

**ENCYCLOPEDIA  
OF LIBRARY  
AND  
INFORMATION SCIENCE**

**VOLUME 1**

**EXECUTIVE EDITORS**

**Allen Kent  
Harold Lancour**



# ENCYCLOPEDIA OF LIBRARY AND INFORMATION SCIENCE

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**VOLUME 1**

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MARCEL DEKKER, INC., New York • Basel

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MARCEL DEKKER, INC.  
270 Madison Avenue, New York, New York 10016

LIBRARY OF CONGRESS CATALOG CARD NUMBER 68-31232

ISBN 0-8247-2001-6

Current Printing (last digit):  
10 9 8 7 6 5 4

PRINTED IN THE UNITED STATES OF AMERICA

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## PREFACE

World War II used the store of accumulated human knowledge as did no other. It has been asserted by some that locating and retrieving existing knowledge and information became a vital key to victory. Many people and considerable sums of money were involved in the task of developing techniques and devices to facilitate the handling of information.

The need and the process were certainly not new. They began with man's earliest efforts to recall and to communicate. As records became more permanent and began to accumulate, the process became more complex, finally calling for specialists to carry it out. From this came library science and the profession of librarianship.

Under the heightened stress of wartime pressures and with the vastly increased store of recorded knowledge, the methods of information control then in use were inadequate to handle the load. New procedures utilizing recently perfected electronic and mechanical devices had to be developed, often by personnel recruited from the user ranks of science or technology. Chemists long concerned with the classification of chemical formulae, botanists trained in taxonomy, mathematicians familiar with the representation of complex matters in symbolic terms, experts in structural linguistics, and engineers experienced in systems development all contributed. From this emerged what is termed information science.

The need for serious attention to the problems of information control and knowledge retrieval continued unabated after the War as research activity mounted in all fields throughout the world. Where were the personnel to do this to be found? The schools of librarianship in Europe and America were teaching a curriculum largely based on procedures, technologies, and institutions established in the 19th and early 20th century. Their graduates were too few in number and, for the large part, inadequately prepared to cope with the needs of the post-war conditions. Yet the basic problems were precisely those, in substance though not in degree, confronted by the library profession through two millennia.

Thus it was that, in 1955, Dean Jesse Shera of the Western Reserve University School of Library Science invited J. H. Perry and one of the present editors to join that institution to establish the first "Center for Documentation and Communication Research."

The waves from that dropped pebble have moved out to cover the world. It was only a matter of time to the instance of a recognized school of library science changing its character and its name to the Graduate School of Library and Information Sciences, as at the University of Pittsburgh in 1963. Similar identifying names are now found at the University of Maryland, School of Library and Information Services; University of Western Ontario, Graduate School of Library and Information Science; University of Sheffield, Postgraduate School of Librarianship and Information Science; and others.

It was also only a matter of time before an enterprising publisher experienced

in the production of major reference works in science and technology would recognize the usefulness of a comprehensive coverage of the broadened field of modern librarianship. The editors, who have a known commitment to a new discipline built upon time-tested foundational principles and incorporating all of the new concepts and techniques, were approached and accepted the challenging opportunity to create a basic compendium of what has become an integrated library and information science. This work is the result.

The editors are equally committed to a "one-world" concept of their science. To this end the approach has been strongly international, as expressed through the composition of the Advisory Board, the choice of contributors, and in the editors' instructions to the contributors.

A more accurate description of the basic editorial policy would be that this work is not so much inter-national as it is non-national, although, admittedly, this has not been easy to accomplish. Nor, indeed, have we been completely successful in conveying this highly sophisticated notion to all contributors equally. But it has been a constant aim.

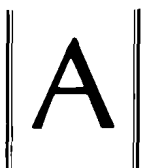
The emphasis has been, throughout, on depth of treatment. While the contributors were urged to stress basic information, they were likewise encouraged to express their evaluative opinions as well and, wherever possible, to suggest and indicate future trends as they saw them.

This Encyclopedia is arranged in one straight alphabet, as is a dictionary. There are cross references from one heading to another which for one reason or another we preferred to use. The final volume will contain a detailed analytical index to the entire work which is to be used as the principal means of getting into the body of the text. Where appropriate, at the end of the article will be found references to other articles for additional information on the same general topic.

