

## A BOOK CATALOG AT STANFORD

Richard D. JOHNSON: Stanford University Libraries, Stanford, Calif.

*Description of a system for the production of a book catalog for an undergraduate library, using an IBM 1401 Computer (12K storage, 4 tape drives), an expanded print chain on the 1403 Printer, and an 029 Card Punch for input. Described are the conversion of cataloging information into machine readable form, the machine record produced, the computer programs employed, and printing of the catalog. The catalog, issued annually, is in three parts: an author & title catalog, a subject catalog, and a shelf list. Cumulative supplements are issued quarterly. A central idea in the depiction of entries in the catalog is the abandonment of the main entry concept. The alphabetical arrangement of entries is discussed: sort keys employed, filing order observed, symbols employed to alter this order, and problems encountered. Cost factors involved in the preparation of the catalog are summarized.*

In November, 1966, a new library opened at Stanford University. Designed primarily to serve undergraduates, the J. Henry Meyer Memorial Library is a major addition to the libraries on the University's campus. A four-story structure with 88,000 square feet of usable space, it has shelving for 140,000 volumes and seating for 1,900 readers. The new library has numerous distinctive features. One is the subject of this account—the catalog. There is no standard card catalog in the building. Instead, copies of a book catalog are situated at eighteen locations throughout the library, easily accessible to all students and staff. In addition, copies

of the catalog have been placed at other points on the campus: the main and departmental libraries, offices of academic departments, and student dormitories.

The literature now contains numerous accounts on the preparation of book catalogs in libraries (1,2). One may question the value of yet another narrative, but an account of the Stanford experience is valuable for several reasons. The genesis of the Stanford book catalog has been recorded, and a follow-up describing what happened subsequently is the next chapter in the story. The book catalog experience at Stanford is now sufficiently advanced that one may recount the undertaking both in depth and breadth—from its inception, through design, implementation, and first full year of operation. Such an account can give Stanford's approach to some still unsolved problems; for example, filing order, and the innovations it has made. The particular environment within which the book catalog was designed was conducive to innovation, because the entire University Library system was not itself committed. Finally, the approach here employed has been eclectic, and this report can record thanks to the many individuals and institutions whose ideas and plans have been examined for possible use in the Stanford undertaking. Of particular importance to this project were the example and experience of Florida Atlantic University, the Ontario New Universities Library Project at the University of Toronto, and the Columbia-Harvard-Yale Computerization Project.

## ORIGINS

The Stanford book catalog had its origins in 1962. During planning for an undergraduate library it was felt a catalog in book form and available in many locations would have immeasurable educational benefits for the students. Particularly was it felt that the subject portion of such a catalog would prove a valuable bibliography to students in the University (3). Somewhat later, when the size and proposed layout for the new library indicated the desirability of at least three complete card catalogs as an adequate guide to the collection, further emphasis was given to the possibility of a book catalog in multiple locations.

A grant in 1963 to Stanford University from the Council on Library Resources, Inc., permitted a study by Robert M. Hayes and Ralph M. Shoffner on the economics of book catalog production. This investigation compared the costs of the various ways in which a book catalog can be produced (4). Of the methods considered, Stanford selected the computer to study further. The computer was chosen not only because equipment was already available on campus but also because of the recent introduction of an expanded print chain with the capability of printing upper and lower case letters as well as necessary diacritical marks.

In the fall of 1964 Stanford undertook further study, employing the Hayes-Shoffner report as a basis but now comparing refined costs of a

computer-produced book catalog with costs for three complete card catalogs in the new library, as well as costs for two shelf lists and main entries in the University Libraries' union catalog. This second study was completed in December, 1964, and University officials approved the preparation of a computer-based book catalog for the library when it was determined that such a catalog would prove more useful, and for a few years less expensive, than the three card catalogs (5).

While the autumn study was in progress, cataloging of the new library's collection began. Plans were made for three card catalogs. Although the card catalogs were never prepared, the planning was of considerable value later in establishing field and record lengths for the machine record, as well as in securing general agreement on the kind of information to include and the format of the final catalog.

### SYSTEMS DESIGN

Preliminary systems design began in January, 1965. A systems engineer from IBM guided a team of University staff composed of librarians and personnel from the Administrative Data Processing Center in the Controller's Office. At the outset it was recognized that the assignment to produce a book catalog for the new library did not call for consideration of the other aspects involved in the library's operations, such as acquisitions, circulation and reference. But as work proceeded, efforts were consciously made to design a system that could be integrated into a larger system at a later date.

The basic object of the preliminary systems design was to refine further the cost estimates from the study of the preceding autumn. The system as it was being designed, however, called for increased machine time and corresponding increases in cost for processing as well as for programming.

In retrospect, the major achievement of the preliminary systems design was to establish the environment for a meaningful dialogue between the librarian and systems and computer personnel. When the study began, the librarian requested a system that would have involved use of a large configuration of equipment with direct-access capability. The systems and computer staff approached the design with knowledge of the equipment that would be used for the project (an IBM 1401 Computer, 12K storage, 4 tape drives) and thought in terms of fixed-length records and fixed-length fields. Through a program of mutual education, the librarian learned of the computer and what it could do and what it could not do; and systems and computer personnel learned of the library's requirements and desires. There evolved the basic design for a system capable of being implemented on the equipment at hand and acceptable to the library.

As preliminary systems design drew to a close, necessary equipment was ordered. The principal element was the expanded print chain for

the IBM 1403 Printer, containing 100 different characters and developed earlier by Florida Atlantic University, Yale University, and the University of Toronto. In addition, appropriate modifications were made to the central processing unit of the 1401 Computer to be used in the project. For the inputting of data the IBM 026 Card Punch was selected. It was available, and there was considerable local experience in its use. A modification made to it simplifies punching of one character, the word-separator character, used to designate an upper-case letter. Delivery time on the 026 Card Punch was four months. Although it was realized that the newly announced IBM 029 Card Punch would be superior for our project, delivery time on it was one year. Even before the 026 Card Punch was received in July, 1965, an order was placed for an 029. The 029 replaced the 026 in August, 1966. The 029 Card Punch, designed for use with System/360, was considered superior to the 026, because it is possible to punch each of the characters specified on the expanded print chain without resorting to the multi-punch key. Appropriate modifications were ordered for the 029 so that desired characters would print at the top of the punched cards.

Detailed systems design was completed by June, 1965, and the system may be described in the following manner.

## OUTPUT

The design called for four basic outputs from the system:

1. An edit list to facilitate proofing of the items converted into machine readable form. This was considered essential because of print-out in upper and lower case.
2. An author & title catalog listing items under their author and title entries.
3. An alphabetical subject catalog listing items under Library of Congress subject headings.
4. A shelf list entering all items in call number order (the Library of Congress classification was adopted in May, 1965), giving all tracings for a particular entry, as well as the number of volumes and copies and their location in the library.

A complete catalog was to be printed annually (author & title, subject, and shelf list) with cumulative monthly supplements to each. Output for the annual author & title catalog and subject catalog from the computer printer were to be photographically reduced, offset masters created, and fifty copies printed. The catalogs were then to be bound in reusable binders. Later it was decided to restrict use of the reusable binders to the shelf list, printed in four copies, and the supplements for the author & title and subject catalogs, to be printed in six copies, and to bind the basic annual catalog in standard book form. It was also decided to print ten copies of the author & title and subject supplements.

It was originally proposed to divide the catalog in a slightly different manner: names (as authors and as subjects) and titles in one section, and topical subjects in the other. Although this seemed to have considerable logical value, it proved impossible to implement during preliminary work with card files, given the time and staff available.

Provision was also made to print the catalog in one section as a dictionary catalog if so desired, or on cards if the book catalog should be abandoned at a later date.

## INPUT

To achieve the above output, the design called for four kinds of input into the system:

1. Entries for titles cataloged. A separate record was to be made for each volume or copy of a title cataloged so as to provide holdings information for the shelf list and for integration into a circulation system at a later date.
2. Cross references to connect headings in the author & title catalog and in the subject catalog. In addition, the cross reference format would permit the introduction of information notes into any of the catalogs.
3. Changes to entries that are in the catalog.
4. Entries for items that are on order, with a view to integrating this form of input into a larger acquisitions system at a later date.

## IMPLEMENTATION

The systems design called for the preparation of eight different computer programs to transform the input into the various documents as specified above. The basic programs were written during the six-month period of June-December, 1965. During the first part of 1966 the programs were debugged and the very important change procedure prepared that enables revision or deletion of a record. Coincident with the preparation of the programs, library staff began in July, 1965, the inputting of cataloging information. The expanded print chain was installed in June, 1965, and edit listings for proofing purposes were available in August. In order to test the programs and study the catalog's format, a first test catalog was prepared in January, 1966. A second test, incorporating the change procedure, was undertaken in April; and a third, partial, test was run in June.

## THE MACHINE RECORD

When Stanford first considered the costs of a book catalog in 1962, it was quickly discovered that the most expensive element was reproduc-

tion of the individual pages. This factor influenced many decisions in design: The more entries per page, the fewer pages and less overall expense. It became necessary then to consider which elements in a standard catalog entry could be omitted or abbreviated. Decisions were fairly simple to make. The collection duplicates almost entirely material in the main research library's collection, with full bibliographical information given in that library's union card catalog. In addition, browsing is encouraged among the open shelves of the new library. The books are readily available should further information be required.

Along with the factor of cost another element appeared—the desire to make a book catalog that would be something more than reproductions of unit catalog cards. As this thought evolved, it was learned that more space could be saved in the catalog through abandonment of the unit card and main entry concept. Articles by Ralph H. Parker (6) and Wesley Simonton (7) were instrumental in developing this aspect of the system.

The Library was amenable to a short entry in the catalog, but the actual length was another matter. From a sampling of items cataloged, it was learned that more than 99 per cent of the entries would be less than 500 characters in length. There was considerably less certainty on maximum lengths for the individual units, or fields, composing each entry. Computer personnel argued in favor of a fixed-length machine record in order to simplify programming, and a successful compromise was made: There was to be a fixed-length record composed of one fixed-length field and six variable-length fields. Each record is 570 characters in length. For the few catalog entries that are extremely long it is possible to use two records for one catalog entry. The maximum length for any catalog entry is thus approximately 1,000 characters. It is possible to enter even longer units by dividing them into sections and entering each as an analytical entry. To speed input-output time and to conserve space on tape, the records are placed on magnetic tape in blocks of two records each.

Each of the six variable-length fields in the record is individually tagged. It was learned during the preparation of a later program that it would be necessary to restrict the overall length of any one field, and it was agreed that the maximum length of any one of the variable-length fields would be 400 characters. Through a misunderstanding, the author did not realize that in tape storage an upper-case letter is equivalent to two characters, a factor not taken into account when record and field lengths were established. Fortunately, this minor error has occasioned no problem.

#### THE MASTER TAPE RECORD

The master tape record (Table 1) illustrates how all of the information appears on magnetic tape. (Figure 5 gives an example of the layout.)

