed this matter fully in a paper The Place of the Library in the Organization.

In the process of evaluating each position in the library, the duties should be defined and appropriate titles established. Suggestions are provided in the sections of this chapter where the various positions are described.
STAFF MANUAL

It should be apparent that the information gathered in the course of developing descriptions for staff positions ought to be preserved in a manner that makes it readily accessible. The recommendation is that this be made part of a Staff Manual in which the functions of the library are described in terms of the duties of each staff member. Such a record is invaluable, though it requires a program of disciplined effort to produce. Wesner (9) has reported an attempt to locate examples of staff manuals to be used as guides in the preparation of one. It may or may not be surprising that few libraries were found to possess them. It was generally agreed, Wesner found, that the idea is excellent, but there were not many administrative heads of libraries who had taken time to produce one. Wesner did undertake to organize a manual and concluded that “the preparation of such a manual consumes hours of time — and (I) hasten to add that it will be worth every minute of it.” The significance of the staff manual is discussed again in Chapter 12.

A staff manual may be prepared as a typed copy with several carbons if a small number will suffice, or it can be duplicated to provide as many as may be required. It is advisable to maintain it in loose-leaf notebooks for convenience in adding material as well as deleting portions that are superseded.

One of the most important sections in a manual covers personnel policies affecting all staff members. Working hours, vacation allowances, sick leave, and any other pertinent matters should be stated explicitly. The duties of each staff member should be outlined in detail so that there may always be understanding of who is responsible for the various categories of service. This assures uniform observance of methods once they are instituted. It may be preferable, in libraries where there is but one professional staff member and a clerical assistant, not to specify who does the individual tasks but rather to provide a detailed outline of procedures only.

A manual serves other purposes in addition to providing a guide to the execution of duties. It can be an excellent introduction to the library for new staff members, giving them an immediate perspective of its broad functions so that they can appreciate the role of their individual assignments in the whole program. Boots, moreover, has pointed out that a manual provides administrative officers with concrete evidence of the activities of the library (9). It can be unquestionable proof of a well-administered operation.
STAFF TRAINING

The head of the service and all other staff members must be allowed an adequate period of introduction to their duties, during which they are given basic information concerning the organization served by the library. It is most important for the librarian, as director of the service, to know as much as possible of the broad objectives of the over-all program so that he can achieve the proper perspective of his own role. Full understanding of the place of the library in the organization and its relationships with other departments should be developed. This will be a continuous process that will be aided by a sensitivity to changes to which adjustment in thinking must be made. In addition to personal introductions to key personnel, a tour of laboratories and offices should be scheduled. The operating plant might be included if there is one. Should there be plants or other units in far-removed localities, it is advisable to plan for eventual visits to them, especially if there are other libraries operating as branches or autonomous units. The more the librarian knows about his organization, the more effective his planning for the best possible service is likely to be.

Just as the librarian receives guided orientation from his superiors, so must he be responsible for having a program of training for his assistants. They, too, should learn of the general purpose of the organization and be introduced to those persons with whom they will be dealing. Duties should be discussed, and a period allowed for comprehension of what is expected. This is time well spent because new staff members become effective much more quickly than they would if the need for adjustment to new duties were not recognized. Some potentially helpful articles concerning the training of staff are cited in the list of Supplementary References at the end of this chapter.

The several types of positions that might comprise a library staff are described and discussed in the following sections. The duties and educational requirements are outlined for each. From this presentation the number and kind of positions required to establish the service envisioned may be determined.

Librarian

Title

The administrative head of a scientific-technical library service may be given any one of a number of titles. It may be
simply "Librarian," but frequently a more specific designation is preferred. It may derive from the name given to the service itself, the possible designations for which are cited in Chapter 1. Some of the more commonly used titles are:

Technical Librarian  
Research Librarian  
Technical Research Librarian  
Chief Librarian  
Supervisor of Library  
Director (or Head) of Information Service  
Manager of Technical Information Service  
Head of Intelligence Service  
Information Officer  

In this book the term "Librarian" is used for convenience in referring always to the person in administrative charge of the library service.

Duties  

So varied are the activities of a library in the fields of science and technology, often encompassing segments of both, that the administrative head must be capable of carrying on and supervising an array of diversified operations. Where the staff is limited, the librarian executes many of them himself. He must plan, organize, and direct all of the main functions of the service, interpreting needs as they develop or, preferably, be ever alert to anticipate them. He must keep in mind the policies of the organization and comprehend its technical problems if he is to fulfill its information requirements effectively. Specifically, the broad functions for which the librarian is responsible include the following:

Planning the physical arrangement of the library and layout  
Preparing budget  
Selecting of personnel and assigning duties  
Correspondence, orders, approval of bills  
Selecting and purchase of books, periodicals, other publications  
Supervising of classification and cataloging books, indexing other materials  
Supervising of readers' services  
Handling of reference requests
Executing or supervising literature searches
Reviewing and abstracting of current literature, editing a library bulletin
Translating from foreign languages
Contributing to, and rendering editorial assistance with organization publications
Supervising of files of special materials: Laboratory notebooks, organization archives, research reports
Attending organization meetings, research conferences, seminars
Preparing annual reports to management concerning library activities and future plans

Some of these duties can be performed by other staff members if they are available and have adequate qualifications. Other tasks that should be delegated as soon as assistants are employed are:

Circulation procedures, including statistics
Filing of cards, pamphlets, loose-leaf services
Recording and filing periodicals
Binding procedures
Requisitioning supplies
Taking inventory of collection
Interlibrary loans

What is expected generally of the science librarian has been well stated first by an industrial research man and second by a research worker in an academic institution. Leighty (10) wanted an elastic service, designed to assist him without hampering by too strict regulations. He found it important to be informed as quickly as possible of the new publications pertaining to his field, and pointed to the necessity of the librarian’s knowing exactly what are the objectives of the research projects. Gilman (11), representing an academic situation, recognized that the special librarian in industry can give faster service to a clientele smaller than is usual in a university library, but he advocated branch libraries where the research worker could reach for reference publications without undue interruption of his own creative activity. He urged that librarians be alert to these needs, and use their influence to bring about the kind of service that is wanted.
Qualifications and Training

Certain qualifications for the position of librarian in a scientific or technical library can be stated, but so varied are existing libraries in the emphasis of their activities that absolute requirements cannot be stipulated as mandatory for success. Those who are presently among the most effective in such positions do not fit a regular pattern, and therefore do not provide data from which definite conclusions can be drawn. Since the requirements of no two situations will coincide, there may well be liberal interpretation of the experience and training of a prospective applicant for a position. The good librarian must first of all be a well-educated person with an appreciation for scholarship and its needs. Brown (12) stressed the importance of the personal attitude, stating that the science librarian should have a natural liking for his work, and should find personal satisfaction in reading the literature of his field. He should be confident that what he does as a library research worker is highly significant to the success of the program of the organization. In the opinion of Hunt (13), to be competent as a science librarian a person should possess “a high degree of intelligence, intellectual curiosity, and an excellent memory.” Knowledge of publications in the field and how to use them is essential, and there must be reasonable acquaintance with the particular sciences involved.

If the duties of the librarian are primarily administrative, that is, consist largely in supervising readers’ services and technical processes, then training in library science is of chief importance. However, in situations where the librarian works more closely with the literature, doing literature searches and locating and evaluating information, knowledge of the scientific subjects is paramount. Administrative ability must also be present to some degree if a staff of any size is to be supervised. Thus, a combination of skill in library science, in subject knowledge, and administrative ability, each in proportion to suit the particular position, should be sought in the person who is to head the service envisioned.

In addition to the more easily measured qualifications there is the elusive one of personality, which is equally significant in determining the potential success of an individual who would become a librarian. It is important that he be personable, well-adjusted, poised in manner, and able to deal pleasantly with people. Not only is it necessary to establish a dignified rela-
tionship with the library clientele and to maintain good staff cooperation, but it is also expedient to develop friendly relationships with professional associates. The person who possesses, or has the wit to develop, an attractive personality has an incalculable asset in favor of his success.

Lively discussions regarding the formal education necessary to qualify librarians to serve in the fields of science and technology occurred occasionally during the 1930s. Coincidental with the meteoric demand created in World War II for scientific and technological information, these discussions became more frequent, and, at times, controversial. Personal opinions were aired in the pages of professional journals with much emphasis on the need to recruit subject specialists, either with or without degrees in library science, for the many openings existing in literature searching, in patent work, and in the administration of libraries. As an indication of the increasing concern felt for more adequate preparation, a conference representing the employers’ viewpoint was held preceding the annual convention of the Special Libraries Association on June 5, 1948 (14).

A positive step in the right direction was made a few months later when the Princeton Conference, called to discuss issues in library education, focused attention on the needs of the special librarian. An important outcome was the resolution to form a Joint Committee on Library Education under the sponsorship of the Council of National Library Associations. Efforts of this committee resulted in the publication of prepared statements setting forth programs for the education of librarians in several subject fields (15). The proposed curriculum for Scientific and Technical Librarianship was outlined by Voigt (16). In his introduction the following statement appears:

...Another basic consideration is that of whether specialized library-school education, or even any library-school training at all, is essential for the technical librarian. The answer is the same in this field as in most others. The subject specialist with some natural inclination and ability in librarianship can become, if he wishes, an effective science and technology librarian in his own field. With enough experience he can do this without any library training, but it is doubtful if he can ever be quite as effective as he might have been with such training. The same argument applies to specialized library training in the sciences. Most successful scientific and
technical librarians have combined a good subject background, a general library-school course, and practical experience of many years. The value of library-school training lies largely in the methods and procedures which are learned and perhaps even more in the resultant acquaintance with the organization of large libraries and methods of efficiently extracting information from them. Such training should result in a useful understanding of the over-all pattern of bibliographic organization and of the library's importance in it.

The basic professional program of education in library science requires a minimum of five years of study beyond the secondary school, four years of college or university work leading to a bachelor's degree in either arts or science, followed by a year in library school from which a master's degree is earned.

In most library schools the curriculum is broadly based as preparation for work in general libraries. However, there has been a trend in recent years toward giving attention to the needs of special librarianship. Results of a survey by Owens (17) of schools offering curricula leading to degrees in library science revealed that five of the 31 schools replying had no course in special librarianship in 1959. The 26 schools that did have courses offered from one to as many as nine in one institution.

During the past decade changes have taken place in the pattern of special library education. To meet the demand for science librarians, increasing attention has been given in library schools to the inauguration of special courses varying from surveys of the literature of special subjects to an intensive program of study leading to the doctor's degree.

Regularly scheduled library-school courses have been supplemented and augmented by institutes and conferences sponsored chiefly by library schools, professional associations, universities, government agencies, and those engaged in the business of developing the effectiveness of machines for literature control. Evidence of the wide scope of this activity is apparent from these few examples of programs carried on in 1961-1962:

Drexel Institute of Technology, Graduate School of Library Science. Seminar in Search Strategy, April 30 - May 18, October 8-26, 1962.

Georgia Institute of Technology, Atlanta, Georgia — A Short Course for Industrial and Government Information Specialists, Oct. 29-Nov. 9, 1962.


Western Reserve University, Center for Documentation and Communication Research, School of Library Science, Cleveland, Ohio. Conference on "Information Retrieval in Action." April 18-20, 1962.

The best source for learning of such events is the publication Science Information Notes, reporting national and international developments in scientific and technical information dissemination. This is published by the National Science Foundation.

The comprehensive survey by Bonn (18) of the training offered in several countries of Europe and the United States for work in scientific documentation covered every aspect of educational activity, formal and informal. He cited the in-service programs in effect in some of the major institutional libraries such as Battelle Memorial Institute and the Research Information Service of the John Crerar Library. Industrial firms also provide training within their own libraries. Another kind of study opportunity is offered by several of the library schools that have work-study programs whereby a student works one term then goes to school, alternating until he receives his degree.

An especially significant effort to train literature information scientists was announced in May 1962 by the American Institute of Biological Sciences as its Biological Sciences Communications Project. The program is supported by the National Institute of Health and the National Science Foundation and is based in Washington, D.C. Training includes courses given at The American University, The Catholic University, Georgetown University, The George Washington University, Howard University, and The University of Maryland. The scope is all-inclusive and ranges from the fundamental biological sciences to administration. Additionally, on-the-job training experience is required. Only persons who have serious intentions of working in the field are considered for appointments.
Shera (19), who has been actively interested in the problem of education for special librarianship over a long period of years has warned:

Subject specialization must not be confused with professional fragmentation, and it must not be promoted at the expense of the proper perspective relating the specialization to the central unity that is librarianship. Such a perspective is to be achieved only through constant emphasis upon those elements or characteristics of librarianship that are common to all bibliographic activity and all problems of recording, disseminating, and retrieving graphic records in whatever subject fields.

Formal instruction in the literature of specific subject fields from a different point of view than that of librarianship is provided by many colleges and universities for undergraduate students. This provision is made particularly in chemistry because of the number and complexity of its reference publications. There is also increasing recognition of this need for students in engineering. Though the courses earn only one credit, the serious student can often gain enough insight into the source materials to enable him to qualify for employment in such positions as literature searching and abstracting, though not in library administration. Through experience and/or courses in library science, literature specialists have frequently been promoted to administrative positions, particularly in the areas of science and technology.

In spite of all efforts toward recruiting and training, there remains an acute shortage of librarians who have talent and competence in the fields of science, a fact pointed out by Wormann when he said, "It is a general phenomenon all over the world that comprehensive libraries do not have sufficient specialists for natural science and technology." (20). With the increasing emphasis on research and development, resulting in higher expenditures, the demand for librarians is likely to increase in order to insure greater productivity among research staff members. Furthermore, the demand for specialists will grow also because of the great number of academic and public libraries where reorganization along subject lines is taking place.
Assistant Librarian

Duties

The assistant librarian is responsible for those functions of the library that are delegated to him by the librarian. Additionally, it is his duty to be in charge of the whole operation in the absence of the librarian.

Qualifications and Training

Qualifications will be determined by the particular requirements of the situation. In general, they should not fall far short of those stated for the head position—an academic degree with a major in the appropriate science is a primary requirement, to which library-school training should be added for the best preparation. One or the other may be lacking and acquired partly by guided working experience or taking courses after employment. In developing a staff it is possible, and certainly desirable to choose individuals whose qualifications complement one another rather than duplicate too closely. If the librarian is a subject specialist, for example, it may be well to choose an assistant whose aptitudes are in the direction of developing well-organized readers' services.

Library Assistants

Library assistants will usually be on the professional level though on a small staff they may be clerical. They will likely be assigned specific duties such as are discussed under the heading "Reference Librarian." A clerical assistant may be assigned the task of routing periodicals and be known as a Periodicals Assistant. The more common professional positions are outlined briefly in the following sections.

Reference Librarian

Duties. Where activity is on a large enough scale a reference librarian is needed to devote full time to answering reference questions. He will have to do some searching of the literature in the course of supplying information, and may combine the function of a literature searcher.
Qualifications and Training. The reference librarian must be familiar with the reference publications in the pertinent fields. To achieve this, at least a bachelor’s degree with major courses in the sciences is almost mandatory. Some knowledge of other languages is helpful. Certain library schools offer courses in the scientific literature, and from time to time special concentrated programs of instruction for persons already employed in libraries are available. Columbia University has had such a course in the summer term. Rutgers has a work-study program.

Order or Acquisitions Librarian

Duties. An acquisitions librarian is in charge of placing orders for all publications, including books, periodicals, pamphlets, patents, or any unusual items. Equipment and supplies may or may not come under his jurisdiction.

Qualifications and Training. To discharge his duties effectively, the acquisitions librarian must know how to locate dealers and agencies that will supply needed publications quickly and accurately. If he has not had prior experience he should know where and how to consult the proper guides to such practice. He should have an academic degree toward which he has studied some scientific subjects. A library science degree will have required some training in order procedures.

Literature Searcher or Abstracter

Duties

A literature searcher investigates the published literature in a systematic manner to locate specific facts or to compile bibliographies on assigned subjects. He may also abstract his references if required. In some instances one person may do abstracting only, possibly of articles in current issues of periodicals. The searcher may work primarily with either the book and periodical literature, current and noncurrent, or with patents, sometimes with both. Searching assignments which involve reviews of the literature of a particular subject require competence in the use of reference sources. If the literature of the field is coded for retrieval by machine methods, the searcher must know how to work with the code.

The person performing literature searches must be capable
of organizing the results in good bibliographic form. He may be required to write reports summarizing and evaluating information.

Qualifications and Training

The first requirements for a literature searcher are knowledge of the subjects involved and of the literature in which they are recorded. A bachelor's degree as a minimum will usually be required, with the major courses in science. Graduate study will, of course, increase potential capabilities. Reading knowledge of foreign languages is a likely requirement. Strieby (21) has outlined these essential background needs for chemists to qualify for nonlaboratory research positions in technical fields, a patent library, or a technical library.

This work with the literature demands a unique ability to visualize search problems, patience with detail, and to be most effective, intellectual aggressiveness. The only way to acquire proficiency in literature searching is by experience. Its ways are devious, and much can be learned from guided in-service training. The ability to write in a clear, direct style is imperative.

Translator

Duties

A staff translator is required to translate from foreign languages into acceptable idiomatic English. Journal articles, patents, correspondence, theses, or even books may be assigned for translation.

Qualifications and Training

Knowledge of foreign languages as well as superior command of English is essential. It is necessary that a translator be familiar with the terminology of the sciences with which he works, and be cognizant of the importance of determining precisely-equivalent terms. He should develop some sense of the reliability of sources and authors in the publications of the countries whose languages he handles. An academic degree with emphasis in the course of study in science or engineering subjects is an evident requisite. A translator may start work with only one or two languages and, by virtue of his interest, learn others.
Cataloger and Indexer

Duties

A cataloger is responsible for the complete process of preparing books for placement on the shelves and for making the card catalog an effective guide to the information they contain. This requires, in a scientific-technical library the adaptation of standard cataloging procedures and classification schedules to the requirements of the specific situation. A system for preparing catalog cards and filing them must be established.

The indexing of periodical articles, patents, and pamphlet material may be done by the cataloger or by assistants in situations where a large number of items must be handled. It is advisable to have all indexing done under the direction of or in consultation with the cataloger for the sake of achieving and adhering to a uniform point of view. As machine or other nonconventional types of indexing for information retrieval find increasing application, the coding for this purpose will become a part of this area of operation.

Filing of special materials such as complicated loose-leaf services should also be assigned.

Qualifications and Training

Knowledge of cataloging procedures and their underlying philosophy is essential for a cataloger. There should be an appreciation for and some knowledge of the subjects involved, and awareness of the continuous developments in the realm of science. A bachelor’s degree, toward which some undergraduate courses in science have been included, and a master’s degree in library science are both essential. There must be specific personal aptitude for the work, particularly patience with details and high regard for accuracy.

An indexer should have the same mental qualities as a cataloger, and his education should include the bachelor’s degree as a minimum. Library-science training is not so necessary, though it may be highly advantageous to attend special brief courses such as those given at Western Reserve University’s Center for Documentation and Communication Research, Columbia University, Drexel Institute of Technology, and from time to time at other institutions. When special indexing methods are installed, those who sell or rent the equipment aid in training personnel to use it.
Typist-Clerk

Duties

The duties of a typist-clerk will depend largely upon the number of other staff members. On a small staff the duties will be more varied, and may include such tasks as card filing, which is done by library assistants in larger libraries. All necessary typing, taking of dictation, and preparation of periodicals for binding may be done by this staff member. The many miscellaneous jobs to be done in all libraries, such as shelving books, sorting mail, checking in periodicals, and the like may also be assigned to this person.

Qualifications and Training

A high school education with special training in typing and other general office procedures should be adequate for the work required. Intelligence of a higher than ordinary level is necessary for satisfactory performance because of the complicated details of the subject matter handled.

Secretary

Duties

A secretary works closely with the librarian, transcribing letters, filing correspondence, and keeping a record of the many details that accompany a busy executive position. Where the scope of activity is not large, the secretary may also perform some of the duties of a typist-clerk or library assistant.

Qualifications and Training

Ordinarily, high school education plus a business-school course is sufficient for this position. The ideal type of person is one who possesses a strong willingness to be helpful, and who will be alert to aid the librarian in all possible ways.

It may be desirable to employ a college graduate in this position if special responsibilities are to be delegated.

PROCUREMENT OF STAFF MEMBERS

Professional personnel may be sought in several ways. Advertisements of openings can be inserted in certain library peri-
Cataloger and Indexer

Duties

A cataloger is responsible for the complete process of preparing books for placement on the shelves and for making the card catalog an effective guide to the information they contain. This requires, in a scientific-technical library the adaptation of standard cataloging procedures and classification schedules to the requirements of the specific situation. A system for preparing catalog cards and filing them must be established.

The indexing of periodical articles, patents, and pamphlet material may be done by the cataloger or by assistants in situations where a large number of items must be handled. It is advisable to have all indexing done under the direction of or in consultation with the cataloger for the sake of achieving and adhering to a uniform point of view. As machine or other nonconventional types of indexing for information retrieval find increasing application, the coding for this purpose will become a part of this area of operation.

Filing of special materials such as complicated loose-leaf services should also be assigned.

Qualifications and Training

Knowledge of cataloging procedures and their underlying philosophy is essential for a cataloger. There should be an appreciation for and some knowledge of the subjects involved, and awareness of the continuous developments in the realm of science. A bachelor's degree, toward which some undergraduate courses in science have been included, and a master's degree in library science are both essential. There must be specific personal aptitude for the work, particularly patience with details and high regard for accuracy.

An indexer should have the same mental qualities as a cataloger, and his education should include the bachelor's degree as a minimum. Library-science training is not so necessary, though it may be highly advantageous to attend special brief courses such as those given at Western Reserve University's Center for Documentation and Communication Research, Columbia University, Drexel Institute of Technology, and from time to time at other institutions. When special indexing methods are installed, those who sell or rent the equipment aid in training personnel to use it.
Typist-Clerk

Duties

The duties of a typist-clerk will depend largely upon the number of other staff members. On a small staff the duties will be more varied, and may include such tasks as card filing, which is done by library assistants in larger libraries. All necessary typing, taking of dictation, and preparation of periodicals for binding may be done by this staff member. The many miscellaneous jobs to be done in all libraries, such as shelving books, sorting mail, checking in periodicals, and the like may also be assigned to this person.

Qualifications and Training

A high school education with special training in typing and other general office procedures should be adequate for the work required. Intelligence of a higher than ordinary level is necessary for satisfactory performance because of the complicated details of the subject matter handled.

Secretary

Duties

A secretary works closely with the librarian, transcribing letters, filing correspondence, and keeping a record of the many details that accompany a busy executive position. Where the scope of activity is not large, the secretary may also perform some of the duties of a typist-clerk or library assistant.

Qualifications and Training

Ordinarily, high school education plus a business-school course is sufficient for this position. The ideal type of person is one who possesses a strong willingness to be helpful, and who will be alert to aid the librarian in all possible ways.

It may be desirable to employ a college graduate in this position if special responsibilities are to be delegated.

PROCUREMENT OF STAFF MEMBERS

Professional personnel may be sought in several ways. Advertisements of openings can be inserted in certain library peri-
odicals such as the Library Journal, College and Research Libraries, and Special Libraries. Persons wanting positions advertise in these publications also. A special publication, Library Placement Exchange, P. O. Box 172, Benjamin Franklin Station, Washington 4, D. C., is devoted entirely to listing positions open and wanted in libraries, including special fields. At this address too is the National Librarians' Register, a listing with personal records of individuals wanting positions.

Another approach is through library schools. They keep record of their graduates seeking employment, and they can supply full information concerning them. It is good policy to keep in touch with certain schools if new staff members are needed from time to time. If the library is in such a location that advantage can be taken of the work-study program in effect in some of the schools, and can employ a student part time until he graduates, this is a possible means of enlisting specially trained staff members.

A third channel for professional staff members is the employment services operated by scientific and professional societies. The American Chemical Society, for example, keeps a roster of members wanting positions and arrangements can be made for personal interviews at semiannual meetings. Special Libraries Association operates an employment service from its New York City headquarters office, and local chapters have employment committees through which positions can be filled.

Large organizations have personnel departments that are experienced in locating qualified persons to fill all kinds of positions. They can be helpful in placing advertisements and in screening potential candidates. If they send representatives to interview graduates at colleges and universities, these interviewers can watch for possible staff members for the library.

For clerical positions, local high schools and business schools may be approached. Advertising in newspapers is an obvious means for inviting applications. If the organization of which the library is a part is large enough, there may be a pool from which to draw assistants who have had some experience.

CONCLUSION

Whatever the size and composition of the staff, its members must be able to work together harmoniously as a steadfast influence toward attaining the objectives of the enterprise which
the library serves. It is a challenge to the astute librarian to create the esprit de corps in his co-workers that makes every member an active, willing contributor to the effective operation of the library. The importance of rapport among staff members in interpreting service is stressed further in Chapter 12.

BIBLIOGRAPHY


SUPPLEMENTARY REFERENCES


Woodruff, E. Work measurement applied to libraries. Spec. Lib. 48, 139-144 (1957).
Budget

Costs of Operating the Library Service

GENERAL CONSIDERATIONS

When the establishment of a library service is contemplated, it is essential that the financial requirements be studied. After the type of service is determined it is possible to anticipate the cost with fair accuracy, and this should be estimated as a part of the preliminary planning process. In fact, costs may decide, to some extent, the kind of service that will be undertaken at the outset.

It is recommended that a definite budget be developed within which the service should operate. From a survey (1) made in 1946 of a group of special libraries in science-technology fields it was found that a majority of them did have specifically allocated budgets. Proof of the continuance of this good practice was reported in surveys a decade later by Gibson (2) and Sharp (3). Gibson investigated a group of libraries in engineering fields; Sharp, a smaller number of such services in electronics companies. The report on the Administration of Technical Information Groups prepared by Knox (4) from a study of 85 library services in chemical companies included budget figures for more than half of the group. From such published figures for various types and sizes of organizations it is possible to judge the approximate price of a contemplated service.

In some instances the library is operated as a distinctly separate department of an organization. In others, it is a subgroup of a larger unit and in the latter case a detailed budget may not be assigned for information service operations; perhaps the
total cost only may be ascertainable. Though this practice may be satisfactory for those who follow it, it is not recommended. It is desirable from several standpoints to be able to point to a breakdown of figures to show just how much is being spent for salaries, for books and periodicals, and for any of the services administered by the library. An occasion could arise that would make it necessary to produce facts and figures to justify the library from an economic standpoint.

In considering the costs of the library service generally, and in view of the fact that a majority of scientific and technical libraries are in industrial research organizations, usually as part of the research and development activity, the amounts of money spent for library and related functions are closely linked to total research budgets. A survey of research expenditures by the National Association of Manufacturers in 1948 (5), made to determine the relationship between total sales and funds spent for research, showed that though variations were wide on the average about 2% of an industrial organization’s sales income was allotted to research. By 1955 this figure had risen to 2.8% (6). The percentage of the research budgets allotted to information services was known to range in 1958 from as low as 1.5% to as high as 10%; these figures were presented in the survey reported by Knox (4).

Costs may be viewed from the standpoint of annual expense for each professional/technical employee. Mees and Leermakers (7) stated in 1950 that this was about $200, a figure derived from industrial research experience on a large scale. According to Knox’s report, this figure had risen to at least $500 a year by 1958, at least in the 46 chemical company services that provided figures. A table from this report, reproduced here by permission, shows information-group budgets as related to research and information staff sizes.

The surveys cited previously by Gibson (2) and Sharp (3) showed that for the libraries reporting figures for these groups of engineering and electronics libraries, $53.00 and $19.40, respectively, were being spent annually for each engineer or scientist on the research staff. These figures excluded salaries, which is why they are so much lower than the other costs reported. The wide range may be indicative of broad differences in methods of calculating for various organizations as well as in those functions included as part of the information service.

The total budget required for an adequate library service may well be determined by the point of view of the management
of the enterprise it serves as well as by the nature of its activities. Monetary resources will also have some bearing, especially in a business that is not yet firmly established, though it is at this stage that there is greatest need for good information support. In fields where extensive development work is in progress even the most successful organizations recognize that where competition is strong, published information cannot be ignored and a budget for information services may reach as much as one million dollars a year.

There are certain economies that can be exercised to keep expenses to a minimum though they are not recommended as the best practices. One means for saving money is to order books through an agency that will catalog them and supply catalog cards

<table>
<thead>
<tr>
<th>No. of companies</th>
<th>Annual budget $</th>
<th>Professional staff</th>
<th>Research Av.</th>
<th>Range</th>
<th>Information Av.</th>
<th>Range</th>
<th>Res./info. Research staff Av.</th>
<th>$ per member Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>20,000-50,000</td>
<td>Under 2</td>
<td>0-2</td>
<td>29</td>
<td>260</td>
<td>260</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>50,000-100,000</td>
<td>140</td>
<td>16-500</td>
<td>3</td>
<td>1-7</td>
<td>47</td>
<td>400</td>
<td>90-635</td>
</tr>
<tr>
<td>14</td>
<td>100,000-150,000</td>
<td>223</td>
<td>16-1000</td>
<td>4</td>
<td>1-10</td>
<td>55</td>
<td>530</td>
<td>100-1365</td>
</tr>
<tr>
<td>3</td>
<td>150,000-200,000</td>
<td>383</td>
<td>100-1000</td>
<td>6</td>
<td>1-10</td>
<td>64</td>
<td>500</td>
<td>165-835</td>
</tr>
<tr>
<td>3</td>
<td>200,000-300,000</td>
<td>267</td>
<td>100-500</td>
<td>11</td>
<td>3-20</td>
<td>24</td>
<td>770</td>
<td>440-1165</td>
</tr>
<tr>
<td>4</td>
<td>About 1,000,000</td>
<td>1583</td>
<td>400-4000</td>
<td>20</td>
<td>11-40</td>
<td>79</td>
<td>630</td>
<td>250-2500</td>
</tr>
</tbody>
</table>

46—TOTAL
that need only to be filed. Obviously, this kind of cataloging must of necessity be very general and could not be satisfactory for a library requiring detailed analyses of its books. In Chapter V of this book a dealer rendering this service is cited.

Another possible economy which may serve for a time, but which should not be prolonged, is to put a good clerical worker in charge of the beginning library until a qualified person can be employed. Such a person cannot be expected to do more then keep publications in order, and maintain accurate records of receipt and holdings of periodicals. If these measures provide the only possible means of bringing some of the needed literature sources within reach, they should be adopted as temporary expedients.

One item of expense that has not been included in the conventional budget outlined in this chapter but which is likely to become increasingly necessary is the application of automated methods to library procedures. This will add a minimum of $3000 a year to information service costs and can range as high as $1,000,000 for a major installation. Though such figures appear to be high in contrast with expenses for less sophisticated procedures, there is evidence that the adoption of machine methods will eventually prove to be economically sound. Farsighted planning should allow for this possibility.

BUDGET ITEMS

The projected budget will consist of two parts, the first an initial sum to start the service, a portion of which will be included in the second part which is the annual appropriation for operating expenses. Initial expenditures will vary widely, depending upon needs and the scope of the service envisioned. If every bit of equipment, from a desk to book stacks, and from a handbook to a file of the chief abstracting publication, must be purchased before the first question can be answered, this sum will obviously have to be larger than it would if a few books and periodicals are already at hand. Salaries will constitute a rather constant item in the budget, though allowance must be made for regular salary increases as well as for occasional additions to the staff.

Figures are suggested in the following sections of this chapter for the principal items in the budgets for scientific and technical libraries. They are to be regarded as tentative and subject to many modifications. However, they do carry significance since they are based on known costs in existing libraries. Salaries are considered first, followed by an outline of a budget
including all other important items for a small information service operated by a staff of two to three members, and one for a large unit in which the staff may number as many as 30.

Salaries

The compensation for the head of the library service will be the first point to be settled. It will be influenced by several factors. If extensive experience is required in addition to subject knowledge, the salary must be higher than it need be for a person with lesser qualifications. For example, in a library located in a metropolitan area where major public or semi-private collections are accessible, it is advisable to pay adequately for an experienced individual who can take full advantage of these resources. In an isolated situation, it may be the better expedient to spend a larger proportion of the budget funds for the acquisition of an extensive collection of books and periodicals. However, recognition of the importance and potential contribution of the person in charge of the library to the effectiveness of the information program will indicate compensation on a par with the administrators of other departments for which the education and other requirements are comparable.

After the salary range for the head of the service is determined, the amounts to be paid to other staff members will be decided. Duties involved and stipulated requirements will be influencing factors as will salaries paid in other departments for comparable positions. Many organizations have salary schedules with ranges in each category for both professional and clerical positions. In Table 2 salaries are indicated for staff members in a small and in a large library. The figures are admittedly tentative because many factors must be taken into consideration. Salaries may be influenced by geographical location, by type of industry, or other kind of situation such as research institute, academic institution, public library, government agency, each of which has its own compensating peculiarities.

It is common practice to determine salaries for various positions on a staff by means of job evaluation procedures. The detailed duties required in each staff position are listed and evaluated, possibly using some of the standard forms developed for this purpose, particularly for clerical positions. A similar approach can also be used in developing fair compensations for professional staff members. The individual merit ratings that are part of such a system permit some flexibility and subsequent recognition of superior abilities.
Table 2
Staff Salaries

<table>
<thead>
<tr>
<th>Position</th>
<th>Small library staff, 2-3</th>
<th>Large library staff, 5-30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Librarian (or Administrative Head)</td>
<td>$6000-9500</td>
<td>$9000-15,000</td>
</tr>
<tr>
<td>Assistant Librarian (professional)</td>
<td>4500-7000</td>
<td>6000-9000</td>
</tr>
<tr>
<td>Library Assistant (sub-professional)</td>
<td>3700-4000</td>
<td>3600-5000</td>
</tr>
<tr>
<td>Literature Searcher or Abstracter</td>
<td>—</td>
<td>5000-7000</td>
</tr>
<tr>
<td>Cataloger</td>
<td>—</td>
<td>5500-8000</td>
</tr>
<tr>
<td>Translator</td>
<td>—</td>
<td>5500-8000</td>
</tr>
<tr>
<td>Editor or Writer</td>
<td>—</td>
<td>6000-8000</td>
</tr>
<tr>
<td>Secretary</td>
<td>2600-4000</td>
<td>3000-4500</td>
</tr>
<tr>
<td>Typist-clerk</td>
<td>2400-3000</td>
<td>3000-4500</td>
</tr>
</tbody>
</table>

There are more or less obvious difficulties involved in setting down specific figures because the unique aspects of every situation make it a case in itself. However, enough factual information exists to make meaningful the salaries cited here. They were obtained from the results of a questionnaire distributed at the Special Libraries Association Board and Council meeting in February 1961. Though this group is small in size, its members comprise a select representation of the most active segment of the Association. Additionally, salaries cited in positions advertised as open in 1961 were noted. There have been significant increases in the past decade.

Budget Items Other Than Salaries

Actual budget figures vary appreciably among scientific and technical libraries, but figures can be cited for standard items to provide tentative costs. Minimum expenditures for a small library operation covering a restricted subject area are given in Table 3. The service has been in existence for a few years, possibly five, and there are between five and ten thousand vol-
umes in the collection. Subscriptions to about 200 periodicals are carried. Overhead expenses are not included. This budget is suggested as a base from which to start thinking about a real situation. Each item is discussed subsequently.

Table 3

<table>
<thead>
<tr>
<th>Items</th>
<th>Initial sum</th>
<th>Annual sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment, including furniture</td>
<td>$3000-8000</td>
<td>$500-1000</td>
</tr>
<tr>
<td>Books</td>
<td>2000-6000</td>
<td>5000-1000</td>
</tr>
<tr>
<td>Periodical back files, including film, microprint copies</td>
<td>3000-5000</td>
<td>2000-5000</td>
</tr>
<tr>
<td>Subscriptions, periodicals and reference services</td>
<td>2000-5000</td>
<td>2000-5000</td>
</tr>
<tr>
<td>Telephone and telegraph</td>
<td>300-5000</td>
<td>200-400</td>
</tr>
<tr>
<td>Photostats and microfilm</td>
<td>100-300</td>
<td>100-200</td>
</tr>
<tr>
<td>Supplies</td>
<td>200-300</td>
<td>150</td>
</tr>
<tr>
<td>Insurance</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Travel</td>
<td>300</td>
<td>200</td>
</tr>
</tbody>
</table>

**Equipment, Including Furniture**

The furniture and equipment necessary or desirable are listed and discussed in Chapter IV. Three thousand dollars would provide only a modest beginning toward the purchase of all of the furnishings needed to equip a library with properly designed furniture, but a start could be made. Some service can be initiated with little more than a desk and a few shelves, but this is a foolish economy and it is wise to provide adequate equipment as soon as possible. Though furniture made specifically for library purposes is likely to appear to be expensive, the excellence of its design and lifetime durability warrant its purchase.
Books

When the library is started, an initial sum should be allotted for immediate purchase of the books that are known to be standard works in the fields represented. The basic reference works, handbooks, treatises, scientific dictionaries, encyclopedic works, and monographs written by the recognized authorities are the kinds of publications to be acquired first. The initial amount suggested, $2000, would not purchase many titles with prices of many scientific books as high as $20.00, but it may be wise to buy slowly, exercising cautious judgment in selecting titles so that maximum value is realized from the money spent. The situation may, however, be viewed in the light of prices of laboratory equipment, some of which costs several thousands of dollars for one instrument. A twenty-dollar book can provide the same bit of information that might be determined in the laboratory at much greater expense.

Book prices have increased in recent years at a rate comparable to other commodities. Kurth (8) made a study of book costs as they rose in the 1950's and found that, based on an index number of 100 and comparing the average increase of prices for 1947-1949 with those of 1958, the index number advanced to 160.8, the average price from $5.52 to $9.16 for science books. For technical books the increase of the index number was to 114.4, the average price from $4.86 to $8.09.

Periodicals—Back Files

Periodicals constitute what may be the most important area of the library's resources, and immediate efforts should be made to acquire back files of those titles that will unquestionably be needed. A few thousand dollars can be spent very quickly, if, for example, a file of Chemical Abstracts that may cost at least $4000 is a necessary purchase. Back files are not always available when wanted so that it may take a couple of years before certain ones can be located. Money should be set aside for this purpose in a fund to be drawn upon for these opportunities as they arise. It is good policy to determine which titles can be used satisfactorily as microfilm or microprint copies. In some instances there may be no choice since the early volumes of some journals are not available as regular print copies. However, there is a program in effect to reprint titles for which there is demand. A few thousand dollars spent annually for carefully
selected files of journals can result in a good collection in a few years.

Periodical Subscriptions

A significant proportion of the annual budget should be spent for periodical subscriptions. They are of such vital importance that, should the necessity arise for a cut in the budget, the item for books should be sacrificed in their favor. Subscription prices for scientific periodicals are high, averaging from $20.00 to $40.00 a year, with some titles costing much more than this. The price for one subscription to Chemical Abstracts, which is now called a service, is, since 1963, $1000 a year except to academic and member subscribers to whom it is $500. Similar services, such as Engineering Index, may be included in this part of the budget. Serials such as annual reviews may be included with either the book or periodical part of the budget. If the subscription list is chosen wisely, it will not vary significantly from year to year unless it must reflect major changes in organizational interests.

Binding

The amount of money needed for binding will depend upon how many back files of periodicals are bought at one time. Some may already be bound when purchased. If they are not, binding should be done as promptly as possible both for ease of use and to safeguard against the chance of losing individual issues. Not all journals received on subscription should be bound, though it is likely that a majority of them will merit this treatment. The cost of binding a 12-inch-high volume in plain buckram in 1962 was about $4.00.

Telephone and Telegraph

The amount needed for telephone and telegraph service will be determined in part by the location of the library, with respect both to distances from sources of materials and other branches of the organization. If the over-all organization is in widely scattered locations it may have an interconnecting teletype system that can be used by the library.
Photocopy and Microfilm

Policy, the nature of the activities conducted, and the size of the collection of materials available in the library will determine how much money will be required for the purchase of copies of needed references. If a decision is made not to acquire extensive files of periodicals but rather to order photocopies of items as they are requested, then this budget figure may amount to more than the $100 to $200 suggested. Photocopy service is not inexpensive. Microfilm is less costly than full-size copies, and if a microfilm reader-printer is available it will be feasible to buy copies on microfilm and enlarge only those pages that are necessary in full size. Copyright question need also be considered.

Provision should be made for the photoduplication of materials in the library for persons wanting personal copies. It is permissible to copy as single duplicates most published materials for individual use. A few publications expressly forbid this, and their requests should be honored. Once the copying device is either purchased or rented, the cost of copying will be relatively minor unless unusually large demands have to be met.

Supplies

The particular functions administered by the library will determine whether the amount required for supplies is significant or not. All stationery, cards, printed forms, mending, and temporary binding materials as well as miscellaneous office supplies are included in it. If one or more major library bulletins are issued, the cost of mats and paper for this one purpose can amount to several hundred dollars in a year.

Insurance

Because the collection of publications constituting the library represents an investment that is continuously appreciating, it should be insured adequately against whatever hazards may threaten. It should be recognized that fire is only one of the possible damaging agents that can do harm in a library, and even fire is more of a potential danger than was once thought. Fires have ruined books beyond salvage in libraries in recent years, thus awakening awareness of the need for both adequate precaution and insurance.

Help in approaching the question of library insurance is available in several published articles on this subject. Mixer (9)
has outlined a procedure followed in evaluating a university collection for insurance purposes, and though his actual values are not realistic in view of increased costs, these can be easily updated. In another article Mixer (10) has reminded librarians that not only are books and journals valuable but the card catalog is a virtually nonreplaceable item. He has specified the different kinds of insurance that should be considered for libraries: property, fine arts, and valuable papers policies. Krettek (11) has called attention to aspects of insurance that might otherwise not be brought to mind, such as liability for personal accidents.

The type of insurance coverage for a particular library should be determined in consultation with an insurance agent. In a large organization the library will doubtless be included under a broad policy, but it will be advisable to call attention to the full value of the collection. A minimum value of three dollars a volume is as low as replacement costs dare be figured. Some special files may not be replaceable.

Travel

It is good policy to provide a definite sum in the budget to enable the head of the library service to attend meetings of professional and scientific societies. Certain other staff members also should be encouraged to be active professionally in this way because such participation enlivens personal interest in the information program. Awareness of new developments is certain to benefit the organization served.

Another reason for travel may be the necessity to visit large bibliographic centers when the resources at hand are not adequate for exhaustive literature searches. It is important also to observe other libraries covering the same subject areas, particularly for the purpose of comparing practices and to discuss new developments with fellow professional associates. These travel requirements are especially important when the library is in an off-the-beaten track location that does not permit the kind of ready communication possible in a metropolitan area.

CONCLUSION

Final decision as to what should be spent to make it possible for an organization to take full advantage of all published and otherwise available information. Those who are placed in charge
of a library service are likewise accountable for providing full
details of what is required to accomplish what is wanted. It will
almost always be much less costly to obtain information in this
way than it is to get it by the much more expensive methods of
laboratory experimentation.

BIBLIOGRAPHY

1. Strain, P. M., and Brewer, J. Questionnaire survey of Special Li-
braires Association Science-Technology Group (1946). Not pub-
lished.
2. Gibson, E. B. What may be learned from a library survey. Spec.
Lib. 48, 133-138 (1957).
160 (1957).
5. Trends in industrial research and patent practices. New York, Na-
tional Association of Manufacturers of the United States of America,
Patents and Research Committee (1948).
(1958).
7. Mees, C. E. K., and Leermakers, J. A. The organization of indus-
(1960)
9. Mixer, C. W. Insurance evaluation of a university library’s collec-
10. Mixer, C. W. Columbia insures its main card catalog. Lib. J. 82,
2304-2311 (1957).
11. Krettak, G. What you should know about library insurance. Lib. J.
82, 2302-2303 (1957).

SUPPLEMENTARY REFERENCES

Baker, M. O. Metallurgical library pays its own way. The Iron Age 178,
96-98 (1956).
Kent, A., and Perry J. W. Documentation and information retrieval; an
introduction to basic principles and cost analysis. Western Reserve
University Press (1957).
Lefebvre, L. The special library; what it is and what it can do for busi-
Special Libraries Association Personnel Survey 1959. Spec. Lib. 51,
133-157 (1960).
Physical Layout and Equipment

SURVEY OF SPACE REQUIREMENTS

Before any active planning of space for the library is begun, it is advisable to study the aims of the contemplated service. The decisions reached, even though they may in some measure be tentative, will provide a starting point for discussion of how to lay out a space that is already assigned or to specify what is required if the library is yet to be built. The fundamental requirements can be anticipated with fair accuracy and should reflect the basic plan for service. The broad requisites are (1) area for housing the collection of all types of publications; (2) area for clientele to make use of materials; and (3) areas for administration and operations by staff members. In all areas there must be allowance for growth. In too many libraries this has not been considered and the consequence has been that moving or shifting has had to be done when it might have been avoided or at least delayed.

The space allotted for a library of the special type herein considered may be situated in various ways, though it is usually on one floor. It may be square, rectangular, or L-shaped. It may include more than one room, and if so, they should certainly be adjacent and interconnecting. Whatever the space, it should be centrally located within the unit where the greatest number of persons are to be served.

There is an inevitable handicap in the planning of a library service where none has existed because no one in the organization can visualize its potential growth. It is not always possible to anticipate the directions in which research or other relevant activities may develop. Therefore, the head of the library service
must exercise judgment as best he can in planning for the efficient use of the space allowed for this purpose. Ideally, the librarian would be present when a building was being planned and would be invited to aid the architect in providing adequately for the library. This does occasionally happen.

A first step in any planning is to take advantage of the experience of others who have faced the same problem. There is much valuable information in a number of publications concerned with the planning of libraries, and even those dealing with public and university libraries can be helpful to the special situation. For example, Lyle’s The Administration of the College Library, 3rd ed., H. W. Wilson Co. (1961) and The American Public Library Building: Its Planning and Design with Special Reference to Its Administration by Wheeler and Githens, Scribner, New York (1941), are excellent sources for ideas. Most relevant of all, however, is the booklet Special Libraries: How to Plan and Equip Them, edited by Lewis and published by Special Libraries Association as its Monograph No. 2 in 1963. It contains many photographs and illustrations including excellent floor plans. The series of articles on planning new libraries published in the journal Special Libraries in the 1950s and 1960s is also recommended.

SPACE ALLOCATIONS

In the opening paragraphs of this chapter the main areas of operational activity are indicated as being necessary for a library. These are discussed in the following sections.

Area for Housing the Collection

The over-all planning for the service will have provided some figures to show the number of volumes that will be acquired within a period of five to ten years. Book stacks will be a first necessity, and the method of determining how many will be required is to calculate the number of shelves needed to hold the book and periodical volumes comprising the collection immediately and for the period being planned. An average of seven scientific books or four bound periodical volumes occupy one foot of shelf space. Another method of calculating is based on the “cubook,” a standardized unit representing an average size volume; allowance should be made for 100 cubooks to a standard single-faced section
of shelving measuring 36" in length, 7'6" in height, 9" in depth. Metcalf (2), an experienced authority on library planning, has advised that a maximum of 125 volumes can be accommodated on one standard single-faced section, and that this cannot be recommended because it allows for no growth. He has reviewed the several types of compact storage shelving in the same article, pointing to all factors that should be considered if their use is contemplated.

Book stacks will stand as single-faced sections against wall space or in double-faced sections free-standing in open areas. There should be a minimum of three feet of space between all book stacks. Each section of standard shelving will hold an average of seven shelves. In addition to this standard height shelving some units of counter height will be convenient. Besides being useful for reference publications, they serve also to divide areas.

Some kind of shelving will be required to hold current periodicals. The most economical practice from the standpoint of both space and costs, is to use book shelving of a type in which the shelves can be hung with only enough space between them to hold a few unbound periodicals lying flat. Either bracket or slotted-type shelving can be used. A special kind of shelving for current periodicals consists of a sloping shelf for display of the most recent issues. When this shelf is raised, it reveals a storage space for earlier issues to be accumulated until they are bound or other disposition made of them.

Randall’s report (1) on the planning of library space included an interesting example of two ways of placing shelving in an area 61' by 54'. One arrangement allowed only 200 shelf sections, whereas a tighter but still acceptable rearrangement increased the capacity to 323 shelf sections. The descriptions in this article of the several types of standard library shelving should be helpful to anyone with a library space-planning problem.

Some vertical files will be required, if only to hold correspondence and technical files. Pamphlets can be kept in them, but they are not as convenient for large numbers as the divider-type shelving which is similar to bookshelving except for the shelves which have closely spaced slots to hold vertical dividers designed to support unbound materials. The vertical filing cabinets that will be needed may stand against walls, back-to-back, or facing an aisle. They may also serve a secondary purpose as partitioning units.
Area for Clientele To Use Materials

The second important area is that required for readers, and it can be difficult to predict how large this should be with any degree of certainty. Influencing factors are (1) the total number of persons who might use the library facilities, and (2) their own laboratory-office locations. If they are within easy reach of the library, their habit may be either to borrow most materials to use in their offices, or, to do their work in the library, if it is situated conveniently and arranged efficiently. A general guide might be to try to plan for seating space for 10 percent of the total number of potential users.

For comfortable use there should be a minimum of three and a half feet between a wall and table, five feet between tables. Tables to accommodate individual readers may be preferred by many, though some larger ones where a number of volumes and papers can be spread should be provided also. For intensive or extended study, carrels or other specially designed cubicles for individual use where books and papers may be kept during the course of an investigation should be provided if possible. Many libraries have such facilities. Two good examples are the Firestone Research Library at Akron, Ohio, and the Bell Telephone Research Laboratories Library at Murray Hill, New Jersey.

Areas for Administration and Operations

The librarian should have an office, or have his desk placed where some degree of privacy is afforded. Administrative duties require conferences, interviews, and telephone conversations that should not be disturbing to others.

There must be a general service desk from which the library is supervised.

Each staff member should have a desk situated in his own working area. At least 40 square feet of space is required for every desk exclusive of passageways.

Provision should be made for a place to prepare books for the shelves, for getting periodicals ready to be bound, for handling mail, and for any other similar tasks that need to be done. This work room should preferably be partitioned and be equipped with a sink. Supply cabinets and coat racks for staff may be placed here.

Special equipment such as duplicating devices, microprint and microfilm readers that may be used by both library staff and clientele should be placed where they are accessible to anyone who may need to use them.
Layout Planning

After the general size of the fundamental areas of activity for the projected library service have been estimated, rough sketches of possible layouts can be made to determine how to make the best possible use of available space or to aid the architect in planning a new structure. The main areas may be indicated and placed in various combinations of positions in proper relation to each other. Joannes (3) suggested that at this stage one chart showing the salient features of the organization of the library and another showing work flow will aid in assuring the placing of various operations in the best relative positions. The service areas where circulation and reference activities are conducted should be near the library entrance and adjacent to readers’ tables. Book-stack openings must be convenient to both users of the library and to staff. The card catalog and other indexes must be accessible to everyone.

Furniture and equipment should be used for partitioning areas; interior walls should be avoided as much as possible. This allowance for flexibility is advantageous when the inevitable time comes that the space must be re-planned.

Provision must be made for special equipment, microfilm and microprint readers, copying machines, and even, in major operations, for whatever machines may be used in the information retrieval process.

All of the aforementioned activities must be kept in mind and various arrangements tried until the right one is achieved. At this stage a most helpful device is to make cut-outs to scale of the furniture and equipment, because these can be changed much more readily than drawings. The functions of the library must be understood by those who execute the specifications for the space, and this, Joannes emphasized, the head of the service must make clear to architects and anyone else involved in the general building plans. Layouts of some well-planned libraries are shown in this chapter. (Figures 6-9). Photographs of two libraries are reproduced in Figures 10 and 11.

Placing of Books and Periodicals

A very important feature of the planning of the library is the placing of the various types of publications. The most-used reference volumes should be within reach of the main desk and telephone. In fact, some of these, such as the handbooks and diction-
aries may be kept on this desk. Other reference publications should be kept in this vicinity too, unless the library is large enough to have a separate reference section with a staff member always present.

The ideal arrangement will place the main part of the book collection within easy reach of staff and readers. Much, of course, depends upon the size of the collection, though the books, as distinct from periodicals, should always be in a clearly indicated part of the library, arranged according to the classification system.

Periodicals constitute a major part of the whole collection. It is possible to intersperse books and periodicals if they are all classified, but it is not the usual practice. The preference is to provide a separate section of the library for the files of bound volumes, perhaps arranged according to the classification number but more often alphabetically by title. If the unbound issues of each title are kept in boxes beside the bound volumes, there will be only two possible locations for every issue in the library, either with the complete bound file or with the current issues that will have their own area on special shelves in a readily accessible spot in the library.

Fig. 6—Library layout of the Abbott Laboratories Library. Plan of the main floor.

Plan of mezzanine stack area.
Plan of Library main floor.

Fig. 6—Library layout of the Abbott Laboratories Library. Plan of mezzanine stack area.
Fig. 7—Hughes Aircraft Co. Ground Systems Library. Floor plan: The document room covers 1484 square feet; the reading room, 1728 square feet.

As guides to the contents of the periodicals, the indexing and abstracting publications should be grouped close to them. A desirable piece of equipment is a special table with a double shelf placed in the middle with space for consultation of volumes on either side. Another arrangement is to construct an abstract "bar" against a wall with a shelf at table height and shelves above so that volumes are within easy reach.

In some libraries the cumulative indexes to those periodicals that publish them are shelved in the vicinity of the abstracting publications. Certain bibliographies will be more likely to be noticed and used if they are placed in this literature-searching area also.
Fig. 8—Ford Motor Co. Engineering Staff Library.
Fig. 9—Mead Corporation Library. The total area is 3360 square feet. Seating capacity is 35, exclusive of the library staff.

KEY TO FLOOR PLAN
1. Current periodical area
2. Reading tables
3. Arm chairs
4. Periodical display racks
5. Air conditioning units
6. Librarian’s office
7. Library staff desk
8. Counter-high book shelves
9. Credenza
10. Documents room
11. Card catalogs
12. Filing cases
13. Correspondence tray and stand
14. Microfilm reader
15. Fireproof vault
16. Shelving for vertical filing
17. Microfilm cabinet
18. Carrel desks
19. Encyclopedia table
20. Bulletin board and periodical list
21. Book truck
22. Charging desk
23. Dictionary stand
24. Dord Hunter display case
25. Assistant Librarian’s office
26. Workroom
27. Cupboards for supplies—sink
28. Book stacks
29. Kordex cabinet and table
30. Counter-high shelving for vertical filing
31. Book and bound periodicals stack area
32. Abstract bar

All factors must be considered judiciously in developing the plan for placement of these natural divisions of the collection. Their effective use will depend in large measure upon the convenience of the final arrangement.

FILING OF PAMPHLETS AND OTHER MATERIALS

A small pamphlet file can be contained in ordinary filing cabinets. However, for extensive collections, such cabinets are
neither economical nor convenient, and special shelving, the divider type with extra supports spaced at intervals, is recommended. Pamphlet boxes of various types may also serve to hold some types of materials. Unusual materials, pictures, slides, maps, and the like will require their own special filing equipment.

LIGHTING

In developing the plan of arrangement of areas of activity, the over-all lighting should be kept in mind. Windows will dictate the manner of placing equipment and furniture to take advantage of natural light, but too much sunlight should be avoided where it might cause discomfort at some hours of the day. Book stacks may be relegated to areas that must be lighted artificially at all times. The general type of artificial lighting will no doubt be predetermined by the decisions made for the lighting in the building where the library is located. However, there may be opportunity for having it placed so that it is most effective with respect to the position of certain kinds of equipment and furniture. Shadows on the bottom shelves of bookstacks can be very troublesome.
Opinion is still somewhat divided as to the best type of artificial light. Fluorescent illumination has found increasing favor, particularly as the color has been modified to make it more like natural sunlight. There are some individuals who are sensitive to it, though they are a small minority. In a study made of this problem by Holway and Jameson (4) at the Graduate School of Business of Harvard University, the authors suggested that the fluorescent tubes might be shielded to deflect the ultraviolet rays, these being the only tangible reason for creating annoyance to some persons. Indirect incandescent light can be used in ceiling lights if preferred. Additional table lamps may be appreciated by readers of fine print. Because lighting is so important for the use of library materials, thorough study of requirements and methods for meeting them is imperative. Kraehenbuehl (5) has made specific suggestions as to the quality and quantity of lighting needed for various library activities, and the Committee on Library Lighting of the Illuminating Engineering Society has published its recommendations (6).

FLOORING

The question of flooring for the library is a more important feature than first might be recognized. If there is the possibility
of choice, consideration should be given to the use of carpeting for those areas where there is much traffic. Not only is the consequent quiet desirable, but it is noticeably less tiring to walk on a shock-absorbing surface for staff members who must do much moving about in the course of their work. The care of carpet may actually be less difficult than is the keeping in proper condition of other types of floor covering. However, linoleum, rubber tile, vinyl tile, and similar materials can be entirely satisfactory. They can also add to the colorful attractiveness of the room if full use is made of their potentialities.

AIR CONDITIONING

It is now generally recognized that the atmosphere in which books are housed should be controlled. For the sake of their physical preservation as well as the comfort of using them in a salutary atmosphere, it is wise to look into the matter of incorporating an air-conditioning provision that will control the temperature and the humidity at all times of the year. Gates (7) has recommended that books be kept in a place where the temperature is held between 65-75 degrees F, and the humidity between 30-50%. Also, it is highly desirable to have dirt removed from the air before it sifts onto books, for which it has a natural attraction. Precleaning of the air takes the place of the eventual necessity for removing the deposit from the books. There is certainly excellent reason for installing air-conditioning devises in libraries in any climate.

FURNITURE AND EQUIPMENT

Suggestions are made here for various types and brands of furniture and equipment with recognition that the list is not complete, nor does mention of particular brands necessarily imply recommendation. The individual purchaser should make full investigation of all items before making purchases. For a compilation of all kinds of things used in library operation the annual issue of the Library Journal devoted to this purpose is recommended. A very helpful service has been established by the American Library Association in its Library Technology Project that is undertaking to study all procedures and operations performed in libraries. This includes the testing of materials and
equipment about which reports are published as results are ready. Additionally, questions will be answered concerning particular problems, for example, the kind of book truck that can be moved easily over carpeted floors. The address is 50 East Huron St., Chicago 11, Illinois.