In a work such as this there are many references to individuals both living and deceased. Biographies of many prominent figures in the fields within the scope of the Encyclopedia are included in the regular alphabet. Such biographies are for deceased individuals only.

The editors have frequently found it necessary to turn to their immediate colleagues for counsel and advice on specific points of substance or organization. The following have been particularly helpful and their advice is gratefully acknowledged. Each is a member of the Faculty of the University of Pittsburgh, Graduate School of Library and Information Sciences with but one exception, Dr. Nasser Sharify, who was once a member of the Faculty: Jack Belzer, Jay E. Daily, J. Clement Harrison, Norman Horrocks, William V. Jackson, Frank B. Sessa, Nasser Sharify, C. Walter Stone and Siegfried Treu.

ALLEN KENT  
HAROLD LANCOUR



## ABBREVIATIONS

An abbreviation can be defined as a shortened form of a word or term. Abbreviations are an attempt to communicate information fast, accurately, and with a minimum of confusion and misinterpretation. This goal is not always achieved. To many people, particularly to those new to a field, reports and papers sometimes seem to be written in a telegraphic style with abbreviations so interspersed as to make the message almost meaningless. Frequently it is necessary to search through several reference books to find the exact word or phrase represented by an abbreviation. Owing to the lack of a comprehensive dictionary of abbreviations and the disparity of definitions of abbreviations among subject areas, it is common practice in most scholarly publications to include in the introductory text or in an appendix at the end of the book a list of the abbreviations used. Another method is to explain the abbreviation to the reader the first time it appears.

Librarians, like everyone else, tend to use abbreviations to save space and time and to eliminate the necessity of repeating words or phrases that are long and complicated. In the library and information science field, abbreviations are used primarily for periodical and book titles, names of organizations, corporate author entries, names of computer programs, and publishers' names.

The following are examples of abbreviations used in library literature:

n.d.	no date
o.p.	out of print
ed.	edition, or editor(s)
p.	page
illus.	illustrated
pub.	publication, or publisher
rev.	revised, or revision
pt.	part
per.	periodical

Many abbreviations are immediately recognizable as the first letters of the word. The most obvious example in this case is the abbreviation “lib” for “library” or “librarian.” Other abbreviations are recognized as the first and last letters of the word. An example of this type is the abbreviation “ca.” for the word “circa.”

### Acronyms

There are abbreviations which use the first letter of several words, such as the name of an organization. Examples of this type in the library field are “ALA” standing for “American Library Association” and “LC” standing for “Library of Congress.” This type of abbreviation is now being referred to by the term “acronym.” The increasing use of abbreviations for the names of commissions, departments, companies and products, professional societies and associations, labor unions, and government agencies has occurred since the turn of the century.

It has become apparent that some effort has been made to devise an acronym that can be pronounced and then to find appropriate words to fit the initials. There are some names of library organizations that can be pronounced—not necessarily implying that any of them have been devised to fit predetermined initials. “IFIPS” is an abbreviation that can be pronounced; it stands for “International Federation of Information Processing Societies.” Another acronym, “MEDLARS,” is an abbreviation for “Medical Literature Analysis and Retrieval System.”

### Dictionaries of Abbreviations in the Library Field

An absolutely comprehensive list of abbreviations used in the library and information sciences does not exist. A selected list of abbreviations used in library terminology appears in *ALA Glossary of Library Terms*, compiled by Elizabeth H. Thompson and published by the ALA in 1943. Other lists of library abbreviations appear in the following:

Akers, S. G., *Simple Library Cataloging*, 4th ed., American Library Association, Chicago, 1954.

Bako, E., comp., *Hungarian Abbreviations*, Library of Congress, 1961.