Table 1. *Map of Master Tape Record.*

<i>Position</i>	<i>Type of Information</i>
1-30:	Library of Congress classification
31-35:	Size and/or format of publication (e.g., folio, Mfilm)
36-42:	Volume number
43-44:	Part number
45-46:	Copy number
47:	Type (blank: monograph, no anal.; 1: monograph, anals. made; 2: serial received in unbound form; 3: serial, unbound, anals. made; 4: serial received in bound form; 5: serial, bound, anals. made; 6: analytic; 7: author-title cross reference; 8: subject cross reference; 9: item on order)
48:	Record indicator (program supplies "1" if there is an overflow record and "2" in second record)
49:	Special location in library (code A-Z)
50:	Change indicator (code C for revision; code D for delete)
51:	Title indicator (code T if entry desired under title)
52:	Shelf list indicator (code S if entry is to appear in shelf list only)
53-54:	Year acquired (e.g., 67)
55-57:	Month and year reported missing (e.g., 117 for Nov. 1967). It is assumed a book will be removed from the catalog if missing more than nine years.
58-71:	Future codings
72-77:	Address and length of main entry (Area 20) (three positions for address, three for length)
78-83:	Address and length of conventional title (Area 30)
84-89:	Address and length of title paragraph (Area 40)
90-95:	Address and length of notes (Area 50)
96-101:	Address and length of subject headings (Area 60)
102-107:	Address and length of added authors and added titles (Area 70)
108-570:	Variable length fields

## THE FIELDS

To simplify coding and keypunching, each field in the record is called an Area and numbered 10 through 70. As will be shown later, these numbers are not transferred to tape. A description of the seven fields in each record can give a good idea of the elements included in cataloging and how the unit card/main entry concept was abandoned.

Area 10 is the one fixed-length field in the record. It is 71 characters long and contains positions for call number, volume number, and copy

number. In addition, it contains indicators for other elements: type of publication; record indicator (program supplied if there is overflow to a second record); special location in the library; change indicator; title indicator; shelf list indicator; year of acquisition; and date missing. Fourteen positions remain blank for future use.

Area 20 contains the main entry, Area 30 the conventional title, Area 40 the title paragraph. The title paragraph includes: the title; author statement; edition statement; imprint, limited to publisher and date; and collation, limited to pagination. Area 50 contains notes.

Subject headings are recorded in Area 60, entered one after another and separated one from another by a record mark, a symbol resembling a double dagger. Added authors and added titles are entered in Area 70, similarly separated one from another by the record mark. Only *added* titles are entered in Area 70. If a catalog entry is desired under title, then the title indicator is marked in Area 10.

#### PERSONAL NAMES

On the form of personal names in the catalog, it was decided to anticipate the *Anglo-American Cataloging Rules*, publication of which was imminent. In general, the title-page form of a personal author's name is used. On the one hand, this has meant a shorter record and greater simplicity in inputting data; on the other hand, it became necessary to maintain a name authority file when the form adopted for the book catalog differed from that established by the Library of Congress or earlier cataloging rules.

The relator, the element that describes the relationship of a person used as an entry to the work being cataloged (e.g., ed., tr., comp., illus.), is omitted in the heading to save space. The relationship is shown in the title paragraph. A heading in the book catalog, either author or subject, is printed once before a group of titles and repeated only if the titles associated with it are continued in another column.

In addition to not permitting use of the relator, the system does not permit in the author & title catalog "added" entries composed of an author and a title. In standard cataloging such a technique may be used instead of a separate analytical entry. In the author & title catalog, however, such a composite entry would establish a new "author" (name plus title of the work) and would file as a separate unit after all works by that author. In the subject catalog the author-title entry is permitted so that books about voluminous authors and their individual works may be better displayed.

#### THE CONVENTIONAL TITLE

The conventional title has been employed to assemble under an author's name editions of a work with variant titles. Collected writings of an author, or selections, are given the conventional title [Works] or [Se-



lections]. Through a combination of coding and programming, they are entered first under an author's name before titles of individual works are listed. (See in Figure 8 the entry under Karen Horney for an example.) The conventional title has meaning only as it is related to the main entry. For that reason it prints only in the catalog when preceded by the main entry.

### THE TITLE PARAGRAPH AND THE UNIT RECORD

As summarized above, the title paragraph includes the title, author statement, edition statement, imprint, and collation. With one major exception this involves the copying of, or truncation of, information present on a Library of Congress card. The exception is the author statement. As shown in a recent investigation (8), this element was present in but twenty-five per cent of the entries studied. Current cataloging rules permit in some cases the omission of the author statement when it is identical with the form used in the heading (9,10). These rules are based upon a cataloging system employing unit records on cards, the first element of which is the main entry. In unchanged form the author statement is used as the main entry; for added entries another heading, such as author, title, or subject, is superposed on the card.

In the Stanford system a new unit record was introduced. The first element of it is the title paragraph. All headings, main or added, are placed directly above it; and if entry under title is desired, a title entry is made in hanging-indentation form.

The Stanford book catalog thus does away with the main entry concept completely. The necessity, or even wisdom, of setting apart one field in the machine record as main entry may be questioned. Why not group the main entry with the other added author entries in Area 70P? There were two reasons: First, it is simpler to adapt the information from Library of Congress cataloging information if the form can be followed relatively closely. Second, we wished to allow for the possibility of printing standard catalog cards if necessary, and this would allow for a reinstatement of the standard unit card concept.

A basic requirement of the system is that the author statement must be included in the title paragraph. If for any reason it cannot be listed there, then it is recorded in note position in Area 50. Although no formal study was undertaken, it was believed that works by single personal authors would constitute more than fifty per cent of the collection. The addition of the author statement in the title paragraph for each such book could add considerable bulk to the catalog. Accordingly, through the use of record marks as coding symbols, the author statement is set off in the title paragraph for those works by single personal authors. Through programming, the author statement is suppressed when the work is entered in the catalog under the name given in the main entry; whereas it appears under all "added" entries.

*Proofed to names  
M.V. R.S. 1/4/67*

<p>AREA SEQ. 101</p> <p>20 <input type="checkbox"/> E</p> <p>30 <input type="checkbox"/> 99</p> <p>40 <input type="checkbox"/> .N5J6</p> <p>50 <input type="checkbox"/></p> <p>60 <input type="checkbox"/></p> <p>70 <input type="checkbox"/></p> <p>SHELF LIST</p>	<p>ENTRY I.D. NO. 08111009</p> <p>Josephy, Alvin M. The Nez Percé Indians and the opening of the Northwest, by Alvin M. Josephy, Jr. Yale Univ. Press, 1965. 705 p.</p> <p>1. Nez Percé Indians--History 2. Northwest, Pacific--History I. Title</p> <p style="text-align: right;">66-09/009 DEC 20 1966</p>	<p>AREA SEQ. 101</p> <p>CLASS. DIV. 17 SUB DIV. 31</p> <p>E 99</p> <p>BOOK NO. 99 DATE</p> <p>OTHER I. D. SIZE &amp; FORMAT</p> <p>VOL. NO. 53 PT. COPY 56</p> <p>STYP. PRCH. II SH. PLAC. 63</p> <p>58 60 62</p>
<p>AREA SEQ. 101</p> <p>20 <input type="checkbox"/></p> <p>30 <input type="checkbox"/> E</p> <p>40 <input type="checkbox"/> 171</p> <p>40 <input type="checkbox"/> .A43</p> <p>40 <input type="checkbox"/> index</p> <p>50 <input type="checkbox"/></p> <p>60 <input type="checkbox"/></p> <p>70 <input type="checkbox"/></p> <p>SHELF LIST</p>	<p>ENTRY I.D. NO. 08111010</p> <p>American heritage Ten year cumulative index, Volume VI, Number 1--Volume XV, Number 6, December, 1954-- October, 1964. American Heritage, 1965. 187 p.</p> <p>1. U.S.--History--Indexes 2. U.S.--Civilization--Indexes I. Title</p> <p style="text-align: right;">66-08/010 DEC 20 1966</p>	<p>AREA SEQ. 101</p> <p>CLASS. DIV. 17 SUB DIV. 31</p> <p>E 171</p> <p>BOOK NO. 171 DATE</p> <p>OTHER I. D. SIZE &amp; FORMAT</p> <p>VOL. NO. 53 PT. COPY 56</p> <p>STYP. PRCH. II SH. PLAC. 63</p> <p>58 60 62</p>
<p>AREA SEQ. 101</p> <p>20 <input type="checkbox"/></p> <p>30 <input type="checkbox"/> E</p> <p>40 <input type="checkbox"/> 176</p> <p>40 <input type="checkbox"/> .B17</p> <p>50 <input type="checkbox"/></p> <p>60 <input type="checkbox"/></p> <p>70 <input type="checkbox"/></p> <p>SHELF LIST</p>	<p>ENTRY I.D. NO. 08111011</p> <p>Bailey, Thomas A. Presidential greatness; the image and the man from George Washington to the present. By Thomas A. Bailey. Appleton-Century, 1966. 368 p.</p> <p>1. Presidents--U.S. I. Title</p> <p style="text-align: right;">66-08/011 DEC 20 1966</p>	<p>AREA SEQ. 101</p> <p>CLASS. DIV. 17 SUB DIV. 31</p> <p>E 176</p> <p>BOOK NO. 176 DATE</p> <p>OTHER I. D. SIZE &amp; FORMAT</p> <p>VOL. NO. 53 PT. COPY 56</p> <p>STYP. PRCH. II SH. PLAC. 63</p> <p>58 60 62</p>
<p>AREA SEQ. 101</p> <p>20 <input type="checkbox"/></p> <p>30 <input type="checkbox"/> E</p> <p>40 <input type="checkbox"/> 806</p> <p>40 <input type="checkbox"/> .I2</p> <p>50 <input type="checkbox"/></p> <p>60 <input type="checkbox"/></p> <p>70 <input type="checkbox"/></p> <p>SHELF LIST</p>	<p>ENTRY I.D. NO. 08111012</p> <p>Ickes, Harold L. The secret diary of Harold L. Ickes. Simon and Schuster, 1954-55. 3 v. Contents. v.1. The first thousand days, 1933-1936. v.2. The inside struggle, 1936-1939. v.3. The lowering clouds, 1939-1941.</p> <p>1. U.S.--Politics and government--1933-1955 I. Title</p> <p style="text-align: right;">DEC 20 1966</p>	<p>AREA SEQ. 101</p> <p>CLASS. DIV. 17 SUB DIV. 31</p> <p>E 806</p> <p>BOOK NO. 806 DATE</p> <p>OTHER I. D. SIZE &amp; FORMAT</p> <p>VOL. NO. 53 PT. COPY 56</p> <p>STYP. PRCH. II SH. PLAC. 63</p> <p>58 60 62</p>

*Card and encl.*

Fig. 1. The Coding Sheet.

The system as it has been established calls for works to be entered alphabetically by title under the heading in the catalog. In the subject catalog this means, too, that works are listed alphabetically by title under each subject heading and not by author. It was felt that this form of arrangement is quite satisfactory for a selective collection, such as the Meyer Library; and it offers the possibility of scanning a page of thirty or more entries. It has occasioned one problem—when a subject heading expresses form and not subject. For example, under “SYMPHONIES,” works are arranged alphabetically by title and not by composer.

### CONVERSION

The basic source document used is the Library of Congress catalog card. Although the card itself could be used by crossing out unnecessary information and adding other data, it was felt that a clearer document would result if the needed information were copied onto another catalog card. Examples of such cards are shown in Figure 1. (Subsequent figures depict the manipulation of the entry for the book by Thomas A. Bailey, *Presidential Greatness*.) As illustrated in Figure 1, an identification number is assigned to each catalog card and four catalog cards are placed upon a coding board and a xerographic copy made.

The original cards are filed in a manual shelf list with the identification number as an indication that the information has been coded. The coding sheet is given to the coder, who enters Area 10 information in the blocks at the right and indicates to the keypuncher where other areas begin and what special symbols should be used.