When planning to equip a library service it is advisable to locate the nearest dealer who supplies such equipment either by writing to the headquarters office of the major manufacturers, some of whom are cited in this chapter, or by consulting the local telephone directory. The Thomas' Register of Manufacturers is the most inclusive source for locating the makers of all kinds of manufactured articles.

The broad categories of furniture and equipment required for efficient operation of a library service are outlined and discussed briefly.

Furniture

The essential items of furniture for a library service are:

1. Tables and Chairs, for readers

   The number and size of the tables will be determined by the space allotted for readers as well as by individual preference. A combination of small tables seating one person and larger ones accommodating four or more, in various locations, is recommended.

2. Desks and Chairs, for staff members

   Every staff member with special tasks to perform should have his own desk and chair of a type to suit his duties. Some desks should accommodate typewriters; others will not need to do so.

3. Central Control Desk

   A desk must be placed in a central location from which the person in charge of immediate service charges books, gives help with reference questions, and answers the telephone. If the volume of such business is not large, an ordinary office desk will serve. If this is not adequate, units of special type designed for handling book circulation should be investigated.
4. Special Furniture

a. A stand for the unabridged dictionary with space for other reference books below is a worthwhile convenience.

b. A rack for the display of newly acquired books that can be placed on top of the card catalog or elsewhere may be desirable. A book truck with sloping top shelf can also be used for this purpose.

c. Racks for the display of current periodicals. These are of several types, and manufacturers' catalogs should be consulted. As has been mentioned earlier in this chapter, standard book shelving with special shelves closely spaced is satisfactory and space-saving.

Some Manufacturers of Library Furniture

Bro-Dart Industries. 56 Earl St., Newark 14, N.J.
Demco Library Supplies. Box 1070, Madison 1, Wisconsin, and Box 1772, New Haven 1, Conn.
D & P Modular Study Carrels.
Gaylord Brothers. Syracuse, N.Y., and Stockton, Calif.
Library Bureau of Remington Rand Systems. 122 East 42nd St., New York 17, N.Y.
Ramak—The Rak Makers for Business and Institutional Literature. New London, Conn. (Special racks for display of periodicals.)
Standard Wood Products Corporation, Library Division. 10 Columbus Circle, New York 19, N.Y.

Shelving

Shelving designed for standard library use is strongly recommended. It may be either wood or steel, with likely preference for the latter as being more generally practical. Any kind of shelving can be used, the type designed for storage purposes for example, but it may not be found to be as satisfactory as that made specifically to hold books. A combination of steel and wood shelving is sometimes desirable; steel for the book stacks proper,
with some counter height units of wood, for example.

All types of shelving should be investigated before decisions for purchase are final. There are some of special design that should be used for certain purposes. The divider-type shelf for storing pamphlets and other unbound materials is very satisfactory. Bracket shelving in which the shelves can be closely spaced is excellent for current periodicals. Storage shelving, the specially designed kinds consisting of a combination of shelf and drawer behind it, will hold several shelves of books in a space ordinarily occupied by one. Where space is at a premium this should certainly be considered.

Some Suppliers of Shelving

W. R. Ames Co., Bookstack Division. 150 Hooper St., San Francisco 7, Calif., or 1001 Dempsey, Milpitas, Calif. Representatives in principal cities also. (Stor-Mor Book Drawers).

Art Metal Construction Co. 1937 Clark St., Jamestown, N.Y. DeLuxe Metal Furniture Co. 243 Struthers Ave., Warren, Pa.

Estex Corp. 252 Broadway, New York 13, N.Y.

The General Fireproofing Co. 236 Dennick Ave., Youngstown, Ohio.

Globe-Wernicke Co. Cincinnati 2, Ohio, and 12 Worth St., New York 13, N.Y.

Hamilton Manufacturing Co. 1935 Evan St., Two Rivers, Wisc. ("Compo" shelving, a storage type).

Library Bureau of Remington Rand (Division of Sperry Rand Corp.). 122 East 42nd St., New York 17, N.Y., and offices principal cities.

Lyon Metal Products Co. 1933 Montgomery St., Aurora, Ill. Yawman & Erbe Manufacturing Co. Jan & Glide Sts., Rochester, N.Y.

Filing Equipment

Standard office filing cabinets are necessary for such papers as correspondence, pamphlets, reports, and any other similar materials. It will be wise to examine all of the kinds of materials before placing orders to determine whether some legal-size drawers will be required. In a large organization it might be necessary to consult the purchasing agent because there may be a policy in effect that makes it necessary to adopt a specified brand. If there is freedom as to choice it may be worthwhile to
investigate equipment developed as improvements over the standard cabinets. For example, Diebold, Inc. announced in December 1960 a mechanized filing machine available in both letter and legal sizes. A 16-shelf unit is said to have a capacity equal to six four-drawer filing cabinets. The Library Bureau of Remington Rand has developed a motorized rotary unit, called Kard-Veyer, that holds large numbers of cards. There are 26 sizes and the device can be used for several library purposes involving the necessity for keeping record of items in the hundreds or thousands.

Card-filing cabinets must meet library specifications to hold 7.5 by 12.5 cm. catalog cards. If other size cards are used for any purpose, special filing equipment must be provided for them also. They may be of either wood or metal, wood being preferred for the standard catalog drawers.

The aforementioned "divider type" shelving should be considered for filing large collections of reports or other materials in soft covers.

For filing reels of microfilm in large number a specifically designed cabinet having provision for controlling the humidity within it is recommended, though general reports as to the satisfactory condition of film stored under ordinary room atmospheres makes this less necessary than was once thought. The Recordak Corporation, a subsidiary of Eastman Kodak Company, makes a convenient cabinet for storing film. If only short strips need be filed, they may be put into pockets and filed in drawers. There are commercially designed devices for this purpose; some of them are listed in a later part of this chapter.

Lantern slides or transparencies require special filing cases if many must be handled. Uniquely designed equipment is available from the Technicon Company, 215 East 149th St., New York 51, N.Y. Portable slide boxes holding slides are useful for lending purposes. For small collections they can be used for permanent storage units.

Record-Keeping Equipment for Periodicals

There are several systems for keeping records of periodicals, both those currently received and files of older volumes. Choice depends upon the number of titles to be accommodated, on whether the record is to be stationary and used only by staff members, and on plain personal preference. The most common device is a system based upon the placing of cards so that only
the edges are immediately visible, these to carry titles. Some types of equipment with their suppliers are:

Acme Visible Records. Acme Visible Records, Inc. General offices — Crozet, Virginia. Printed forms are filed in book type holders or drawers in such manner that edges are visible. There are other types also, adaptable for library purposes, i.e. the FLEXOLINE equipment. Some equipment can handle several thousand cards. The rotary types are either manual or motorized.

Demco Visible File. Demco Library Supplies. 110 S. Caroll St., Madison, Wis., or 83 Wallace St., New Haven 11, Conn. Printed card forms, fitting into overlapping holders are filed in trays so that edges are legible. Interchangeable with Kardex equipment.

Kardex. Library Bureau of Remington Rand Systems (Divisions of Sperry Rand Corp.). 122 East 42nd St., New York 17, N.Y. Printed card forms fitting into overlapping pockets held in place in steel trays or book-type covers, with edges visible. One tray holds 50 cards. Markets also the Victor Sectional visible equipment using same cards and pockets, available in units that can start with only one tray to which others can be added.

Shif-Dex Visible Binder. Wilson Jones Company. 3300 West Franklin Blvd., Chicago, Ill., and 122 East 23rd St., New York, N.Y. This is a ring binder with a capacity for 100 record sheets upon which complete information can be recorded for periodicals. The binders are about 11 by 14 inches in size, and from one to four of them can be fastened on a special posting table equipped with casters.

Wheeldex. Wheeldex & Simpla Products, Inc. 425 Fourth Ave., Corner 29th St., New York 16, N.Y. This is a ferris-wheel type of filing device to which cards are attached by shallow notches in the corners. The wheel turns for quick location of individual card, and permits filing of large numbers of cards in a minimum of space. A range of sizes is available.

Card-o-Guides. Diebold, Inc. 828 Mulberry Road S.E., Canton, Ohio. Sells several types of equipment, among them the Cardinier, a device in the shape of an arc to which notched cards are attached and held securely, yet are readily removable. Some models can be equipped with motors.
Some of these devices are useful for maintaining records of items other than periodicals. Index files for any kind of materials can be kept in this manner. Their common virtue is that of being easy to consult. Different models can handle from as few as 50 to several thousand cards.

Microfilm-Reading Machines

There are many satisfactory microfilm-reading machines on the market, with new and improved features being developed continuously. In ordinary library use, however, a machine lasts a long time and rarely needs to be replaced because of obsolescence. There are circumstances, of course, requiring the most convenient kind of reader possible, and it is then economic to have the most efficient model.

If there is intention to purchase a reader, the several types should be investigated. An excellent source of information is provided in the compilation titled Guide to Microreproduction and Equipment, 2nd edition, by H. W. Ballou, published by the National Microfilm Association in 1962. Ballou gives concise descriptions of the machines available in 1962. Lewis and Offenhauser (8) reviewed all types of readers available a few years earlier, and compiled a comprehensive list of those on the market, supplying full details of their capabilities. There are small, readily portable machines that can be carried to a desk and used satisfactorily in moderately subdued light. Larger machines may be equipped with a motor for quick transport of film, a highly desirable feature where large reels must be handled. There is even a device, on at least one maker’s product, permitting the pre-selection of a certain page at which the transport mechanism will stop. Some machines can be used for one size of film only, others do not provide for a change of position of the film holder or “head.” There are some models designed for reading aperture cards in which a piece of film is inserted in an opening designed to hold it, or jacket cards of which the upper half is a plastic sleeve to hold a short strip of film. All requirements should be considered before a machine is purchased.

Some of the manufacturers or suppliers of good microfilm readers are listed here. In seeking to purchase a reader it is advisable to locate a local dealer who can provide servicing of equipment.
Manufacturers of Microfilm Readers

American Optical Company, Instrument Division, Buffalo 15, N.Y. Some models distributed by Remington Rand, Micro Opaque Reader, AO5075A; Film-A-Record Electronic AO Microfilm Reader FO77.

Atlantic Microfilm Corporation. 700 South Main St., Spring Valley, N.Y. Atlantic X-ray Projector Model XB.

Audio Visual Research, dept. SL110. 523 South Plymouth Court, Chicago 5, Ill. Agent for the Dagmar Super Microfilm Reader, a machine made in Holland that has found wide acceptance in the U.S.

Bell & Howell Company. 7100 McCormick Road, Chicago 45, Ill. Distributed by Burroughs Corporation. BH 189 (Hand), BH 189B (Electric).

Diebold, Inc., Flofilm Division. 45 Rockefeller Plaza, New York 20, N.Y.

Documat, Inc. 221 Crescent St., Waltham 54, Mass. Models "U," "D," "R," "F."

Griscombe Products Corporation. 133 West 21st St., New York 11, N.Y. Film-A-Record Microfilm Reader Model 9, F72; Filmcard Readers.

Microfilm Products of Minnesota Mining and Manufacturing Company. Distributed by Thermo-Fax Division, 900 Bush Ave., St. Paul, Minn. Designer "184."

Recordak Corporation, Division of Eastman Kodak Company. 415 Madison Ave., New York 17, N.Y. Models MPE, PL, PM-2, Lodestar Reader Model P5.

Manufacturers of Hand Viewers

Microreader Manufacturing & Sales Corporation. 2217 N. Summit Ave., Milwaukee 2, Wis.

Optics Manufacturing Corporation. 170 Eileen Way, Syosset, Long Island, N.Y.

A special kind of microfilm reader that has been on the market for only a few years is the reader-printer. This is a reader that is equipped with a printing device with which to make immediate copies of selected pages from the film as it is read. Incidentally, Lewis and Offenhuaser (8) gave directions for doing this
with an ordinary reader, and though it is feasible it is too troublesome to be practical on a large scale.

At least three companies make reader-printers. Each one makes more than one model. One difference among them is the size of the image produced, an important feature for such things as engineering drawings. Most of them can handle roll or strip film in either 35 mm. or 16 mm. size, aperture and jacket cards, and sheet film.

Manufacturers of Reader-Printers

1. Documat, Inc. 84 Fourth Ave., Waltham 54, Mass. Mark II Reader-printer. Three models; one makes half-size prints.

2. Recordak Corporation. 415 Madison Ave., New York 17, N.Y. Recordak Reader-Printer (Lodestar model is self-threading, speed can be regulated) and Recordak View-Printer. The View-Printer has large screen for engineering drawings.

3. Minnesota Mining and Manufacturing Company, St. Paul 6, Minn. Thermo-Fax Reader-Printer called Filmac Models 100, 200, 200R, and 300, varying as to kinds of film handled, size of screen.

The prices of reader-printers ranged from about $600 to $1500 in 1962. The Xerox Company, Rochester 3, N.Y., makes a machine, its number 1824, that prints enlargements of all types of microfilm copy, but is not a reading device.

Microfilm Cameras

Only those libraries in which it is necessary to do a large amount of microcopying will require microfilm cameras. Sometimes it is possible to make use of one already owned by the organization if there is need for an occasional item to be copied in this way. If such a major undertaking as the microfilming of laboratory notebooks is to be a continuing assignment there will be sufficient reason to acquire equipment. Another application might be to provide film copies of materials in a central library to be sent in place of interlibrary loans to other branch libraries or even offices in remote locations. If reader-printers are
available this can be a completely satisfactory service. A microfilm camera equipped with a tripod can also be used effectively for recording references in large-scale literature searching. It saves time as a substitute for either copying by hand or dictating.

The Guide to Microreproduction and Equipment cited in the discussion of microfilm readers includes extensive information on cameras as well as any other kind of equipment needed to establish a microfilm program.

There are many ways in which microfilm can be used advantageously by libraries if the potentialities are recognized. Lewis and Offenhauser (8) have explored and reported these possibilities.

Microtext Reading Machines

With the steadily increasing provision of published materials in reduced size print called "microtext" by Davison (9), there is need for a reading machine to make use of it. Microtext is produced in various forms, such as the Microcard, which is the same size as the standard catalog card. The Microfiche is slightly larger and the machine designed specifically for the former will not serve to read the latter, though some machines will handle both forms.

The Microcard Reader Corporation has developed a reader for its Microcard; the model designated as Mark VII was the result of a decade of experiment. The same company has produced a Microcard Copier also that makes copies of selected pages from a card, though it does not serve as a reader. Some of the microfilm readers will handle the opaque microtext form in addition to film. The Micro III model is portable and with it not only Microcards but other unitized microforms can be read.

DUPLICATING EQUIPMENT

In any library it is possible to make good use of some kind of equipment for making multiple copies of materials beyond what can be done with a typewriter. There is usually need for duplicating both typed and printed items in quantities from as few as one or two to as many as several hundred. Specific examples include catalog and index file cards, pages of a library bulletin,
and special forms such as routing slips and personal notification cards. Also, it is now usual practice to supply single copies of articles from periodicals for the convenience of readers. All of these requirements should be kept in mind when investigating equipment. Some machines can reproduce only from specially prepared mats thus limiting their application to typed materials. Others will handle either typed or printed forms, but will produce but one copy from a matrix. Certain equipment can take single sheets only, thus precluding its use for periodicals, whereas others can be used for both purposes. If the volume of copying to be done is large, two machines with different capabilities may be desirable. Should there be a central duplicating service in the organization it may be used either for part or possibly all of the duplicating needs.

In recent years there have been many developments resulting in new processes for providing rapid copying of graphic materials as well as improvements in older processes. In fact, new models of available machines are being introduced continuously. Good reviews of the basic types of copying methods are provided in several books on the subject. One edited by Doss (10), titled Information Processing Equipment, is broad in its coverage and includes all kinds of auxiliary equipment and processes, from special typewriters to data-handling machines. Hawken has published two comprehensive reports, the first on Full-Size Photocopying and the second titled Photocopying from Bound Volumes (11). Hawkens' descriptions of the techniques applied in the several processes and the evaluations of performances of machines on the market in 1961 are so inclusive that they stand as authority for whatever information may be required. However, the situation is not static and developments should be watched. Evidence of the activity in this area is attested by the extensive bibliographies compiled and published from time to time by Kiersky (12) and usually published in the journal Special Libraries.

Here a brief introduction only is provided to the most commonly used methods for duplicating graphic materials for library purposes. Machines used for making copies of typed or handwritten items are considered in the first group and then some machines that handle printed material are described.

Machines Duplicating from Prepared Copy

Copy must be prepared by either typing or inscribing by hand. In most instances typed copy will be required and this
means that careful consideration must be given to the provision of the best kind of typewriter or other machine for the purpose. It may be that a good standard typewriter will be adequate. If variation of type size is a desirable feature a Vari-Typer will be a convenience. For special formats a book-face typewriter produces an eye-catching page. In buying typewriters, thought should be given to the selection of type for various purposes. Special symbols may be needed on one or more machines. Chemical notations and mathematical symbols on the keyboard can save time if they are used frequently.

The following duplicating methods all require copy prepared on special masters designed for use on one kind of machine.

*Stencil or Mimeograph*

The process consists in cutting a master on a wax composition mat with a typewriter (ribbon removed) or Vari-Typer, or drawing manually with a stylus. The mat is subsequently fastened to a drum and ink transferred through the cutting to produce copy as paper passes under the revolving surface. Mimeograph machines may be hand operated or electrically driven if as many as several hundred copies are required. The standard models can be used to make copies of items of various sizes and shapes, from the catalog card size to legal-size sheets.

Several companies manufacture equipment of the general mimeograph type under various trade names. Some of them are the Mimeograph Stencil Duplicating Process produced by the A. B. Dick Company (720 West Jackson Blvd., Chicago, Ill.), and BDC made by Bohn Duplication Company (New York, N.Y.). Other trade names are Mercury, Heyer, Speed-o-print, Tempagraph, and Niagara.

A special type of stencil duplicator that can be useful for the specific purpose of providing copies of catalog cards is known as the Cardmaster, or the Chiang Small Duplicator. This is a small, very simple machine with no parts to get out of order. Stencils are cut from masters similar to those used for the mimeograph machine, and the inking is done on a card-size pad. Nitecki (13) has described its use, including data on costs that show that it is a less expensive way of reproducing cards than multilith or hand typing. It is distributed by Cardmaster Company, 1920 Sunnyside Ave., Chicago 40, Ill.
Hectograph

The hectograph method is based upon the preparation of a master by typing on a special carbon-backed paper so that a copy in reverse is produced on the back of the sheet. In one process the impression is transferred from the master to a gelatin roll, thence to paper. A limited number of copies, a maximum of 100, can be made from one master. The process is relatively inexpensive. Two companies, Ditto, Inc., and the Varigraph Corporation, are among those selling this type of equipment.

A variation of the same principle makes use of the same kind of master but employs a solvent that is sprayed against the paper as it comes in contact with the master producing the copy. This is known as the "direct" process. Some of the suppliers of equipment for this method include A. B. Dick Co., Ditto, Inc., Standard Mailing Machine Co., and Rex-o-graph, Inc. As many as 500 copies can be made from a master.

Multilith

The multilith method is akin to the offset printing procedure on a small scale. Copy is prepared by typing or drawing on special masters which can be inked and copies produced by contacting paper. Twenty-five hundred copies can be made from one paper master. Aluminum masters are available, also, and these will allow runs of up to 20,000. These must be prepared photographically. Several models of multilith machines are available, from hand-operated to completely automatic ones that can be set to run for a specific number of copies.

A major supplier of multilith equipment is the Addressograph-Multigraph Corporation, 1200 Babbitt Road, Cleveland 17, Ohio.

Machines Duplicating from Typed or Printed Copy

There are so many devices for duplicating both published materials and typed copy that it is impractical to attempt to cite all of them in so necessarily brief a presentation as this. Again, the aforementioned books by Doss (10) and Hawken (11) should be consulted for a complete review of the processes and the machines applying them. Although changes are being made
constantly by the individual manufacturers of each type, most of the methods have been in existence for a long time. Stevens' (14) article reviewing the developments for one year, 1961, however, proved that this is still a very active business.

A few general considerations are cited first as points to be remembered when purchasing equipment. While it is true that these processes are supposed to copy all kinds of typed or written or printed material, they do so with varying degrees of clarity and permanence. Some machines can take single sheets only; others can handle either a single sheet or a bound volume. One that is designed for single sheets only can be used with some success for thin pamphlets or unbound issues of periodicals. Some do not reproduce pictures or other illustrative material satisfactorily. Resolving power may not be adequate to take care of fine print. Machines said to be made to copy from bound volumes do not perform well for this purpose. A highly skilled operator can utilize some equipment to reasonably good advantage whereas the novice cannot.

The principal methods upon which the many types of machines are based are few. They can be considered as falling into two main divisions, (1) contact reflex, and (2) optical. These are outlined here very briefly because detailed discussions are available in the books already cited.

**Contact Reflex Copying**

Very simply, contact reflex copying consists in placing a sheet on which there is something to be copied against a sheet of sensitized material and exposing them to light or heat, depending upon the kind of sensitivity involved in the process. The desired image is thereby produced but must be subjected to some kind of developing process before being put in contact with a sheet of plain paper upon which the copy is produced for reading as a positive image.

The principal contact reflex copying processes are the following:

**Soft Gelatin Dye Transfer Process. Examples:**

Verifax Copiers. Eastman Kodak Company. 303 State St., Rochester 4, N.Y. At least three models have been marketed, including one for bound volumes. From one to ten copies can be made from one master.
Photostat Instant Copier. Photostat Corporation, 303 State St., Rochester 14, N.Y. Models for single sheets and bound volumes.

Diffusion Transfer Reversal Process. Examples:

In Hawken's book on Photocopying from Bound Volumes (11) he names and describes the products of thirteen companies making machines utilizing the diffusion transfer process. Among the trade names are Copease, APECO, Photorapid, Contoura, and Rolla-copy. All of these companies make both single-sheet and bound-volume copiers.

Thermographic Process. Example:

Only one company, Minnesota Mining and Manufacturing Company, produces equipment using the heat transfer process under the trade name of Thermofax. Several models are available and improvements have been continuous in the few years since this completely dry process was put on the market.

Optical Processes

Electrophotographic or Electrostatic Process. This is an optical method requiring no contact with the page to be copied. In brief, it consists in exposing by projection a charged plate to the image to be copied. The dark portions retain the charge which is developed by a negatively charged powder and this is transferred to a sheet of paper or an offset-duplicator paper master.

Several companies make equipment based on this principle. One is the Xerox Corporation, Rochester 3, N.Y., whose Model 914 is proving to be as advertised a "versatile, time-saving copying machine." It copies any kind of original material, including all colors, as single sheets or bound volumes. By using a filter, picture illustrations can be reproduced. The machine is available on a rental basis for $95.00 a month for which price 2000 exposures can be made. Purchase price is $2995.00.

Another company making a machine based on the electrostatic principle is Radio Corporation of America. Its Electrofax Copymaker is marketed by American Photocopy Equipment Company, 2100 West Dempster St., Evanston, Illinois, and a different model is sold by Savin Business Machines, Inc., New York, N.Y. One Electrofax machine is designed to make enlarged copies from microfilm in both strip form and the single frames in Filmsort aperture cards.
Photostat Camera. One of the best known methods of making photo copies of documents is by means of the Photostat camera with which either enlarged or reduced sizes can be made. The product is white on a black background, but positive prints can be made from the negatives if necessary. Photostat Corporation, Rochester 14, N.Y. was the original developer of the method. Similar cameras are made by other companies, however, Remington Rand, and Merritt Lacey Corporation are among those who do so.

Special Copying Camera

A unique copying device is the portable camera called the Contoura. It is designed to be carried to a library and used there to copy needed pages from periodicals or books by exposing a very slow photographic paper that can be used in subdued light (except fluorescent). The copies are the same originals. The camera has an inflatable plastic bag that fits the contour of the opened volume, hence its name. Exposed sheets are accumulated and developed subsequently using equipment supplied by the manufacturer of the camera, F. G. Ludwig, 1300 Coulter Ss., Old Saybrook, Connecticut.

FACTORS TO CONSIDER IN PURCHASING DUPLICATING EQUIPMENT

After reviewing the several types of equipment available for copying purposes the question of how to determine exactly what to acquire may be summarized. The primary considerations will be the kinds and volume of work to be done. For a multi-copy duplicator of typed material one of the group of processes first outlined, mimeograph-stencil, hexograph, or multilith, will be required. The minimum cost will be close to $200 and it can reach as much as $1000 for a completely automatic operation.

For a machine to copy both printed and typed materials the amount of copying to be done will certainly be the determining factor. If at least 1000 pages a month are to be copied, rental of the Xerox 914 machine is recommended as the most effective one available in 1962. Where appreciably less copying is to be done, one of the smaller copiers will suffice. The local dealer in such equipment will be prepared to demonstrate them. In large scale operations it is desirable to have two machines with different capabilities.
EQUIPMENT FOR NONCONVENTIONAL INDEXING
AND FILING

Application of one of the newer nonconventional indexing and indexing systems requires the use of special kinds of cards that may be handled either by hand or mechanically. Investigation of such methods will be necessary when the scale of operation is so large that ordinary methods do not suffice, and attention is directed to Chapter 8 where the whole subject of filing and indexing is treated. Here some of the various types of equipment are cited, chiefly those whose developers have been active in the United States. Inquiries should be made directly to those companies that are thought to have methods that are likely to suit the situation in hand. Help and advice will be given in the establishment of a particular application. Some systems operate under a license agreement and equipment may be available on a rental basis only.

INDEXING EQUIPMENT

Manual Systems

Edgenotched Cards

E-Z Sort. 45 Second St. San Francisco, Calif.
Findex. W. K. Walthers, Inc. 1245 N. Water St., Milwaukee, Wis.
Geriac. Oliver Garfield Co., Inc. Room 822, St. Marks Place, New York 3, N.Y.
Flexisort. Superior Business Machines, Inc. 285 Madison Ave., New York, N.Y.
Needlesort. Arizona Tool and Die Co. 31 E.R. Nite St., Tucson, Arizona.
Royal Mc Bee Corp. Port Chester, N.Y.
Zator. 140-1/2 Mt. Auburn St. Cambridge 38, Mass.
Uniterm. Documentation, Inc. 7900 Norfolk Ave., Bethesda, Md. Applicable to both manual and machine systems.
Combination Indexing and Filing Systems

For Film Copies

1. Aperture Cards. For single frames or short strips.
   Filmsort, Inc. 50 South Pearl St., Pearl River, N.Y.
   Edgenotched or machine punched cards.
   Royal BMcBee Corp. Port Chester, N.Y. Edgenotched or
   machine sorted cards.
   Remington Rand. 315 Fourth Ave., New York, N.Y.
   International Business Machines Co., 590 Madison Ave.,
   New York 22, N.Y.

2. Jacket Cards. For short strips.
   Filmsort, Inc. 50 South Pearl St., Pearl River, N.Y.
   Ohio Envelope Co. 341 Calhoun St., Cincinnati 19, Ohio.
   Vis-a-jac.
   Atlas Microfilming Service. 105 North Fifth St., Phila-
   delphia 6, Pa. Sertafilm.

3. Positive Prints. From microfilm for application to cata-
   log cards.
   Microstrip. Hall and McChesney. 1233 Oswego Blvd.,
   Syracuse, N.Y.
   Microtape. The Microcard Corp. West Salem, Wis.

4. Reels of Microfilm
   Rapid Selector. First proposed by Vannevar Bush, sub-
   sequently developed by Ralph R. Shaw and the U.S.
   National Bureau of Standards. Documents on film,
   beside them an identifying code in patterned dots to be
   selected by electronic scanner.
   Filmorex. 74 Rue des Saints-Peres. System similar to
   the Rapid Selector, differing in details.

5. Minicard
   A special system developed by Recordak Corporation,
   subsidiary of Eastman Kodak Company. 415 Madison
   Ave., New York 17, N.Y.

Systems Storing Document Images (Separate index)

1. CRIS Command Retrieval Information System. Informa-
   tion Retrieval Corporation. 1000 Connecticut Avenue,
   N.W., Washington 6, D.C.
2. VERAC. Avco Corporation Electronics and Ordnance Division. Cincinnati 41, Ohio.
3. WALNUT. IBM, International Business Machines Corporation. 590 Madison Avenue, New York 22, N.Y.
5. CRAM. National Cash Register Co. 5 Main at K St., Dayton 9, Ohio.

Machine Systems

The development of machine systems is so rapid that it is virtually impossible to present a review that could be up-to-date by the time a book reached its public. The companies whose products have been on the market for as long as the idea of using data processing equipment for information retrieval are listed here. It is recommended that the two National Science Foundation publications, Current Research and Development in Scientific Documentation which has been revised and issued twice a year (No. 12, May 1963) and Nonconventional Technical Information Systems in Current Use (No. 2, 1959, No. 3, 1962), be referred to for the latest information.

Some Examples of Data Processing Equipment Adaptable for Information Retrieval—Punched Cards, Computers

IBM, International Business Machines Corporation. 590 Madison Ave., New York 22, N.Y. Special Engineering Products Division is continuously improving devices and methods.

Remington Rand, Inc. Division of Sperry Rand Corporation. 315 Fourth Avenue, New York 10, N.Y., Univac Division.


Behnson-Lehner. Santa Monica, California. Machine; Equipment for COMAC system developed by Documentation Inc., 7900 Norfolk Ave., Bethesda, Md.

MISCELLANEOUS SUPPLIES AND EQUIPMENT

Catalogs from library supply houses should be obtained and studied for suggestions of things that could make the work of the
library more efficient. The most active general library supply houses are:

Bro-Dart Industries. 56 Earl St., Newark 14, N.J.; 520 King St. West, Toronto.
Demco Library Supplies. P.O. Box 1772, New Haven 2, Conn.
Gaylord Brothers, Inc. Syracuse, N.Y., and Stockton, N.Y.
Library Bureau Remington Rand. 315 Fourth Ave., New York 10, N.Y. Offices in other cities also.
Library Efficiency Corporation. 36-38 West 20th St., New York 11, N.Y.

Some of the more necessary items are:

2. Dictionary stand with space on top for a large reference book, and shelves below for smaller reference volumes. Several revolving stands to be placed on tables or counter-height shelves are desirable for other large volumes.
3. Tables of special design for reference sets such as Chemical Abstracts. These are available from some library furniture dealers or they can be built to individual specifications. Such a table should have a double row of shelves down the middle, two shelves high, with space for using them on either side. A table ten feet long can thus accommodate 40 feet of shelving. Alternately, an abstract "bar" can be built against a wall, with shelves above a writing shelf at desk height.
4. Pamphlet boxes. A number of kinds are available. One that has many merits, including that of being inexpensive is the Magafile, made by the Magafile Company, P.O. Box 2615, Merchants Station, St. Louis 2, Mo. Another is made by the National Metal Edge Box Company, 344 North 12th St., Philadelphia, Pa. The Gaylord Princeton File, supplied by the Gaylord Company, Syracuse, N.Y., is a sturdy type. Bro-Dart Industries makes one designed according to ALA Library Technology Project specifications in three sizes.
5. Book truck. Care should be taken to select a truck which is light in weight, yet constructed well enough to withstand heavy loading.
6. Rack for current periodicals. Cabinets which allow display of current issues and storage of earlier issues are ideal.
7. Storage cabinet. A metal cabinet of the type used in offices is convenient for storing supplies.
8. Stool or ladder for reaching high shelves.
9. Paper-mending tape. Perma-film—transparent material for mending torn pages or covering worn ones. It attaches to paper without any more attention than slight pressure. (Infinitely superior to cellulose acetate tape which should never be used for mending books.) Perma-film, Henry G. Lissauer, 21 W. 45th St., New York 36, N.Y. Scotch-Tape makers also have a type for mending paper.
Fastape. Demco Library Supplies. P.O. Box 1772, New Haven 2, Conn.
Book-Aid. Bro-Dart Industries. 56 Earl St., Newark 14, N.J.
11. Plastic adhesive. Several makers provide this white plastic solution that dries to form a clear pliable film. Some trade names are: Book-Saver, Magic Mend, Bind Art.

The science-technology librarian is always faced with the task of handling a heterogeneous mass of specialized materials, any of which may present a problem in equipment as well as in method of administration. Since this is true, he should make sure that he is familiar with the experience of others who have dealt with comparable problems. For example, a vault may be needed to provide storage for confidential documents and research notebooks; this would call for an investigation of equipment not found in library supply catalogs. A number of authorities have discussed the housing of fugitive materials, maps, photographic reproduction, and audio-visual aids, all offering helpful ideas. Lyle (15) devotes a chapter to special types of materials, supplementing it with a classified directory of dealers and bibliographical references. Library Journal publishes annually a Library Buying Guide telling where all types of library supplies, ordinary and special, can be purchased.

HELPFUL GADGETS

There are many small devices that are very useful in a library, not often of sufficient importance to reach commercial
markets, but nonetheless worth knowing. Most librarians discover some special aids or short cuts of their own. Several that have been developed by Lane (16) are described here:

1. Book support. Ordinary steel book supports will hold more securely if strips of inner-tube rubber are glued to the under side
2. A weight to hold down the pages of an open volume can be cut from a sponge rubber pad. A convenient size is 3 by 5 inches
3. The pad described under (2) will serve to mark lines or as an aid in following page references if a strip of white cardboard is glued to the under side so that it projects. A dark line should be drawn on the edge
4. Book marks, 3 by 9 inches, can be cut from manila file folders. They can be used to mark both pages in a volume and lines on a page

CONCLUSION

The effective planning of a library service is a challenge that should evoke the exercise of thoughtful judgment and as much foresight as possible. Every known source of assistance should be sought and used, publications dealing with library planning, manufacturers' literature, and, most rewarding of all, functioning libraries. Those who have had experience in planning such services will usually be ready to share the results of their own experience. Extra time and effort spent in the planning stage will minimize the chance of avoidable errors.

BIBLIOGRAPHY


SUPPLEMENTARY REFERENCES

Pioneer. Quarterly publication of Library Bureau of Remington Rand.
BOOK SELECTION

The person who heads a newly established library faces the challenging task of planning the book collection. He must recognize the responsibility if he is to spend money wisely and provide the books that will be needed by those who use the service. The results of his judgment will stand on the shelves as permanent reminders either of painstaking selection or of haphazard gathering. Unfortunately, there are some books published that, though their subject be scientific, do not merit a place in a good science-technology library in which quality and not quantity must be the objective. McClelland (1) has given excellent advice on the matter of choosing books for a technical department of a public library, and his philosophy is broadly applicable to any library in the domains of science and its related arts. He urged that librarians hold to high standards in selecting books by refusing to purchase material that is poorly presented, thereby influencing publishers to put into print only books that are well-written, accurate, creditable contributions to the literature of science. The founding and maintaining of a collection of the best books in the pertinent subject fields is certainly one of the most important functions of the library.

The selection of books must be done systematically, always keeping in mind the broad purpose and specific interests of the organization. The types of books that comprise the basis of a science-technology collection are primarily texts, monographs,
handbooks, encyclopedic works, dictionaries, and treatises on scientific subjects, these being supplemented by some general reference works. In addition, most libraries will want to provide for some unique interests that can be served only by certain highly specialized publications such as trade literature, patents, photographs, indexes, and directories. Acquisition of these less-conventional types of publications is discussed later in this chapter following the presentation of procedures for procuring books. In conjunction with the process of book selection the basic book lists comprising the Appendix of this book should be consulted. Adequate study of what is required should precede the final selection of books for purchase. Advice should be sought from those whom the library will serve, particularly the library committee, one of whose chief offices might be advising on book purchases. All sources of judgment and opinion should be called upon, but the ultimate responsibility must rest with the librarian.

PROCEDURE FOR BOOK SELECTION

The first step in choosing books to start a collection is to learn what has been published in the subject fields to be covered. Book lists of all kinds, catalogues of scientific publishers, and pertinent bibliographies should be studied, and titles of likely interest noted on order slip forms. Standard works will be known from acquaintance with the subjects if the person making the selection has such background. These will constitute the nucleus of the collection which will be expanded upon further investigation of titles noted from the various lists that are investigated. Some examples of good lists of scientific and technical publications are cited here. There has been no attempt to offer an inclusive presentation of such lists; it is only suggestive as to the kinds of aids that are available. New ones are almost certain to be in process of publication at any moment, and there are doubtless others now in print that may be equally helpful. Bibliographies in authoritative books are also good sources for titles pertinent to their subjects.

Some Source Lists of Scientific and Technical Books

General Scientific

Les Sources du travail bibliographique, Tome III, Bibliographies spécialisées—sciences exactes et techniques. Malclès, L.N. Geneva,
Librairie E. Droz; Paris, Librairie Minard (1958). The most exhaustive and critically selective listing of the major publications, without prejudice as to language, in all fields of science.


Mathematics, Physics, Engineering


Chemistry


BOOKS — SELECTION AND ACQUISITION

Biology


Agriculture


General Listings that Include Science


Trade Bibliographies and Publishers’ Lists

The United States catalog. 4th ed. New York, H.W. Wilson Co. (1928). This is a listing by author and title of all books published in the United States and England that were in print on January 1, 1928. It is brought up to date by a supplementary publication, Cumulative book index, which is issued monthly and accumulated periodically. A directory of publishers is included. This is available in all large libraries.


Subject guide to books in print. New York, Bowker. Revised annually.


Führer durch die Technische Literatur. Hanover, Weidemann. An annual listing of German publications.

Though many of these cumulated listings are generally inclusive of important works irrespective of language or place of publication, it is admitted that the emphasis is on books more easily accessible in the United States. However, in the process of selecting books for purchase it must be recognized that results of scientific investigation are being published in many countries and languages. Some books written in languages other than English are authoritative works, and must be provided in an adequate collection.

In the process of making selections of titles for serious consideration, and after studying source lists, a logical next step is to visit an already established library covering the same fields of interest and examine as many books as possible. It is possible also to ask publishers to send books on approval. This can be something of a nuisance but, for expensive titles about which there is doubt, it is certainly worth the risk of having to prepare returns.

If it is not feasible to examine all books in which there is potential interest, the next best way to find out more about them is to read reviews. Many scientific journals include reviews of books in their fields, and these can be located in Technical Book Review Index, a monthly (except July-August) publication of Special Libraries Association that has been published from 1935 to date. It is indexed annually so that reviews can be located readily. In judging reviews of books, McClelland (1) has observed that (a) reviews in journals in pure science are likely to be better than those in trade journals, (b) British reviews are more trustworthy than American ones, and (c) a signed review is more likely to be reliable than an unsigned one. It will be found to be worth while to spend some little time on this process of selection for the initial collection.

RECORD OF TITLES SELECTED

As titles of books for possible purchase are accumulated, it is necessary to keep a systematic record of them. This can
be done most conveniently by noting each title, always including full data as to accurate title, edition, first name and initial of author, publisher, and date, on 7.5 by 12.5 cm. cards. Printed ones, in multiple copy, especially designed for this purpose can be obtained from the library supply houses, or blank cards can be used if the habit of always being accurate in noting complete information can be cultivated. There has been some use of edge-notched cards for ordering purposes, and it may even be desirable to use a machine-sorting card such as the typical IBM one. The initial selection card may be used for a shelf-list file by adding the call number to the upper left-hand corner.

As the process of title selection progresses, it may be helpful to keep a file of titles considered but rejected, with notation of the reason for the rejection. This file can save time if consulted, because no one can recall all items investigated.

**SELECTION OF CURRENTLY PUBLISHED BOOKS**

After the nucleus of the book collection has been established it is obviously as important to add to it as carefully as the initial selections were made. A regular system for locating newly published books should be devised. There is no one source that can be depended upon for the announcement of all titles in any of the fields of science. All possible listings must be watched, and every individual responsible for the selection of books will develop his own procedures for learning of the new titles in his areas of interest. The most complete listing of titles of both books and pamphlets is included in *Publishers Weekly*, and this should be scanned weekly. Even though it often happens that many of the titles in this list have already been discovered, the double check is warranted. Since 1959 *Publishers Weekly* provides the Dewey classification number for each title, a helpful feature for quick review.

Many journals in specific subject fields announce new book titles in each issue. Some include reviews; others give publishing information only. Journals published in other countries are particularly helpful in revealing newly published books. Certain of the abstracting publications, for example, *Chemical Abstracts*, that serve chiefly as guides to periodical literature, also list titles of new books.

Some of the more important publications that list new books in the sciences are:
Publishers Weekly. This periodical includes a list of books and pamphlets published each week in the United States, with occasional annotations. Publishers' advertisements, special spring and fall issues devoted to specific subject fields make this an essential publication for every library. In addition to the Weekly, the publisher, R.W. Bowker Co., provides two other excellent services:

American Book Publishing Record. A monthly cumulation of titles announced in PW arranged by Dewey classification number. Published since February, 1960.

Library Journal. Quarterly lists of scientific, technical and medical books announced for publication by publishers.

Science. This weekly periodical issued by the American Association for the Advancement of Science publishes reviews of a few important titles, announcements of 20 to 30 others.

Nature. This British weekly journal of science has excellent reviews of some books, announcements and advertisements of others; once a month includes a comprehensive listing indicated as Supplement: Recent Scientific and Technical Books.

Quarterly Review of Biology. Includes an extensive list of new book titles.

Science News Letter. This weekly published by Science News Service lists the Scientific Books of the Week.

Science Progress. A Quarterly Review. Publishes excellent essay reviews, and lists books received. Almost 200 titles in one issue.

Chemical Abstracts. At the end of each subject section in individual issues new titles are noted but not reviewed. Many titles from all countries included.

Dealers' publications such as Stechert-Hafner Book News, 31 East 10th St., New York; Scientific Books, James Thin, 53-57 South Bridge, Edinburgh, Scotland.

Aslib Book List. A monthly publication of the British Association of Special Libraries and Information Bureaus. Lists, with annotations, scientific and technical books in English language only.

Publishers' announcements. Mailing lists are maintained by publishers who send announcements of their publications to libraries and individuals interested in their fields.

Library Accession Lists


Science Reference Notes: Critical Notes on Recent Important Reference Materials in the Sciences. The Science Libraries of Columbia Univer-
National Bibliographies


Bibliographie der deutschen Bibliothek. Frankfurt.

Deutsche Nationalbibliographie. Leipzig.

As has been indicated, reviews of books published in the scientific periodicals should be watched routinely. Sometimes it is difficult to locate a review of a new book because there is no relationship between the date of publication and the appearance of a review. A book may be reviewed quite promptly, but it is by no means unusual to come upon a review of a title that actually was available a year before. Schutze (2) made a statistical analysis of the review situation, and gave figures proving the wide discrepancies in book publication and review dates.

BOOK PUBLISHERS

The lists of publishers of scientific books supplied there are highly selective, the chief intention being to supply the names and addresses of those who publish the greater number of titles in the several countries represented. For inclusive lists such compilations as Books in Print (U.S.), British Scientific and Technical Books, and Publishers International Yearbook: World Address Book of Book Publishers, published by Alex P. Wales, 26 Charing Cross Road, London, W.C. 2, England, may be consulted.

Some Publishers of Scientific Books: A Selected List

United States

Academic Press, Inc. 125 East 23rd St., New York 10, N.Y.
American Elsevier Publishing Co. Inc. 52 Vanderbilt Ave., New York 17, N.Y.
W.A. Benjamin, Inc. 2465 Broadway, New York 25, N.Y.
Butterworth, Inc. 7235 Wisconsin Ave., Washington 14, D.C. (sales office only).
Chemical Publishing Company, Inc. 26 Court St., Brooklyn 2, N.Y.
Dover Publications, Inc. 180 Varick St., New York 14, N.Y.
Hafner Publishing Company. 31 East 10th St., New York 3, N.Y.
Harper & Row. 49 East 33d St., New York 16, N.Y.
Holt, Rinehart & Winston, Inc. 383 Madison Ave., New York 17, N.Y.
Interscience Publishers, Division of John Wiley & Sons, Inc. 605 Third Ave., New York 16, N.Y.
Longmans, Green and Company, Inc. 119 West 40th St., New York 18, or 215 Victoria St., Toronto 1, Canada.
The Macmillan Company. 60 Fifth Ave., New York 11, N.Y.
McGraw-Hill Co., Inc. 330 West 42nd St., New York 18, N.Y.
C.V. Mosby Company. 3207 Washington Blvd., St. Louis, Mo.
Pergamon Press Inc. 122 East 55th St., New York 22, N.Y.
Pitman Publishing Corp. 2 W. 45th St., New York 36, N.Y.
Plenum Press. 227 West 17th St., New York 11, N.Y.
Prentice-Hall, Inc. 70 Fifth Avenue, New York 11, N.Y.
Reinhold Publishing Corp. 430 Park Ave., New York 22, N.Y.
John F. Rider, Publisher, Inc. 116 W. 14th St., New York 11, N.Y.
St. Martins Press, Inc. 175 Fifth Ave., New York 10, N.Y.
Charles C. Thomas, 301-327 East Lawrence Ave., Springfield, Ill.
D. Van Nostrand, Inc., 120 Alexander St., Princeton, N.J.
John Wiley & Sons, Inc. 605 Third Ave., New York 16, N.Y.
The Williams & Wilkins Company. 428 E. Preston St., Baltimore 2, Md.

Great Britain

George Allen & Unwin, Ltd. Ruskin House, 40 Museum St., London W.C. 1,
Edward Arnold & Company. 41 Maddox St., London S.W. 1.
Benn Brothers, Ltd. 154 Fleet St., London E.C. 4.
Bell & Sons Ltd, 6 Portugal St., London W.C. 2.
Cambridge University Press. 220 Euston Road, London, N.W. 1. (U.S.
Grafton & Co. 51 Great Russell St., London, W.C. 1.
Hutchison & Co., Ltd. 47 Princes Gate, London S.W. 7 (419 Fourth Ave.,
New York 16, N.Y.).
Longmans, Green & Company, Ltd. 6 Clifford St., London W. 1.
Macmillan & Co., Ltd. 10 St. Martin’s St., London W.C. 2.
Methuen & Co., Ltd. 36 Essex St., London W.C. 2.
Oliver & Boyd, Ltd. Tweeddale Court, Edinburgh, Scotland.
Oxford University Press. Warwick Square, London E.C. 4 (1600 Pollitt
Drive, Fair Lawn, N.J.).
Taylor & Francis Ltd. 18 Red Lion Court, Fleet St., London, E.C. 4.

Germany

Akademie-Verlag. 19 Schiffbauerdamm, Berlin N.W. 7.
Johann Ambrosius Barth. Leipzig Cl.
J. F. Bergmann. Munich.
Ferdinand Enke Verlag. Stuttgart.
Walter de Gruyter & Co. Berlin 35.
Carl hanser Verlag. Munich 27.
Physik Verlag. Mosbach/Baden.
Quelle und Meyer. Heidelberg.
Springer Verlag. Lahge & Springer, Heidelberger Platz 3, Berlin-Wil-
mersdorf.
Dr. Dietrich Steinkopff. Darmstadt, Germany Holshofallee 35.
Vieweg, F. & Sohn. Burgplatz 1, Braunschweig.

France

Bailliére, J.B., et Fils. 19 Rue Nautefeuille, Paris VI.
Dunod. 92 Rue Bonaparte, Paris VI.
Hermann et Cie. 6 Rue de la Sorbonne, Paris 5.
Masson et Cie. 120 Boulevard Saint-Germain, Paris VI.

Holland

North-Holland Publishing Company. 68–70 Voorburgwal, P.O. Box 103,
Amsterdam C.
Elsevier Publishing Company. 110–112 Spuistraat, Amsterdam C.

Italy

Riccardo Patron. Via Zamboni 26, Bologna.
Ulrico Hoepli. Corso Matteotti 12.
Sansone Edizione Scientifiche. Viale Mazzini 46, Firenze.
Libreria Scientifica C. Manfredi s.r.l. Viale Papiano 47, Milano.
DENMARK

Einer Munksgaard. 6 Norregade, Copenhagen.

SPAIN

Espasa Calpe, S.A. Rios Rasas 26, Madrid.

PUBLISHERS' SERVICES

Certain publishers of scientific books encourage the establishment of direct standing-order arrangements with them. In general the purpose is to circumvent the delays entailed in the library's having to wait for published announcements of books and then placing orders through a book dealer. Whether or not the arrangement is advantageous is a matter to be determined for every library. The many separate procedures involved can be more trouble than handling all orders with one dealer. Details of direct-order plans vary among publishers. Examples of three that were actively promoting such arrangements in 1962 are the following:

The Macmillan Company, 60 Fifth Ave., New York 11, N.Y. This publisher sends customers of its Standing Order Plan announcements of books prior to publication. A number of titles are included at a time and the ones wanted are marked on the selection sheet which is returned to the publisher who sends the books themselves immediately upon publication. The discount allowed is 10% with no return privilege.

Reinhold Book Division, 430 Park Ave., New York 22, N.Y. The Automatic Library Plan operates by having customers indicate the subject fields in which they want to receive books. Books are sent as they are published on an approval basis and may be returned if not wanted. Discounts are 20% for trade books, 10% for technical ones.

Another publisher, McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 18, N.Y., has long had a standing order program in effect. In fact, particularly where purchases are on such a large scale that almost everything issued is almost certain to be ordered, this arrangement can usually be made with most publishers.
PROCEDURES FOR ORDERING BOOKS

Before book orders are placed, the most efficient routine for purchasing must be determined. If the library is part of a larger organization, conference with the chief purchasing officer will be necessary. When policy requires, requisitions can be handled through a central department provided that the library is permitted to specify where orders are to go. The more common practice is for the orders to be sent directly from the library to the vending agent. Book ordering is a highly specialized activity, the details of which may be more familiar to the librarian than to the general purchasing officer.

The best procedure is to place the orders for a majority of titles with a book dealer. Some effort should be spent in locating a satisfactory dealer, preferably one located in the same community as the library. He will undertake the details of procuring books from all publishers, saving time and expense for the library and the purchasing department. There are fewer bills to be paid when a dealer is used, and difficulties that arise in the process of locating obscure publications are assumed by him. Certain dealers handle both new and secondhand books. Lists of some of the book dealers located in the United States, Canada and other countries are included in this chapter. These are very selective lists. It is recognized that there are many others who can give good service. The use of local facilities where at all possible is recommended.

Some dealers are able to give good service for books published in other countries. It may, however, be desirable to establish an account with a dealer located abroad from whom fast service can be had in response to air-mailed orders. It is not difficult to make such an arrangement, and in most instances bills can be paid by ordinary bank check. Experience will eventually determine the best course to follow. If the organization has affiliates in other countries, it is possible that arrangements can be made to have books published there purchased through them.

Orders for books can be written on letterhead stationery or standard requisition forms. For short lists an alphabetical arrangement by authors is convenient. However, when large numbers of titles are to be processed and it is not difficult to do so, the arrangement may be by publisher. As was mentioned earlier in the discussion on selection of titles to be ordered, the use of
multiple order forms such as library supply houses carry in
stock, is recommended. One carbon only may be adequate, or
more copies may be required. The original (or the carbon) copies
may be sent to the book dealer who returns each one with the
title supplied. A permanent record of orders can be maintained
with the slips; they can even be used for the shelf list file. Titles
waiting for order or reconsideration can be kept in an easily
consulted file if the slips are typed as books are noted.

Information that should be supplied to the dealer for each
title includes:

Author, first name and initial
Title — indication as to whether it is part of a series
Publisher — year — edition — price
Date of order

An example of a printed order slip is shown (Fig. 12).

<table>
<thead>
<tr>
<th>Author (Last Name First)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
</tr>
<tr>
<td>Dept.</td>
</tr>
<tr>
<td>Date req.</td>
</tr>
<tr>
<td>Series</td>
</tr>
<tr>
<td>Publisher</td>
</tr>
<tr>
<td>Year</td>
</tr>
<tr>
<td>Ed</td>
</tr>
<tr>
<td>No. copies</td>
</tr>
<tr>
<td>Price</td>
</tr>
<tr>
<td>Cite source or send brochure or cat. if available.</td>
</tr>
<tr>
<td>Serial: begin with</td>
</tr>
<tr>
<td>Get back nos.</td>
</tr>
</tbody>
</table>

Fig. 12.

Many dealers and publishers allow a discount to libraries
on the list prices of books, usually about 10% on scientific titles.
However, good service is a more important factor in choosing
a dealer than is the possibility of this small saving. Where the
total volume of business placed with the dealer in a year is not
large, he cannot be expected to grant significant discounts.

It may be desirable to place orders for books at regular
intervals, weekly, perhaps, depending upon the rate of purchase. Rush orders should be sent immediately if the urgency is warranted.

Dealers in Scientific Books: A Selected List

UNITED STATES

California

P. D. and Ione Perkins. P. O. Box 167, South Pasadena, (specialize near Middle East, Far East Publications).
J. W. Stacey, Inc. 581 Market St., San Francisco 5.
Zeitlin & Ver Brugge Booksellers, 815 N. La Cienega Blvd., Los Angeles 46.

Colorado

Stacey Technical Book Co., Inc. 1814 Stout St., Denver.

Connecticut

Bookshop, New London.
Whitlock's. Inc. 15 Broadway, New Haven.

Illinois

A. C. McClurg and Company. 2121 Landmeier Road, Elk Grove Village.
Kroch's & Brentano's Inc. 206 N. Michigan Ave., Chicago.

Louisiana

Jenkins Book Company. 1739 Bordeaux St., New Orleans.

Massachusetts

Barnes & Noble, 28 Boylston St., Cambridge
Campbell & Hall, Inc. 289 Commonwealth Ave., Boston 9.
The Philips Book Store. Cambridge.

Missouri

Cramer Book Store. 1321 Grand Ave., Kansas City.
Midwest Library Service, 802 Demun Ave., St. Louis 5.
New York

Barnes & Noble, Inc. Fifth Ave. at 18th St., New York.
British Technical Books. Staples Press, Inc. Dept. PW. 70 East 45th St.,
   New York 17.
Circa Publications, Inc. Town Dock Road, New Rochelle.
Engineer's Book Service. 359-361 N. Central Ave., Valley Stream, L. I.
Franz Fager. 17 East 22nd St., New York 10 (specializes in Spanish,
   Portugese books).
Four Continents Book Corporation. 156 Fifth Ave., New York 10 (spe-
   cializes in Russian publications).
International Publications, Inc. 317 East 34th St., New York 16.
International University Booksellers, Inc. 103 Fifth Ave., New York 3,
   N.Y.
Walter J. Johnson, Inc. 111 Fifth Ave., New York 3.
Medical and Scientific Books. 1302 Second Ave., New York.
Albert J. Phiebig. Box 352, White Plains (International congresses a
   speciality).
Stechert-Hafner, Inc. 31 East 10th St., New York 3 (with offices in other
   countries also).
Taylor-Carlisle's Book Stores, Inc. 9 East 47th St., New York 17.

North Carolina

Straughans Book Shop. Greensboro.
Technical Publications. 334 South Elm St., Greensboro.

Ohio

W. E. Falk Company. 701 Main St., Cincinnati 2.

Oregon


Pennsylvania

The Book Center. 4000 Fifth Ave., Pittsburgh 13.
Technical and Scientific Book Center. 1206 Penn Ave., Pittsburgh.
Walleck's Book Store. 607 Wood St., Pittsburgh.
Washington

Puget Sound News Company. 1931 Second Ave., Seattle.
Shorey Book Store. 815 Third Ave., Seattle.

Washington, D. C.

William Ballantyne and Son. 1421 F Street, NW.
Government Publications Service. Bernan Associates. P. O. Box 5567,
Sidney Kramer Books. 1722 H St. NW.
Library Book Mart. 918 Woodward Bldg.
W. H. Lowdermilk & Co. 1418 F Street.

Wisconsin


CANADA

American News Company, Ltd. 474 Wellington St. West, Toronto.
Davies Book Co., Ltd. 3468 Melrose Ave., Montreal, Quebec.
Librairie Ducharmelt. 995 St. Lawrence St., Montreal.
Ryerson Press. 299 Queen St. West, Toronto.
W. H. Smith & Son (Canada) Ltd. 224 Yonge St., Toronto.

GREAT BRITAIN

Blackwell's. Broad St., Oxford.
Wm. Dawson & Sons. 16 West St., Farnham, Surrey.
W. Heffer & Sons, Ltd. 3 & 4 Petty Cury, Cambridge.
B. F. Stevens & Brown, Ltd. 77-79 Duke St., Grosvenor Square, Lon-
don W.1.
James Thin. 53-59 South Bridge, Edinburgh, Scotland.

FRANCE

Victor Attinger. 4 Rue le Goff, Paris 5.
Desforges Librairie des Sciences Pratiques. 29 Quai des Grands-
Augustin, Paris VI.
Librairie Hachette. 79 Boulevard Saint-Germain, Paris VI.
Johne-Albert Michaux. 13 Rue de Clos, Paris XX.

THE NETHERLANDS

E. J. Brill. Leiden.
Dekker en Nordemann, n.v. o.z. Voorburgwal 243, Amsterdam C.
Martimus Nijhoff. P. O. Box 269, The Hague.

SWITZERLAND

H. Freihofer Buchhandlung. Universitatstrasse 11, Zurich.

DENMARK

Einar Munksgaard. 6, Norregade, Copenhagen.

GERMANY

Otto Harrassowitz. Wiesbaden.
Haug et Cie., Wissenschaftliche Buchhandlung und Antiquariat. 79 ULM/
Donau, Stuttgart.

ITALY

Messaggerie Italiane, SRA. Via P. Lomazzo 52, Milan.
Santo Vanasia. 71 Via M. Macchi, Milan.

SPAIN

Afrodisia Aguado, S.A. Ayala 124, Madrid.
Librería Científica Medinaceli del C.S.I.C. Duque de Medinaceli 4,
Madrid.

BOOK DEALERS’ SERVICES

Some of the major book dealers in both the United States and other countries provide extraordinary services in sending notifications of newly published books to libraries. There is no charge, but if a library asks to have its name placed on such mailing lists there is tacit obligation to place some orders with
these sources of sometimes very helpful publication announce-
ments. The names of publishers are not usually supplied as a
device to encourage purchasing from the dealer.