- Blackburn, F. M., "Booksellers' Terms and Abbreviations; an Annotated Glossary," M.A. thesis, Kent State Univ., Kent, Ohio, 1951.
- Carnes, C. C., "Guides to Technology's New Tongue (Acronyms and Abbreviations)," *STWP Rev.*, 12, No. 3, 4 (1965).
- Dmitrieff, A., *Russian-English Glossary of Library Terms*, Telberg Book Corp., New York, 1966.
- Fisher, E. L., "Sokpashcheniia (Abbreviations) for Bibliographic Search," *Bibliog., Spec. Lib.*, 49, 365-370 (1958).
- Furness, K. Z., *Bulgarian Abbreviations: a Selective List*, Library of Congress, 1961.
- Haymon, S., "Short of It," *Lib. R. No.* 123, 165-169 (1957).
- Jarrell, H. R., "Annotated Bibliography of Sources of Abbreviations and Symbols in Various Subject Fields," M.S. thesis, Western Reserve Univ., Cleveland, 1958.
- Moran, L. C., "Polish and Russian Book Trade Terms and Abbreviations," *Spec. Lib.*, 49, 246-252 (1958).
- Moravek, E., and E. Bernath-Bodnar, *Verzeichnis Ungarischer Fachausdrucke und Abkürzungen aus Dem Buch- und Bibliothekenwesen mit Übersetzung ins Deutsche, Französische und Englische* (Index of the Expressions and Technical Hungarian Abbreviations in the Domain of Books and Library Economy, with Translation in German, French, and English), Österreichische Nationalbibliothek, Vienna, 1958.
- Neeland, F., *A Bibliography on Information Technology for 1966*, American Data Processing, Inc., Detroit, 1967.

### Printing, Filing, and Alphabetizing Abbreviations

Abbreviations in text are usually shortened forms of words and are printed in lower-case letters. Acronyms are usually printed in upper case, since the use of capital letters seems to convey to the reader that the abbreviation is taken from the first letters of words in a phrase. Punctuation is inconsistently used on abbreviations. A final period is always used on an abbreviation that forms a word when the abbreviation may be mistaken for a word and is not written in capital letters. The same abbreviation is commonly used for both plural and singular forms of a word. Variations in an abbreviation sometimes exist for different forms of a word.

In alphabetizing abbreviations, all periods, slashes, hyphens, apostrophes, subscripts, and superscripts are generally disregarded. Numbers which appear in abbreviations are alphabetized as though they were spelled out.

The filing of abbreviations is a problem to library and information scientists. Most filing rules include a procedure dealing with the filing of abbreviations. Over the years many variations of filing rules have been developed for the manual filing of catalog cards. The following are significant ones currently being used in the library field:

*ALA Rules for Filing Catalog Cards*, American Library Association, Chicago, 1942.



*Filing Rules for the Dictionary Catalogs of the Library of Congress*, U.S. Library of Congress, Processing Department, 1956.

A book entitled *Computer Filing of Index, Bibliographic, and Catalog Entries*, by Dr. T. C. Hines and Mrs. J. L. Harris, was published in 1966. This book of rules for filing entries in alphabetic order is intended for filing in a purely mechanical manner, as with a computer. Included in the code is a section covering the filing of abbreviations.

### Standards for Periodical Title Abbreviations

#### GENERAL

In general, standards for abbreviating do not seem to exist or are not generally accepted, which means that several abbreviations may be used for a single word or phrase. The publication of dictionaries or catalogs of abbreviations should increase the use of standard abbreviations and avoid confusion. Standards applied to abbreviations can provide a common base and permit communication in a clear, concise, and exact language.

Librarians have long recognized the necessity for standardization in periodical title abbreviations. Citations in bibliographies and footnotes can be vague and confusing, especially when abbreviated titles are identical. Over the years innumerable articles have been written on the subject of abbreviations of titles of periodical articles. Among recent articles are the following:

Artelt, W., "Problem of Abbreviating the Titles of Medical Periodicals," *Assoc. Bull.*, 43, 52-57 (1955).

Brode, W. R., "Journal Abbreviations," *Phys. Today*, 4, No. 8, 4-5 (1951).

Dezsenyi, B., "L'abreviation des titres de periodiques" (Abbreviation of Periodical Titles), *Magyar Könyvszemle*, 73, 223-227 (1957).

Drachmann, A. G., "Danish Standard for Abbreviation of Titles of Periodicals: DS 909," *Libri*, 6, No. 3, 247-254 (1956).

Fisher, E. L., "Abbreviations of Russian Scientific Serial Publications," *Am. Doc.*, 10, 192-208 (1959).

Goyal, R. S., and S. N. Raghav, "Abbreviations for Titles of Periodicals in Indian Languages," *Lib. Herald*, 1, 16-21 (1958).