To simplify the inputting of data and the scanning of punched cards, a special data-processing card was designed for input (see Figure 2). Each title converted is represented by a decklet of punch cards averaging six. Each of the seven areas or fields begins on a separate card. Al-

ENTRY I.D.	AREA SEQ	CLASS	DIVISION	SUB DIV	BOOK NUMBER	DATE	OTHER I.D.	EDITION	VOLUME NUMBER	PART	COPY	SUBJECT	AUTHOR
10	1				ORDERED	DATE	ORDER NUMBER						
		STANFORD UNDERGRADUATE LIBRARY CATALOGING DATA											

Fig. 2. The Data Processing Card.

though this may be considered wasteful of cards and indicative of "80-column mentality," it does have its benefits. A mistake in punching in one area requires repunching of the material in that area only, the area being the smallest unit for editing purposes.

So that the cards are kept in correct order for processing, the first ten columns of the card are used for identification numbers. The six-digit identification number assigned to the original card is punched in the first six columns. The first digit is the month, 1-9 being January through September and zero being October-December, one "month" of 92 days; the second and third digits are the day of the month; and the fourth through sixth a consecutive number assigned each day. It is possible thus to code 999 entries each day. The year is omitted, because it was assumed data would be transferred to magnetic tape at least once a year and probably more often. The area number is punched in columns 7 and 8 and the sequence within the area in columns 9 and 10. Cataloging information begins in column 11. Figure 3 shows a decklet of cards for one title.

Information in Area 10 is formatted somewhat differently for books on order or for cross references. To enter a book on order, the word "ORDERED" is punched in columns 22 through 28, the date and order number in columns 29 through 40, and 9 in column 57, the type indicator. This information prints in the catalog as a call number, and books on order are listed first in the shelf list. To date, entering of books on order has been limited to a few sample cases only. A cross reference in the subject catalog has a "call number" composed of the first nine characters of the entry to which reference is made (punched in columns 13-21) and an eight-digit identification number (in columns 22-29). An 8 is punched in column 57, the type indicator. A cross reference in the author & title catalog has a similar "call number" composed of the first ten characters of the entry to which reference is made (punched in columns 12-21) and an eight-digit identification number (in columns 22-29). A 7 is punched in column 57, the type indicator.

Subject cross references are listed in the shelf list in "call number" order following books on order; and author & title cross references follow subject cross references. The "call numbers" for cross references do not print in the catalog proper, and serve only as addresses to retrieve the cross reference from magnetic tape when a change or deletion is necessary.

Added copies and volumes are entered by preparing Area 10 information only and punching S in column 61, the shelf list indicator. The first copy entered is never coded explicitly as copy 1, even though a second copy is being simultaneously added. The program automatically identifies the first copy entered as copy 1, and the number prints in the shelf list when another copy is added or a volume or location is shown.

So long as cataloging information is on punch cards and not on mag-

netic tape, the 10-digit identification number is the device used to retrieve the information. When the information is transferred to magnetic tape, the identification number is lost and the call number becomes the identification device.

As shown in Figure 3, information in Area 40 (and in Areas 20, 30, 50, and 70 as well) continues to successive cards. It is not actually necessary to punch through column 80 before beginning a continuation card for an area, and experience indicates that corrections are simplified if blanks are left at the end of each card. The only requirement is that if

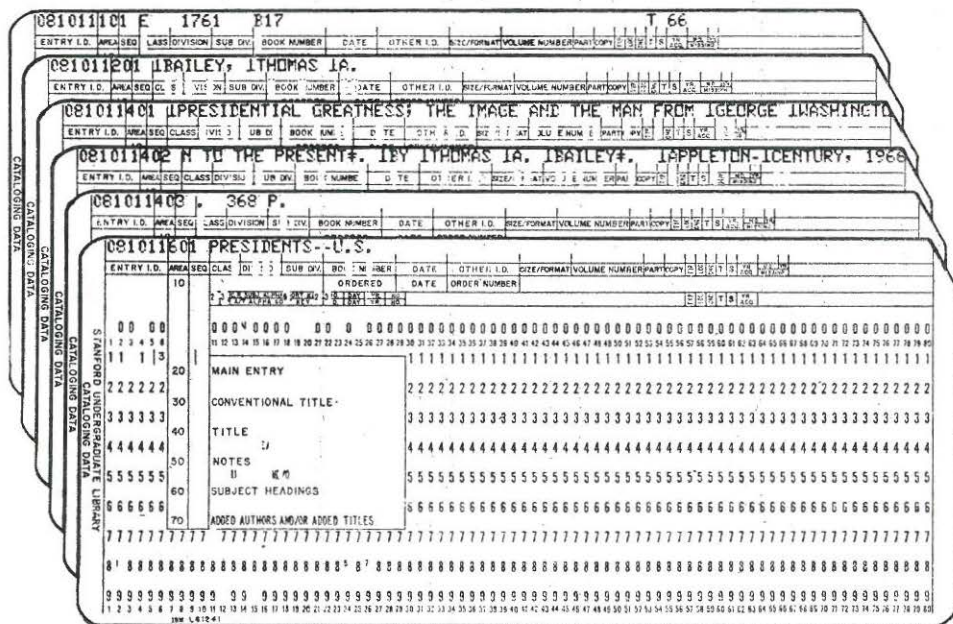


Fig. 3. A Decklet of Cards for One Title.

one word ends in any column on one card and a new word starts on the next, the space separating them must be in column 11 on the second card.

The inverted T printed on the cards in Figure 3 is the locally devised symbol to represent the word-separator character. This symbol designates the following character as a capital letter or as a special character. Through programming, subject headings are printed in upper case; and so word-separator characters are not used in Area 60.

Following keypunching and proofing, the coding sheets are filed in identification number order. The card shelf list and the file of coding sheets are the two manual back-ups to the system.

Page 35

Edit List 1/ 5/67

Call	D396.F3		typ	loc	chg	ti.	T shf	yr	66
Auth	Falls, Cyril								
Titl	<A >hundred years of war†, by Cyril Falls†. G. Duckworth, 1953. 419 p.								
Subj	MILITARY HISTORY, MODERN--1800-1999	MILITARY HISTORY, MODERN--1900-							
I.D.	081006								
Call	DC195.07L4 V.1		typ	loc	chg	ti.	T shf	yr	66
Auth	Lefebvre, Georges								
Titl	Etudes orléanaises†, par Georges Lefebvre†. Centre National de la Recherche Scientifique, 1962-63.								
Subj	ORLEANS, FRANCE--HISTORY	ORLEANS, FRANCE--ECONOMIC CONDITIONS				ORLEANS, FRANCE--SOCIAL CONDITIONS			FRANCE
I.D.	081007	--HISTORY--@1789 @REVOLUTION--CAUSES AND CHARACTER							
Call	DC195.07L4 V.2		typ	loc	chg	ti.	shf	S yr	66
I.D.	081008								
	<i>Proofed to here MNVRJ 1-6-67</i>								
Call	E99.N5J6		typ	loc	chg	ti.	T shf	yr	66
Auth	Josephy, Alvin M.								
Titl	<The >Nez Percé Indians and the opening of the Northwest†, by Alvin M. Josephy, Jr†. Yale Univ. Press, 1965. 705 p.								
Subj	NEZ PERCE INDIANS--HISTORY	NORTHWEST, PACIFIC--HISTORY							
I.D.	081009								
Call	E171.A43 INDEX		typ	loc	chg	ti.	shf	yr	66
Auth	American Heritage								
Titl	Ten year cumulative index, American heritage. Volume VI, Number 1--Volume XV, Number 6. December, 1954--October, 1964. American Heritage, 1965. 187 p.								
Subj	U.S.--HISTORY--INDEXES	U.S.--CIVILIZATION--INDEXES							
I.D.	081010								
Call	E176.1.B17		typ	loc	chg	ti.	T shf	yr	66
Auth	Bailey, Thomas A.								
Titl	Presidential greatness; the image and the man from George Washington to the present†. By Thomas A. Bailey†. Appleton-Century, 1966. 368 p.								
Subj	PRESIDENTS--U.S.								
I.D.	081011								
Call	E806.I2 V.1		typ	loc	chg	ti.	T shf	yr	66
Auth	Ickes, Harold L.								
Titl	<The >secret diary of Harold L. Ickes. Simon and Schuster, 1954-55. 3 v. The program has encountered a card sequence error.								
Subj	U.S.--POLITICS AND GOVERNMENT--1933-1945								
I.D.	081012								
Call	E806.I2 V.2		typ	loc	chg	ti.	shf	S yr	66
I.D.	018013								

*func. no 081013*

Fig. 4. The Edit List.

## THE EDIT LIST

On a regular basis, generally once a week during activation, an edit list is run on the computer for cards punched since the last listing. An example of a page from this list is shown in Figure 4. This list is proofed against original cataloging data as represented on the coding sheets. Information still remains on punched cards, and errors detected are corrected on the cards.

As an aid to proofing, the edit program generates a number of error messages: cards out of order; absence of Area 10 information; call number incorrectly formatted; an invalid character punched; information too long to fit into two machine records; information in one field more than 400 characters in length; an incorrect use of coding symbols (for use in determining filing order and to set off author statements); and incorrect use of record marks in Areas 60 and 70.

A nagging problem encountered during proofing is the fact that it is done out of context. In the preparation of cards for a standard card catalog, a second form of proofing is possible when cards are filed and entries compared with headings already in the catalog to insure that they are compatible. With a machine performing this function, this further check is not practical with existing equipment. Similarly, the machine does not recognize human errors and will file a misspelled word as it was entered and not as the word it was meant to be. The discipline required for the accurate inputting of cataloging information intended for machine manipulation is at times frightening.

Differences between a book catalog and a card catalog became more obvious as work progressed. In a card catalog one can see from the typography, the stains on older cards, and the kind of card stock used, that information was entered at different times. One is more willing to tolerate the differences that appear. Because it is not generally possible to compare a number of entries at the same time in a card catalog, one misses many inconsistencies. On the other hand, in a machine-produced book catalog, one scans numerous entries with one glance. Produced at the same printing, they appear of equal vintage even though they may have been entered at different times. The inconsistencies resulting from changing cataloging rules become very obvious. This is particularly annoying with respect to the matter of capitalization, and the effort to produce an internally consistent document is difficult.

## COSTS FOR INPUTTING

The first year's experience (1965-66) has indicated a cost of \$.40 per title for inputting of cataloging information. Indications are that this cost has remained constant for the second year. Included in inputting for each title is provision for all extra records needed for added volumes and copies and cross references. The cost does not include actual cata-

logging, preparation of the typed catalog card, overhead, or computer charges for the edit list. The cost may be broken down as follows:

*Table 2. Inputting Costs, 25,000 Titles (1965-66)*

Coding: 50 titles per hour @ \$2.20 per hour	\$ 1,100.00
Keypunching: 12 titles per hour @ \$2.20 per hour	4,583.33
Proofing: 72 titles per hour @ \$7.40 per hour (2 staff members)	2,569.43
Equipment: Key punch rental (\$926.02); punch cards (\$312.34); and coding sheets (\$520.86)	1,759.22
Total	<u>\$10,011.98</u>

The Stanford experience indicates that over a period of time it is possible to input 100 titles per eight-hour day on each card punch or approximately 2,000 per working month. This figure is based on a shortened catalog record as described, but includes provision for separate records for added volumes and copies and cross references. The staff employed at Stanford had no previous experience keypunching and were instructed either in a formal school for five days or, as is now done, on the job. Three or four staff members are trained for keypunching at all times and have regular schedules. With a staff of this size, punching can proceed on a steady basis in spite of vacations and illnesses.