Dealers who have established a program for this kind of
services are:

Stechert-Hafner, Inc. 31 East 10th St., New York 3, N. Y. Issues a
monthly publication titled Stechert-Hafner Book News that gives news
of book publishing and related activities and lists titles of new books
and periodicals in all scholarly fields.

Maxwell Scientific International, Inc. Documentation and Procurement
Centre, 122 East 55th St., New York 22, N. Y. Announced in 1962 ini-
tiation of a service of sending announcements of new titles on IBM-
type cards to libraries indicating interest in selected subject fields.
The cards are to be used for orders.

Blackwell's Booksellers, Broad St., Oxford, England. Publishes catalog
of New and Forthcoming Books in spring and autumn each year and
other cumulative lists.

of books categorized according to subject fields.

James Thin. 53-59 South Bridge, Edinburgh, Scotland. Sends occasional
announcements of recently published and forthcoming books. The
summaries of contents are very informative.

Otto Harrossowitz. Wiesbaden, Germany. Compiles at intervals a list
titled German Book Digest. A selective list of German books that in-
cludes all fields of science.

A unique service whereby books can be ordered from a deal-
er who will supply a complete set of the appropriate Library of
Congress catalog cards for each title is offered by Unidoc Serv-
ice, Box 923, Williamsport, Pa. This can represent a significant
saving of time for a library that must operate with a small staff.
However, there are some publications for which L.C. cards are
never made so that there would always be some cataloging that
would have to be done. The cataloging provided on this basis,
too, is of necessity very general and may not be adequate in
situations where it is desirable to analyze books in detail.

Some Dealers Specializing in Out-of-Print Books

United States

Argosy Book Stores. 114 59th St., New York 22, N.Y.
G. H. Arrow. 218 S. Fourth St., Philadelphia 6, Pa.
Barnes & Noble, Inc. Fifth Ave. at 18th St., New York, N. Y.
P. & H. Bliss. Middletown, Conn.
J. S. Canner & Co. 909 Boylston St., Boston, Mass.
The Arthur H. Clark Co. 1214 Brand Blvd., Glendale, Calif.
Paul Gottschalk, Inc. 21 Pearl St., New York 4, N. Y.
James C. Howgate. 18 S. Church St., Schenectady 1, N. Y.
International Art & Science Book Co. 192 Broadway, New York 7, N. Y.
Walter J. Johnson, Inc. 125 East 23rd St., New York 10, N.Y.
Leary's Book Store. 9 S. Ninth St., Philadelphia, Pa.
Mary S. Rosenberg. 235 West 108th St., New York 25, N. Y.
Schoenhof's Foreign Books, Inc. 1280 Massachusetts Ave., Cambridge, Mass.
Peter Smith (National Bibliophile Service). 321 Fifth Ave., New York, N. Y.
Stechert-Hafner, Inc. 31 East 10th St., New York 3, N. Y.
Stevens & Co. 1841 Broadway, Room 201, New York 23, N. Y.
Superbooks. P. O. Box 24, Gedney Station, White Plains, N. Y.
Zeitlin & Verbrugge. 815 La Cienega Blvd., Los Angeles 46, Calif.

Great Britain and the Continent

Wm. Dawson & Sons, Ltd. 16 West St., Farnham, Surrey, England.
H. J. Lyng Ejercert & Son. Lorstraeede 10, Copenhagen, Denmark.
address: 555 Woodside Ave., Berwyn, Pa.
Wepf & Co. Basel, Switzerland.

Many dealers handle both new and out-of-print books. Each one should be investigated to determine the exact service that can be rendered.

GIFTS

A word might be said for the acquisition of publications as gifts from scientists on the staff or others who no longer need personally owned materials. Though it may at times be a nuisance to be the recipient of stacks of unsorted items of little intrinsic
value, it can happen that among such discards there is the possibility that some very much needed bulletin or other out-of-print book or pamphlet will be found. It is worth while to accept such offerings.

ACCESSION RECORDS

Some kind of systematic record of acquisitions should be established and maintained scrupulously, usually on cards or slips. The previously mentioned order slip is well suited to this purpose. Occasionally recording is done in a large, ledger-type bound book in which sections can be assigned to the several classifications of the scheme used in the library. On its pages the classification number, date ordered, full title, author, publisher, date of publication, by whom requested, and when received are entered for each item. Another system is to enter each title as it is received, giving it a number by order of accession. This practice has been abandoned in many libraries, but it does have some merit and might be given consideration.

It is possible also to make use of one of the systems of recent development that apply manual or mechanical coding procedures. The simpler one is the Royal-McBee Keysort card, with the edges rimmed by holes that can be notched for coded meaning; these can be sorted by hand. There is as yet, at least up to 1962, limited use being made of machine sorting cards for this purpose although such application can be made as has been reported by Berry and Schultheiss (3, 4).

MISCELLANEOUS PUBLICATIONS

There are other kinds of publications in addition to books that are of great importance in a scientific collection. They vary widely in character and originate from many sources, and can be discovered only by diligent scanning of all kinds of listings and even advertisements. Brief notices appear in current issues of periodicals in inconspicuous places. Such publications are usually designated as pamphlets, and their value may be either ephemeral or permanent in a particular collection. Several types of publications are discussed in the following sections of this chapter, with advice concerning their location and acquisition.
Trade Literature

Trade literature constitutes one of the most valuable types of pamphlet material. It is comprised of publications put forth by companies for advertising purposes, usually presenting technical information concerning their products. Some companies issue regular trade journals, as mentioned in the chapter on periodicals; others publish pamphlets that sometimes reach the proportion of books. These can be located by careful reading of advertisements and special sections in certain of the technical periodicals that make a point of noting them. Mailing lists are maintained by some companies who will send their advertising literature to those who may be interested. Compilations of sources of important trade publications are published from time to time; for example, the source list done by Moore and Holleman (5). There is, in most instances, no charge for such publications. Some libraries prepare their own forms for requesting free materials. Similar provision should be made for acknowledgement of receipt of items asked for, and while this is not always necessary, it is a courtesy that builds good will.

A particularly important category of trade literature consists of product descriptions and specifications as contained in manufacturers’ catalogs. Because they are so numerous they are difficult to acquire and keep in order. Special aids for coping with them have been instituted in recent years. One system is the "Vendor-Specs-Microfile" service, designated as V-S-V-F, offering manufacturers’ specifications by industry groups. Vendors’ catalogs are supplied on microfilm with a Recordak Reader-Printer to permit immediate enlargements of selected pages. By 1962 the aircraft, missiles, and electronics fields were being offered with promise of others to be added in the near future. Details are available from Information Handling Service, Inc., 52 Vanderbilt Ave., New York 17, N. Y.

Starting in 1963 the publishers of Thomas' Register of American Manufacturers (Thomas Publishing Company, 461 8th Ave., New York 1, N. Y.) are making available in microprint the catalogs of most of the manufacturers represented in their annual list. These will be the Microfiche size, 4 by 6 inches, filed in a metal box. A portable reader, the model designed by the Microcard Corporation, is supplied with the file. Total cost is $250.00 a year.

A service in a limited field is that offered by Technical Information Corporation, 260 Glen Road, Glen Head, Long Island,
N. Y., in its Directory of Technical Specifications—Electronic Test Instruments, a three-volume compilation. An annual subscription is $250.00 with renewals at $190.00. If the whole directory is not needed, individual sections such as Signal Generators, Spectrum Analyzers, etc., can be purchased separately at varying prices.

Government Documents

Government documents are issued by national, state, and municipal bodies. The major number of those that are significant in a science-technology library are published by United States Government agencies, though some foreign and local government ones may be of interest. The location of United States Government publications requires knowledge of the special compilations that serve as guides to them as well as awareness of the unique functions of the agencies producing publications of potential interest. Some of these are:

- U.S. Atomic Energy Commission
- U.S. Bureau of Mines
- U.S. Department of Agriculture
- U.S. Geological survey
- National Advisory Committee for Aeronautics and Space Administration
- National Bureau of Standards
- Office of Naval Research

In each instance it is necessary to find out what the publication policies and practices of the agency are. All agencies provide indexes to their own publications in addition to the listing in the Monthly Catalog of United States Government Publications, which has been issued since 1895. Minor publications are not listed there, however. Every library must determine whether it requires complete files of certain series of titles, or whether only selected ones will be adequate.

For background information concerning government publications in general there are two books that are very helpful: The first is Boyd’s United States Government Publications: Sources of Information for Libraries, revised by Rips in 1949; and the second, Schmeckebier and Eastin’s Government Publications and their Use, 3d ed., revised in 1961.

U.S. Government publications are acquired generally in two ways, either by direct order to the Superintendent of Documents,
U.S. Government Printing Office, Washington 25, D.C. for items for which there is a cost; or, when there is no charge, by request to the issuing agency. Special subscription service for government publications is available from Government Publication Service, Bernan Associates, P. O. Box 5664, Washington 16, D.C. Standing orders may be placed for many series publications that appear irregularly.

The discussion thus far deals only with the standard publications issuing from agencies that have been established for a long time. Since World War II additional ones have come into being, the result of widespread government support of scientific research. The greater number comprise what is known as the Technical Report Literature. Such reports come from private companies doing research under government contract, from universities working under similar arrangement, or from government agencies themselves. Some are available to anyone needing them, others are "classified" and available only to those who can establish a "need to know." Usually only persons engaged in government contract research and who have "clearance" have access to classified report literature which is listed in Abstracts of Classified Reports.

Declassified reports are located by watching for the relatively few that are listed in regular publication listings, and, for the great majority, by becoming familiar with the special guides and indexes. Some of these are discussed in the following paragraphs. There are numerous guides to this literature, some of which are cited in the supplementary references at the end of this chapter. The chief publications listing or announcing them are discussed here.

U.S. Government Research Reports v.1 (1943) to date. This is a twice-monthly publication listing reports issuing from many sources. It is published by the Office of Technical Services of the U.S. Department of Commerce; items are ordered either from the Office or the Library of Congress, whichever is indicated. Each report is identified by a "PB" number; PB stands for Publication Board, a body that has lost any significant meaning since the days of World War II when it was established to review captured enemy documents. At that time a periodical titled Bibliography of Scientific and Industrial Reports was published as a means of listing and making available to the public those German and Japanese documents that were deemed to have possible importance to the defense program. This publication has had two changes of title,
first to Bibliography of Technical Reports, then, in 1954, to U.S. Government Research Reports.

Since July 1961 U.S. Government Research Reports has included as the first section of each issue the same list of unclassified reports as is contained in Technical Abstracts Bulletin, a publication that provides abstracts of government sponsored research reports which is described in a later section of this chapter. This inclusion in USGR makes many reports more readily available to scientists who might make use of information contained therein. Such reports are not classified, that is, they do not contain secret or confidential information, and the problem of locating them has been largely a matter of distribution, a situation that the Office of Technical Services has tried to overcome. It must be remembered that all reports are not of equal value and that they have not been subjected to the editing that is exercised by professional journals, but because some information published in them is eventually accepted by the journals, they merit attention.

Further help in using the report literature was provided by the establishment in 1962 of 12 Regional Technical Report Centers in locations well distributed in the United States. Reports from such agencies as National Aeronautic and Space Administration (NASA), Atomic Energy Commission (AEC), Department of Defense (DOD), Office of Naval Research (ONR), and many others are being contributed to this effort. The centers are located in the following places:

National Science Foundation—Office of Science Information Service

Federal System of Regional Technical Report Centers

Location of Centers and the Area Served by Each

1. Atlanta, Georgia. Georgia Institute of Technology (serving Alabama, Florida, Georgia, Mississippi, South Carolina, and Tennessee)
2. Cambridge, Massachusetts. Massachusetts Institute of Technology (serving Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont)
4. Dallas, Texas. Southern Methodist University (serving Louisiana, Oklahoma, and Texas)
5. Boulder, Colorado. University of Colorado (serving Colorado, New Mexico, North Dakota, South Dakota, Utah, and Wyoming)
6. Kansas City, Missouri. Linda Hall Library (serving Arkansas, Iowa, Kansas, Missouri, and Nebraska)
7. Los Angeles, California. University of California (Los Angeles Campus) (serving Arizona and Southern California)
10. San Francisco, California. University of California (Berkeley campus) (serving Hawaii, Nevada, and northern California)

_Nuclear Science Abstracts_ v. 1 (1948) to date. This abstracting journal, published by the U.S. Atomic Energy Commission, Office of Technical Information, provides abstracts of articles published in the standard journals and, more importantly, of the many reports emanating from AEC sponsored research. Only unclassified reports are abstracted. There are excellent indexes, especially since 1959, and explicit directions for procuring copies of reports or for consulting them at Government Depository Libraries are provided.

_Technical Abstract Bulletin_, 1944 to date. This publication, issued by the Defense Documentation Center for Scientific and Technical Information (DDC) which was called Armed Services Technical Information Agency (ASTIA) prior to 1963, publishes abstracts of reports resulting from government-sponsored research. It has had two changes of title, having been published initially as _Technical Information Pilot (TIP)_ , changed to _Title Announcement Bulletin_, then to the present title, or TAB. It is
available only to persons holding government contracts for research. TAB provides abstracts of both classified and unclassified documents, but the full documents of classified publications are available only to persons qualified to see them. Each report has a serial number prefaced by the letters "AD" identifying it as a report issued under the aegis of ASTIA. It is difficult to use the back volumes of TAB for searching because of the lack of indexes; only since 1960 is there a quarterly cumulative index.

*Scientific and Technical Aerospace Reports*, v. 1 (1963). Described as a "semi-monthly abstract journal with indexes"; this is published by the National Aeronautics and Space Administration as a means of providing a guide to the publications of direct concern to its programs. It appears in coordination with *International Aerospace Abstracts* which covers the standard book and periodical literature.

*Abstracts of Classified Reports*, v. 1 (1944) to date. Only holders of government contracts involving classified material have access to this listing of classified reports. Some classified reports are eventually declassified, and are then listed in the open publications.

The report literature poses very special problems, though they are not insuperable, once the proper guides to them are located. Some of the helpful ones relating to atomic energy reports are:


These publications are obtainable from the Office of Technical Information Extension, P.O. Box 1001, Oak Ridge, Tennessee.

Jackson's summary of ways of obtaining research and development reports from the government includes a chart of the major agencies as they were organized in 1953 (6). Since that date there have been changes but the article is still a good guide to the over-all situation.

There is difference of opinion among scientists as to the significance of the report literature. Some contend that it is time-wasting to try to keep up with it since any information that has lasting importance will eventually be published in standard journals. According to Randall (7) technical reports in the field of aeronautics have a median life of only 1.5 years; in physics
it was found to be somewhat longer, or 2.4 years. Burton and Green (8) substantiated this two years later by stating that "the reports do not constitute a significant portion of the cited physics literature." While there may be necessity to acquire reports, it may be satisfactory not to retain them for more than a couple of years.

It could be that the reason why reports are not cited more extensively is that they are not readily accessible. Gray and Rosenberg (9) published evidence in 1957 that only about one half of the significant data contained in government sponsored research reports was published within two to three years. Progress in placing report files in the 12 centers scattered across the United States will provide greater opportunity for their consultation.

State and Municipal Documents

The occasional state or municipal agency document that may be wanted will be noted from published announcements in periodicals that list such items. If it is known that there is likelihood of needing to watch for such publications, subscription may be carried to the Library of Congress's Monthly Checklist of State Publications. Knowledge of investigational work in progress or of prior publications of certain agencies will serve to indicate sources to be watched. They may be ordered directly from the publishers, or a dealer may undertake to procure them.

Documents in Countries Other than the United States

Documents issued in other countries are announced in the journals published there. There are also official lists similar to those published for U.S. agencies. In Great Britain, the Department of Scientific and Industrial Research issues lists of publications of the individual units of which it is comprised. There is also a Government Publications Monthly List issued by Her Majesty's Stationery Office, London. British publications may be ordered in the United States from British Information Service, 30 Rockefeller Plaza, New York 30, N. Y.; additional offices are maintained in Washington, D.C., Chicago, and San Francisco. Canada, too, has published important bulletins through its Department of Mines, National Research Council, and other agencies. Inquiries should be made to central government offices for information concerning possible publications.
In situations where documents are of particular importance, it is advisable to be aware of the compilations that have been provided by Wilcox (10). He has kept record of new guides and aids as they have been issued and has made their finding easier for others.

Patents

Patents constitute a unique category of government documents which are frequently required in technical libraries. If current patents pertaining to specific interest are to be selected and obtained, the Official Gazette of the United States Patent Office must be subscribed for and read weekly. Printed copies of patent specifications can best be ordered by means of coupons purchasable from the Commissioner of Patents, U.S. Patent Office, Washington 25, D.C., costing 25 cents each. Or, if large numbers of patents are needed, it is a simple convenience to maintain a deposit account with the Office. Photostat copies of patents for which the printed supply is exhausted may be ordered against this account as may coupons and photostat copies of foreign patents.

Where interests are well defined, subscriptions to certain classes of patents can be entered, these to be determined from the Manual of Patent Office Classification. Each week the patents issued in these specific classes are automatically forwarded to subscribers.

Foreign patent developments may have to be watched also, and copies of specifications procured. They can be located from official publications of other countries corresponding to the Official Gazette or from the technical journals that carry announcements, sometimes with abstracts. An excellent journal is Industrie Chimique Belge that provides listings of Belgian patents in the field of chemistry. Chemical Abstracts cites important patents granted in all countries in which there is an active chemical industry, though it cannot be depended upon for citing all chemical patents. Photocopies can be obtained from the U.S. patent office where files from all countries that issue printed copies are maintained. French, German, and British ones are also in some of the large public libraries, such as the New York Public, from which photostat service is very prompt. Chemical Abstracts carries in the January 10 issue of each year a list of foreign patent office addresses, telling also whether or not printed copies are available.
Standards and Specifications

Published standards for various procedures and materials are vitally important in some organizations, and must be obtained for some libraries. There are both national and international organizations concerned with standardizing activities, government bureaus, trade associations, and even individual companies that set up standards. In the United States, the National Bureau of Standards carries out a broad program of investigation, and develops national standards. The largest nongovernmental organization in this field in this country is the American Society for Testing and Materials, 1916 Race St., Philadelphia 3, Pa., which keeps up to date a series of standards on hundreds of materials. The American Standards Association, 10 East 40th St., New York 16, N.Y., is the headquarters for gathering information on standards on an international scale, and is prepared to identify almost any standard. It publishes an annual Catalog of American Standards. A list of publishers of standards is included in the appendix to this book.

Translations

Translations of articles and even books from foreign languages into English are frequently required in libraries serving fundamental scientific research, and are occasionally of interest with respect to technical applications. When a translation is requested the first step should be to try to determine whether one has already been made. The most comprehensive listing is the periodical Technical Translations published by the U.S. Department of Commerce, Office of Technical Services, initially published by Special Libraries Association as Translation Monthly. Its purpose is to serve as a clearinghouse and make available translations that are kept on file at the Library of Congress and John Crerar Library, a project sponsored by Special Libraries Association. There is no relationship between the date of a published item and its appearance in Technical Translations so that a complete search of all volumes should be made. The best search procedure is to start with current issues and work back.

In Great Britain the Department of Scientific & Industrial Research and Aslib maintain files of translations. There are some translating agencies that work in one subject field and have accumulated stocks of translations that are available for a much lower price than the cost for an original order. An excellent guide to
translations is the SLA publication Translators and Translations, Services and Sources edited by Kaiser (1959), 2d ed. in preparation 1962. In the same year the U.S. Department of Health, Education and Welfare published another pamphlet guide titled Scientific Translations, A Guide to Sources and Services. The agencies specializing in particular fields should be investigated if there is regular need for translations.

Some of the well-established sources for translation are:

Henry Brutcher, P.O. Box 157, Altadena, Calif. Field of metallurgy only. Maintains stock, and sends lists to prospective customers.

Consultants Bureau Enterprises, Inc. 227 West 17th St., New York 11, N.Y. All languages, some complete Russian journals to English, individual articles, will supply translated tables of contents.

Associated Technical Services. P.O. Box 271, East Orange, N.J. Many languages, will do abstracts, bibliographies, can supply translated tables of contents of journals.

John Crerrar Library. Research Information Service. 35 West 33rd St., Chicago 16, Ill.

Carl Demrick. Technical Translations. 53 South Broadway, Yonkers 2, N.Y. Translations to order, many languages.

Morris D. Friedman, Inc. Foreign Technical Translations. P.O. Box, West Newton 65, Massachusetts. Can supply lists of translations in stock.

Werner Jacobson. 7939 West 98th St., Oaklawn, Ill. Many languages, specializes in chemistry, physics.

Charles A. Meyer & Co., Inc. Translations. Lime Rock, Conn. Translations to order from any languages.

Engineering Societies Library. 345 East 47th St., New York 17, N.Y. Accepts orders for translations from almost any language, maintains file of several thousand.


Kreske-Hooker Science Library. Wayne State University, Detroit 2, Michigan. Specializes in chemistry, but will undertake all scientific subjects. Maintains file.

Brown (11) has published the results of a survey of the situation with respect to translations as it stood in 1962. The purpose of the investigation was to try to determine the broad pattern of interest and activity in this area as a guide to programming future plans for the SLA Translation Center. Results indicated a continuing need for such service.

Dissertations and Theses

Much potentially valuable information appears in doctoral dissertations and masters' theses written by candidates for degrees in colleges and universities. This cannot often be found through regular abstracting and indexing publications because it is not published. Some of the research results issuing from this source do get into print eventually, but usually in a condensed form and long after the work has been done. It may be worth some effort to locate these sources.

Doctoral dissertations written at universities in the United States are listed in a periodical titled Dissertation Abstracts published by University Microfilms since 1953. From 1933 to 1957 the Association of Research Libraries, published annually Doctoral Dissertations Accepted by American Universities, D. B. Gilchrist et al., editors. Some institutions publish their own bulletins of abstracts of dissertations. Dissertation Abstracts includes chiefly those from the universities that cooperate in sending their dissertations to University Microfilms to be microfilmed, and it has indexed certain others. Microfilm or Xerox copies may be purchased.

Stevens (12) has compiled a comprehensive list of sources for locating dissertations written in the United States and other countries.

Some publications that provide information concerning dissertations in specific fields are:

Directory of Graduate Research: Faculties, Publications and Doctoral Theses in Department or Division of Chemistry, Biochemistry and Chemical Engineering at United States Universities. Committee on Professional Training, American Chemical Society. 1155 Sixteenth St. N.W., Washington 6, D.C. Published biennially since 1955. Includes authors and titles of "doctoral theses."


Some universities will lend copies of their dissertations. Others have had to stop this practice. In certain instances the only way of getting a copy of a dissertation is to write to the institution and ask for the price of a microfilm, then send cash with the order.

Masters' theses are more difficult to locate because there has been no listing of them anywhere. Usually the only source is the card catalogs of the universities at which they were written. However, in 1960, University Microfilms initiated a move to attempt to start a publication listing them. The announced title is Masters Abstracts. Purdue University has published lists of certain M.S. theses in science and engineering starting in 1958.

The results of research reported by students in universities in other countries can sometimes be of possible concern, and likewise difficult of access. Some periodicals carry announcements and abstracts as, for example, Angewandte Chemie, which cites titles of those done in German institutions, and Industrie Chimique Belge, which lists Belgian ones in the field of chemistry. In Great Britain, Aslib has published lists of dissertations accepted by universities in Great Britain and Ireland.

Reprints

It is sometimes desirable to obtain reprints of important papers published in journals either as extra copies or, if a journal is not of sufficient interest to justify subscription, the occasional article that is needed can be obtained from the author. Acknowledgment of receipt is a courtesy that should not be neglected, and a refund of postage is even more likely to be appreciated. The institutional connection of the author usually appears with his name in the journal. Reprint-request envelopes have been devised whereby the person making the request automatically pays the postage upon receipt of the item.
Company Reports

Though reports written as the result of research in industrial organizations are not generally available, there are occasions when a company is willing to lend them. This might be more likely if the requester is not in direct competition, and a polite inquiry could be rewarding.

CONCLUSION

The value of a published item cannot be judged from its physical form or its origin. Vital facts are to be found in all kinds of publications ranging from the most insignificant-looking pamphlet to the most pretentious encyclopedic treatise. Finding and procuring the information in print that will anticipate the requirements of a particular enterprise require wide familiarity with all sources of information and constant vigilance to see that nothing significant escapes notice.

BIBLIOGRAPHY


SUPPLEMENTARY REFERENCES


Periodicals constitute the most important part of a science library's resources because they publish the immediate results of experimental research and announcements of technical developments. A continuous record of scientific advance is presented in these journals, though not as a story that is easily read since related information is frequently scattered in numerous papers. The larger the collection of periodicals in one library, particularly of long runs of important titles, the more of the story there will be at hand to be put together, and it is for this reason that periodicals, in contrast to most books, appreciate in value with time. Consequently they merit the most careful selection and subsequent preservation. Recognition of this is evidenced in the policy of many libraries of spending a greater portion of the budget for subscriptions to periodicals and purchase of back files than for large numbers of books. Major subscriptions should never be affected by a cut in the budget with the expectation of their being purchased in future more prosperous times. It is often impossible to acquire certain issues at any price. Books, on the other hand, may not go out of print so rapidly and are more likely to be available through the used book market. The acquisition and servicing of periodicals is regarded as a serious responsibility by those who are fully aware of their significance. The periodical files available in a science library may well be the most accurate indication of the worth of the whole collection.
DEFINITION AND CHARACTER OF PERIODICALS

Several types of serial publications belong in the general category of periodicals. They are defined as continuing titles, issued in parts at intervals that are usually but not always regular, and to which subscription is made in advance. They continue publication for an indefinite period of time. A few titles that began in the early 1800s are still being published. Many are issued as proceedings or transactions of the professional societies or are sponsored by such groups; some issue from government bureaus; others are published as independent enterprises, and a few appear as house organs of companies as dignified good will advertising. The important scientific journals have distinctive characters, and maintain definite editorial policies over long periods of time. There are those that publish only brief reports of original research; others specialize in exhaustive reviews of work that is in an active state of development. Still others are concerned with the reporting of the productive applications of ideas that have achieved fruition after lengthy experimentation in the laboratory. Then, to provide means of locating the information published in these many journals, there are the abstracting and indexing publications. As records of progress, whatever their form, the scientific and technological periodicals are indeed living organs for the transmission of information, comprising the groundwork for the advancement of human progress.

This chapter is concerned primarily with the publications usually referred to as periodicals or journals. Those titles that are published serially as annual reports, yearbooks, "advances in" or "progress in" continuations may be treated in a library in a similar manner or they may be considered as part of the book collection. Standing orders can be placed for many of them, and their receipt recorded in the same file as that of the journals. However, if they are not published at regular intervals, some few may require special attention and watching to be certain of their receipt.

SELECTION OF TITLES FOR SUBSCRIPTION

The selection of titles for a science-technology library requires study of the needs to be met. The objectives of the whole organization and the library's potential role in fulfilling them
must be kept in mind. Procedures have been developed by Hooker (1), Voigt (2), and others to determine the actual use of specific periodicals by the counting of references to them, a somewhat tedious process but one productive of valid results. It is not necessary for an individual library to undertake such a detailed investigation in order to determine which journals should be purchased, however, because Brown (3) has published in 1956 an excellent survey of scientific serials in a monograph, Scientific Serials bearing as subtitle Characteristics and Lists of Most Cited Publications in Mathematics, Physics, Chemistry, Geology, Physiology, Botany, and Entomology. This is the most comprehensive study of periodicals in these fields that is available, and from its lists a start can be made toward determining those titles that will be wanted in a particular library.

The basic list of journals required will be obvious to the librarian who has knowledge of and experience in the subject areas involved. Advice and suggestions should be sought from key persons in the group who will be making most use of the library's resources. It is likely that some of the less frequently cited journals will be among those needed in certain situations. The listings of essential publications in the specific subject fields that comprise the Appendix of this book will be helpful in the process of title selection. If a broad program of fundamental research is to be served, the publications of the appropriate learned societies will certainly head the list. Other related journals, perhaps dealing with the marketing of products, business economics, or any other possible direction of interest should be included. When the library is in operation, note should be made of articles requested from journals that are not in the library, and when it becomes evident that certain titles are needed, they should be added.

Abstracting and indexing periodicals that cover the subject fields in which there is interest must be procured also. The scope of the library is increased materially by these publications because they bring to hand coverage of obscure and fringe-interest publications in which occasional articles of importance to the research or development program do appear, but not frequently enough to warrant subscription. In 1950 there were about 50,000 scientific and technical periodicals being published. By 1960 the total number approached 60,000, well on the way to Brown's (3) prediction of over 100,000 by 1979. Obviously no one library can subscribe to more than a few hundred at best, and must depend upon indexing and abstracting services for information published in many others.
After making certain that first needs are being met, before closing the subscription list it may be wise to review the situation as a whole to determine whether some additional types of publications should be added. Members of the technical sales department of the organization, for example, should perhaps be served by having certain business publications in the library. It is usually advisable to subscribe to at least one metropolitan daily newspaper, such as the New York Times, as well as The Wall Street Journal or American Metal Market, in order to watch announcements of business happenings. Some few magazines of quite general content, such as those reporting political and financial news, may serve a useful purpose if they are provided. The cost of these additional items will be small in proportion to the total amount spent for subscriptions, and they may prove to be worth more than this expense in promoting the use of the library. It is good practice to review the whole list annually so that new titles can be added and those of lesser value removed.

There are several compilations listing the titles of scientific and technical periodicals. Consultation of one or more of these in the process of setting up the subscription list is likely to be profitable. The most important of these lists are:

Scientific Periodicals Only

The American Chemical Society. List of Periodicals Abstracted by Chemical Abstracts. Chemical Abstracts Service, Ohio State University, Columbus, Ohio. Revised every five years, annual supplements. In 1961 about 10,000 titles were listed, giving names with addresses of publishers, prices, locations of files.


Pflucke, Maximilian, and Hawelek, A., eds. Periodica Chimica; Verzeichnis der im Chemischen Zentralblatt referierten Zeitschriften mit den entsprechenden genormten Titelabkürzungen. 2 ed. Berlin, Akademie-Verlag (1952), 411 p. This is the list of periodicals abstracted by Chemisches Zentralblatt.


Southern Research Institute, Inc. Directory of Engineering Data Sources. Atlanta, Georgia (1948). Gives an extensive listing of engineering periodicals, indexed according to subject.


World Medical Periodicals. 10 Columbus Circle, New York 19, N. Y. World Medical Association (1957).
It is of paramount importance that the indexing and abstracting publications covering the areas of subject interest be discovered and purchased, the prior files as far back as may be thought necessary. Some lists of abstracting services are given here. Reference is directed also to the Appendix of this book where the publications pertinent to the subject fields represented are indicated.

✓ Lists of Abstracting and Indexing Publications

✓ Gray, Dwight E., and Bray, Robert S. Abstracting and indexing services of physics interest. American Journal of Physics 18, 274-299 (May 1959); 18, 578-579 (December 1950). Reprinted and issued by the Office of Technical Services as PB99951.


Inclusive Lists of Periodicals

British Union-catalogue of Periodicals; a Record of the Periodicals of
the World, from the Seventeenth Century to the Present Day in British
Bowker (1962). This classified list is an aid in determining titles in
specific subject fields.
Union List of Serials in the Libraries of the United States and Canada.
ments through 1949, subsequently carried on by the following title:
New Serial Titles, Joint Committee on the Union List of Serials. Wash-
ington, D.C., The Library of Congress. Cumulation for 1950-1960,
annual to date. Titles with library locations of newly issued serials.

ACQUISITION OF PERIODICALS

Periodicals are acquired usually by subscription, occasion-
ally through membership in professional societies, and some-
times by gift or exchange. Subscriptions can be placed directly
with individual publishers of titles, but it is more efficient to
put the whole list in the hands of an agency whose business it is
to handle such matters. One order written annually or established
on an "until forbid" basis eliminates the many orders and bills
for individual subscriptions. There are a few publications that
cannot be handled through dealers and these must, therefore, be
placed directly. When initiating the subscription list, it may be
desirable to submit it to more than one agency for competitive
bids, though it is not likely that there will be significant differ-
ences in the prices quoted. More to be sought is efficient serv-
vice. Some agencies will take care of both domestic and foreign
periodicals, or it may be preferable to use a dealer located in
another country for titles published abroad.

All subscriptions should be established so that they expire
at the same time of the year, usually with December issues since
most volumes are completed at that time. However, there may be
good reason for paying for renewals at another time of the year,
and this can be arranged. Subscription renewals and titles to be
added or deleted should be decided upon well in advance of the
January 1 date. It is a good practice to have the subscription list
for the following year completed by September or October at the
latest.

It may be obligatory for the library to process all orders
through a purchasing department, in which case the librarian
will want to discuss the placing of subscriptions with the head of that department. The preferable procedure is for the library to deal directly with those from whom subscriptions are ordered because of the occasional difficulties that arise when individual issues are not received. Strieby (4) has described a situation where a transfer of responsibility for the placing of subscriptions from a central purchasing office to the library was effected. The benefits to everyone concerned were immediately recognized, and there was no thought of returning to the previous system.

Where large numbers of subscriptions are carried, several hundred or so, the possibility of using punched cards, the types in common use with IBM or Remington Rand sorting equipment, might be considered. If time is available for use of the library of machines already installed in the organization, this application is worth investigating. McCann (5) has described procedures using such a system for renewing subscriptions as well as for handling the details of routing periodicals. The suppliers of the equipment will give help in using the machines for this purpose.

Periodicals published in certain countries may pose problems in their procurement that the ordinary agencies cannot handle. This is sometimes the case for Russian and Far Eastern titles. The dealers that specialize in these areas should be used.

A list of some agencies handling periodical subscriptions is given here. There are doubtless others in various localities that are equally satisfactory. Certain book stores handle subscriptions. It will be wise, however, to investigate to be certain that any such vender has adequate facilities to handle whatever business may be offered to him. Certain agencies also supply back files.

Subscription Agencies—A Selected List

United States

Clark Subscription Agency. 400 West Madison St., Chicago, Ill.
Cross World Books and Periodicals. 333 S. Walker Drive, Chicago 6, Ill.
F. W. Faxon Company. 83 Francis T., Boston 15, Mass.
Four Continent Book Corporation. 156 Fifth Ave., New York 10, N. Y.
(specializes in Russian titles)
Hanson-Bennett Magazine Agency. 180 N. Wabash Ave., Chicago 1, Ill.
International Art & Science Book Company. 192 Broadway, New York 7, N. Y.
Walter J. Johnson, Inc. 111 Fifth Ave., New York 3, N. Y.
Victor Kamkin, Inc., Bookstore. 2906 14th St., N.W., Washington, D.C.
Maxwell, Meier & Holmes Co., Division Maxwell Scientific International
Inc. 13-05 44th Ave., Long Island City 1, N. Y.
The Moore-Cottrell Subscription Agencies, Inc. North Cohocton, N. Y.
Steichert-Hafner, Inc. 31 East 10th St., New York 3, N. Y.
The Turner Magazine Agency, Inc. 235 Park Ave. South, New York 3,
N. Y.
Charles E. Tuttle Co. Rutland, Vermont (specializes in publications from
the Far East).

Canada

Davies Book Co., Ltd. Box 1300, Station N D.G., Montreal, Quebec (spe-
cializes in Russian titles).
William Dawson Subscription Service. 60 Front St., Toronto.
Gordon & Gotch Ltd. 43 Victoria St., Toronto.

Great Britain and the Continent

Isa Brauer. 8 Saar Strasse, Berlin-Fridenau, Germany.
Dekker en Nordemann, N.V. o.z. Voorburgwal 243, Amsterdam C, Hol-
land.
B. F. Stevens & Brown Ltd. 77-79 Duke St., Grosvenor Square, London
W.1, England.
Swets & Zeitlinger. Keizersgracht 471, Amsterdam C, Holland. Office in

Some few periodicals are available on current subscription as either microfilm or microprint copies. This form of publica-
tion can be entirely satisfactory as a way of accumulating files
because it saves storage space, and if certain titles are not con-
sulted frequently the inconvenience, if any, is minor. The process
and application of microreproduction is in such an active state
of development that it should be watched and quick advantage taken
of improved methods. The availability of microprint copies may
be learned from the announcements and catalogues of the Micro-
card Foundation, the publishing body of which is Microcard Edi-
tions, Inc., 901 Twenty-Sixth St., N.W., Washington 7, D.C. The
1962 edition of its catalogue, Guide to Microforms in Print, lists
all publications microreproduced from commercial publishers in
the U.S.A. Davison (6) has compiled annually, since 1956 and
through 1959 at least, excellent reviews of progress in the devel-
opment of all aspects of microtext, citing titles available.
Tilton (7) has provided A Union List of Publications in Opaque Microforms, published in 1959 with promise of keeping it up to date.

Memberships in societies that publish needed journals can be carried in the name of the librarian or other staff member if he be qualified, or even in the name of a staff member of another department. If there is a choice, there is wisdom in keeping such memberships in the library because it is sometimes difficult to impress upon individuals other than library staff the necessity for giving publications to the library promptly. In some instances it is preferable to include certain of the professional society publications with the regular subscription list. In others, the saving of money or better service in the receipt of journals will warrant the extra trouble of arranging for payment of memberships.

Some house organs, the serial publications published by industrial firms, should be available in libraries in which the reference sources must be as complete as possible. Though the primary purpose of such publications is to build good will or to advertise products, a proportion of them contain information of sufficient interest and importance to be covered by the abstracting journals. Many may be procured simply by requesting that the name of the library be added to the mailing list; others are issued for limited distribution only, and occasionally there is a regular subscription charge. Titles of house organs and publishers thereof can be located in these lists:

Market Data Book, annual issue of Industrial Marketing. 100 East Ohio St., Chicago, Ill.

Extraordinary Subscription Services

There are a number of unique services, available on a subscription basis, that can be of inestimable value. Their common purpose is to aid in getting information from the original journal literature to the potential user by a method that is in one way or another more expedient than the usual abstracting periodical. They may provide faster service or more selective and detailed abstracts. A list of significant ones is included in Chapter X of this book in connection with the process of disseminating current-
ly published information to the clientele of the library. Those of possible interest to the organization's fields of activity should be seriously considered. Though they may appear to be expensive, they may more than repay their costs if they bring information to attention more quickly than it is discovered through ordinary channels.

RECORDS OF PERIODICALS

There are several systems for keeping records of the receipt of single issues as well as the cumulated holdings of periodicals, any of them adequate if kept meticulously. From the placing of the order to the ultimate binding of a completed volume, the location of every issue of a journal must be known. Even the date of receipt of an issue can be important, particularly when patent situations are involved. Periodical files constitute a useful resource in direct proportion to their completeness; every issue of every volume is like a link in a chain, each of which is a vital entity. In establishing the system for record keeping, provision should be made for nothing the following items of information concerning each title:

Exact title
Where and when ordered; period covered by order
Current volume number; year; indication of receipt of individual issues; how index is published. Dates of receipt of issues should be noted
Notations of special issues
Record of volumes in the library; where shelved

Printed forms for keeping these records are available, and their use is recommended even for collections of fewer than a hundred titles. The visible-file type such as that provided by Remington Rand (Kardex) and Demco is a convenient system, this being an arrangement of overlapping holders for the cards that leaves the edges exposed. Titles are typed on these visible portions. Examples of these cards are shown in Figures 13 and 14. Cabinets for trays of cards or book-type holders are supplied. The cabinets with trays holding about 35 cards each are better adapted to an expanding subscription list. Descriptions of this equipment and addresses of suppliers are given in Chapter IV.

A slightly different system is one using the Shif-Dex binder which is very compact for large numbers of titles. Pliefke (8) has
described the use of this binder in a medical library. An example of a record form is given as Figure 15.

![Periodicals Selection, Acquisition, Recording](image)

<table>
<thead>
<tr>
<th>TITLE</th>
<th>FREQUENCY</th>
<th>RENEWAL/DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO. OF COPIES</td>
<td>SOURCE</td>
<td>PRICE</td>
</tr>
<tr>
<td>PUBLISHER/AGENT</td>
<td>ADDRESS</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VOL.</th>
<th>PERIOD</th>
<th>DATE OF INV.</th>
<th>DATE APPROVED</th>
<th>REQ. NO.</th>
<th>AMOUNT</th>
<th>VOL.</th>
<th>PERIOD</th>
<th>DATE OF INV.</th>
<th>DATE APPROVED</th>
<th>REQ. NO.</th>
<th>AMOUNT</th>
</tr>
</thead>
</table>

Fig. 13—Order record form for periodicals (Kardex).

For a very small number of titles, in libraries starting their operation in a limited way, plain index cards can be set up for recording the required information. Also, the library supply houses offer printed cards of standard catalog size that may be adequate. The more highly developed systems will, of course, give greater satisfaction, and the relatively small expense of instituting them is warranted.

Each issue of a periodical should be stamped on the cover with the name of the library and any other identifying mark that may be desirable. The date of receipt may also be stamped thereon for the benefit of the patent attorney.

It is usually necessary to provide a list of holdings and locations of periodicals in a place where users of the library can find it readily. This may have to be a duplicate of the listing used for the official record. However, in a small operation the clientele
Fig. 14—Monthly periodical check-in record for periodicals (Demco).

can use this too, without inconvenience to either purpose. When a second listing is required, some thought should be given to the choice of using a card system or making a list to be duplicated for wide distribution, Nicholson and Thurston (9) have described a procedure for compiling a list of periodicals and serials in the M.I.T. Library using IBM punch cards. While this method is a convenience in some ways, cards provide the possibility of keeping the record up-to-date. One excellent device for this is a rotary file, a revolving wheel carrying cards that are easily removed and just as easily filed. Such equipment is described in Chapter IV. An additional aid to persons searching for bound files of journals is to have lists of titles attached to the ends of the ranges where they are shelved.

ACQUISITION OF BACK FILES OF PERIODICALS

In the process of planning the library service and establishing the subscription list for periodicals, some thought will have
been given to the requirements for back files. The titles to be purchased should be chosen as carefully as possible because they represent a continuous expense in providing shelf space. In some instances it may be satisfactory to acquire the prior 10 years only of certain publications. However, libraries serving laboratories where serious research in organic chemistry is undertaken, for example, will have to acquire complete files of such titles as the Chemische Berichte and the Journal of Organic Chemistry. If only short runs of titles are to be kept in the library, the intention will be to procure photocopies, microfilm or photostat, of the occasional article that will be needed from earlier volumes.

Consideration should be given to procuring long runs of the back files of periodicals in either microfilm or microprint form. Mention has already been made of this in connection with current subscriptions, but it is even more significant for files that will not be consulted often. The sources for locating titles in these forms are cited in the aforementioned section of the chapter.

Files of periodicals in the originally published form can be purchased from dealers who specialize in supplying them. It is not often that they can be obtained from the publishers. The list of titles needed should not be sent to more than one dealer at a time, though it may be desirable to submit it to more than one
before placing orders. If several dealers, particularly in the same city, receive simultaneous queries for certain titles, false competition may increase prices. A selective list of representative dealers in back files of periodicals is given here. Some of these agencies handle both current subscriptions and back files. This is true of certain of the subscription agencies listed on pages 132 and 133.

Dealers in Back Files of Scientific and Technical Periodicals

United States and Canada

Abraham’s Magazine Service. 56 East 13th St., New York 3, N.Y.
G. H. Arrow. 218 S. 4th St., Philadelphia 6, Pa.
Ashley-Ratliff Corporation. 27 East 21st St., New York 10, N.Y.
Robert Bentley, Inc. 993 Massachusetts Ave., Cambridge 38, Mass.
The Arthur H. Clarke Co. 1214 S. Brand Blvd., Glendale 4, Calif.
Luther M. Cornwall Co. 261 Broadway, New York 7, N.Y.
Davies Book Co., Ltd. Box 1300, Station N.D.C., Montreal, Quebec, Canada (Russian publications).
Paul Gottschalk, Inc. 21 Pearl St., New York 4, N.Y. (Publications from European countries).
James C. Howgate. Star Route, Rotterdam Junction, N.Y.
International Art & Science Book Co. 192 Broadway, New York 7, N.Y.
International University Booksellers, Inc. 103 Fifth Ave., New York 3, N.Y.
Walter J. Johnson, Inc., and Johnson Reprint Corporation. 111 Fifth Ave., New York 3, N.Y.
Kraus Periodicals, Inc. 805 Mamaroneck Ave., N.Y., and Kraus Reprint Corporation. 16 East 46th St., New York 17, N.Y.
B. Login & Sons, Inc. 29 East 21st St., New York 10, N.Y.
Mapleton House, Inc. 5415 17th Ave., Brooklyn 4, N.Y.
Maxwell, Meier & Holmes, Inc. 13-05 44th Ave., Long Island City 1, N.Y.
Minerva Booksellers, P.O. Box 1345, Baltimore 3, Md.
The Periodical Mart. Box 85, Bushwick St., Brooklyn 21, N.Y.
Periodicals Supply Service. 207 West 29th St., Baltimore 11, Md.
Schoenhof’s Foreign Books, Inc. 1280 Massachusetts Ave., Cambridge 38, Mass.
Kurt L. Schwarz. 450 North Beverly Drive, Beverly Hills, Calif.
Peter Smith (National Bibliophile Service). 321 Fifth Ave., New York, N.Y.
Stechert-Hafner, Inc. 31 East 10th St., New York 3, N.Y.
Other Countries

Wm. Dawson & Sons, Ltd. 16 Pall Mall, London S.W. 1, England (has re-printed some titles).
Dekker en Nordemann N.V. o.z.-Voorburgwal 243, Amsterdam C, Holland.
Otto Harrassowitz. Wiesbaden, Germany.

There are, of course, many other dealers able and willing to provide good service in locating files of needed periodicals, and it will be wise to investigate local possibilities.

Another way of finding back files, if there is no urgency in getting them, is to watch the advertising columns of such journals as Science and Chemical & Engineering News. Individuals who want to dispose of their own journals, particularly those acquired through memberships in professional societies, frequently offer sets at good prices.

Another aspect of the buying and selling of periodicals is that of the library itself as seller. Libraries often find themselves to be recipients of files of periodicals as gifts that are not needed for their own shelves either at the moment or in the foreseeable future. Lists of these titles can be submitted to a dealer who will quote prices for what he can use. Participation in duplicate-exchange activities with other libraries in programs sponsored by professional library association groups such as Special Libraries Association, or contributions to the United States Book Exchange are other ways of channeling valuable journals to libraries that need them to complete their own files.

There may still be difficulty in locating issues of journals published during the years of World War II. Photo-offset copies were made of some titles by J.W. Edwards of Ann Arbor, Michigan. However, all issues that are not readily available could not be duplicated for this project because of too limited demand for some titles. In an article in Research for April 1948 Cooper (10) gave this information: “Complete runs of German periodicals covering the war period are to be found in Dutch, Swedish, and
Swiss libraries, and photocopies may be purchased through the reproduction centers in the Hague (Federation Internationale de Documentation) Stockholm (Tekniska Hogskope) and Zurich (Eidgenossische Technische Hochschule)." It is likely that there will eventually be at least one copy of all but the most obscure publications available in the United States. The Library of Congress makes every possible effort to procure them.

Another source for the hard-to-locate periodical is the United States Book Exchange, Inc., 3335 V St., NE, Washington 18, D.C., the organization mentioned previously as a place to send duplicate periodicals. It is sponsored by library and professional associations to serve as a clearing house for the exchange of printed materials, principally periodicals. Any library may become a participant in this enterprise by contributing its unwanted items, thereby establishing credits against which it may place requests for publications that it needs.

PRESERVATION OF PERIODICAL FILES

If periodical files are to be preserved the individual issues must be handled as carefully as their full use allows, then brought together as complete volumes and treated according to the significance of each title in a particular situation. Some will be given sturdy commercial bindings that will preserve them for as long as the paper itself will live. Others may be worth keeping for a limited time only, perhaps five to ten years, and these may either be kept in boxes or given temporary bindings that can be applied in the library. Judgment must be exercised in determining which titles to bind commercially because the expense is not inconsiderable as it recurs annually. An alternative procedure that is entirely satisfactory in some libraries is to retain original copies for a certain period, perhaps for three years, and then to microfilm them for permanent preservation. There is slight inconvenience if this is done with the lesser used titles. A reader-printer should remove any objection.

When a number of volumes of the titles selected for binding have accumulated, they must be prepared carefully before being sent to the binder. All issues must be present and placed in order, but they need not be collated page by page because this is done in the binding process. Title pages and indexes for each volume must be in evidence, perhaps being marked by the placing of slips if their location is at all unusual. Indexes may appear
in any one of several places, apparently according to the whim of the publisher. They may be either loose or fastened in the last issue of a volume, or with an issue of a succeeding volume. They may be completely separate items that may even have to be requested; a few must be purchased. A title page may be with the appropriate index, or it may be in the first issue of the volume. To further the confusion, publishers have been known to vary their practices from one volume to another, thereby making this seemingly simple procedure more time consuming than it might be. If the index is combined with the title page, it must be bound in the front of the volume. The best place for it is at the end of a volume. For some titles no index is provided, but a table of contents to be bound at the front of the volume stands in its stead.

Ordinarily a single volume is preferably bound by itself, but sometimes if volumes are thin and subject to infrequent use, two or even more may be included in one cover, thus saving both money and shelf space. The index for each volume may be edged with red ink for convenience, and the volumes separated by sheets of colored, lightweight board. Volumes more than 4 inches thick should be divided, and the inclusive paging of each part noted on the spine in preference to the months because references are usually cited by volume and page numbers. Suggestions for the division of volumes are sometimes given on title pages. Special marking should be used to draw attention to individual peculiarities of certain periodicals. For example, the volumes of the Official Gazette of the United States Patent Office should show the numbers of the patents included. Any device that will aid the users of the publications should be adopted.

A satisfactory job of binding is in large part dependent upon the efficiency of the binding establishment. There must be intelligent comprehension of the vagaries of the publications handled, and the shop must be equipped to use approved methods. The facilities should be investigated before valuable journals are entrusted to a binder. For instance, the sewing of parts is preferable to the use of cords because this process leaves more of the inner margins of the pages visible.

Library buckram is a satisfactory binding material, and some of the newer plastic-impregnated fabrics are equally desirable. In fact they may be superior because they can be cleaned with a damp cloth.

The matter of choice of colors for binding material is a more significant matter than it might first appear. It is desirable to choose a variety of colors, a different one for each title, as a
means for quick identification as volumes stand on the shelves. Darker shades are usually preferable to the lighter ones because the inevitable soiling is not so evident. A good effect is achieved by having some titles in black with gold lettering, and interspersing them with the dark green, blue, and red, with perhaps a brown here and there. In working out this color diversification scheme, consideration must be given to the manner of shelving periodical titles, whether alphabetically or according to a classified arrangement.

A regular program for binding should be established. In most instances it is good practice to send some volumes at times spaced throughout the year, rather than to attempt to have them all done at one time. Record must be kept of the individual peculiarities of each title, the decision as to how to bind, the spacing of the lettering, and then the staff member responsible for this duty must be always alert for the inevitable changes, major and minor, that the publishers of journals are continuously perpetrating.

In selecting a commercial binder it is advisable to investigate any who may be located close at hand because transportation can be costly, though some binders do include pick-up and delivery from distances as great as a couple of hundred miles. Local directories can be consulted, and if they are unrewarding, advertisements in library journals may be helpful. The Library Binding Institute, 501 Fifth Avenue, New York, N. Y. will supply a list of its members, all of whom are pledged to do work according to specified standards. If local firms are either nonexistent or unable to do satisfactory binding for library purposes, it will be necessary to arrange for shipment to the nearest establishment that can take the work.

TEMPORARY BINDING

Journals that must be retained, yet are not worth commercial binding may be treated in several ways. The least convenient method is to tie them in volumes and stack them on shelves. Another procedure is to put them in boxes that stand on shelves. The Magafile, cited in Chapter IV, is a box that is well designed for this purpose because it is available in several standard magazine sizes. It will not take much hard use, however. For journals that must stand up to some handling beyond an occasional consultation, a temporary binding can be applied. Directions for do-
ING this are supplied by the venders of the liquid plastic adhesives that work so well for this purpose. Sometimes it is sufficient simply to stack the issues to be fastened together, weighting them with a heavy volume, and apply two coats of the white liquid plastic adhesive that dries as a colorless film. A further step is to attach stiff cardboard covers. The choice of treatment for such periodicals will depend upon the use to be made of them, and the availability of staff time to do the work.

CONCLUSION

The importance of periodicals to work in the sciences and their attendant technologies cannot be overemphasized. Those titles that publish the most pertinent information relating to projects in progress must be made available as promptly as possible, and continuously serviced in a manner to assure maximum benefit from the investment.

BIBLIOGRAPHY

SUPPLEMENTARY REFERENCES


Technical Processes

Cataloging, Classification and Subject Headings

The past few years have seen enormous growth in the materials in the science-technology field. Coincidental with this growth has been the deviation from the traditional book as the general basis for the special library collection. So great has been the output in all areas including reports, government documents, books, etc., that new means and devices have come into being to speed the flow of information from its source to its ultimate end and purpose, the user. This chapter will deal with one phase of this flow of information, i.e., the classification, assigning of subject headings, and cataloging of books and periodicals.

This single chapter is not intended to be a philosophical discussion of the basic principles of these subjects, but rather a guide for the inexperienced librarian in the science-technology field or for the subject specialist without professional library training who is confronted with the technical aspects of library work. The three processes mentioned above are usually carried on as a single unit in a small or medium-sized library, but for reasons of clarity they are discussed separately here. However, references to the cataloger or the classifier will refer to the same person.

CLASSIFICATION

Classification, expressed in its most elementary terms, is placing like things together, but this simple concept which is so
easy to express is extremely difficult to achieve. Two scientists in different disciplines will look at the same book and probably make diverse classification decisions regarding it, and both could be approximately right. The inexperienced librarian or the subject specialist without the technical training necessary to carry on these processes would do well to consider the existing classification schemes and to choose the one which seems best suited to the needs of the situation involved. There is always a temptation, particularly to the inexperienced, to attempt to build a new classification scheme rather than to adapt an old one. Few librarians have sufficient background or experience to organize a whole field of knowledge so that subjects with their subdivisions will fall into logical and historical sequence and the subject specialist without professional library training lacks the technical know-how to build a scheme. Mann (1) has indicated that the following qualifications should be stressed in any system of classification:

1. It should be systematic, proceeding from the general to the special.
2. It should be as complete as possible, that is, cover the entire field of a subject.
3. It should be sufficiently detailed to represent all degrees of generality.
4. It should allow for the combination of ideas and for classifying from several points of view.
5. It should be logical, that is, show a sequence of ideas.
6. It should be explicit, but concise.
7. It should furnish a notation easy to write and to remember, which shall serve as a symbol for the books and determine their arrangement on the shelves.
8. It should be expansive and flexible in both plan and notation.
9. It should furnish a class for general books, and also provide for books treating subjects in any class or divisions of classes in a general way.
10. It should have an alphabetic index to facilitate its use.
11. It should be printed in a form which will give one a quick survey of the field covered by the system.

Two of the best known systems of classification are the Dewey Decimal Classification and the Library of Congress Classification. Both meet Mann’s 11 points in some measure and both have advantages and disadvantages.
The Dewey Decimal Classification, named for its originator Melvil Dewey (2), has been through 16 editions since the first one in 1876. All knowledge in this scheme has been divided into the following 10 classes:

- 000 General Works
- 100 Philosophy
- 200 Religion
- 300 Social Sciences
- 400 Language
- 500 Pure Science
- 600 Technology
- 700 The Arts
- 800 Literature
- 900 History

Each of the above 10 groups is further divided into classes which represent the main subdivisions of the subject. For example, 500 represents Pure Science and the subdivisions in this class are as follows:

- 500 Pure Science
- 510 Mathematics
- 520 Astronomy & Allied Sciences
- 530 Physics
- 540 Chemistry
- 548 Crystallography
- 549 Mineralogy
- 550 Earth Sciences
- 560 Paleontology
- 570 Anthropology & Biology
- 580 Botanical Sciences
- 590 Zoological Sciences

510 represents Mathematics and this is further subdivided into the various types of mathematics: 511 Arithmetic; 512 Algebra; 513 Geometry, etc. Further subdivisions are possible by the use of decimal figures. 511 represents Arithmetic; 511.1 Numeration systems; 511.2 Fundamental Arithmetic Operations; 511.3 Prime Numbers and Factoring, etc. Throughout, the 10 general classes are divided and subdivided in an attempt to bring related subjects together in a natural sequence. The above sequence looks as follows:

- 500 Pure Science
- 510 Mathematics
  - 511 Arithmetic
  - 512 Algebra
  - 513 Geometry
    - 513.1 Plane Geometry
    - 513.2 Curves
    - 513.3 Solid Geometry

A detailed index makes it possible to locate material in the
body of the work easily. One of the physical advantages of the last two editions is the fact that the index is published in a separate volume. One of the cardinal principles of classification is to put like things together through an understanding of the subject, but this cannot be effectively achieved merely by the use of an index, therefore, a classifier should thoroughly familiarize himself with the schedules themselves.

The fifteenth edition of Dewey (3) was known as the “Library Standard Edition of the Decimal Classification.” The foreword to this edition states: “The guiding principle for this revision was adaptation to the needs of the general library collection of up to 200,000 volumes, eliminating over-detailed expansions useful only to the special library or for very large collections.” Because of the elimination of detailed expansions this edition is therefore not as useful to the librarian in the science-technology field, but fortunately the sixteenth edition (1958) is considerably more detailed and is consequently better suited to their use.