"International Code for the Abbreviation of Titles of Periodicals," *UNESCO Bull. Lib.*, 9, 7-8 (1955).

Kent, F. L., "Periodica Abbreviata and International Standardization," *J. Doc.*, 10, 59-64 (1954).

Moran, L. C., "Polish and Russian Book Trade Terms and Abbreviations," *Spec. Lib.*, 49, 246-252 (1958).

Ranganathan, S. R., "Abbreviated Titles of Periodical Publications," *Abgila*, 2, 81-89 (1951).

Richmond, P. A., *Index to Scientific Journal Title Abbreviations Found in the Physical Review*, Report AIP/DRP 64-4, American Institute of Physics, New York, 1964.

Rogers, F. B., and T. Charen, "Abbreviations for Medical Journal Titles," *Med. Lib. Assoc. Bull.*, **50**, 311-352 (1962).

"Skroty Tytulow Czasopism" (Abbreviations of Titles of Periodicals), *Biul. IB*, **4**, No. 1, 1-21 (1953).

"Skroty Tytulow Czasopism; Uzupełnienie Słownika i Sprostowania" (Abbreviations of Titles of Periodicals; Supplement and Corrections), *Biul. IB*, **4**, No. 4, 157-160 (1953).

A brief set of rules for abbreviating periodical titles was published in *World List of Scientific Periodicals* in 1925. The abbreviations based on the rules appeared with the title of the periodical. In 1928 a draft of a German standard based on the same rules was published. In 1930 the International Institute of Intellectual Cooperation in Paris published the "Code international d'abbreviations des titres des periodiques." In 1938 the International Federation of National Standards Associations accepted the "Code international" and published it with a selected list of abbreviations based on it as ISA Bulletin 23. The International Organization for Standardization (ISO) revised the text in 1948 at the Hague, modified the revision at Ascona in 1950, and approved it in Copenhagen in 1952. The final draft was circulated to the ISO member bodies, accepted by the majority, and finally approved as an ISO Recommendation.

#### USASI STANDARD Z39.5-1963

One of the nearly 3000 standards approved by the United States of America Standards Institute (USASI) is entitled "Periodical Title Abbreviations." The standard was prepared by a subcommittee of the Sectional Committee Z39 on Standardization in the Field of Library Work and Documentation. Committee Z39 is organized under the procedures of USASI and sponsored by the Council of National Library Associations. The Subcommittee on Periodical Title Abbreviations was organized in December, 1961.

The subcommittee obtained lists of title-word abbreviations from *Index Medicus*, *Biological Abstracts*, *Bibliography of Agriculture*, *Chemical Abstracts*, and other abstracting journals. A primary list of these abbreviations was compiled. The subcommittee determined standard abbreviations based on the current practice. Standard Z39.5-1963 was submitted by the subcommittee to Sectional Committee Z39 on February 15, 1963, and was approved by the committee on August 1, 1963. The Council of National Library Associations, the sponsoring organization, approved the standard and submitted it for approval to the American Standards Association, now reconstituted as USASI. Final approval was given to USASI Standard Z39.5-1963 on November 20, 1963. Grants received from the National Science Foundation and the Council on Library Resources made the work on "Periodical Title Abbreviations" possible.

According to the stated purpose, "This standard is to serve as a guide for the creation of periodical title abbreviations. It is to be regarded as indicating the limits permitted for abbreviations." A list of standard abbreviations for the most common title words are listed in the standard. For example, the most commonly used words in periodical titles are "Bulletin," "Journal," "Proceedings," and "Transactions." The standard abbreviations for these words are, respectively, "Bull.," "J.," "Proc.," and "Trans."

Rules for omitting letters, word order, capitalization, and punctuation are set forth in the standard. A section entitled "Clarification in Abbreviation" gives examples of conflicting title words, stating that "The same abbreviation shall not be used for unrelated words," and "Two abbreviations shall not be used for the same word." In the case of similar title abbreviations, the standard advises: "Distinguish between similar or identical title abbreviations by giving the place of publication (city or country) in parentheses after the title abbreviation." The examples cited are *Chemistry and Industry* to be abbreviated *Chem. Ind. (London)*, while *Chemische Industrie* is abbreviated as *Chem. Ind. (Duesseldorf)*.