### THE PROGRAMS

Systems design called for the preparation of eight computer programs. In addition, two package sort programs from IBM are employed for the filing of entries in the shelf list and in the author & title and subject catalogs. As experience increased, it was found that the updating of entries in the first annual catalog when merged with new data for the second annual catalog could be simplified if three utility programs were used; these also were prepared. A locally devised assembly language, SOPAT, similar to Autocoder, was used for the programs.

The first program is the Edit Program (LB001) which processes the cards to prepare the edit list described above.

During the first two years of operation the basic pattern has been to prepare weekly the edit list described above using the Edit Program (LB001), and transfer data to permanent storage on magnetic tape once every three months. (The punch cards are stored in another area on campus, as back-up.) The quarterly basis has coincided with the schedule for the program tests as well as the quarterly supplements and annual catalogs. In brief, the following happens:

1. Cataloging information is transferred from punch cards to magnetic tape through the Card to Tape Program (LB010).
2. Through a Call Number Sort (IBM Sort 7) the above records are arranged in call number order for a basic shelf list.



3. Through the Format and Update Program (LB020), all the necessary entries for the author & title catalog and subject catalog are generated from the above records and the shelf list is updated.
4. Through an Alphabetical Sort (IBM Sort 7 or IBSYS 7090 Sort depending on the magnitude) the entries for the author & title and subject catalogs are arranged in alphabetical order. (Longer sorts have been run on an IBM 7090 Computer.)
5. Through the Author-Title and Subject Update Program (LB050), the new entries created by LB020 are merged with existing entries and existing records are deleted as specified by LB020.
6. The Author-Title and Subject Split Program (LB060) sets up the entries on magnetic tape (line length, indention) as they will appear in the catalog and establishes the two columns for each page.
7. The Author-Title and Subject Printout Program (LB070) prints the pages of the author & title and subject catalogs.
8. The Shelf List Split Program (LB030) performs the same function for the shelf list as undertaken by the Split Program for the author & title and subject catalogs (LB060).
9. The Shelf List Printout Program (LB040) prints the pages of the shelf list.

#### THE CHANGE PROCEDURE

It is possible to change information in a preceding supplement by following the change procedure: To change a call number, the entire entry is deleted, employing a record consisting of Area 10 and a delete symbol in the change indicator, and a new entry inserted in a separate record. To change an area, a change record is prepared consisting of Area 10 information with the change indicator marked plus card(s) for any area(s) to be changed. For example, if there is an error in a subject heading, it is necessary to prepare only an Area 10 plus an Area 60 change record showing the subject headings desired. The smallest unit for editing purposes between supplements is the Area.

#### CHANGES IN AN ANNUAL CATALOG

During systems design it was realized that machine time could be saved if a different procedure were followed to change information in the preceding year's catalog when merging it with fresh data to form a new annual catalog. The procedure used is to delete through three utility programs (LB075, LB080, and LB090) entries that are to be changed and then enter them anew.

The first of these programs (LB075) is a card-to-tape program. Special delete cards (essentially Area 10 information giving call number) are

prepared for each volume and copy to be deleted. They are transferred to magnetic tape and sorted into order by call number.

In the second program, the Shelf List Delete Program (LB080), the last annual shelf list tape is read and entries as specified by LB075 are deleted and a new shelf list tape written.

Since the author-title and subject files are not in call-number order, a table look-up technique is used in the third program, LB090, the Author-Title and Subject Delete Program. The table consists of call numbers (in proper sequence) for all records to be deleted. Each entry in the author-title and subject files is checked against the table and deleted if the call number for the entry is listed there. A revised author-title and subject tape is thus prepared.

### RECORDS ON TAPE

The basic tape record follows the format of the master machine record described earlier. Figure 5 shows a tape dump of the master shelf list

```

501
601          12      1 C 566
701
801
901
1001
1101
+

1      1      10      20      30      40      50      60      70      80      90      100
101    E 1761 10 817 20 30 40 50 66 60 70 108021 129150 27901
201    7      BAILEY, THOMAS A.+ PRESIDENTIAL GREATNESS THE IMAGE AND THE MAN FROM GEORGE WASHINGTON
301    TO THE PRESENT+. BY THOMAS A. BAILEY+. APPLETON- CENTURY, 1966. 368 P.+PRESIDENTS--U.S.+
401
501
601          2      566
701
801
901
1001
1101
+

1      1      10      20      30      40      50      60      70      80      90      100
101    E 1761 K3 20 30 40 50 66 60 70 108023 13119927003590501
201    7      KANE, JOSEPH NATHAN+ FACTS ABOUT THE PRESIDENTS A CCMPIATION OF BIOGRAPHICAL AND HISTOR
301    ICAL DATA. BY JOSEPH NATHAN KANE. H. W. NILSON, 1960. 348 P.+ S$H$E$S$E$D ONLY IN AREA 2
401    30.+PRESIDENTS--U.S.+
501
601          1      T 66          108018      126153      279C24      1762 M4
701    WCMAN IN THE WHITE HOUSE THE LIVES, TIMES AND INFLUENCE OF TWELVE ACTABLE FIRST LACIES+. BY M
801    ARIANNE MEANS+. RANDCM HOUSE, 1963. 299 P.+PRESIDENTS--U.S.--WIVES+
901
1001
1101
+

1      1      10      20      30      40      50      60      70      80      90      100
101    E 178 A24 20 30 40 50 66 60 70 108C24 1321C123309933204
201    4      ADAMS, JAMES TRUSLCW+ ALBUM OF AMERICAN HISTORY. JAMES TRUSLCW ADAMS, ECITOR IN CHIEF.
301    C. SCRIBNER, 1944-60. 6 V.+ VOL. 5 EDITED BY J. G. E. HOPKINS.+ VOL. 6 IS INDEX.+ S$H$E$S$E$D
401    E$D IN REFERENCE ALCOVE 340.+U.S.--HISTORY+U.S.--SOCIAL LIFE AND CUSTOMS+
501
601          2      1 K 566
701
801
901
1001
1101
+

1      1      10      20      30      40      50      60      70      80      90      100
101    E 178 A24 20 30 40 50 66 60 70 80 90 100

```

Fig. 5. Tape Dump of Master Shelf List.

as formatted in the Card to Tape Program (LB010) and after having been sorted into call-number order. As stated above, two records are placed in a block of 1,140 characters, each record with 570 characters. Printed with a limited print chain, some characters do not appear as they will finally. The record mark prints as a plus sign, and in the entry for the work by Kane the symbol indicating underscoring prints as a dollar sign. The word-separator characters and some other characters do not print at all; spaces are left to indicate their presence.

Once the information has been processed through the Format and Update Program (LB020), however, the machine record is somewhat different. New records, one for each entry that will appear in the final catalog, are generated. A listing of the elements in each of these records is shown in Table 3. Figures 6 and 7 show tape dumps for author and subject entries.

Table 3. *The Author-Title and Subject Tape Record.*

<i>Position</i>	<i>Type of Information</i>
1:	Catalog indicator (1: Author & Title Catalog; 2: Subject Catalog)
2-81:	Major sort key
82-101:	Minor sort key
102-131:	Library of Congress classification number
132-136:	Size and format
137:	Record indicator (Program supplies "1" if there is an overflow record and "2" in second record)
138:	Delete indicator (program supplied, for use in change procedure)
139:	Address for main entry (Area 20) or added author/added title (Area 70)
142:	Address for title paragraph (Area 40)
145:	Address for conventional title (Area 30)
148:	Address for notes (Area 50)
151:	Address for subject heading (Area 60)
154-618:	Variable-length fields

## THE SORT KEY

The Format and Update Program (LB020) generates the sort key for each entry. The sort key determines the characters that will be considered when the entry is to be alphabetized. A succeeding sort program does the actual alphabetizing. After some study, experimentation, and conjecture a 100-character sort key was selected. It is in two parts: a major sort key of 80 characters and a minor sort key of 20 characters.

The major sort key is formed from the first 80 characters of the ele-

	1	10	20	30	40	50	60	70	80	90	100
1	1	10	20	30	40	50	60	70	80	90	100
101	1BALCWIN T W				154171		BALDWIN, T. W.+				ORGANIZATION AND PE
201	RPR 3095 B3										THE ORGANIZATION AND PERSONNE
301	L OF THE SHAKESPEAREAN COMPANY.				RUSSELL -		RUSSELL, 1961.	463 P.+			
401											
501											
601			+								
1	1	10	20	30	40	50	60	70	80	90	100
101	1BAILEY STEPHEN KEMP				154178		BAILEY, STEPHEN KEMP+				POLITICAL PARTIES
201	UJK 2265 G59										POLITICAL PARTIES, U.
301	S. A. ESSAYS BY STEPHEN KEMP				BAILEY AND OTHERS.		EDITED BY ROBERT A.				GCLDWIN. RAND MC NAL
401	LY, 1965. 158 P.+										
501											
601			+								
1	1	10	20	30	40	50	60	70	80	90	100
101	1BAILEY THOMAS A				154175		BAILEY, THOMAS A.+				PRESIDENTIAL GREATN
201	EE 1761 B17										PRESIDENTIAL GREATNESS T
301	HE IMAGE AND THE MAN FROM GEORGE WASHINGTON TO THE PRESENT.						APPLETON- CENTURY, 1966.	368 P.+			
401											
501											
601			+								
1	1	10	20	30	40	50	60	70	80	90	100
101	1BAILEY THOMAS A				154175		BAILEY, THOMAS A.+				WCCDROW WILSON AND
201	TD 643 A7B2B										WCCDROW WILSON AND THE G
301	REAT BETRAYAL. ENCOUNTER PAPERBACKS, 1963. 429 P.+										
401											
501											
601			+								
1	1	10	20	30	40	50	60	70	80	90	100
101	1BAIN J ARTHUR				154173		BAIN, J. ARTHUR+				LIFE AND EXPLORATIO
201	NG 7001873B3										LIFE AND EXPLORATIONS OF F
301	RIDTJOF NANSEN. NEW ED. REV. AND CONSIDERABLY ENL., WITH NUMEROUS ILLUS. AND MAP. W. SCOTT, N.D										
401	. 449 P.+										
501											
601			+								
1	1	10	20	30	40	50	60	70	80	90	100
101	1BAINVILLE JACQUES				154175		BAINVILLE, JACQUES+				FRENCH REPUBLIC 18
201	7DC 335 B32										FRENCH REPUBLIC, 18
301	70-1935. TRANSLATED, WITH AN INTRODUCTORY NOTE, BY HAMISH MILES. J. CAPE, 1936. 253 P.+										

Fig. 6. *Tape Dump of Entries in Author & Title Catalog.*

ment that will serve as the entry in the catalog—the author, the added author, the title (for entry under title), the added title, or the subject heading.

The minor sort key is formed from the first 20 characters of the element that follows the heading—the title or conventional title. The conventional title can never be a major sort key. The title, on the other hand, can be either a major sort key or a minor sort key.

During the course of the Split Program (LB060), major sort keys are compared. If two or more are identical, the entry words for the second and subsequent identical headings are suppressed and do not print. Under the heading that does print, entries are arranged in alphabetical order through the first twenty characters of the element generating the minor sort key.

In a sense, there is a third sort key. If both major and minor sort keys

are identical, items will print in call-number order. In no case will the element generating the minor sort key be suppressed.