Library of Congress Classification

This scheme (4) was originally developed for the books in the Library of Congress but has since been adopted by many other libraries. When the scheme was built, the books already in the Library of Congress were arranged by subject and a study made of their relationships; consequently, the final product is the result of the study of a large body of literature in each field. Inasmuch as over 3,000,000 books were in the Library of Congress collection when the main part of the work was done, there was a sound philosophical and scientific basis for the decisions made. The L.C. differs from the D.C. in many ways, but notably in two respects: (1) it is not a decimal system and (2) the whole field of knowledge is divided into 21 groups using the letters of the alphabet to represent the classes. Provision is made in the L.C. for very minute subdivisions of a subject and for expansion. Four letters of the alphabet were left unused and may be utilized for new major classifications. The outline of the general scheme is as follows:

A  General Works  Polygraphy
B  Philosophy  Religion
C  Auxiliary Sciences of History
D  Universal History
E-F  American History
G Geography. Anthropology
H Social Sciences
J Political Science
K Law
L Education
M Music
N Fine Arts
P Language and Literature
Q Science
R Medicine
S Agriculture
T Technology
U Military Science
V Naval Science
Z Bibliography. Library Science

It will be seen from the above outline that the classes of greatest use in the science-technology field are Q, R, S, and T and to some extent H, J, U, V, and Z. The above schedules are published as separates, each with its own index, thus making it more convenient for the classifier needing only part of the classification. The L.C. uses a combination of letters and figures. The letter, as noted above, indicates the general class; an additional letter, the general divisions of a class; and Arabic figures, in numerical sequence, its smaller subdivisions. Using Q (Science) as an example, we find the following:

Q Science
QA Mathematics
QB Astronomy
QC Physics
QD Chemistry
QE Geology
QH Natural History
QK Botany
QL Zoology
QM Human Anatomy
QP Physiology
QR Bacteriology

Using mathematics as an example in the L.C. as a comparison with the D.C. the schedule gives the following:
Q Science
QA Mathematics
QA101 Arithmetic
152 Algebra
445 Geometry
447 Elementary Pure Geometry
501 Descriptive Geometry
529 Trigonometry
538 Analytic Geometry

The L.C. adapts itself more readily to the large collection needing minute subdivision, though it may also be adapted to the small collection which has a variety of materials within its scope. The notation is somewhat more complicated than the D.C., but it is flexible and provides for the practical subarrangement of many types of material. It does not have a general index, but each schedule has its own index, as mentioned above. If one is using the D.C., the Library of Congress classification is a useful source of information regarding the content, arrangement and sequence of a subject.

Other General Classification Schemes

Because of the limitations of space the discussion of the following schemes will necessarily be brief but will serve to identify them. For further study the following are recommended:

Aslib. Handbook of special librarianship and information work (5).
Tauber, M. F. Technical services in libraries (6).

Bliss: A System of Bibliographic Classification (7)

This classification was originally developed in the library of the College of the City of New York and was intended to be a bibliographic rather than a library classification. The scheme is divided into 35 main classes using the letters of the alphabet for notation. Taube (8) has said: "The classification has been recommended on the excellence and simplicity of its notation and the fact that being the latest system in a long series of similar attempts, it is more up to date and represents more adequately current fashions in the grouping of ideas and the arrangement and subordination of various subjects."
Ranganathan: Colon Classification (9)

This scheme, the structure of which is quite different from those mentioned above, was developed at the Library of the University of Madras. “In it, Bliss’s principle of composite specification is applied to the actual division of classes. The result is that the schedules consist mainly of a series of tables from which a composite symbol must be assembled in classifying specific topics.” (10).

It consists of 33 main classes and 10 generalia classes and uses a mixed notation of upper and lower case letters, numerals, Greek letters, and punctuation marks.

Universal Decimal Classification (11)

The International Institute of Bibliography was organized as a result of a conference held in Brussels in 1895. One of its purposes was to devise a scheme to be used in indexing world literature. The Dewey Decimal classification was used as the basis for this new scheme since it was considered flexible enough to be expanded more or less indefinitely. This new scheme has become known variously as the Universal Decimal Classification, or more popularly as the Brussels Expansion or simply as the U.D.C. The scheme was not developed primarily as a book classification, but for the purpose of indexing or arranging an enormous card bibliography which included not only books but also all kinds of documents, journal articles, patents, trade catalogs, abstracts, etc.

Publication of an English translation was begun in 1943, titled Universal Decimal Classification: Complete English Edition, and designated as the fourth international edition (12). The British Standards Institution has recently published the second edition of the Abridged English edition, revised 1957 (13).

National Library of Medicine: Classification (14)

This classification covers the field of medicine and its related sciences. Its notation was developed from the block of letters QS-QZ and W, unused by the Library of Congress in their classification scheme and assigned for this purpose to the National Library of Medicine.
HOW TO CLASSIFY

Sayers (15) gives the following rules for classifying:

1. Classify a book according to its subject, and then by the form in which the subject is presented, except in generalia and in pure literature where form is paramount.

2. In determining the subject, consider the predominant tendency or obvious purpose of a book, and its author's intention in writing it.

3. When a book appears to belong equally in two places in the classification, make a decision as to the one in which it is to go.

4. When a book deals with two (or three) divisions of a subject, place it in the one which appears to be the most important; or, if the parts seem of equal importance, in the first one treated. When more than two (or three) divisions of the subject are dealt with, place the book in the general heading which contains all or the majority of them.

5. When a subject arises for which no place is provided in the scheme of classification, find the heading to which it seems to be most nearly allied and make a place for it there.

6. Place a book in the most specific head that will contain it.

7. Avoid placings which are in the nature of criticism. Pros and cons of any subject go together.

8. Index all decisions, or new headings, which are not already in the index to the scheme; that is to say, make your index exactly represent your practice.

9. Finally (to repeat), place a book where you think it will be most useful; and always have a reason for placing it there.

In the technical field, the place in the classification scheme for a book is often quite simple to locate: as, Fieser and Fieser, Experiments in Organic Chemistry obviously belongs in 547, Organic Chemistry in the D.C. However, it is frequently difficult to know just where to fit in a book, especially in a field with minute subdivisions. An examination of the table of contents will give one some idea of the scope of the book and some further
reading in the body of the work will amplify this. The author's preface and the introduction may add further information, but the classification may still elude one, largely because the scheme used is not detailed enough. At this point, the classifier should examine the literature of the subject under consideration in an effort to fit the subject into its larger class in the scheme. A brief survey of the subject found in a textbook will often be helpful in placing material in its proper sequence in a larger field. An examination of other expansions in the field will be useful, and if one is using the D.C., the L.C. with its greater detail is often helpful. No scheme should be expanded on the basis of a few books; it is better to put them together into a larger class at first and when this has grown unwieldy to subdivide further. It is important to keep in mind that the classification must serve the special clientele. It is sometimes necessary to place a book in a seemingly unsuitable class because the material will be more useful so placed in a special situation.

BOOK NUMBERS

One of the various Cutter tables (16-18) may be used to assign an author symbol for each book within a class as a means for assuring an alphabetical order which is important as the collection grows. For example, a two-figure designation for Huntress is H92. The smaller the book collection, the less need there is for exact identification and differentiation of each work in any one class. However, Cutter numbers and other symbols used to differentiate two titles, or more than one edition of a work by a particular author may facilitate shelving and finding books. Each table is supplied with a set of rules, and further discussion of book numbers may be found in Akers (19) or in Mann (1).

SUBJECT HEADINGS

The functions of classifying and assigning subject headings are closely related. After material has been examined for content in order to assign it to its proper place in the classification scheme, it is logical to determine the subject or subjects under which it will be entered in the card catalog. The choice of subject headings under which books are to be entered in the catalog
is a very significant action since their accuracy determines the effective use of the books. Subject headings serve to supplement the title of a book, and may even be more important than a non-descriptive title. Mann (1) in her discussion of subject headings says: "By subject entry, we mean the term or terms used in a dictionary catalog to express the subject or subjects of books. It is part of the cataloger's task to discover the topics with which books deal and then to select terms which express those topics briefly and exactly."

The two best known subject heading lists are The Library of Congress List of Subject Headings (20) and Sears, List of Subject Headings for Small Libraries (21). The former is designed for use in the large library and the latter in the smaller one; a further difference is the inclusion of a larger number of scientific terms in the L.C. list, its greater size being in part responsible for this difference. Both lists have several useful features in common. The L.C. list adds the L.C. classification number to each subject listed for use, while the Sears lists the D.C. number. In both lists, the subjects actually to be used are printed in boldface type while those subjects which refer from an unused form to the one chosen to represent the subject and known as "see" references are in light-face type.

Anderson (22) has said: "Subject headings do one or all of three things: they show where to find material on any specific subject; they show as nearly as possible in one place everything that is to be had on that subject; and, through cross-references, they indicate mention of the subject in places which would not be apparent immediately."

There are two kinds of cross references, "See" or final cross reference, and "See also" which is a related cross reference. The "See" reference refers from an unused heading to the one which has been chosen for use; for example, Carbonic acid, see Carbon dioxide; or Activated charcoal, see Carbon, Activated. Since many subjects may be looked for under synonyms or under another form of the subject heading, this device directs the reader to the 'official heading. The "See also" cross reference refers the reader to additional related material. Each list indicates the related headings which the catalog may use and refer to provided the library already has material both on the subject to which he is referring and also the subject from which he is referring. This process involves keeping track of the subject headings which have been used and also the references which already have been made. For this purpose an authority
list may be used, or the headings chosen and the cross references made may be checked in the subject heading list.

In assigning subject headings, several principles should be kept in mind:

1. Use as many subjects as necessary to describe the book. Many books can be described by a single subject heading, but in a small library a book discussing several subdivisions of a subject may be the only material in the library on these topics and they should be brought out under each one rather than lumped together into one larger subject.

2. Be specific. Never use a vague term or one capable of several interpretations. In case the latter is necessary, qualify it with a note indicating the type of material entered under it.

3. Make an authority list. This is essential if the cataloger is to achieve consistency, and particularly necessary in a library where subject headings must be chosen from several sources. This is usually made on cards, one subject to a card and filed alphabetically. References ("see" and "see also") are also made and entered in the subject authority file.

4. Use the shelf list as a guide to the material already placed in a subject. (The shelf list will be discussed more fully in the section on Cataloging.) If the class number has been determined, note the subject headings which have been used for the books classified in that number. Use the shelf list as your guide.

5. Be consistent. By the use of the authority list, shelf list, and other general aids, the same heading should always be used for the same type of material.

The real problem in the science-technology field is the matter of finding good up-to-date subjects to use. The L.C. list and Sears were intended for the general library, large and small respectively. They are brought up to date by new editions, and the L.C. list is kept current by monthly supplements. They are useful as guides and both could well be on the cataloger's shelf as reference tools whether or not they are being followed. However, for current usage, special indexes should be examined. Some of these sources are:
1. Agricultural Index
2. Applied Science and Technology Index
3. Biological Abstracts
4. Chemical Abstracts
5. Engineering Index
6. Index Medicus and its predecessors: Quarterly Cumulative Index Medicus and Current List of Medical Literature
7. Nuclear Science Abstracts
8. Physiological Abstracts
9. Public Affairs Information Service

Any abstracting or other service prepared by subject specialists in the field will be a valuable source of information for the field for which it has been prepared, and should be used as a basis for decisions. There is not space here to discuss subject headings fully, but the person who is inexperienced would do well to read the introductions in the L.C. List (20) and Sears (21) as well as the chapters devoted to the subject in Mann (1) and the Handbook of Medical Practice (23).

It has been suggested earlier in this chapter that the inexperienced would do well not to attempt to build a classification scheme. However many individual schemes have been built by librarians who have become specialists in their fields as well as by subject specialists. The following publication may be useful to those looking for classification schemes and subject heading lists in special fields:


"The SLA Loan Collection of Classification Schemes and Subject Heading Lists was begun in 1924 at Special Libraries Association Headquarters. Its purpose was and is to provide guides to cataloging and indexing materials in special subject areas. The first list...was compiled by Isabel L. Towner and issued in mimeographed form in 1945. A supplement was issued in 1948, a second edition in 1949, a third edition in 1951 and a fourth edition in 1958.

In 1955 Special Libraries Association arranged to have the Collection housed at the School of Library
Science at Western Reserve University, and a complete reorganization and evaluation of the holdings of the Collection was undertaken. Dr. Jesse H. Shera, Dean of the School of Library Science at Western Reserve University, was appointed Curator of the Collection.

788 schemes and subject heading lists are contained in the fifth edition of the Guide noted above. The items are arranged alphabetically by subject, and a subject index containing references is given after the appendices. The Collection is growing rapidly, and the Special Classifications Committee has a continuing program for solicitation of new material in subject areas where schemes and lists are lacking.

Almost without exception, the volumes now contained in the Collection were acquired by donation. Publishers of a number of items for which a charge is normally made generously provided free copies. The American Library Association, through its Committee on Classification, solicited in 1957 a representative group of public libraries and college and university libraries, with the result that more than 50 new schemes and lists were added. Aslib (Association of Special Libraries and Information Bureaux) in London cooperated by supplying a list of classification schemes and subject lists in the Aslib Library that was checked against the SLA holdings. Several schemes from this list, not then included in the SLA holdings, were donated to the Collection. A project to collect classification schemes was also instigated by Unesco in Paris, but on learning of the SLA project, the Unesco committee decided to abandon its program and donated the material it had already collected to SLA. During 1959 the Classification Research Study Group established its "loan collection" to supplement the SLA holdings and is adding material on a continuing basis. These classifications consist largely of FID publications and U.D.C. sections. Finally, the American Association of Law Libraries has presented a collection of schemes in its field to Western Reserve University."

(The above discussion of the fifth edition of the Guide was taken from the Preface to the same edition.)

The Guide itself may be purchased from Special Libraries
Association in New York; individual schemes and subject heading lists may be borrowed or purchased from the School of Library Science at Western Reserve University.

Another project worthy of study in relation to the field of subject headings is the National Library of Medicine "Index Mechanization Project," known as MEDLARS (Medical Literature Analysis and Retrieval System.) A detailed discussion of the development of the project may be found in Medical Library Association Bulletin 49: No. 1, Part 2 (January 1961).

ANALYTICS

Classification and the assigning of subject headings in a science-technology library involve more than the ability to fit a book into an existing scheme, or to find a specific subject for it. All indexing, particularly periodicals as found in Chemical Abstracts and Index Medicus, concerns itself with small units, so that each article contained in the journal indexed is brought out and made available. In the larger field of books, this has not always been true, for a book has of necessity been classified as a unit, and the subject headings have been assigned for the book as a whole. But in a library where minute information is of importance the material in books needs to be analyzed in greater detail, and the approach, especially in the matter of subject headings, should be on the level of the smaller units within each book. This will naturally vary with each library, but an example in point would be a general book on color which would fall into the general class, but a color chart may be a very useful item of information which is often difficult to locate; therefore, if this book contains such a chart and it is important in the situation, an analytical entry should be made. Ranganathan (24) in Special Librarianship—What it Connotes defines this thought-unit process, which connotes the "special" in special librarianship, as "microscopic" rather than "macroscopic" in that it focuses attention upon parts of books and articles.

DESCRIPTIVE CATALOGING

Reduced to its simplest terms the card catalog is a record of the books in the library. Classification brings like things together and the subject headings indicate the topics under which
books should be entered in the card catalog; but cataloging is the process by which one transfers certain technical information about the book to a card according to rule. It has already been suggested that reading the introduction and preface of a book and surveying its table of contents will help to give one a general idea of its scope and purpose. Much of the actual cataloging is the transference of the information found on the title page to the catalog card. The following items are listed on the card in the order mentioned and are found for the most part on the title page:

- Call number
- Author
- Title
- Edition
- Translator
- Imprint
- Collation
- Series note

The call number and the collation are not a part of the information found on the title page and the series note, if the book happens to belong to a series, may or may not be found on the title page. These items are discussed in the sequence mentioned above and in order to make the information clearer, this discussion will be built around a single book. A sample title page of the book and an author or main entry card for it is included to illustrate the points made.

**Items on the Main Entry or Author Card**

1. **Call number.** The call number as mentioned earlier in the section on classification is made up of the classification number plus the book number and is placed in the upper left-hand corner of the card.

2. **Author.** The author's name appears in inverted form on the top line at first indentation (eight typewriter spaces from the left edge of the card and the third line down from the top of the card) in as full form as is readily available. If the author entry is long and requires more than one line succeeding lines should be at third indentation (14 typewriter spaces from the left edge of the card,)
If there is more than one author for a book, the first one named on the title page is used; additional authors are discussed later under Title and Added Entries. Some catalogers add the author's dates after his name, but this may not be considered important excepting in the case of persons whose names are identical.

3. Title. The title is entered on the line following the author's name at second indention (12 typewriter spaces from the left edge of the card) with succeeding lines at first indention and should be copied as it appears on the title page, including explanatory or alternative titles. If there is more than one author for a book they are all included as part of the title; but when there is only one author this information may be omitted from the title.

4. Edition. If the book has been brought out in more than one edition this should be noted. This is particularly important in the science-technology field.

5. Translator. When a book has been originally written in a foreign language and the information regarding the translation or translator appears on the title page this should follow the title. If this information appears in the preface or in a place other than the title page, it should be added in a note. Information regarding the edition or translator found on the title page follows the title and the information is separated from the title only by punctuation.

6. Imprint. This consists of the place of publication, publisher, and date of publication and follows the title after four typewriter spaces.

7. Collation. The collation specifies the number of volumes if more than one or the number of pages if the book is in one volume plus information concerning illustrations, maps, plates, tables, etc. This latter information regarding illustrations, etc, may or may not be essential and may be omitted, or it may be added in note form following the collation. The collation is entered on the second line below the imprint at second indention with succeeding lines at first indention.
8. Series note. Series are of various kinds, i.e., author, publishers or monograph series. The collective title for a series may appear at the head of the title page, on the half title page, or on the cover of the book. The series note follows the collation in parentheses and is separated from it by four typewriter spaces.

9. Special features, such as bibliography, which may be important to the reader are added in note form. Notes should be placed on the line after the collation beginning at second indentation with succeeding lines at first indentation.

10. Contents. Akers (10) advises that the card should "give contents of publications containing several works by the same author, or works by several authors, or works on several subjects, or a single work on a number of distinct subjects, especially if the collective title does not sufficiently describe them." Contents follow notes, if any, and are entered at second indentation with additional lines at first indentation.

The title page of the book chosen for this demonstration reads as follows:

Natural Products Related to Phenanthrene
by
Louis F. Fieser and Mary Fieser
Department of Chemistry Harvard University
Third Edition
Of the Monograph previously entitled Chemistry of Natural Products Related to Phenanthrene
By L. F. Fieser
Reinhold Publishing Corporation 330 West Forty-Second Street, New York 1949

Following is a sample of the author or main entry card for Fieser's book:
547.28 Fieser, Louis Frederick, 1899-
F46 Natural products related to phenanthrene; by Louis N. Fieser and Mary Fieser; 3d ed. N.Y., Reinhold, 1949.
   xii, 704p. figs., tabs. (American Chemical Society. Monograph series, no. 70)
   The 3d ed. of the monograph previously entitled Chemistry of natural products related to phenanthrene.

 Added-Entry Cards

Additional cards known as added-entry cards are exact copies of the main entry card which is also known as a unit card, except that the necessary heading is added at second indentation above the author's name. If the heading is too long to be typed on one line succeeding lines are typed at third indentation. If there is too much typing for one card, a second one should be used. Subject headings may be typed in red or in all black capitals; other entries are in black. Four added entries are necessary for the above book as follows:

1. Title card: Natural products related to phenanthrene
2. Subject card: Phenanthrene
3. Joint author card: Fieser, Mary A. (Peters)
4. Series card: American chemical society. Monograph series, no. 70

Tracing

This is a record of all added entries made for the book. It is usually entered on the back of the main author card, though it may be added to the shelf list (to be discussed later). The purposes of tracing are two: 1. To indicate the added cards that are to be made by the typist and, 2. To show the cards that are to be removed if the work is withdrawn, or if the cards need correction. If the former, it is well to have headings for the added entries appear exactly as they are to be copied by the typist. Usually the cataloger decides on the order for the tracing to avoid confusion.

In tracing, a “t” indicates that a title card has been made; and “ser” is sufficient indication that a series card has been
made. For subjects and other added entires the full heading is used. The tracing for Fieser’s book used as an illustration is as follows:

\[ t \\]
\[ jt a \ Fieser, \ Mary \ A \ (Peters) \]
\[ s \ Phenanthrene \]
\[ ser \]

**Shelf List**

The shelf list is a record of the books in the library arranged in the order of the books on the shelves. It is shorter in form than the main author card as it needs to contain only enough information to identify the book. It is usually kept near the cataloger’s desk.

According to Akers (19), the shelf list is used for the following:

1. To take the annual inventory to see if any books are missing.
2. To show how many copies of a given book the library owns.
3. To show what kind of books are in a given class as an aid in classifying.
4. To show the librarian who is making out book orders how many books the library already has in any given class.
5. To serve in a limited way as a classed catalog.
6. To give source, date and cost if no accession record is kept.
7. To serve as a basis for a bibliography or reading list on a specific subject.

In addition, the shelf list, as mentioned above, may also be used for tracing. The shelf list is a unit or main author card except that notes, contents (and sometimes tracing) are omitted to shorten it. The accession number, if used, is added to the shelf list. If an accession record is not used, the source, acquisition date and price are entered on this card.

There are many additional cataloging facts which are necessary equipment for any cataloger and a careful study of Akers (19) and Mann (1) as well as the A.L.A. Cataloging Rules for Author and Title Entries (25) and the L.C. Rules for Descriptive Cataloging in the Library of Congress (26) will be helpful. Much material has of necessity been omitted here because of the brevity of the presentation.
PERIODICALS

The treatment of periodicals deserves some discussion as it differs somewhat from that of books. Some libraries classify periodicals so that books and journals in the same field will be placed together; i.e., Journal of Organic Chemistry would stand in 547 in the D.C. and in QD in the L.C. Other libraries arrange all periodicals together alphabetically by title. One variation of this latter arrangement is that journals which are the official organs of societies may be entered and shelved so that the Journal of the American Medical Association would file under American rather than under Journal and by the same rule the Journal of Physiology would fall in the J’s.

Rules for cataloging periodicals are discussed in the A.L.A. Cataloging Rules for Author and Title Entries (25), the L.C. Rules for Descriptive Cataloging in the Library of Congress (26) and in Akers (19). For ease in determining the library’s holdings, it is sometimes advantageous to file the catalog card for periodicals in a separate drawer. A subject index may also be added as there are times when it will be useful to know what journals are received in one subject field.

LIBRARY OF CONGRESS PRINTED CARDS

The Card Division of the Library of Congress prints the cards used in its own catalogs and these may be purchased by other libraries. A unit card is used, and the purchasing library must add its call number, subjects, and other added entries to the set of unit cards received. By the use of boldface type combined with several other types of print somewhat more detailed information can be put on this card than on one which is typed, and furthermore, items of greater importance are emphasized. As mentioned above, added entries are traced on the back of the typed catalog card, but on the L.C. card these are indicated on the face of the card at the bottom. Libraries using L.C. cards usually check those which are to be used; any additional entries used must then be added to those on the face of the card, or, preferably, typed on the back of the card. The L.C. and D.C. classification numbers are noted at the bottom of the L.C. cards and may be helpful as guides to the cataloger.

In order to facilitate the ordering and use of these cards, the Library of Congress has issued two booklets explaining them:
Handbook of Card Distribution (27), and L.C. Printed Cards: How to Order and Use Them (28). The latter is a somewhat briefer and less detailed explanation of the process. It will be seen from the above facts that the L.C. printed cards can save any cataloger considerable time, in general they possess a high degree of accuracy, and are particularly helpful to the less experienced person.

MISCELLANEOUS CATALOGING AIDS

Multilith

Cataloging costs run high, and it is well to consider this when making a decision regarding Library of Congress printed cards. If facilities are available, very good cards can be reproduced by the multilith process. The main author or unit card is typed on the multilith master, then the number of cards needed are run off. Headings are later added to the cards. Since the master and the headings can be typed on the same typewriter the typing looks consistent, thus making a good-looking card which is as permanent as any typed card. Multilithing cards has one distinct advantage, i.e., cataloging need not be held up for receipt of cards. Costs should again be considered. This method should not be used for less than 6 or 7 cards since it costs $0.35 (Jan. 1959) to run the master for any number of cards up to 50; and $0.64 per master for 50 to 100 cards.

Flexowriter (Model: FL) (Friden Company)

This automatic writing machine though initially expensive (about $3000 in 1959) may be an excellent means for card reproduction. Some libraries using it report that the time saved during the first year will cover the original cost. The unit catalog card is typed on the Flexowriter, and at the same time the machine produces a by-product punched paper tape of the information in code. If the card is typed perfectly, the tape will be perfect and it will be ready for the automatic reproduction process. However, if mistakes in typing do occur, they can be corrected in the tape itself. By using the tape the number of cards needed can be run off and headings can be added later. The Flexowriter can be equipped with any special library symbols needed.
Friden has offices all over the United States and a call to one of their branch offices will bring a company representative to demonstrate the use of this simple typewriting machine if such a demonstration is necessary.

Other automatic machines which might be considered are the following:

Remington Rand: Electronic Synchro-tape Typewriter
American Automatic Typewriting Company: Autotypist
Royal McBee Company: Robotypey

ARRANGEMENT OF THE CARD CATALOG

When the classifying and cataloging have been completed, the cards are filed in the card catalog. This card catalog may be of several kinds depending upon the use made of it. The most common form is the dictionary catalog. A.L.A. (25) defines this as "A catalog usually on cards, in which all the entries (author, title, subject, series, etc.) and their related references are arranged together in one general alphabet. The subarrangement frequently varies from the strictly alphabetical." For a good discussion of this subarrangement which varies from the alphabetical, see "Arrangement of Cards in a Catalog," by Akers (19).

The author-subject catalog, sometimes called the divided catalog is a variation often useful in a special library. In this type of catalog, the subject cards are filed in one section and all other cards in another. This division makes it possible for different persons to use the sections at the same time. Also a person wishing to look for subject material is not bothered with the other cards. Another common division in a science-technology library is to separate journal holdings from the rest of the catalog as this information is needed frequently. The idea of division can be used for any special collection such as microfilms, reprints, etc. This type of catalog has been successfully used at the Library of the New York Academy of Medicine and also in the Library of the American College of Surgeons in Chicago.

The classified catalog differs from the previous two mentioned in that it is arranged by the class number rather than by the alphabetical entry of the catalog card. In this sense, it is similar to the shelf list; however, it is an expansion of it for it includes cards for parts of books which have been analyzed and added to the catalog, pamphlet material, and other classified items. It is more useful in the large library where one may not
go to the stacks to examine books first hand. It may also be useful to the research worker who wishes to visualize the entire content within a given class. The classified catalog must be supplemented by an alphabetical author and subject catalog and an index to the classes. Classified catalogs are in use in the John Crerar Library, Chicago; the Technology Department, Carnegie Library, Pittsburgh; and Engineering Societies Library, New York.

The horizontal catalog is useful in some libraries where material is important by date. "In this catalog, whether the dictionary or author-subject arrangement is used, the entries for books published during the last five or ten years are filed in separate sections from those published previously," according to Prime (22).

The filing of cards for all types of materials, both cataloged and indexed, in one central catalog is worthy of consideration. Variously colored cards can be used for each distinctive kind of publication represented so that it can be seen at a glance; for example, the number of patents indexed in a given subject. The advantage of being able to find all the material in the library by looking in one file is obvious. This system is used in the Hercules Powder Company Experiment Station Library.

CONCLUSION

The technical processes discussed in this chapter are of great importance to the effective use of the library. Inefficient or incomplete cataloging may mean that valuable material is not available when most needed, so that the time expended to do competent cataloging is a good investment. Moreover a thorough knowledge of the principles of cataloging, classification, and subject headings gives one a sound foundation for the many kinds of indexing needed in the science-technology library. Whether one calls a subject a descriptor, or a "see" reference a link, is wholly unimportant, but an understanding of basic principles makes it possible to adapt these principles to the indexing world. Technical processing as discussed in this chapter describes one way of handling the flow of information from its source to its ultimate end and purpose, the user. For the large organization with unlimited funds the use of machines may be essential, but the smaller and financially limited organization must of necessity produce the same end results by the use of the traditional
methods. At the end of this chapter is a selected list of books and articles dealing with this general subject for the benefit of those who may wish to pursue it further.

BIBLIOGRAPHY

1. Mann, M. Introduction to cataloging and classification of books. 2d ed. Chicago, American Library Association (1943).
17. Ibid. 3-figure alphabetic-order table. Boston, Remington Rand Business Service, Library Bureau Division, n.d.


SUPPLEMENTARY REFERENCES

Library Literature: a quarterly index to materials on library science and librarianship. H. W. Wilson. A useful index for the person who may wish to keep abreast of the current developments in the field.


Indexing and Filing of

Non-book Materials

The indexing and filing of items other than books and periodicals constitutes a problem that requires much forethought to insure the eventual location of the information they contain when it is needed. These materials comprise one of the most important parts of the library collection, and because it is unique to every situation, the indexing process must be developed to fit the subject area from the viewpoint of organizational interests. Among the possible categories represented may be the following: research and development reports; journal articles; patents; trade literature, including catalogs; laboratory notebooks; pictures and photographs; maps; reprints; archival items; and technical correspondence. These will be in various forms, printed or typed, as photocopies the same size as the original or as microprint, microfilm, or even slides. The indexing of such materials is a process of documentation, the purpose of which is to provide a means for retrieving every bit of information once it has been put into any kind of filing location.

Because of the significant increase in the numbers of publications resulting from the expansion of scientific research activities in recent years, especially since World War II, there has developed a consequent awareness of a need for more effective methods of locating the facts presented in every individual document, the process commonly termed "information retrieval." For some purposes the newly developed methods are supplanting traditional ways and are proving to be more effective. However, each indexing project requires study and
individual decision as to what approach to use to take care of it adequately.

The problems involved in the classification of subjects for indexing are so diverse and complex that it is impossible to encompass them in so necessarily brief a chapter as this. Attention is directed to the excellent books and periodical articles dealing with the philosophy and procedures involved. The titles of some of them are appended to this chapter. One of the best surveys of the subject as a whole, including an admirably provocative analysis of the newer systems for indexing information, is the book by Metcalfe (1) titled Information Indexing and Subject Cataloging: Alphabetical, Classified, Coordinate, Mechanical. This most scholarly presentation could be studied profitably by anyone seriously concerned with indexing problems. Vickery's book (2) on classification and indexing in science is a comprehensive review of all systems and theories, from the long established traditional patterns to the more recently developed ones designed for use with mechanical devices. Much mental effort has been directed toward the solving of where to put and how to relocate large numbers of bits of information.

However, all indexing is not on such a scale as to require the intense study that these newer approaches require, though warning must be given against a temptation to be too hasty in analyzing an indexing problem. If today there are only a few research reports to be handled, within five years there could be hundreds, in which case the initial indexing should be done in such a systematic manner that the time spent will not have been completely wasted. There will inevitably be some trial and error no matter how carefully the approach is made.

The introduction to procedures for indexing and filing special subjects and materials in a scientific or technical collection provided in this chapter consists in first outlining briefly the simple, traditional methods that have long been and still are in use. This is followed by a short summary of the nonconventional methods with advice as to how to determine which methods will suit a particular indexing requirement.

GENERAL INDEXING CONSIDERATIONS

It may safely be assumed that in any library there will be a collection of materials that cannot be classified and cataloged as are books, yet they must be recorded and indexed, then filed in
some orderly manner for ready location. The system to be used will be dictated by the general nature or physical form of these items, their degree of complexity, and the use to be made of them. Every case is unique to some extent, and general principles can aid only in working out individual problems. Before deciding how to proceed, the content of the publications must be studied to assess its value, to attempt to anticipate the amount of use that will be made of it, and to foretell the ultimate volume it may attain. A small collection of ephemeral items, not worth permanent retention, will merit less time and thought than will a large number of highly significant ones. The book by B. M. Weeks, *How to File and Index*, revised edition, Ronald Press (1951) contains helpful advice concerning general indexing procedures.

It should be borne in mind that this indexing activity ought not be completely divorced from the book classification procedures. Should it happen that a special scheme is chosen for the classification of the books, it may be possible and would certainly be desirable, to extend it to these other materials. The same authorities should be used for subject headings if this is feasible. It is vitally important that the terms chosen for use in any indexing that is part of a major program be either selected or approved by someone who has knowledge of and experience in the subject field.

If a group of items to be put into filing order and indexed is not large and the contents are limited to direct, readily definable subjects, the simplest of all possible systems can be used. This consists in filing according to individual author or corporate author, then letting the file stand as its own index. This will rarely be satisfactory and is applicable principally to directory-type publications. Though it may be suitable to file in such order, a separate index on cards is usually necessary.

**CONVENTIONAL INDEXING SYSTEMS**

A system of indexing is based upon an arrangement of topics in systematic order. This may be (1) alphabetical, (2) numerical, (3) a combination of 1 and 2 called alpha-numerical, (4) classified, and (5) special. These systems are ones adaptable for readily controlled collections, not requiring the applications of machines for which more complicated codes must be developed. These several types of indexing are discussed individually.
Alphabetical Indexing

In this system a list of subjects to be used for the identification of individual documents is developed to suit the subject areas. The topical words are officially recognized designations taken from a well-established authority list, possibly expanded from the one used for books. Cross references are used to lead to all possible aspects of one topic. One disadvantage of this system is that related materials are arbitrarily separated with respect to position in the file. However, it is used, and a portion of a list of subject headings developed for use in the library of the United Aircraft Corporation is shown here as an example.

Subject Headings

United Aircraft Corporation

Air Brakes (for aerodynamic brakes) see also Brakes; Drag Brakes (for Satellite & Space Vehicles); Propeller Brakes
Air Cleaners see Air Filters; Filters and Filtration
Air Compressors see also Compressed Air Equipment; Compressors
Air Conditioning see also Air Conditioning (specific item); Ventilation
Air Conditioning, Airplane
Air Conditioning, Building
Air Conditioning, Ship
Air Conditioning, Space Vehicle
Air Conditioning, Submarine
Air Currents
Air Cushion Vehicles
Air Cushion Vehicles (name)
Air Ducts see Ducts
Air Filters see also Filters and Filtration
Air Flow see Flow of Air
Air Flow Indicators see Flow of Air—Measurement
Air Inlets see Airscoops; Intake Systems
Air Lines see also names of Airlines
Accounting
Cost of Operation
Countries
Directories
Finance
Management
Operation see Air Lines * Management
Personnel
Statistics
Air Lines, Feeder
Air Mail
Countries
Pickup Service

Numerical Indexing

The subjects to be used as topical words are listed in any way desired, preferably in some logical sequence showing hierarchical relationships, and then these words are numbered in order of the listing. The scheme may be very simple if the subjects are few and acceptably broad in their coverage. Provision should be made for the insertion of new terms.

The procedure consists in analyzing a document as it is acquired, assigning to it the appropriate number fitting its main content, then filing it with similarly numbered items. This file can then be consulted directly. An alphabetical index to the list of subjects may be needed.

If the documents are complex it will be helpful to provide an index record on cards, with the necessary multiple copies bearing appropriate subject headings to be filed in the catalog. It may be desirable to include some cross references in this file.

Alpha-Numerical Indexing

A combination of the alphabet and numbers can be utilized in establishing an indexing scheme. Broad subjects are listed in alphabetical order, then the subdivisions under them are numbered. No attention need be paid to the beginning letter of the first word; there may or may not be a hierarchical significance. This can take care of an almost limitless number of subtopics. The documents are identified with this number and filed according to it.

Classified Indexing

In a classified system subjects are grouped in logical sequence according to the rational development of the field of knowledge represented. These subjects are assigned numbers
to be given the items indexed, just as class numbers are given to books. In fact, if at all feasible, the classification scheme used for books can in some instances be adapted to the indexing of other materials, a procedure that has much to commend it. An alphabetical index to the scheme must be provided for users. The several major classification schemes that were developed primarily for books can in some instances be modified and expanded for the more detailed indexing procedure. The briefest mention is made here of some of the principle ones. For a somewhat more detailed explanation of them, Chapter 7 should be consulted. Only a concise summary follows.

The most highly developed classification is the Universal Decimal Classification system which is a detailed expansion of the Dewey Decimal System, one of the most commonly used even in special libraries for books. The expansion of this system is usually referred to by the letters UDC. Bradford (3) was a strong champion of this system and attempted to instigate the practice of having every published item, including articles in periodicals, tagged at the time of publication with the appropriate UDC number. There is not much chance that this will ever be adopted universally, though a few journals do have these numbers affixed to the articles in them. The logic of some of the sections of the system is questionable and it has not been possible to keep pace with recent developments in science, though it is subject to continuous study and revision. However, in certain subject areas it is found to be satisfactory, particularly if modified to suit a particular situation.

The UDC is available in parts, each covering a specific subject, from the British Standards Institution.

Another system of classification developed originally for books is the one known by its originator's name, Bliss. It is amenable to detailed subject breakdown, and has found some acceptance for indexing applications. The Bliss schedules (4) should be investigated if it is thought that the approach is fitting to the subject in hand. Its broad divisions are designated by letters. For example, B is for Physics, C is for Chemistry and so forth. Letters denote subdivisions also.

Ranganathan's Colon system uses letters and numbers with the colon as connective to show facets of relationship. The reader is advised to study Metcalfe (1) and Vickery (2) for thorough discussion and comparison of this and other systems. Vickery included some illuminating examples of representative classifications of science, 23 in all, that have been proposed
from the thirteenth century to the twentieth. It is a subject
certain to challenge man as a mental exercise as long as scien-
tific investigation provides the subject matter with which to
work.

Special Schemes

In certain situations it is expedient to adapt or devise a
system of classification that is based upon some special aspect
of the product or activity of the organization served by the li-
brary. For example, in some industries where the areas of
business pursuit are well-defined, and the processes involved
so highly developed that major changes are unlikely, the flow
sheets for the processes in the plant may be used as a basis for
the indexing scheme. Because of the habit of the clientele of
thinking in the already established pattern, it is helpful to have
the information files follow a similar arrangement of subjects.
As an instance, a metallurgical company might use these
broad headings:

I. Geology and Exploration
II. Mining
III. Ore Beneficiation
IV. Processing
V. Products: Metals, Alloys

However, instead of attempting to devise a scheme for
metals, attention might be given to the possibility of using the
one already developed by committees of the American Society
for Metals and the Metals Division of Special Libraries Asso-
ciation. It is available from the headquarters office of the
American Society for Metals. An important feature of this one
is its adaptability to both manual and machine coding operations.

Schaler (5) has provided an excellent, detailed description
of the development of a classification scheme for a petroleum
company. It is based upon the natural operating divisions of the
industry.

Before undertaking the task of setting up a schedule it is
advisable to take advantage of those already prepared for the
appropriate areas. A comprehensive list of a collection of
classification schedules covering many subjects is published as a Special Libraries Association pamphlet titled Guide to
the SLA Loan Collection of Classification Schemes and Subject
themselves may be borrowed from Western Reserve University, School of Library Science, Cleveland 6, Ohio.

An indexing system developed about 1910 by J. Kaiser is still of interest, even though it has never been used as much as some authorities think it should have been. Holmstron (6) has, among others, provided an adequate description of it; the original publication has long been out of print. Essentially it consists in the selection of a group of appropriate terms, subjects called "Concretes" which are typed on the upper left-hand corner of a card, these being very broad topics that can be explicitly modified. On the right-hand corner of the card another key word called the "Process" term is typed. This card then represents a process in relation to the concrete term. For example, a concrete term is "Air," for which a process term is "Circulation." If document numbers are written on these cards, an index to information is developed. The system appears to be neatly logical, and has the virtue of permitting subject additions when needed. Holmstrom devised a similar system with certain modifications. The more recently promulgated uniterm system, with the added modifying roles and links, shows some relationship to the Kaiser idea.

The foregoing presentation of conventional indexing methods is admittedly the barest introduction, and it will be of help in only the simplest situations. However, there are such to be handled in many libraries concerned with scientific subjects. When they reach beyond these bounds, recourse must be made to more complex systems.

NONCONVENTIONAL INDEXING FOR INFORMATION RETRIEVAL

When an indexing situation is faced where the number of items is so great and their content so complex that conventional methods do not suffice, then attention must be given to the possibility of adopting one of the established nonconventional methods. It is necessary first to become familiar with the broad characteristics of the systems in order to assess their suitability for the contemplated application.

To acquire background knowledge in the realm of information retrieval by nonconventional methods it is recommended that the publications of the authorities who have been responsible for the development of the methods that have found acceptance
be read. Some of these are cited at the beginning of this chapter. Additional ones that are particularly pertinent are:

**Books**


Current research and development in scientific documentation, National Science Foundation, Office of Scientific Information Service, Washington, D.C. Semiannual 1, May and November (1957–).


**Periodicals**

American Documentation, official journal of American Documentation Institute, Washington, D.C. v. 1 (1949 to date).

Journal of chemical documentation, official journal of Division of Chemical Literature, American Chemical Society, Washington, D.C. v. 1 (1960 to date).

Major Bibliographies


For an explicit review of retrieval systems developed since 1950 the two-part article published in Chemical & Engineering News in July 1961 (7) is informative. In it the problems created by the increased volume of publication are outlined, and specific applications of some of the newer types of information control systems are cited. A significant feature is the list of the principal kinds of systems in use or in an advanced state of development that is reproduced here by permission (Table 1). From the brief observations summarizing the merits of each device their relative suitabilities for various applications can be judged.

There are actually many more systems in the developmental stage, about 100 in all according to another review published in 1962 by Holm (8). Some, however, are in such an experimental stage that they may never achieve more than the prototype model.

Any attempt to outline an introduction to this aspect of the art of information retrieval, involving particularly the use of machines, should acknowledge the warning stated by Gull (9) in his review of the volume of the State of the Library Art series that deals with this area. Gull expressed the opinion, an authoritative one, that it is impossible to learn the complete story from the published literature. It must be searched by diligent investigation of unpublished sources such as manufacturers' pamphlets and by observing equipment in operation. However, a start can be made in the published literature that abounds, and enough background acquired thereby to make possible an intelligent inquiry.

The chief purpose of the newer systems is first to provide an indexing approach that will permit access to every bit of significant information in a publication. In some systems there
### Table 1

<table>
<thead>
<tr>
<th>Device</th>
<th>U.S. Manufacturer</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple manual devices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edge-notched cards</td>
<td>Royal McBee, E-Z Sort Systems, Burroughs, Zator Co., and others</td>
<td>Available for many years; widely used</td>
</tr>
<tr>
<td>Peekahoo cards</td>
<td>Jonker Business Machines, Wassell, Inc., and others</td>
<td>National Bureau of Standards and other organizations are doing research on these cards</td>
</tr>
<tr>
<td>Uniterm cards</td>
<td>Documentation, Inc.</td>
<td>Widely used; many users print their own cards</td>
</tr>
<tr>
<td>Equipment in which the document images and indexing information are together</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapid selector</td>
<td></td>
<td>National Bureau of Standards is continuing to develop this system, using film reels and photographic indexing code</td>
</tr>
<tr>
<td>Flip</td>
<td>Benson-Lehner</td>
<td>Commercial system; uses film reels with photographic indexing code; sells for about $50,000</td>
</tr>
<tr>
<td>Filesearch</td>
<td>FMA, Inc.</td>
<td>Commercial system; uses film reels with photographic indexing code; sells for about $115,000</td>
</tr>
<tr>
<td>Filmsort</td>
<td>Minnesota Mining &amp; Mfg.</td>
<td>Commercial system; uses aperture cards, which are modified punched cards containing microfilm copies of documents</td>
</tr>
<tr>
<td>Minicard</td>
<td>Eastman Kodak</td>
<td>Commercial system; uses 0.6 x 1.3 inch pieces of film with photographic indexing code; sells for $2.5 to $3.5 million</td>
</tr>
<tr>
<td>Magnavue</td>
<td>Magnavox Research Laboratories</td>
<td>In laboratory stage; uses 1 x 3 inch plastic cards with magnetic indexing code; expected to sell for $250,000 to $450,000, depending on the computer used</td>
</tr>
<tr>
<td>Equipment containing document images and using a separate index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Versac</td>
<td>Avco Corp.</td>
<td>Not yet used commercially; employs 8 x 8 inch sheets of film to record highly reduced document images</td>
</tr>
<tr>
<td>Microcrite</td>
<td></td>
<td>Developed experimentally by National Bureau of Standards; highly reduced images are recorded on 15 x 15 inch sheets of film</td>
</tr>
<tr>
<td>Project Walnut</td>
<td>IBM (temporary name)</td>
<td>First unit is now being built; document images are recorded on 0.9 x 15.5 inch strips of film</td>
</tr>
<tr>
<td>Mechanically sorted card devices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punch cards and sorters</td>
<td>IBM and Remington Rand</td>
<td>Very widely used</td>
</tr>
<tr>
<td>Electronic calculating equipment</td>
<td></td>
<td>Winning increasing acceptance in handling complex retrieval problems as high speed; companies frequently use the same equipment also for non-I.R. purposes</td>
</tr>
<tr>
<td>Computers</td>
<td>IBM, Remington Rand, Bendix, Burroughs, Minneapolis-Honeywell, General Electric, RCA, and others</td>
<td></td>
</tr>
</tbody>
</table>
is the secondary purpose of providing immediate access to the document itself. Certain methods are concerned only with the indexing aspect. Others combine the two and produce a copy of the document in conjunction with the index entry.

In this part of the chapter the principal systems are outlined and discussed briefly. For the names and addresses of the chief designers and manufacturers of equipment, attention is directed to Chapter 4.

An immediate observation that is apparent in a quick review of these recently developed systems is that some of them are completely manual in their operation whereas others require the use of various kinds of mechanical devices such as the electrical and electronic equipment of the type designed primarily for data processing. There are also systems utilizing the process of photography, usually for making copies of documents in greatly reduced size for storing large numbers of documents in little space.

In general, the manual systems are suitable for collections of intermediate size, too numerous for conventional methods and not large enough to warrant the cost and work of machines. The complexity of the subject matter is an influencing factor too. There are, unfortunately, too few figures published suggesting the numbers of items for which the various systems are intended, and rarely is there any indication of their costs. Shaw (10) has advised that a collection should contain at least 50,000 units and that there be a concomitant need for many items of information from each one before the use of a machine method is efficient. A study made by Bourne and others (11) of information and retrieval systems included cost comparisons of three systems. They showed such wide differences as not to be very conclusive.

Manual Systems

Of the manual systems the foremost are those employing a special type of card called the notched or edge-notched card. The trade name of one that is much used is Keysort, a product of the Royal McBee Company. There are several others, all slightly different, made by other companies. These cards have holes punched around their peripheries to which meanings are assigned according to a code. If a hole is punched out to leave a notch the card drops from the pack when a needle is inserted through the holes in that position.

An example of a notched-card system that involves a unique
coding principle known as "random" is sold under the trade name of Zator. Brenner and Mooers (12) have described a Case History of a Zatacoding Information Retrieval System in Chapter 15 of the book Punched Cards edited by Casey et al. The unit is an edge-notched card of special design. A list of subjects must be developed for a specific application, then the coding that consists of a pattern of notches for each subject, all of them overlapping one another, is done. If the code patterns are properly manipulated the multiple use of holes does not create a chaotic result. This system can be used only under contract with the Zator company.

Another manual system is that known as "coordinate indexing" which was developed by Taube (13). This is a neatly logical procedure that is based on a relatively simple concept. It consists in establishing a list of broad yet exact terms called Uniterms, one to a card. As documents are received they are numbered in sequence, their contents analyzed and their numbers written on the cards bearing the applicable Uniterms. By visual matching of the numbers appearing on two or more cards, the documents relating to a desired topic can be detected. A typical application of this system has been outlined by Zerwecki (14) in Chapter 7 of the aforementioned book on punched cards edited by Casey (12). The capabilities of the coordinate system are enhanced by the use of modifying terms called links and roles that indicate such factors as "how" and "what" occur in a process thus making possible more accurate searching.

The Peek-a-boo method, again a manual process, consists in establishing a list of official subjects or indexing terms and recording them on specially designed cards in which holes can be punched to indicate the number of a document that includes subject matter pertinent to the term on the card.

When the cards are stacked the documents relevant to a search are revealed by throwing light through the deck; the coincident holes permit the passage of the beam, thus showing which cards carry the numbers of the documents required. Thompson (15) has provided an excellent illustration of a procedure for developing an index for a broad subject collection.

Combination Indexing and Filing Systems

Certain of the nonconventional systems combine the filing and indexing operation, usually by utilizing film copies of documents. Single frames of microfilm can be inserted in IBM-style cards known as aperture cards for which Filmsort is one of the
prominent trade names. These must be searched by machine, but there are also manually searched ones of the edge-notched type for which Filmsort, among others, has a card.

Short lengths of film recording brief documents can be inserted in special standard card-size devices combining a half card to which is attached a plastic pocket or sleeve into which the film can be slipped for filing purposes. The upper section of the card carries the typed legible identification.

A related procedure is the preparation of positive prints from microfilm on strips of printing paper especially made for this purpose. These strips have a backing paper that peels away to expose a sticky surface permitting it to adhere to a filing card. Indexing information can be typed on the top edge of the card. Microstrip and Microtape are trade names for similar products. The copy can, of course, be read only with the aid of a reading device.

One of the earliest systems for the simultaneous indexing and filing of a large file of documents was to microfilm them on reel-length strips. A code consisting of a pattern of dots is filmed beside each frame. As the film is run through a machine an electronic scanning device selects those items that relate to a specific search and these are stopped so that they can be read or photographed. The U.S. National Bureau of Standards has spent effort in perfecting the original model first conceived by Vannevar Bush and developed by Ralph Shaw, then Librarian of the U.S. Department of Agriculture, who called it the Rapid Selector. McMurray (16) has reported a fully satisfactory installation of the machine at the Bureau of Ships of the U.S. Naval Department. A similar system has been developed in France under the name Filmorex.

The Minicard system, a development of Recordak Corporation, has a feature in common with the Rapid Selector in that a copy of a document is put on film that carries also a code pattern. The film, however, is in discrete units, 16 mm., by 32 mm. in size, each of which is slotted for filing on a stick. There are special machines that can select specific Minicards from the file; enlarged photocopies can be reproduced. Because it is so costly it is not likely that there will be many installations of this system, thus making it difficult to judge its potential effectiveness.

Of the other filing with index systems listed in Table 1, Flip, Benson-Lehner, Filesearch, FMA, Inc., and Magnavue, Magnavox Research Laboratories, the first two were in produc-
tion in 1961 while the third was still in the laboratory stage. However, according to a later review of systems by Bushnor (17) Magnavox was ready to supply installations in 1962.

Systems Providing Separate Document Image File and Index

The list of retrieval devices on page 181 includes three: Verac, Avco Corporation; Microcite, National Bureau of Standards; and Walnut, IBM, each of which proposes a unique method for recording micro images of documents to which a separate index is keyed. They all provide a method for reproducing copies of documents in greatly reduced size and storing them in such a way that any single one can be selected from the store when it is requested. The Verac machine uses sheet film, putting 10,000 pages on a 10 by 10 inch sheet. The fantastic Walnut is designed to produce microfilm copies of pages from the film in IBM aperture cards. Microcite uses sheet film in 15 by 15 inch sheets, and the index is made on a set of peek-a-boo cards.

Another system announced as being ready for installation in June 1962 is known as CRIS or Command Retrieval Information System. It is sold by Information Retrieval Corporation. Microfilm images of documents in either 16 mm. or 35 mm. size are stored on scrolls, 500,000 images to a scroll, and these are placed in a special retrieving device having a keyboard selector and a screen where an enlargement can be viewed or copied as a micro image. Any document can be located in less than 20 seconds, according to the Corporation’s literature.

Machine Systems

By the term “machine systems” is meant those using the kind of electrical and electronic equipment that was designed initially for accounting and other data processing procedures. Such machines are capable of accepting a store of information appropriately coded, storing it until it is requested, and then producing selected items in some useable form. They can be used for the indexing function only or they can record full bibliographic information.

The two principal machine systems are known as punch card and computer. Each one can function as a complete system itself or their units can be used in combination. There are several types of units, each designed for a particular operation in a complete system. The chief operations for which provision must be made include the following:
1. Preparation of a code to fit the subject area concerned, and programming procedures developed.

2. An input procedure to put information into the storage unit. This can be punched cards, paper tape, or magnetic tape.

3. An output procedure to deliver information as requested in a form such that it can be read by persons. This can be punched cards, tape from which typed copy is produced, or a form to be photographed.

4. A procedure to store all information that is fed into the system. The usual storage devices are magnetic drums, magnetic cores, magnetic tapes, or special photographic processes.

5. A control operation to give instructions to the aforementioned units and execute the process of selecting from the store.

It is apparent that machines that can perform such functions must be extremely complicated and hence expensive. Their use is, therefore, confined only to major information retrieval operations.

Some General Observations Concerning Machine Systems

One aspect of the machine systems often questioned is their cost. It has already been mentioned that there are few published figures giving clues to what might be anticipated. However, it is obvious that any machine installation will require a greater budgetary provision than a manual system, but the consequence of having more information accessible from the same documents may make its adoption a good bargain. Additional personnel will certainly be needed, both clerical and professional. The total financial requirement should be investigated and honest comparisons made of all possible systems before embarking on a major program.

Permission has been given to cite an example of a projected change from a conventional indexing procedure to an IBM punch card operation in the library of HRB-Singer, Inc. (18). About 600 documents, chiefly from the Defense Documentation Center, are handled monthly. Specifically, they are ordered, received and accessioned, indexed, circulated, and most of them eventually discarded. An additional file of data to be included is the record of education and skills of personnel. In this situation there is already access on the premises to an IBM sorter and tabulator. It will be necessary to install in the library a punch and a verifier. The estimated cost to the library of this change is $200 a
month (in 1962) which is expected to be absorbed as a normal increase in operating expenses within five years.

Kulp (19) has stated that to establish an IBM card system when all equipment must be acquired, the rental fees would be about $1000 a month. The more versatile computer system would come to about $22,000 a month. In view of the fact that many organizations now have some kind of punch card or computer equipment for other purposes that may not require the full time of the machine, it is likely that an additional use such as information-retrieval functions would be encouraged.

The analysis of an information-retrieval problem requires the keenest analytical insight to detect all of its implications and to determine the system best suited to solve it. Then, Kulp warned, once the decision to institute a procedure has been reached and its program defined, all temptations to expand its capacities must be rigidly resisted. If it is too heavily burdened the end result will be disappointing.

In the process of investigating systems, the distributing agents and manufacturers of equipment should be approached. They stand ready to give advice and to assist in getting the right system for the situation into operation.

SUBJECT HEADINGS

No matter what kind of indexing system is adopted, conventional or nonconventional, there will be the necessity of establishing the list of subjects to be used uniformly for index entries. The major indexing and abstracting publications relating to the fields involved should be consulted and the terminology adopted from the one or more that fits most closely the publications to be indexed. Additions and modifications can then be incorporated. The indexes of such publications as Chemical Abstracts, Engineering Index, Biological Abstracts, and Applied Science and Technology are examples of some that are known to be followed. Especially important authorities for those libraries handling technical reports are the thesauri, one covering a broad subject scope, another for chemistry, developed by ASTIA (Armed Forces Technical Information Agency, Arlington, Va.), which in 1963 became DDC (Defense Documentation Center.) The American Institute of Chemical Engineers published a thesaurus that has provided a starting point for the whole engineering profession. Planning for its expansion was begun in 1962 by the Engi-
neers Joint Council. Every field of science or technology has some publication that is recognized for its leadership in exact nomenclature.

FILING PROCEDURES

There are two possible methods for filing documents in their published forms. One is to place them according to the indexing notation, either a subject or a code designation. The other is to file in order of acquisition, in which case everything is marked with a sequential number when it is received. The first system has the disadvantage of requiring good guessing with respect to leaving space for growth in various parts of the file and having to cope with differing rates of acquisition. If the second method is followed all filing space is used economically. However, this means that there is complete dependence upon the most detailed and accurate subject indexing for locating information and there can be no direct consultation of the file at all. Where space is a problem and where the approach is through an excellent indexing system, it can be a good procedure.

The alternative to filing full size original copies of publications is to reproduce them photographically in one of the several possible microforms. The form chosen will then determine the manner of filing.

KINDS OF PUBLICATIONS INDEXED

The foregoing brief discussion of indexing problems and procedures is followed by descriptions of the several types of materials that may have to be cared for in a science-technology library. Each has its own unique features with respect either to the character of the information or its physical form.

Pamphlets and Reprints

Pamphlets, a generic designation of publications, consisting of few pages (sometimes specified as fewer than 64) usually of less permanent significance than books, and reprints of articles from periodicals will constitute a large part of the material in this category. They should be approached from the points of view indicated in the general discussion on indexing and the appropriate
scheme used, Richardson (20) has provided a detailed description of the most simple of systems which is filing by author and indexing by subject. Index cards must be typed with the appropriate subject headings.

Pamphlets may be filed in drawers of standard filing cabinets (legal size may be necessary), possibly in manila folders or pockets for ease in handling. It may be preferable to house them in file boxes to stand on shelves, or even on divider-type shelving to hold them upright. Some few will be given hard use and these should be fastened in pamphlet binders. The object of the method of storage should be to have them as accessible as their use warrants.

Provision should be made for periodically weeding this file since material will inevitably accumulate that is not worth keeping indefinitely. However, only the individual situation can determine what may safely be discarded. Date of publication alone will not be a certain determining factor.

Government Publications

If only a few government publications, referring principally to United States or other nationally issued ones, need be acquired, they can either be cataloged as books if of permanent importance (fastened in pamphlet binders if small in size), or put into the pamphlet file and indexed. Many libraries, however, require extensive files of certain series, such as the Bulletins and Technical Papers of the United States Bureau of Mines. These should be kept together in numerical order. Where a fair representation of government documents from a number of agencies must be handled, a special scheme for indexing them should be adopted. An excellent one has been developed by Jackson (21) as presented in A Notation for Public Document Classification. The issuing agencies are utilized as a basis for classifying, and a combination of capital letters and arabic numbers is used for notations in a manner simple enough for ready comprehension.

At an E. I. duPont de Nemours & Company library an effective system for filing government documents separately from other pamphlets was developed and information concerning it supplied by Goff (22). Series publications are filed alphabetically by issuing bureau, then by title of the particular series in numerical order. In the catalog, cards with numbers 00 to 999 printed thereon are marked to show the holdings. Subject cross-reference cards are typed, using the official subject headings.
The publications need only be stamped to show that they belong in the library collection, and the subjects under which they are entered in the card catalog are written inside the back cover. Special "out" cards are inserted in the file when an item is borrowed. The system is recommended as being both simple and adequate.