With the acceptance of the USASI standard, efforts are underway to promulgate the information. The Chemical Abstracts Service has issued a publication entitled "Guide for Abbreviating Periodical Titles" which is based on the USASI Standard Z39.5-1963. One section of the guide lists those abbreviations which differ from the ones previously used by Chemical Abstracts Service in its publications. With technical societies like the American Chemical Society (Chemical Abstracts Service is a Division of the American Chemical Society) encouraging their members to use the standard, less time will be expended in tracing elusive periodical citations.

#### MINABBS

A study on a method to aid in the location of correct titles of periodicals from abbreviated references which may be unfamiliar, unusual, incorrect, or ambiguous was conducted by M. L. Tompkins, University of California at Los Angeles, and J. W. Tukey, Princeton University and Bell Telephone Laboratories. A discussion of their system appears in their paper entitled "Permuted (Circularly Shifted) Indexes to Abbreviations: A Mechanically Prepared Aid to Serial Identification," which was published in *Proceedings of the American Documentation Institute, 1966 Annual Meeting, October 3-7, 1966, Santa Monica, California*.

They first developed a standard form of abbreviation, which they call "minabb" for "minimum abbreviation." A few examples of the rules will serve to demonstrate how the minabb abbreviations are formed. Basically the minabb consists of some initial portion of the word being abbreviated. When four consecutive consonants appear, this sequence of letters becomes the abbreviation; e.g., the minabb for "Schwierz" is "Schw." Also, if a vowel is followed by a consonant, the minabb stops before the next vowel. An example of this rule is the word "aerospace," which becomes the minabb "aer."

After they formed the minabb for the significant words in the title of a periodical, the minabb and the complete title of the periodical were prepared as input to be

compiled by computer into a cross-reference index. The final product was a permuted index of the minabb abbreviations, with the complete title of the periodical appearing on the same line as a cross reference. Thus *Gaz Mat Buch*, the minabb for *Gazeta Mathematica Bucharest*, was indexed as follows:

<i>Gaz Mat Buch</i>	<i>Gazeta Mathematica Bucharest</i>
<i>Gaz Mat Buch</i>	<i>Gazeta Mathematica Bucharest</i>
<i>Gaz Mat Buch</i>	<i>Gazeta Mathematica Bucharest</i>

This example shows the four basic parts of the system:

1. Each significant word in the periodical title was assigned a minabb.
2. Each minabb was circularly shifted to appear in alphabetic order.
3. The complete minabb title appeared on the same line.
4. The complete title of the periodical appeared on the same line, thus identifying the periodical for the searcher.

#### CODEN

In connection with periodical title abbreviations, Dr. Charles Bishop went one step further by introducing an extremely abbreviated title: a four-letter mnemonic code which he named "CODEN." In his paper "An Integrated Approach to the Documentation Problem," which appeared in *American Documentation*, 4, 54-65 (1953), he described the first systematic approach to assigning the code. To briefly demonstrate the technique for assigning these mnemonic codes, the CODEN for titles of some library periodicals are as follows:

<i>American Documentation</i>	AMDO-A
<i>Library Journal</i>	LIBJ-A
<i>Library Quarterly</i>	LIBQ-A
<i>Library Trends</i>	LIBT-A
<i>Library World (London)</i>	LIWO-A
<i>Special Libraries</i>	SPLB-A
<i>Wilson Library Bulletin</i>	WLBU-A
<i>Zentralblatt Fur Bibliothekswesen</i>	ZBBB-A

After developing almost 4000 CODEN, Dr. Bishop suggested that the American Society for Testing and Materials (ASTM) assume the custody and responsibility for the CODEN, since ASTM was the largest user of the codes at the time.

In 1961 Dr. L. E. Kuentzel, vice-chairman of the Committee E-13 on Absorption Spectroscopy of ASTM, undertook the project of assigning the codes and making certain there was no duplication of any sort in the set of codes. A directory of CODEN was published by ASTM in 1963 entitled *CODEN for Periodical Tables*. A supplement was published a year later under the title *CODEN for Periodical Titles, Supplement 1*. The number of CODEN assigned at that time totaled approximately 25,000.

In 1966 the responsibility for the CODEN project was transferred to the ASTM