During the first test of the programs one mistake was discovered with respect to the generation of sort keys and the suppression of entry elements. In a few cases the library possessed multiple copies of the same book cataloged under different call numbers (for example, one as a separate and one as part of a series). The problem arose when there was to be an entry under title, with two major sort keys identical. A similar situation arose for periodicals. A periodical might be entered itself under its title (Area 40) and also appear in the catalog as an author (Area 20) for a book it might issue. To eliminate this problem, a minor

```

1      1      10      20      30      40      50      60      70      80      90      100
101    2PRESERVATION OF ZOOLOGICAL SPECIMENS SEE ZOOLOGICAL SPEC
201    I ZOOLOGICAL SPECIMENS 191 154PRESERVATION OF ZOOLOGICAL SPECIMENS+ $ $ $ $ $ Z
301    ZOOLOGICAL SPECIMENS-- COLLECTION AND PRESERVATION.+
401
501
601
+

1      1      10      20      30      40      50      60      70      80      90      100
101    2PRESIDENTS U S FACTS ABOUT THE PRE
201    SE 1761 K3 171 310154PRESIDENTS--U.S.+ FACTS ABOUT THE PRESIDENTS
301    A COMPILATION OF BIOGRAPHICAL AND HISTORICAL DATA. BY JOSEPH NATHAN KANE. H. W. WILSON, 1960.
401    348 P.+ $ $ $ $ $ $ $ $ $ $ ONLY IN AREA 230.+
501
601
+

1      1      10      20      30      40      50      60      70      80      90      100
101    2PRESIDENTS U S THE LONELY GUEST THE E
201    VJK 516 R46 171 154PRESIDENTS--U.S.+ THE LONELY GUEST THE EVOLUTI
301    CN CF PRESIDENTIAL LEADERSHIP. BY ROBERT RIENOW AND LEONA TRAIN RIENOW. FOLLETT, 1966. 367
401    P.+
501
601
+

1      1      10      20      30      40      50      60      70      80      90      100
101    2PRESIDENTS U S PRESIDENTIAL GREATN
201    EE 1761 B17 171 154PRESIDENTS--U.S.+ PRESIDENTIAL GREATNESS THE I
301    MAGE AND THE MAN FROM GEORGE WASHINGTON TO THE PRESENT. BY THOMAS A. BAILEY. APPLETON- CENTU
401    RY, 1966. 368 P.+
501
601
+

1      1      10      20      30      40      50      60      70      80      90      100
101    2PRESIDENTS U S ELECTION PEOPLES CHOICE +OW
201    JK 524 L38 1965 181 154PRESIDENTS--U.S.--ELECTION+ THE PEOPLES CHOICE
301    HOW THE VOTER MAKES UP HIS MIND IN A PRESIDENTIAL CAMPAIGN. BY PAUL F. LAZARSFELD, BERNARD B
401    ERELSON, AND HAZEL GAUDET. 2D ED. COLUMBIA UNIV. PRESS, 1965. 178 P.+
501
601
+

1      1      10      20      30      40      50      60      70      80      90      100
101    2PRESIDENTS U S ELECTION STATISTICAL HISTORY
201    JK 1967 P4 181 349154PRESIDENTS--U.S.--ELECTION+ A STATISTICAL HISTC
301    RY OF THE AMERICAN PRESIDENTIAL ELECTIONS, BY SVEND PETERSEN. INTRCC. CUR NATIONAL ELECTIO
401    N BY LOUIS FILLER. F. UNGAR, 1963. 247 P.+ $ $ $ $ $ $ $ $ $ $ IN REFERENCE ALCCVE 340.+
501
601
+

1      1      10      20      30      40      50      60      70      80      90      100
101    2PRESIDENTS U S ELECTION 1896 PRESIDENTIAL ELECTI
201    CF 710 J6 187 154PRESIDENTS--U.S.--ELECTION--1896+ THE PRESIDENT
301    IAL ELECTION OF 1896, BY STANLEY L. JONES. UNIV. OF WISCONSIN PRESS, 1964. 436 P.+
401
501
601

```

Fig. 7. Tape Dump of Entries in Subject Catalog.

change was made in the program: If a title generates a major sort key, it is never suppressed if identical with a preceding major sort key.

### FILING ORDER

Formation of sort keys leads immediately to a discussion of the unsolved problem of alphabetization. In the Meyer Library catalog the aim has been to duplicate as closely as possible the arrangement of entries found in the University Libraries' union card catalog. Basically, this means a word by word alphabetization. In addition, we have attempted to preserve as many of the currently used typing conventions as possible in preparing entries for the card catalog. For example, two or more initials separated one from another by periods have no spaces following internal periods. Thus, the abbreviation for the United States is typed as U.S. and not as U. S. Abbreviations filed as they are spelled and Mc's and Mac's in separate sequences are two of the major differences from standard manual library filing.

It was recognized that in generating the sort key the computer will scan the entry words character by character and space by space. Thus, it is important that each character and each space be positioned accurately. The computer checks a character and either interprets it as a blank, a letter, a numeral, a symbol, or else ignores it. In alphabetizing, this basic rule is followed: A blank files before a letter (A through Z), and a letter files before a numeral (0 through 9).

Certain marks of punctuation are interpreted as a space. They are: period, comma, colon, semicolon, hyphen, and question mark. Some marks of punctuation are ignored. They are: parentheses, brackets, dollar sign, virgule or slash (/), equal sign, number or sharp (#), per cent, asterisk, apostrophe, flat sign, and ampersand. It was believed that the presence of a space on either side of an ampersand would place entries in correct order, but in some cases this did not happen.

Some diacritical marks change the value of the character with which they are associated. For example, an umlaut over an "a," "o," or "u" changes that character to "ae," "oe," or "ue" respectively.

### NON-FILING SYMBOLS

If an alphabetical order is desired other than that explicitly given in the entry words, special symbols are employed at the time of coding. Since language of publication is not coded, it is necessary to place symbols around introductory articles for them to be ignored. The less-than (<) and greater-than (>) signs are the symbols used to set off a sequence of characters to be ignored. The placement of these symbols is important. For example, to eliminate the article from the title, *The century of science*, it is necessary to place the symbols in this manner: <The >century of science. In this way the sort key would be generated starting with

the letter "C" in the word "century"; and a space would be left between the words "the" and "century" in the printed heading.

Use of the non-filing symbols internally in an entry is limited and must be strictly controlled through recording of decisions in authority files. So that names filed under prefixes and written as two words will be filed in the same sequence as names written as one word, the non-filing symbols are employed internally. For example, in order that Van Buren and Vandenburg will file in the same sequence, Van Buren is coded as Van< >Buren. In this manner the computer is instructed to ignore the space when forming the sort key.

The use of non-filing symbols has proved quite useful in subject headings to arrange period subdivisions in chronological order when there is a word or words intervening between the heading and the date. Thus, with non-filing symbols employed as shown below, these particular subject headings are arranged chronologically:

- GT. BRIT.—HISTORY—<EDWARD, THE CONFESSOR, >1042-1066
- GT. BRIT.—HISTORY—<NORMAN PERIOD, >1066-1154
- GT. BRIT.—HISTORY—<MEDIEVAL PERIOD, >1066-1485
- GT. BRIT.—HISTORY—<STEPHEN, >1135-1154
- GT. BRIT.—HISTORY—<HENRY II, >1154-1189
- GT. BRIT.—HISTORY—<ANGEVIN PERIOD, >1154-1216

#### THE FILING SYMBOL

The less-than and greater-than signs are provided on the expanded print chain purchased for the book catalog project. To date it has not been found necessary to use these signs as symbols in titles, and so their use is restricted to their role in forming non-filing elements. As work proceeded, need was felt for another symbol—one that would set off a field that would not print but which would be filed upon. For example, we wished to file the title, *1848: chapters of German history*, as though it were written, *Eighteen forty-eight; chapters of German history*; yet we did not wish to violate the form of the title as given in the book. An examination of all characters in the print chain led us to sacrifice the symbol @ for use as a sign in its own right. It is used solely as a filing symbol. Thus, any characters or spaces placed between two @'s will generate a sort key as specified by those characters, but the information will not print. The title, *1848: chapters of German history*, will be coded in this manner: @eighteen forty-eight@<1848>: chapters of German history. It will be filed as though it were written: Eighteen forty-eight: chapters of German history.

The use of the filing symbol has been especially useful in arranging period subdivisions in chronological order when treating years in the pre-Christian era or before the year 1000 A.D. For years in the pre-Christian era, coding permits chronological arrangement of years beginning with

9999 B.C. The following procedure is observed: The year in question is subtracted from 9999 and the resulting difference, preceded by the letter Z, is entered inside the filing symbols. The year will thus file after all letters but before years in the Christian era. For years before 1000 A.D. the leading 0 is simply placed inside the filing symbol, for example, @0@476.

To illustrate further, here are three subject headings as manually filed:

ROME—HISTORY—REPUBLIC, 510-30 B.C.

ROME—HISTORY—REPUBLIC, 365-30 B.C.

ROME—HISTORY—AUGUSTUS, 30 B.C.-14 A.D.

They are coded in this manner:

ROME—HISTORY—<REPUBLIC, 510-30 B.C.>@Z9489-Z9969@

ROME—HISTORY—<REPUBLIC, 365-30 B.C.>@Z9734-Z9969@

ROME—HISTORY—<AUGUSTUS, 30 B.C.-14 A.D.>@Z9969-0014@

The following sort keys are generated:

ROME—HISTORY—Z9489-Z9969

ROME—HISTORY—Z9734-Z9969

ROME—HISTORY—Z9969-0014

The headings will file in correct chronological order and print as originally shown above.

#### OBSERVATIONS ON FILING ORDER

With but few exceptions, the filing order as designed has proved a very satisfactory arrangement. It has been felt advisable to place notes at various points in the catalog to link together headings which are filed separately. For example, the abbreviation *Mr.* is filed as *mr*, and the word *Mister* is filed as *mister*. Here a note refers from one to the other. In the subject catalog it was discovered that if a country or local heading is abbreviated, two different alphabets are established. So far this has occurred for the United States (U.S.) and Great Britain (Gt. Brit.) The terminal period generates a space when the sort key is established. Thus subdivisions separated from the heading by a dash (two hyphens equivalent to two spaces) are in fact separated by three spaces and file before jurisdictional or form subdivisions which do not require the dash. For example, U.S.—HISTORY files before U.S. DEPT. OF STATE. A note in the catalog gives instructions on the filing order in such a case.

Less fortunate is the situation of the author who chooses to use a name with a first initial and a complete middle name. Because of the period and space separating the first initial from the middle name, there are established two spaces. Thus, the following "incorrect" alphabetical order is established.

Smith, J. Russell

Smith, J.A.

Smith, J.C.



As may be expected, situations such as those described above do not occur often. It is hoped that through scanning of the open page before him the reader will find the correct heading.

It may be argued that the coding required to achieve the alphabetical order in this catalog is too demanding for a project based upon use of a sophisticated electronic computer. Possibly, programming should have taken care of all of this work. It has been our belief that we have achieved, in terms of the present state of the art, a good balance between what the machine should do and what the human should do. In the process we have been able to keep the form of the information as it appears in the source. As examples, introductory articles have not been eliminated from titles, and Library of Congress subject headings have been retained (11). Most important, it has been possible to implement these rules consistently with a relatively inexperienced staff.

#### PAGE CREATION

With each entry created and alphabetized, the Author-Title and Subject Split Program (LB060) is called upon to generate the lines for the final catalog and create the two columns of each page on magnetic tape. The final program (LB070) prints the pages of the catalog from the tape.

The computer line printer permits the use of 132 print positions in each line. The type size is the same as pica type—ten characters to the horizontal inch, six lines to the vertical inch. It was decided that the completed page size for the book catalog should be 8½" x 11". With an allowance for an adequate margin on all four sides of the page, it was believed that the reduction necessary to employ the 132 characters in a line probably no longer than seven inches would be too great. Experimentation led us to accept a reduction to 68 per cent and use of 98 of the 132 print positions. This can, however, prove expensive, as the printer takes as long to print 98 characters as it does 132.