The foregoing discussion applies chiefly to the standard government publications that have been issued from the agencies that have been in existence for many years. The more recent type of publication known as the "report literature" that had its beginnings at the time of World War II has stimulated the necessity for somewhat different handling. Though these reports are usually in numbered series, the corporate authors are sometimes not simple to identify and there may be several numbers on one document: the contract number, the sequential number of the report issuing under that contract, and an over-all series number. These documents are the results of government-sponsored research contracted chiefly by the Atomic Energy Commission, the Air Force, and other Armed Services agencies. In some libraries they are filed according to the series numbers, with special rules for the exceptions. In others, they are simply accessioned and filed in order of accession, the indexing serving as the guide for subsequent location. This latter procedure solves the problem of judging how much space to leave for a series, each of which grows at a different rate. Divider-type shelving is preferred for these reports.

The comprehensive work edited by Weil on The Technical Report (23) includes several chapters that give practical advice on the handling of government reports. Fry's chapter on Cataloging Government Technical reports and Taube's The Uniterm Coordinate Indexing of Reports are examples of the kind of detailed instructions that the book provides.

Several of the government agencies supply important indexing aids. The ASTIA (Armed Services Technical Information Agency), since 1963 DDC (Defense Documentation Center) publication titled TAB (Technical Abstract Bulletin) lists reports, and supplies indexing terms, "Descriptors," for each document preceding its abstract. For a number of years, through 1957, index cards were available also, and in 1962 tentative plans were in process to resume the preparation of cards and/or punched tape to be used by computers. Other agencies, such as the Naval Ordnance Laboratory, have had a card service. Because ASTIA (or DDC) has published thesauri of its indexing terms and these
cover a broad range of scientific and technical fields presently in active development, they are likely to be extensively used as authority lists.

Patents

Patents constitute a class of government publication that must be treated distinctively if it is a significant part of the library’s resources. The patents should be indexed by assigning an adequate number of subject headings on cards to be filed in a conventional file if the number acquired is not too great for the limitations of this method. Where large numbers of chemical or electronics patents are needed, the Uniterm Index provided by Information for Industry, Inc., 1000 Connecticut Ave., Washington 6, D.C., can supplant this effort.* The indexing information required usually includes the patentee, assignee, and subjects to cover those aspects of the content that are pertinent. The copies themselves may be filed either by number or Patent Office classification. When the files are used for searching, the latter method is helpful.

A special indexing procedure as applied to a collection of foreign patents reported by Weinstein et al. (24) is effective in coping with a situation where both an abstract bulletin and the indexing became a problem for a small staff. The Peekaboo system using Remington Rand cards and a National Bureau of Standards punch has been found to be completely satisfactory. Details of the procedures followed are provided by the authors.

As for filing, patents may be kept in folders in filing cabinets, in boxes that stand on shelves, or in loose-leaf binders. In one library at least, the copies acquired for permanent reference are bound into volumes to assure their safekeeping.

All countries in which an extensive scientific research program is conducted have patent systems. They follow practices similar to those of the U.S. system of numbering each patent in sequential order, classifying, and issuing to an inventor, though in some countries patents are issued directly to a company. Because of the general similarities, they can be treated in like manner.

*Documentation Incorporated, 4827 Rugby Ave., Bethesda 14, Md., has prepared an index to Chemical patents on magnetic tape sold under the name Textape Service. Patent copies are in reduced size known as Docuform.
Trade Literature

Publications covered by the term "trade literature" may be pamphlets or even books. They are usually published by industrial firms. They may be catalogs of products. Some are issued as periodicals bearing volume numbers and dates, in which case they are treated like other serials if important enough to retain for any length of time. The pamphlet type will range from price lists likely to be of current significance only (though their possible eventual importance in market research should not be overlooked) to compilations of data not readily available from any other source. Items of temporary importance might be assigned to the pamphlet file, and indexed accordingly. The more permanently valuable will merit full cataloguing and a place on the shelves with the book collection.

A large collection of trade literature such as a group of product catalogs must be treated as an entity. The most obvious approach to it is by the names of the manufacturers. Moore and Holleman (25) have described in thorough detail a method for cataloging this type of material which has as its basis Cutter-Sanborn numbers for the names of commercial companies. This modified table was developed at the Boeing Airplane Company Library. General rules for indexing, using the Thomas' Register of American Manufacturers as authority for the company names, are presented. A significant feature is the cross-indexing of trade names to company names. The provision by Thomas of manufacturers catalogs on microfilm in card size to accompany the Register provides a welcome solution to the problem of keeping such files in order. Details of this service are given in Chapter V of this book.

Another procedure for indexing technical trade literature has been outlined by O'Farrell (26). This system consists in filing alphabetically by company and possibly indexing by company, though this step may be omitted. The Thomas' Register can be used for the product index.

A unique aid is available for literature relating to electronic equipment. From Electronic Engineer Master, 60 Madison Avenue, Hempstead, New York, complete directions for establishing a filing system can be obtained for the asking. The complexity of the parts used in this kind of equipment makes this an important service.
Photocopies

The filing of photocopies will be dictated by the way their printed counterparts are handled. Photostats of items similar in nature to a file already in the library will simply be treated as are these originals, indexed as they are, and filed with them.

Microfilm copies present a special filing problem because of their physical difference from conventional printed publications. Long strips, such as are required for volumes of journals or complete books, must be kept on reels, preferably in individual boxes. Large collections should be kept in cabinets designed for the purpose. It had once been thought that microfilm had to be kept in a humidity-controlled atmosphere, but it has not been found to deteriorate as much as had been anticipated under ordinary atmospheric conditions. The contents of the reels must be marked on the boxes in which they are kept, and cards prepared with proper subject headings to file in the card catalog.

Short strips of film require their own methods of handling. Brown and Austin (27) developed a method of filing in cloth pockets, the strips being cut to uniform length to fit filing cabinet drawers. Dice (28) also devised a system involving the cutting of the file into strips, filing in standard stationery-size envelopes, and identifying the contents on the envelopes. Special filing equipment has been developed in which short pieces of film are filed in catalog-card size devices of which the top third is of plain card stock to which a clear plastic sleeve is attached. A piece of microfilm can be inserted in the lower part and the identifying information typed at the top. One example is known as "Sertafilm" and is available through Atlas Microfilming Service, 105 North Fifth St., Philadelphia 6, Pa. Another is "Filmsort," made by The Filmsort Company, Pearl River, New York.

An alternate procedure for dealing with short strips of film is to splice them and put them on a reel. The contents of the reel is then indexed.

The Recordak Corporation has prepared a pamphlet titled How to Index Your Microfilm Records which is free upon request to its Advertising Department, Wanamaker Place, New York 3, N. Y. Included in the pamphlet are its Kodomatic and Target systems, these being applicable chiefly to large-scale projects.

Evans and Goepp (29) developed a scheme for building a skeleton periodical file using both photostat and microfilm copies
to be filed alphabetically by journal title, then chronologically just as a file of printed copies would be placed on shelves. In this system each item is put into a file folder which is lined with pockets to accommodate over 100 pages of microfilm copy. Only those parts of the periodical files that are pertinent to specific interests need be acquired.

Photocopies in microprint form are usually made on cards of standard catalog size. They cannot, however, be used to file in the card catalog, but should be kept in a separate file or drawer, and catalog cards provided to show holdings. Regular cataloging procedures can be followed.

Photographs and Pictures

When photographs and pictures comprise an important part of the library's resources they must be handled as a completely separate file. In few scientific libraries is it likely that they will be present in large number, but since a few collections do include them, their treatment is covered here. Strain (30) has reported the results of a study of methods of filing and indexing photographs that deal with scientific subjects. Photographs may be in the form of either positive prints or negatives. It is obvious that the latter must be treated from the point of view of their permanent preservation; a print can be replaced. Negatives should not be handled unnecessarily, and it is good practice to keep them in glassine envelopes. The usual arrangement is to file by accession number. Prints may be mounted on uniform-size cardboards to simplify their filing, or they may be put into loose-leaf binders of the special type that permit several to be on one page in a shingled position. There are some attendant disadvantages to this method, however, since individual pictures cannot be removed. Prints may also be kept in folders and filed in legal-size vertical files.

The indexing of photographs and other pictures is peculiarly difficult because the assigning of adequate captions may be largely a matter of personal judgment. Photographs that are records of information sought in the study of certain materials such as metals or textiles should be filed in accord with the system for keeping other research data and indexed with the research reports. A special system for indexing pictures has been described by Milhollen (31) who advocated the placing of microfilm copies of the pictures on the catalog card to aid in identification and also avoid undue handling of the prints. In general, the
indexing procedures should conform to those used for other materials.

Slides

Slides must be kept in a separate file. It may be desirable to group them so that they are ready for special purposes, such as lecture illustrations, or it may be preferable to maintain a single file from which they may be pulled when needed. Special filing drawers must be provided, slotted to hold individual slides. They should be indexed in the same way as are other pictures, or they may be reproduced into enlarged prints, and these mounted on the index cards to obviate the necessity for worded descriptions.

Maps

Where maps must be acquired as part of the collection, they, too, must be treated as a separate entity. Some types, such as the topographical sheets and folios of the United States Geological Survey, are easy to file because their arrangement is obvious, alphabetically by state and quadrangle name; the Survey supplies the index maps. They do, of course, require specially designed map cases. If large numbers of different kinds of maps are to be filed, they must be approached from a broader point of view. The main objective, as in any classification scheme, is to bring like things together and, according to Lewis (32), this principle must be kept in mind when maps are put into any order. He recommended the placing of the most used ones where they can be reached easily, however. The outstanding feature is usually the geographical area, but the subject classification should attempt to anticipate whatever call is likely to arise in the particular library. If large numbers of maps become part of the collection the pamphlet titled Classification and Cataloging of Maps and Atlases by Boggs and Lewis (33) should be consulted.

Organization Reports

In many organizations reports of intramural activities are written for internal circulation only. They may be reports of engineering studies, sales promotion, product development or, as is customary in such organizations as maintain science-technology libraries, reports of laboratory research. Any of these may be assigned to the library or to a file room under
supervision of the library. A survey of science-technology libraries in 1946 revealed that about one third of the total were responsible for research report files. It is likely that the practice has grown. These reports constitute unique records of the progress of original investigation and it is of great importance that their contents be indexed accurately and in detail so that the information may be located easily. Because the library staff is accustomed to indexing subject matter similar to that contained in such reports, it is logical that the indexing should be done in the library.

Most research activities follow a fairly standardized pattern; individual problems are assigned project numbers; research workers as individuals or teams undertake an investigation; periodically they write reports of progress until the project is terminated, at which time a final summarizing report is written. In the course of this process laboratory notebooks, progress reports, and final reports accumulate to be filed and indexed. To locate information contained in them a scheme must be developed relating it to the basic one used for classifying published information if at all feasible, though the pattern will be predetermined by the way in which the search is organized. Shorb (34) has provided an excellent description of the methods used in one large research library. The book edited by Weil (23) includes several chapters on their filing. Poland’s chapter in the latter work on subject-classifying and alphabetical indexing presents a detailed analysis of all aspects, giving examples of procedures and advice concerning equipment.

Because laboratory notebooks precede the written reports, their treatment is considered a major responsibility. Bound blank notebooks have been generally adopted for this purpose, and in some instances the library has the task of issuing them to research workers, marking them with the project number for which they are to be used, and collecting them for filing when they are filled. Sometimes these notebooks are so designed that duplicate and even triplicate copies of the pages are made. The copy pages are perforated for easy removal. Where patents are likely to eventuate, all notebooks must be signed and witnessed as a regular procedure. Some of the data first set down in these notebooks are later included in reports so that their indexing need not be too detailed, though some guide to their content should be provided. This may be done by the person whose work is recorded in the book.

The notebooks must be filed in a manner such that they can
be relocated when needed. However, because reference to them becomes increasingly rare with the passage of time, it may be satisfactory to have them microfilmed for permanent record if the organization’s patent attorneys consent.

An organization’s research reports are of two types, progress reports written at intervals during the course of an investigation and final reports summing the work at its completion. There must first be a system for numbering projects; each report issuing from a project will bear the project number and an additional serial number indicating its position in the file of reports for that project. It may also be desirable to assign a serial number in chronological order to each report and enter these in a record book which will show what reports from all projects have been issued in a certain period. If the research program is at all diversified, a system of classification of the projects may be used. This is preferable to filing alphabetically by subject.

Research reports should be indexed meticulously to reveal all work that has been done as insurance against its needless repetition. The person who assigns index entries should know thoroughly the subjects concerned. An individual card file, separate from any other, should be maintained. It is usually considered important that these reports be indexed by author as well as subject.

The foregoing suggestions apply where the volume of material is small enough to be treated adequately by conventional indexing methods. However, in a large organization where there are many projects in progress dealing with hundreds if not thousands of individual entities such as chemical compounds, traditional methods may not suffice. This kind of situation calls for the investigation of automated methods. Schulze (35) has published a detailed description of an example of a situation where a collection of research reports reached 28,000, many of them containing information about hundreds of chemical compounds. The solution consisted in installing an IBM punch-card system that coped with the mass of detail most satisfactorily.

Other applications of the newly created methods of indexing for information retrieval are reported in the comprehensive survey by Chemical & Engineering News (7) with special reference to company research reports. Some employ the manually sorted edge-notched cards of the Zator, Royal McBee or E-Z Sort types. Others use the Peekaboo system developed by the National Bureau of Standards or the Uniterm system developed by Taube. Whaley (36) has written several very helpful papers telling how to analyse and code the kind of material that is contained in company reports.
for mechanized searching. Of particular interest is Jahoda’s report of applying a combination manual and machine-based index to research and engineering reports (37).

The description by Kennedy (38) of an application of the special type of indexing by machine called “permutation indexing” showed that it can be effective and efficient for a collection of internal reports. It was done using in this instance the IBM 7090 computer to prepare a KWIC index. This Key Word in Context index form is an increasingly familiar device since it is used in such publications as Chemical Titles. It consists in setting up in columns the titles of items being indexed and manipulating them so that all of their Key Words appear in alphabetical order. The result is not a perfect index but it is good enough to serve a useful purpose in getting material into the hands of a large group very quickly.

For a final word concerning the handling of research reports, they must be regarded as meritig special handling in the library files. Because they are written as the result of costly research they must be treated as confidential material, subject to restricted circulation within the organization only to persons authorized to see them. They should be kept in locked files.

Correspondence Files

In many libraries correspondence files, particularly those relating to the scientific and development research activities, are assigned to the library for control. The system for filing and indexing can be adapted from the one used for published materials. Interoffice memoranda may be very important because ideas for possible laboratory investigation or conceptions of patentable ideas may be recorded in them. It is apparent that there will be a close relationship between some parts of this file and the content of the research reports. Good indexing will make possible the location of every piece of information that may ever be needed.

CONCLUSION

The problem of adequate indexing is one of the largest and most important that must be solved by the information service staff. Judgment must be exercised in selecting areas requiring close control or indexing in depth and those that merit only
cursory attention. Eventually, the indexing of published information may be done by automated procedures on a national or even an international scale, though it is likely that it will be another decade at least before such a program could be established. However, there are already some beginnings being made in this direction, for example, in the field of metallurgy by the American Society for Metals. It is certain also that every organization will always have some materials unique to its own interests for which indexing will have to be done.

BIBLIOGRAPHY


SUPPLEMENTARY REFERENCES


Keen, E. Aids for use in cataloging and classifying audio-visual materials. Lib. Res. & Tech. Services, 1, 189-197 (Fall 1957).

Snyder, P. Handling company technical reports. Spec. Lib. 45, 240-244 (1954).
Administration of Readers' Services

The major purpose in developing the book and periodical collection and the special files of unique materials, all cataloged and indexed with meticulous attention, is to provide the group of persons for whom the service is planned with these sources of information to use when needed. This use must be administered through procedures that are adapted to the convenience of the clientele insofar as possible. Routine procedures controlling the lending-borrowing transaction should be established on the basic principle of keeping them as simple as expediency allows. All interests should be served impartially, though, to be sure, the occasional rush requirements of top management must be given priority in emergency situations.

A good impression of efficiency is created if a staff member is always available to accept requests for information or specific publications. A book or periodical volume may require some searching even though it is in the collection. It should be located as quickly as possible, and promptly given to the person asking for it. If it is not in the library steps must be taken to procure it.

The several ways of fulfilling readers' requests for publications are discussed in this chapter.

CIRCULATION OF BOOKS

Books have only potential value as they stand on the shelves; it is the use made of them that is the ultimate measure of their
worth. The best books are those that are read, and in a special library, book circulation should be as informal as possible. However, it is inevitable that there must be regulations governing this use of the collection if all individuals in any group are to be served equitably. They should be respected as mutually recognized policies established for the sole purpose of assuring the privileges of everyone concerned.

It is usually desirable to designate a definite loan period for the borrowing of books. Two weeks is the time limit often observed, with the understanding that this may be extended if there are no other calls. When one person has urgent need for a book that is not in much demand, a longer period of six months to a year may be granted. Or the situation may be such that there is no real necessity for establishing any definite loan period. This decision should be made cautiously, however, because borrowers are likely to take full advantage of it, and some books will never be on the library shelves for other readers to discover or for the staff to make use of in answering information requests. Even though the card catalog is an excellent guide to books on specific subjects, everyone who has used a library has had the happy good fortune of accidentally coming upon a book on the shelf that, because he did not happen to approach it from the cataloger's point of view, was not revealed by the catalog. The book collection should always be in a fluid state with every volume as freely accessible as possible to anyone who may need to consult it. Upon occasion it may tax the diplomatic abilities of the staff member in charge to communicate the idea that the best interests of every user are at stake.

In some situations it is necessary to make arrangements to provide small collections of books in certain laboratories or offices. These will almost always be duplicates of titles already in the library unless, for example, it should be decided that all books on analytical chemistry should be placed in the analytical chemistry office. This kind of splintering of the collection should be kept to the minimum because such proliferation obviously weakens the library. It is sometimes possible to place such books on semipermanent loan to these locations, with the understanding that they be returned to the main collection eventually. Where this has not proved to be entirely satisfactory, some administrative regulations call for the processing by the library of all books purchased by anyone in the organization. Cards may then be added to the card catalog to show that these books are within reach even though they are not part of the library's regular
collection. The department in which they are housed assumes responsibility for controlling them. Such needs for books are certain to present problems, but the library should cooperate in coping with them.

Certain reference books should not circulate. Handbooks, directories, dictionaries, encyclopedic works, abstracting journals, and indexes ought always to be available for consultation in the library at any time without delay. Reference works that are required as laboratory tools should be provided as duplicate copies.

RECORDS OF LOANS

There are several methods of keeping records of book loans, each of which has merit in a particular situation. It is customary to keep record only of the books that are out in circulation, but in some libraries it is desirable to be able to determine which books are charged to individual borrowers.

The most common method for charging books involves the use of book cards. Standard ones such as are offered by the library supply companies and used in conjunction with a book pocket pasted inside the back cover of a book are adequate. The call number of the book, its author, title and accession number (if used) are typed on both the card and the book pocket. This card is signed by each successive borrower and filed in the circulation file by call number or author when the book is on loan. A date, either that on which the book is taken or will fall due for return is stamped on the card and on a date slip pasted in the book. Several colors of cards might be used if it is desirable to distinguish any special groups of books. Examples of loan record cards are shown in Figures 16, 17, and 18.

Where record of books borrowed by individuals is wanted, name cards are required for each borrower. Notations must be made on these cards for each book taken, then crossed off when they are returned. If this is really important, it may be preferable to use, instead of book cards, printed forms on paper thin enough to permit the making of carbon copies. The borrower must then write the name of the book and the author in addition to his own, plus the call number if this is needed. One copy of the slip can then be filed by author or call number, the other by name of the person taking the book. This record is likely to be desirable only where there is a large turnover or moving of staff from one location to another.
Fig. 16—Standard book circulation card.
Fig. 17—Mechanically sorting card.
Fig. 18—Routing slip for periodicals.
Though ordinarily it is not considered an economic procedure to use punch card devices for the control of book circulation in libraries of the type with which this book is primarily concerned, some applications have been reported. Richardson (1) has outlined the details of methods developed by three special libraries for using such cards for circulation routines. It would appear that the total number of books circulated would have to be more than a few hundred for this to be a reasonable use. However, if the equipment is at hand, it may be a time-saving process for the library, particularly if additional information concerning the use of the library can be obtained in this way. The handsorting notched card can also be used for book circulation but, like the punch card, it is advantageous chiefly where large numbers of books are handled, such as in university or public libraries. It may be worth considering for a smaller scale operation, particularly where record of individual borrowers is wanted, because it can be notched according to an alphabetical code. In most situations it is necessary to have a regular system for noting overdue books as a safeguard against the tendency, possibly no greater among scientists than any other group, to be forgetful of the books they borrow. In some libraries a two-week tickler file is kept in which slips are put for each book that is borrowed, and removed if the book is returned within that period. If not, the slip is sent to the delinquent borrower on the day after the book was due and a colored signal attached to the filed book card. Another procedure is to review the circulation file at stated intervals, every two weeks or once a month, to catch those that are long overdue. If there is a significant amount of personnel change, this routine will assume greater significance.

As a general incidental policy, new books should be kept in the library for at least a week on prominent display before being loaned. An individual who has called attention to a book, or made specific request for its purchase, should be notified when it is received and given first chance to borrow it.

EXTRAMURAL LOANS

In addition to the usual service to persons located in the immediate vicinity of the library there may be need to extend it to personnel in other units of the organization in far removed locations. Branch plants and scattered sales offices might
make good use of materials that could be supplied by the library if this possibility is brought to attention. Where there are several libraries or branches attached to the various unit locations, a system of interlibrary lending is advantageous.

Any library is likely to receive requests for loans of books from individuals entirely outside the province of the intended service. They may be from other libraries, in which case for the sake of developing reciprocal relations, loans might be granted if there is no chance of consequent inconvenience to the library's own clientele. These additional courtesies are not likely to be abused, and the good will they engender is worth their little trouble. See Chapter 12 for further discussion.

CIRCULATION OF MISCELLANEOUS MATERIALS

Provision should be made for full use of the non-book materials such as pamphlets, bibliographies, reports, translations, and patents that are normally housed in indexed files. Individual circumstances will determine which of these may safely be loaned for use outside the library. Administrative policy may require that certain reports and laboratory notebooks, for example, not be permitted to leave the library. For items that may reasonably be circulated, special forms such as the one shown in Figure 19 might be designed. Whether or not it will be necessary to stipulate definite loan periods is an individual decision, though it is usually wise to do so. For materials kept in vertical file drawers or on divider-type shelving the standard "out" cards such as those used in general office files are satisfactory. One is simply signed by the borrower, the item removed from the file identified, and the card substituted in the file.

In organizations that must handle government reports that are classified, special procedures must be instituted. Only those individuals who have the proper security clearance may even see such documents, and their signatures must be affixed to a record for each item borrowed. Where many documents are used, this can be a time-consuming task which may well warrant the institution of machine control.

CIRCULATION AND ROUTING OF PERIODICALS

Because of their importance with respect both to use and preservation, the system for controlling the use of periodicals
<table>
<thead>
<tr>
<th>Name</th>
<th>Dept. No.</th>
<th>Send Back</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Druggist</td>
<td>C.3</td>
<td></td>
</tr>
<tr>
<td>McDowell, J.L., Jr.</td>
<td>M-481</td>
<td></td>
</tr>
<tr>
<td>DaHays, B.F.</td>
<td>M-483</td>
<td></td>
</tr>
<tr>
<td>Meese, W.W.</td>
<td>M-495</td>
<td></td>
</tr>
<tr>
<td>Schmitz, G.L.</td>
<td>M-490</td>
<td></td>
</tr>
<tr>
<td>Sebold, C.W.</td>
<td>M-489</td>
<td></td>
</tr>
<tr>
<td>King, B.H.</td>
<td>M-201</td>
<td></td>
</tr>
<tr>
<td>Arnold, L.F.</td>
<td>M-223</td>
<td></td>
</tr>
<tr>
<td>Sims, P.</td>
<td>M-461</td>
<td></td>
</tr>
<tr>
<td>Cromwell, L.G.</td>
<td>M-796</td>
<td></td>
</tr>
<tr>
<td>Maze, N.</td>
<td>M-781</td>
<td></td>
</tr>
<tr>
<td>Rawlings, D.V.</td>
<td>M-781</td>
<td></td>
</tr>
<tr>
<td>Nash, J.F.</td>
<td>M-741</td>
<td></td>
</tr>
<tr>
<td>Market, H.L.</td>
<td>M-741</td>
<td></td>
</tr>
<tr>
<td>Library</td>
<td>M-789</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 19—Periodical routing form used at Eli Lilly & Co. Library.

should be considered carefully. Current issues and bound volumes may be treated in the same manner, or different regulations may be established for each. In many technical libraries current issues are routed to those persons who want to see them regularly, and there have been many expressions of opinion for and against this practice. According to a survey made by Bloomer (2), no completely satisfactory system has yet been evolved for circulating periodicals, though in many libraries it is done because it is thought that the benefits outweigh the drawbacks.

There are several alternates to the routing of the issues of journals. One of them consists in duplicating the tables of
contents as they are received and circulating these reproductions. Readers may then request short loans of those journals that they definitely want to see, or copies of individual articles can be made and supplied for permanent retention by the persons requesting them.

Another choice is to subscribe to the appropriate edition of Current Contents of which three are published by the Institute of Scientific Information in Philadelphia. This unique publication consists entirely of reproduced tables of contents of issues of periodicals supplied by the original publishers before their own publications are available. Subscription can be made to Current Contents of Space, Electronic and Physical Sciences, Current Contents of Chemical Pharmaco-Medical and Life Sciences, and Current Contents of Social Sciences.

If, after all considerations, a firm decision is made to route periodicals, the titles to be routed must be determined, and the persons who want to see them must select which ones they will need. In some libraries only certain types of journals are circulated in this way, and it may be either the most scholarly or the technical ones. It is often expedient to subscribe to more than one copy of the most important titles.

The process of routing periodicals requires the establishment of detailed routines. Lists of individuals to whom each title is to be sent must be compiled, while attempting vainly to satisfy everyone who thinks that he merits priority. These names are then typed on routing slips and duplicated so that a supply is always kept ready. This feat can be performed by IBM or other electronic machine if there is access to one. An example of a routing slip is shown in Figure 20. Booser (3) has shown how satisfactorily data-processing equipment can be applied for the circulation of periodicals.

There are two main systems for routing periodicals. One consists in having each person pass the issue on to the next name on the list attached to the front cover either directly or by inter-office mail, with the understanding that each issue is to be kept no longer than three days. This hand-to-hand routing allows no control of the location of an issue, and requires a clientele inclined to be voluntarily considerate if it is to operate successfully. The other method involves the return of each issue to the library, from whence it is sent out anew to the next person on the list. The advantage of this method is that the location of circulating issues is always known in case of a serious need for them. It is apparent that this system may take the full time of
one clerical staff member if many periodicals are handled. Moreover, it also takes longer for a journal to reach the last name on the list if special messenger service is not provided.

In a small, closely knit organization it may be entirely satisfactory to circulate bound periodical volumes without special restrictions. However, complications arise where the group is large and much literature searching is done in the library. The absence of one volume, borrowed for the sake of only one paper in it, puts a hundred or so others out of immediate reach. The character of the particular literature involved, too, is a determining factor as to whether bound volumes should leave the library. If a reference work such as Beilstein’s *Handbuch der Organische Chemie* is used extensively it would be a serious inconvenience not to have all of the volumes of the *Berichte* or the *Annalen* on the shelf for quick consultation. A compromise arrangement is to have bound periodical volumes subject to prompt return if borrowed. The question of the circulation of periodicals should be weighed carefully, particularly if there are opposing points of view. The decision reached should be the one that benefits the greatest number of persons requiring the use of journals. Inasmuch as the majority of scientific libraries are oriented toward research activities, their most important resource, the periodical literature, ought to be available always.
For this reason it is the policy of some libraries not to circulate bound volumes.

A solution to the journal circulation problem that is finding increasing favor is to provide photocopies by means of one of the easily operated copying devices. Such equipment is discussed in Chapter IV of this book. The question of copyright remains to be resolved, although it is generally understood that one copy of an article may be made for scholarly purposes without harm to the interests of publishers. However, there are certain publications that expressly forbid such copying, and their wishes should be honored.

PROVISION OF MATERIALS NOT OWNED BY THE LIBRARY

Interlibrary Loan

When there is urgent need for published material that is not owned by the library, either books or periodical articles that cannot be easily procured by purchase, effort must be made to discover where it can be found in other libraries. When located, request can be made either for loan or a photocopy of the item. If it is a book that is needed, it is obviously preferable to try to borrow it than to have a photocopy made, though a microfilm can be satisfactory and not very expensive should the publication be out of print.

Before requesting an interlibrary loan, several facts concerning ethical practice in borrowing should be investigated. It is important that the Interlibrary Loan Code (4) developed by the American Library Association be read carefully. Most libraries operate their lending service in accord with these regulations, and they must be observed scrupulously if the system of interlibrary loan is to be retained. It is likewise expedient to learn of any special restriction imposed by the libraries to which requests are addressed. As a rule public libraries cannot render interlibrary loan service because their primary function is to have all of their holdings available for consultation in the library. University libraries, too, must give preference to the needs of their own students and staff members, and therefore cannot always comply with requests that take volumes away from them for as long as a month.

In general, requests for loans should be made from libraries that are in nearby locations. This is good practice because it is
less expensive as well as time saving. It is also easier to become acquainted with the holdings and personnel of libraries within reasonable distances.

Groups of libraries in a geographical area may cultivate reciprocal relationships to expedite loans among themselves. For publications that will not be used frequently, an arrangement may be developed whereby certain titles are acquired by each library in the group of those cooperating, and freely loaned to the others.

It should be apparent to those who are employed in large and complex, decentralized organizations with units in widely separated locations, such as corporations with various divisions or operations in several states and countries, that a system of intracompany cooperation might be fostered to advantage. The several libraries will likely differ with respect to subject area emphasis. If it is so planned that acquisition policies recognize these subject limitations and there is agreement to depend upon an internal interlibrary loan system instead of calling upon outside sources, the interests of the whole organization will be well served.

PROCEDURE FOR LOCATING BOOKS IN OTHER LIBRARIES

To be borrowed, an item must first be located, and since the procedures for books and periodicals differ they are discussed separately. Finding a somewhat rare, out-of-print book can be a challenge, and it may require more than one letter of inquiry before it is found. The most likely source will be a library covering the appropriate subject field, preferably one that has been in existence long enough to have had time to acquire a significant collection. A first step may be to investigate special libraries in the immediate vicinity, locating them through directories of library associations or possibly Bowker's Guide to Subject Collections. There may be a university library that would have the book and be willing to lend it. The bibliographic centers that maintain union catalogs should be consulted for the purpose of providing information as to the locations of books.

There are several large bibliographic centers located in various cities of the United States. Inquiries should be directed first to the one nearest to the inquirer. As a last resort, the Union Catalog of the Library of Congress which administers a system of circularizing for hard-to-find titles may be consulted. It is conceivable that similar centers in other countries, the
Centre Nationale de Recherche Scientifique in Paris, for example, might be approached for a very elusive title. For detailed information on the development of the union catalogs and a listing of some of the smaller specialized projects, Downs (5) has provided an excellent summary of the whole program. Some of the important union catalogs are:

Ohio Union Catalog. 1434 W. Fifth Ave., Columbus 12, Ohio.
The Bibliographic Center for Research. Rocky Mountain Region—Denver, Colorado.
North Carolina Union Catalog. Louis Round Wilson Library, University of North Carolina, Chapel Hill, N.C.
State Union Catalog. California State Library, Sacramento 9, Calif.

PROCEDURE FOR LOCATING PERIODICALS IN OTHER LIBRARIES

The location of a file of a periodical is not usually as difficult as finding a book, except for some of the obscure titles that are owned by only a few libraries. It can happen, too, that a journal that would not seem to be difficult to locate cannot be found anywhere, such for example as is known to be the case for a reference in the Bulletin Therapeutique Naturelle et de Renaissance de l'Art Medical for the year 1891. Even the Bibliothèque Nationale possesses but one issue for that year!

To locate a periodical the procedure is to look first in the published listings—with—locations, both local union lists and nationwide ones. It is important first to be certain of the complete, exact title of the journal sought. Because references are usually cited as abbreviations, some trouble may be encountered; everyone cannot be counted upon to follow official abbreviations, nor are the same rules followed by even closely related disciplines. Ann., for example, may indicate either Annalen, Annales, or even Annals. Sometimes the date and volume number will provide a clue in determining whether a citation is for one title or another. It is essential that complete, unabridged titles always be given when ordering interlibrary loans or photocopies to avoid errors and unnecessary searching in the library to which requests are sent.

A detail that is too often ignored is indication of the source of the reference. When there is error the chance of correcting
it is enhanced by providing this information. The library to which a request is sent should not be expected to spend time verifying careless citations.

Some of the important listings of periodicals are:


**Checklist of Certain Periodicals.** The Library of Congress, Union Catalog of. This is a listing of the holdings in certain libraries of about 3600 scientific and technical periodicals published from 1939 to 1946 in enemy countries.

**Periodicals Abstracted by Chemical Abstracts.** Chemical Abstracts Service. The Ohio State University, Columbus, Ohio (1961). Published in Chemical Abstracts, also as a convenient separate pamphlet. Revised every five years, annual additions included in C.A. and separately.


**Union List of Periodicals in Pharmaceutical Libraries.** Bloomer, G., ed. Pharmaceutical Section of Science-Technology Division of Special Libraries Association (1951).


**TO BORROW OR PROCURE PHOTOCOPY?**

Once the journal has been located, the question is whether to try to borrow it or order a photocopy. A book, will, of course, most likely be borrowed. For journal articles, a photocopy is certainly the most convenient solution for everyone concerned. Few large libraries can lend their bound volumes freely, and in any event the requester should be better satisfied with a photocopy that does not have to be returned before he is quite ready to surrender his hold upon it, as is so often the case. A good policy is to order full-size copies of articles of less than 20 pages, and microfilm copies of longer ones.
Many university and public libraries provide photocopying service; the listings giving locations of files such as the Union List of Serials and the List of Periodicals Abstracted by Chemical Abstracts indicate what type of copying can be done. There are exceptionally efficient photocopying departments in some of the large libraries such as the following:

New York Public Library, Photographic Service. Fifth Ave. & 42d St., New York 17, N. Y. Because of its extensive resources, it can provide copies of many publications not readily found elsewhere. Orders are filled promptly, and deposit accounts can be carried.

U.S. National Library of Medicine. 8600 Wisconsin Ave., Bethesda, Md. Photoprints are provided at no charge to research workers in the fields of medicine or allied areas covered by the library's holdings.

John Crerar Library. 86 Randolph St., Chicago, Ill.

Technology Department, Carnegie Library of Pittsburgh. 4400 Forbes St., Pittsburgh 13, Pa.

Engineering Societies Library. 345 East 47th St., New York 17, N. Y.

A useful publication in any library requiring much photoduplication service is the Directory of Library Photoduplication Services in the United States, Canada, and Mexico compiled by Cosby Brinkley, Head of the service from which it is available—Photoduplication Service, University of Chicago Library, Chicago 37, Ill., price $1.50.

Every effort should be made to provide publications in one form or another as promptly as possible. To accomplish this the staff members must be well acquainted with the resources of the library and to know what steps to take to acquire quickly whatever may not be in the collections.

RECORD OF SERVICES

In the day-to-day operation of the library many services will be rendered, and it will be advisable to keep some kind of record of exactly what is done. A daily tally of the number of books circulated, the reference questions asked and answered, requests for bibliographic searches, and any other noteworthy activity may be kept conveniently on a desk calendar. These can be totaled daily, cumulated monthly, and thus provide a continuous record.
of the use made of the library. Such figures are very effective
evidence of an operation that is contributing to the progress of
the organization served in ways that can be measured. They may
be brought to attention in the library's annual report.

CONCLUSION

The ultimate purpose of the library is to render service as
simply and efficiently as possible. The users' convenience should
be the primary consideration in establishing all procedures that
affect him. New developments in techniques should be watched
in the professional literature and anything that can be adapted
profitably should be instituted.

BIBLIOGRAPHY

2. Bloomer, G. The circulation of current journals in a special library.
3. Booser, R.J. The use of data processing equipment for the control
4. General Interlibrary Loan Code, 1952. Revised ed. Chicago, Amer-
ican Library Association (1956).
5. Downs, R.B. Union catalogs. Chicago, American Library Associa-
tion (1946).

SUPPLEMENTARY REFERENCES

Boyle, R.R., and May, R.C. More service from your company library.
Brown, A.L. Summary of copyright positions. Spec. Lib. 52, 499-505
(1961).
Hewetson, C.E.C. Is periodical circulation effective? Aslib Proc. 6,
Jensen, H. Periodicals routing with diazo at the FAO library. Unesco
Bull. 12, No. 4, 82-84 (April 1958).
Vilentchuk, L. A charging system for small libraries. Unesco Bull. 15,
Dissemination of Currently Published Information

Library Bulletins—Other Methods

One of the most important functions of an information service in the areas of science and technology is the establishment of a system for reviewing publications immediately upon receipt, selecting information pertinent to the program of the organization served, and recording individual items to be brought to the attention of those persons to whose work they are related. This is commonly known as a "current awareness" service. It involves a combination of processes including the selection of pertinent information from periodicals, books, pamphlets, patents, reports, in fact, from anything of serious content that is received. A systematic record is made of these significant references, and in many libraries they are accumulated as listings that are duplicated for distribution in periodic bulletins. An important co-product is the development of a file of uniquely significant references from which information is immediately available when it is needed.

The volume of publication in any broad field of science has increased within the past quarter century to such magnitude that it is not possible for either a research scientist or one in management who determines the direction of future investigations to review regularly and consistently the many publications that contain information that may be of interest to him. Though each individual develops his own methods for keeping abreast of his personal areas of interest and does some regular reading himself, he cannot spend as much time as it would take to cover all of the publications that might contain information important to
him. This situation provides an opportunity for the information service to fulfill a need that exists in any organization where research and development work are in progress.

There are several methods for accomplishing this purpose of getting recently published information to those who should be made aware of it promptly. Some are more fitting in one situation than in another. The procedures used in existing libraries are reviewed in this chapter, and discussed also in Chapter 12.

METHODS FOR DISSEMINATION OF INFORMATION

As publications are received in the library their contents can be reviewed, and procedures instituted for selecting those items that are of potential interest to anyone in the organization, erring on the side of too much rather than too little. This continuous supply of information must then be communicated in the most effective manner possible. In this process the obviously pertinent material will be recorded for permanent retention in the special indexed files maintained in the library in either traditional card catalog style or by one of the nonconventional systems.

Once the material is selected methods for disseminating must be decided. The following procedures are possible:

1. Telephone calls to individuals
2. Noting of individual references on slips and sending to individuals
3. Routing of periodicals, possibly marking certain articles for attention
4. Maintenance of a card file of references in the library by either conventional manual methods or by nonconventional methods, manual or machine
5. Preparation of a library bulletin for wide distribution.
6. Duplication of tables of contents of periodicals
7. Subscriptions to centralized services.

Telephone Calls to Individuals

Personal telephone notifications cannot be used extensively because they take too much time; they are not fully effective in reaching individuals promptly for the obvious reason that everyone is not always at his desk. Only in small organizations can the telephone be used for this purpose with any degree of
efficiency. However, in any situation the library staff may be requested to keep special watch for certain information, and the urgency may warrant telephoning.

Noting of References on Slips and Sending to Individuals

Written personal notifications can be undertaken to a limited extent only, again because it is too time consuming. This procedure will have a place, however, in almost any library where there is a close working relationship between the library staff and the clientele. In fact, card files for recording personal interests are often maintained as an aid in helping to remember who should receive personal notice of subjects in an active state of investigation. An excellent opportunity is afforded for the library to prove that it can participate fully in the program of the organization by seeing that key persons are apprised promptly of particularly significant publications. However, the broader purpose must be kept in perspective, and this means that the requirements of the many must not be sacrificed in favor of the few in key positions.

Routing of Periodicals

A system of routing issues of periodicals to individuals can be established. This has already been described in detail in Chapter 7 of this book, with arguments pro and con. Dissemination of information to the group is quite uneven because those whose names appear at the head of the routing lists have a great advantage over those below them.

Maintenance of Card File of References

If periodicals are reviewed, articles of direct pertinence to the activities of the organization selected from them, these references typed on cards with adequate annotations or abstracts, and filed according to a subject classification scheme, information is made available immediately and permanently by this means. Where such a file is sufficiently well advertised, kept up to date promptly, and adequate in its coverage, the clientele will develop the habit of consulting it.

The maintenance of a continuous file of references can also be achieved by using nonconventional methods, either manual or machine. Manual methods might be one of the edge-notched card
systems or the optical scanning or peek-a-boo devices. Machine methods—punched card, computer, magnetic tape or any of the special systems that may be adopted for the over-all information storage system in the library—can be used for this purpose. Reference is suggested to Chapter 4 where equipment is cited and Chapter 8 where its use for indexing is outlined.

Preparation of a Library Bulletin

Perhaps the most completely satisfactory way of publicizing information promptly upon its receipt comprises a combination of the immediately preceding operations. This consists, in brief recapitulation, of establishing a system for reviewing all publications as received, making note of the pertinent items, collecting these citations, and then as an ultimate step, issuing at regular intervals what is commonly called a library bulletin. Because this is thought to be the most effective of all possible procedures for getting information to the greatest number of readers, its preparation is described in detail.

Several factors will be reviewed in the process of reaching a decision to issue a bulletin. One of the strongest arguments in its favor is the fact that many libraries do produce them. Because the items selected for inclusion in the private bulletin emphasize internal interests, its readers do not have to scan a large volume of material of no possible concern to them. Foreign language articles can be abstracted with particular care in deference to the American research worker’s impatience with learning other languages well enough to read them easily. All of these points indicate that the bulletin merits most serious consideration.

However, the economic aspect of the situation must be faced also because the whole process of preparing, duplicating, and distributing a bulletin will require significant budgetary provision. The amount of money involved will vary from a truly minor expense to a major one, especially if the scale of operation is such that several staff members spend full time preparing abstracts. Sewell (1) has analyzed and reported one situation where the costs were deemed to be too large, cited at $28,000 a year in 1951, to continue to issue what was a significant bulletin of such merit that it was distributed not only in the immediate organization but to the whole pharmaceutical industry and to schools of pharmacy and medicine as well. A decade later, in 1961, Mohlman (2) reported another situation where the cost of producing a
bulletin in which the total number of abstracts for the year was 15,000 the expense was estimated to be $110,000. This included selection of items, abstracting, and processing of the bulletin. Lesser publications, not so comprehensive in scope or so expensively reproduced, are found to be entirely satisfactory for internal purposes. In a paper on library bulletins, published in 1955, Ford (3) observed however, that "figures mean little in this survey since so many variables must be taken into consideration."

Of the many library bulletins issued, chiefly in industrial organizations, no two are identical in any of their essential features. Jackson (4) reported a detailed study of 50 representative examples from a cross-section of industries in 1953, every one of which was in some way unique. Many of the observations made in this investigation were reaffirmed by Blair (5) who published in 1961 a survey of 123 bulletins produced in 94 engineering libraries. In a table comparing general characteristics Blair brought to light some differences and similarities in the two groups; these were reflections for the most part of variations of emphases in certain directions among the industries represented. For instance, in the bulletins from chemical companies only one included research reports, whereas 69 of those from engineering firms carried them. Here, however, there may have been some misunderstanding of the intention of what was being referred to, research reports from within the company or those issuing from government-sponsored research in many research laboratories. More chemical company bulletins provided abstracts than did those in engineering fields.

Weil (6) undertook a study in 1959 of a major bulletin program, the purpose of which was to determine the effectiveness of different types of bulletins. The readers at Esso Research and Engineering Company expressed preference for the inclusion of abstracts, and responded favorably to a style of presentation in which the chief point of each article was written as a beginning sentence with the bibliographic citation at the end. At Esso also, several bulletins, each one devoted to a well defined subject area such as (1) petroleum processes and products, (2) chemical processes and products, (3) analysis and instrumentation, (4) transportation and storage, and (5) applied mathematics literature, were found to reach their audiences more effectively than they did if they were combined in one bulletin. A "Highlights" page calling attention to items of special significance proved to be a
desirable feature. It could also be sent as a separate page to executives who were too busy even to glance at the whole publication.

The significant features of library bulletins are outlined in the following sections.

Content

Since the most important purpose of a bulletin is to disseminate currently published information, the major material will be from periodicals. In fact some bulletins consist entirely of references selected from periodicals. In addition, the titles of newly acquired books, pamphlets, technical reports (both internal and external) and patents are frequently included. If abstracts from abstracting publications are used, as they sometimes are as a means of saving time, permission to do so should be requested from their publishers. Payment may be required. However, though the use of abstract services saves time the disadvantages in general may outweigh that saving. The literature is no longer current, and it is not abstracted from the point of view of those for whom its benefit is intended.

Certain news items concerning activities of personnel, news of major developments in the industry or other related sphere, and notices of forthcoming national and international meetings may also be considered for inclusion in the bulletin if there are time and space.

Style

Citations of references in a bulletin may be very brief, providing nothing more than the titles of articles, with journal titles, volume numbers, pages, and dates. The addition of brief annotations can be helpful to readers, and informative abstracts make a bulletin a truly helpful adjunct. However, if abstracts increase the size to such an extent that quick scanning is difficult, they may defeat its purposes. Where abstracting is done as a means of developing permanent information files in the library, the same process of duplication can be used for both purposes, and individuals can clip the bulletin to retain those items that are of most concern to them. In the aforementioned surveys by Jackson (4) and Blair (5) it was found that abstracts are considered to be more necessary in chemical than in engineering organizations.
Format

The size of most bulletins is the standard 8-1/2 by 11-inch sheet, a convenient one from the points of view of both preparation and handling. Where the bulletin items are used for filing, it is desirable that they be of a size to fit the standard catalog card. In this case the size of the bulletin pages has to be somewhat larger. They may be perforated so that individual references can easily be torn apart, or they may be lined to mark the 3 by 5 inch card size.

Blair (5) has provided several significant suggestions for the design of effective bulletins. He advised the use of elite type instead of either pica or micro, and warned against the crowding of material. Readability is certain to be an influential factor in making the bulletin a popular publication.

The use of a distinctive first page for a bulletin is recommended. This can be either a colored sheet of the same weight as the other pages, or a heavier stock if a true cover is considered desirable. The cover should carry the title, volume and issue number, date, and any other general identification that is pertinent. If more than one bulletin is issued, the cover might show that one is the patent bulletin and the other devoted to periodical literature. Or, the first page can be a working page also and carry the title, volume, and issue number at the top, then have the references start below. The first page is often used as a table of contents page when the items are grouped according to a breakdown of subject.

A request form to be used by readers who want to see items cited in a bulletin will prompt them to take advantage of a service that supplies either a copy or a loan of the originals. It may be placed on the last page for easy removal.

Although the bulletin is distributed exclusively intramurally, with some exceptions, it should carry the name of the organization on it somewhere. There are occasions when it is desirable for a copy to be permitted to be used in some way outside the organization, and for this reason it should be identifiable. A bulletin may be distributed also to other scattered units or plants, and for this reason should have the exact address of the library plainly shown.

Scope

The bulletin program may provide for one publication only or a division of material into two or more categories is some-
times desirable. One bulletin may be devoted to periodical literature, another to patents. Whether or not to have more than one bulletin will depend in some measure upon the volume of material that should be brought to attention.

Frequency

Blair (5) found from his study of many bulletins that an equal number were issued weekly and monthly. Some were semimonthly, very few were quarterly. Only one was a daily production. The decision as to how often to distribute a bulletin will be influenced by such factors as the need for readers to be apprised of published information as promptly as possible, and the availability of staff to prepare it.

Although Blair found but one library that published a daily bulletin, one of the most efficient systems for disseminating current information is based upon this practice. Hocken (7) has reported the background situation that led to the initiation of the IBM San Jose Technical Library News which is a single 8-1/2 by 11 inch sheet, multilithed on both sides. In it are included announcements of meetings, abstracts of articles from periodicals, titles of newly acquired books, and any other items that might be of interest. The whole circumstance of this very effective operation is worthy of investigation.

Methods of Duplicating

The more commonly used methods for making copies of a bulletin are mimeograph and multilith. If a large number, up to several thousand, of copies is required, then the Xerox-multilith method is advantageous. Very few bulletins are printed or done by photo-offset. Costello and Voos (8) have described the preparation of one done by ozalid and offset.

Mechanics of Bulletin Preparation

Once the decision to institute a bulletin has been made, and its general character determined, its editor must be selected and procedures for preparing it established. If the library staff consists of but two or three members, the editor will likely be the librarian. Where the whole operation is on a larger scale, this responsibility will be assigned to another staff member whose principal duties will center around the bulletin. If abstracts are required, he may prepare most of them.
The routines to be followed in preparing a bulletin include:

(1) Review of publications as received. The editor will review all publications, principally periodicals, as they are received daily, and mark items to be cited by inserting slips. If they are to be grouped in the bulletin according to a classified system, he may indicate the class at the same time.

(2) Preparation of abstracts or annotations. If the editor prepares abstracts, he may either do so immediately upon selecting an article or he may wait and do this later. He will need to have assistance in situations where the number is very large. Abstracts may be written by hand or roughly typed, but many more can be prepared if a dictating machine is used. A typist sets up the final copy according to specifications, then returns them for proof reading. The same stencils can be used for duplicating on card stock for the cumulative file maintained in the library as well as for the bulletin pages.

An ideal arrangement with respect to the preparation of abstracts or annotations is to invite research staff members to write some of them. Certain journals can be assigned to individuals who express willingness to undertake some abstracting. Unless there is willing cooperation of the kind reported by Hocken (7), this can result in more hindrance than help, however. Ford (3) also reported a successful cooperative abstracting effort.

The choice of what to include in the bulletin requires judgment that can be reliable only if the person responsible is thoroughly acquainted with the whole program of organizational interests and knows the subjects well enough to recognize pertinent developments. It is helpful to keep a list of specific subjects to watch for in addition to the broad areas of continuing interest.

Examples of some library bulletins are shown as Figures 21-26.

Duplication and Distribution Procedures

The material for an issue of a bulletin may either be assembled for typing all at one time or a typist may do some of it daily as the abstracting or annotating of references is done. The latter method, however, might make it difficult to assemble the items in any logical order in the bulletin. Final typing is done on stencils, and these are sent to the duplicating department to have the copies made. It is good practice to do this at regularly scheduled times.
The names and addresses of persons to whom the bulletin is to be sent should be listed, preferably on cards because this is an easy way of keeping abreast of personnel changes. Arrangements for addressing bulletins will have to be made; one way is to prepare duplicated copies of pre-addressed labels. If there is a central mailing service, it will likely undertake this task.

Duplication of Tables of Contents of Periodicals

In situations where there is neither sufficient staff nor time to prepare a bulletin of selected items, an alternative that has been found to be satisfactory in some libraries is to duplicate the tables of contents of periodicals as they are received daily. As many copies as are required for distribution can be made at little cost. Those who receive them can either come to the library where the journals themselves are kept for a definite period, or, by marking the bulletin to indicate the articles they would like to see, can have certain issues sent to their offices. A better procedure is to supply copies if duplicating equipment is conveniently available.

Subscription to Centralized Services

There are in existence various kinds of special service publications, designed to gather and supply at intervals collections of references to the literature published in a specified field. In some fields these are so efficiently edited that they can supplant the individually prepared bulletin, or at least be relied upon for major coverage so that only a very brief supplementary listing need be prepared in the library. Some of the extant services are listed. Preliminary investigation is recommended before contracting with any of them to be certain that they fulfill what is needed.


Battelle Technical Review, includes Battelle Technical Review Abstracts. Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio. Monthly, comprehensive coverage, from "Administration and Philosophy of Research" to "Welding and Joining."
Current Engineering Literature

Volume 31
May 25, 1962
Number 21

This weekly announcement service is intended to bring newly available technical literature to the attention of research and engineering personnel of the Corporation. It is issued by the GM Research Laboratories Library, GM Technical Center, Warren, Michigan.

Page

PERIODICAL REFERENCES .................. 1
NEW BOOKS ................................ 25
PREPRINTS .................................. 27
UNIVERSITY PUBLICATIONS .............. 30
TRANSLATIONS ............................. 40
R & D REPORTS (Non-GM) .................. 43

Fig. 21a

Chemical Abstracts. Published biweekly by Chemical Abstracts Service of the American Chemical Society, The Ohio State University, Columbus, Ohio. "Key to the World's Chemical Literature."


Chemical Titles. Published biweekly by Chemical Abstracts Service. Permutted title index designed for quick dissemination.
Periodical References

These references are selected from the index card service of the Engineering Index Service, New York. Foreign and domestic technical periodicals are covered, including some not in the Library's collection. Normally requests are supplied for photocopies of articles for retention, though individual periodical issues may be sent on loan when articles are of excessive length or the issue is available here in multiple copies.

REQUESTS should include for each item desired: Name of periodical, Volume, Number, Date, Pages, Author, and Brief title. (Example: General Motors Eng J. v 2 n 1 Mar-Apr 1956, p 24-32. H. L. Root. Trends and principles in progressive mechanization.)

AERODYNAMICS

GEORGE A. TAYLOR


AEROSPACE GUIDANCE

S. J. F. A. M. CAMPBELL


AIR CONDITIONING, HEATING AND VENTILATING

HERBERT W. WILSON


AIRCRAFT GAS TURBINES

J. S. SMITH

Growth of Gas Turbine Technology, J. S. Smith. ASME Paper, 1956, p 94-100. The development of gas turbine technology, from its inception to the present day.

AIRCRAFT MANUFACTURE

J. S. SMITH


AIRCRAFT MATERIALS

FRANK E. GLASGOW


AUTOMATIC CONTROL

J. S. SMITH

of current periodical issues are reproduced and brought together to comprise weekly guides to Chemical, Pharmaco-Medical & Life Sciences, and Space, Electronic, & Physical Sciences. Copies of individual articles can be supplied for a small fee.


Engineering Index. Published by Engineering Index, Inc. 345 East 47th St., New York 17, N.Y. Issued as an annual volume or subscriptions
are taken for references to be supplied on cards throughout the year for complete coverage or individual engineering fields, from Abrasives to X-ray analysis. Published also as monthly bulletin, started October 1962.

Gas Chromatography Abstracting Service. 80 East Jackson Boulevard, Chicago 4, Ill.


Nuclear Theory Index Cards. National Research Council. 2101 Constitution Ave., Washington 24, D.C. References pertaining to nuclear theory on 3 by 5 inch cards, issued at irregular intervals.


CONCLUSION

Each situation must be analyzed to determine the best method feasible for keeping the clientele informed of information as it is published. Personal notifications are possible only when the literature involved is not voluminous nor is the group served too large. A library bulletin can be made to suit whatever requirements are desired and it can reach an unlimited number of persons. If time and staff are not adequate, then the duplication of tables of contents of periodicals for distribution may serve. In some subject areas there are centralized services for which
An oil-cool slurry suitable for injection into a blast furnace is described in a South African Patent application to Asquith (P-261f).

The high temperature stability of a middle distillate can be improved by adding an ester of tetracarboxylic acid and an alkyl diethanolamine, according to a U. S. patent granted to Sinclair (P-261d).

Optimum chain length for alkylbenzenesulfonate detergents is 10 to 13 carbons, according to Rhopsonexx studies specific to biodegradability and harmful effects on fish. Mid-chain isomers are found less desirable than the C-2 position isomers for a given chain length (G-398b).

Microbial oxidation of n-octane yields a mixture of dibasic acids from which suberic and adipic can be isolated and identified. The reaction involves n-octane dixidation and is accomplished with a gram-positive bacterium tentatively identified by English workers as a Pseudomonas (G-398c).

A stable heptamethylocyclopentanoyl ion has been isolated from strong sulfuric acid in contact with isobutylene by Pmm, Denver (Penn State). It is a simple cyclic trimer, which may be recoverable from various spent acids and is easily converted to a cyclo-diene of potential interest (C-399a).

The mechanism of the polymerization of butadiene by rhodium complexes in aqueous emulsion is discussed in an article by French workers. They postulate that steric control is exercised via formation of a coordinant complex in which monomeric butadiene is attached to the metal by a ~C~ bond (G-491).

A steel more than twice as strong as ordinary structural steel is available from Inland Steel Co. Called INX 70, it contains either niobium or vanadium and has a minimum yield strength of 70,000 psi versus 35,000 psi for conventional structural steel (G-495a).
**Transportation and Storage**

**TECHNICAL INFORMATION DIVISION**

**ESSO RESEARCH AND ENGINEERING COMPANY**

<table>
<thead>
<tr>
<th>Volume 6</th>
<th>June 20, 1963</th>
<th>No. 5</th>
</tr>
</thead>
</table>

**WATER TRANSPORT**
- Economics and News: 85
- Design and Construction: 86
- Operating Problems: 87
- Corrosion: 87
- Water Terminals: 88

**RAIL AND TRUCK TRANSPORT**
- 88

**PIPINES**
- Pipelines Descriptions and Plans: 89
- Pipeline Construction: 90
- Pump-Station Equipment: 92
- Communications and Remote Control: 92
- Pipeline Operating Problems: 93
- Pipeline Maintenance: 94

**PIPELINE**
- Pipeline Corrosion: 95
- Pipeline Economics: 95
- Flow Theory and Problems: 96

**STORAGE**
- Storage Design & Construction: 96
- Underground Storage: 97
- Storage-Tank Corrosion: 97
- Storage-Tank Gauging: 97
- Storage Economics: 98

**LIQUEFIED GASES**
- 98

**METERING**
- 101

**SAFETY**
- 102

---

This bulletin reviews the current Literature and Patents on Transportation and Storage that relate to the business of the Company. It is issued monthly by the Technical Information Division of Esso Research and Engineering Company, at Linden, N.J., for the information of employees of Standard Oil Company (N.J.) and of its subsidiaries and affiliates having a General Research Agreement or other agreement with Esso Research and Engineering Company. It supplements bulletins which review "Petroleum Processes and Products," "Chemical Processes and Products," and "Iron and Steel Manufacturing." TID also distributes journals of applied-mathematics abstracts and analytical abstracts. Requests for actual publications, in the N.J.-N.Y. area, should be addressed to the Esso Research Library, using the attached "Request for References" form. Questions concerning circulation of this bulletin should be addressed to Miss Hilda Duck, Technical Information Division, ERC Building No. 1, Ext. 2138.