The catalog page as designed calls for two columns, each 45 characters in length, with an eight-character margin between them. The text is 80 lines, and the page is 84 lines in length because of the heading at the top and the page number centered at the bottom. Catalog entries are not split between columns, so that the bottoms of the pages are rarely even.

To simplify programming it was decided not to attempt programmed hyphenation of words or to require right and left justification of the lines in the catalog. The first words of a catalog entry are set flush left, and all successive lines are indented two spaces. The call number is set flush right on the last line of the entry if there are three spaces separating it from the last word of the entry; otherwise, it is set flush right on the following line.

As stated earlier, entry words (authors, subject headings, added titles) are suppressed if they are the same as those found in a preceding entry

and are repeated only at the head of a new column if the entries are continued there. Entry words are so clearly shown in the catalog that it was not considered necessary to use keys at the top of each page indicating which letters are included on that page.

Because an expanded print chain is employed, speed on the printer is considerably reduced, actually to 250 lines per minute. The printer requires eighteen seconds to print one page. The page image is approximately ten inches by fourteen inches. Through use of the Itek Plate-master, this image is reduced to 68 per cent and an offset master created for reproduction on offset equipment. Figures 8 and 9 show representative pages from the 1967 annual catalog.

The foregoing account has emphasized the preparation of a page in an annual catalog. Except for the size of the page and the kind of paper used, the identical process is followed for the preparation of the supplement. Through a switch setting, a forty-line page for the supplement is printed. The supplement is printed on ten-ply paper (8½" x 11"), kept in unburst form, and bound at the top in post binders. Figures 10 and 11 show representative pages from the January, 1967, supplement and illustrate how some of the entries earlier depicted in Figures 6 and 7 appear in final form.

Through similar programs the shelf list is prepared and printed in essentially the same format as the supplement, a 98-character line and a page of forty lines. A key at the top of each page indicates the first call number on that page. The shelf list is printed on four-ply paper, and copies distributed to important staff service points in the Main and Meyer Libraries. Figure 12 shows a copy of a page from the January, 1967, shelf list, depicting how the information from Figure 5 appears when finally printed. The lone call number, E176.1.B77, copy 2, is for an item, of which copy one is represented in the 1966 annual shelf list.

#### THE FIRST ANNUAL CATALOG AND ITS SUPPLEMENTS

The first annual catalog was prepared during the summer of 1966, listing the 25,000 titles cataloged as of the end of June. The catalog was 2,804 pages long, 1,569 pages in the author & title catalog and 1,235 pages in the subject catalog.

Each page from the printer was first scanned by library staff and serious errors masked with white tape. In consequence, the user of the catalog will encounter an occasional blank on a page. The pages were then sent to the University's Photo Reproduction Service, where offset masters were created and fifty copies of each page reproduced. The Stanford University Press prepared the binding. Each set of the catalog was bound in red buckram in seven volumes, approximately 400 pages in each, four volumes for the author & title catalog, three volumes for the subject catalog. There is a title page in each volume and several pages of explanation on the use of the catalog. Letters included in each volume are

A Book Catalog at Stanford/JOHNSON 39

AUTHOR & TITLE CATALOG -- JUNE 1967

J. HENRY MEYER MEMORIAL LIBRARY

- Hornbein, Thomas F.  
Everest: the west ridge. Photographs from the American Mount Everest Expedition and by its leader, Norman G. Dyhrenfurth. Introd. by William E. Siri. Edited by David Brower. Sierra Club, 1965. 198 p., illus. DS486.E8H54 Folio
- Hornberger, Theodore  
Benjamin Franklin. Univ. of Minnesota Press, 1962. 48 p. PS751.H6
- Hornblow, Arthur  
The captive, by Edouard Bourdet. Translated by Arthur Hornblow, Jr. Introd. by J. Brooks Atkinson. Brentano's, 1926. 255 p. PQ2603.0777P72
- A history of the theatre in America from its beginnings to the present time. J.B. Lippincott, 1919. 2 v. PN2221.H6
- The triumph of death, by Gabriele d'Annunzio. Translated by Arthur Hornblow. Introd. by Burton Rascoe. Boni and Liveright, 1923. 412 p. PQ4803.Z3T7
- Hornby, A.S.  
A guide to patterns and usage in English. Oxford Univ. Press, 1962. 261 p. PE1460.H64
- Horne, Alistair  
The fall of Paris; the Siege and the Commune, 1870-71. St. Martin's Press, 1966. 458 p. DC311.H6
- The price of glory: Verdun 1916. St. Martin's Press, 1963. 371 p. D545.V3H6
- Return to power; a report on the new Germany. Praeger, 1956. 415 p. DD259.4.H65
- Horne, C. Silvester  
Puritanism and art; an inquiry into a popular fallacy. By Joseph Crouch. Introd. by the Rev. C. Silvester Horne. Cassell, 1910. 381 p. N72.CB
- Horned moon; an account of a journey through Pakistan, Kashmir, and Afghanistan. By Ian Stephens. Indiana Univ. Press, 1955. 288 p. DS377.S8
- Horner, Harlan Hoyt  
Lincoln and Greeley. Univ. of Illinois Press, 1953. 432 p. E457.2.H79
- Horney, Karen  
[Works. 1964.]  
The collected works of Karen Horney. W.W. Norton, 1942-64. 2 v.  
Contents.- v.1. The neurotic personality of our time.- v.2. Self-analysis. RC435.H6
- Neurosis and human growth; the struggle toward self-realization. W.W. Norton, 1950. 391 p. RC343.H648
- The neurotic personality of our time. W.W. Norton, 1937. 299 p. RC343.H75
- New ways in psychoanalysis. W.W. Norton, 1939. 313 p. BF173.H762
- Our inner conflicts; a constructive theory of neurosis. W.W. Norton, 1945. 250 p. RC343.H66
- Horney, Karen  
Self-analysis. W.W. Norton, 1942. 309 p. BF173.H7625
- Horgren, Charles T.  
Cost accounting; a managerial emphasis. Prentice-Hall, 1964. 801 p. HF5686.C8H59
- Hornik, Henri  
Le temple d'honneur et de vertus, par Jean Lemaire de Belges. Ed. critique publiée par Henri Hornik. Droz, 1957. 136 p. PQ1628.L5T4
- Horns, strings and harmony. By Arthur H. Benade. Doubleday, 1960. 271 p. ML3805.B33
- Das Hornungser Heimweh, and other stories. By Werner Bergengruen. Edited by W.I. Lucas. T. Nelson, 1963. 117 p. PT2603.E59H6
- Horodisch, Abraham  
Picasso as a book artist. World Pub. Co., 1962. 136 p. NC247.P5H63
- Horonjeff, Robert  
The planning and design of airports. McGraw-Hill, 1962. 464 p. TL725.3.P5H6
- Horowitz, David  
Hemispheres north and south; economic disparity among nations. Johns Hopkins Press, 1966. 118 p. HD82.H617
- Student. Ballantine Books, 1962. 160 p. LD760.H6
- Horowitz, Irving Louis  
The anarchists, edited with an introd. by Irving Louis Horowitz. Dell, 1964. 640 p. HX826.H6
- The idea of war and peace in contemporary philosophy. With an introductory essay by Roy Wood Sellars. Paine-Whitman, 1957. 224 p. JX1952.H72
- The new sociology; essays in social science and social theory in honor of C. Wright Mills. Edited by Irving Louis Horowitz. Oxford Univ. Press, 1964. 512 p. H35.H68
- Radicalism and the revolt against reason; the social theories of Georges Sorel, with a translation of his essay on the decomposition of Marxism. Humanities Press, 1961. 264 p. HX263.S6H5
- Revolution in Brazil; politics and society in a developing nation. E.P. Dutton, 1964. 430 p. F2538.2.H6
- Three worlds of development; the theory and practice of international stratification. Oxford Univ. Press, 1966. 475 p. D840.H6
- Horrabin, J.F.  
An atlas of Africa. 2d, rev. ed. F.A. Praeger, 1961. 126 p. G2445.H6
- Mathematics for the million, by Lancelot Hogben. Illustrations by J.F. Horrabin. W.W. Norton, 1937. 647 p. QA36.H6
- Horrobin, David F.  
The communication systems of the body. Basic Books, 1964. 214 p. QH508.H6

SUBJECT CATALOG -- JUNE 1967

J. HENRY MEYER MEMORIAL LIBRARY

- CROMWELL, OLIVER**  
 Oliver Cromwell, by John Morley. Century Co., 1900. 486 p. DA426.M86  
 Oliver Cromwell, by C.V. Wedgwood. Macmillan, 1956. 144 p. DA426.W4  
 Oliver Cromwell and the rule of the Puritans in England. By Sir Charles Firth. With an introd. by G.M. Young. Oxford Univ. Press, 1961. 488 p. DA426.F52
- CROMWELL, THOMAS**  
 Thomas Cromwell and the English Reformation, by A.G. Dickens. English Universities Press, 1959. 192 p. DA334.C9D5
- CRONIN, A.J.**  
 Adventures in two worlds, by A.J. Cronin. Little, Brown, 1952. 331 p. PR6005.R68A4
- CROP REPORTS**  
 See Agriculture--Statistics.
- CROPS--STATISTICS**  
 See Agriculture--Statistics.
- CROPS AND CLIMATE--U.S.**  
 Climate and man, the yearbook of agriculture, 1941. U.S. Dept. of Agriculture. U.S. Govt. Print. Off., 1941. 1248 p. S21.A35 1941
- CROSS, MARIAN EVANS**  
 See Eliot, George, pseud.
- CROSS-COUNTRY RUNNING**  
 See Running.
- CROW INDIANS**  
 Crow Indian beadwork; a descriptive and historical study. By William Wildschut and John C. Ewers. Museum of the American Indian, Heye Foundation, 1959. 55 p., illus. E99.C92W5  
 The Crow Indians, by Robert Lowie. Farrar & Rinehart, 1935. 350 p. E99.C92L913  
 The life and adventures of James P. Beckwourth. Edited by T.D. Bonner. A.A. Knopf, 1931. 405 p. F592.B393  
 The religion of the Crow Indians, by Robert H. Lowie. American Museum of Natural History, 1922. 309-444 p. E99.C92L6
- CROWDS**  
 The crowd; a study of the popular mind. By Gustave Le Bon. T. Fisher Unwin, 1917. 239 p. HM281.L5  
 The crowd in history; a study of popular disturbances in France and England, 1730-1848. By George Rude. J. Wiley, 1964. 281 p. HM283.R8  
 The crowd in the French Revolution, by George Rudé. Clarendon Press, 1961. 267 p. DC158.8.R8  
 The psychology of social movements, by Hadley Cantril. J. Wiley, 1941. 274 p. HM291.C3
- CRUSADES**  
 An Arab-Syrian gentleman and warrior in the period of the crusades; memoirs of Usamah Ibn-Munqidh. Translated from the original manuscript by Philip K. Hitti. Columbia Univ. Press, 1929. 265 p. DS97.U5  
 Background to the Crusades, a BBC publication. British Broadcasting Corporation, n.d. 38 p. D159.B7  
 The Crusades, by Ernest Barker. Oxford Univ. Press, 1923. 112 p. D158.B3  
 The crusades, by Richard A. Newhall. Rev. ed. Holt, Rinehart and Winston, 1964. 136 p. D158.N4  
 The crusades, by Zoë Oldenbourg. Translated by Anne Carter. Pantheon Books, 1966. 650 p. D158.O4  
 The Crusades; iron men and saints. By Harold Lamb. Doubleday, Doran, 1930. 368 p. D157.L3  
 The Crusades; the story of the Latin Kingdom of Jerusalem. By T.A. Archer and Charles L. Kingsford. G.P. Putnam, 1936. 467 p. D158.A67  
 A history of the Crusades, by Steven Runciman. Cambridge, Eng., Univ. Press, 1957. 3 v. D157.R8  
 The kingdom of the crusaders, by Dana Carleton Munro. D. Appleton, 1935. 216 p. D182.M8  
 The recovery of the Holy Land, by Pierre Dubois. Translated with an introduction and notes by Walther I. Brandt. Columbia Univ. Press, 1956. 251 p. D152.D813
- CRUSADES--HISTORY**  
 A history of the Crusades. Editor-in-chief, Kenneth M. Setton. Univ. of Pennsylvania Press, 1958--  
 Library has v.1-2. D157.S48
- CRUSADES--FIRST, 1096-1099**  
 The first crusade; the accounts of eye-witnesses and participants. P. Smith, 1958. 299 p. D161.1.A3K7  
 Gesta Francorum et aliorum Hierosolimitanorum. The deeds of the Franks and the other pilgrims to Jerusalem. Edited by Rosalind Hills; introd. by R.A.B. Mynors. T. Nelson, 1962. 103, 103 p. In Latin and English. D161.1.G4
- CRUSADES--SECOND, 1147-1149**  
 De professione Ludovici VII in orientem, edited, with an English translation by Virginia Gingerick Berry. Columbia Univ. Press, 1948. 154 p. D162.1.U3
- CRUSADES--THIRD, 1189-1192**  
 The Crusade of Richard Lion-heart, by Ambroise. Translated by Merton Jerome Hubert. With notes and documentation by John L. La Monte. Columbia Univ. Press, 1941. 478 p. D163.AJA52