These bulletins are private communications and should not be distributed to outside persons.

W. G. HOCKBERGER, Editor

---

**Fig. 23b**

---

**BIBLIOGRAPHY**

A Pentagon source estimates that the number of computers in defense installations will increase to 1078 by the end of fiscal year 1964. Previous estimates of 750 by the end of FY 1963 have been increased to over 800. Currently over 30,500 man years of personnel are associated with computer activities and it is expected that this will increase to over 35,000 in FY 1964. Over-all defense costs for computers and punched-card equipment, including supporting personnel and contractual services will exceed $515,000,000 in FY 1964.  

The computer: a tool for clerical automation or integrated management systems? Estimates that 6,275 digital computers will be delivered this year in the US for data-processing applications. Two hundred of these will go to Federal Government agencies, and more than 6,000 to institutions, industry, banking and commerce. Their total value, including standard peripheral equipment, will approximate $1.6 billion, and their use will involve a total expenditure of some $6 billion. The first business computer applications were purely clerical, but today's payoff is in integrated information systems. A typical integrated system will take about 3 years to get into the black on a cash flow basis. One business with $40 million a year in sales is now saving $1.1 million per year and will save $1.6 million a year through its integrated information systems when the present.
SUPPLEMENTARY REFERENCES


Fig. 25.

SPECTROCHEMISTRY

A364F (In German)

A62A

ELECTROCHEMISTRY

General

PLATINUM ON ION ADSORPTION. Na, Electrochimica Acta 7: 124, Sept/Oct 1962

A390D (In German-Engl abstr)

A390C
DOUBLE LAYER CAPACITY AND METAL ON PLATINUM IN PERCHLORIC AC. Breiter MW, Electrochimica Acta 42, Sept/Oct 1962

Fig. 26.
ORGANOSILICON CHEMISTRY - SYNTHESIS

BAILEY, R. E., TUTAS, D. S. and WEST, R.

Monosodium of phenylsilane to cyclic poly-
olefine.


An attempt was made using H2PtCl6, or Mg2O

to cause phenylsilane to add to the three
double bonds of 1,3,5-cyclooctadiene to
give perhydro-9 b-silbenaalene.

Only SiH2 was obtained, and it
was completely resistant to further addn.

Similarly, 1,3-cyclooctadiene led only to

ORGANOSILICON CHEMISTRY - SYNTHESIS

BAILEY, R. E., TUTAS, D. S. and WEST, R.

(Contd)

3-phenylsilanylcyclooctene. Inability to
cyclize 5-pentenyldichlorosilane led the
authors to the mechanics of addn. requires a geometry unfavorable to for-
mation of a six-membered ring.

[163] [669]

ORGANOSILICON CHEMISTRY - SYNTHESIS

BINDEBERG, L., RITTER, A. and Dieckhoff, H.

Preparation of trimethylsilylal. [in
German]

Chem. Ber. 96 (5), 1473-78 (1963)

MeCONH2Me3Si( I) + NO2

MeCONH2 + Me3SiCl + Et3N \rightarrow I + Et3NCl.

English translation available from L.E.

Nelson

[168] [670]

Fig. 26
Reference Procedures and

Literature Searches

The prior chapters of this book have been concerned primarily with methods of organizing a library service, the development of a good collection of publications, and administrative procedures. All of this is preparation of the background from which the service of supplying information can proceed. In many instances, however, the reference materials that can be assembled in one library are not adequate to supply answers to all queries, and the whole of the literature, published and unpublished, wherever located, must be regarded as potential resource.

The reference information service of the library divides into two categories, (1) the answering of relatively simple requests for brief facts or simple data, commonly referred to as "reference questions," and (2) the supplying of either complete or selected information on specific subjects requiring a search of the literature. A staff member must always be available to fulfill either type of request. In large organizations where many diversified projects are in progress, provision must be made for full-time literature searchers.

It is common practice to have as member of a research team pursuing scientific investigation one person whose chief assignment is to do whatever consultation of the literature is necessary to aid the project. This person may be a member of either the library staff or the research staff. The number of such literature scientists required for the purpose will obviously depend upon the scope and diversity of the research program. Kent and Perry (1) have described some ways in which literature
specialists function on research teams. They illustrated graphically the possible organizational relationships where the literature scientists are members of the laboratory research team or the information division.

In this chapter the scientific literature is discussed in its broadest aspects with a view toward providing a guide for organizing reference procedures and literature searches. Various aids for the finding of the literature of specific fields are cited. Finally, some methods of achieving the answers to the kinds of questions that are asked in a science library are shown.

THE LITERATURE OF SCIENCE AND RELATED TECHNOLOGIES

The literature of science, theoretical and applied, is voluminous, and much of it is remarkably well organized for the location of specific subject information. There are many guides to its contents. As might be expected, some subject fields are better served by existing indexes and abstracting publications than others. Attempts are being made continuously, by one means and another, to improve the possible ways of locating facts once they have been published. In the United States the National Science Foundation has assumed responsibility for encouraging investigation in this realm of scientific publication. It issues bimonthly Scientific Information Notes that provides news of development in the field as does the semiannual summary, Current Research and Development in Scientific Documentation, which outlines active projects in this area. The situation is also receiving attention on an international scale.

In viewing the broad field of scientific publication, there is an apparent similarity in the basic types of publications in each subject area. These include (1) the periodicals in which results of original investigations are reported, (2) technical reports from government-sponsored research, (3) the indexing and abstracting serials, (4) texts and monographic works, (5) compilations of data or handbooks, (6) dictionaries and encyclopedic works, and (7) comprehensive treatises. An additional class, (8), equally important and unique to technological interests, is the patent literature. The chapters of this book dealing with the selection of books, periodicals, and other publications should aid in developing a perspective of the literature that must be known in order to provide answers to reference questions.
If the literature is to be used effectively, ways of locating individual items of information must be provided. This invokes the problems and processes of documentation, the ways and means of selecting, classifying, and indexing specific facts. The total situation is a matter of concern to both the individual library that is developing its own indexed file of information and on a world wide scale to those who try to provide the comprehensive literature aids. Evidence that this has been a subject of attention at least since the 1940's was provided by Ditmas (2) in a review of efforts then being directed toward bibliographic control on an international scale. Studies of the situation as it stood in 1948 were summarized in the Royal Society Scientific Information Conference Report (3) in which extensive analyses of the difficulties attending the publication and subsequent retrieval of scientific information were presented. The potential problems are apparent from consideration of the great numbers of individual scientists who have been and are at work in laboratories scattered throughout the world wherever scientific investigation is pursued. As each one adds his contribution to the scientific literature, his results must be subject to location by those who have need of knowing what has been done in the same field.

The international situation was reviewed again in 1958 at an International Conference on Scientific Information held in Washington, D.C. (4). There were many cogent papers presented, analyzing all aspects of the increasingly complex problems, but the consensus was that in the years since the 1948 conference the chief progress had been in the growth of understanding of the difficulties rather than in their solution.

While the problems of the literature are in process of being solved, the publications themselves must be used with such guides to their contents as are in existence. It is possible to locate with fair ease the major information that has been published on most subjects that have been investigated extensively. However, it is admitted that there are areas lying between broad fields, topics that are neither physics nor engineering, for instance, yet related to both, in which information can be elusive.

The literature searcher can work most effectively if he knows the indexes, abstracting journals, and other special aids concerned with a subject he is called upon to investigate. In the Appendix to this book are examples of the specific publications covering certain subject fields. It will be noted that the abstracting or indexing publications covering the broad area are listed first, followed by those concerned with a narrow range of
subjects. There is considerable overlapping of subject coverage in some of the indexing publications; experience alone can tell exactly what should be used to effect complete coverage in any area or for any specific topic.

There are guides to the literatures of a number of scientific subjects that are very helpful. They provide excellent compendia of sources that would be most difficult to gather except by a lifetime of experience in the field. The most comprehensive list of such guides is the compilation by G. Schutze, Bibliography of Guides to the S-T-M (Science-Technology-Medicine) Literature published by the author, 801 Crotona Park North, New York 60, N. Y. in 1958, with supplement in press in 1962. Some of the most significant ones are listed here.

_Guides to the Literature_


 Doe, J., ed. A handbook of medical library practice; including annotated bibliographical guides to the literature and history of the medical and allied sciences. 2d ed. Chicago, American Library Association (1956).


RECORD OF REFERENCE AND LITERATURE SEARCH REQUESTS

It is good practice to establish a system for recording reference requests in a uniform manner, with provision for complete information to be noted when questions are presented. There must first be a distinction between the brief, reference type of query and the request for a literature search. For the former it is adequate to record questions with the source of their answers in a loose-leaf notebook or card file that is kept on the desk. It is particularly important to note those for which answers are not supplied immediately. Consultation with other members of the library staff can sometimes result in another approach that will produce the needed facts.

In the case of requests for extensive literature searches, it is helpful to both the inquirer and the person who is to execute
the search to have a written record of what is required. The information that is wanted must be clearly defined, the period of coverage indicated if there is a possible limiting date, sources to be searched may be suggested, and any other aids noted that the requester can supply. A form similar to the one following might be used for this purpose.

LIBRARY SEARCH REQUEST

Requested by........................

Subject of Search......................

To be reported as:

Specific facts, citing sources......

Complete bibliography..................

List of selected references only..........  
Annotations.........Abstracts..........  
Pertinent quotations.............

Summarized report............

Sources to be searched:

Books
Abstracting periodicals and indexes
Information files
Laboratory reports
Patents
Other

Staff Member Accepting Request

After the search has been accomplished the request sheet should be added to the permanent classified file. Questions sometimes recur or follow a pattern, and knowledge of this can be useful. The file can even be helpful to new staff members who become oriented more quickly if they review a representative selection of information requests.
KINDS OF REFERENCE QUESTIONS

Reference questions may be classified according to the nature of the information requested. In general, these are:

1. For specific factual information. A single item or a group of related facts may be wanted. It may take but a few seconds to locate a formula, a publication date, an address, or a physical constant. Such facts may also be elusive and require lengthy pursuit.

Examples:

- Melting point of beeswax.
- Address of the editor of the Physical Review
- Price of naphthalene, C.P. grade
- Composition of sterling silver
- First metal spring, when and where made

2. For a few selected references concerning a specific subject. Background information regarding the development of a product or a process may be supplied in a brief list of selected references.

Examples:

- Methods in current use for producing pencillin.
- Applications of iodine as a tracer element
- Publications by Dr. X of Y University for the past five years
- Methods for waterproofing woolen cloth
- Designs for a 3-phase electric melting furnace

3. For a comprehensive bibliography. A request may require the preparation of a systematic bibliography representing all information that can be found on a specific subject. Book and periodical references with only incidental patents may be adequate, or it may be necessary to do a complete patent search also. The procedure for executing an exhaustive literature search as a process of compiling such a bibliography is outlined in a later section of this chapter.

Examples:

- All published information on the coloring agents used in glass
- Methods for the preparation of titanium metal
- Drugs used for local anaesthesia
- Designs for television tubes
RESOURCES FOR ANSWERING REFERENCE QUESTIONS

In seeking to supply the answer to a reference question, one that requires an on-the-spot delivery of the specific bit of information wanted, the possible sources for its location will first be reviewed mentally if it is at all devious. There must first be complete understanding of what is wanted, and this can sometimes be elicited only by asking further questions of the inquirer. He may ask, for example, for a certain kind of directory and not be aware that even though the library does not own such a publication, his information may be available in something else that is at hand.

As the approach to the answer is being sought, the potentially helpful directories, handbooks, encyclopedic works, special compilations, and such reference works that have been procured and assembled in an accessible place will be considered. One of the most important resources to be considered at this time will be the files and indexes of information pertinent to the immediate interests of the organizations. This file can be developed only over a period of time; the longer the library is in existence the more significant the cumulation becomes. Items will be put into it that are not easily located quickly even though they are in print. Such facts as trade names, changed addresses, statistics, and the like will be added to the file when they are noted from current publications. Strieby (5) has provided a detailed description of the kinds of files that serve active demands in a pharmaceutical library. Here the accumulated records of selected abstracts of articles, remedies, names of companies, names of organizations, miscellaneous pamphlets, trade catalogs, telephone directories, and picture and history files provide facts that may be needed quickly. However, all queries cannot be anticipated in this way, and a question can make it necessary to ponder the most likely source for its answer. The major types of reference works to be considered include the following; the order in which they are brought to mind will be determined by the nature of the question.

Scientific dictionaries and encyclopedia
Directories
Handbooks
Special compilations in specific subject fields
Treatises and texts
General reference works
Bibliographies
Telephone directories
Compilations of statistics

Questions can sometimes be answered from books whose titles do not reveal or even suggest all that they contain. Therefore, knowledge of the contents of the books in the collection as well as of the subjects involved is necessary if the materials at hand are to be used to their fullest extent. For example, a book on insecticides contains information about a trademarked aerosol needed in connection with a problem on mineral flotation. A book on chromatography tells something about the filtration of viruses. These possibilities are not apparent from the card catalog and the kind of personal knowledge that leads to such answers will be invaluable.

Some examples of questions that have been asked in a science-technology library have been supplied by Lane (6) who outlined the exact procedures followed for locating their answers:

Question: Information on the design of pumps for dredges.
Procedure to answer: The word "dredges" led to "gold dredges" in the initial mental attack. This led to an entry in an index "pumps in hydraulic service" which brought to mind a book titled Fire Service Hydraulics. This contained designs of the type of pump required.

Question: A book or possibly an article in a journal by Taylor on the Mechanics of compressible fluids.
Procedure to answer: Not knowing Taylor's initials precluded a search in an author index. Hence it was thought best to look in books on hydraulics. The index of Rouse's Fluid Mechanics for Hydraulic Engineers gave a reference to Taylor on page 367. On this page there was a footnote referring to mechanics of compressible fluids in volume 3, page 217 of Durand's Aerodynamic Theory. Upon consultation of this volume it was found that the right Taylor had written the section.

Question: What is shot clay?
Procedure to answer: The term was not found in several dictionaries. However, in a volume of the Agricultural Index there was an entry under "clays" citing an article on "buckshot soil." This article was not in the library. In the "Index to Publications of the U.S. Dept. of Agriculture," there was reference to a report in 1908 of the Office of Experiment Stations in which there was mention
of drainage of buckshot soil near a small town in Georgia. The Postal Guide gave the county in which this town is located. By referring again to the USDA index, a soil survey of the county was found, and in this it was stated that buckshot soil belonged to the Sharkey series.

A quick method of supplying answers to reference questions is to provide photocopies of the required pages and give them to the inquirer. In addition to being fast, this eliminates the chance of errors in copying, particularly where tables of data are involved.

THE COMPREHENSIVE LITERATURE SEARCH

Before initiating a major literature search it may be wise to determine whether or not the project is one that should be done by the library staff. It may be preferable to contract for it with an outside agency employing skilled professional searchers. Charges are made on a contract basis or by the hour, about $7.00 to $8.00 in 1963. In busy times such expenditures are justified. A comprehensive guide to such services is the publication Specialized Science Information Services in the United States: A Directory of Selected Specialized Information Services in the Physical and Biological Sciences issued by the National Science Foundation in November 1961. It provides full descriptions of the facilities and activities of the organizations listed, including indication as to whether or not searching service is available.

Examples of some of the major searching services are the following:

Battelle Memorial Institute. 505 King Ave., Columbus 1, Ohio
Capitol Hill Research Group. 326 Pennsylvania Ave. S.E.,
Washington 3, D.C. (specialize in Russian publications)
Chemists Club Library. 52 East 41st St., New York 17, N.Y.
John Crerar Library. Research Information Service. 35 West 33rd St., Chicago 16, Ill.
Engineering Societies Library. 345 East 47th St., New York 17, N.Y.
Illinois Institute of Technology. Technical Information Research. 10 West 35th St., Chicago 16, Ill.
Library of Congress, Science and Technology Division, Washington 25, D. C.

A particularly noteworthy service is that provided by The Smithsonian Institution in Washington, D.C. known as the Science Information Exchange. Its purpose is to maintain an index to current research projects in the sciences that are in progress in both government and nongovernment laboratories, making it possible for an organization contemplating research in a certain area to determine whether or not work is already being done.

Another prospect to consider is the possible existence of a centralized documentation service where the literature of a certain subject field is indexed in detail, and provided in such form that it can be searched by either machine or manual methods. By 1962 several such organizations were in full operation, with others preparing to begin. Examples of such services are the Documentation Service of the American Society for Metals, Metals Park, Novelty, Ohio, which is prepared to do intensive searching of the metallurgical literature back through 1958; and Information for Industry, Inc., 1000 Connecticut Ave., N.W., Washington 6, D.C., among whose projects is a Uniterm Index to U.S. Chemical Patents, and another to U.S. Electronics Patents. The index to the chemical patents goes back to 1950. Chemical Abstracts Service has indicated that it is preparing to embark upon a similar undertaking, using its vast resource of indexed chemical literature from 1907 to date.

Additional sources may be found in the aforementioned list of specialized information services. The continuing literature abstracting projects such as are listed in Chapter X of this book should be kept in mind as being possibly pertinent.

However, the decision may be that the search must be done by the library staff, and, for these occasions which may well be in the majority, procedures for conducting literature searches should be established.

PROCEDURES FOR A COMPREHENSIVE LITERATURE SEARCH

There are two broad purposes for making a comprehensive search of the literature. One is to bring together all of the published information that can be found on the subject. The other
is to locate certain specific facts concerning it. In either case
coverage must be thorough if the results of the effort are to be
submitted as conclusive. It may be adequate for some purposes
to cover the book and periodical literature primarily and include
patent references only incidentally, or it may be necessary to
make an independent patent search. The two kinds of searches
require different techniques, and are discussed separately in this
chapter. Either one results in a bibliography which may be pre-
sented in several ways. The organization of bibliographies is con-
sidered following the discussion of search procedures.

In setting up the plan of procedure for a search, the first
step is to define what is to be sought, the necessity being greater
when much time and effort are to be expended. Before any start
is made a conference should be held between the person sched-
uled to perform the search and the one requesting it. There must
be mutual understanding as to the scope of the investigation,
points to be emphasized, and the possibility of related material
that might be pertinent. The known history of the development of
an art may be sufficiently definite to make it safe to establish a
limiting date beyond which it would be unrewarding to go. Other
factors such as patent situations will suggest relevant clues.
Once the problem is defined, the outline for the search can be
made.

Despite the fact that one of the chief characteristics of sci-
ence is that of being systematic, the execution of a good literature
search is an art. Though there are the obvious guides to the lit-
eratures of the several distinct subject fields of the physical and
biological sciences, there are also reference aids that are unique
to each one, some of which are not so readily discerned. Every
expert searcher develops his own techniques, but certain general
procedures are commonly followed. Berolzheimer (7) recom-
mended that as a beginning the searcher acquaint himself with the
subject upon which he is going to work by reading an article con-
cerning its broadest aspects in a scientific or technical encyclo-
pedia, making mental note of the terminology as a guide in using
the indexes of abstracting publications.

Singer (8), as another literature searcher of wide experi-
ence, has provided a well documented warning of the pitfalls in
scientific publications that the novice should learn to heed and
thereby avoid stumbling into them as much as possible. The two
attitudes that Singer considered to be imperative were imagina-
tion and scepticism as he cited examples of such traps as the
use of varying terminologies, a practice certain to break the
spirit of the most redoubtable electronic scanner, to say nothing of the patience of the human searcher.

Most literature searches are made in the organization's own library, but it will occasionally be desirable to know where unusual collections in certain fields are located. These may be in libraries freely accessible to public use, or if they are in private special libraries, permission to use them may be granted. There are several papers in the book, Searching the Chemical Literature, cited in the list of Guides to the Literature in a prior part of this chapter that tell of the collections of chemical publications in some of the major chemical libraries. An invaluable source for the location of libraries in special subject fields is the compilation Guide to Subject Collections, published by Bowker, though some judgment must be exercised in detecting whether or not all collections cited can be of such size as to merit being rated as significant. Another is Special Libraries and Information Centers edited by Kruzas and published by Gale Research Company in 1963.

If a particular search requires that all of the information published in books, periodicals, pamphlets, and any other source, published and unpublished, be found, the search should be carried forward through the following steps, (n.b. Advantage should be taken of any bibliographies that may be discovered in the course of the search.)

1. For summarized information in comprehensive works. These reference publications include the handbooks, dictionaries, and encyclopedias. One or two will be consulted initially for the searcher's own orientation. Specific data and other information may be found in them also. A little browsing in these compilations is likely to be rewarding.

2. For information in texts, monographs, and special studies. Assuming that the library acquires all books published that are pertinent to its interests, the card catalog will be the first place to look for the books dealing with the subject. Annual reviews and other serials, major treatises, and monographic works in the subject field should be sought. The information in these sources may be more up-to-date than that in the comprehensive works.

3. For all relevant articles in the periodical and report literature. This entails a complete search of the appropriate abstracting and indexing publications. It must be done in a rigidly systematic manner, keeping exact record of the sources consulted with note of the subject entries used in the indexes of each publication, and taking into account differences in indexing practice from one publication to another. This latter point is more im-
portant that it might first appear. Sometimes it becomes necessary to alter the course of a search or to review it in the light of subsequent developments, and it is therefore expedient to be able to learn from the index search record exactly what topics have been covered thoroughly.

A form for keeping a proper record of a search in an abstracting periodical was developed by Lewton (9) which is shown as Fig. 27 below. Though it is designed specifically for use with

![Table](image)

Fig. 27—Form for page notations from Chemical Abstracts Indexes

Chemical Abstracts, the scheme is adaptable to other publications of similar type. As a rule the best approach is to start with the most recent index to the abstracting or indexing publication that is available and work back. Reviews which include comprehensive bibliographies that may expedite the search will thereby be discovered and used. Furthermore the perspective of the development of the subject is more revealing than when viewed from the forward direction.
Before starting a search in the abstracting publications, it is advisable to determine which ones cover the subject to be investigated most fully. In some areas there is a significant amount of duplication of periodicals abstracted, whereas others are not caught completely by any abstracting journal. When approaching a field in which the searcher has had no prior experience he should first investigate the guides to the literature to determine which abstracting and indexing publications are indicated, then test them by sampling their coverage and thus decide which ones to use. Those recommended for searches in the subject fields represented in the Appendix to this book are listed with the other pertinent publications.

After the appropriate abstracting publications have been determined, the next step is to decide whether to consult first the comprehensive one encompassing a broad area and subsequently verify and expand the coverage by ultimately searching one dealing with the specific field only. For example, if the topic is concerned with a ferrous metallurgical process, Chemical Abstracts might be used first, after which the abstracts in the Journal of the Iron and Steel Institute could be searched for possible articles not included in the first. Perhaps it might even be necessary to go as far as a third source such as the American Society for Metals Review of Metal Literature before being satisfied that all possibilities have been exhausted. Or the opposite procedure could be pursued, namely, to start with the specialized abstracts and then consult the comprehensive one. There is no other way of comparing their scope.

An important point to be considered in searching is the question of how far back in time to carry the investigation. If it is necessary to find everything that may ever have been published on the subject, attention must be given to the vagaries of the older literature. The field of chemistry at least, has had an excellent guide into these less well marked paths. Dyson’s (10) paper on searching the older chemical literature is invaluable for tracing publications prior to 1875.

The effective use of indexes requires an analytical approach to discern the indexing pattern. It is an absolute necessity to follow the same line of thought, even though there might be disagreement with it, if maximum information is to be retrieved. Indexes to abstracting publications in the same field such as Chemical Abstracts and Chemisches Zentralblatt for example differ in indexing procedure. All aspects of a subject must be kept in mind when using an index if the subject is at all com-
plex, and changes in terminology accompanying developments over a period of time must be recognized.

The inherent difficulties in the indexing of scientific subjects have not yet been circumvented by any systems developed to this date. It may be that eventually a mechanical system may produce more interrelated facts, but the possibilities must always be anticipated in the thinking that produces the code involved.

Another small difficulty to be kept in mind in using indexes is the various ways of transliterating the alphabets of foreign languages. The German umlaut must be regarded in detecting the alphabetizing procedure. A Russian language consonant may be indicated either as Ts or Ch, and is found in both forms in different indexes.

As an example of the kind of imagination that must be brought into play in using indexes, Lewton (9) cited the following in a paper concerned with the art of searching the scientific literature:

For instance, a search was recently made on Rates of Diffusion of Swelling Agents and Reactants Through Cellulose Fibers. Upon consulting the indexes of Chemical Abstracts no entries were found under Cellulose or under Fibers using the words rates or penetration. To make an adequate survey of this subject it was necessary to search the following key words under both the main heads of Cellulose and of Fibers: 1) absorption, 2) dyes and indicators, penetration of, 3) structure, 4) grinding effect, 5) reactivity, 6) water sorption, 7) swelling, 8) degradation, 9) hydrolysis, as well as the commonly known reagents for cellulose, viz. NaOH (mercerization), cuprammonium, nitric acid, acetic acid (acetylation), carbon bisulfide (Xanthation), and to inspect all such abstracts, selecting only work with a kinetic approach, discarding that which was qualitatively descriptive. Thus, ability to analyze the subject into constituent aspects furnished the clues.

There is some information published in certain journals that is not noted by the indexing and abstracting publications. This is sometimes of possible concern for some search projects and it is difficult to locate. Even though an article is abstracted its full content is not always caught. This may be due to certain policies established by the publication rather than error on the part of abstracters. Rose has observed, for example, that in one of the
major chemical abstracting publications chemical processes have not been covered with the same thoroughness as have compounds (11). Brief news items, announcements of the marketing of a new product, preliminary announcements of developments of one kind or another, are the types of things that may not be considered as worthy of being abstracted, yet may have great importance in certain kinds of searches.

4. For information from miscellaneous sources. There is much potentially significant information all but hidden in several types of publications. It can be found only if the searcher is acquainted with their possibilities. As he gains experience he develops a special sense that leads him to the facts needed, no matter how obscure their location. Among these special kinds of publications are the following:

Trade Literature. These publications issued by companies to advertise their products may be serials issued regularly and possibly indexed, or occasional pamphlets. Most company libraries will maintain files of competitors’ literature, and index the most important items. Some of the large reference libraries, such as the Technology Department of Carnegie Library in Pittsburgh, have been collecting advertising literature for a long time, and their collections are invaluable. If it is known that a company manufactured a product some years back, or if there is suspicion that it might have, this can be verified from such a file. Part of this literature is noted by some of the abstracting publications; much of it is not.

Another approach is to inquire directly of a company that manufactures a certain product. This should be done only if permission is obtained from the person responsible for requesting the search.

Dissertations and Theses from Academic Institutions. These records of directed research done by students as part of the requirements for an advanced degree have already been cited in Chapter V of this book. Some Ph.D. dissertations are abstracted by the regular abstracting publications; no masters theses are abstracted though some information appearing in them may appear in journal articles. A periodical titled Dissertation Abstracts, (1957 to date), published by University Microfilms, provides abstracts of dissertations written at a large number of universities in the United States. Some institutions publish listings of their own dissertations and theses, and these may be consulted in university or major public libraries if they are not used
enough to be purchased. The publication, Doctoral Dissertations Accepted by American Universities, 1933-1955, issued by H. W. Wilson Company, is a helpful source for the years it covered. In 1940 Palfrey and Coleman (12) published a Guide to Bibliographies of Theses, United States and Canada, 2d edition.

Certain specific subject fields are served by important comprehensive publications. For Physics there is Dissertations in Physics, an Indexed Bibliography of all Doctoral Theses Accepted by American Universities, 1861-1959, compiled by M. L. Marckworth and published by Stanford University Press in 1961. For Chemistry there is the American Chemical Society’s biennial, since 1957, publication, Directory of Graduate Research: Faculties, Publications, and Doctoral Theses in Departments of Chemistry, Biochemistry, and Chemical Engineering at United States Universities.

Universities in countries other than the United States also produce these academic publications. There are some national listings such as the Catalogue des Thèses et Écrits Académiques that was published annually in France, from 1884 to 1943, followed by Bibliographie de la France, 1930 to date. In Germany there is the annual, since 1885, Jahres-Verzeichnis de an den deutschen Universitäten und Hochschulen erschienen Schriften. In Great Britain the society, Aslib, publishes an annual Index to Theses Accepted for Higher Degrees in the Universities of Great Britain and Ireland. Other countries have published listings also. Many of these were cited by Stephens (13) in a paper on the subject of searching this literature.

Government Publications. Some publications issued either by government agencies or as a consequence of government-sponsored research are indexed in the standard indexing and abstracting sources. The best direct approach to those of the major, long-established agencies is through the Monthly Catalog of United States Government Publications. Also, such bodies as the National Bureau of Standards, the U.S. Bureau of Mines, the U.S. Department of Agriculture, and the U.S. Geological Survey provide cumulative lists of their own publications. Investigation of these compilations will reveal their potential usefulness in a particular area of inquiry.

In the years since World War II a new type of government publication that is known as the “report literature” has become so voluminous that it is very difficult to locate the significant information that is presented in these reports that are written as a result of investigations sponsored and supported by govern-
ment funds. Work is done in industrial, educational, and professional organizations under contract with such government agencies as the Air Force, Atomic Energy Commission, and the Office of Naval Research. There are thousands of projects and concomitantly, hundreds of thousands of reports, most of which are not cited by the standard indexing publications. Consequently there have had to be ways of keeping this mass of information available, and several publications are issued primarily as guides to the report literature. The most important ones are:

Nuclear Science Abstracts. U.S. Atomic Energy Commission. 1944-. Published initially as Abstracts of Declassified Documents. Provides abstracts of reports and a significant number of journal articles.


Technical Abstract Bulletin. Armed Services Technical Information Agency (ASTIA), which became Defense Documentation Center for Scientific and Technical Information (DDC) in 1963. 1944-. TAB is available only to those who are engaged in research sponsored by armed forces agencies. It publishes abstracts of reports issuing from these projects. Each issue is in two sections, one citing unclassified material, the other listing titles only of classified reports.

Abstracts of Classified Reports. Defense Documentation Center for Scientific and Technical Information. 1944-. This publication is highly restricted and may be seen only by persons who have proper "clearance."

Scientific and Technical Aerospace Reports (STAR). National Aeronautics and Space Administration. 1963-. Abstracts reports concerned with aeronautical and space (outer) problems.

It is not easy to discern the scope of these abstracting publications. Certain reports have been found in at least three of them, others in two, some in one. A reference that consists of a number preceded by two or three letters is likely to be a report. Such combinations as HW, NYO, and BNL are examples of a few. There are various aids for coping with the attendant report literature problems, among them a very helpful Dictionary of Report Series Codes by Redman and Godfrey, published in 1962 by Special Libraries Association. It is an excellent guide to the complications of multiple numbers, government agencies, and contractors. A cumulative index of report numbers is published in conjunction with Nuclear Science Abstracts. The situation concerning reports is not simple, but increasing familiarity with them makes
it possible to locate whatever information they may contain that might be of use in a literature search.

Patents constitute a type of government publication that is so specialized and important to technical development that they are treated separately and in detail in a later section of this chapter.

Government agencies in countries other than the United States issue publications that may contain information of importance to a particular research problem if they can be located. In some instances there are bureaus such as the Department of Scientific and Industrial Research in Great Britain in which the divisions correspond to similar United States Government scientific research bureaus. The United Kingdom Atomic Energy Research Authority is a source in recent years of documents like those issuing from the United States Atomic Energy Commission. In fact, some British documents are listed in A.E.C. abstracts and bibliographies.

Business Publications. Facts and figures pertinent to its major interests are necessary to many components of an organization. For example, the personnel group may want information about retirement programs and vacation policies which may be found through the Business Periodicals Index (14) or in special files. In libraries offering company-wide service, many are able to maintain limited files of business publications which have reference as well as news value whether housed in the main information center or in a separate business library within the organization. If not, the librarian is usually able to tap local resources for the information needed.

Even within the research and development group, market data are often needed before a decision is made to place an item in production, possibly prior to the initiation of research itself. Since business literature is a source of information which aids in decision making, the librarians must be aware of its potentialities and how to use it effectively, especially in situations where a separate market research division is not maintained (15, 16).

Institution Archives. Efficient organizations seldom neglect to plan for the future but, so busy are they with day-to-day operations, many fail to see the importance of organizing significant noncurrent records in an accessible manner unless a crucial need for some segment of them arises unexpectedly. The classic example usually cited is the sudden decision of management to commemorate an anniversary with the publication of an historical booklet. Though less dramatic, there is often a daily need for such information as may be contained, for example, in old price lists or advertisements (17).
Far-seeing librarians have, in many instances, taken the initiative in "preserving the corporate memory." They have collected, classified, and indexed many different types of materials, perhaps some of them audiovisual in nature, in anticipation of the fact that anniversaries, exhibits, and publications always represent a potential need. The historical material, once collected, may become the nucleus of a real archival program. In the interim, the basic collection has definite reference value in providing answers to questions posed by a wide variety of personnel (18).

Personal Sources. Acquaintance with persons who are in positions where they have access to sources of information in the fields of interest should be cultivated. Librarians, research workers, statistical experts, documentalists, and any other individuals who are experts in certain areas and who can give advice concerning problems may be consulted. Of course, the situation must be a reciprocal one with the inquirer ready to help when he can. It is usually wise, however, to obtain approval before asking for information outside the organization in case the subject is confidential.

Recording of References

When making a literature search it is vital that whatever notes are made of the selected citations be legible, complete, and amenable to arrangement in whatever order may ultimately be desired. These notes may be taken by hand or spoken into a dictating device for transcription by a typist. Another procedure is for the searcher to prepare the record of the index search such as is shown in Figure 27, and this be given to a typist who locates the individual references and copies them.

There are some occasions when it is desirable to be able to make copies quickly of complete abstracts or other reference citations, particularly if a search is being done in another library and time for hand copying is limited. This can be done with a conveniently portable Contoura camera by covering a page with a special sensitized paper and exposing to the light of a 75-watt bulb. The developing can be done later. A microfilm camera with tripod and flash attachment can be used effectively also.

Every literature searcher will develop his own habits for taking notes of references, especially after he has had the frustrating experience of trying to relocate citations for which the complete identification was not made when they were first read.
For an article in a journal the complete reference includes the author, title of the article, titles of the journal, volume number (if used), issue number (if necessary), inclusive pages, and date. Indication of the indexing or abstracting source is usually a good safety factor. For a book, the author, title, publisher, edition, and date of publication are all significant. The test of a citation is whether or not it provides adequate identification for anyone else to relocate it. Some examples of references are shown here:

Articles from Periodicals

1. Self-induced relief of airframe loads.
   Anon.
   Engineering 190, 458 (Sept. 30, 1960); Appl. Sc. &
2. Carroll, J.G., and Bolt, R.O.
   Radiation effects on organic materials.
   Nucleonics 18, No. 9, 78-83 (1960); C.A. 55, 85.
3. Phillipott, J.
   Irreversibility in interacting spin systems.

Books

1. Stevens, G.W.W.
   Microphotography.
   Wiley (1957).
   Chapter 9—Microphotographic technique.
2. West, W.
   Spectroscopy and spectrophotometry in the visible
   and ultraviolet. Chapter 28 in Weissberger, A., Tech-
   nique of organic chemistry, Vol. I, part 3, Inter-
   science (1959).

Pamphlets

Gibson, K.S.
Spectrophotometry.

These are only a few examples to suggest ways in which citations might be made. Several points are matters of personal preference; whether to put author or title first may be important only to the person making the compilation.

References may be noted on plain cards or slips of uniform size, always being consistent in the manner of taking notes. In some libraries colors are used for different types of sources searched. Where many important bibliographic searches are
undertaken, printed forms such as are illustrated in Figures 28-31 are used. They can be set up in any way that suits a particular situation. Cards for use with sorting devices are shown as Figures 32 and 33. These are the type known as "punch" cards. The results of extensive and possibly continuing searches can be filed in special binders to provide a permanent record of the work done.

Fig. 28—Reference record form (Mellon Institute).

Fig. 29—Reference record form.
### Fig. 30—Reference record form.

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTHOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TITLE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAT. NO.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AB. REF.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Fig. 31—Reference record form.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Bibliography for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author</td>
<td>Journal</td>
</tr>
<tr>
<td>Title</td>
<td>Vol., Page, Date</td>
</tr>
</tbody>
</table>

L-279


Fig. 32—Punched card for bibliographic use.

Fig. 33—Punched card for bibliographic use.
ORGANIZATION OF BIBLIOGRAPHIES

After the references pertinent to the subject being searched have been gathered, the next step is to organize them so that they constitute a good bibliography, easy to consult, and giving assurance of a job well executed. Schrero (19) has provided an excellent guide for the organization of scholarly bibliographies in his article Bibliographic Technique. He stressed the necessity for accuracy, completeness, consistency, and effective final arrangement. If there are only a few references, an alphabetical order by author is likely to be adequate, but a large number requires a breakdown into classified groups. There are these possibilities for the sequential order of references comprising a bibliography:

1. Alphabetical by author
2. Chronological
3. Classified by sub-topics, alphabetical by author within these groupings
4. By types of publications
5. By source, as by titles of journals
Combinations of these main kinds of groupings are also possible. For instance, references may be arranged chronologically, then alphabetically by author for each year. Within the groups, no matter which type of general arrangement is followed, it is usually desirable to keep together the references from each main type of source if the total number is at all large, e.g. books, periodical articles, and patents may each be kept together. As the references concerning a subject accumulate during the search, a logical order for their arrangement usually becomes apparent. The chief influencing factor should be the intended use of the finished work. For most bibliographies in scientific fields, a grouping by subdivisions of the broad subject with an outline indicating the subdivisions is the most useful system unless the person requesting the information is interested in a chronological development or the publications of certain authors. Such a bibliography can be used if it is kept only on the original cards or other forms, but it is often desirable to have the references typed as a report with as many copies made as might be needed.

When a bibliography is completed, an introductory preface should be written to accompany it. The sources searched and the dates covered ought to be indicated prominently because they can show at a glance the value of the search for certain purposes. It is helpful, too, to number the pages and provide a table of contents. The completed bibliography should be signed by the person responsible for executing it.

ANNOTATIONS AND ABSTRACTS

In the process of compiling a bibliography the searcher should make some note of the content of each reference, selecting those points that pertain to the problem prompting the investigation. He may make brief annotations only or fully informative abstracts may be required. Instead of writing complete sentences, a style of noting the most telling phrases as tersely as is compatible with retaining correct meaning may be used. McClelland (20) stated that the purpose of an annotation is simply to characterize an article as an aid to the reader to determine whether or not he should read the original publication. An abstract should summarize information so well that there will be need in rare instances only for the complete article to be consulted.

The preparation of good abstracts requires a special skill.
Hopp and Howell (21) discussed the problem of abstracting primarily from the standpoint of preparing current library bulletin material, but their advice is generally applicable to the writing of abstracts of scientific publications for any purpose. They emphasized the point that the abstracter must think from the point of view of the potential reader, be as brief as possible, yet be certain to include essential information. Dyson (22) has outlined and discussed the main points to be considered in writing an abstract, and even mentioned the easily overlooked value of including negative results.

MECHANICAL AIDS FOR BIBLIOGRAPHIC CONTROL

As the literature of science grows in volume, the problem of making literature searches that can be relied upon as being complete in their coverage by using conventional indexing publications becomes increasingly difficult. The results are contingent on the matching of wits between the searcher and indexers-abstracters. Since the 1950's methods of meeting this problem by using devices such as the Uniterm indexing process developed by Taube, or Mooers' Zatacoding, and mechanical aids utilizing data processing equipment have been developed. Reference has already been made to these procedures, particularly in Chapter 8 concerning indexing of information. Mention has been made in Chapter 10 of services that supply information that has been indexed by such methods. Consideration will be given to the matter of indexing for retrieval in any library that has serious need to be able to locate facts and data as regular literature searching procedures. If equipment is installed in the organization for other purposes the library may be able to make use of it, especially if it can procure bibliographies already on punched tape; for example, those the Defense Documentation Center for Scientific and Technical Information has proposed to institute. Development in this area is in such fluid state that it must be watched closely to recognize what can be utilized effectively in a particular situation.

THE PATENT LITERATURE

Patents constitute a distinct division of the literature, and they are of particular importance to an enterprise concerned with
technological developments. As records of scientific advances, they sometimes constitute the only source of detailed descriptions of new processes. Some of the information revealed in them is eventually incorporated in books and journal articles, but much never reaches these more accessible publications, and it is usually available at an earlier date in the patents. Therefore this literature cannot be ignored, though it is of greater significance to certain types of developmental activities than others.

The collection of patents may be confined to a separate patent department, which may in fact maintain its own patent library, or it may be part of the main library collection to be used by anyone concerned with any phase of patent investigation, including prosecution. In many scientific and technical libraries the staff is expected to furnish patent information, including the execution of comprehensive searches of the literature as a part of the organization's developing patent program.

This section of the chapter is concerned with the handling of patents as a source of information, how to locate pertinent ones, and typical questions involving them are illustrated. For more detailed coverage, such guides as Crane, Patterson, and Marr's *A Guide to the Literature of Chemistry* (23) or Soule's *Library Guide for the Chemist* (24) should be consulted. Some of the papers presented at meetings of the Chemical Literature Division of the American Chemical Society and published in the Society's *Advances in Chemistry Series* and in the Division's *Journal of Chemical Documentation*, are concerned with patent searching problems.

**What Patents Are**

Since patents are not as generally familiar as other types of publications, the essential facts concerning them are presented briefly. Patents are individual documents representing agreements between a national government and an inventor. In return for disclosing his invention for the benefit of the public good, the inventor is granted the right to exclusive exploitation of his invention for a definite period ranging in various countries from 15 to 20 years. In the United States the term is 17 years. All countries in which scientific research is conducted have a patent system, though the greatest number of patents, as might be suspected, are granted in the United States. Because the bulk of the patent literature issues in the United States, this discussion is centered chiefly on the situation in this country. However, the systems in other countries are somewhat similar.
In brief, a patent is awarded in the United States to an inventor who proves that he has brought forth any "new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof." When his patent is granted, printed copies of the complete document are made available to the public. The essential features of a printed patent are:

1. **The patent number.** Consecutive numbers are assigned to patents as they are issued, and they are listed in this order within the three subject groupings in the weekly issues of the Official Gazette of the United States Patent Office. This number serves as complete identification for the document, e.g. U.S. 2,192,624.

2. **Date of Issue.** The Tuesday upon which a patent is officially granted is the date from which the time of protection is calculated.

3. **Application date and serial number.** The date upon which an application for a patent is made to the Patent Office is shown on the printed copy. A serial number is given to the application when it is received by the Office, and this too is carried on the copy.

4. **Title.** The title of a patent is often so general that it does not adequately identify the contents. Particularly is this true for older patents, and, since the index entries in the annual index are made from the title, they may be difficult to detect.

5. **Patentee.** The name of the inventor or inventors to whom the patent is issued is cited below the title on the copy. n.b. In the United States a patent is always issued to individual persons, whereas in some other countries it may be issued directly to a company.

6. **Assignee.** The patentee may immediately assign his invention, usually to a company by which he may or may not be employed, though occasionally it is assigned to another individual, at the time of issue. If he assigns it at some later date it is difficult to determine because the only record of this subsequent transaction will be in the Patent Office.

7. **Classification.** A patent is assigned to a specific class in the Patent Office System of Classification when it is granted. This notation is indicated on the printed copies of those issued since about 1930.

8. **Specifications.** The body of a patent is in two parts, first of which is called the specifications. This is the statement of the
argument for the invention. In some instances there are reviews of the technology involved that provide valuable expositions of the state of the art.

9. **Claims.** The other part of the body of the patent comprises the claims which are exact statements of what the invention covers. Since each claim must be stated in one sentence, they are sometimes very involved.

10. **File wrapper.** The complete history of a patent application is held in a file wrapper, available for consultation in the Patent Search Room. Copies may be obtained through Washington agents.

11. **Reissue.** If a patent must be revised after it has already been issued, it is reissued in corrected form.

12. **Disclaimer.** When the validity of the claims of a patent are questioned and cannot be defended, disclaimers are published in the forepart of an issue of the Gazette. Needless to say, these can be elusive.

**Location and Selection of Patents**

To some extent the selection of patents has already been dealt with in the chapter of this book on the Selection and Acquisition of Books and Other Publications. For those issued currently the Official Gazette of the United States Patent Office should be scanned each week, and patents of interest either ordered or notations made for indexing record. If subscriptions are carried to certain classes, the Gazette need not be read so carefully. All relevant patents are entered in the library's card index to information which, as it is carefully maintained over the years, becomes a major source to be searched when inquiries are made. Shaler (25) has shown how the development of such a file provides a series of continuous records in certain subject areas. Some patents, particularly those in the field of chemistry, are cited in the abstracting publications, but complete coverage in any area cannot be achieved unless the official journals are read, or subscriptions carried for all classes of possible interest.

It is necessary in some libraries to make a complete search of all patents pertaining to a certain art which has not been of interest prior to the time of the request for the information. The library's indexed file will be of no help. A first step at this point will be to consult the Patent Office's Manual of Classification to determine the numbers of the classes in which patents containing pertinent information will be entered. After the classes are de-
terminated, two courses of action are open; one to go to the Search Room of the United States Patent Office in Washington, D.C. and examine the files. This is the only place where a complete, classified file of patent copies is maintained. The other procedure is to obtain from the Patent Office lists of the numbers of the patents in these classes, then either purchase them, thus building a classed file for permanent reference, or to take the numbers to a library that has a complete file of patents in numerical order. In the large cities at least one library has such a file. Soule (22) gave the locations of comprehensive patent files, including those from both the United States and other countries.

In each issue of the Gazette, the classes of the patents contained in it are indicated, thereby making a search by classes theoretically possible. However, this would be much too tedious a procedure to be practical.

In 1962, a very significant aid to patent literature research was announced. This is called The National Catalog of Patents and it is a compilation of U.S. patents in the fields of Chemistry and Electricity, including communications and radiant energy, arranged by Patent Office classification. Although the Catalog gives only the representative claim for each patent as it appears in the Official Gazette, it should prove to be a valuable searching tool. The plan is to publish in six series, each one to cover a span of 10 years except for number one which will include all years prior to 1900. This project has been undertaken by Rowman and Littlefield, Inc. New York.

Another effort to improve the accessibility of the patent literature is the publication of French chemical patents on Microcards. This was begun for those issued in 1961 and is to be continued for all subsequent ones by Microcard Editions, 901 26th St., N.W., Washington 7, D.C.

If a complete search of the patent literature is not required, it may be sufficient to locate only those patents that are cited in the abstracting publications. Some references to patents can be found in this way, but it must be recognized that this coverage is far from complete. In 1936 von Hohenhoff (26) prepared a comprehensive list of periodicals that list and abstract patents in the various subject fields; unfortunately it has not been revised. The area that has best coverage is chemistry because both Chemical Abstracts and Chemische Zentralblatt include many patents. Since 1947 Chemical Abstracts has included a greater number than was the case in earlier years. Some periodicals in more restricted fields that review patents of concern in their

In addition to the periodicals that publish abstracts of patents, there are some excellent specialized compilations in some subject fields that are sufficiently thorough in their inclusion of patents as to warrant their use for background searching. Many were included in the Von Hohenhoff publication referred to previously. Others are cited in the guides to the chemical literature by Mellon (27), Soule (24); and Crane, Patterson, and Marr (23).

Alterthum, H. Fortschritte der Chemischen Apparatewesens Elektrische Ofen, Leipzig, Akademische Verlagsgesellschaft M.B.H. (1936). This is a classified listing of patents relating to electric furnaces. Only the German ones are abstracted.


A unique service covering patents issued in countries other than the United States is provided by Derwent Information Service, Rochdale House, Theobalds Road, London W.C.1, England. It publishes on subscription basis these compilations: Fine Chemicals Patents Journal, Plastics Chemicals Patents Journal, Petrochemicals Patents Journal, British Patents Gazette, German Patents Gazette, and Commonwealth Patents Gazette.

Patent Searching

Patent searching is a highly specialized art; it can be done reliably only by those whose attention is devoted almost exclusively to patents, and who have made a protracted study of them. However, it is possible for the library staff to render significant assistance on patent problems if there is some understanding of the principles involved. Particular help can be given in the preliminary investigation of subjects upon which research is contemplated. Hoffman (28) has provided an excellent description of the procedure followed in a library serving the patent department of
a petroleum company, an example of an industry in which there is much concern with patents. Some of the parts of the procedure could be readily incorporated in a library where a patent situation is only an occasional problem. An example of a form for keeping record of a patent search is shown as Figures 35 and 36. A less elaborate one that may be quite satisfactory is suggested as Figure 37.

A patent search may have one of several purposes. In general it is concerned with the finding of specific information relating to a technological device or process. This information may exist either in patents or other kinds of publications so that books, periodicals, and patents must all be investigated in a complete search. If a fact can be shown to be in print in any kind of publication, no matter how obscure, a patent position may be invalidated. Specific terms are used to designate the usual types of patent searches, the more common being these:

1. Patentability search. This is also called the "preliminary search" which is made to determine whether or not an idea is patentable, that is, whether it is novel, and has not been available for public use for more than two years. It is assumed that the invention fulfills the other requisite of being useful. Hoffman (28) has indicated that this search may be either a brief preliminary review, or it may be comprehensive and consist in locating all published information on the subject in books, journal articles, patents, and any other possible sources.

2. State-of-the-art search. A full survey of all patents and other publications relating to the art involved is required to determine the precise state of progress of a technological development. It is an extension of the patentability search.

3. Infringement search. A study of the claims contained in all patents concerned with the subject under investigation for a prior period of 17 years is made to determine whether or not there has been an encroachment on an idea. Patents are, in some respects, closely akin to politics.

4. Validity search. This, the most exhaustive of all searches, is called for when it is necessary to gauge the strength of an existing patent. The patent may be one blocking an activity in which a company wishes to participate, or it may be a patent involved in an infringement suit. Every possible reference must be investigated and, as in other patent searches, publication date is of paramount importance.

5. Index search. A routine investigation of all patents issued to a certain individual or assigned to a company, rarely requiring exercised judgment with respect to subject matter. It
Fig. 35—Form for patent search.

Fig. 36—Form for patent search.
can be done from the annual indexes to the *Gazette*, or from the inventor and assignees files often maintained in a library where there is a large collection of patents.

**TRADEMARKS**

Trademarks are closely allied to patents, though handled officially as a separate kind of agreement. Those granted each week are illustrated in the forepart of the *Gazette*. They are indexed annually, but the only complete index to them is in the Patent Office Search Room. Some of general interest are included in scientific dictionaries, and a few are cited in current periodicals. Several cumulative indexes have been published, but so many new trademarks are granted continuously that no list can be complete. Many libraries develop their own index record of those of interest to them, noting them from the *Gazette* as it is read weekly.

**TYPES OF PATENT QUESTIONS**

All kinds of requests that concern or involve patents vary, though most of them fall into several main categories. As in any search, efficiency of approach to it depends upon the understanding of what is wanted, and in the case of subject searches there must be knowledge of the subject field. Discussion of patent requests may be presented most directly by citing examples of typical ones, with suggestions for locating the answers to them. As was suggested for general reference questions, it is advisable to keep a systematic record of requests, taking care to establish the habit of noting complete citation in a uniform manner. In libraries where much patent work is done, it is important to have all requests for searches submitted in writing, perhaps on a special form for the purpose.

Some examples of patent questions follow: (Note: It is assumed that the answers are not to be found in the library's own index files).

**Question:** Locate United States Patents known to have been assigned to Company X within the past five to ten years concerned with a process for removing phosphorus from copper ores.

**Procedure:** Since the name of the company is known, the annual indexes to the *Official Gazette of the United States Patent Office* may be consulted, and likely titles noted. If there is any
doubt, the exact contents of the patents may be verified from the claims cited in the Gazette. Should the Gazette not be at hand and the subject be chemical, there is a good chance of locating abstracts in Chemical Abstracts by consulting the indexes from 1937 to date. Prior to 1936 they were not indexed by number, but a special index covering the years 1907-1936 has been prepared by the Science-Technology Group of Special Libraries Association. A Collective Numerical Patent Index 1937-1946, and another for 1947-1956 have been issued by Chemical Abstracts.

**Question:** Locate all patents assigned to Company Y having to do with the dyeing of nylon.

**Procedure:** Again, since the name of the company is known, the annual indexes to the Gazette will supply the titles of all patents assigned to the company at the time of their issue. There is also the possibility that the company may hold others that may have been acquired subsequent to the time of their being granted, which fact may or may not be of particular importance, but it should be kept in mind, as these can be located only from Patent Office Records. Another point to be aware of is that patents may be assigned to a company affiliated with Company Y, and if no patents appear to be assigned to Y, a study of the corporate structure as shown in Moody’s Industrials or Stanard & Poor’s Register may reveal other companies whose patents on the dyeing of nylon should be investigated.

**Question:** Locate all patents on the dyeing of nylon.

**Procedure:** This necessitates a subject search which should start with the Manual of Classification of Patents from which the likely classes will be selected. The files of the pertinent ones must either be read in the Patent Search Room or copies purchased. It may be economic to do this in view of the cost of a trip to Washington. However, if the organization already has an arrangement with patent searchers in Washington, the assignment can be made to them. The aforementioned National Catalog of Patents might be consulted for this purpose.

**Question:** Locate some representative patents on the dyeing of nylon.

**Procedure:** A search in Chemical Abstracts will show which references are to patents; the page number is preceded by “P” in the index. Unfortunately, subject fields other than chemistry are not abstracted as effectively.

**Question:** Locate the patent covering a composition trademarked as XYZ.

**Procedure:** The name of the company will probably be known, or it may be discovered readily in trademark indexes. If it is not,
it can be found only from the files in the Patent Search Room in Washington. The patents assigned to the company should then be located, and the likely ones read until the correct one is identified. This can be a troublesome item to locate, especially if a company has had issued to it a large number of patents. Sometimes the patents covering an invention are cited with the trade mark.

**Question:** Locate the British patent corresponding to a specific U.S. one.

**Procedure:** If the subject is chemical, it may be possible to locate the patent fairly easily by investigating those granted and abstracted at the same period that the U.S. one was issued. The patent index of *Chemisches Zentralblatt* is particularly useful for finding equivalent patents issued in other countries. However, if this is not rewarding the next step is to consult the British Office *Journal*; this failing, the files of British patents in the Patent Office Search Room must be investigated.

**CONCLUSION**

The ultimate service that can be rendered in the science-technology library is to supply factual information in response to requests. If the preliminary preparations of assembling files of materials and indexes are thorough and they are kept up to date, a majority of the questions brought to the library should be answerable from the resources at hand.

The introduction to the use of the literature provided in this chapter is admittedly brief, but it should afford an adequate start into the maze. The source publications themselves must be studied as they are used; there is no substitute for this educational experience. A good literature searcher has a deeply inquisitive attitude and an open mind, is always on the alert for new resources to augment his mental stock. The literature and methods of approach are not static; continuous effort must be made to follow the shifting advance of science and its resultant technologies as it is recorded and indexed.

**BIBLIOGRAPHY**

2. Ditmas, E.M.R. Co-ordination of information, a survey of schemes put forward in the last fifty years. J. Documentation 3, 209-221 (1948).
6. Lane, B.B. Personal communication.


SUPPLEMENTARY REFERENCES


Gray, B.S. Automatic typing of literature searches. J. Chem. Document- 
tation 1, 71–73 (1961).
Janisch, W. Uber die Kunst des Recherchierens. Nachrichten für Doku-
mentation 1, No. 3-4, 85-92 (Dec. 1950).
Lanham, B.E. Services available from the Patent Office. Spec. Lib., 46, 
Lederman, L.F. Abstracting and indexing periodicals of chemical inter-
(1952).
McCasland, G. E. A concise form for scientific literature citations. Sci-
ence 120, 15–12 (July 23, 1954).
McCrumb, B., and Jones, H.D. Bibliographical procedures and style for 
Maizell, R. E. Techniques of data searches in chemical libraries. J. 
Manley, M. Business information: how to find and use it. New York, 
Marden, E., and Koller, H.R. A survey of computer programs for chem-
ical information searching. U.S. National Bureau of Standards Tech-
nical Note 85, PB 161586. Washington, D.C. Office of Technical Services 
(1961).
Moore, C.K. Abstracting journals in the electronics field. Aslib Proc. 
Moseley, E.G. Publications and services useful to the medical librarian. 
Mount, E. Abstracting and indexing sources for literature on metals and 
National Federation of Science Abstracting and Indexing Services. A 
guide to the world's abstracting and indexing services in science and tech-
technology. Washington, D.C., U.S. Library of Congress, Science and 
Technology Division (1963).
Neelameghan, A. Abstracting services in medical sciences. Annals of 
Oatfield, H., and Emilio, B.R. Some aspects of searching the pharma-
ceutical literature, reference: fringe benefits. Am. Documentation, 
9, 238–272 (1958).
Phelps, R.H. Engineering information — all is not lost. Science, 129, 
Perry, J.W., and Kent, A. Tools for machine literature searching: Se-
metic code dictionary, equipment, procedures. New York, Inter-
science (1958).
Schlundt, E.M. Services available from large libraries, a review. Spec. 
Short, M. A. Searching the literature of physical and inorganic chemistry. Research 10, 313-317 (1957).
Interpreting Library Service

A scientific organization depends upon its library for all kinds of specialized information pertinent to its needs. This may be recorded in books, journals, pamphlets, reports, government documents, and occasionally it may be information which has not yet found its way into print. To develop the potential value of the library, its staff must be alert to all unfilled needs and meet them courteously, rapidly, effectively, accurately, and economically. Preceding chapters have covered many aspects of the administration of the special library in the fields of science and technology regardless of its location—in an academic or research institution, in a subject department of a public library, in a manufacturing organization, or in a trade association. There now remains the further need to emphasize the librarian's responsibility to interpret library service for his many publics—the publics which are points of contact for his relations with people.