Fig. 9. A Page in the Annual Subject Catalog.

Bailey, Stephen Kemp  
Political parties, U.S.A.; essays by  
Stephen Kemp Bailey and others. Edited by  
Robert A. Goldwin. Rand McNally, 1965.  
158 p. JK2265.G59

Bailey, Thomas A.  
Presidential greatness; the image and the  
man from George Washington to the present.  
Appleton-Century, 1966. 368 p. E176.1.B17

Woodrow Wilson and the great betrayal.  
Encounter Paperbacks, 1963. 429 p.  
D643.A7B28

Bain, J. Arthur  
Life and explorations of Fridtjof Nansen.  
New ed. rev. and considerably enl., with  
numerous illus. and map. W. Scott, n.d.  
449 p. G700.1893.B3

Bainville, Jacques  
The French Republic, 1870-1935. Translated,  
with an introductory note, by Hamish Miles.  
J. Cape, 1936. 253 p. DC335.B32

Baird, A. Craig  
Argumentation, discussion, and debate.  
McGraw-Hill, 1950. 422 p. PN4181.B29

General speech; an introduction. By A.  
Craig Baird and Franklin H. Krower. 3d ed.  
McGraw-Hill, 1963. 448 p. PN4121.B314

Speech criticism; the development of  
standards for rhetorical appraisal. By

Baird, Donald  
The English novel, 1578-1956; a checklist  
of twentieth-century criticisms. By Inglis  
F. Bell and Donald Baird. A. Swallow,  
1958. 169 p.  
Shelved only in Reference Alcove 380.  
Z2014.F4B4

Baird, William Raimond  
Baird's manual of American college  
fraternities. 17th ed. G. Banta, 1963.  
834 p.  
Shelved only in Area 230. LJ31.B2

Baird's manual of American college  
fraternities. 17th ed. G. Banta, 1963.  
834 p.  
Shelved only in Area 230. LJ31.B2

La baja Edad Media, por Enrique Bague y Juan  
Petit. S. Barral, 1956. 412 p., illus.  
DP99.B3

Bak, Børge  
Elementary introduction to molecular  
spectra. 2d rev. ed. Interscience, 1962.  
144 p. QC451.B16

Baker, Carlos  
American issues: The social record. Edited  
by Merle Curti, Willard Thorp, and Carlos  
Baker. 4th ed. J.B. Lippincott, 1960.  
1160 p. PSS07.T54

Ernest Hemingway: critiques of four major  
novels. Edited by Carlos Baker. C.

Fig. 10. A Page from the January 1967 Author-Title Supplement.

SUBJECT CATALOGUE -- JANUARY 1967 SUPPLEMENT

J. HENRY MEYER MEMORIAL LIBRARY

- POWYS, LLEWELLYN**  
The Powys brothers, by R.C. Churchill.  
Longmans, Green, 1962. 40 p.  
PR6031.0867Z65
- POWYS, THEODORE F.**  
The Powys brothers, by R.C. Churchill.  
Longmans, Green, 1962. 40 p.  
PR6031.0867Z65
- PRAGUE**  
Franz Kafka and Prague, by Pavel Eisner.  
Translated by Lowry Nelson and René Wellek.  
Arts, Inc., 1950. 100 p. PT2621.A26Z68
- PRAIRIES**  
Grasslands of the Great Plains: their  
nature and use. By J.E. Weaver and F.W.  
Albertson. With special chapters by B.W.  
Allred and Arnold Herrwagen. Johnsen Pub.  
Co., 1956. 395 p. QK938.P7W37
- PREGNANCY**  
The family book of child care, by Niles  
Newton. With the editorial collaboration of  
Paul György, Irwin M. Marcus and Thaddeus  
L. Montgomery. Harper & Row, 1957. 477 p.  
RG525.N43
- PRERAPHAELITISM**  
The pre-Raphaelite tragedy, by William  
Gaunt. Harcourt, Brace, 1942. 256 p.  
ND467.G3 1942
- PRESERVATION (NATURAL HISTORY)**  
See Insects--Collection and preservation;  
Zoological specimens--Collection and  
preservation.

- PRESERVATION OF MANUSCRIPTS**  
See Manuscripts--Conservation and  
restoration.
- PRESERVATION OF ZOOLOGICAL SPECIMENS**  
See Zoological specimens--Collection and  
preservation.
- PRESIDENTS--U.S.**  
Facts about the Presidents; a compilation  
of biographical and historical data. By  
Joseph Nathan Kane. H.W. Wilson, 1960.  
348 p.  
Shelved only in Area 230. E176.1.K3
- The lonely quest; the evolution of  
Presidential leadership. By Robert Rienow  
and Leona Train Rienow. Follett, 1966.  
307 p. JK516.R46
- Presidential greatness; the image and the  
man from George Washington to the present.  
By Thomas A. Bailey. Appleton-Century,  
1966. 368 p. E176.1.B17
- PRESIDENTS--U.S.--ELECTION**  
The people's choice; how the voter makes up  
his mind in a presidential campaign. By  
Paul F. Lazarsfeld, Bernard Berelson, and  
Hazel Gaudet. 2d ed. Columbia Univ. Press,  
1965. 178 p. JK524.L38 1965
- A statistical history of the American  
presidential elections, by Svend Petersen.  
Intro. "Our national elections" by Louis  
Filler. F. Ungar, 1963. 247 p.  
Shelved in Reference Alcove 340. JK1967.P4

Fig. 11. A Page from the January 1967 Subject Supplement.

E176.D563

Dictionary of American biography. C.  
Scribner, 1957. 12 v.  
Published under the auspices of The  
American Council of Learned Societies.  
vol. 12 is Index.

Shelved only in Area 230.

U.S.--BIOGRAPHY--DICTIONARIES

American Council of Learned Societies  
Devoted to Humanistic Studies

Title

v.1 c.1 C, v.10 c.1 C, v.11 c.1 C, v.2 c.1  
C, v.3 c.1 C, v.4 c.1 C, v.5 c.1 C, v.6  
c.1 C, v.7 c.1 C, v.8 c.1 C, v.9 c.1 C,  
v.12 c.1 C

E176.1.B17

Bailey, Thomas A.  
Presidential greatness; the image and the  
man from George Washington to the present.  
By Thomas A. Bailey. Appleton-Century,  
1966. 368 p.

PRESIDENTS--U.S.

Title

E176.1.B77

c.2

E176.1.K3

Kane, Joseph Nathan.  
Facts about the Presidents; a compilation  
of biographical and historical data. By  
Joseph Nathan Kane. H.W. Wilson, 1960.  
348 p.

Shelved only in Area 230.

PRESIDENTS--U.S.

Title

c.1 C

E176.Z.M4

Means, Marianna.  
The woman in the White House; the lives,  
times and influence of twelve notable first  
ladies. By Marianna Means. Random House,  
1963. 299 p.

PRESIDENTS--U.S.--WIVES

Title

E178.A24

Adams, James Truslow  
Album of American history. James Truslow  
Adams, editor in chief. C. Scribner,  
1944-60. 6 v.

Vol. 5 edited by J.G.E. Hopkins.

Vol. 6 is index.

Shelved in Reference Alcove 340.

U.S.--HISTORY

U.S.--SOCIAL LIFE AND CUSTOMS

Title

v.1 c.1 K, v.2 c.1 K, v.3 c.1 K, v.4 c.1 K,  
v.5 c.1 K, v.6 c.1 K

E178.B988 1947 Folio

Butterfield, Roger

The American past; a history of the United  
States from Concord to Hiroshima,  
1775-1945. By Roger Butterfield. Simon and  
Schuster, 1947. 476 p., illus.

U.S.--HISTORY

U.S.--HISTORY--PICTORIAL WORKS

Title

Fig. 12. A Page from the January 1967 Shelf List.

imprinted on the spine. Fifty sets of the catalog were ready when the building opened in November, 1966. The shelf list, printed in four copies, contained 3,261 pages. Each set required seven binders.

In view of the fact that activation of the Library continued through the first year of opening, the collection grew at a much greater rate than is anticipated for subsequent years. Hence when the building opened, there was available besides the annual catalog a first supplement, in ten copies, listing the 4,000 titles cataloged from July through September, 1966.

Although it was proposed originally to prepare monthly supplements, factors of cost and staff time led to acceptance of quarterly supplements. The second supplement, issued in January, 1967, included the 8,000 titles cataloged from July through December, 1966. A third supplement, issued in April, 1967, included the 12,000 titles cataloged from July, 1966, through March, 1967. The April supplement had 1,934 pages in its author & title section, 1,206 pages in the subject section, and 1,752 pages in the shelf list.

The major drawback to an off-line, batch-process book catalog is that it is an obsolete document when produced. This was especially true during the first year when the library grew at the rate of 100 volumes per working day. As a partial remedy to this situation a brief, dated catalog card accompanies each book cataloged for the Meyer Library. Information included consists of call number, author, and title. This card is placed in an alphabetical file at the reference desk and purged when a new supplement is issued.

The Meyer Library staff considered the ten copies of the supplement inadequate for use in the building; during the second year twenty copies of each supplement are to be prepared by running the print program twice. Supplements in the second and succeeding years will, of course, be considerably shorter than those issued in the first year.

#### THE SECOND ANNUAL CATALOG

Preparation of the second annual catalog began in the spring of 1967. This catalog lists the 41,000 titles cataloged as of the end of June, 1967. The first procedure was to emend the 1966 tape by purging the entries to be changed or deleted; corrected entries come in with new data.