Public relations is an umbrella term with many definitions, most of them attempts to convey the same meaning although the words used are not always synonymous. Some of the expressions are exceedingly simple such as "human engineering," "a way of life," and "the art of getting along with people." The broad scope of public relations is indicated by the definition found in the library's most frequently used reference tool which characterizes public relations as (1):

The activities of an industry, union, corporation, profession, government or other organization in building and
maintaining sound and productive relations with special publics such as customers, employees or stockholders, and with the public at large, so as to adapt itself to its environment and interpret itself to society.

Another definition has been chosen as one of the best by the majority of two thousand public relation specialists, according to Canfield (2). It underscores the caption selected for this chapter:

Public relations is the continued process of keying policies, services and actions to the best interests of those individuals and groups whose confidence and good will an individual or institution covets; and secondly, it is the interpretation of these policies, services and actions to assure complete understanding and appreciation.

The librarian has a ready-made opportunity to cooperate in a process such as one encompassed by this broad definition.

Wright and Christian (3) explained that the number of publics in any community is theoretically the number of distinct combinations of people possible there. They prepared a chart, "The Composition of Publics," with examples of groups bound together by common interests such as professional, economic, fraternal, political, educational, patriotic, and geographical. Underlying all is the common denominator of people, people who compose a specific public, each capable of forming its own opinion. Such a chart may be useful to the librarian in analyzing his publics; this he must do before he decides why he should reach them, upon what he needs to place emphasis, and how he will communicate—face to face, by telephone, by memorandum, or indirectly through other media. Under no circumstances can the librarian assume that his publics have complete information about library operations and resources.

At first thought it may seem fairly simple for librarians of scientific collections to identify, as distinct audiences, the separate groups of people with whom they have contact. The diverse types of institutions with which libraries are connected, however, prevent formation of an outline equally applicable to all. For example, there is a striking difference between the publics of two types of technical libraries, one in the science department of a public library with its ever-changing clientele, another in a multi-divisional manufacturing company with its clientele relatively stable though geographically dispersed.
Contrast in publics can also be indicated by the relationships of the departmental librarian of a technical library in a decentralized university library system who must deal with the faculty, with the students, and with his own staff, as well as with the director of the university libraries. The latter may need the help, at times, of the departmental librarian in budget justification, or, if connected with a state-supported institution, the director may need aid in keeping a weather eye on the legislature, farm interests, or some other public, especially if the university offers extension work. Schoenfeld (4), in his book, The University and Its Publics, set forth many suggestions adaptable to the special library.

The present chapter will emphasize the point of view of a librarian’s working relations within an organization the library of which exists to serve a particular clientele. It is in this type of library that it is possible to identify and to discuss at least four specific publics. They are: (I) the library staff; (II) the clientele, or users of the library; (III) the many-sided one of over-all management; and (IV) the members of his profession upon whom the librarian depends for help. Various channels of communication open to the librarian, and the motivation for using them, are discussed under these four categories. While they are interdependent and sometimes overlap, all need consideration in planning a balanced program for an industrial library. Various suggestions made under each of the four divisions can be altered to fit other types of special library service.

It is incumbent upon the librarian to acquire a clear perspective of the value of the library to his organization, not only by acquainting himself with the historical background and operation of the parent institution, but also with those of the industry of which it is a part. One of his first steps should be to work out with management the objectives of library service for which he is to be held responsible. Duncan (5) reviewed the factors necessary in establishing an information activity geared to the organization’s needs. With his method of study in mind, the organizational location of the library to meet its objectives can be determined. The status of the librarian depends upon the place of the information group within the parent structure. This subject is discussed more fully elsewhere by the author of this chapter (6–8). Although the points covered in this paragraph are primarily aspects of library administration, they have a direct bearing on the successful interpretation of services.
LIBRARY STAFF IS A PUBLIC

In his chapter on "Managements nearest public—employees," Hill says (9):

Its every communication must build management’s status as an honest, far-sighted leadership to which employees can always look for the truth—and even for real inspiration and guidance, too, in making life a good experience.

Effective communications are necessary whether the staff consists of two, ten, twenty, or more members who serve a clientele located in one geographic area or one scattered among components in various parts of the country. It is impossible to state where staff administration per se ends and public relations begins. In any case, it is the librarian’s task to foster the realization that good internal relationships precede sound external ones with the clientele; the librarian, therefore, has this additional responsibility to the staff members who work with him. Lincoln Filene, the department store executive, emphasized this obligation when he said, "If we were to create contentment in front of the counter we had first to create contentment behind."

Once the objectives of library service are outlined it is the duty of the librarian to explain them to the library staff and, with its aid, to develop policies for carrying out the objectives. In doing so, there is an opportunity to instill in each member a spirit of participation in carrying out activities necessary to meet objectives. It is also the librarian’s privilege to interpret the organization’s over-all operating philosophies to his staff and relate the library’s function to each. Likewise he has a responsibility to state clearly organization policies and practices such as those having to do with employment, pay plans, and progress reviews. Future relations of the librarian with his staff may depend on how carefully he takes these first few steps. It is also during the staff orientation period that good staff-clientele relationships must be emphasized. Suggestions for the portrayal of case situations have recently been suggested by Carter and Schryver (10) for use in staff instruction in the methods of improving staff relations with library users.

The staff looks to the librarian for direction of effort. When effort is effectively coordinated, each staff member forgets his own interests in contributing to the total operation of library service. Staff members must understand what is to be done, when
it is to be done, and how it is to be done—in other words, the librarian, in order to train, must give clear and concise instructions; to guide staff members in putting knowledge to work, he must work with them and help them understand the problems to be met separately and together. The efficiency of the entire staff will be increased if and when many of the library operations are described in a staff manual. Not only does a manual provide the medium for the recording of experience gained in solving problems pertinent to the job at hand, but it also proves to be excellent insurance against errors of memory. It is also invaluable in training staff replacements; therefore, it must be kept up to date.

There are many other ways of accomplishing effective staff rapport. If there is a small news or bulletin board for the exclusive use of the staff, no member lacks a medium to reach others working in the same unit. It may have a hodgepodge appearance but is never ignored. Where staff members are scattered, one may resort to the circulation of memoranda which may concern only the staff or they may cover announcements of general interest. To secure immediate reactions and results the staff meeting is most effective. Some library problems, however, are more easily solved if committees are appointed to investigate all angles and to propose a solution, or possible alternatives for further discussion. In a “Program for staff development,” Lage (11) listed a variety of ways in which staff members are encouraged to develop professionally on the job and, at the same time, to gain more knowledge for their day-to-day work.

An audiovisual presentation of library operations is an effective method of library staff orientation, especially for the new employee. Many librarians also take advantage of invitations to lectures concerned with their subject fields, particularly if presented within the plant. These not only are educational for the individual but his attendance fosters good public relations both within and without the library’s walls. In a large library organization, a staff news sheet often serves as an excellent information medium and, at the same time, aids in the unification of the working group. Most special library staffs are so small, however, that good liaison prevails without this suggested aid.*

A summary of suggestions, as well as additional ideas for

---

*In developing this chapter, recognition was given to the fact that there are many "one-man" technical libraries operating successfully. For the purpose of this discussion it should be kept in mind that many of the suggestions are not practicable unless there is a minimum of five staff members.
staff development, appear at the end of this chapter.

Many recent articles emphasize the important role played by the library as an information center, recognizing the fact that it is a creative participant in research and development. For example, the following is quoted from a news article (12):

Here's a big management problem that plagued Esso Research. How does a company get the best use of today's technical literature? Esso's answer now: Organize literature the same way a firm handles such jobs as research, development, and engineering. Esso made this reorganization move....when it created its Technical Information Division. The company made it clear that TID was on the same plane as research, engineering, and processing by giving the new arm division status.

It is awareness of this creative potential that the librarian must bring to his staff members so that the library's role may be firmly established through their coordinated efforts; each one must realize that a corollary to the giving of information is a keen sense of participation in its eventual use. This results in developing team know-how and effort.

Atmosphere of the Library

Lying somewhere between the areas of responsibility of the librarian to the staff and the staff to the clientele is consideration of the library's atmosphere and its impact on the public relations program. Many new buildings are designed with the recognition that an easily accessible location for the library is an added factor in the economical use of time which, in turn, enhances good relations with users. Even a less desirable location can be made attractive and comfortable with due attention paid to lighting, ventilation, and adequate working areas. Cleanliness and good housekeeping in general add immeasurably to the appearance of the library. Pleasant, courteous, efficient, and well-groomed staff members lend to the library an air of assurance which will be reflected not only in the initial approach of the clientele to the library but also in the continuous use of its service.
THE CLIENTELE IS A MAJOR PUBLIC

The second area of responsibility for interpretation of library service is to those who use the library and who, by their actual physical presence, greatly outnumber its other publics. Little wonder, then, that it is this public to whom the greatest number of services are aimed. The scope of the latter varies from library to library whether the services are offered on a company-wide basis or only to the research and development function. Southern (13) listed 17 distinct services offered by pharmaceutical libraries. Weil, through a more recent survey (14), considered the question of defining information groups in terms of their functions which include others in addition to the traditional service of technical libraries. Regardless of number or type, their scope must be recognized in order to develop a linking of operations between the library and its users, making the latter aware that the library is the most logical place to find information.

Library Committee

The most important function of the library is to give adequate and imaginative service; in so doing, the information function may, in time, be recognized as a major resource of the business just as are manpower, money, materials, and machines. To this end, as well as to guide staff efforts along the most productive lines, a library committee is often helpful if organized so that its duties will be purely advisory in nature rather than supervisory; its liaison function also has been discussed in Chapter 1. Such a committee should be representative of major interests of the organization, or at least of the function in which the library operates. Within the personal experience of the writer, it has been observed that middle-management men have more interest in serving on such a committee than executives whose time is at a premium for other types of meetings and conferences. Some other methods for enhancing good relationships with the library's clientele are outlined below.

Bulletin Boards

Even the smallest of libraries, both in staff and in space, can utilize a bulletin board to advantage. If placed in a prominent
spot near the main entrance, those using the library unconsciously form the habit of looking at it, either upon entering or leaving the library. Here the clientele may read of notable achievements in its fields of interest, of scientific meetings, of academic courses scheduled in the area, and announcements of forthcoming publications. Reprints of papers presented by staff members at recent meetings please both the author and his associates if placed on the bulletin board. Announcements of personnel changes and news stories released by the company's press relations department, including those of honors and awards to individual employees, are likewise appreciated. Vacation folders, road maps, and competitive advertisements can always be used if and when technical news items are scarce.

In at least one library, pertinent science items from The New York Times and other daily papers are clipped regularly for the bulletin board. This practice has occasioned favorable comment to the extent that other scientific spot news is noted by readers and sent to the library. Changed frequently, those clippings which promise to be of more than current interest may be preserved in the information or picture files. Even an occasional cartoon attracts attention and has been known to aid in getting back lost books!* A shelf built below the bulletin board affords a choice spot for display of new books before they are placed in the stacks or circulated to individuals. A comfortable chair close at hand enhances the invitation to examine new books and thus pays dividends in reader comfort and satisfaction. If one of the new books has been recommended by a library user, advance notice to him that the book is available will be appreciated.

Exhibits

Some libraries are fortunate in having the space and cases for exhibits. Initiative and careful planning are necessary in order to produce displays that are timely and pertinent to the interests of the organization. Archival material never fails to arouse interest, not only on the part of the newcomers to the organization, but also of the older members who have contributed to its growth. Visitors to the library also carry away with them

*Accompanying the talk, "Books—Borrowed, Lost or Stolen" given at St. Paul in 1951, a page of effective cartoons was distributed by the author of this chapter. This was not published when the article appeared in Special Libraries, 43, 84, 86, 94 (1952).
a favorable and lasting impression if something tangible focuses their attention directly upon a phase of current research.

Rare books of historical interest in the field of the organization's activities are in the possession of many libraries. Although they are usually hidden away in the stacks, the exhibit case offers an opportunity to display them occasionally. Materials borrowed from various units of the organization may prove interesting; a collection of raw ores or crude drugs might be used in a metallurgical and pharmaceutical library, respectively. To be effective, however, exhibits must be varied from time to time and tied in whenever possible with the organization's calendar of events. Their subjects are limited only by the imagination of and time available to the librarian and his staff.

Library Handbook

Staff collaboration is necessary in preparing a handbook for the clientele. At the outset it is wise to ask questions of users to get their points of view as to what needs emphasis and explanation. Since a handbook is a guide to the use of the library, it should be kept up to date. Such a handbook usually contains library policies and rules for circulation of materials, library hours, floor plans, and telephone numbers; explains the classification system in use; tells how to use the card catalog, especially noting variations from the traditional; describes special services, files, and indexes; and some may give the names of staff members who are in charge of special duties such as microfilming and interlibrary loans. The handbook of the libraries of Bell Telephone Laboratories incorporated most of the essential features in an interesting format (15). Another attractive booklet presented a minimum amount of information in a readable and eye-catching manner; it was designed for the Martin Company Library (16). Several other libraries have developed useful handbooks within the past few years.

Librarians willing to contribute professional-level assistance and on-the-job teaching aid the newly employed bench scientist in improving his own public relations because he must learn during the early part of his professional career how to find, to use, and to communicate information. For example, he may not know how to copy a bibliographical reference correctly. Occasionally he does not know how to use an indexing service. And he may learn by trial and error that one requests a reprint from the author rather than the publisher. Many of these problems
may be anticipated and the necessary information incorporated in the library handbook, thus recognizing its instructional value. If more time were available for preparation of handbooks, many librarians of industrial organizations could utilize the talents of their in-plant visual aid department in presenting readable and attractive booklets.

Annual Report

A formal report draws specific attention to what is being accomplished, thus provides organization members with an opportunity to evaluate their library's services. It is also valuable as a historical record of the library. Examples of services inaugurated, such as a new file of trade names, compilation of a comprehensive bibliography covering an important company product, contribution of the library staff to professional journals — all are grist for an annual report. One of the most succinct statements covering the purpose, audience, contents, preparation, and style of such a report appeared as an editorial of a professional library publication five years ago (17). It is well worth the brief reading time required. Ferguson (18) likewise presented a splendid case for preparing a report. She included the suggestion that many items not covered in the usual routine statistical summaries might be included such as interesting contacts made or a "good story" illustrating effective reference work.

Scientific and technical libraries have not kept pace in presenting annual reports in interesting and unusual formats such as those currently devised by many public libraries. The latter must keep the taxpayers informed and interested whereas reports of industrial library operations are designed for internal consumption. Jackson (19), however, did an excellent job in presenting pictorially acquisition policies, processing activities, circulation statistics, and reference services, all accompanied by a unique fact table which re-emphasizes the story told by the charts and supplements the GM Library's other publications. MacWatt (20) showed how a pharmaceutical library is fulfilling its function by charting the increase in circulation of informational material over a period of seven years — an average of less than 40 publications daily in 1947 to 240 in 1953. In the Monsanto Library at St. Louis a quarterly summary of activities was prepared by the librarian for incorporation into the annual report of the research department (21). A joint report of staff members responsible for various areas of activities of the Upjohn Library was prepared
by Brown (22). Whether the report is brief or comprehensive it is a legitimate means of telling the library's story not only to top management but to any one who is either a habitual or a potential user.

Library Bulletin

Discussed in detail in a preceding chapter, the main purpose of the library bulletin, regardless of the form in which it is issued, is the dissemination of information pertinent to the organization's specific interests. The first or last page is often utilized for booklists, bibliographies, or news items of intramural interest. The bulletin offers a way to publicize a new file or staff service which may be of special interest — in fact, there is always the opportunity to issue supplementary material when and where the need for it is indicated. This library publication is also an excellent medium of two-way communication when a return card is attached to be used in requesting an item mentioned. One of the best summaries of library bulletins was made by Jackson (23). It is possible that, subsequent to this report, many libraries have supplanted their bulletins with a tables-of-contents service either purchased commercially or prepared within their organizations.

House Organs

Exercising one's imagination in showing the library's "wares" through print is an effective way to reach potential users. Many organizations have one or more publications issued at regular intervals, the columns of which are usually open to the librarian. Appropriate contributions might include reviews, lists of new books, or selected abstracts of articles having an organization-wide interest if editorial policy permits their inclusion. By far the most welcome type of news in a publication intended solely for distribution within the organization is an account of unusual service rendered by the library provided it is of a non-confidential nature; many such stories are available if a library staff member develops a "nose for news." From a public relations point of view an experience which created interest outside the organization was one of a chemist who found a letter from Liebig to Faraday, dated 1842, among the pages of an old volume of the Journal of the Chemical Society which had been purchased by the library a century later (24). The letter, which was repro-
duced to illustrate the story, has since been laminated for permanent preservation.

Special Indexes

To supplement the printed reference tools in a subject field, special indexes and files are often prepared when time permits. Information needed by investigators usually demands a prompt answer since progress in some experiment or report may hinge upon it. When the library staff member can answer reference questions from files of unpublished or unindexed information, he expedites his own work as well as that of the client. Not only do these special indexes facilitate reference work; their availability also gains the confidence and appreciation of the library's publics. The philosophy of this service has been discussed elsewhere by this author (25) and by Taylor (26).

Photocopying Service

Librarians report that one of their best builders of good will is the provision for an on-the-spot method of reproducing one copy of an abstract, of a complete article, or possibly only a bibliography. This is usually done for or by the person who has an immediate use for the item and who would be inconvenienced if required to wait for procurement by some other method. This plan also eases the situation in respect to the extended loan periods for items needed for project work which does not end in a month and sometimes not within a year. Such a service is not without mechanical drawbacks and repair work on a copying device has become expensive in some instances. There is also the question of copyright which must be taken into consideration—a subject perennially discussed at professional library conferences. See Chapters 10 and 11 for additional information on photocopying.

Individualized Service

The librarian has an unusual opportunity of learning the special interests of his clientele through personal conversation subjects of papers presented at meetings, reports of contact trips, and attention to the reference questions directed to the library. The ideal situation is brought about when the librarian is informed of research projects to be undertaken, either through actual attendance at research staff meetings when the projects
are in the planning stage, or by reports and memoranda circulated by the director of research and development. Still another opportunity is opened to the librarian when he first is asked to make a preliminary search on a subject which holds promise for investigation. Credit to the library for assistance given in preparation of scientific articles is especially rewarding since it proves public relations to be a "two-way street."

Once informed of research in progress or anticipated, the librarian is in a strategic position to catch items of interest as they appear in current publications. Although limitations of time may make the use of printed or mimeographed forms advisable, telephone calls expedite personal service. An individualized type of service was described by Wennerberg (27). With current project interests in mind staff members scan each issue of scientific journals as they are received. Abstracts of pertinent references are typed on punched cards and forwarded to the clientele which, in this case, is composed both of ARF personnel and outside sponsors of research projects. In another library situation, as reported by Sewell (28), all professional staff members spent part time at the information desk in order to keep informed of the special interests of the clientele, thus placing them in a position to relate any pertinent article, immediately upon its receipt, to the work interests of the specific individual who might use information contained in the publication.

In any consideration of clientele, service to potential or future users should not be overlooked; in fact, if time permits, the development of a "user-interest" file will prove rewarding. There are always employees who are grateful for help with personal problems such as how to get rid of termites or to take the ink spots out of the rug, if time permits the librarian to give such aid. Even occasional help with a popular contest will gain a staunch supporter for the library; the mail boy may be a potential division manager. Particularly rewarding is the time given to acquainting secretarial employees with library resources for it is they who often remember where to go for the answer when "the boss" forgets.

Other Media

Since not all of the librarian's public relations activities can be described in detail, a checklist of media and techniques available for use is appended to this chapter. They are applicable to plant-wide service if management encourages service to all
components of its organization. Furthermore, many are adaptable to other types of libraries whether applied to a hospital, technical society, or departmentalized subject library since the principles are basically the same for all. It will be judicious for the librarian to select only those media and techniques most likely to produce results and thereby gain the support of management. If impediments exist, a resourceful librarian usually meets the challenge to circumvent or to overcome them. He never forgets that good service to the clientele is his best messenger of good will, and his best means of interpreting service is the time given to introducing the new employee to the library and learning the latter's needs.

RESPONSIBILITY TO MANAGEMENT'S PUBLIC

Because direct contact is so often lacking, the third area of the librarian's individual responsibility for good public relations is perhaps the most difficult for him to recognize. In an article reviewing various statements of prominent business leaders as to how and why they are striving to reach their publics, Buchanan (29) quoted an insurance executive:

Every employee is a public relations emissary. If you multiply the number of employees by individuals in their circle of family and friends, that will represent a substantial section of the public, even with a moderate-sized firm. All of these people are getting their ideas about the company and what it stands for through what the employees are saying about it.

As pointed out earlier in this chapter, the library staff has an unusual opportunity in helping to build and to keep the good will of the firm's publics.

What groups compose management's complex public? Still assuming that we are concerned primarily with an industrial library, the public of its over-all management will usually fall into major divisions such as (a) employees who desire steady employment, good working conditions, friendly human relations, and high wages; (b) stockholders who wish their assets protected and a fair return on investment; (c) suppliers, dealers, distributors, competitors, and others with whom there are business relations; (d) consumers of the manufactured product who expect the best and most for their money; (e) government, because of
its multiplicity of regulations affecting business operations; and (f) the community of which the organization is a part — sometimes referred to as the "grass roots" public. Many of these publics overlap because they are made up of people who represent more than one group.

In many industrial companies the house organ serves a dual purpose and therefore receives both external and internal distribution. In others, separate publications are directed to potential users of products manufactured; they serve an educational purpose and likewise are messengers of good will. By giving thoughtful study to the purpose of the publications, an alert library staff has much to offer the editors. Suggestions may include creative ideas for cover designs, a series of illustrated biographical articles, or bibliographies on products developed by the organization. The experiences of individual librarians in creating good will for and understanding of their organizations would make interesting reading for those considering these media.

Another type of contribution to management's public was the result of a request to develop the story of library service in a pharmaceutical organization as an educational aid for sales representatives in Latin America. Whatever physical form was used, it had to be small enough to carry in a brief case because of weight limitations of plane travel. A series of 20 colored slides was made showing library staff members providing information by means of reference work, bibliographies, interlibrary loans, microfilm, maps, special files, weekly abstracts, as well as by routine circulation of journals. An appropriate script accompanied the slides which required a viewing time of 15 minutes. With this audiovisual presentation, company representatives were better prepared to explain to members of the health professions whom they contacted how their questions could be handled on a referral basis. It also demonstrated the library phase of the careful search preceding the development of company products.

It is in this same area, responsibility to management's publics, that the librarian's sense of public relations sometimes undergoes a severe test. Some students, in their eagerness to acquire information for term papers, try to think of quick and easy ways. They may address an inquiry to the sales department of an organization. More often than not, the letter is referred to the library. Averse to doing the actual work, the librarian has difficulty in deciding on the minimum amount of information to assemble for the student, a potential customer. The final decision,
usually shared with an official of the sales department, might be to send a review article or a bibliography which may lead the student further in his quest for information.

From company archives come ideas and information for speeches, institutional advertising, anniversary celebrations, and material for the company history which, sooner or later, everyone wants. Early production, payroll, and utility records make intriguing statistics when compared with the present. Old pictures showing interior and exterior views of the plant furnish excellent subjects for articles in company publications; pictures of people and products of a century ago are likely to create even more interest. Price lists and advertisements are often useful to the legal department. The value of archival material in planning exhibits has been mentioned elsewhere. In brief, its preservation is actually the preservation of the corporate memory. Because the public relations value of company archives to all areas of an organization has not been sufficiently stressed by librarians in their professional literature, the author of this chapter (30) reviewed 22 articles which appeared in print on company archives prior to 1959.

The technical librarian in industry, in fact the librarian working within any organization, is a captive professional rather than an independent operator such as are many engaged in professional occupations. Fortunately for the librarian, he is usually connected with an organization that recognizes the worth of good public relations; therefore he does not need to waste time contending with misunderstood concepts of its value. More often than not he has ready-made support for his efforts. His problem, however, is to comprehend the breadth and significance of management’s public and to mesh his own program with the over-all program. Within the range of his own duties he must keep in mind that each telephone conversation, each letter written, each purchase negotiated, each questionnaire answered represents his organization in the eyes of the public. As a matter of fact the library staff member is the organization in each of his contacts.

PROFESSIONAL RELATIONSHIPS FORM ANOTHER PUBLIC

A fourth area of responsibility for good public relations is that which lies between the library staff and the professional sources outside the library upon which it relies for aid. For example, information is often needed to supplement the resources
of the special library. An experienced librarian realizes that there is scarcely a problem in any field of human endeavor for which there is not at least a partial answer recorded somewhere. Always optimistic, he will try to produce needed facts from whatever source is available; if the source is neither the printed nor written page, a search may lead him to subject specialists in specific fields who have not yet put their ideas on paper. However, in the process of seeking personal help outside his own organization, a librarian depends primarily upon members of his own and related professions.

Information can often be obtained locally by telephone, by trips to other libraries, or by borrowing needed items by special messenger service. The librarian knows that his efficiency and enthusiasm are increased when he is fully informed of the significance of the item sought as well as the end use to be made of it — another step in successful public relations. So, too, he must recognize that those from whom he, in turn, seeks help will work more intelligently if they know why their aid is sought. Certainly confidential information must be kept as such, but there are usually reasonable limits within which a librarian can work and still impart to others that desire for cooperation with which he himself is imbued. Furthermore, the ethics of professional librarianship encompass the treatment of requests for information as a trust.

The following incident illustrates skillful professional relations. A special librarian was called upon periodically for illustrations to be used in a publication distributed to scientists. Exhausting his own resources, he occasionally asked for help from the reference and art departments of the local public library. At first, these department staffs saw no connection between the special librarian’s area of interest and the item requested; in fact, once or twice they questioned the need. Upon one occasion, to their surprise, they received marked copies of the completed publications in which appeared the illustrations based upon those originally loaned from their files. This tangible evidence of their help led to enthusiastic cooperation when future requests came from this same librarian whose organization represented one of the city’s largest taxpayers.

Special libraries, and especially those with limited resources, depend upon interlibrary loans to supplement their service. When items are obtainable within the immediate vicinity, responsibility falls upon the librarian to encourage his staff to become familiar with resources of other libraries and to know
the personnel administering them. Even if he is in the position of borrower more often than that of lender, he may have much with which he can reciprocate. Lists of new books and periodicals, with borrowing privileges, are the minimum means to accomplish this end. He can also offer, if his organization's policies permit, to help with a specialized reference question. In fact, management's community relationships emphasize the librarian's professional obligation to maintain good public relations.

When needed items must be obtained from without the local area, professional relationships are just as important to cultivate and to preserve. The obligation of clearly stating requests, giving complete bibliographical references, and observing the rules of interlibrary loan is unquestioned. Perhaps the operation will be expedited if and when facsimile transmission or closed-circuit TV become available on a nation-wide basis. Here again the borrowing librarian can always be on the alert to cooperate in contributing to union lists of holdings as well as to devise other means of reciprocal relations with librarians of collections containing items which supplement his own library's holdings.

Further channels of communication are open to the librarian who encourages his staff to become members of professional library associations; to attend their meetings; to share in joint projects likely to be of lasting usefulness; to contribute articles to periodicals which enrich professional literature; and in other ways to enhance the exchange of useful methods and techniques of disseminating information. Participation in National Library Week pinpoints another opportunity; not only will it foster cooperation at the local level but it also will contribute toward the aims and goals of all librarians. Aware of the necessity for maintaining good relationships in every aspect of business, management will support these professional contacts of the library staff but the staff must assume the initiative.

CONCLUSION

In this chapter the responsibility of the technical librarian and his staff to their principal publics has been discussed. His channels of communication with each of them have been pointed out. They involve human relations, business relations, professional relations, and even community relations, all of which are facets of public relations — good, bad, or indifferent. Equipped with knowledge of the expenditure of time and effort needed in
developing good relationships, the librarian will have the incentive to analyze the background necessary to develop a program geared to his own situation and needs. The suggested methods included both in the text and the checklist can be selected in the order of their relative significance.

The parent administrative authority expects services of a highly specialized nature from the librarian it employs. To be effective, the interpretative process of the services cannot be sporadic such as issuing only an occasional list of new books or preparing a report once in a decade. The program must be planned carefully, possess continuity, and reach the specific group for which it is intended. Lacking such direction, a haphazard program is likely to develop with obvious areas of responsibility overlooked. Added to tangible efforts made as a result of planning are the subconscious acts that reflect a helpful attitude on the part of the library staff; good service is always contagious. Since "public relations begins at home" and each contact made presents its own opportunity for building good will, it clearly becomes the duty of each library staff to interpret its services adequately to its multiple publics.

**Checklist of Media and Techniques for Public Relations Activities in Special Libraries**

I. Numerous media exist, in addition to the usual communications in person, by telephone, and in memoranda, which can be used effectively such as:

- Weekly library bulletins
- Feature articles in house organs
- Use of plant-wide bulletin boards
- Moving pictures of library operations
- Tours of library for all new employees
- Bookmarks to announce new materials
- Effective brochure introducing the library
- Library corner or column in company newspaper
- Attractive formats for bibliographical compilations
- Pictorial posters showing information center in action

---

*Reprinted with permission from an article by the author of this chapter, "Public Relations Activities in Special Libraries" which appeared in the October 1958 issue of Library Trends, a publication of the University of Illinois Library School. The entire issue was devoted to public relations.*
"Reading as a Hobby" exhibit at annual hobby shows
Information section in handbook for new company employees
Explanation of library service in organization procedure manual

II. Some techniques are:

a. With clientele who depend on the library
   Attention to specific interests
   Bibliographies on any subject
   Assistance with editorial problems
   Display of company news releases
   Cheerful consideration of criticisms
   Careful consideration of recommendations
   "Extra touch" such as a comfortable chair
   Aid in acquisition of personal library items
   Suggestions for binding of personal periodicals
   Presentation of library service at a research seminar
   Duplicating and/or copying machines available in library
   Suggest classification schemes for personal information files
   Reproduction of tables of contents of important current journals

b. With management
   Material for talks
   Daily intelligence digest
   Indexing company publications
   Annual reports summarized to one page
   Provision for employee's recreational reading
   Participation in company's educational program
   Preservation and organization of company archives
   Advice in classification of personal book collections
   Cooperation in the plant-wide public relations program
   Good working relationships with library committee members

c. With the library staff
   In-service training
   Staff manual kept up-to-date
   Cooperation with management
   Handle exhibits as staff projects
Communicate effectively and clearly
Invite ideas for library bulletin boards
Staff participation in employee activities
Staff meetings in which members participate
Encourage additional educational preparation
Bulletin board for exclusive use of library staff
Suggest contributions for professional periodicals
Man the station library maintained by local public library

III. Media and techniques useful outside the organization are:

a. With professional colleagues
   Exchange of duplicate material
   Attendance at professional meetings
   Adherence to rules of other libraries
   Visits to library facilities in the area
   Cooperation with professional projects
   Participation in National Library Week
   Report help gained through interlibrary loan
   Arrange for professional meeting in company library
   Consultation regarding library development in the area

b. With potential library employees
   Library summer work-study program
   Vocational talks to high school groups
   Acquaint library schools in the area with library
   Illustration of library in company’s recruiting folder
   Annual open house for students interested in library work
   Keep colleges informed of successful careers of their graduates

In using this checklist it should be kept in mind (1) there are several overlapping items in the above categories; (2) not every library will find it practicable or even desirable to consider all of them; and (3) many of the suggestions may already be incorporated not only in programs of special libraries but in those of other types as well — school, college, and public.
BIBLIOGRAPHY

6. Ibid. (Contains abstract of Irene M. Strieby's paper, "Organizational status of information groups"); preprint of complete paper contains diagrams of 10 organization charts).
15. The technical information library; its services and how to use them. Murray Hill, N.J., Bell Telephone Laboratories (1957).
18. Ferguson, E. The what... why... how... of annual reports. Spec. Lib. 47, 203-206 (1956).


SUPPLEMENTARY REFERENCES


Channels of communication for special libraries; papers presented at the Institute sponsored by the Indiana Chapter, Special Libraries Association and the Indiana University Division of Library Science, Indiana University, Bloomington. Apr. 22-23, 1960.


Medical Library Association Handbook of medical library practice... 2d ed. rev. and enl. Chicago, American Library Association (1956). (Chapter 10, Public relations, p. 239-263.)


Appendix

BASIC REFERENCE PUBLICATIONS

The following list of reference tools is intended to cover the fundamental essentials in establishing a beginning library irrespective of the type of library or the subject field involved. For ease of consultation the books are grouped under general headings; i.e., Encyclopedias, Dictionaries, etc. The fundamental plan is to list several works in each class to provide possible choice. Two leading sets of encyclopedias have been included; a large library would probably find it useful to buy both sets, but a smaller organization no doubt would find one set sufficient.

In this section an effort has been made to list the latest edition available in each entry; all books, insofar as ascertainable, were in print as of May 1, 1962. The material in this section is arranged under the following headings:

1. General
   A. Encyclopedias
   B. Dictionaries
   C. Almanacs
   D. Travel information
   E. Miscellaneous

2. Manuscript aids
   A. Style manuals
   B. Technical and report writing; editing

3. Biographical data

4. Directories
   A. Trade directories and associations
   B. Foundations

Page

307

308

309

310
<table>
<thead>
<tr>
<th>5. Technical dictionaries and encyclopedias</th>
<th>312</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. General</td>
<td></td>
</tr>
<tr>
<td>B. Chemistry</td>
<td></td>
</tr>
<tr>
<td>C. Chemical technology</td>
<td></td>
</tr>
<tr>
<td>D. Mathematics</td>
<td></td>
</tr>
<tr>
<td>E. Physics</td>
<td></td>
</tr>
<tr>
<td>F. Miscellaneous</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6. Handbooks</th>
<th>313</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. General</td>
<td></td>
</tr>
<tr>
<td>B. Chemistry</td>
<td></td>
</tr>
<tr>
<td>C. Physics</td>
<td></td>
</tr>
<tr>
<td>D. Engineering</td>
<td></td>
</tr>
<tr>
<td>a. General</td>
<td></td>
</tr>
<tr>
<td>b. Chemical</td>
<td></td>
</tr>
<tr>
<td>c. Electrical</td>
<td></td>
</tr>
<tr>
<td>d. Mechanical</td>
<td></td>
</tr>
<tr>
<td>e. Miscellaneous</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7. Foreign language dictionaries</th>
<th>315</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Bibliographies</td>
<td></td>
</tr>
<tr>
<td>B. Bilingual</td>
<td></td>
</tr>
<tr>
<td>a. French</td>
<td></td>
</tr>
<tr>
<td>b. German</td>
<td></td>
</tr>
<tr>
<td>c. Italian</td>
<td></td>
</tr>
<tr>
<td>d. Portuguese</td>
<td></td>
</tr>
<tr>
<td>e. Russian</td>
<td></td>
</tr>
<tr>
<td>f. Spanish</td>
<td></td>
</tr>
<tr>
<td>C. Multilingual</td>
<td></td>
</tr>
</tbody>
</table>

| 8. Standards and specifications           | 318 |

<table>
<thead>
<tr>
<th>9. Market data and statistics</th>
<th>319</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Market data</td>
<td></td>
</tr>
<tr>
<td>B. Statistics</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10. Trade names information</th>
<th>319</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. General</td>
<td></td>
</tr>
<tr>
<td>B. Chemistry</td>
<td></td>
</tr>
<tr>
<td>C. Drugs and cosmetics</td>
<td></td>
</tr>
<tr>
<td>D. Process industries</td>
<td></td>
</tr>
</tbody>
</table>
11. Abstracting and indexing publications  
   A. Abstracting services  
   B. Indexing services  
   C. Bibliographies  

12. Bibliographic aids  
   A. Books  
   B. Periodicals  
   C. Miscellaneous  

1. General  

A. ENCYCLOPEDIAS  


B. DICTIONARIES  

C. ALMANACS


D. TRAVEL INFORMATION


E. MISCELLANEOUS

Holy Bible. (Any suitable edition printed on good paper in readable print and bound in hard covers.)

2. Manuscript Aids

Style manuals are designed to help prospective authors in the preparation of manuscripts for publication. Style in its broadest sense may be interpreted to mean forms of expression in writing and the general technical requirements of journals. This latter usually covers details for typing manuscripts, acceptable abbreviations, citation of references, etc. Scientific and technical journals generally include one or more pages of instructions variously known as Notice to Contributors or In-
structions to Authors which should be consulted before present-
ing a paper for publication.

Publishers occasionally prepare booklets describing their
rules for publication and these are often free. One example of
this type of free material is "Rules for the Preparation of Man-
scripts and Bibliographies with a List of Abbreviations and Titles

Following is a selected list of manuscript aids.

A. STYLE MANUALS

Chicago University Press. A manual of style; containing typographical
and other rules for authors, printers, and publishers recommended
by the University of Chicago Press, together with specimens of types.
Chicago, University of Chicago Press (1949).

Conference of biological editors. Committee on form and style. Style
manual for biological journals. Washington, D.C., American Instit-
ture of Biological Sciences (1960).

Fieser, L. F. and Fieser, Mary. Style guide for chemists. New York,
Reinhold (1960).

Strunk, William, and White, E. B. The elements of style. New York,
Macmillan (1959).


B. TECHNICAL AND REPORT WRITING; EDITING

Hicks, T.G. Writing for engineering and science. New York, McGraw-

Jordan, E. P., and Shepard, W.C. Rx for medical writing; a useful
guide to principles and practice of effective scientific writing and

Rhodes, F.H. Technical report writing. 2d ed. New York, McGraw-

Trelease, S.F. How to write scientific and technical papers. 3d ed.
Baltimore, Williams & Wilkins (1958).


3. Biographical Data

American men of science; a biographical directory.... 10th ed. The
physical and biological sciences. Tempe, Arizona. The Jaques Cat-

Chemical Who's who, 1956; biography in dictionary form of the leaders in chemical industry, research and education. New York, Lewis Historical Publications (1956).
Poor's register of directors and executives. New York, Standard and Poor's Corporation (Annual).

4. Directories

A. Trade Directories and Associations
Canadian trade index. Montreal, Canadian Manufacturers Association (Annual).
Trade directories of the world; a loose-leaf handbook containing the latest information on all business and trade directories in the United States and foreign countries.... Queens Village, N.Y., Croner publications. Kept up-to-date by an amendment service.
APPENDIX

11


B. FOUNDATIONS


C. INDUSTRIAL RESEARCH LABORATORIES


D. SCIENTIFIC ORGANIZATIONS


E. UNIVERSITIES AND COLLEGES


For a list of Directories see: Directories in Public affairs information service.
5. Technical Dictionaries and Encyclopedias

A. GENERAL


B. CHEMISTRY


C. CHEMICAL TECHNOLOGY


D. MATHEMATICS


E. PHYSICS


F. MISCELLANEOUS


6. Handbooks

A. GENERAL

B. CHEMISTRY


C. PHYSICS


D. ENGINEERING

a. General


b. Chemical


c. Electrical


APPENDIX


d. Mechanical


e. Miscellaneous

Hicks, T.G. Plant engineers' easy problem solver.... New York, Conover-Mast Publications (1954).

7. Foreign Language Dictionaries

A. BIBLIOGRAPHIES

Collison, R.L. Dictionaries of foreign languages; a bibliographical guide to the general and technical dictionaries of the chief foreign languages, with historical and explanatory notes and references. New York, Hafner (1955).


Stechert-Hafner, Inc. The world's languages; grammars, dictionaries: general, specialized, scientific, technical. 12th ed. New York (1962). "This catalogue includes the most important and most useful works in print in each language." (Preface). Free.


B. BILINGUAL

a. French


b. German


Webel, A. German-English dictionary of technical, scientific and general terms. New York, Dutton (1953).

c. Italian


d. Portuguese


Michaelis, Henriette. Pocket dictionary of the Portuguese and English languages; incl. technical expressions of commerce and industry, of


e. Russian


f. Spanish


C. MULTILINGUAL


Elsevier’s dictionary of nuclear science and technology, in six languages .... comp. and arr. on an English alphabetical base by W.E. Clason. New York, Elsevier (1958). (Elsevier has announced a series of multi-lingual dictionaries in the fields of science and technology. These include electronics, industrial agriculture, meteorology, pharmacy, telecommunications, textiles, wood and others.)


8. Standards and Specifications

American Society for Testing Materials. ASTM standards, 7 vols. Philadelphia. (Issued triennially with suppl. in intervening years. ...Index to standards including list of titles in numeric sequence of all ASTM serial designations. Beginning 1964, published annually in 32 vols.)

Ibid. Fifty year index to ASTM technical papers and reports, 1898-1950. Philadelphia (1952). (Includes subject index.)


APPENDIX


9. Market Data and Statistics

A. MARKET DATA


B. STATISTICS


10. Trade Names Information

A. GENERAL

B. CHEMISTRY

Chemical week. Buyers guide issue (Annual).
Haynes, Williams. Chemical trade names and commercial synonyms; a
Nostrand (1955).
Oil, paint and drug reporter. Green book buyer's directory. New York,
Schnell (Annual).

C. DRUGS AND COSMETICS

Accepted dental remedies... drugs used in dental practice including a list
of brands accepted by the Council on dental therapeutics of the Ameri-
can Dental Association. Chicago, American Dental Association (Annual).
American drug index, Philadelphia, Lippincott (Annual).
Drug and cosmetic catalog. New York, Drug and Cosmetic Industry (An-
nual). (Includes trade name index.)
Modern drug encyclopedia and therapeutic index, 8th ed. New York, R.H.
PharmIndex; professional product information for pharmacists. Portland,
Ore., PharmIndex (Semimonthly). (Loose-leaf.)
Unlisted drugs. New York, Special Libraries Association (1948- )
(Monthly).

D. PROCESS INDUSTRIES

C E C: Chemical engineering catalog; the process industries catalog.
New York, Reinhold (Annual). (Includes trade names index.)
Electrical products guide; company and trade names. in Electrical con-
struction & maintenance. (Annual issue).
Electronic industries directory; brand and trade name index in Electronic
industries; annual issue.
Zimmerman, O.T., and Lavine, Irvin. Industrial Research Service's
Handbook of material trade names. 1953 ed. Dover, N.H., Industrial

11. Abstracting and Indexing Publications

A. Abstracting Services. Comprehensive abstracting and indexing tools
are listed here. Special subject abstracting journals are listed under
each subject.

Biological abstracts, v. 1- 1927-. Philadelphia, Biological Abstracts
(1927- ).
Section A: Pure chemistry. Section B: Applied chemistry. Section C:
Analysis and apparatus. Continued in 1954 as follows: Section A: Pure


Chemical abstracts, v. 1- (1907- ). Easton, Pa., American Chemical Society (1907- ).


Excerpta medica; Sections 1-20 1947- . Amsterdam, Excerpta medica (1947- ). World wide coverage of medical journals published in 20 sections. All sections did not begin publication in the same year.

Index of technical articles; a monthly index of articles published in British technical periodicals (Feb. 1957- ). London, Iota Services, Ltd


B. INDEXING SERVICES


Engineering index monthly bulletin. New York, Engineering Index, Inc., (1962- ). (A monthly author and subject index of the current technological literature of the world which will supplement the present Engineering Index annual volume and the current weekly card service. Entries will include author and title of the article, publication page reference followed by a brief summary or abstract of the article. Publication announced for Oct. 1962. (Information taken from publisher's announcement.)


Science citation index, 1963- , Philadelphia, Institute for Scientific Information (...association of ideas index...).

C. BIBLIOGRAPHIES

Ulrich's periodicals directory. 10th ed. New York, Bowker (1952). (List of abstracts and abstracting services may be found under classified list of periodicals). (New edition in process 1963.)

12. Bibliographic Aids

A. BOOKS


British scientific and technical books; a select list of recommended books published in Great Britain and the Commonwealth in the years 1935 to 1952. London, Aslib; New York, Hafner, (1956).


B. PERIODICALS


C. MISCELLANEOUS


BIBLIOGRAPHIES FOR SOME SPECIFIC SUBJECT FIELDS

The following subject bibliographies were prepared for the most part early in 1959 and therefore cover material through 1958. An effort has been made to bring these up to date by the addition of new material whenever possible and particularly by citing the latest edition of the books listed. In general, books by American publishers listed are in print since they were verified against the Publishers Trade List Annual. However, materials issued by little known publishers or by organizations for which sources were not available for verification have been cited as originally quoted provided they were apparently current in content. 1950 has usually been chosen as the cut-off date in such cases. Source materials, such as encyclopedias, bibliographies, and abstracting and indexing tools, have been listed whether or not in print.

Complete bibliographic information regarding abstracting and indexing materials is given in Section 11 of Basic Reference Publications. Full information is included in each section for items not listed in this Section.

A selected list of periodicals has been chosen for each subject. The beginning date of publication is noted following each title. For further information regarding them, i.e., publisher, price, frequency, etc., one should consult either Ayer or Ulrich cited in Section 12C of Basic Reference Publications.

Each bibliography has been arranged under three headings, i.e., Abstracts and Indexes, Special Reference Works, and Periodicals. Since each one was originally prepared by a different person, there is some variation in formats. Additional subjects have been added where important, textbooks of significant value have been included as part of the section entitled Special Reference Works; reports have been used where the subject field is closely related to government research, etc.

The Bibliographies are separated into two main groups: Theoretical Science and Applied Science.
A. THEORETICAL SCIENCE

1. Chemistry 324
2. Physics 329
3. Biological sciences 330
4. Earth sciences and Geography 335

B. APPLIED SCIENCE 337

1. Aeronautics and astronautics 338
2. Air conditioning and refrigeration 342
3. Automotive engineering 344
4. Ceramic technology 347
5. Chemical technology 348
6. Cosmetics 350
7. Explosives 351
8. Forestry 352
9. Glass 354
10. Medicine 356
11. Metallurgy 359
12. Nuclear science and technology 362
13. Nutrition and food technology 366
14. Oils, fats, soaps, waxes 370
15. Pharmacy 371
16. Plastics 376
17. Pulp, paper, and board 378
18. Rubber and synthetic elastomers 380
19. Textiles 381
20. Veterinary science and medicine 383
21. Petroleum and natural gas 384

A. THEORETICAL SCIENCE

1. Chemistry

Prepared by Barbara M. Davis
Research Librarian
Godfrey L. Cabot, Inc.
Cambridge, Massachusetts

A. BIBLIOGRAPHIES


B. GUIDES TO THE LITERATURE


C. CHEMICAL NOMENCLATURE


N.B. A list of pamphlets on Nomenclature available from the American Chemical Society is published inside the front cover of Chemical Abstracts.

D. ABSTRACTS AND INDEXES

Analytical abstracts (1954- ).
British abstracts (1926-1953). Pts. AI-AII.
Chemical abstracts (1907- ).
Chemical titles (1960- ).
Chemisches Zentralblatt (1830- ).
Current chemical papers (1954- ).
Index chemicus. Institute for scientific information. Philadelphia (1960- ). (A monthly register and index of new chemical compounds. Reports and indexes new chemical compounds within thirty days after their appearance in the primary journals. Pref.).

E. SPECIAL REFERENCE WORKS

(1) Organic Chemistry


Elsevier's Encyclopedia of organic chemistry. E. Josephy and F. Radt, eds. New York, Amsterdam, Elsevier (1940- ). Originally announced to be complete in 4 parts and 20 volumes. Published in 1962: Ser. 3, vols. 12-14 in 19 parts. Elsevier has announced that this basic series will be merged with Beilstein's Handbuch der organischen Chemie. The steroid section will be completed as planned because of the advanced state of the monograph.


(2) Inorganic Chemistry


APPENDIX


F. REVIEW SERIALS

Advances in analytical chemistry and instrumentation. v. 1-. New York, Interscience (1960- ).
G. PERIODICALS

The analyst (1876-  ).
Analytica chimica acta (1947-  ).
Annalen der Chemie, Justus Liebigs (1832-  ).
Annual reports on the progress of chemistry (1904-  ).
Bulletin de la société chimique de France (1858-  ).
Bulletin des Sociétés chimiques Belges (1887-  ).
Chemical reviews (1924-  ).
Collection of Czechoslovak chemical communications (1929-  ).
Comptes-rendus...Académie des Sciences (1835-  ).
Helvetic a chimica acta (1918-  ).
Inorganic chemistry (1962-  ).
Journal of chemical physics (1933-  ).
Journal of research of the National bureau of standards (1928-  ).
Journal of the American chemical society (1879-  ).
Journal of the chemical society (1841-  ).
Nature (1869-  ).
Quarterly reviews (1947-  ).
Science (1880-  ).
Tetrahedron (1957-  ).
Theoretica chimica acta (1962-  ).
Transactions of the Faraday society (1905-  ).
Zeitschrift für analytische Chemie (1862- ).
Zeitschrift für anorganische Chemie (1892- ).

2. Physics

A. ABSTRACTS AND INDEXES

Applied science and technology index (1958- ).
Chemical abstracts (1907- ).
Engineering index (1884- ).
Science abstracts: Sect. A; Physics abstracts (1898- ).

B. SPECIAL REFERENCE WORKS

Morse, P.M., and Feshbach, H. Methods of theoretical physics. 2 vols.

C. PERIODICALS

Annalen der Physik (1799- ).
Annales de Physique (1789- ).
British journal of applied physics (1950- ).
Canadian journal of physics (1929- ).
Contemporary physics (1960- ).
Czechoslovak journal of physics, Sect. B (1950-).
Infrared physics (1962-).
Journal de physique et le radium (1872-).
Journal of applied physics (1930-).
Journal of chemical physics (1933-).
Journal of the Acoustical Society of America (1929-).
Journal of the mechanics and physics of solids (1952-).
Journal of the Optical Society of America (1917-).
Philosophical magazine (1798-).
Philosophical transactions. London, Royal Society (1655-).
Physical review (1893-).
Physical review letters (1958-).
Physics letters (1962-).
Physics today (1948-).
Physik der kondensierten Materie, Physique de la Matière Condensée,
Physics of condensed matter (1963-).
Reviews of modern physics (1929-).
Zhurnal eksperimental’noi i teoreticheskoi fiziki (1931-).

(1) Selected list of Russian journals available in English translation

Bulletin: Physical series (1958-).
Optics and Spectroscopy (1959-).

Soviet physics: Acoustics (1955-).
Crystallography (1957-).
Doklady (1956-).
JETP (1956-).
Solid state (1959-).
Technical physics (1956-).
Uspekhi (1959-).

3. Biological Sciences

The following fields in the Biological Sciences have been included here:
Cytology, Ecology, Enzymology, Genetics and Heredity, Microbiology, and Physiology.

A. ABSTRACTS AND INDEXES

Agricultural index (1916-).
Abt. B: Berichte über die gesamte Physiologie und experimentelle Pharmakologie (1920-).

Biological abstracts (1927-).
British abstracts (1926-1953).
Chemical abstracts (1907-).
Index medicus (1960-).
Current list of medical literature (1941-1959).
Quarterly cumulative index medicus (1927-1960).

Nutrition abstracts and reviews. Aberdeen, Commonwealth Bureau of Animal Nutrition, 1931-.


B. SPECIAL REFERENCE WORKS


C. REVIEW SERIALS


D. PERIODICALS

A.I.B.S. bulletin (1951- ).
Biological bulletin (1898- ).
Development biology (1959- ).
Human biology (1929- ).
Quarterly review of biology (1926- ).
Stain technology (1925- ).

(1) Russian Journals in English Translation


E. SPECIAL SUBJECT MATERIAL

(1) Cytology

(a) Books


(b) Periodicals

Chromosoma (1939- ).
Experimental cell research (1950- ).
International review of cytology (1952- ).

(2) Ecology

(a) Books

Oosting, H.J. Study of plant communities; an introduction to plant ecology.

(b) Periodicals

Ecology (1897- ).
Journal of ecology (1913- ).

(3) Enzymology

(a) Books


(b) Periodicals

- Enzymologia (1936- ).
- Ergebnisse der Enzymforschung (1932- ).

(4) Genetics and Heredity

(a) Books


(b) Periodicals

American journal of human genetics (1949- ).
Genetics (1916- ).
Heredity (1947- ).
Journal of heredity (1910- ).

(5) Microbiology

(a) Books


(b) Periodicals

Applied microbiology (1953- ).
Acta microbiologica (1953- ).
Canadian journal of microbiology (1954- ).

6. Physiology

(a) Books

Volumes not issued in sequence.

(b) Periodicals

Acta physiologica Scandinaevica (1940- ).
American journal of physiology (1898- ).
Comparative biochemistry and physiology (1959- ).
Ergebnisse der Physiologie, biologischen Chemie und experimentellen Pharmakologie (1902- ).
Journal of applied physiology (1948- ).
Journal of general physiology (1918- ).
Physiological reviews (1921- ).

4. Earth Sciences

Geology, Mineralogy, Geochemistry, Geophysics, and Meteorology

A. ABSTRACTS AND INDEXES

Geologisches Zentralblatt, A. Geologie; B. Paleontologie (1901- ).
Chemical abstracts. Section 18; Mineralogical and geological chemistry (1907- ).
Mineralogical abstracts (1920- ).
Bibliography and index of geology exclusive of North America (1933- ).
Annotated bibliography of economic geology (1928- ).
Engineering index (1884- ).
Applied science and technology index (1913- ).

B. SPECIAL REFERENCE WORKS

WilmARTH, M. G. Lexicon of geological names of the United States.

C. PERIODICALS

Advances in geophysics (1952- ).
American geologist (1888- ).
American journal of science (1818- ).
American Geophysical Union, Transactions (1920- ).
American Meteorological Society, Bulletin (1919- ).
Annalen der Meteorologie (1948- ).
Annales de geophysique (1944- ).
Annali di geofisica (1948- ).
Archiv fur Meteorologie, Geophysik und Bioklimatologie (1948- ).
Bioklimatische Beiblätter (1934- ).
Canadian geophysical bulletin (1950- ).
Economic geology
Fortschritte der Mineralogie, Kristallographie und Petrographie (1911- ).
Geological magazine (1893- ).
Geological Society of London, Quarterly journal (1945- ); Proceedings (1826- ); Transactions (1811- ).
Geophysics (1936- ).
Gerland’s Beitrage zur Geophysik (1901- ).
Journal of geology (1892- ).
Journal of geomorphology (1938- ).
Journal of paleontology (1927- ).
Meteorologe (1853- ).
Meteorologische Zeitschrift (1884- ).
Pan American geologist (1922-1963).
Reviews of geophysics (1963- ).
Seismological Society of America, Bulletin (1934- ).
Societe Francaise de Mineralogie, Bulletin (1878- ).
Sands, clays, and minerals (1934- ).
Zeitschrift fur meteorologie (1946- ).
Zentralblatt fur Geophysik, Meteorologie und Geodasie (1937-1944).

Geography

A. ABSTRACTS AND INDEXES

Bibliographie geographie internationale (1900- ).
Current geographical publications (1938- ).

B. SPECIAL REFERENCE WORKS

(1) Atlases (some representative examples)

Times atlas of the world. 5 vols. Bartholomew, J., ed. New York, Hough-
ton, v. 1 (1959); v. 2 (1960); v. 3 (1955); v. 4 (1956); v. 5 (1957).

(2) Treatises

1936).
Traité de géographie physique. 8th ed. 3 vols. Martonne, E.de, ed. Paris

C. PERIODICALS

Annales de géographie (1891- ).
Geographical journal (1893- ).
Geography (1915- ).
Geographical review (1916- ).
Journal of geography (1883- ).
Professional geographer
The Scottish geographical magazine (1885- ).
B. APPLIED SCIENCE

1. Aeronautics and Astronautics

Prepared by Eugene B. Jackson, Librarian
Research Laboratories
General Motors Corporation
Warren, Michigan

AVAILABILITY

The symbol * followed by ASTIA, ESL, IAS, LHL, and NASA, respectively, indicates that material included in that entry may be borrowed on loan and/or photocopies purchased at:

ASTIA. Armed Services Technical Information Agency. Arlington Hall Station, Arlington 12, Virginia, which became, in 1963, the following: DDC. Defense Documentation Center for Scientific and Technical Information.

ESL. Engineering Societies Library. East 41st Street, New York 18, N.Y. IAS. Institute of the Aeronautical Sciences. 2 East 64th Street, New York 21, N.Y.

LHL. Linda Hall Library. 5109 Cherry Street, Kansas City, Mo. NASA. U.S. National Aeronautics and Space Administration. 1520 H Street, N.W., Washington 25, D.C.

A. BIBLIOGRAPHIES


B. ABSTRACTS AND INDEXES


Engineering index (1884- ). *ESL.


C. SPECIAL REFERENCE WORKS


Bevan, William. Fatigue, stress, bodily change and behavior; selected bibliography. Wright-Patterson AFB, Ohio, Wright Air Development Center, Air Research and Development Command (1957). (WADC technical report 57-125).


Royal Aeronautical Society. A series of textbooks published under the authority of the Society: Conway, H. C. Aircraft hydraulics. New

D. PERIODICALS AND RESEARCH REPORTS SERIES

Aero/Space engineering (1942- ). (Formerly Aeronautical engineering review).
Aeronautical quarterly (1949- ).
Aeroplane (1911- ).
Aircraft engineering (1929- ).
American aviation (1937- ).
Applied mechanics reviews (1948- ) *LHL.
ARS Journal (1930- ) (Formerly Jet propulsion).
Astronautica acta (1955- ).
Astronautics (1954- ).
Aviation week, including Space technology (1916- ). (Title varies; Formerly, Aviation). Canada. National aeronautical establishment. Laboratory report (1947- ).
Ibid. Note (1948- ).
Canadian aeronautical journal (1955- ).
Docaéro; revue documentaire de la technique aeronautique mondiale (1950- ).
Flight and aircraft engineer (1909- ).
*NASA.


Ibid. Current papers (1950- ) *NASA.

Institute of the Aeronautical Sciences. Preprints (1946- ) *IAS.

Interavia; review of world aviation (1946- ).


Journal of the aero/space sciences (1934- ) (Formerly Journal of the aeronautical sciences).


Ibid. Reports (1955- ) *NASA.


Office national d'études et de recherches aeronautiques. Note technique (1950- ) *NASA.

Ibid. Publications (1948- ) *NASA.

Ibid. Report technique (1948- ) *NASA.

Planetary and space science (1959- ).


SAE journal (1917- ).

U.S. National Advisory Committee for Aeronautics.

Annual report (1917- ).

Report (1915- ) *NASA.

Technical memorandum, no. 1-1441 (1920-1958) *NASA.

Technical note, no. 1-4410 (1920-1958) *NASA.

U.S. National Aeronautics and Space Administration.

Memorandum (1958- ) *NASA.

Reports (1959- ).

Semiannual report (1959- ).

2. Air Conditioning and Refrigeration

Prepared by Eleanor B. Gibson, Librarian
Logan Lewis Library
Carrier Corporation Research Center
Syracuse, New York

A. BIBLIOGRAPHIES

Air conditioning and ventilation. Washington, D.C., U.S. Dept. of Commerce, Business and Defense Services Administration (1954) (IB-87). Controlled atmospheric environment in relation to people, animals and

B. ABSTRACTS AND INDEXES

ASM review of metal literature. Cleveland, Ohio, American Society for Metals (1943- ).
Applied science and technology index (1958- ).
Chemical abstracts (1907- ).
Engineering index (1884- ).
Industrial arts index (1913-1957).
Refrigeration abstracts. New York, American Society of Mechanical Engineers (1946-1957).

C. SPECIAL REFERENCE WORKS


D. PERIODICALS

Air conditioning and refrigeration news (1926- ).
Air conditioning, heating and ventilating (1904- ) (Formerly Heating and ventilating).
American Society of Heating and Air Conditioning Engineers. Transactions (1895- ) (Formerly American Society of Heating and Ventilating Engineers).
Automatic heating (1950- ).
Canadian refrigeration and air conditioning (1935- ).
Electric heat and air conditioning (1935- ).
Facts for industry: Air conditioning and refrigeration equipment (U.S. Dept. of Commerce, Bureau of the Census; Quarterly).
Heating and air conditioning contractor (1910- ) (Formerly Sheet metal worker).
Heating, piping and air conditioning (1929- ) (Contains bibliographies).
Heating, plumbing and air conditioning age (1923- ).
Industrial refrigeration (1891- ) (Formerly Ice and refrigeration).
Institution of heating and ventilating engineers journal (1898- ).
International Congress of Refrigeration, Proceedings (Biennial).
International Institute of Refrigeration, Bulletin (1920- ).
Kaeltetechnik (1949- ).
Modern refrigeration (1898- ).
National Warm Air Heating and Air Conditioning Association technical conference proceedings (1956- ).
Refrigerating engineering (1914- ) (Contains bibliographies).
Refrigeration and air conditioning business (1944- ) (Formerly: Refrigeration industries; Commercial refrigeration and air conditioning).
Refrigeration journal (1947- ) (Australia).
World refrigeration and air conditioning (1950- ).

3. Automotive Engineering

Prepared by Mrs. Rachel MacDonald, Librarian
Engineering Staff Library
Ford Motor Company, Dearborn, Michigan

A. ABSTRACTS AND INDEXES

Applied science and technology index (1958- ).
APPENDIX

Engineering index (1884- ).
Industrial arts index (1913-1957).

B. SPECIAL REFERENCE WORKS


C. PERIODICALS

ATZ (Automobiltechnische Zeitschrift) (1898- ).
Air conditioning and refrigeration news (1926- ).
Auto (1932- ).
Auto, motor und sport (1923- ).
Autocar (1895- ).
Automobile (Paris) (1946- ).
Automobile engineer (1910- ).
Automobile topics (1900- ).
Automotive industries (1899- ).
Automotive news (1925- ).
Automotive service digest (1913 ).
Autosport (1950- ).
Battery man (1921- ).
Bus and coach (1929- ).
Car life (1954- ).
Commercial car journal (1911- ).
Commercial motor (1905- ).
Corrosion (1945- ).
Design news (1946- ).
Deutsche Kraftfahrtforschung (1938- ).
Diesel and gas turbine progress (1935- ).
Engineer (1856- ).
Engineering (1866- ).
Ford dealers news and Ford field (1917- ).
General Motors engineering journal (1954- ).
Highway research abstracts (1931- ).
Industrial design (1954- ).
Ingenieurs-archiv (1929- ).
Institute of fuel, journal (1926- ).
Institute of petroleum, journal (1914- ).
Institution of Mechanical Engineers; Automobile division (1914- ).
Lubrication (1912- ).
Lubrication engineering (1945- ).
MTZ (Motortechnische Zeitschrift) (1939- ).
Machine design (1929- ).
Materials in design engineering (1929- ).
Mechanical engineering (1906- ).
Modern plastics (1925- ).
Moteurs; new series (1957- ).
Motor age (1899- ).
Motor italia (1926- ).
Motor life (1952- ).
Motor-revue (1952- ).
Motor Rundschau (1930- ).
Motor sport (1924- ).
Motor trend (1949- ).
National petroleum news (1909- ).
Noise control (1955- ).
Oil and gas journal (1902- ).
Oil engine and gas turbine (1933- ).
Petroleum engineer (1929- ).
Power wagon (1906- ).
Product engineering (1930- ).
APPENDIX

Revue technique automobile (1945- ).
Road and track (1950- ).
Scientific lubrication (1949- ).
Société des ingénieurs de l’automobile, journal (1927- ).
Society of Automotive Engineers, journal (1917- ).
Society of Automotive Engineers Transactions (1926- ).
Sports car illustrated (1956- ).
Traffic safety (1953- ).
Ward’s automotive reports (1925- ).
Wear (1957- ).

4. Ceramic Technology

Prepared by Anthony T. Kruzas
Department of Library Science
University of Michigan
Ann Arbor, Michigan

A. BIBLIOGRAPHIES

The American Ceramic Society published two bibliographies in 1924 covering magnesite and silica.

B. ABSTRACTS AND INDEXES

American Ceramic Society, journal. Ceramic abstracts section. Columbus, Ohio (1922- ).
Applied science and technology index (1958- ).
Chemical abstracts (1907- ). Section 17: Ceramics.
Industrial arts index (1913-1957).

C. SPECIAL REFERENCE WORKS


D. PERIODICALS

Berichte der deutschen Keramischen Gesellschaft (1920- ).
Brick & clay record (1892- ).
British clayworker (1892- ).
Bulletin of the American ceramic society (1922- ).
Ceramic age (1921- ).
Ceramic industry (1923- ).
Cermatics (1949- ).
Journal of the American Ceramic Society (1918- ).
Keramische Zeitschrift (1949- ).
Sprechsaal für Keramik-Glass-Email (1867- ).
Transactions of the American Ceramic Society (1899-1917).
Transactions of the British Ceramic Society (1901- ).
Glass and ceramics (1956- ) (Translations of Steklo i Keramika).

5. Chemical Technology

Prepared by Barbara M. Davis
Research Librarian, Godfrey L. Cabot, Inc.
Cambridge, Massachusetts

A. BIBLIOGRAPHIES

See material listed under Chemistry under "A. Theoretical Science."
APPENDIX

B. ABSTRACTS AND INDEXES

Chemical abstracts (1907- ).
Chemisches Zentralblatt (1830- ).
Engineering index (1884- ).
Journal of applied chemistry abstracts (1954- ).

C. SPECIAL REFERENCE WORKS


D. REVIEW SERIAL


E. PERIODICALS

A.I.Ch.E. journal (1955- ).
British chemical engineering (1956- ).
Canadian chemical processing (1917- ) (Formerly: Canadian chemistry and process industries).
Canadian journal of technology (1929- ) (Formerly: Canadian journal of research, Section F).
Chemical and engineering news (1923- ).
Chemical engineering (1902- ).
Chemical engineering progress (1908- ). (Formerly: Transactions of the
American Institute of Chemical Engineers).
Chemical engineering science (1952- ).
Chemical processing (1938- ).
Chemical week (1914- ).
Chemie-Ingenieur-Technik (1928- ).
Chemistry and industry (1881- ).
Cost engineering (1956- ).
Industrial and engineering chemistry (1909- ). Fundamentals (1962- );
Process design and development (1962- ); Product design and develop-
ment (1962- ).
Instruments and automation (1928- ).
Journal of applied chemistry (1951- ).
Journal of applied chemistry of the U.S.S.R. (1950- ) (Translation of:
Zhurnal Prikladnoi Khimii).
Journal of Chemical and engineering data (1956- ).
Oil, paint, and drug reporter (1871- ).
Proceedings of the Academy of Sciences of the U.S.S.R. Chemical tech-
nology section (1956- ) (Translation of: Doklady Akademii Nauk
S.S.S.R.).
Society of the Chemical Industry, Annual reports on the progress of ap-
plied chemistry (1916- ).
Transactions of the Institution of Chemical Engineers (1923- ).

6. Cosmetics

Prepared by Dr. Else L. Schulze, Supervisor
Technical Information Service
Technical Library
The Proctor & Gamble Company
Cincinnati, Ohio

A. ABSTRACTS AND INDEXES

Applied science and technology index (1958- ).
Chemical abstracts (1907- ). Section 39: Pharmaceuticals; 40: Essential
oils and cosmetics.
Industrial arts index (1913-1957).

B. SPECIAL REFERENCE WORKS

De Navarre, M.G. The chemistry and manufacture of cosmetics. 2d ed.
Ibid. International encyclopedia of cosmetic material trade names. New
Drug and cosmetic industry, Drug and cosmetic catalog. New York, Drug
and Cosmetic Industry (Annual).

C. PERIODICALS

American perfumer and aromatics (1906- ).
Drug and cosmetic industry (1926- ).
Manufacturing chemist (1930- ).
Perfumery and essential oil record (1910- ).
Seifen-Ole-Fette-Wachse (1874- ).
Soap, perfumery and cosmetics (1928- ).

7. Explosives

Prepared by Thomas L. Martinke
Research Center Library
Technical Information Division
Hercules Powder Company
Wilmington, Delaware

A. ABSTRACTS AND INDEXES

Applied science and technology index (1958- ).
British abstracts (1926-1953).
Chemical abstracts (1907- ). Section 51: Propellents and explosives.
Chemisches Zentralblatt (1830- ).
Industrial arts index (1913-1957).
Journal of applied chemistry (1954- ).
B. SPECIAL REFERENCE WORKS


C. PERIODICALS

Explosifs (1948- ).

Explosives engineer (1923- ).

Explosivstoffe (1952- ).

Mémorial de l'artillerie française (1921- ).

Mémorial des poudres (1882- ).

Mémorial des services chimiques de l'état (1882- ).

Zeitschrift für das gesamte schiess- und sprengstoffwesen-nitrocellulose (1906-1944).

8. Forestry

Prepared by Frederic C. Battell, Librarian
Minnesota & Ontario Paper Company
Minneapolis, Minnesota

A. BIBLIOGRAPHIES

APPENDIX


U.S. Forest service. List of publications. Madison, Wis., Forest Products Laboratory (Semiannual).

B. ABSTRACTS AND INDEXES

Agricultural index (1916- ).
Biological abstracts: Forestry (1927- ).

C. SPECIAL REFERENCE WORKS


D. PERIODICALS

Allgemeine Forst- und Jagd-Zeitung, n.s. (1832- ).

American forests (1895- ).

Carribean forester (1938- ).

Empire forestry review (1922- ).

Forest science (1955- ).

Forestry (1927- ).

Forestry digest (1946- ).
Journal of forestry (1917- ).
Pennsylvania forests (1886- ).
Quarterly journal of forestry (1907- ).
Schweizerische Zeitschrift für Forstwesen (1849- ).
Unasylva (1947- ).
Zeitschrift für Forstgenetik und Forstpflanzenzuchtung (1951- ).
Zeitschrift für Weltforstwirtschaft (1933- ).
Zentralblatt für das gesamte Forstwesen (1875- ).

E. PERIODICALS—LUMBER

American lumberman and building products merchandiser (1873- ).
British Columbia lumberman 1917- .
Canada lumberman (1880- ).
Forest products journal (1951- ).
Lumberman (1889- ).
Revue du bois et de ses applications (1946- ).
Southern lumber journal and building material dealer (1898- ).
Southern lumberman (1881- ).
Timber of Canada (1940- ).
Timber trades journal and saw mill advertiser (1873- ).
Wood (1936- ).
Wood construction and building materialist (1915- ).
Wood products (1923- ).

9. Glass

Prepared by Mrs. Phyllis A. MacDonell
Reference and Catalog Librarian
Corning Glass Works
Corning, New York

A. ABSTRACTS AND INDEXES

Applied science and technology index (1958- ).
Ceramic abstracts. Columbus, Ohio, American Ceramic Society (1922- ).
Chemical abstracts (1907- ). Section 17: Ceramics.
Industrial arts index (1913-1957).

B. SPECIAL REFERENCE WORKS


C. PERIODICALS

American Ceramic Society: Bulletin (1922- ); Journal (1918- ); Transactions (1899-1917).
Glass industry (1920- ).
Glass technology (1960- ).
Glastechnische Berichte (1922-1943); (1948- ).
Physics and chemistry of glasses (1960- ).
Research laboratory of Ashai Glass Company; Reports (1950- ).
Silikat-Technik (1950- ).
A. BIBLIOGRAPHIES

Cunningham, E.R., Annan, G.L., and Grinnell, M.E., compilers. A bibliography of the reference works and histories in medicine and the allied sciences (in Medical Library Association. Handbook of medical library practice with a bibliography of the reference works and histories in medicine and the allied sciences. 2d ed. rev. and enl. Janet Doe, Mary Louise Marshall, eds. Chicago, American Library Association (1956) p. 337-537). "The objective of this list is to introduce the reference material in medicine and the related sciences to medical, dental, and pharmaceutical libraries.... The closing date for entries in the bibliography is in general October 1953. However, occasional later editions and a very few 1954 and 1955 imprints have been noted." (Preface to Bibliography.)


B. ABSTRACTS AND INDEXES

British abstracts of medical sciences. v. 1- (1954- ) (Replaces Section A III of British abstracts).

Excerpta medica; Sections 1-20 (1947- ). All sections do not begin at the same time. References to specific subjects are supplied on cards by the Excerpta Medica Service Corporation of New York; this service began in 1951.


(1) Related Materials

Biological abstracts (1927- ) and Biochemical title index (1962- ).
Chemical abstracts (1907- ) and Chemical Titles (1961- ).
APPENDIX

(2) Extensive Lists of Abstracting and Indexing Tools


C. SPECIAL REFERENCE WORKS

(1) Directories


(2) Dictionaries


(3) Encyclopedias


Tice, Frederick, ed. Practice of medicine.... Hagerstown, Md., Prior (1931). 10 vols.

(4) Medical Terminology


Harned, J.M. Medical terminology made easy. Chicago, Physicians Record Co. (1951).
Pepper, O.H.P. Medical entymology; the history and derivation of medical terms for students of medicine, dentistry, and nursing. Philadelphia Saunders (1949).

(5) Miscellaneous


D. PERIODICALS

American journal of medicine (1941- ).
American journal of public health (1911- ).
American journal of the medical sciences (1827- ).
American Medical Association, journal (1848- ).
American practitioner and digest of treatment (1950- ).
Annals of internal medicine (1927- ).
Archives of internal medicine (1908- ). The American Medical Association publishes a series of "Archives" in various fields.
British medical journal (1857- ).
Canadian Medical Association, journal (1909- ).
Lancet (1823- ).

E. REVIEW SERIALS

Current therapy, Philadelphia, Saunders (Annual).
11. Metallurgy

Prepared by Barbara Thompson, Assistant Librarian
American Iron and Steel Institute
New York, New York

A. ABSTRACTS AND INDEXES

Applied science and technology index (1958- ).
Battelle technical review abstracts. Columbus, Ohio, Battelle Memorial Institute (1952- ).
Engineering index (1884- ).

B. SPECIAL REFERENCE WORKS

(1) Dictionaries


(2) Directories

American Iron and Steel Institute. Directory of iron and steel works of the U.S. and Canada (Published every 3 years).
(3) Standards and Specifications

AB and AI. New York, American Boiler and Affiliated Industry.
API. New York, American Petroleum Institute.
ASA. New York, American Standards Association.
ASME. New York, American Society of Mechanical Engineers.
AWS. New York, American Welding Society.
SAE and AMS-Aeronautical materials. New York, Society of Automotive Engineers.
UL-INC. Chicago, Underwriters Laboratories, Inc.

(4) Statistics

Associazione Industrie Siderigiche Italiane “Assider,” Milan, Italy.
Statistical yearbook. 2 parts.
Canada. Dominion bureau of statistics, Dept. of Trade and Commerce.
Iron and steel series of Canada. Ottawa, Canada.
Geneva, Switzerland (Quarterly).
Luxembourg, Belgium, ECSC.

(5) General Reference Books

Goodale, S.L. Chronology of iron and steel. Cleveland, Penton (1931).
United States Steel Co. The making, shaping and treating of steel. Pittsburgh (1957).
Zapfe, C. A. Stainless steels. Cleveland, Ohio, American Society for Metals (1949).

C. PERIODICALS

Acier, Stahl, Steel (1932- ) (Formerly: Ossature métallique).
Alloy metal review (1936- ).
American Institute of Mining and Metallurgical Engineers, transactions (1871- ).
American Society for Metals, transactions (1920- ).
Archiv für das Eisenhuttenwesen (1927- ).
Archiv für Metallkunde (1946- ).
Blast furnace and steel plant (1913- ).
British steelmaking (1935- ).
Canadian metalworking (1938- ).
Eastern metals review (1948- ).
Iron age (1859- ).
Iron and coal trades review (1866- ).
Iron and steel (1927- ).
Iron and steel engineer (1924- ).
Jernkontorets (1817- ).
Journal of metals (1949- ) (Formerly: Metals technology).
Metal age (1947- ).
Metal bulletin (1913- ).
Metallurgia (1929- ).
Metallurgist (1957- ) (Technical journal of the Ministry of Iron and Steel of the USSR; English translation of Metallurg).
Metals review (1930- ).
Revue de metallurgie (1904- ).
Stahl und Eisen (1881- ).
Steel (1867- ).
Steel review (1956- ).
Zeitschrift für Metallkunde (1911- ).

12. Nuclear Science and Technology

Prepared by Albert P. Bradley, Supervisor
Library
Atomics International
Canoga Park, California

A. BIBLIOGRAPHIES


(For extensive bibliographies and reports consult Superintendent of Documents Monthly Catalog under Atomic Energy Commission.)

B. ABSTRACTS AND INDEXES

Chemical abstracts (1907- ). Section 3A: Nuclear phenomena.
APPENDIX

Energy Commission, Division of Technical Information extension, P.O. Box 62, Oak Ridge, Tenn. (1962- ) (For reports falling outside the scope of NSA).


C. SPECIAL REFERENCE WORKS

(1) Dictionaries, Handbooks, etc.


(2) Tabular and Survey Guides


(3) Books

Appendix 365

Ibid. The industrial atom monographs. Washington, D.C., Office of Technical Services (1956-).

(4) Review Serials

D. PERIODICALS

Die Atom Wirtschaft (1956- ).
Atoms and nuclear energy (1949- ).
Atomkern Energie (1956- ).
Atompraxis (1955- ).
Bulletin of the atomic scientists (1945- ).
Forum memo (1953- ).
Nuclear engineering (1956- ).
Nuclear instruments and methods (1956- ).
Nuclear physics (1956- ).
Nuclear power (1956- ).
Nuclear safety (1959- ).
Nuclear science and engineering (1956- ).
Nucleonics (1946- ).
Nukleonik (1955- ).
Power reactor technology (1958- ).
Reactor core materials (1958- ).
Reactor fuel processing (1958- ).

13. Nutrition and Food Technology

Prepared by Alice D. Saunders, Librarian
Research and Technical Division
Wilson & Company
Chicago, Illinois

A. BIBLIOGRAPHIES

B. ABSTRACTS AND INDEXES

Agricultural index (1916- ).
Applied science and technology index (1958- ).
Biological abstracts (1927- ).
British abstracts (1926-1953) (Part B, Section III.)
Chemical abstracts (1907- ) Section 64: Foods.
Dairy science abstracts. Shinfield, Reading, England, Commonwealth Bu-
reau of Dairy Science (1939- ).
Journal of the science of food and agriculture (1954- ).
Nutrition abstracts and reviews. Buckburn, Aberdeenshire, Scotland;
Commonwealth Bureau of Animal Nutrition; Rowett Institute (1931- ).
Vitamin abstracts. Chicago, Ill., Association of Vitamin Chemists(1947- )
(Formerly: Abstracts of vitamin literature).

C. SPECIAL REFERENCE WORKS

Albritton, E.D., ed. Standard values in nutrition and metabolism; being
the second fascicle of a handbook of biological data (Federation of
American Societies for Experimental Biology). Philadelphia, Saunders
(1954).
American Association of Cereal Chemists, Inc. Cereal laboratory meth-
American Meat Institute Foundation. The science of meat and meat prod-
American Oil Chemists' Society. Official and tentative methods. 2d ed.
American Public Health Association. Standard methods for the examina-
Association of Official Agricultural Chemists. Official methods of analy-
Bender, A.E. Dictionary of nutrition and food technology. London, Butter-
worths (1960).
Block, R. J., and Weiss, K.W. Amino acid handbook; methods and results
Vol. 1. Production, biochemistry and microbiology. (Vols. 2-3. In
preparation.)
Comar, C.L., and Bronner, Felix, eds. Mineral metabolism. New York,
ration).
Desrosier, N.W. The technology of food preservation. Westport, Conn.,
Deuel, H.J., Jr. The lipids; their chemistry and biochemistry. New York,
Food science and technology: Papers presented at the first international
congress of food science and technology, Imperial College of Science


Kirschenbauer, H.G. Fats and oils; and outline of their chemistry and technology. 2d ed. New York, Reinhold (1960).


Pigman, W., ed. The carbohydrates; chemistry, biochemistry, physiology. New York, Academic (1957).


APPENDIX


(1) Review Serials

Recent advances in food science. v.1-. London, Butterworths (1962- ) (Published in 2 parts: Commodities and Processing).

D. PERIODICALS

Agricultural marketing (1956- ).
Applied microbiology (1953- ).
Archives of biochemistry and biophysics (1942- ) (Formerly: Archives of biochemistry).
Association of Food and Drug Officials of the United States, Quarterly bulletin (1937- ).
Bakers’ digest (1926- ).
Baking industry (1887- ) (Formerly: Bakers’ helper).
Biochemical journal (1906- ).
Canner/Packer (1895- ) (Consolidation of Canner and freezer, Food packer, and Western canner and packer).
Cereal chemistry (1924- ).
Food in Canada (1941- ).
Food engineering (1928- ) (Formerly: Food industries).
Food field reporter (1932- ).
Food manufacture (1927- ).
Food processing and packaging (1932- ) (Formerly: Food).
Food technology (1947- ).
Journal of agricultural and food chemistry (1953- ).
Journal of food science (1936- ) (Formerly: Food research).
Journal of the American Dietetic Association (1925- ).
Journal of animal science (1942- ).
Journal of biological chemistry (1905- ).
Journal of dairy research (1929- ).
Journal of dairy science (1917- ).
Journal of home economics (1909- ).
Journal of lipid research (1959- ).
Journal of milk and food technology (1937- ).
Journal of nutrition (1928- ).
Journal of the science of food and agriculture (1950- ).
Manufacturing confectioner (1921- ).
National provisioner (1891- ).
Nutrition reviews (1943- ).
Poultry science (1921- ).
Quick frozen foods (1937- ).
Wallerstein Laboratories communications (1938- ).
Zeitschrift für Lebensmittel-Untersuchung und -Forschung (1890- ).


Prepared by Dr. Else L. Schulze, Supervisor
Technical Information Service
Technical Library
The Proctor & Gamble Company
Cincinnati, Ohio

A. ABSTRACTS AND INDEXES

Applied science and technology index (1958- ).
Chemical abstracts (1907- ). Section 41: Fats and waxes; 42: Surface-active agents and detergents.
Loose-leaf; Arranged by subject classification; Monthly; Annual index.
Journal of the American Oil Chemists’ Society; Abstract section. Chicago, American Oil Chemists’ Society (1932- ) (Monthly; not indexed).
Ibid. Reports of the Literature Review Committee of the American Oil Chemists’ Society. Chicago, American Oil Chemists’ Society (1934- ) (Annual review of the literature; now appears in May and June issues of the Journal).
Synthetic detergents punched card file. New York, John W. McCutcheon (Additions and corrections made at regular intervals).

B. SPECIAL REFERENCE WORKS


Soap and chemical specialties. Blue book and catalog; annual buyers’ guide for manufacturers, converters, and repackers of soaps, detergents, and chemical specialties. New York, MacNair-Dorland (Annual).


C. PERIODICALS

American perfumer and essential oil review (1906- ).

Cotton gin and oil mill press (1917- ).

Fats and oils situation (1937- ) (U.S. Dept. of Agriculture, Agricultural marketing service).

Fette, Seifen, Anstrichmittel (1894- ).


National provisioner (1889- ).

Oil mill gazetteer (1900- ).

Oil, paint and drug reporter (1871- ).

Oleagineux (1946- ).

Perfumery and essential oil record (1910- ).

Seifen-Öle-Fette-Wachse (1874- ).

Soap and chemical specialties (1925- ).

Soap, perfumery & cosmetics trade review (1928- ).

15. Pharmacy

Prepared by Jewell Maurice
Library
Eli Lilly & Company
Indianapolis, Indiana

The field of pharmacy is so closely allied with medicine, chemistry, and biology that the bibliographies in these should be consulted for recommended titles in related subject areas.
A. BIBLIOGRAPHIES


Baer, K.A. Bibliographic tools for selection of published materials in pharmacy. in American journal of pharmaceutical education 18, 373-381 (1954).


Hocking, G. Periodicals pertaining to pharmacognosy; a preliminary list. in American journal of pharmaceutical education 7, 217-233 (1943).


Oatfield, Harold, and Emilio, B.R. Some aspects of searching in the pharmaceutical literature in American documentation 9, 238-272 (1958).

Pharmaceutical journals and their abbreviations. in American journal of pharmaceutical education 7, 187-217 (1943); 8, 487-490 (1944).


APPENDIX

Stuhr, E.T. Materia medica, including pharmacology, pharmacognosy and toxicology; a select bibliography, in American journal of pharmaceutical education 8, 504-507 (1944).
Urdang, G. History, ethics and literature of pharmacy, in American journal of pharmaceutical education 8, 491-503 (1944).

B. ABSTRACTS AND INDEXES

Agricultural index (1916- ).
Applied science and technology index (1958- ).
Biological abstracts (1927- ) and Biochemical title index (1962- ).
Chemical abstracts (1907- ) and Chemical titles (1961- ).
Excerpta medica (1947- ).
Index medicus (1960- ).

C. SPECIAL REFERENCE WORKS

Accepted dental remedies..., drugs used in dental practice including a list of brands accepted by the Council on dental therapeutics of the American Dental Association. Chicago, American Dental Association (Annual).
Gershenfield, L. Bacteriology and allied subjects. Easton, Pa., Mack (1945).

(1) Review Serials

Advances in pharmacology. v. 1-. New York, Academic (1962- ).
Progress in drug research. v. 1-. Basel, Switzerland, Birkhauser (1959- ).
n.b. See also Review Serials on page 327.

D. PERIODICALS

American druggist (1871- ).
American journal of pharmacy (1829- ).
American professional pharmacist (1935- ).
Annales pharmaceutiques françaises (1943- ) (Formerly: Journal de pharmacie et de chimie and Bulletin des sciences pharmacologiques).
Antibiotics and chemotherapy (1951- ).
Archiv der Pharmazie und Berichte der Deutschen pharmazeutischen Ge-
sellschaft (1822- ).
Canadian pharmaceutical journal (1868- ).
Chain store age (1925- ).
Chemist and druggist (1859- ).
Drug and allied industries (1915- ).
Drug and cosmetic industry (1926- ).
Drug and research reports (1957- ) (The blue sheet: subsidiary of
F-D-C- reports).
Drug standards (1951-1960) (Merged with the Scientific edition of the
Journal of the American pharmaceutical association to form the Jour-
nal of pharmaceutical sciences).
Drug trade news (1925- ).
F-D-C- reports (The pink sheet) (1939- ).
Food, drug, cosmetic law journal (1946- ).
Journal of the American Pharmaceutical Association (1912- ). Practical
the Journal of pharmaceutical sciences (1961- ).
Journal of pharmacy and pharmacology (1949- ).
New medical materia for diagnosis, prevention, treatment (1959- ).
Oil, paint and drug reporter (1871- ).
Pharmaceutica acta Helvetiae (1926- ) (Supplement to Schweizerische
Apotheker-Zeitung).
Pharmaceutical journal (1841- ).
Produits pharmaceutiques (1946- ).
Die pharmazie (1946- ).
Toxicology and applied pharmacology (1959- ).
Unlisted drugs (1949- ).
Weekly pharmacy report (1951- ) (F-D-C Green sheet; formerly:
F-D-C drug letter).

16. Plastics

Prepared by Helen G. Dikeman, Librarian
Plastics Division
Monsanto Chemical Company
Springfield, Massachusetts

A. ABSTRACTS AND INDEXES

Chemical abstracts (1907- ). Section 47: Plastics.
Journal of applied chemistry. London, Society of Chemical Industry
(1954- ). Part I, Section 6: Fibres, etc. — Subdivision Plastics and
resins.
APPENDIX

Literatur-Schnelldienst, Darmstadt, Germany, Deutschen Kunststoff-Institut (1955-).

B. YEARBOOKS AND DIRECTORIES (ALL ANNUAL)

Modern plastics encyclopedia. Bristol, Conn., Plastics Catalog Corp.
(The above are all annual publications).

C. SPECIAL REFERENCE WORKS

Advances in polymer science. v. 1-. New York, Springer (1958-).
2 vols. in 8 parts in 1961.
(Biennial).
2 vols.
D. PERIODICALS

Adhesives & resins (1953- ).
Australian plastics and rubber journal (1946- ).
British plastics (1929- ).
Canadian plastics (1943- ).
Fortschritte der Hochpolymeren Forschung (1958-) (Advances in polymer science).
Industries des plastiques modernes (1949- ).
Journal of polymer science (1946- ).
Kunstoffe (1911- ).
Kunstoffe-Plastics (1954- ).
Kunstoffe-Rundschau (1954- ).
Makromolekulare Chemie (1945- ).
Materie plastiche (1934- ).
Modern packaging (1927- ).
Modern plastics (1925- ).
Oesterreichische Plastic-Rundschau (?).
Plaste und Kautschuk (1954- ).
Pensez plastiques (?).
Plastic (1951- ).
Plastica (1948- ).
Plasticos (1954- ).
Plastics (1937- ).
Plastics Institute Transactions and Journal (1932- ).
Plastics technology (1955- ).
Plastics week (1941- ).
Plastics world (1943- ).
Plastiques informations (1950- ).
Plast Varlden (1951- ).
Plastverbeiter (?).
Poliplasti (?).
Polymer (1960- ).
Polymer Science USSR (1960- ).
Popular plastics (1951- ).
Reinforced plastics (?).
Revista de plasticos (?).
Rubber and plastics age (1920- ).
SPE journal (1945- ).
SPE transactions (1961- ).

17. Pulp, Paper, and Board

Prepared by Frederic C. Battell, Librarian
Minnesota & Ontario Paper Company
Minneapolis, Minnesota

A. ABSTRACTS AND INDEXES

Chemical abstracts (1907- ). Section 49: Cellulose, lignin, paper, and other wood products.
APPENDIX


B. SPECIAL REFERENCE WORKS


Ibid. Tappi standards: tentative and official testing methods.... New York, Loose-leaf.

Varossieau, W.W. Forest products research and industries in the U.S. Amsterdam, Holland, Meulenhoff (1954).


C. PERIODICALS

Allgemeine Papier-Rundschau (1950- ).

Australian pulp and paper industry technical association, Proceedings (1947- ).

Board (1958- ).
British paper and board makers' association; Proceedings of the technical section (1915- ).
Bumazhnaya promyshlennost (1922- ).
Canadian pulp and paper industry (1948- ).
Finnish paper and timber (1950- ).
Forest products journal (1951- ).
Holz als Roh- und Werkstoff (1937- ).
Holzforschung (1947- ).
Indian pulp and paper (1946- ).
Norsk skogindustri (1947- ).
Paper and paper products (1884- ).
Paper and print (1928- ).
Paper industry (1919- ).
Paper maker and British paper trade journal (1891- ).
Paper mill news (1876- ).
Paper trade journal (1872- ).
Paperi ja puu (1921- ).
Papeterie (1878- ).
Das Papier (1947- ).
Pulp and paper (1927- ).
Pulp and paper magazine of Canada (1903- ).
Southern pulp and paper manufacturer (1938- ).
Svensk papperstidning (1898- ).
Tappi (1918- ) (Continuation of Technical Association Papers).
Wochenblatt für Papierfabrikation (1870- ).
World's paper trade review (1879- ).
Zellstoff und Papier (1921- ).

18. Rubber and Synthetic Elastomers

Prepared by Mrs. Cornelia Rosmini, Supervisor
Technical Information Service
Chemical Research and Development Center
Food Machinery and Chemical Corporation
Princeton, New Jersey

A. ABSTRACTS AND INDEXES

Applied science and technology index (1958- ).
Chemical abstracts 1907- ). Section 46: Rubber and other elastomers.
Resins — Rubber — Plastics; a literature and patent service. New York,
Rubber abstracts. Shawbury, Shrewsbury, Shropshire, England, Research
Association of British Rubber Manufacturers (1923- ).

B. SPECIAL REFERENCE WORKS

American Chemical Society. Division of rubber chemistry. Bibliography of rubber literature (including patents) (1952-1954, 1955-1956, 1957-
APPENDIX

American Society for Testing Materials. ASTM standards on rubber
LeBras, Jean. Rubber; fundamentals of its science and technology....
Co. (1957).
Moakes, R.C.W., and Wake, W.C., eds. Rubber technology. New York,
Academic (1952).
Naunton, W.J.S., ed. The applied science of rubber. London, E. Arnold
(1961).
Rubber red book; directory of the rubber industry. New York, Rubber
Age (Revised biennially).
(1948).

C. PERIODICALS

Chemical and rubber industry report (1954- ).
Institution of the rubber industry; Transactions and proceedings (1925- ).
Kautschuk und Gummi (1948- ).
Revue générale du caoutchouc (1924- ).
Rubber age (1917- ).
Rubber and plastics age (1920- ) (Incorporated Rubber age and syn-
thetics).
Rubber chemistry and technology (1928- ).
Rubber journal (1884- ) (Formerly: India rubber journal).
Rubber statistical bulletin (1946- ).
Rubber world (1889- ) (Formerly: India rubber world).
Vanderbilt news (1934- ).

19. Textiles

Prepared by W. W. Price, Librarian
Philadelphia Textile Institute
Philadelphia, Pennsylvania

A. ABSTRACTS AND INDEXES

Chemical abstracts (1907- ). Section 48: Textiles.
Natural and synthetic fibers: abstract service. New York, Interscience
Washington, D.C. (1963- ). A limited quantity of bound volumes of
the Abstracts is available at the end of each year as Natural synthetic fibers yearbook (1954- ).

B. BIBLIOGRAPHIES

Lawrie, L.G. A bibliography of dyeing and textile printing; comprising a list of books from the 16th century to the present time (1946). London, Chapman & Hall (1949).


C. SPECIAL REFERENCE WORKS

(1) Directories


(2) Encyclopedias, Dictionaries, Handbooks

APPENDIX

(3) Books


D. PERIODICALS

American dyestuff reporter (1916- ).
American fabrics (1946- ).
America’s textile reporter (1887- ) (Formerly: American wool and cotton reporter).
Canadian textile journal (1883- ).
Ciba review (1937- ).
Fibre and fabric (1885- ).
Fibres international (1940- ) (Formerly: Fibres).
Journal of the textile institute (1910- ).
Man-made textiles (1924- ) (Formerly: British rayon and silk journal).
Modern textiles (1925- ) (Formerly: Rayon and synthetic textiles).
Skinner’s silk and rayon record (1928- ).
Textil Rundschau (1946- ).
Textile age (1937- ).
Textile and cordage quarterly (1950- ) (Formerly: Fibres, fabrics, and cordage).
Textile bulletin (1911- ).
Textile industries (1899- ).
Textile research journal (1930- ).
Textile technology digest (1944- ).
Textile world (1888- ).

20. Veterinary Science and Medicine

A. ABSTRACTS AND INDEXES

Biological abstracts (1927- ). Section F: Animal production and veterinary science.
Index veterinarius. Farnam Royal, England, Commonwealth Agricultural Bureaux (1933- ) (Compiled from world literature).

B. SPECIAL REFERENCE WORKS

Advances in veterinary science. v. 1- . New York, Academic (1953-).
6 vols. in 1960.
Blood, D.C. Veterinary medicine.... Baltimore, Williams & Wilkins (1960).

C. PERIODICALS

American journal of veterinary research (1940- ).
British veterinary journal (1949- ).
Canadian veterinary journal 1960-.
Journal of animal science (1942- ).
Journal of dairy science (1917-).
Journal of the American Veterinary Medical Association (1877- ).
Modern veterinary practice (1920- ) (Formerly: North American veterinarian).
Poultry science (1921- ).
Research in veterinary science (1960- ).
Veterinary medicine (1905- ).
Veterinary record (1888- ).

21. Petroleum and Natural Gas

A. ABSTRACTS AND INDEXES

API technical abstracts. New York, American Petroleum Institute (1954-).
APPENDIX


B. SPECIAL REFERENCE WORKS


Hardwicke, R.E. Petroleum and natural gas bibliography, a reasonably complete guide to the literature in English dealing with petroleum and natural gas. Austin, Texas, The University of Texas (1937).


World Petroleum Congresses, 1st, London (1933); 2d, Paris (1937); 3d, The Hague (1951); 4th, Rome (1955); 5th, New York (1959); 6th, Frankfurt (1963).

C. BOOKS


Murphy, B.M., ed. Conservation of oil and gas. Chicago, IAMERICAN GAS ASSOCIATION (1948).


D. PERIODICALS

American Chemical Society. Division of petroleum chemistry. Symposia.
  General papers.
  Fuel oil and oil heat (1942- ).
  Geophysics (1936- ).
  Hydrocarbon Processing & Petroleum refiner (1922- ).
  Journal of petroleum technology (1949- ).
  Liquified petroleum gas (1941- ).
  Lubrication engineering (1945- ).
  National petroleum news (1909- ).
  Oil and gas journal (1902- ).
  Petroleos Mexicanos (1957- ).
  Petroleo e metano (1955- ).
  Petroleum engineer (1929- ).
  Petroleum processing (1946- ).
  Petroleum refiner and natural gasoline manufacturer (Title changed to
  Petroleum times (1919- ).
  Petroleum today (1959- ).
  Petroleum week (1955- ).
  World oil (1916- ).
  World petroleum (1930- ).
Author Index

Akers, S.G., 153, 161, 163, 164, 166
Anderson, I.T., 153
Austin, J.A., 193
Ballou, H.W., 73
Battell, F.C., 352, 378
Bedsole, D.T., 7, 23
Berolzheimer, D.D., 249
Berry, M.M., 109
Birdwell, E.N., 16
Blair, K.G., 222, 224, 225
Bliss, H.E., 176
Bloomer, G., 209
Bogg, S.W. and D.C. Lewis, 195
Bonn, G.S., 33
Booser, R.J., 210
Boots, R., 26
Bourne, C.P., 182
Bradford, S.C., 176
Bradley, A.P., 362
Brenner, C.W. and C.N. Mooers, 183
Brinkley, C., 216
Brown, A.L., 120, 291
Brown, C.H., 126
Brown, D.F., 30
Brown, H.P. and J.A. Austin, 193
Buchanan, M.B., 294
Burton, R.E. and B.A. Green, 116
Bush, V., 184
Bushnor, W.E., 185
Canfield, B.R., 282
Carter, M.D. and L. Schryver, 284
Christian, B.H., 282
Cooper, W.T., 139
Costello, M.A. and H. Voos, 225
Crane, E.J., 266, 270
Cutter, C.A., 153
Davis, B.M., 324
Davison, G.H., 76, 132
Dewey, M., 147, 148
Dice, L.R., 193
Dikeman, H.G., 376
Ditmas, E.M.R., 240
Doss, M.P., 77
Duncan, G.W., 283
Dyson, G.M., 252, 265
Ellingham, H.S.T., 2
Evans, E. and R. M. Goepp, Jr., 193
Ferguson, E., 290
Ford, K.G., 222, 226
Fry, B., 190
Furnas, C.C., 15, 25
Gates, R.H., 67
Gibson, E.B., 23, 43, 342
Gilchrist, D.B., 120
Gilman, M., 29
Githens, A.M., 56
Godfrey, L.E., 256
Goepp, R.M., Jr., 193
Goff, M.S., 189
Gray, D.E. and S. Rosenberg, 116
Greear, Y.E., 16
Green, B.A., 116
Gull, C.D., 180
Hawken, W.R., 77
Heatwole, M.R., 24
Henkle, H.W., 7
Herner, S., 24
Hill, J.W., 283
Hocken, S., 225, 226
Hoffman, T., 270
Holleman, W.R., 110, 192
Holm, B.E., 180
Holway, A.H., 66
Hooker, R.H., 126
Hopp, R.H. and W.W. Howell, 265
Howell, W.W., 265
Hunt, J.W., 30
Jackson, E., 189
Jackson, E.B., 115, 290, 338
Jackson, L., 222, 291
Jahoda, G., 198
Jameson, D.A., 66
Joannes, E., 59
Kaiser, J., 178
Kennedy, R.A., 201
Kent, A. and J.W. Perry, 238
Kiersky, L.J., 77
Knox, W.T., 43, 44
Kraehenbuhl, J.G., 66
Krettek, G., 53
Kruzas, A.T., 250, 347
Kulp, K., 187
Kurth, W.H., 50
Kyle, B., 2
Lage, L., 285
Lane, B.B., 246
Leighty, J.A., 29
Lewis, C.M., 56
Lewis, C.M. and W.H.
   Offenhauser, Jr., 73, 74, 76
Lewis, D.C., 195
Lewton, L.O., 251, 253
Loeb, J., 18
Loftus, H.E., 8
Lyle, G.R., 56, 87
McCann, A., 131
McClelland, E.H., 90, 94, 264
MacDonald, R., 344
MacDonell, P.A., 354
McMurray, J.P., 184
MacWatt, J.A., 290
Mann, M., 146, 153, 154, 156, 163
Marr, E.B., 266, 270
Martinke, T.L., 351
Maurice, J., 8, 371
Mees, C.E.K. and J.A.
Leermakers, 44
Mellon, M.G., 270
Metcalfe, J., 172, 176
Metcalf, K.D., 57
Milholen, H., 194
Mixer, C.W., 52, 53
Mooers, C.N., 183, 265
Mohlman, J.W., 221
Morley, L.H., 1
Nicholson, A.L., 78
Nicholson, W. and D. Thurston, 136
Nitecki, A., 78
O'Farrell, J.B., 192
Offenhauser, W.H., Jr., 73, 74, 76
Owens, E.W., 32
Patterson, A.H., 266, 270
Perry, J.W., 238
Phelps, R.H., 18
Pliefke, F., 134
Poland, L.B., 196
Price, W.W., 381
Randall, G.E., 57, 115
Ranganathan, S.R., 151, 158, 176
Redman, H.F. and L.E. Godfrey, 256
Richardson, L.R., 189
Richardson, W.H., 207
Rose, E.G., 253
Rosenberg, S., 116
Rosmini, C., 380
Royer, G.L., 15, 16
Saunders, A.D., 366
Sayers, W.C.B., 152
Schaler, C., 177, 268
Schoenfeld, C.A., 283
Schirro, M., 263
Schryver, L., 284
Schultheiss, L.A., 109
Schulze, E.L., 197, 350, 370
Schutze, G., 97, 241
Sears, M.E., 154, 156
Sewell, W., 221, 293
Sharp, H.S., 23, 43
Shaw, R.R., 182, 184
Shera, J.H., 34
Shorb, L., 196
<table>
<thead>
<tr>
<th>Author Name</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singer, T.E.R.</td>
<td>5, 249</td>
</tr>
<tr>
<td>Soule, B.</td>
<td>266</td>
</tr>
<tr>
<td>Southern, W.A.</td>
<td>287</td>
</tr>
<tr>
<td>Stevens, I.R.</td>
<td>120</td>
</tr>
<tr>
<td>Strain, P.</td>
<td>194</td>
</tr>
<tr>
<td>Strieby, I.M.</td>
<td>8, 25, 131, 245, 257, 296</td>
</tr>
<tr>
<td>Taube, M.</td>
<td>150, 183, 190, 265</td>
</tr>
<tr>
<td>Taylor, A.M.</td>
<td>292</td>
</tr>
<tr>
<td>Thompson, B.T.</td>
<td>359, 362</td>
</tr>
<tr>
<td>Thompson, M.S.</td>
<td>183</td>
</tr>
<tr>
<td>Thurston, W.</td>
<td>136</td>
</tr>
<tr>
<td>Tilton, E.M.</td>
<td>133</td>
</tr>
<tr>
<td>Vickery, B.C.</td>
<td>172, 176</td>
</tr>
<tr>
<td>Voigt, M.J.</td>
<td>31, 126</td>
</tr>
<tr>
<td>Von Hohenhoff, E.</td>
<td>269</td>
</tr>
<tr>
<td>Voos, H.</td>
<td>225</td>
</tr>
<tr>
<td>Vormelker, R.L.</td>
<td>251</td>
</tr>
<tr>
<td>Weeks, B.M.</td>
<td>173</td>
</tr>
<tr>
<td>Weil, B.H.</td>
<td>190, 196, 222, 287</td>
</tr>
<tr>
<td>Weinstein, S.J.</td>
<td>191</td>
</tr>
<tr>
<td>Wennerberg, A.P.</td>
<td>293</td>
</tr>
<tr>
<td>Wesner, J.</td>
<td>26</td>
</tr>
<tr>
<td>Whaley, F.R.A.</td>
<td>197</td>
</tr>
<tr>
<td>Wheeler, J.L.</td>
<td>56</td>
</tr>
<tr>
<td>White, H.S.</td>
<td>16</td>
</tr>
<tr>
<td>Wilcox, J.K.</td>
<td>117</td>
</tr>
<tr>
<td>Wilkinson, W.A.</td>
<td>290</td>
</tr>
<tr>
<td>Wormann, D.C.</td>
<td>34</td>
</tr>
<tr>
<td>Wright, J.H. and B.H. Christian</td>
<td>282</td>
</tr>
<tr>
<td>Zerwecki, C.E., Jr.</td>
<td>183</td>
</tr>
</tbody>
</table>
Subject Index

Abbott Laboratories library, floor plan, 60, 61
Abstracting and indexing publications, bibliographies of, 129, 321-322
list of, 320-322
Accession records, 109
Acquisition librarian, 36
Air conditioning, 67
Almanacs, 308
American Chemical Society, Division of Chemical Literature Survey, 8
American Institute of Chemical Engineers, thesaurus, 187
American Library Association, cataloging rules, 163
interlibrary loan code, 212
American Society for Metals, classification, 177
Documentation service, 248
Analytics, 158
Annotations and abstracts, 264
Annual report, 217, 290
Archives, 257
Assistant librarian, duties, qualifications, training, 35
Basic reference publications, 305-323
Battelle Memorial Institute, 33
Bibliographic aids, 322-323
Bibliographies available on tape, 248, 265
Bibliographies for, aeronautics and astronautics, 338-342
air conditioning and refrigeration, 342-344
automotive engineering, 344-347 biological sciences, 330-335
ceramic technology, 347-348
crystallography, 348-350
chemistry, 324-329
comics, 350-351
earth sciences, 335-337
explosives, 351-352
geography, 337
glass, 354-356
medicine, 356-358
nuclear science and technology, 362-366
nutrition and food technology, 366-370
oils, fats, soaps, waxes, 370-371
petroleum and natural gas, 384-388
pharmacy, 371-375
physics, 329-330
physiology, 334-335
plastics, 376-378
pulp, paper, and board, 378-380
rubber and synthetic elastomers, 380-381
textiles, 381-383
veterinary science and medicine, 383-384
Bibliographies, mechanical aids, 265
organization of, 263
Binding, costs, 51
professional, 141
temporary, 142
Bibliographical data sources, 309
Bliss classification, 150, 176
Boeing Airplane Company, 192
Book dealers, 103-106
  in out-of-print books, 107
  services, 106
Book numbers, 153
Book ordering, procedures, 101
  sample form, 102
Book publishers, 97-100
Book selection, 90
  for beginning collection, 91
  for current books, 95
  recording of titles, 94
  source lists, 91
Budgets, 43-54
  items in, 46
    suggested example, 49
Bulletin boards, 285, 287
Business periodicals index, 257
Business publications, 257
CRIS, 185
Card catalog, 166
Cardmaster duplicator, 78
Catalog cards, 159-162
  added-entry, 162
  analytics, 1
  Library of Congress, 164
  tracing, 162
Cataloger and indexers, duties
  and qualifications, 38
Cataloging procedures, 145-162
Chemical & Engineering News,
  retrieval systems review,
  180-181, 197
Circulation, of books, 203-208
  extramural, 207-208
  recording, 205
  of miscellaneous materials, 208
  of periodicals, 208-212
Classification of books, 145-153
Classification schemes, special, 156
Committee on Library Lighting, 66
Contoura camera, 82, 258
Coordinate indexing, 183
Correspondence files, indexing,
  198
Costs of library services, 43
  economies, 45
  relation to total research
  costs, 44
Current awareness services, 218-237
Current Contents, 210
Current publications, dissemination
  of information from,
  217-237
  centralized services, 227-231
Cutter numbers, 153
  for trade catalogs, 192
Data processing, see Information
  retrieval systems
Derwent Information Service
  (patents), 270
Descriptive cataloging, 158
  added-entry cards, 162
  main entry cards, 159
Dewey decimal classification,
  147, 176
Dictionaries, English language,
  307
  French-English, 315
  German-English, 316
  Italian-English, 316
  multilingual, 318
  Portuguese-English, 316
  Spanish-English, 317
Directories, sources for, 310
Dissertations and theses, searching,
  254
  sources of, 120
Division of Chemical Literature,
  American Chemical Society, 8
Documentation, Inc., 191
Duplicating equipment, 76-81
  contact reflex method, 80
  for both typed and printed
  copy, 79
  for typed copy, 77
  optical processes, 81
  stencil or mimeograph, 78
E.I. du Pont de Nemours & Com-
pany library, 189

Electrofax Copymaker, 81

Electronic Engineer Master Index, 192

Eli Lilly and Company Library, 8

Employment services, 40

Encyclopedias, 307

Equipment and furniture costs, 49

Exhibits, 288

Filing, equipment, 70

procedures, 188

Filmorex, 184

Filmsort, 193

Flexowriter, 165

Flip, 184

Floor plans, 60-64

Flooring, 66

Ford Motor Company, Engineering Staff library, 63

Foundations (directories), 311

General Motors Technical Center Library, annual report, 290

Gifts to library, 108

Government documents, indexing, 189

searching, 255

sources of U.S., 111

sources in other countries, 116

HRB-Singer, Inc., 186

Hand viewers, 74

Handbooks, list of, 313-315

Hectograph copiers, 79

Helpful gadgets, 87

House organs, library news in, 291

sources of, 133

Hughes Aircraft Company, Ground Systems Library, 62

Indexing of, correspondence files, 198
government documents, 189

laboratory notebooks, 196

organization reports, 195

pamphlets and reprints, 188

patents, 191

photocopies, 193

photographs and pictures, 194

product catalogs, 192

slides, 195

trade literature, 192

Indexing systems, alphabetical, 174

alpha-numerical, 175

classified, 175

combination indexing and filing, 84, 183

machine, 85

numerical, 175

separate image and index, 185

storing document image, 84

Industrial research laboratories (directories), 311

Information for Industry, Inc., 191, 248

Information Retrieval Corporation, 185

Information retrieval systems, 83-85, 178-186

combination indexing and filing, 183-184

machine, 185-187
costs, 186

manual, 182-183

peek-a-boo, 183, 191

review of, 180

Zator, 183

In-service training programs, 33

Institution archives, searching of, 257

Interlibrary loan, 212-213

locating books for, 213

locating periodicals for, 214

Insurance, 52

International Conference on Scientific Information, 240

John Crerrar Library, 7, 33

KWIC indexing, 198

Keysort, 182
Laboratory notebooks, indexing, 196
Layout planning, 59
Librarian, duties, 23
qualifications, 30
title, 27
training, 30-32
Library assistants, cataloger, 38
order or acquisitions, 36
reference, 35
Library bulletins, 221-237, 291
content, 223
costs, 221
texts, 229-230, 232-237
format, 224
frequency, 225
methods of duplicating, 225-226
methods of preparing, 221, 226
surveys, 222
Library committee, 16, 287
Library furniture, 67-71
manufacturers, 69
Library handbooks, 289
Library Journal, library buying guide, 87
Library of Congress, classification, 148-150
printed cards, 164
subject headings, 154
Library school curricula, 32
Library supply houses, 86
Library systems surveys, 7-8, 23
Library's publics, clientele, 287-294
management's, 294-296
professional relationships, 296-298
staff, 284-286
Lighting, 65
Literature guides, 241
Literature searcher, duties, 36, 239
qualifications and training, 37
Literature searches, comprehensive, 247-265
index search record form, 250
procedures, 248-263
record of, 242-243, 258
searching services, 247-248
MEDLARS, 158
Magnavue, 184
Manuscript aids, 308
Maps, indexing and filing, 195
Market data and statistics, sources, 319
Masters' theses, sources of, 121
Mead Corporation Library, 64
Mechanized services, 248, 265
Mellon Institute of Industrial Research Library, 65
Mending tape, 87
Microcine, 185
Microfilm cameras, 75
Microfilm reading machines, 73-75
hand viewers, 74
manufacturers, 74
reader-printers, 75
Microtext reading machines, 76
Minicard, 184
Mimeograph, 78
Chiang small duplicator, 78
Multilith copiers, 79
for catalog cards, 165
Monsanto Chemical Company Library, annual report, 290
National Catalogue of Patents, 269
National Library of Medicine, classification, 151
MEDLARS project, 158
Nonconventional indexing, bibliographies, 180
combination indexing and filing, 84
costs, 186
equipment for, 83
machine systems, 85, 178
manual systems, 83, 182
Organization charts, 10-12
Organization reports, indexing of, 195
Organizational status of libraries, 6
Pamphlet boxes, 86
Pamphlets, filing, 64
indexing, 188
Patent literature, 265-270
Patent searching, 270-273
forms for, 272
questions, examples of, 274
Patents, definition, 266-267
filing and indexing, 191
French chemical on Microcard, 269
location and selection, 268
Peek-a-boo indexing, 183, 221
Periodicals, back files acquisition, 50, 136, 140
binding, 51
dealers for, 138-139
definition, 125
in microform, 132
importance, 124
preservation of files, 140
records of, 71-72, 134
routing, 208-209, 220
selection for subscription, 125-130
source lists, 127-129
subscription procedures, 130-131
Personal service, 219, 292
Personal sources (for information), 258
Photocopies, how to procure, 215-216
Photocopying, equipment, 81-82
service, 292
Photostat camera, 82
Position evaluation, 25
Product catalogs, indexing, 192
Professional relationships, 296-298
Professional societies, 17
Publishers' services, 100
Public relations, 281-283
media and techniques, 299-301
Ranganathan classification, 151, 176
Rapid Selector, 184
Reader-printers, 74
manufacturers, 75
Readers' services, 203-217
book circulation, 203-204
Reference citations, 258-260
Reference librarian, 36
Reference questions, 238-246
examples, 246
how to answer, 245
kinds, 244
patents, 274-276
record, 242
Reference record forms, 260
Report literature, indexes to, 256
indexing, 190
searching, 255
Reprints, procuring, 121
Routing of periodicals, 208-209, 220
Royal Society Scientific Information Conference, 240
Salaries, 47-48
Science Information Exchange, 248
Scientific and technical libraries, designation, 5
functions, 15
organizational status, 6-9
origins, 9
planning for, 13
Scientific organizations, directories, 311
Secretary, duties and qualifications, 39
Sertafilm, 193
Shelf list, 163
Shelving, design, 69
suppliers, 70
Slides, indexing and filing, 195
Smithsonian Institution, Science Information Exchange, 248
Space for library, allocations, 56-58
requirements, 55
Special information indexes, 220, 245, 292
Special library, definition, 1
functions, 2
Special Libraries Association, classification schemes, 156, 177
survey, 24
Specifications, sources, 110
Staff, communication, 285
manual, 26, 285
orientation, 27, 285
procurement, 39
size, 22-24
Standards and specifications, sources, 118, 318
State and municipal documents, 116
Statistics, sources, 319
Style manuals, 308
Subject headings, 153-158, 187
sources, 156, 187
thesauri, 187, 190
Subscription agencies, 131-132
Technical Book Review Index, 94
Technical dictionaries and encyclopedias, 312-313
Technical processes, 145-168
Technical reports, regional centers, 113
significance, 115
sources, 111-116
Technical writing guides, 309
Thermofax copier, 81
Trade literature, indexing, 192
searching, 254
sources, 110
Trade names information, 319-320
Trademarks, 273
Training for science librarianship, 30-33
Translator, duties and qualifications, 37
Travel, allowance in budget, 53
guides, 308
Thomas Register of American Manufacturers, catalogs in microtext, 110
Translations, sources, 118
Typist-clerk, duties and qualifications, 39
Unidoc Service, 107
Union catalogs, 214
United Aircraft Corporation, subject headings, 174
U.S. Naval Avionics Facility Library, 66
United States Book Exchange, 140
Uniterm index, for patents, 191
system, 265
to U.S. chemical patents, 248
to U.S. Electronics patents, 248
Universal decimal classification, 151, 176
Universities and colleges, directories, 311
The Upjohn Company, annual report, 290
Vendor-Specs-Microfile, 110
Verac, 185
Verifax copier, 80
Walnut, 185
Western Reserve University School of Library Science, 157, 178
Xerox copier, 81
Zatocoding, 183
"A book that is shut is but a block"

CENTRAL ARCHAEOLOGICAL LIBRARY

GOVT. OF INDIA
Department of Archaeology
NEW DELHI.

Please help us to keep the book
clean and moving.

S. B., 146. N. DELHI.