In July the information for titles cataloged from April through June was transferred to magnetic tape and merged with the data in the April, 1967, supplement. All programs were run through the Author-Title and Subject Update Program and at that point merged with the emended catalog from the preceding year, the Split Program was run, and the pages for a new catalog were created.

As in the preceding year, library staff scanned the completed pages and masked noticeable errors. The Photo Reproduction Service printed



75 copies of each page during the first half of August, and the Stanford University Press bound the catalog during the following month. Completed sets of the catalog were delivered on September 20, 1967, a week before classes were to begin for the new academic year.

The 1967 catalog is 4,612 pages in length—2,683 pages in the author & title catalog, divided into five volumes of 530 pages each, and 1,929 pages in the subject catalog, divided into four volumes of 480 pages each. As in 1966, there is a title page and an explanatory introduction in each volume. Floor plans of the library are on the end sheets; and imprinted in gold on the spine are the letters included in each volume, there being clean alphabetical breaks between volumes. The second annual shelf list is 5,634 pages long, and each of the four copies requires eleven binders.

Some confusion resulted in 1966, when both author & title and subject catalogs were bound in the same color. In 1967 the author & title catalog was bound in tan bookcloth and the subject catalog in light green.

### MACHINE TIMING

As the above figures demonstrate, the 1967 edition of the book catalog is no brief document. Similarly, time required to process the information on the computer was not brief. As stated earlier, the addition of the expanded print chain considerably reduced the speed of the line printer. Instead of printing in excess of 600 lines per minute, the printer speed was reduced to 250 lines per minute. This speed was determined by timings made of the print programs. To print each page in the annual author & title and subject catalogs, eighteen seconds were required. To print each page in the supplements or in the shelf list, ten seconds were required. Thus, for example, to print the 4,612 pages in the 1967 annual catalog, twenty-three hours were required on the computer printer.

In processing the supplements and annual catalogs, it has now become necessary to talk of time required for processing in terms of hours and not seconds or minutes. During the preparation of the 1967 annual catalog timings were made of the various internal programs, whose output was magnetic tape and which were not tied to the mechanical limitations of the line printer. Sample times are shown in Table 4.

*Table 4. Program Running Times*

Format and Update Program (LB020)	6.5 hours
Shelf List Split Program (LB030)	11.2 hours
Author-Title and Subject Update Program (LB050)	3.7 hours
Author-Title and Subject Split Program (LB060)	28.5 hours

Throughout the year time is required on the computer for the preparation of edit lists. Timing was conducted for this particular program as well. For each 100 records entered, four minutes of machine time are required to prepare an edit list.

The computer employed for the project is a university facility, and the Library was billed for its use at the rate of \$32.00 per hour. The Library receives a monthly statement for various charges from the Administrative Data Processing Center, and these have served as one basic record to employ in calculating the actual costs of the book catalog.

## COSTS

The determination of actual costs is a difficult undertaking, and a meaningful comparison with costs estimated during the planning process is filled with problems, uncertainties, questions of definition, etc. In a sense, it is impossible to make a meaningful comparison. An element measured during planning is not the same as the element actually achieved. For example, during the early planning stages, before systems design actually began, there was no clear plan for the shelf list nor idea of what its role would actually be. The shelf list as finally designed and implemented is a far more sophisticated document than was then visualized. Second, there was no clear thought given to the inputting of separate records for each added volume or copy of a given item in order to achieve an inventory control document as well as a classed listing of items in the library. Third, there was no clear determination as to the length of the sort field required and its effect on processing. Fourth, a principal study conducted to justify the book catalog compared its projected costs with the costs of three dictionary card catalogs in the new library. Although the book catalog was implemented, the three card catalogs were not, and we have no idea as to the accuracy of our calculations of their cost, even though our experience with the preparation of card catalogs is greater. Fifth, cost studies were based upon the preparation of a 40,000-title catalog as the first product. This was an unrealistic assumption to make, because the library was to open with only 25,000 titles in its collection.

Given such reservations and conditions, an effort has been made to summarize estimated costs and so attempt an understanding of how they compare to actual costs. Even the determination of actual costs is difficult. It must be borne in mind that the complete operation was performed "in house." Cost statements thus omit considerations of such necessary factors as overhead and considerable administrative supervision. For example, during the second year the Library was not charged for program maintenance, a significant contribution from the Administrative Data Processing Center.

Initial planning was based upon preparation of a 40,000-title (60,000-volume) catalog, and it is possible to present cost approximations in two sections, the first recording costs required to prepare 50 copies of the 25,000-title catalog issued in 1966; and, second, the additional costs required to input the next 16,000 titles, issue three supplements, and pre-

pare 75 copies of the 41,000-title (60,000-volume) catalog issued in 1967. They are shown in Table 5.

Table 5. Cost Approximations

	July 65-Aug. 66	Sept. 66-Aug. 67
Input (@ \$.40 per title)	\$10,000	\$ 6,400
Programming	5,945	-----
Computer charges		
Edit lists	3,000	1,660
Test catalogs	4,000	-----
Supplements	-----	4,460
Annual catalog	2,500	4,950
Reproduction	4,570	5,270
Binding		
1966 (350 vols.); 1967 (675 vols.)	805	1,690
Binders for shelf list and supplements	84	300
Totals	\$30,904	\$24,730

If we eliminate the costs directly related to the production of the 25,000-title catalog, we may be able to isolate the cost of the 41,000-title catalog issued in 1967. This calculation is subject to a certain amount of error, because some processing done in preparation of the 1966 catalog was used again in 1967. This may be compensated for, however, by the time required for the utility programs to emend and delete items from the 1966 tape. Test catalogs and their cost were not considered in early planning, and so their \$4,000 cost is eliminated as well.

In Table 6 below the actual costs for the 41,000-title catalog so derived are compared with the estimates prepared in the fall of 1964 and the estimates offered in April, 1965, at the conclusion of the preliminary systems design. Various adjustments have been made so that these figures are as comparable as possible. For example, the systems estimate did not include a cost for inputting, and this has been added. The actual figures have been adjusted to include costs only for the printing and binding of fifty sets of the catalog instead of the seventy-five which actually were prepared. Although the December, 1964, estimate included under computer charges a factor for supplements, these are not included in the systems estimate or actual charges. The format of the supplement particularly became so sophisticated in design and implementation, both in format and number of copies, that this discrepancy is minimal. These figures necessarily cannot be precise, but they give some magnitude of the work undertaken.

Although the cost figures indicate that the actual cost was more than fifty per cent greater than actually estimated in 1964, it does remain close to the estimate prepared in the systems design. The chief reasons for the discrepancy may be summarized as the underestimation of the amount

of machine time needed for the various programs, the underestimation of the programming job involved, underestimating the charges for edit lists; and, most important, the design of a system that was very much more sophisticated than that originally foreseen in 1964.

*Table 6. Comparison of Estimated and Actual Costs*

	Dec. 64 Estimate	April 65 Estimate	Actual Costs
Input of 40,000 titles	\$11,060	\$16,647	\$16,400
Computer charges	1,750	8,595	9,610
Reproduction (50 copies)	4,324	4,500	5,115
Binding	3,750	2,385	1,600
Programming	3,000	6,000	5,945
Totals	\$23,884	\$38,127	\$38,670

Even though costs were greater than expected, one estimate did hold up, namely the time required to complete the job. Delivery and installation of equipment, programming, program testing, inputting of data, reproduction, and binding—all were on schedule with only minor slippage that did not affect the completion date of the overall job.

#### THE FUTURE

The publication of the second annual book catalog coincided with the completion of the library's activation project. Continued work on the addition of materials to the new library has been assigned to existing divisions within the University Library. Inputting of cataloging information for the Meyer Library and preparation of supplements to the book catalog and of new annual catalogs are now functions of the Catalog Division. Growth of the library will henceforth proceed at a slower rate, with from 5,000 to 8,000 titles being added each year.

The first by-product of the system has appeared—a listing of serial publications in the library for use in ordering and claiming operations.

Even as the first annual catalog was being prepared, the feeling was expressed that the equipment employed (the IBM 1401 Computer) was not adequate in an economic sense to undertake this mission for increasingly larger masses of material. This feeling became clearer with the preparation of the second edition. Looking to the future, we see at present several paths we may follow.

First, studies are under way on the conversion of the book catalog operation to larger equipment, in this case an IBM System/360, probably linking it to the overall library program of automation. Not only might this change entail use of more powerful equipment for the off-line processing necessary to prepare a book catalog, but there may be possibilities as well of instituting on-line inquiry. There could thus be eliminated the problem of supplements and time-lags.

Second, preliminary inquiries have also been made on the use of the existing tapes in computerized typesetting equipment. The hoped-for result would be the achievement of graphic arts quality on the book catalog page and less bulk to the completed catalog through the greater legibility and greater density thus realized.

## CONCLUSION

Such success as this project has achieved may be attributed to a number of factors:

The entire operation was performed "in house;" we were able to draw upon the skills of many staff members on the Stanford campus—in the Library, the Administrative Data Processing Center, the Photo Reproduction Service, the News and Publications Office, and the Stanford University Press.

IBM representatives, and particularly the systems engineer assigned to the project, gave considerable impetus and guidance to the undertaking. Equipment was delivered on schedule and functioned well.

There was a particularly harmonious and understanding working relationship achieved among the many participants in the project, and administrative support from Library and University officials was constant.

There never was any problem in gaining access to the computer, and the staff responsible for its operation gave devoted service in the preparation of the catalog.

Through a happy combination of circumstances, sufficient lead time was available for the project to be completed on schedule.

When it became obvious that we should exceed the cost estimates originally prepared, Library funds were available to continue the work.

It is clear from student reactions that the book catalog is a useful tool in the new library, and it is hoped that the experience here recounted will prove valuable to the profession at large.

## REFERENCES

1. McCune, Lois C.; Salmon, Stephen R.: "Bibliography of Library Automation," *ALA Bulletin*, 61 (June 1967), 674-94.
2. Weber, David C.: "Book Catalog Trends in 1966," *Library Trends*, 16 (July 1967), 149-64.
3. Freitag, Wolfgang M.: "Planning for Student Interaction with the Library," *California Librarian*, 26 (April 1965), 89-96.
4. Hayes, Robert M.; Shoffner, Ralph M.: *The Economics of Book Catalog Production, a Study Prepared for Stanford University Libraries and the Council on Library Resources* (Sherman Oaks, Calif.: Advanced Information Systems Division, 1964).
5. Hayes, Robert M.; Shoffner, Ralph M.; Weber, David C.: "The Economics of Book Catalog Production," *Library Resources and Technical Services*, 10 (Winter 1966), 63-65, 90.

6. Parker, Ralph H.: "Book Catalogs," *Library Resources and Technical Services*, 8 (Fall 1964), 348.
7. Simonton, Wesley: "The Computerized Catalog: Possible, Feasible, Desirable?" *Library Resources and Technical Services*, 8 (Fall 1964), 403-405.
8. Avram, Henriette D.; Guiles, Kay D.; Meade, Guthrie T.: "Fields of Information on Library of Congress Catalog Cards: Analysis of a Random Sample, 1950-1964," *The Library Quarterly*, 37 (April 1967), 190-91.
9. "Rule 134," *Anglo-American Cataloging Rules. North American Text* (Chicago: American Library Association, 1967), pp. 196-97.
10. "Rule 3:6," *Rules for Descriptive Cataloging in the Library of Congress* (Washington, D. C.: U. S. Government Printing Office, 1949), p. 14.
11. Hines, Theodore C.; Harris, Jessica L.: *Computer Filing of Index, Bibliographic, and Catalog Entries* (Newark: Bro-Dart Foundation, 1966), p. 18.